The revision date for this manual is August 15, 1994.

Part Number: 900-041

WARNING

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against such interference when operating in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with this guide, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause interference in which case the user, at his or her own expense, will be required to take whatever measures may be required to correct the interference.

Warning: Changes or modifications to this device not explicitly approved by Lantronix will void the user's authority to operate this device.

Cet appareil doit se soumettre avec la section 15 des statuts et règlements de FCC. Le fonctionnement est subjecté aux conditions suivantes:

(1)   Cet appareil ne doit pas causer une interférence malfaisante.
(2)   Cet appareil doît accepter n'importé quelle interférence reìue qui peut causer une
         opération indésirable.

LSB4 Reference Manual

For Lantronix LSB4 Ethernet Switch

Contents

1 Introduction

About This Manual

This manual lists all commands that can be used in conjunction with the LSB4. These commands can be used to configure the switch to specific needs, such as limiting access to the switch or setting a particular data transfer rate. All parameters to be used with a command are listed, as well as the correct syntax for the command. For instructions on the various methods used to execute commands, see Chapter 3 of the LSB4 Installation Guide, *Set-Up and Operation*.

This manual covers the following topics:

◆ Manual conventions

◆ System commands: Set/Define System, Show/
                             Monitor/List System, Set
                             Privileged

◆ Protocol commands: Set/Define Protocol, Show/List
                             Protocol

◆ Port commands: Set/Define Port, Show/Monitor/
                             List Port

◆ SNMP commands: Set/Define SNMP, Show/List
                             SNMP

◆ Filter commands: Set/Define Filter, Show/List
                             Filter, Clear/Purge Filter

◆ Switch commands: Set/Define Switch, Show/
                             Monitor/List Switch

◆ Miscellaneous commands: Cls, Finger, Help, Initialize, Lock,
                             Logout, Netstat, Ping, Show
                             Users, Unlock, Zero Counters

*Where **Show/ Monitor/List Switch** and **Set/ Define Switch** commands are used, "Bridge" can be used in place of "Switch." For example, **List Bridge** has the same functionality as **List Switch**.*

Manual Conventions

All command names are displayed in all capital letters. Manual conventions for command parameters are discussed in the following paragraphs.

Required Parameters

♦ Required parameters are parameters that must be used with a particular command.

♦ Required parameters appear in all capital letters and within braces ({}).

♦ When there is a choice of two or more required parameters to be used with a command, all available options will be displayed within braces. For example, if either **Enabled** or **Disabled** must be used with a command, the parameters will be displayed as follows:

$$\left\{ \begin{array}{l} \text{ENABLED} \\ \text{DISABLED} \end{array} \right\}$$

Optional Parameters

*Parameters may be abbreviated when entering a command, however, an abbreviation must be unique to the desired command. For example, **Show** could not be abbreviated to S, as that S could also denote **Set**.*

♦ Optional parameters are parameters that may be omitted or included in a command.

♦ Optional parameters appear in all capital letters and within brackets ([]).

♦ When there is a choice of two or more optional parameters that may be used with a command, all available options will be displayed within brackets. For example, if either **Characteristics** or **Counters** may be used with a command, the parameters will be displayed as follows:

$$\left[\begin{array}{l} \text{CHARACTERISTICS} \\ \text{COUNTERS} \end{array} \right]$$

User Defined Parameters

♦ These parameters are displayed in *italics*. The name of the parameter represents the type of information to enter, for example, *ipaddress*.

Restrictions

♦ Any restrictions on the use of a command or its parameters will be covered in this section.

2 System Commands

Introduction

System commands are used to configure and display the LSB4's **non-switch** functions, such as incoming logins, password protection, and the host from which software will be downloaded.

Some of the system commands require the user to have privileged status. To learn how to obtain privileged status, see page 2-5.

Set/Define and Show/Monitor/List Commands

Set/Define and Show/Monitor/List commands appear frequently in this manual. It is important to note the difference between these commands. **Set** makes an immediate change, but is not permanent. (Changes made with the Set command can be made permanent using the Save command.) Conversely, **Define** makes a permanent change, but it doesn't take effect until the LSB4 is rebooted.

Define Port will take effect as soon as the port is logged out.

The Show and List commands function in a similar manner to the Set/Define commands. **Show** displays the current settings (including those Set but not saved as permanent changes). **Monitor** displays the same current information as Show but is updated every three seconds. The **List** command displays permanent settings.

Set/Define System

Set System and Define System accept the following parameters:

♦	Incoming:	Specifies login restrictions
♦	Name:	Assigns a name to the LSB4
♦	Login Password:	Changes the password required to login to the LSB4
♦	Privileged Password:	Changes the password required for particular commands
♦	Prompt:	Sets a custom prompt string
♦	Software:	Specifies the name of a file to be downloaded to the LSB4

Show/Monitor/List System

Show System, Monitor System, and List System commands display LSB4 status and configuration.

Set Privileged

This command enables privileged status, permitting a user to enter an additional set of commands.

Set/Define System

$$\left\{ \begin{matrix} \text{SET} \\ \text{DEFINE} \end{matrix} \right\} \text{SYSTEM} \left\{ \begin{matrix} \text{INCOMING} \left\{ \begin{matrix} \text{TELNET} \\ \text{NONE} \\ \text{PASSWORD} \\ \text{NOPASSWORD} \end{matrix} \right\} \\ \text{LOGIN[PASSWORD][}CurrentPswd\text{]} \\ \text{NAME } systemname \\ \text{PRIVILEGED[PASSWORD]}CurrPrivPswd \\ \text{PROMPT } promptstring \\ \text{REFRESH } seconds \\ \text{SOFTWARE } filename \end{matrix} \right\}$$
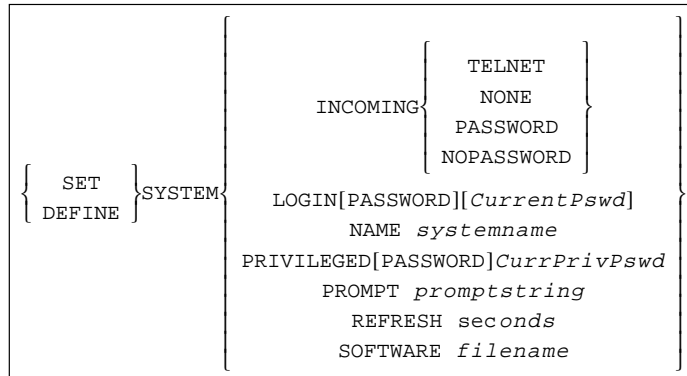
Parameters   **Incoming**

Incoming has no effect on the serial console port.

Telnet
Enables incoming Telnet connections.

None
Disables incoming Telnet connections.

Password
Establishes a password requirement for logging into the LSB4.

Nopassword
Removes the password requirement for logging into the LSB4.

Login Password
Establishes or changes the password required to log into the LSB4.

The default CurrentPswd is access.

CurrentPswd
Any combination of six digits or letters.

Name
Changes the LSB4's name. This name is used to connect to the LSB4 from remote hosts.

If the specified Name contains lower-case letters, it must be enclosed in quotation marks (" ") and may not include any spaces.

systemname
Any combination of up to sixteen characters. When the LSB4 is shipped, the system name is in the form LSB4_xxxxxx. The six x's represent the last six hexadecimal digits of the ethernet address.

Privileged Password
Establishes or changes the password required to use privileged commands.

Set/Define System (cont.)

Parameters   *CurrentPrivPswd*
Any combination of six digits or letters.

Prompt
Selects a custom command prompt.
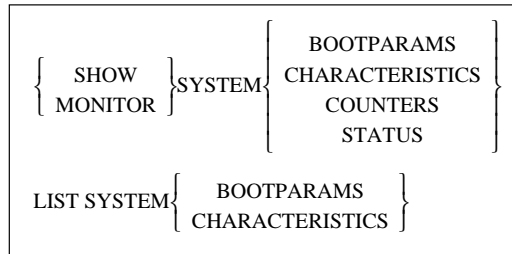
promptstring
Any combination of up to sixteen printable ASCII characters.
The following special character combinations may be used in
the promptstring: %p, %n, %s, %D, %C, %P, and %%.

The default prompt is Local>.

%**p**	includes the name of the port currently logged into.
%**n**	includes the number of the port currently logged into.
%**s**	includes the current name of the LSB4.
%**D**	includes the LSB4 description characters.
%**C**	includes the letters **Lantronix**.
%**P**	includes a "greater-than" symbol (>) whenever a Set Privilege command has been entered.
%%	includes a percent (%) symbol.

If lower-case letters are used, the promptstring must be enclosed in quotation marks.

Refresh
Specifies how often information displayed by a Monitor com-
mand is updated.

seconds
A value from 2 to 60.

The default value of **seconds** *is 3.*

Software
Specifies the name and path to the file to be downloaded to
the LSB4 at boot time.

filename
Any combination of up to forty-six characters. The file name
may contain up to fifteen characters and the path may be up
to thirty-one characters.

If lower-case letters are used, the filename must be enclosed in quotation marks.

Restrictions   This command requires privileged status.

Examples
```
Local> SET SYSTEM INCOMING TELNET
Local> SET SYSTEM NAME "Lab_Switch"
Local> DEFINE SYSTEM SOFTWARE "/tftpboot/LSB.SYS"
Local> SET SYSTEM PASSWORD
Password> hobbes (not echoed)
Verification> hobbes (not echoed)
```

See Also   Set Privileged, page 2-5.

Show/Monitor/List System

```
┌        ┐        ┌                   ┐
│ SHOW   │        │ BOOTPARAMS        │
│        │ SYSTEM │ CHARACTERISTICS   │
│ MONITOR│        │ COUNTERS          │
└        ┘        │ STATUS            │
                  └                   ┘

           ┌                 ┐
LIST SYSTEM│ BOOTPARAMS      │
           │ CHARACTERISTICS │
           └                 ┘
```

Parameters   **Bootparams**
Displays reloading information including the file name and
path as specified by the Set/Define System Software com-
mand, and the load host name specified by the Set/Define
Protocol commands.

Characteristics
Displays network settings, system flags, and any login restric-
tions.

Counters
Displays a current count of traffic being directed to the LSB4.
The counters represent traffic to the switch (telnet sessions
traffic to the switch, ping traffic to the switch, etc.), not traffic
that is being forwarded.

The counters are reset every time the LSB4 is turned on, re-
booted, re-initialized, or a Zero Counters System command is
entered.

Status
Displays available memory and login events.

Set Privileged

```
      ┌                        ┐
SET  │  PRIVILEGED[OVERRIDE]  │
      │     NOPRIVILEGED       │
      └                        ┘
```

Parameters   **Privileged**
When entered, the user is prompted to enter the current priv-
ileged password as specified by a Set or Define System Privi-
leged command.

When the privileged password is accepted, supervisor status
is given. This status will remain in effect until the user logs out
of the LSB4, a Set Privileged Override command is entered, or
a Set Noprivileged command is entered.

Override
Permits user to obtain supervisor status when another user is
currently logged into the LSB4 with supervisor status. When
this command is entered, supervisor status is given and the
other user's supervisor status is immediately disabled.

Noprivileged
Immediately disables supervisor status.

3 Protocol Commands

Introduction

Protocol commands are used to specify, configure and display the LSB4's protocol settings. Protocol settings are for setting values for incoming logins and for downloading software.

Set/Define Protocol

Set Protocol and Define Protocol accept the following parameters [Table 3-1]:

*For an explanation of the **Set** and **Define** commands, see page 2-1.*

Protocol	Parameter	Function
AppleTalk	Zone	Identifies an AppleTalk zone for the LSB4
IP	IPaddress	Specifies an IP address for the LSB4
	Loadhost	Specifies a host from which to download software to the LSB4
	Subnet Mask	Assigns a subnet mask
Netware	Loadhost	Specifies a host from which to download software to the LSB4

Table 3-1: Set/Define Protocol Parameters

Show/List Protocol

Show Protocol and List Protocol display the status of the LSB4's protocol settings.

*For an explanation of the **Show** and **List** commands, see page 2-1.*

Set/Define Protocol
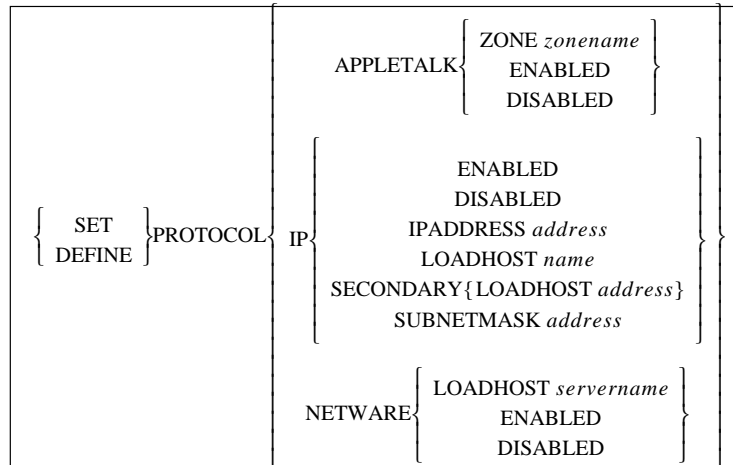
When the LSB4 is booted up, the AppleTalk, IP, and Netware protocols (discussed below) are enabled. To improve performance, disable any protocols that are not being used.

A protocol cannot be "set" to enabled or disabled; it must be defined using the **Define** *command.*

A **Set/Define** *Protocol IP Nameserver command must be given before a text name can be specified.*

Parameters   **AppleTalk Zone**
Specifies an AppleTalk zone in which the LSB4 will reside.

zonename
Any combination of characters, or an IP address. If the specified name contains lower case letters, it must be enclosed in quotation marks.

An IP address must be in the following form:

    nnn.nnn.nnn.nnn

where *nnn* is a decimal number between 0 and 255.

IP IPaddress
Specifies the LSB4's IP address.

address
An IP address in the following form:

    nnn.nnn.nnn.nnn

where *nnn* is a decimal number between 0 and 255.

Set/Define Protocol (cont.)

Parameters   **IP Loadhost**
Specifies the name of a TFTP host to be used to download soft-
ware to the LSB4.

name
Any combination of characters, or an IP address. If the speci-
fied name contains lower case letters, it must be enclosed in
quotation marks.

An IP address must be in the following form:

   nnn.nnn.nnn.nnn

where *nnn* is a decimal number between 0 and 255.

Secondary Loadhost
Specifies the IP address of a backup loadhost. This loadhost
will be used if the primary host cannot be reached.

address
An IP address in the following form:

   nnn.nnn.nnn.nnn

where *nnn* is a decimal number between 0 and 255. The peri-
ods must be included.

IP Subnet Mask
Specifies the IP address of a subnet mask. A subnet mask is
automatically assigned when Set/Define Protocol IP IPAd-
dress is used to specify an IP address. This parameter is used
to override the assigned subnet mask.

address
An IP address in the following form:

   nnn.nnn.nnn.nnn

where *nnn* is a decimal number between 0 and 255.

Netware Loadhost
Specifies the name of a Netware file server to be used to
download software to the LSB4.

servername
Any combination of characters. If the specified name contains
lower case letters, it must be enclosed in quotation marks.

Set/Define Protocol (cont.)

Restrictions   This command requires privileged status.

Examples
```
Local> SET PROTOCOL IP LOADHOST "elmer.cid.ins.com"
Local> SET PROTOCOL APPLETALK ZONE "Lab_Zone"
Local> SET PROTOCOL NETWARE LOADHOST "Acct_Fserv"
```

See Also   Set Privileged, page 2-5.

Show/List Protocol

```
┌      ┐         ┌ APPLETALK ┐
│ SHOW │PROTOCOL │    IP     │
│ LIST │         │  NETWARE  │
└      ┘         └           ┘
```

Parameters   **AppleTalk/IP/Netware**
                     Displays the current AppleTalk, IP, or Netware configuration.

4 Port Commands

Introduction

Port commands are used to specify, configure and display the different port settings for the LSB4's serial console port.

Set/Define Port

Set Port and Define Port accept the following parameters:

♦ Character, Flow, Modem Parity, Speed, and Type:
Configure the settings that ensure the LSB4 functions properly when connected to a modem or terminal

♦ Command Completion:
Instructs the LSB4 to complete a keyword when keywords are being entered and the space bar is pressed

*For an explanation of the **Set** and **Define** commands, see page 2-1.*

Show/Monitor/List Port

Show Port, Monitor Port, and List Port display the current and permanent settings of the LSB4's serial console port.

*For an explanation of the **Show**, **Monitor**, and **List** commands, see page 2-1.*

Set/Define Port

$$
\left\{ \begin{array}{c} \text{SET} \\ \text{DEFINE} \end{array} \right\} \text{PORT} \left\{ \begin{array}{l}
\text{CHARACTER[SIZE]} \left\{ \begin{array}{c} 7 \\ 8 \end{array} \right\} \\[2ex]
\text{COMMAND[COMPLETION]} \left\{ \begin{array}{c} \text{ENABLED} \\ \text{DISABLED} \end{array} \right\} \\[2ex]
\text{FLOW[CONTROL]} \left\{ \begin{array}{c} \text{CTS} \\ \text{DSR} \\ \text{XON} \\ \text{NONE} \end{array} \right\} \\[3ex]
\text{MODEM[CONTROL]} \left\{ \begin{array}{c} \text{ENABLED} \\ \text{DISABLED} \end{array} \right\} \\[2ex]
\text{PARITY} \left\{ \begin{array}{c} \text{ODD} \\ \text{EVEN} \\ \text{SPACE} \\ \text{MARK} \\ \text{NONE} \end{array} \right\} \\[4ex]
\text{SPEED} \left\{ \begin{array}{c} 300 \\ 600 \\ 1200 \\ 2400 \\ 4800 \\ 9600 \\ 19200 \\ 38400 \\ 57600 \\ 115200 \end{array} \right\} \\[7ex]
\text{TYPE} \left\{ \begin{array}{c} \text{ANSI} \\ \text{SOFTCOPY} \\ \text{HARDCOPY} \end{array} \right\}
\end{array} \right\}
$$

Define Port functions differently than other Define commands. When **Define Port** is entered from a terminal connected to the serial console port, the specified configurations will take effect and will be placed into permanent memory when the user logs out of the switch. If remotely logged into the LSB4, the configurations will take effect when the user logs out of the port.

The LSB4 does not have to be rebooted or initialized to store port configurations in current memory.

Set/Define Port (cont.)

Parameters

Character Size
Sets the character size for the current port.

*The default Character Size is **eight**.*

Command Completion
When enabled, completes a keyword when a keyword is being entered and the space bar is pressed.

Flow Control
Specifies the type of flow control for transfer to and from a port. Flow Control choices consist of XON/XOFF software handshaking protocol, CTS/DSR hardware handshaking protocol, or no (None) protocol.

*The default Flow Control setting is **XON**.*

Modem Control
Enables or disables manipulation of modem control signals. When this parameter is enabled, the LSB4 will operate as if there is a modem connected to the serial console port. Specifically, the DTR signal will drop when the modem connected to the serial console port logs out. The LSB4 will assume a log out when the DSR signal (provided to the serial console port) drops.

When disabled, the LSB4 will ignore the status of DTR and DSR signals.

Parity
Specifies a parity setting of Odd, Even, Space, Mark, or None.

*The default Parity setting is **None**.*

Speed
Specifies one of the following baud rates: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200.

*The default baud rate is **9600**.*

Type
Use this parameter to specify the desired output from the serial console port.

If **ANSI** is selected, the output will contain cursor movement key characters and editing command characters.

*The default Type is **ANSI**.*

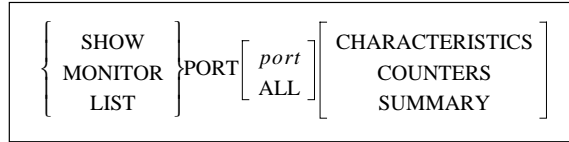**Softcopy** limits the transmission of special characters to the backspace/delete key only. Softcopy is used on devices that do not support the ANSI characters.

Hardcopy removes all special characters except carriage returns and line feeds. Hardcopy can be used when the serial console port is connected to a printer.

Examples

```
Local> SET PORT SPEED 38400
Local> SET PORT FLOW XON
Local> SET PORT COMMAND ENABLED
```

Show/Monitor/List Port

$$\left\{ \begin{array}{c} \text{SHOW} \\ \text{MONITOR} \\ \text{LIST} \end{array} \right\} \text{PORT} \left[\begin{array}{c} port \\ \text{ALL} \end{array} \right] \left[\begin{array}{c} \text{CHARACTERISTICS} \\ \text{COUNTERS} \\ \text{SUMMARY} \end{array} \right]$$

The information displayed will depend on the *port* or **All** parameters. If neither parameter is present, information will be displayed for the port through which the LSB4 received the Show/Monitor/List Port command.

Parameters   *port*
Specifies either the serial console port or one of the devices currently logged into the LSB4. Port numbers are assigned sequentially as each device logs into the LSB4. To determine a particular port number, enter the Show Users command or the Show Port All command.

What is displayed depends on any additional parameters specified. For example, if Counters is specified, the port counters will be displayed. If a port number is specified without another parameter, the Characteristics for the specified port will be displayed.

All
Displays the serial console port and any other current network connections. The information displayed will be in accordance with the additional parameter selected.

If All is included without another parameter, the Summary information is displayed.

Example   `Local> SHOW PORT COUNTERS`

5 SNMP Commands

Introduction

Simple Network Management Protocol (SNMP) is a network protocol used to interrogate the status of and specify parameters to different nodes on the local area network.

SNMP commands (described below) are used to specify and configure limits to the usage of SNMP.

Set/Define SNMP

These commands specify which users can configure and obtain information from the LSB4 using SNMP.

*For an explanation of the **Set** and **Define** commands, see page 2-1.*

Show/List SNMP

Show SNMP and List SNMP display the current status and settings of SNMP restrictions.

*For an explanation of the **Show** and **List** commands, see page 2-1.*

Set/Define SNMP

$$\left\{ \begin{array}{c} \text{SET} \\ \text{DEFINE} \end{array} \right\} \text{SNMP COMMUNITY } \textit{name} \text{ ACCESS} \left\{ \begin{array}{c} \text{NONE} \\ \text{READONLY} \\ \text{READWRITE} \end{array} \right\}$$

Set SNMP and Define SNMP commands are used to limit the abilities of particular **communities** to make SNMP requests.

*By default, SNMP traffic containing the community name **public** will be permitted Readonly access.*

Parameters

Community
An identification provided in SNMP packets that specifies a particular community. The LSB4 will respond to SNMP packets that contain the community name specified by this parameter.

Set/Define SNMP Community *name* will affect only the SNMP packet traffic containing the specified community name.

name
Any string of characters.

Access
Gives a specified type of access to a specified community name.

None denies access to SNMP packets containing the specified community name.

Readonly permits SNMP packets containing the specified community name to query the LSB4 for information.

Readwrite permits full access; SNMP packets containing the specified community name may query for information and specify commands that can alter the configuration of the LSB4.

Restrictions   This command requires privileged status.

Example   `Local> SET SNMP COMMUNITY lab ACCESS READWRITE`

See Also   Set Privileged, page 2-5.

Show/List SNMP

$$\left\{ \begin{array}{l} \text{SHOW} \\ \text{LIST} \end{array} \right\} \text{SNMP}$$

Show SNMP and List SNMP display the SNMP community names and access types.

6 Filter Commands

Introduction

Filters are used to permit or deny passage of data packets through the LSB4. The **Set Filter** and **Define Filter** commands are used to specify filters. Also included in this chapter are the associated commands **Show/List Filter** and **Clear/Purge Filter**.

*For an explanation of the **Set/Define** and **Show/List** commands, see page 2-1.*

Filter commands define filters for different types of data packets, different protocols, and different patterns of data within packets. The filter is then configured to either permit or deny passage through the LSB4.

When a filter is identified with a filter command, it is placed on a list stored in the LSB4. In order to activate the filters, a filter list must be associated with a particular LSB4 port. Filter lists are associated with the different LSB4 ports using the **Set/Define Switch** command.

One filter list may be associated with one or all ports.

The LSB4 compares each data packet against each filter starting with the first filter on the list (up to 16 entries may be included in a filter list.) It continues comparing until the data packet matches a filter on the list. The packet will then be either permitted or denied passage through the switch. If no match is found, the packet is forwarded through the switch.

If a filter list contains more than six or seven items, slow performance may result.

The order that filter commands are entered into the list is very important; switching the positions of two filters can have very different effects. For example, if a filter list is ordered in the following manner:

♦ Allow all IP email traffic

♦ Deny all IP traffic

only IP email traffic will be forwarded. If the order of the filter list is reversed, as displayed below:

♦ Deny all IP traffic

♦ Allow all IP email traffic

any IP packet traffic (including IP email packets) will **not** be forwarded, as the processing of IP traffic stops at the first match on the filter list.

Configuring a Filter List

To configure a filter list, the filter list must be associated with one of the LSB4's LAN ports.

The LSB4 can only have as many filter lists as it does LAN ports; as it has four ports, it can support a maximum of four filter lists. A single filter list can be associated with one or all ports. To link a port with a filter list, use the **Set Switch Filter** command, as in the following example [Figure 6-1].

*If **None** is specified instead of a filter number, no filter list will be consulted. This will ensure the fastest packet forwarding.*

```
Local_1> SET PRIVILEGED
Password> SYSTEM (not echoed)
Local_1> SET SWITCH ETHERNET 2 FILTER 1
```

Figure 6-1: Set Switch Filter Command

The above example indicates that port two will be associated with filter list number one. Note that this example uses a **Set Privileged** command before the Set Switch Filter command. The Set Switch Filter command requires privileged status; if privileged status is currently enabled, the Set Privileged command will not be necessary.

After a filter list is associated with a port, the filter's configuration must be specified using **Set/Define Filter** commands. These commands specify the following information: the filter list number, where the new filter will be placed in the filter list, the packet type to be filtered, and whether to forward or discard the specified type of packet. A complete explanation of the Set/Define Filter options is given beginning on page 6-4.

The example below displays a sample filter list configuration [Figure 6-2].

```
Local> SET PRIVILEGED
Password> SYSTEM (not echoed)
Local>> SET FILTER 2 APPEND MULTICAST DENY
Local>> SET FILTER 2 APPEND PROTOCOL IP UDP SMTP ALLOW
Local>> SET FILTER 2 APPEND PROTOCOL APPLETALK PAP ALLOW
Local>> SET FILTER 2 APPEND PROTOCOL IP DENY
```

Figure 6-2: Filter List Configuration Example

Creating a "Firewall"

A firewall is one use of a filter list. Firewalls are often used to prevent all but one type of traffic (for example, traffic from a specific node) from reaching a particular network segment. When traffic destined for a specific segment reaches the LSB4, it will be compared to a filter list; if it is any but a specified type of traffic, it hits a "firewall" and goes no further--the packet is discarded.

The commands listed below [Figure 6-3] create a firewall between LAN 1 and any other network segment. Filter 1 is configured to deny access to IP packets; this filter is assigned to port 1, preventing IP packets from traveling from port 1 to other segments.

```
Local_1> SET PRIVILEGED
Local_1> SYSTEM (not echoed)
Local_1>> SET FILTER 1 APPEND PROTOCOL IP DENY
Local_1>> SET SWITCH ETHERNET 1 FILTER 1
```

Figure 6-3: Preventing IP Traffic Out of Port 1

Figure 6-3 included a **Set Privileged** command before the Set Filter command. The Set Filter command requires privileged status; if privileged status is currently enabled, the Set Privileged command will not be necessary.

The commands in Figure 6-4 prevent any IP traffic between LSB4 ports; for example, IP packets from LAN 1 cannot reach LAN 2, and IP packets from LAN 2 cannot reach LAN 4.

```
Local> SET PRIVILEGED
Password> SYSTEM (not echoed)
Local_1>> SET FILTER 1 APPEND PROTOCOL IP DENY
Local_1>> SET SWITCH FILTER 1
```

Figure 6-4: Preventing IP Traffic Between All Segments

The **Set Switch** command used above did not specify a particular ethernet port to be used with filter 1, as a result, all LSB4 ports will deny IP traffic.

Figure 6-5 gives an example of a firewall that enables two nodes to send packets to each other through the LSB4; traffic from any other node will not be permitted passage between the two nodes.

```
Local_1> SET PRIVILEGED
Local_1>> SYSTEM (not echoed)
Local_1>> SET FILTER 1 APPEND SOURCE 0:80:a3:01:02:03
Local_1>> SET FILTER 1 APPEND SOURCE 0:80:a3:03:02:01
Local_1>> SET FILTER 1 APPEND ALL DENY
```

Figure 6-5: Isolating Two Nodes With a Firewall

Set/Define Filter

$$\left\{\begin{array}{l} \text{SET} \\ \text{DEFINE} \end{array}\right\} \text{FILTER } \textit{filtr} \left\{\begin{array}{l} \text{APPEND} \\ \text{INSERT } \textit{position} \end{array}\right\} \left\{\begin{array}{l} \text{ALL} \\ \text{BROADCAST} \\ \text{MULTICAST} \\ \text{SOURCE } \textit{address} \\ \text{DESTINATION } \textit{address} \\ \text{SOURCE } \textit{address}[\text{DESTINATION } \textit{address}] \\ \text{PATTERN } \textit{pattern offset} \\ \text{PROTOCOL } \textit{identifier} \end{array}\right\} \left\{\begin{array}{l} \text{ALLOW} \\ \text{DENY} \end{array}\right\}$$
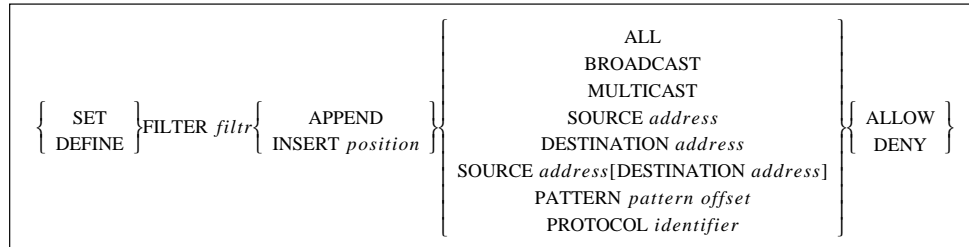
Parameters   **Filter**
Specifies a particular filter list.

filtr
A value between 1 and 4.

Filter list numbers are associated with a particular port number using the Set/Define Switch command.

Append/Insert *position*
Identifies a location in the specified filter list for a particular filter definition. To view a currently active filter list, enter a Show or List Filter command. (For more information on these commands, see Show/List Filter on page 6-11.)

Append will place the new filter definition at the end of the list.

Insert *position* defines a location of the new filter definition. The filter will be placed in the list just prior to the value you specify for the position; for example, if you enter a value of 3, the new filter will be inserted into the list just before the filter currently occupying position 3. If you enter a value larger than the current number of filters on the list, the new filter will be added at the end of the list.

All
Specifies that every data packet will be allowed or denied passage through the LSB4. Using the All parameter and specifying Allow or Deny will affect all data packets regardless of any filter specifications that follow.

Usually, the All keyword is placed at the end of a filter list to prevent passage of all data packets not specifically identified by the previous filters in the list.

Broadcast
Permits or denies passage of broadcast messages through the LSB4.

Set/Define Filter (cont.)

Parameters   **Multicast**
Permits or denies passage of data packets containing multi-cast messages. If the Spanning Tree Algorithm and Multicasts are disabled, BPDU packets will not be forwarded.

Refer to Appendix B of the LSB4 Installation Guide for more information on BPDUs.

Source
Permits or denies passage of data packets that have originated from a specific node on the local area network.

address
Defines the Ethernet address of a particular node. The address may be specified in one of two ways; with the specific Ethernet address, or with patterns. If a pattern is entered instead of a complete address, packets with source addresses matching the pattern will be filtered. For example, the following pattern:

   0-80-a3-*-*-*

will filter all packets that have 0-80-a3 as the first three bytes of their source address. The final three bytes, represented by asterisks, may vary.

Destination *address*
Permits or denies passage of data packets destined for a specific node on the local area network.

As with Source, the address may be specified in one of two ways; with the specific Ethernet address, or with patterns. If a pattern is entered instead of a complete address, packets with source addresses matching the pattern will be filtered. For example, the following pattern:

   0-80-a3-*-*-*

will filter all packets that have 0-80-a3 as the first three bytes of their source address. The final three bytes, represented by asterisks, may vary.

Set/Define Filter (cont.)

Source *address* **Destination** *address*
Permits or denies passage of data packets that have originated from and are destined for a specific node on the local area network.

Entering this command once filters traffic between two nodes in one direction only--from the source to the destination. To filter traffic in both directions (between the two specified addresses), enter the command as follows [Figure 6-6]:

```
SET FILTER 1 SOURCE A DESTINATION B DENY
SET FILTER 1 SOURCE B DESTINATION A DENY
```

Figure 6-6: Set Filter Deny Command

The above command will specify the **Deny** filter to prevent traffic between nodes A and B, where A and B represent specific ethernet addresses.

address
Defines the Ethernet address of a specific node. The address may be specified in one of two ways; with the specific Ethernet address, or with patterns. If a pattern is entered instead of a complete address, packets with source addresses matching the pattern will be filtered. For example, the following pattern:

0-80-a3-*-*-*

will filter all packets that have 0-80-a3 as the first three bytes of their source address. The final three bytes, represented by asterisks, may vary.

Remember that the first data position is zero.

Pattern *pattern offset*
Permits or denies passage of data packets that contain a particular pattern of data within the packet. This is accomplished by identifying two bytes of data that you want to look for within the packet, and a number that specifies the position from the beginning of the data packet.

Set/Define Filter (cont.)

Parameters   *pattern*
Two bytes (four hexadecimal characters, or 16 bits) long and
defines the characters contained in each data packet. The
four hexadecimal characters must be preceded by 0x. Wild-
cards (*) may be used in this field. An example of a wild
card is shown below [Figure 6-7]:

```
SET FILTER 1 APPEND PATTERN 0X12*4 0X23
```

Figure 6-7: Wild Card

offset
Up to three hexadecimal characters long and defines where
in the data packet the LSB4 is to look for the specified pat-
tern. The hexadecimal characters must be preceded by *0x*.

offset may be a hexadecimal value from 000 to 5ff. 000 indi-
cates the first data position in the data packet. For example,
if you specify the hexadecimal value 10, the LSB4 will look
for the first character of the pattern at the seventeenth data
position in the data packet.

Protocol *identifier*
Identifies or selects one of the protocols present in the local
area network. A protocol can be identified by entering hexa-
decimal characters, or by selecting a protocol mnemonic
(for example, IP.)

Protocols may have mnemonics for subgroups and these
subgroups may have further subgroups. For clarity, proto-
cols one, two, or three are identified. In the syntax on page
6-9, the protocol mnemonics in the leftmost column are lev-
el one.

If a level one protocol is specified and has level two and
three protocols, the filter will act upon the level one proto-
col and all of the level two and three protocols as shown in
the syntax below. If a level 2 protocol is included, the filter
will act upon the combination of the specified level one pro-
tocol, the specified level two protocol and any of the level
two protocol's level three protocols. When a level three pro-
tocol is included, the filter will act upon only that combina-
tion of level one, two, and three protocols.

*Sport and Dport
are exceptions and
are not protocol
mnemonics; they
can be used (page
6-10) to specify a
protocol port.*

Set/Define Filter (cont.)

Parameters   **Protocol *identifier* (cont.)**

For example, if the following command is entered [Figure 6-8]:

```
LOCAL> SET FILTER 1 APPEND PROTOCOL IP TCP ALLOW
```

Figure 6-8: Allowing TCP Packets

TCP/IP protocol data packets, including the TCP's level three protocol data packets, will be permitted passage through the LSB4.

If the command below is then entered [Figure 6-9]:

```
Local> SET FILTER 1 APPEND PROTOCOL IP DENY
```

Figure 6-9: Preventing IP Packets

all IP data packets containing all of its level two and three protocols will be denied passage through the LSB4, with the exception of the TCP/IP data packets allowed by the preceding command.

It is important to note that if the order of the two command examples above were reversed, the results would be different. No IP data packets would be passed by the switch regardless of the subsequent filter command.

If the information on **Protocol *identifier*** is not completely clear, please review the syntax representation on page 6-9. The syntax shows the many combinations of protocols, sub-protocols, and sub-sub-protocols.

Set/Define Filter (cont.)

```
             ┌                                    ┐
             │  protocol – ident                  │
             │        ┌ PAP ┐                      │
             │    ATP │ AFP │                      │
             │ APPLETALK  NBP                      │
             │        ZIP                          │
             │        RTMP                         │
             │  ARP                                │
             │  AARP                               │
             │  DECNET                             │
             │  IGRP                               │
             │     ┌      ┌ SMTP        ┐      ┐   │
             │     │      │ FTP         │      │   │
             │     │  TCP │ RUNIX       │      │   │
             │  IP │      │ SPORT portIdent│   │   │
             │     │      │ DPORT portIdent│   │   │
             │     │  ICMP                  │   │   │
             │     │  OSPF                  │   │   │
 PROTOCOL    │  RIP                         │   │
             │     ┌ NFS               ┐         │
             │     │ SNMP              │         │
             │  UDP│ RPC               │         │
             │     │ SPORT portIdent   │         │
             │     │ DPORT portIdent   │         │
             │       ┌ RIP ┐                     │
             │   IPX │ SAP │                     │
             │       │ SPX │                     │
             │  MOPRC                            │
             │  MOPDL                            │
             │  SNA                              │
             │  SNMP                             │
             │  SNMPT                            │
             │  VINES                            │
             │  LAVC                             │
             │  XNS                              │
             └                                    ┘
```
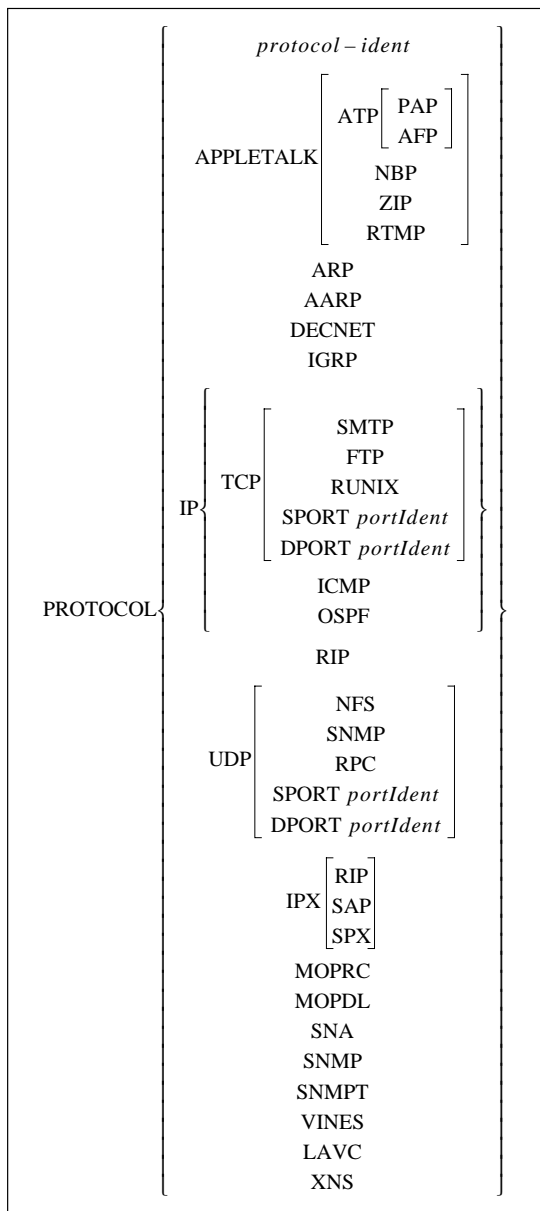
Set/Define Filter (cont.)

Parameters

Two bytes equals four hexadecimal characters.

protocol_ident
Substitutes a protocol identifier for a protocol mnemonic. protocol_ident is two bytes long; the four hexadecimal characters must be preceded by 0x. This protocol identification can be substituted for one the following protocol mnemonics: AppleTalk, ARP, AARP, DECNET, IP, IPX, MOPRC, MOP-DL, SNA, SNMP, SNMPT, VINES, LAVC, or XNS.

An asterisk (*) may be substituted for up to three of the four hexadecimal characters as a wild card character. When an asterisk is present, the LSB4 will accept any value in that position.

Sport *portIdent* / **Dport** *portIdent*
Filters data packets based on both a protocol and the source or destination protocol port of the data packet.

Sport is used to define the source protocol port of a data packet; **Dport** defines the destination protocol port.

portident is one byte (four hexadecimal characters) long. The hexadecimal characters must be preceded by *0x.*

Allow/Deny
Permits or denies passage of data packets that meet the specified filter criteria.

Examples
```
Local> SET FILTER 0 APPEND PROTOCOL MOPRC DENY
Local> SET FILTER 1 INSERT 3 PROTOCOL IP TCP FTP
ALLOW
Local> SET FILTER 1 APPEND PROTOCOL 0x08** DENY
Local> SET FILTER 1 APPEND PROTOCOL IP TCP RUNIX
DENY
Local> SET FILTER 1 INSERT 1 DESTINATION hammer AL-
LOW
Local> SET FILTER 0 INSERT 1 MULTICAST ALLOW
Local> SET FILTER 0 APPEND PATTERN 0x45e1 0x34 DENY
Local> SET FILTER 1 INSERT 5 PATTERN 0x4**4 0x17
DENY
Local> SET FILTER 1 APPEND ALL DENY
```

Restrictions   This command requires privileged status.

See Also   Set Privileged, page 2-5.

Show/List Filter

$$\left\{ \begin{array}{c} \text{SHOW} \\ \text{LIST} \end{array} \right\} \text{FILTER} \left[\begin{array}{c} \textit{filtr} \\ \text{ALL} \end{array} \right]$$

Parameters   **Filter**
Displays the specified filter list.

filtr
A value between 1 and 4.

All
Displays all filter lists. If the *filtr* and All parameters are omit-
ted, all filters will be shown or listed.

Clear/Purge Filter

```
┌       ┐       ┌                  ┐
│ CLEAR │       │ ITEM itemnumber  │
│ PURGE │ FILTER filtr │   ALL     │
└       ┘       └                  ┘
```

Parameters   **Clear/Purge**

Clear removes one or all filters from the filter list entered using the Set Filter command.

Purge removes one or all filters from the filter list in the LSB4's permanent memory.

Filter
Identifies a filter list to be cleared or purged.

filtr
A value between 1 and 4.

Item *itemnumber*
Specifies a particular item on a filter list to be cleared or purged. For example [Figure 6-10]:

```
Local_1> CLEAR FILTER 2 ITEM 3
```

Figure 6-10: Clear Filter Item Command

An "item" may consist of one item, a list of items, range of items, or a combination. Some examples are given below [Figure 6-11]:

```
Local_1> CLEAR/PURGE FILTER 1 ITEM 1                      (one item)
Local_1> CLEAR/PURGE FILTER 1 ITEM 1,3,4                (list of items)
Local_1> CLEAR/PURGE FILTER 1 ITEM 1-3                 (range of items)
Local_1> CLEAR/PURGE FILTER 1 ITEM 1-3, 4, 5-6, 7    (a combination)
```
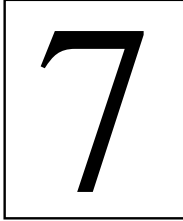
Figure 6-11: Item Parameter Examples

All
Removes the entire specified filter list. If both All and Item *itemnumber* are omitted, filters will not be cleared or purged.

Restrictions   This command requires privileged status.

See Also   Set Privileged, page 2-5.

7

Switch Commands

Introduction

Switch commands are used to configure and display the LSB4's switch functions, including Spanning Tree configurations, updates to the address table, and port priority values.

Set/Define Switch

Set Switch and Define Switch accept the following parameters:

♦	Forward Delay:	Specifies a delay time between state changes
♦	Hello Time:	Specifies how often BPDU packets are transmitted
♦	Maximum Age:	Sets a maximum time by which a BPDU packet must be received in order for the current root to remain the root
♦	Priority:	Specifies a priority value for one or all LSB4 ports
♦	Spanning Tree:	Enables or disables the Spanning Tree Algorithm
♦	Speed:	Defines the speed of the LSB4
♦	Weed:	Controls the interval the LSB4 will wait to hear from a node before it removes its hardware address from the address table
♦	Ethernet:	Specifies which LSB4 port will be configured by Set/Define Switch commands
♦	Path Cost:	Assigns a path cost value
♦	State:	Enables or disables the LSB4 or a particular port
♦	Filter:	Associates a filter list with an LSB4 port

*For an explanation of the **Set** and **Define** commands, see page 2-1.*

The Spanning Tree Algorithm requires certain timing values to operate correctly. If an attempt is made to set a Spanning Tree parameter to an unacceptable timing value, an error message will be displayed. The individual options below discuss specific timing issues; the ranges of acceptable values are subject to the values of other options.

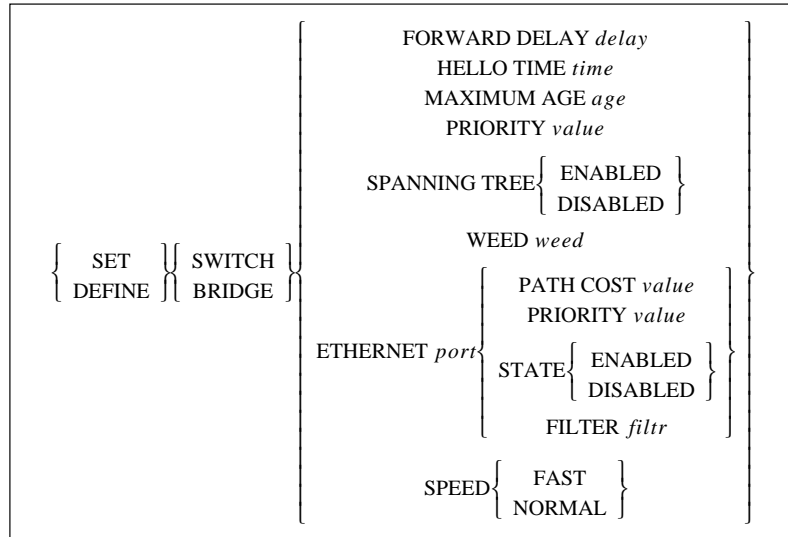*For information about the Spanning Tree Algorithm, see Appendix B of the LSB4 Installation Guide.*

Show/Monitor/List Switch

These commands display LSB4 configuration, current status, and settings.

*For an explanation of the **Show/Monitor/List** commands, see page 2-1.*

Set/Define Switch

*Where **Show/Monitor/List Switch** and **Set/Define Switch** commands are used, "Bridge" can be used in place of "Switch." For example, **Set Bridge** has the same functionality as **Set Switch**.*

$$\left\{ \begin{array}{c} \text{SET} \\ \text{DEFINE} \end{array} \right\} \left\{ \begin{array}{c} \text{SWITCH} \\ \text{BRIDGE} \end{array} \right\} \left\{ \begin{array}{l} \text{FORWARD DELAY } delay \\ \text{HELLO TIME } time \\ \text{MAXIMUM AGE } age \\ \text{PRIORITY } value \\ \text{SPANNING TREE} \left\{ \begin{array}{l} \text{ENABLED} \\ \text{DISABLED} \end{array} \right\} \\ \text{WEED } weed \\ \text{ETHERNET } port \left\{ \begin{array}{l} \text{PATH COST } value \\ \text{PRIORITY } value \\ \text{STATE} \left\{ \begin{array}{l} \text{ENABLED} \\ \text{DISABLED} \end{array} \right\} \\ \text{FILTER } filtr \end{array} \right\} \\ \text{SPEED} \left\{ \begin{array}{l} \text{FAST} \\ \text{NORMAL} \end{array} \right\} \end{array} \right\}$$

Parameters

Forward Delay
Sets the transition delay between the LSB4's listening and learning states. Forward Delay must be large enough so that (2 x (ForwardDelay - 1)) is larger than the Maximum Age setting.

*The default value of **delay** is 15.*

delay
A value between 4 and 30.

Hello Time
Sets the interval between Spanning Tree BPDUs (Bridge Protocol Data Unit).

*The default value of **time** is 2.*

time
A value between 1 and 10. It must be low enough such that (2 x (HelloTime + 1)) is less than Maximum Age.

Maximum Age
Assigns a maximum time by which a BPDU packet must be received in order for the current root to remain the root. When the LSB4 has not heard from the root (received a BPDU packet) by this time, it will assume that the root is down and will attempt to find a new root.

*The default value of **age** is 20.*

age
A value between 6 and 40. It must be less than (2 x (ForwardDelay - 1)), and larger than (2 x (HelloTime + 1)).

Set/Define Switch (cont.)

Parameters

Priority

Specifies the relative priority of the switch. When the Spanning Tree Algorithm is enabled, the switch with the lowest priority value is chosen as the root.

value

A number between 0 and 32768. The higher the value assigned to the LSB4, the less likely it is that the LSB4 will become the root.

The default value is 32768.

Spanning Tree

Enables or disables the Spanning Tree Algorithm.

Spanning Tree is enabled by default.

Weed

Sets the maximum time interval before an address is removed from the address table. If an address is not heard from within *weed* seconds, the address table is updated and the address is removed.

weed is a value between 10 and 10000.

The default value of weed is 300.

Ethernet

Specifies which LSB4 port will be configured by Set/Define Switch commands.

port

A value between 1 and 4 designating which port is to be configured.

If Ethernet port is omitted, Set/Define Switch commands will affect all ports.

Path Cost

Specifies the cost to send a packet from the LSB4 to the root through a particular port. The Spanning Tree algorithm uses current path cost values to determine which links in the network to disable. If necessary, the port with the higher path cost value will be disabled first.

value

A value between 0 and 65535.

The default value is 2000.

Priority

Specifies the priority of a particular port. The priority of a port is one factor the Spanning Tree Algorithm uses to determine the designated port for the LAN.

value

A number between 0 and 255. The higher value is, the less likely it is that the specified port will become the root port.

The default value is zero.

Set/Define Switch (cont.)

*State is **enabled** by default.*

State
Enables or disables the LSB4 (all LAN ports) or a particular LAN port. When a port State is disabled, The LSB4 will not permit the passage of data packets, but will still respond to commands.

Filter
Associates a filter list with one or all of the LSB4's LAN ports.

filtr
A value between 1 and 4 corresponding to a particular filter list specified by Set/Define Filter commands.

If the Ethernet *port* parameter is omitted, the specified filter list will be associated with all LAN ports.

Speed
Defines the speed of the LSB4.

Fast
Sets the LSB4 to **fast** mode; in this mode, the LSB4 can obtain its peak performance. When Speed is set to Fast, user-defined filters, traffic counters, and some bridge MIB SNMP counters will be unavailable.
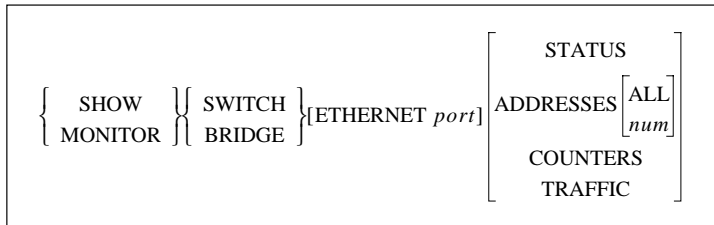
*The default value of Speed is **Normal**.*

Normal
Sets the LSB4 speed to normal performance. All counters and filters (including user-defined filters) will be operational.

Restrictions   This command requires privileged status.

See Also   Set Privileged, page 2-5.

Show/Monitor/List Switch

```
┌ SHOW    ┐┌ SWITCH ┐                    ┌ STATUS              ┐
│         ││        │[ETHERNET port]     │           ┌ ALL ┐  │
│ MONITOR ││ BRIDGE │                    │ ADDRESSES │ num │  │
└         ┘└        ┘                    │           └     ┘  │
                                         │ COUNTERS            │
                                         └ TRAFFIC             ┘
```

```
        ┌ SWITCH ┐
LIST    │        │[STATUS]
        └ BRIDGE ┘
```

Parameters   **Ethernet** *port*
Specifies which LSB4 port information will be displayed by
the Show/Monitor/List Switch commands.

port
A value between 1 and 4 designating which port is to be dis-
played.

Status
Displays current settings as specified by Set or Define Switch
commands.

If the LSB4 is not the root, then the Weed, Maximum Age, For-
ward Delay, and Hello Time values will be determined by the
switch that is the root on the network. In this case, Show/
Monitor/List Switch Status commands will list the root's val-
ues, with the LSB4's values displayed in parentheses.

If all Show/Monitor Switch [Ethernet port] parameters
(Status, Address, Counters, and Traffic) are omitted, Status in-
formation will be displayed.

Addresses
Displays the ethernet addresses heard on each LAN port. The
addresses most recently heard from will be displayed.

num
Specifies a number of minutes. Show Switch Address *num*
will display all addresses heard from within *num*.

All
Displays all known addresses.

Counters
Displays a current count of packets being forwarded and dis-
carded by the LSB4. The counters are reset every time the
LSB4 is turned on, rebooted, re-initialized, or a Zero Counters
Switch command is entered.

*If this parameter is
omitted, informa-
tion about all LSB4
ports will be dis-
played.*

*If the num and All
parameters are
omitted, the last 10
addresses heard
from will be dis-
played.*

Show/Monitor/List Switch (cont.)

Displayed below are the results of the Show/Monitor Switch Ethernet *port* command entered on an LSB4 [Figure 7-1]:

```
Switch Counters                     LSB4 Version V1.0/1(940119)
Topology Changes: 11                Time Since Enabled: 1:15:07
   Packets Received    1143399      Packets Transmitted:   231662
   Missed packets      23           Delayed Transmissions: 14
   Octets Received:    290628732    Octets Transmitted:    69685850
   Packets Filtered:   923719       Packets Forwarded:     223545
   Packets Flooded:    1698         Packets To Us:         0
   Broadcasts Received: 14738       BPDUs Received:        1709
   Multicasts Received: 25361       Packets Not Forwarded: 0

Received Queue Overrun: 0           CRC Errors:            9
Transmit Queue Overrun: 0           Carrier Sense Errors:  14
Misaligned Packets Rx:  0           Failed SQE Test:       0
Single Collisions:      0           Multiple Collisions:   334
Late Collisions:        4           Excessive Collisions:  14
Deferred Transmissions: 192         Excessive Deferrals:   0
Receive Queue Size:     1/908       Transmit Queue Size:   0/910
```

Figure 7-1: Show/Monitor Switch Ethernet *port* Output

The counters are as follows:

♦ BPDUs Received	Displays the total number of Switch Spanning Tree Protocol packets received from other switches.
♦ Broadcasts Received	Displays the total number of broadcast ethernet packets received by the LSB4.
♦ Carrier Sense Errors	Displays the total number of transmitted packets that encountered a loss of the carrier sense signal during transmission.
♦ CRC errors	Displays the total number of packets received with CRC errors.
♦ Delayed Transmissions	Displays the number of transmitted packets delayed due to excessive collisions and/or excessive deferrals. If a packet is delayed, the LSB4 will attempt to retransmit it until transmission is successful.

Packets received with CRC errors are not forwarded.

*See **Excessive Collisions** and **Excessive Deferrals** on page 7-7.*

Show/Monitor/List Switch (cont.)

Counters, cont:

♦ Deferred Transmissions   Displays the number of transmitted pack-
ets deferred during transmission.

♦ Excessive Collisions   Displays the number of transmitted pack-
ets that encountered at least sixteen colli-
sions during transmission.

♦ Excessive Deferrals   Displays the number of packets forced to
"defer" (wait for other nodes to halt trans-
mission) for 3.2 milliseconds.

♦ Failed SQE Test   Displays the total number of transmitted
packets with the Heartbeat signal lost.

♦ Late Collisions   Displays the number of packets that en-
countered a late collision. A late collision
occurs when another node attempts to
send a packet onto the ethernet at the same
time the LSB4 is sending a packet.

♦ Misaligned Packets Rx   Displays the total number packets received
with Frame Alignment Errors.

♦ Missed Packets   Displays the total number of packets
"dropped" by the LSB4. This occurs when   *See **Receive Queue***
the LSB4 has used all of its memory re-   ***Overrun** on*
sources for buffering incoming packets   *page 7-8.*
(RBA / RRA); this number should be small.

♦ Multicasts Received   Displays the total number of multicast eth-
ernet packets received by the LSB4.

♦ Multiple Collisions   Displays the number of packets that en-
countered between one and fifteen colli-
sions during transmission.

♦ Octets Received   Displays the total number of octets (1 byte
= 1 octet = 8 bits) received on the LANs.

♦ Octets Transmitted   Displays the total number of octets trans-
mitted by the LSB4.   *See **Octets Re-***
***ceived**, above.*

Show/Monitor/List Switch (cont.)

Counters, cont:

♦ Packets Filtered

Displays the number of packets received and "filtered" (discarded) by the LSB4. These are the packets addressed to a node on the same port on which the packet was received.

♦ Packets Flooded

Displays the total number of ethernet packets forwarded to all non-receiving ports. This occurs when the packet's destination address is unknown. If the LSB4 does not know where to forward the packet, it will forward it onto all of its LANs.

♦ Packets Forwarded

Displays the total number of packets received on one LAN and forwarded to a non-receiving LAN. This occurs when the ethernet destination address of the packet matches an entry in the address table of the non-receiving LAN.

♦ Packets Not Forwarded

Displays the total number of packets not transmitted due to transmit buffers being exhausted during transmit queue over-runs.

♦ Packets Received

Displays the total number of ethernet packets received by the LSB4.

♦ Packets To Us

Displays the total number of packets received with the ethernet destination address matching one of the LSB4's hardware addresses.

♦ Packets Transmitted

Displays the total number of packets transmitted onto the LANs by the LSB4.

♦ Receive Buffer Usage

Of the total number of Receive Buffer Areas available (physical or actual chunks of memory that have been made available to store received packets), displays the number being used.

*See **Missed Pack-ets** on page 7-7 and **Receive Resource Usage** on page 7-9.*

♦ Receive Queue Overrun

Displays the total number of times the LSB4 has had a Receive Buffers Resource exhausted. If this counter is high, consider setting the switch speed to **Fast**. See **Set Switch Speed** on page 7-4 for details.

Show/Monitor/List Switch (cont.)

Counters, cont:

♦ Receive Queue Size	Of the total number of available slots in the receive queue, displays the number of packets waiting to be processed.	
♦ Receive Resource Usage	Of the total number of receive resource areas (descriptors of chunks of memory in the LSB4 which have been made available to store received packets) available, displays the number being used.	
♦ Single Collisions	Displays the number of packets that encountered one collision during transmission.	
♦ Topology Changes	If Spanning Tree is enabled, displays the number of times that topology changes have occurred.	*See **Set/Define Switch Spanning Tree** on page 7-3 for details on Spanning Tree.*
♦ Transmit Queue Overrun	Displays the total number of packets the LSB4 attempted to transmit onto the LAN but could not. This condition usually occurs when the LSB4 has its allocated Transmit Buffers exhausted.	*See **Transmit Queue Size**, below.*
♦ Transmit Queue Size	Of the total number of transmit slots available in the queue, displays the number of packets that the LSB4 currently has queued to transmit.	

Parameters   **Traffic**
Functions in a similar manner to Counters (discussed on page 7-5), but displays only forwarded packets sorted by packet size, protocol type, and time period (last ten minutes, last hour, etc.)
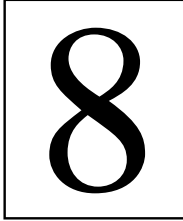
Show Switch Traffic cannot be used when the LSB4 is set to Fast.

Restrictions   Monitor Switch requires privileged status.

See Also   Set Privileged, page 2-5.
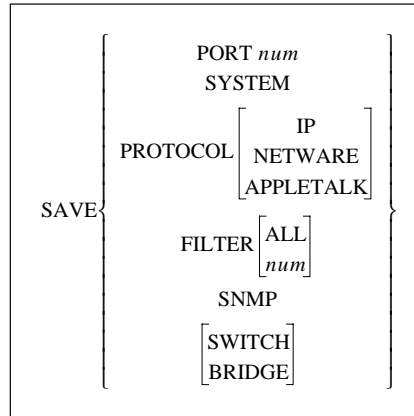
8 Save Command

Introduction

The Save command is used to store current LSB4 settings in permanent memory. When a Save command is entered, temporary configurations made with a corresponding **Set** command will be stored in NVRAM. The newly-saved configurations will overwrite settings made with the Define command and will take effect the next time that the LSB4 is turned on, rebooted, or initialized.

Configurations made with Set/Define Port and Set/Define Switch commands will not be affected by the Save System command. Save Port or Save Switch must be used to save these commands in permanent memory.

Save accepts the following parameters:

♦ Port: Saves the specified port's current settings in permanent memory

♦ System: Saves all current system configurations in permanent memory

♦ Protocol: Saves the current IP, Netware, or AppleTalk configuration in permanent memory

♦ Filter: Saves current filter configurations in permanent memory

♦ SNMP: Saves current SNMP settings in permanent memory

Save

```
        ┌─                              ─┐
        │         PORT num               │
        │         SYSTEM                 │
        │              ┌ IP        ┐     │
        │     PROTOCOL │ NETWARE   │     │
 SAVE ┤ │              └ APPLETALK ┘     │ ├
        │              ┌ ALL ┐           │
        │     FILTER   │ num │           │
        │              └     ┘           │
        │         SNMP                   │
        │     ┌ SWITCH ┐                 │
        │     │ BRIDGE │                 │
        └─    └        ┘                ─┘
```

Parameters   **Port**
                  Saves the specified port's current settings in the LSB4's per-
                  manent memory.

                  num
                  A value between 1 and 4.

                  System
                  Saves all current system configurations in the LSB4's perma-
                  nent memory.

Use caution with
Save *commands; all*   **Protocol**
configurations   Saves the current IP, Netware, or AppleTalk configuration in
made with ***Define***   the LSB4's permanent memory.
commands will be
overwritten by cur-   **Filter**
rent configurations.   Saves current filter configurations in the LSB4's permanent
                  memory.

                  All
                  Saves all current filter configurations.

                  num
                  A number between 1 and 4, specifying a particular filter list.
                  The current filter configurations on this list will be saved in
                  permanent memory.

                  SNMP
                  Saves the current SNMP settings in the LSB4's permanent
                  memory.

                  Switch/Bridge
                  Saves the current switch and filter settings.

Save (cont.)

Restrictions   This command requires privileged status.

Examples
```
Local>> SAVE FILTER 3
Local>> SAVE PROTOCOL APPLETALK
Local>> SAVE SYSTEM
Local>> SAVE FILTER ALL
```

See Also   Set Privileged, page 2-5.

9 Miscellaneous Commands

Introduction

The following commands are discussed in this chapter:

- ♦ Cls: Clears the terminal screen

- ♦ Finger: Displays information about users of the LSB4 or other hosts on the network

- ♦ Help: Accesses the switch help text

- ♦ Initialize: Initializes ("reboots") the LSB4

- ♦ Lock: Prevents other users from accessing a login session

- ♦ Logout: Logs out of the LSB4

- ♦ Netstat: Displays a list of network logins

- ♦ Ping: Tests IP access to another host

- ♦ Show Users: Displays all users currently logged into the LSB4

- ♦ Unlock: Unlocks a currently locked port

- ♦ Zero Counters: Resets counters to zero

Cls

CLS

This command will clear any information on the terminal screen and display the command prompt at the top of the screen.

Finger

FINGER[[*username*][@*hostname*]]

This command is similar to the UNIX finger command. It will display information about different users of the LSB4 or other hosts on the network.

Parameters   ***username***
Any combination of characters.

hostname
Any combination of characters, or an IP address.

If an IP address is used, it must be in the following format:

nnn.nnn.nnn.nnn

where nnn is a decimal number between 0 and 255.

Help

HELP[*commandname*]

This command displays information about a particular LSB4 command.

If the current user level does not permit the use of a particular command, Help will not be available for that command.

*If **Help** is entered without a command name, a list of commands will be displayed.*

Parameters   ***commandname***
Any combination of characters. If the character string is not a valid command name, an error message will be displayed.

Initialize

INITIALIZE
{
DELAY *minutes*
CANCEL
FACTORY
NOBOOT
RELOAD
}
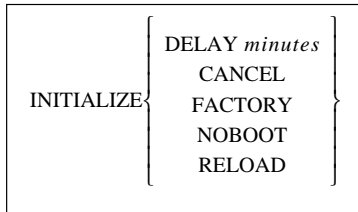
The Initialize command has the same effect as turning the LSB4 off and on. Unless Define or Save commands have been entered, all values and conditions specified by Set commands will be lost.

Parameters   **Delay** *minutes*
Specifies a wait period (in minutes) before initialization begins.

minutes
A value between zero and 120.

Cancel
Cancels a delayed initialization.

Factory
Resets all LSB4 configurations to those in effect when the unit left the factory. Use caution with this parameter; it will overwrite all configurations made using Set, Save, and Define commands.

Noboot
Forces the LSB4 to remain in the Boot Configuration Program, and prevents it from booting from its loadhost.

Reload
Updates the LSB4's Flash ROM.

For instructions on reloading Flash ROM, refer to Appendix D of the LSB4 Installation Guide.

Restrictions   This command requires privileged status.

See Also   Set Privileged, page 2-5.

Lock

LOCK

The **Lock** command is used to restrict access to an LSB4 session. Lock is often used when a user wishes to maintain an LSB4 session, but temporarily leave his or her terminal unattended.

When issued, the Lock command will prompt for a password, then prompt for the same password a second time to verify it. If the two entries do not match, the Lock command will be aborted.

After the verified password has been accepted, the **Unlock Password>** prompt will appear [Figure 9-1].

```
Local> LOCK
Password> ...... (password is not displayed)
Verification> ...... (password is not displayed)
Unlock Password>
```

Figure 9-1: Lock Command

A locked session can be unlocked by doing one of the following:

◆ Entering the same password used to lock the session at the **Unlock Password>** prompt

◆ Entering the **Unlock** command (page 9-6) through a different port

◆ Forcibly ending the session with a **Logout** command (page 9-5)

Restrictions   This command requires privileged status.

See Also   Set Privileged, page 2-5.

Logout

> LOGOUT[PORT *number*]

Logout is used to log out of an LSB4 port.

If the LSB4 has been logged into from a network using one of the network ports, the network session is terminated. If it was logged into from the console port, the console settings are reloaded from non-volatile RAM. The LSB4 will begin a new console session when the Return key is pressed.

*Entering **Logout** without the **Port number** parameters terminates the current session.*

Parameters	**Port *number*** Specifies which port connection will be closed.
Restrictions	Privileged status is required when logging out ports being used by other users.
See Also	Set Privileged, page 2-5.

Netstat

> NETSTAT

This command displays a listing of all network sessions currently connected to the LSB4. The information will be grouped by protocol.

*To display information about the LSB4's ports, use the **Show Users** or **Show Port** command.*

Ping

> PING *host*

This command sends a request for an echo packet to another IP network host.

Parameters	***host*** **host** is any combination of characters, or an IP address. Any character string entered must be resolvable to an IP address. If an IP address is used, it must be in the following format: ***nnn.nnn.nnn.nnn*** where nnn is a decimal number between 0 and 255.
Restrictions	This command requires privileged status.
See Also	Set Privileged, page 2-5.

*If the specified **host** contains lower case letters, it must be enclosed in quotation marks.*

Show Users

SHOW USERS

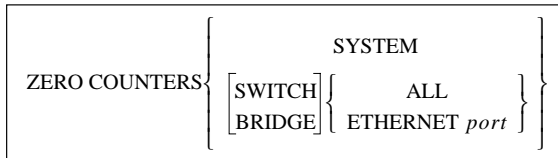This command will display information about all users currently logged into the LSB4.

Unlock

UNLOCK PORT *port*

This command unlocks a previously locked port.

Parameters   *port*
A value between 1 and 4 representing the port number to be unlocked.

Restrictions   This command requires privileged status.

See Also   Set Privileged, page 2-5.

Zero Counters

```
                          ┌                          ┐
                          │         SYSTEM           │
ZERO COUNTERS ⟨  ┌SWITCH┐ ┌       ALL      ⟩  ⟩
                          │ └BRIDGE┘ └ ETHERNET port ┘ │
                          └                          ┘
```

This command resets the LSB4's counters.

Parameters   **System**
Resets the counters related to login events on the two LAN ports and the serial console port.

All
Resets the counters on all ports.

Ethernet *port*
Resets the counters on a specified LAN port.

port
A value between 1 and 4 representing the port to be reset.

Restrictions   This command requires privileged status.

See Also   Set Privileged, page 2-5.
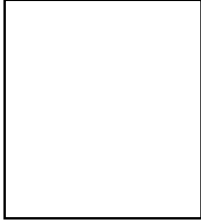
Technical Support

If you are experiencing problems with the LSB4 or have suggestions for improving the product, please contact Lantronix Technical Support at the address or phone number listed below. We are also reachable via Internet email at **support@lantronix.com**.

LANTRONIX
15353 Barranca Parkway
Irvine, California 92718   USA
714-453-3990 • FAX 714-450-7226 • Toll Free 800-422-7044

If you are submitting a problem, please provide the following information:

♦ Your name, company name, address, and phone number

♦ Product name

♦ Unit serial number

♦ Software version (available by issuing the **Show Server** command)

♦ Network configuration including the output from a Netstat command

♦ Description of the problem

♦ Provide a Debug report (stack dump) if applicable

♦ Product status when the problem occurred. Please try to include information on user and network activity at the time.

♦ If the problem is with a particular port, please have the results of a Show Port Counters and Show Port Characteristics for that port.
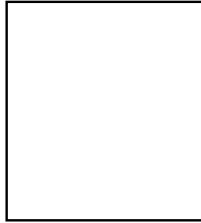
Glossary

Address Table

A table maintained by the LSB containing the addresses of all devices currently on the network. When the LSB4 receives a packet from a node on a network segment, it stores the node's address and the segment on which the node is located in the address table. This enables the LSB4 to know which of its ports to forward traffic to.

If no packets are received by the LSB4 from an address within a certain time period (**weed time**; see page iii), the address is deleted from the table. Up to 4096 node addresses may be stored in the LSB4 table.

BPDU

Bridge Protocol Data Unit. A type of packet that is sent out by a root (see **Root** on page iii) to notify switches on the network of its existence. Used to monitor that the root is up and running; in addition, it enables the switch receiving the packet to monitor the path to the root.

Bridge

A device that moves ("switches") packets from one network segment to another.

The LSB4 moves packets according to the scheme described in the IEEE 802.1d bridging specification.

Broadcast

A packet sent out to all other nodes on a network. For example, a special broadcast packet called an Address Resolution Packet (ARP) is often used. All broadcasts have the same destination address.

Collision

Only one node can transmit packets on the ethernet at a time; a collision occurs when two nodes send packets simultaneously. When a collision is detected, both nodes will wait for a random period of time. When that time is elapsed, the nodes will attempt to send their packets again.

Filter   A filter controls the passage of particular packets from one network seg-
                              ment to another. Users can specify a number of filters (called a filter list)
                              to be used with a particular port; for example, a port can be configured
                              to prevent all broadcast packets but allow all IP traffic. For details, refer
                              to Chapter 6.

Filtering Rate   The maximum number of packets that a switch can receive and discard
                              at the same time. The maximum possible forwarding rate of any switch
                              is the speed of the ethernet (14880 packets per second) multiplied by the
                              number of ports.

Firewall   A method used to block all but a particular type of traffic from reaching
                              a network segment. Often used to limit traffic to packets originating
                              from specific nodes. To construct a firewall, see page 6-3.

Flood   When the LSB4 receives a packet destined for a specific address that is
                              not in its address table, it forwards the packet to all of its ports. This is
                              called flooding. All multicast packets (see page ii) are automatically
                              flooded.

Forwarding Rate   A measurement of the maximum rate at which a switch can forward
                              packets from one network segment to another. Using ethernet, the max-
                              imum possible forwarding rate is 14880 packets per second.

Learning State   When the Spanning Tree Algorithm is enabled, the LSB4 can be in a
                              number of different states. During the Learning state, the LSB4 collects
                              hardware address information for its internal address table.

Listening State   When the Spanning Tree Algorithm is enabled, the LSB4 can be in a
                              number of different states. During the Listening state, an LSB4 ethernet
                              port will listen for BPDU packets from other switches.

MIB   Management Information Base; a list of entries that may be queried or
                              modified. The LSB4 supports the Bridge MIB, which contains lists of
                              bridge-specific information. The information contained in MIBs can be
                              retrieved or modified using SNMP commands; for more information, re-
                              fer to Appendix C of the LSB4 Installation Guide.

Multicast   A packet to be sent to more than one network address. There are many
                              different types of multicast packets; for example, IP multicasts, sent only
                              to IP addresses.

Overrun   An overrun results when there is not sufficient memory on the LSB4 for
                              it to receive packets. Overruns may occur when the network is extreme-
                              ly busy; for example, when the number of packets per second traveling
                              on the network exceeds the LSB4's forwarding or filtering rate.

                              When an overrun occurs, the LSB4 will ignore packets (rather than for-
                              ward them) until sufficient memory becomes available.

RFC   Request for Comments; a document that lists a standard method of com-
                               pleting a particular task. RFCs are available over the internet at no cost;
                               for details, refer to Appendix C of the LSB4 Installation Guide.

Root   A particular switch designated by the Spanning Tree Algorithm. This
                               switch regularly sends out **BPDU** packets (see page i) to enable other
                               switches to monitor the network (in order to prevent network loops).
                               For information about Spanning Tree commands, see Chapter 7.

Spanning Tree Algorithm   A method used to ensure that there is only one possible path between
                               network segments. The Spanning Tree Algorithm is enabled by default
                               on the LSB4. To disable or modify the use of the Spanning Tree Algo-
                               rithm, refer to Chapter 7.

Switch   A device that moves ("switches") packets from one network segment to
                               another.

                               The LSB4 moves packets according to the scheme described in the IEEE
                               802.1d bridging specification.

Unicast   A packet that is destined for only one node on a network.

Weed Time   If the LSB4 doesn't hear from a hardware address for a period of time, it
                               will remove the address from its **address table** (see page i). This time in-
                               terval is the weed time -- the time that the LSB4 will wait before "weed-
                               ing out" the hardware address from the table.

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