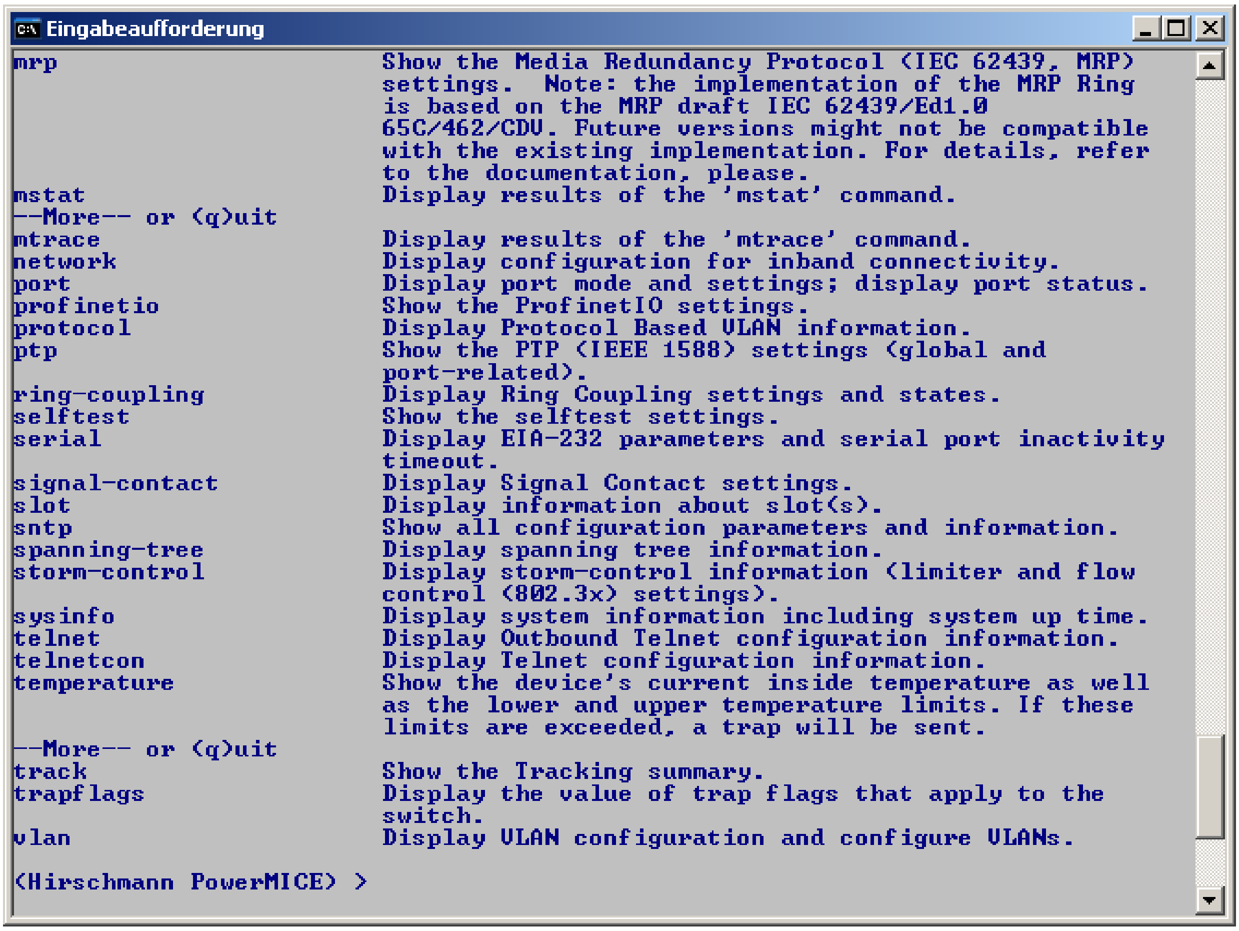
Reference Manual

Command Line Interface
Industrial ETHERNET Gigabit Switch
RS20/RS30/RS40, MS20/MS30, RSR20/RSR30, MACH100, MACH 1000, PowerMICE, MACH 4000, OCTOPUS



```
mrp                      Show the Media Redundancy Protocol (IEC 62439, MRP)
                         settings.  Note: the implementation of the MRP Ring
                         is based on the MRP draft IEC 62439/Ed1.0
                         65C/462/CDV. Future versions might not be compatible
                         with the existing implementation. For details, refer
                         to the documentation, please.
mstat                    Display results of the 'mstat' command.
--More-- or (q)uit
mtrace                   Display results of the 'mtrace' command.
network                  Display configuration for inband connectivity.
port                     Display port mode and settings; display port status.
profinetio               Show the ProfinetIO settings.
protocol                 Display Protocol Based VLAN information.
ptp                      Show the PTP (IEEE 1588) settings (global and
                         port-related).
ring-coupling            Display Ring Coupling settings and states.
selftest                 Show the selftest settings.
serial                   Display EIA-232 parameters and serial port inactivity
                         timeout.
signal-contact           Display Signal Contact settings.
slot                     Display information about slot(s).
sntp                     Show all configuration parameters and information.
spanning-tree            Display spanning tree information.
storm-control            Display storm-control information (limiter and flow
                         control (802.3x) settings).
sysinfo                  Display system information including system up time.
telnet                   Display Outbound Telnet configuration information.
telnetcon                Display Telnet configuration information.
temperature              Show the device's current inside temperature as well
                         as the lower and upper temperature limits. If these
                         limits are exceeded, a trap will be sent.
--More-- or (q)uit
track                    Show the Tracking summary.
trapflags                Display the value of trap flags that apply to the
                         switch.
vlan                     Display VLAN configuration and configure VLANs.

(Hirschmann PowerMICE) >
```

CLI L2P
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Content

1 Command Structure

The Command Line Interface (CLI) syntax, conventions and terminology are described in this section. Each CLI command is illustrated using the structure outlined below.

1.1 Format

Commands are followed by values, parameters, or both.

- **Example 1**
  `network parms <ipaddr> <netmask> [gateway]`
  - `network parms`
    is the command name.
  - `<ipaddr> <netmask>`
    are the required values for the command.
  - `[gateway]`
    is the optional value for the command.

- **Example 2**
  `snmp-server location <loc>`
  - `snmp-server location`
    is the command name.
  - `<loc>`
    is the required parameter for the command.

- **Example 3**
  `clear vlan`
  - `clear vlan`
    is the command name.

1.1.1 Command

The text in courier font is to be typed exactly as shown.

1.1.2 Parameters

Parameters are order dependent.

Parameters may be mandatory values, optional values, choices, or a combination.

- `<parameter>`. The <> angle brackets indicate that a mandatory parameter is to be entered in place of the brackets and text inside them.
- `[parameter]`. The [] square brackets indicate that an optional parameter may be entered in place of the brackets and text inside them.
- `choice1 | choice2`. The | indicates that only one of the parameters should be entered.
- The {} curly braces indicate that a parameter must be chosen from the list of choices.

1.1.3 Values

ipaddr
This parameter is a valid IP address, made up of four decimal bytes ranging from 0 to 255. The default for all IP parameters consists of zeros (that is, 0.0.0.1). The interface IP address of 0.0.0.0 is invalid. In some cases, the IP address can also be entered as a 32-bit number.

macaddr
The MAC address format is six hexadecimal numbers separated by colons, for example 00:06:29:32:81:40.

areaid
Area IDs may be entered in dotted-decimal notation (for example, 0.0.0.1). An area ID of 0.0.0.0 is reserved for the backbone. Area IDs have the same form as IP addresses, but are distinct from IP addresses. The IP network number of the sub-netted network may be used for the area ID.

slot/port Valid slot and port number separated by forward slashes. For example, 0/1 represents slot number 0 and port number 1.

logical slot/port Logical slot and port number. This is applicable in the case of a link-aggregation (LAG). The operator can use the logical slot/port to configure the link-aggregation.

1.1.4 Conventions

Network addresses are used to define a link to a remote host, workstation or network. Network addresses are shown using the following syntax:

Address Type	Format	Range
ipaddr	192.168.11.110	0.0.0.0 to 255.255.255.255 (decimal)
macaddr	A7:C9:89:DD:A9:B3	hexidecimal digit pairs

Table 1: Network Address Syntax

Double quotation marks such as "System Name with Spaces" set off user defined strings. If the operator wishes to use spaces as part of a name parameter then it must be enclosed in double quotation marks.

Empty strings (““) are not valid user defined strings.

Command completion finishes spelling the command when enough letters of a command are typed to uniquely identify the command word. The command may be executed by typing <enter> (command abbreviation) or the command word may be completed by typing the <tab> or <space bar> (command completion).

The value 'Err' designates that the requested value was not internally accessible. This should never happen and indicates that there is a case in the software that is not handled correctly.

The value of '-----' designates that the value is unknown.

1.1.5 Annotations

The CLI allows the user to type single-line annotations at the command prompt for use when writing test or configuration scripts and for better readability. The exclamation point (‘!’) character flags the beginning of a comment. The comment flag character can begin a word anywhere on the command line and all input following this character is ignored. Any command line that begins with the character ‘!’ is recognized as a comment line and ignored by the parser.

Some examples are provided below:

```
! Script file for setting the CLI prompt
set prompt example-switch
! End of the script file
```

1.1.6 Special keys

The following list of special keys may be helpful to enter command lines.

BS	delete previous character
Ctrl-A	go to beginning of line
Ctrl-E	go to end of line
Ctrl-F	go forward one character
Ctrl-B	go backward one character
Ctrl-D	delete current character
Ctrl-U, X	delete to beginning of line
Ctrl-K	delete to end of line
Ctrl-W	delete previous word
Ctrl-T	transpose previous character
Ctrl-P	go to previous line in history buffer
Ctrl-R	rewrites or pastes the line
Ctrl-N	go to next line in history buffer
Ctrl-Y	print last deleted character
Ctrl-Q	enables serial flow
Ctrl-S	disables serial flow
Ctrl-Z	return to root command prompt
Tab, <SPACE>	command-line completion
Exit	go to next lower command prompt
?	list choices

1.1.7 Special characters in scripts

Some of the configuration parameters are strings that can contain special characters. When the switch creates a script from the running configuration (by use of the command #show running-config <scriptname.cli>), these special characters are written to the script with a so-called escape character preceding them. This ensures that when applying the script, these characters are regarded as a normal part of the configuration parameter, not having the special meaning they usually have.

Character (plain)	Meaning, when entered in the CLI
!	Begin of a comment, ! and the rest of the line will be ignored
"	Begin or end of a string that may contain space characters
'	Begin or end of a string that may contain space characters
?	Shows possible command keywords or parameters
\	The backslash has no special meaning here but because it is used as the escape character, it now bears a special meaning (this part of the concept is not backward compatible).

Tab. 2: Special characters

Character (escaped)	Meaning, when entered in the CLI
\!	! is part of the string
\"	" is part of the string
\'	' is part of the string
?	? is part of the string
\	\ is part of the string

Tab. 3: Special characters escaped

The commands with strings that may contain these special characters are listed below.

Note: Not every string is allowed to contain special characters. The string that is output with the escape characters (if necessary) is shown as "...".

Command	Note
!System Description "..."	"At the beginning of the script
!System Version "..."	"At the beginning of the script

Tab. 4: Commands in Privileged Exec mode

Command	Note
snmp-server location "..."	
snmp-server contact "..."	
snmp-server community "..."	
snmp-server community ipaddr <ip> "..."	
snmp-server community ipmask <ip> "..."	
snmp-server community ro "..."	
snmp-server community rw "..."	
no snmp-server community mode "..."	
no snmp-server community "..."	
link-aggregation "..."	
spanning-tree configuration name "..."	
ptp subdomain-name "..."	

Tab. 5: Commands in Global Config mode

Command	Note
name "..."	

Tab. 6: Commands in Interface Config mode

Command	Note
vlan name <n> "..."	

Tab. 7: Commands in VLAN Database mode

When a device creates a script, a human-readable header is included that lists the special characters and the escape characters:

```
!Parameter string escape handling \, 1
!Characters to be preceded with escape char (\): \, !, ", ', ?
```

1.1.8 Secrets in scripts

A configuration may include secrets (e. g., passwords). When creating a script, these secrets are written to it in a scrambled form, not in clear text. These secrets may be up to 31 characters long. The format for a scrambled secret is: ":v1:<scrambled secret>:" (without the quotes ("), they were added for readability). v1 denotes the scrambling method (v1 in this case), the value of the scrambled secret is a 64-digit hex string.

The following commands produce scrambled secrets (if necessary):

Command	Note
ip ospf authentication encrypt <secret> <id>	Software L3P
ip ospf authentication simple <secret>	Software L3P
ip rip authentication encrypt <secret> <id>	Software L3E and L3P
ip rip authentication simple <secret>	Software L3E and L3P
ip vrrp <id> authentication simple <secret>	Software L3E and L3P
radius server key acct <ip> <password>	
radius server key auth <ip> <password>	
users passwd <username> <password>	
users snmpv3 encryption <username> des <password>	

Tab. 8: Commands in Global Config mode

Command	Note
area <ip> virtual-link <ip> authentication encrypt <secret> <id>	Encrypted Authentication
area <ip> virtual-link <ip> authentication simple <secret>	Simple Authentication

Tab. 9: Commands in Router OSPF mode (software L3P)

Applying or validating a script requires the following conditions for a scrambled secret, else it will be considered invalid (usually only relevant if a script is edited manually):

- string must not be longer than 64 hex digits
- string must only contain the digits 0-9 and the characters A-F (or a-f)
- string length must be even

2 Quick Start up

The CLI Quick Start up details procedures to quickly become acquainted with the Hirschmann software.

2.1 Quick Starting the Switch

- Read the device Installation Guide for the connectivity procedure. In-band connectivity allows access to the Hirschmann software locally or from a remote workstation. The device must be configured with IP information (IP address, subnet mask, and default gateway).
- Turn the Power ON.
- Allow the device to load the software until the login prompt appears. The device initial state is called the default mode.
- When the prompt asks for operator login, execute the following steps:
  - Type the word `admin` in the login area. Since a number of the Quick Setup commands require administrator account rights, CLI suggests logging into an administrator account.
  - Enter the state on delivery password `private`.
  - Press the enter key.
  - The CLI User EXEC prompt will be displayed.
    User EXEC prompt:
    ```
    (Hirschmann PowerMICE) >
    ```
  - Use “enable” to switch to the Privileged EXEC mode from User EXEC.
    Privileged EXEC prompt:
    ```
    (Hirschmann PowerMICE) #
    ```
  - Use “configure” to switch to the Global Config mode from Privileged EXEC.
    Global Config prompt:
    ```
    (Hirschmann PowerMICE) (Config)#
    ```
  - Use “exit” to return to the previous mode.

2.2 System Info and System Setup

This chapter informs you about:

- Quick Start up Software Version Information
- Quick Start up Physical Port Data
- Quick Start up User Account Management
- Quick Start up IP Address
- Quick Start up Uploading from Switch to Out-of-Band PC Only XMODEM)
- Quick Start up Downloading from Out-of-Band PC to Switch (Only XMODEM)
- Quick Start up Downloading from TFTP Server
- Quick Start up Factory Defaults

Quick Start up Physical Port Data

Command	Details
`show port all` (in Privileged EXEC)	Displays the Ports
	slot/port
	Type - Indicates if the port is a special type of port
	Admin Mode - Selects the Port Control Administration State
	Physical Mode - Selects the desired port speed and duplex mode
	Physical Status - Indicates the port speed and duplex mode
	Link Status - Indicates whether the link is up or down
	Link Trap - Determines whether or not to send a trap when link status changes
	LACP Mode - Displays whether LACP is enabled or disabled on this port.

Table 10: Quick Start up Physical Port Data

Quick Start up User Account Management

Command	Details
`show users` (in Privileged EXEC)	Displays all of the users that are allowed to access the switch
	Access Mode - Shows whether the user is able to change parameters on the switch(Read/Write) or is only able to view them (Read Only). As a factory default, the ‘admin’ user has Read/Write access and the ‘user’ user has Read Only access. There can only be one Read/Write user and up to five Read Only users.
`show loginsession` (in User EXEC)	Displays all of the login session information

Table 11: Quick Start up User Account Management

Command	Details
`users passwd <username>` (in Global Config)	Allows the user to set passwords or change passwords needed to login A prompt will appear after the command is entered requesting the users old password. In the absence of an old password leave the area blank. The operator must press enter to execute the command. The system then prompts the user for a new password then a prompt to confirm the new password. If the new password and the confirmed password match a message will be displayed. User password should not be more than eight characters in length.
`copy system:running-config nvram:startup-config` (in Privileged EXEC)	This will save passwords and all other changes to the device. If you do not save the configuration by doing this command, all configurations will be lost when a power cycle is performed on the switch or when the switch is reset.
`logout` (in User EXEC and Privileged EXEC)	Logs the user out of the switch

Table 11: Quick Start up User Account Management

Quick Start up IP Address

To view the network parametes the operator can access the device by the following three methods.

- Simple Network Management Protocol - SNMP
- Telnet
- Web Browser

Note: Helpful Hint: The user should do a ‘copy system:running-config nvram:startup-config’ after configuring the network parameters so that the configurations are not lost.

Command	Details
`show network` (in User EXEC)	Displays the Network Configurations
	IP Address - IP Address of the switch Default IP is 0.0.0.0
	Subnet Mask - IP Subnet Mask for the switch Default is 0.0.0.0
	Default Gateway - The default Gateway for this switch Default value is 0.0.0.0
	Burned in MAC Address - The Burned in MAC Address used for in-band connectivity
	Network Configurations Protocol (BOOTP/DHCP) - Indicates which network protocol is being used Default is DHCP
	Network Configurations Protocol HiDiscovery - Indicates the status of the HiDiscovery protocol. Default is read-write
	Management VLAN Id - Specifies VLAN id
	Web Mode - Indicates whether HTTP/Web is enabled.
	JavaScript Mode - Indicates whether java mode is enabled. When the user accesses the switch’s web interface and JavaScript Mode is enabled, the switch’s web server will deliver a HTML page that contains JavaScript. Some browsers do not support JavaScript. In this case, a HTML page without JavaScript is necessary. In this case, set JavaScript Mode to disabled. Default: enabled.
`network parms <ipaddr> <netmask> [gateway]` (in Privileged EXEC)	Sets the IP Address, subnet mask and gateway of the router. The IP Address and the gateway must be on the same subnet.
	IP Address range from 0.0.0.0 to 255.255.255.255

Table 12: Quick Start up IP Address

Command	Details
	Subnet Mask range from 0.0.0.0 to 255.255.255.255 Gateway Address range from 0.0.0.0 to 255.255.255.255

Table 12: *Quick Start up IP Address*

Quick Start up Downloading from TFTP Server

Before starting a TFTP server download, the operator must complete the Quick Start up for the IP Address.

Command	Details
`copy <url> {nvram:startup-config | system:image}`	Sets the destination (download) datatype to be an image (system:image) or a configuration file (nvram:startup-config). The URL must be specified as: tftp://ipAddr/filepath/fileName. The nvram:startup-config option downloads the configuration file using tftp and system:image option downloads the code file.

Table 13: Quick Start up Downloading from TFTP Server

Quick Start up Factory Defaults

Command	Details
`clear config` (in Privileged EXEC Mode)	Enter yes when the prompt pops up to clear all the configurations made to the switch.
`copy system:running-config nvram:startup-config`	Enter yes when the prompt pops up that asks if you want to save the configurations made to the switch.
`reboot` (or cold boot the switch) (in Privileged EXEC Mode)	Enter yes when the prompt pops up that asks if you want to reset the system. This is the users choice either reset the switch or cold boot the switch, both work effectively.

Table 14: Quick Start up Factory Defaults

3 Mode-based CLI

The CLI groups all the commands in appropriate modes according to the nature of the command. A sample of the CLI command modes are described below. Each of the command modes support specific Hirschmann software commands.

- User Exec Mode
- Privileged Exec Mode
- Global Config Mode
- Vlan Mode
- Interface Config Mode
- Line Config Mode

The Command Mode table captures the command modes, the prompts visible in that mode and the exit method from that mode.

Command Mode	Access Method	Prompt	Exit or Access Next Mode
`User Exec Mode`	This is the first level of access. Perform basic tasks and list system information	`(Hirschmann PowerMICE)>`	Enter Logout command
`Privileged Exec Mode`	From the User Exec Mode, enter the `enable` command	`(Hirschmann PowerMICE)#`	To exit to the User Exec mode, enter exit or press Ctrl-Z.
`VLAN Mode`	From the Privileged User Exec mode, enter the `vlan database` command	`(Hirschmann PowerMICE) (Vlan) #`	To exit to the Privileged Exec mode, enter the exit command, or press Ctrl-Z to switch to User Exec mode.
`Global Config Mode`	From the Privileged Exec mode, enter the `configure` command	`(Hirschmann PowerMICE) (Config)#`	To exit to the Privileged Exec mode, enter the exit command, or press Ctrl-Z to switch to user exec mode.
`Interface Config Mode`	From the Global Configuration mode, enter the `interface <slot/port>` command	`(Hirschmann PowerMICE) (Interface-"if number")#`	To exit to the Global Config mode enter exit. To return to user EXEC mode enter ctrl-Z.

Table 15: Command Mode

Command Mode	Access Method	Prompt	Exit or Access Next Mode
`Line Config Mode`	From the Global Configuration mode, enter the `lineconfig` command	`(Hirschmann PowerMICE) (line) #`	To exit to the Global Config mode enter exit. To return to User Exec mode enter ctrl-Z.
Stack Global Config Mode	From the Global Configuration mode, enter the **`stack`** command	Switch (Config-stack)#	To exit to Global Configuration mode enter exit. To return to user EXEC mode, enter ctrl-Z

Table 15: Command Mode

3.1 Mode-based Topology

The CLI tree is built on a mode concept where the commands are available according to the interface. Some of the modes are depicted in the mode-based CLI Figure 1.

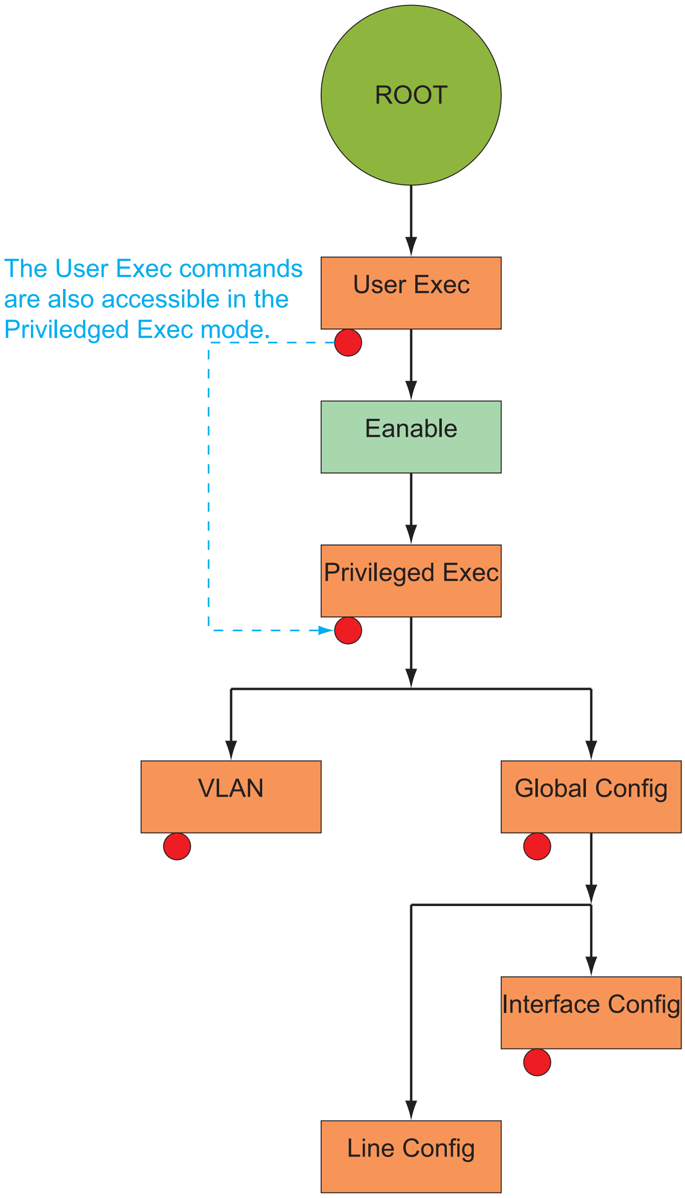

Fig. 1: Mode-based CLI

3.2 Mode-based Command Hierarchy

The CLI is divided into various modes. The Commands in one mode are not available until the operator switches to that particular mode, with the exception of the User Exec mode commands. The User Exec mode commands may also be executed in the Privileged Exec mode.
The commands available to the operator at any point in time depend upon the mode. Entering a question mark (?) at the CLI prompt, displays a list of the available commands and descriptions of the commands.

The CLI provides the following modes:

User Exec Mode

When the operator logs into the CLI, the User Exec mode is the initial mode. The User Exec mode contains a limited set of commands. The command prompt shown at this level is:

```
Command Prompt: (Hirschmann PowerMICE)>
```

Privileged Exec Mode

To have access to the full suite of commands, the operator must enter the Privileged Exec mode. Privileged users authenticated by login are able to enter the Privileged EXEC mode. From Privileged Exec mode, the operator can issue any Exec command, enter the VLAN mode or enter the Global Configuration mode . The command prompt shown at this level is:

```
Command Prompt: (Hirschmann PowerMICE)#
```

VLAN Mode

This mode groups all the commands pertaining to VLANs. The command prompt shown at this level is:

```
Command Prompt: (Hirschmann PowerMICE)(VLAN)#
```

Global Config Mode

This mode permits the operator to make modifications to the running configuration. General setup commands are grouped in this mode. From the Global Configuration mode, the operator can enter the System Configuration mode, the Physical Port Configuration mode, the

Interface Configuration mode, or the Protocol Specific modes specified below. The command prompt at this level is:

```
Command Prompt: (Hirschmann PowerMICE)(Config)#
```

From the Global Config mode, the operator may enter the following configuration modes:

Interface Config Mode

Many features are enabled for a particular interface. The Interface commands enable or modify the operation of an interface.

In this mode, a physical port is set up for a specific logical connection operation. The Interface Config mode provides access to the router interface configuration commands. The command prompt at this level is:

```
Command Prompt: (Hirschmann PowerMICE)(Interface
<slot/port>)#
```

The resulting prompt for the interface configuration command entered in the Global Configuration mode is shown below:

```
(Hirschmann PowerMICE)(Config)# interface 2/1
(Hirschmann PowerMICE)(Interface 2/1)#
```

Line Config Mode

This mode allows the operator to configure the console interface. The operator may configure the interface from the directly connected console or the virtual terminal used with Telnet. The command prompt at this level is:

```
Command Prompt: (Hirschmann PowerMICE)(Line)#
```

`(Hirschmann PowerMICE)(Hirschmann PowerMICE)(Hirschmann PowerMICE)`**MAC Access-List Config Mode**

Use the MAC Access-List Config mode to create a MAC Access-List and to enter the mode containing Mac Access-List configuration commands.

```
(Hirschmann PowerMICE)(Config)# mac-access-list
extended <name>
Command Prompt: (Hirschmann PowerMICE)(Config mac-
access-list)#
```

3.3 Flow of Operation

This section captures the flow of operation for the CLI:

- The operator logs into the CLI session and enters the User Exec mode. In the User Exec mode the `(Hirschmann PowerMICE)`(exec)> prompt is displayed on the screen.

The parsing process is initiated whenever the operator types a command and presses <ENTER>. The command tree is searched for the command of interest. If the command is not found, the output message indicates where the offending entry begins. For instance, command node A has the command "`show spanning-tree`" but the operator attempts to execute the command "`show arpp brief`" then the output message would be `(Hirschmann PowerMICE)(exec)> show sspanning-tree^. (Hirschmann PowerMICE)%Invalid input detected at '^' marker`. If the operator has given an invalid input parameter in the command, then the message conveys to the operator an invalid input was detected. The layout of the output is depicted below:

```
(Hirschmann PowerMICE)(exec) #show sspanning-tree
                                    ^

(Hirschmann PowerMICE)Invalid input detected at '^' marker.
```

Fig. 2: Syntax Error Message

After all the mandatory parameters are entered, any additional parameters entered are treated as optional parameters. If any of the parameters are not recognized a syntax error message will be displayed.

- After the command is successfully parsed and validated, the control of execution goes to the corresponding CLI callback function.

- For mandatory parameters, the command tree extends till the mandatory parameters make the leaf of the branch. The callback function is only invoked when all the mandatory parameters are provided. For optional parameters, the command tree extends till the mandatory parameters and the optional parameters make the leaf of the branch. However, the call back function is associated with the node where the mandatory parameters are fetched. The call back function then takes care of the optional parameters.
- Once the control has reached the callback function, the callback function has complete information about the parameters entered by the operator.

3.4 “No” Form of a Command

“No” is a specific form of an existing command and does not represent a new or distinct command. Only the configuration commands are available in the “no” form. The behavior and the support details of the “no” form is captured as part of the mapping sheets.

3.4.1 Support for “No” Form

Almost every configuration command has a “no” form. In general, use the no form to reverse the action of a command or reset a value back to the default. For example, the `no shutdown interface` configuration command reverses the shutdown of an interface. Use the command without the keyword „no“ to re-enable a disabled feature or to enable a feature that is disabled by default.

3.4.2 Behavior of Command Help ("?")

The “no” form is treated as a specific form of an existing command and does not represent a new or distinct command. However, the behavior of the “?” and help text differ for the “no” form (the help message shows only options that apply to the “no” form).

- The help message is the same for all forms of the command. The help string may be augmented with details about the “no” form behavior.
- For the (`no interface`?) and (`no inte`?) cases of the “?”, the options displayed are identical to the case when the “no” token is not specified as in (`interface`) and (`inte`?).

4 CLI Commands: Base

This chapter provides detailed explanation of the Switching commands. The commands are divided into five functional groups:

- Show commands display switch settings, statistics, and other information.
- Configuration commands configure features and options of the switch. For every configuration command, there is a show command that displays the configuration setting.
- Copy commands transfer or save configuration and informational files to and from the switch.
- Clear commands clear some or all of the settings to factory defaults.

This chapter includes the following configuration types:

- System information and statistics commands
- Management commands
- Device configuration commands
- User account management commands
- Security commands
- System utilities
- Link Layer Discovery Protocol Commands
- Simple Network Time Protocol Commands
- Precision Time Protocol Commands
- Power over Ethernet Commands

4.1 System Information and Statistics Commands

4.1.1 show address-conflict

This command displays address-conflict settings.

Format

```
show address-conflict
```

Mode

```
Privileged EXEC and User EXEC
```

4.1.2 show arp switch

This command displays the Address Resolution Protocol cache of the switch.

Format

```
show arp switch
```

Mode

```
Privileged EXEC and User EXEC
```

4.1.3 show bridge address-learning

This command displays the address-learning setting.
The setting can be enable or disable.

Format

```
show bridge address-learning
```

Mode

```
Privileged EXEC and User EXEC
```

4.1.4 show bridge aging-time

This command displays the timeout for address aging.

Format

```
show bridge aging-time
```

Mode

```
Privileged EXEC and User EXEC
```

4.1.5 show bridge vlan-learning

This command displays the bridge vlan-learning mode.

Format

```
show bridge vlan-learning
```

Mode

```
Privileged EXEC and User EXEC
```

4.1.6 bridge framesize

Activation of long frames. Configure 1522 or 1632[1] as maximum size of frame (packet size). Default: 1522.

Format

```
bridge framesize {1522|1632 1) }
```

Mode

```
Global Config
```

bridge framesize 1522

Configure 1522 as maximum size of frame.

bridge framesize 1632 [1]

Configure 1632 [1] as maximum size of frame.

[1] On MACH4000 and PowerMICE: `1552`

4.1.7 show config-watchdog

Activating the watchdog enables you to return automatically to the last configuration after a set time period has elapsed. This gives you back your access to the Switch.

Format

```
show config-watchdog
```

Mode

```
Privileged EXEC and User EXEC
```

4.1.8 show device-status

The signal device status is for displaying

- the monitoring functions of the switch,
- the device status trap setting.

Format

```
show device-status
[monitor|state|trap]
```

Mode

```
Privileged EXEC and User EXEC
```

Device status monitor

Displays the possible monitored events and which of them are monitored:
– the failure of at least one of the supply voltages.
– the removal of the ACA
– the removal of a media module
– the temperature limits

– the defective link status of at least one port. With the switch, the indication of link status can be masked by the management for each port. Link status is not monitored in the delivery condition.

– the loss of Redundancy guarantee.
Ring/network coupling:

– The following conditions are reported in Stand-by mode:

– interrupted control line

– partner device running in Stand-by mode.
HIPER-Ring:

– The following condition is reported in RM mode additionally:

– Ring redundancy guaranteed. Ring redundancy is not monitored in the delivery condition.

Device status state

`Error` The current device status is error.

`No Error` The current device status is no error.

Device status trap

`enabled` A trap is sent if the device status changes.

`disabled` No trap is sent if the device status changes.

4.1.9 show authentication

This command displays users assigned to authentication login lists.

Format

```
show authentication [users <listname>]
```

Mode

```
Privileged EXEC and User EXEC
```

4.1.10 show classofservice

This command displays class of service settings.

Format

```
show classofservice dot1p-mapping [slot/port]
```

Mode

```
Privileged EXEC and User EXEC
```

slot/port

Valid slot and port number separated by forward slashes.

4.1.11 show eventlog

This command displays the event log, which contains error messages from the system. The event log is not cleared on a system reset.

Format

```
show eventlog
```

Mode

```
Privileged EXEC and User EXEC
```

File

The file in which the event originated.

Line

The line number of the event

Task Id

The task ID of the event.

Code

The event code.

Time

The time this event occurred.

Note: Event log information is retained across a switch reset.

4.1.12 show interface

This command displays a summary of statistics for a specific port or a count of all CPU traffic based upon the argument.

Format

```
show interface {<slot/port> | switchport}
```

Mode

```
Privileged EXEC and User EXEC
```

The display parameters, when the argument is ' <slot/port>', is as follows :

Packets Received Without Error

The total number of packets (including broadcast packets and multicast packets) received by the processor.

Packets Received With Error

The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.

Broadcast Packets Received

The total number of packets received that were directed to the broadcast address. Note that this does not include multicast packets.

Packets Transmitted Without Error

The total number of packets transmitted out of the interface.

Transmit Packets Errors

The number of outbound packets that could not be transmitted because of errors.

Collisions Frames

The best estimate of the total number of collisions on this Ethernet segment.

Time Since Counters Last Cleared

The elapsed time, in days, hours, minutes, and seconds since the statistics for this port were last cleared.

The display parameters, when the argument is 'switchport', is as follows :

Packets Received Without Error

The total number of packets (including broadcast packets and multicast packets) received by the processor.

Broadcast Packets Received

The total number of packets received that were directed to the broadcast address. Note that this does not include multicast packets.

Packets Received With Error

The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.

Packets Transmitted Without Error

The total number of packets transmitted out of the interface.

Broadcast Packets Transmitted

The total number of packets that higher-level protocols requested to be transmitted to the Broadcast address, including those that were discarded or not sent.

Transmit Packet Errors

The number of outbound packets that could not be transmitted because of errors.

Address Entries Currently In Use

The total number of Forwarding Database Address Table entries now active on the switch, including learned and static entries.

VLAN Entries Currently In Use

The number of VLAN entries presently occupying the VLAN table.

Time Since Counters Last Cleared

The elapsed time, in days, hours, minutes, and seconds since the statistics for this switch were last cleared.

4.1.13 show interface ethernet

This command displays detailed statistics for a specific port or for all CPU traffic based upon the argument.

Format

show interface ethernet {<slot/port> | *switchport*}

Mode

`Privileged EXEC and User EXEC`

The display parameters, when the argument is '<slot/port>', are as follows :

Packets Received

Octets Received - The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including Frame Check Sequence (FCS) octets). This object can be used as a reasonable estimate of ethernet utilization. If greater precision is desired, the etherStatsPkts and etherStatsOctets objects should be sampled before and after a common interval. ----- The result of this equation is the value Utilization which is the percent utilization of the ethernet segment on a scale of 0 to 100 percent.

Packets Received < 64 Octets - The total number of packets (including bad packets) received that were < 64 octets in length (excluding framing bits but including FCS octets).

Packets Received 64 Octets - The total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).

Packets Received 65-127 Octets - The total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Received 128-255 Octets - The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Received 256-511 Octets - The total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Received 512-1023 Octets - The total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Received 1024-1518 Octets - The total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Received 1519-1522 Octets - The total number of packets (including bad packets) received that were between 1519 and 1522 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Received > 1522 Octets - The total number of packets received that were longer than 1522 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.

Packets Received Successfully

Total - The total number of packets received that were without errors.

Unicast Packets Received - The number of subnetwork-unicast packets delivered to a higher-layer protocol.

Multicast Packets Received - The total number of good packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.

Broadcast Packets Received - The total number of good packets received that were directed to the broadcast address. Note that this does not include multicast packets.

Packets Received with MAC Errors

Total - The total number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.

Jabbers Received - The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). Note that this definition of jabber is different than the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition where any packet exceeds 20 ms. The allowed range to detect jabber is between 20 ms and 150 ms.

Fragments/Undersize Received - The total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets).

Alignment Errors - The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had a bad Frame Check Sequence (FCS) with a non-integral number of octets.

Rx FCS Errors - The total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had a bad Frame Check Sequence (FCS) with an integral number of octets

Overruns - The total number of frames discarded as this port was overloaded with incoming packets, and could not keep up with the inflow.

Received Packets not forwarded

Total - A count of valid frames received which were discarded (i.e. filtered) by the forwarding process.

Local Traffic Frames - The total number of frames dropped in the forwarding process because the destination address was located off of this port.

802.3x Pause Frames Received - A count of MAC Control frames received on this interface with an opcode indicating the PAUSE operation. This counter does not increment when the interface is operating in half-duplex mode.

Unacceptable Frame Type - The number of frames discarded from this port due to being an unacceptable frame type.

VLAN Membership Mismatch - The number of frames discarded on this port due to ingress filtering.

VLAN Viable Discards - The number of frames discarded on this port when a lookup on a particular VLAN occurs while that entry in the VLAN table is being modified, or if the VLAN has not been configured.

Multicast Tree Viable Discards - The number of frames discarded when a lookup in the multicast tree for a VLAN occurs while that tree is being modified.

Reserved Address Discards - The number of frames discarded that are destined to an IEEE 802.1 reserved address and are not supported by the system.

Broadcast Storm Recovery - The number of frames discarded that are destined for FF:FF:FF:FF:FF:FF when Broadcast Storm Recovery is enabled.

CFI Discards - The number of frames discarded that have CFI bit set and the addresses in RIF are in non-canonical format.

Upstream Threshold - The number of frames discarded due to lack of cell descriptors available for that packet's priority level.

Packets Transmitted Octets

Total Bytes - The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets). This object can be used as a reasonable estimate of ethernet utilization. If greater precision is desired, the etherStatsPkts and etherStatsOctets objects should be sampled before and after a common interval. -----

Packets Transmitted 64 Octets - The total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).

Packets Transmitted 65-127 Octets - The total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Transmitted 128-255 Octets - The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Transmitted 256-511 Octets - The total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Transmitted 512-1023 Octets - The total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Transmitted 1024-1518 Octets - The total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).

Packets Transmitted 1519-1522 Octets - The total number of packets (including bad packets) received that were between 1519 and 1522 octets in length inclusive (excluding framing bits but including FCS octets).

Max Info - The maximum size of the Info (non-MAC) field that this port will receive or transmit.

Packets Transmitted Successfully

Total - The number of frames that have been transmitted by this port to its segment.

Unicast Packets Transmitted - The total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.

Multicast Packets Transmitted - The total number of packets that higher-level protocols requested be transmitted to a Multicast address, including those that were discarded or not sent.

Broadcast Packets Transmitted - The total number of packets that higher-level protocols requested be transmitted to the Broadcast address, including those that were discarded or not sent.

Transmit Errors

Total Errors - The sum of Single, Multiple, and Excessive Collisions.

Tx FCS Errors - The total number of packets transmitted that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had a bad Frame Check Sequence (FCS) with an integral number of octets

Oversized - The total number of frames that exceeded the max permitted frame size. This counter has a max increment rate of 815 counts per sec. at 10 Mb/s.

Underrun Errors - The total number of frames discarded because the transmit FIFO buffer became empty during frame transmission.

Transmit Discards

Total Discards - The sum of single collision frames discarded, multiple collision frames discarded, and excessive frames discarded.

Single Collision Frames - A count of the number of successfully transmitted frames on a particular interface for which transmission is inhibited by exactly one collision.

Multiple Collision Frames - A count of the number of successfully transmitted frames on a particular interface for which transmission is inhibited by more than one collision.

Excessive Collisions - A count of frames for which transmission on a particular interface fails due to excessive collisions.

Port Membership - The number of frames discarded on egress for this port due to egress filtering being enabled.

VLAN Viable Discards - The number of frames discarded on this port when a lookup on a particular VLAN occurs while that entry in the VLAN table is being modified, or if the VLAN has not been configured.

Protocol Statistics

BPDU's received - The count of BPDU's (Bridge Protocol Data Units) received in the spanning tree layer.

BPDU's Transmitted - The count of BPDU's (Bridge Protocol Data Units) transmitted from the spanning tree layer.

802.3x Pause Frames Received - A count of MAC Control frames received on this interface with an opcode indicating the PAUSE operation. This counter does not increment when the interface is operating in half-duplex mode.

GVRP PDU's Received - The count of GVRP PDU's received in the GARP layer.

GMRP PDU's received - The count of GMRP PDU's received in the GARP layer.

GMRP PDU's Transmitted - The count of GMRP PDU's transmitted from the GARP layer.

GMRP Failed Registrations - The number of times attempted GMRP registrations could not be completed.

STP BPDUs Transmitted - Spanning Tree Protocol Bridge Protocol Data Units sent

STP BPDUs Received - Spanning Tree Protocol Bridge Protocol Data Units received

RST BPDUs Transmitted - Rapid Spanning Tree Protocol Bridge Protocol Data Units sent

RSTP BPDUs Received - Rapid Spanning Tree Protocol Bridge Protocol Data Units received

MSTP BPDUs Transmitted - Multiple Spanning Tree Protocol Bridge Protocol Data Units sent

MSTP BPDUs Received - Multiple Spanning Tree Protocol Bridge Protocol Data Units received

Dot1x Statistics

EAPOL Frames Received - The number of valid EAPOL frames of any type that have been received by this authenticator.

EAPOL Frames Transmitted - The number of EAPOL frames of any type that have been transmitted by this authenticator.

Time Since Counters Last Cleared

The elapsed time, in days, hours, minutes, and seconds since the statistics for this port were last cleared.

The display parameters, when the argument is ‘switchport, are as follows :

Octets Received - The total number of octets of data received by the processor (excluding framing bits but including FCS octets).

Total Packets Received Without Error- The total number of packets (including broadcast packets and multicast packets) received by the processor.

Unicast Packets Received - The number of subnetwork-unicast packets delivered to a higher-layer protocol.

Multicast Packets Received - The total number of packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.

Broadcast Packets Received - The total number of packets received that were directed to the broadcast address. Note that this does not include multicast packets.

Receive Packets Discarded - The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.

Octets Transmitted - The total number of octets transmitted out of the interface, including framing characters.

Packets Transmitted without Errors - The total number of packets transmitted out of the interface.

Unicast Packets Transmitted - The total number of packets that higher-level protocols requested be transmitted to a subnetwork-unicast address, including those that were discarded or not sent.

Multicast Packets Transmitted - The total number of packets that higher-level protocols requested be transmitted to a Multicast address, including those that were discarded or not sent.

Broadcast Packets Transmitted - The total number of packets that higher-level protocols requested be transmitted to the Broadcast address, including those that were discarded or not sent.

Transmit Packets Discarded - The number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. A possible reason for discarding a packet could be to free up buffer space.

Most Address Entries Ever Used - The highest number of Forwarding Database Address Table entries that have been learned by this switch since the most recent reboot.

Address Entries in Use - The number of Learned and static entries in the Forwarding Database Address Table for this switch.

Maximum VLAN Entries - The maximum number of Virtual LANs (VLANs) allowed on this switch.

Most VLAN Entries Ever Used - The largest number of VLANs that have been active on this switch since the last reboot.

Static VLAN Entries - The number of presently active VLAN entries on this switch that have been created statically.

Dynamic VLAN Entries - The number of presently active VLAN entries on this switch that have been created by GVRP registration.

VLAN Deletes - The number of VLANs on this switch that have been created and then deleted since the last reboot.

Time Since Counters Last Cleared

The elapsed time, in days, hours, minutes, and seconds, since the statistics for this switch were last cleared.

4.1.14 show interface switchport

This command displays data concerning the internal port to the management agent.

Format

```
show interface switchport
```

Mode

```
Privileged EXEC and User EXEC
```

4.1.15 show logging

This command displays the trap log maintained by the switch. The trap log contains a maximum of 256 entries that wrap.

Format

```
show logging [buffered | hosts | traplogs]
```

Mode

```
Privileged EXEC and User EXEC
```

buffered

Display buffered (in-memory) log entries.

hosts

Display logging hosts.

traplogs

Display trap records.

4.1.16 show mac-addr-table

This command displays the forwarding database entries. If the command is entered with no parameter, the entire table is displayed. This is the same as entering the optional *all* parameter. Alternatively, the administrator can enter a MAC Address to display the table entry for the requested MAC address and all entries following the requested MAC address.

Note: This command displays only learned unicast addresses. For other addresses use the command show mac-filter-table.
See "show mac-filter-table gmrp" on page 169.

Format

```
show mac-addr-table [<macaddr> | all]
```

Mode

```
Privileged EXEC and User EXEC
```

Mac Address

A unicast MAC address for which the switch has forwarding and or filtering information. The format is 6 or 8 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB.

Slot/Port

The port which this address was learned.

if Index

This object indicates the ifIndex of the interface table entry associated with this port.

Status

The status of this entry. The meanings of the values are:

Learned The value of the corresponding instance was learned by observing the source MAC addresses of incoming traffic, and is currently in use.

Management The value of the corresponding instance (system MAC address) is also the value of an existing instance of dot1dStaticAddress.

4.1.17 show signal-contact

The signal contact is for displaying

- the manual setting and the current state of the signal contact,
- the monitoring functions of the switch,
- the signal-contacts trap setting.

Format

```
show signal-contact
[1|2|all [mode|monitor|state|trap]]
```

Mode

```
Privileged EXEC and User EXEC
```

Signal contact mode

`Auto` The signal contact monitors the functions of the switch which makes it possible to perform remote diagnostics.
A break in contact is reported via the zero-potential signal contact (relay contact, closed circuit).

`Device Status` The signal contact monitors the device-status.

`Manual` This command gives you the option of remote switching the signal contact.

Signal contact monitor

Displays the possible monitored events and which of them are monitored:
– the failure of at least one of the supply voltages.
– the removal of the ACA
– the removal of a media module
– the temperature limits

– the defective link status of at least one port. With the switch, the indication of link status can be masked by the management for each port. Link status is not monitored in the delivery condition.

– the loss of Redundancy guarantee.
Ring/network coupling:

– The following conditions are reported in Stand-by mode:

– interrupted control line

– partner device running in Stand-by mode.
HIPER-Ring:

– The following condition is reported in RM mode additionally:

– Ring redundancy guaranteed. Ring redundancy is not monitored in the delivery condition.

Signal contact manual setting

`closed` The signal contact´s manual setting is closed.

`open` The signal contact´s manual setting is open.

Signal contact operating state

`closed` The signal contact is currently closed.

`open` The signal contact is currently open.

Signal contact trap

`enabled` A trap is sent if the signal contact state changes.

`disabled` No trap is sent if the signal contact state changes.

Note: To show the signal contact´s port related settings, use the command show port {<slot/port> | all} (see “show port” on page 176).

4.1.18 show running-config

This command is used to display the current setting of different protocol packages supported on the switch. This command displays only those parameters, the values of which differ from default value. The output is displayed in the script format, which can be used to configure another switch with the same configuration.

Format

```
show running-config [all | <scriptname>]
```

Mode

`Privileged EXEC`

all

Show all the running configuration on the switch. All configuration parameters will be output even if their value is the default value.

<scriptname>

Script file name for writing active configuration.
Note: file extension must be .cli, file name must not exceed 16 characters, must not start with a dot (.) and must not contain a directory.

4.1.19 show sysinfo

This command displays switch information.

Format

```
show sysinfo
```

Mode

```
Privileged EXEC and User EXEC
```

Alarm

Displays the latest present Alarm for a signal contact.

System Description

Text used to identify this switch.

System Name

Name used to identify the switch.

System Location

Text used to identify the location of the switch. May be up to 31 alpha-numeric characters. The factory default is blank.

System Contact

Text used to identify a contact person for this switch. May be up to 31 alpha-numeric characters. The factory default is blank.

System Up Time

The time in days, hours and minutes since the last switch reboot.

System Date and Time

The system clock´s date and time in local time zone.

System IP Address

The system´s IP address.

Boot Software Release

The boot code´s version number.

Boot Software Build Date

The boot code´s build date.

Operating system Software Release

The operating system´s software version number.

Operating system Software Build Date

The operating system´s software build date.

Backplane Hardware Revision
The hardware´s revision number.

Backplane Hardware description
The hardware´s device description.

Serial Number (Backplane)
The hardware´s serial number.

Base MAC Address (Backplane)
The hardware´s base MAC address.

Number of MAC Addresses (Backplane)
The number of hardware MAC addresses.

Auto Config Adapter, State
The Auto Configuration Adapter's state.

Auto Config Adapter, Serial Number
The Auto Configuration Adapter's serial number (if present and operative).

Fan Status
The status of the MACH 4000 fan.

Power Supply Information
The status of the power supplies.

Media Module Information
The description of each media module
– Description: media module type,
– Serial Number of the media modul (if available),
– SFP Part ID: SFP type (if available),
– SFP Serial No. of the SFP module (if available),
– SFP Supported: yes/no,
– SFP Temperature (°C, F)
– SFP Tx Pwr, SFP transmit power,
– SFP Rx Pwr, SFP receive power.

4.1.20 show temperature

This command displays the lower and upper temperature limit for sending a trap.

Format

```
show temperature
```

Mode

```
Privileged EXEC and User EXEC
```

4.1.21 snmp-server

This command sets the name and the physical location of the switch, and the organization responsible for the network.The range for name, location and contact is from 1 to 31 alphanumeric characters.

Default

None

Format

```
snmp-server {sysname <name> | location <loc> | contact <con>}
```

Mode

```
Global Config
```

4.2 Management VLAN Commands

4.2.1 network mgmt_vlan

This command configures the Management VLAN ID. If you enter the VLAN ID “0” , the agent can be accessed by all VLANs.

Default

1

Format

```
network mgmt_vlan <0-4042>
```

Mode

```
Privileged EXEC
```

4.3 Class of Service (CoS) Commands

This chapter provides a detailed explanation of the QoS CoS commands. The following commands are available.

The commands are divided into these different groups:

- Configuration Commands are used to configure features and options of the switch. For every configuration command there is a show command that will display the configuration setting.
- Show commands are used to display device settings, statistics and other information.

Note: The 'Interface Config' mode only affects a single interface, whereas the 'Global Config' mode is applied to all interfaces.

4.3.1 classofservice dot1p-mapping

This command maps an 802.1p priority to an internal traffic class for a device when in ‘Global Config’ mode. The number of available traffic classes may vary with the platform. Userpriority and trafficclass can both be the range from 0-7. The command is only available on platforms that support priority to traffic class mapping on a ‘per-port’ basis, and the number of available traffic classes may vary with the platform.

Format

```
classofservice dot1p-mapping <userpriority> <trafficclass>
```

Mode

```
Global Config or Interface Config
```

■ no classofservice dot1p-mapping

This command restores the default mapping of the 802.1p priority to an internal traffic class.

Format

```
no classofservice dot1p-mapping
```

Modes

```
Global Config or Interface Config
```

4.3.2 classofservice ip-dscp-mapping

This command maps an IP DSCP value to an internal traffic class.
The <ipdscp> value is specified as either an integer from 0 to 63, or symbolically through one of the following keywords: af11, af12, af13, af21, af22, af23, af31, af32, af33, af41, af42, af43, be, cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, ef.

Format

```
classofservice ip-dscp-mapping <ipdscp> <trafficclass>
```

Mode

```
Global Config
```

- **no classofservice ip-dscp-mapping**
  This command restores the default mapping of the IP DSCP value to an internal traffic class.

Format

```
no classofservice dot1p-mapping
```

Modes

```
Global Config
```

4.3.3 classofservice trust

This command sets the class of service trust mode of an interface. The mode can be set to trust one of the Dot1p (802.1p) or IP DSCP packet markings.

Note: In `trust ip-dscp` mode the switch modifies the vlan priority for outgoing frames according to
– the DSCP mapping and VLAN mapping table (Power MICE, MACH 4000)
– the a fix mapping table
(see Reference Manual „Web-based Management for further details”).

Format

```
classofservice trust dot1p | <ip-dscp>
```

Mode

`Global Config` or
`Interface Config` (Power MICE, MACH 4000)

- **no classofservice trust**
  This command sets the interface mode to untrusted, i.e. the packet priority marking is ignored and the default port priority is used instead.

Format

```
no classofservice trust
```

Modes

`Global Config` or
`Interface Config` (Power MICE, MACH 4000)

4.3.4 show classofservice dot1p-mapping

This command displays the current 802.1p priority mapping to internal traffic classes for a specific interface. The slot/port parameter is required on platforms that support priority to traffic class mapping on a ‘per-port’ basis.

Platforms that support priority to traffic class mapping on a per-port basis:

Format

```
show classofservice dot1p-mapping [<slot/port>]
```

Platforms that do not support priority to traffic class mapping on a per-port basis:

Format

```
Show classofservice dot1p-mapping
```

Mode

```
Privileged EXEC and User EXEC
```

4.3.5 show classofservice ip-dscp-mapping

This command displays the current IP DSCP mapping to internal traffic classes for the global configuration settings.

Format

```
show classofservice ip-dscp-mapping
```

Mode

```
Privileged EXEC
```

The following information is repeated for each user priority.

IP DSCP

The IP DSCP value.

Traffic Class

The traffic class internal queue identifier to which the IP DSCP value is mapped.

4.3.6 show classofservice trust

This command displays the current trust mode for the specified interface. The slot/port parameter is optional. If specified, the trust mode of the interface is displayed. If omitted, the most recent global configuration settings are displayed.

Format

```
show classofservice trust [slot/port]
```

Mode

```
Privileged EXEC
```

Class of Service Trust Mode

The current trust mode: Dot1p, IP DSCP, or Untrusted.

Untrusted Traffic Class

The traffic class used for all untrusted traffic. This is only displayed when the COS trust mode is set to 'untrusted'.

4.3.7 vlan port priority all

This command configures the port priority assigned for untagged packets for all ports presently plugged into the device. The range for the priority is 0-7. Any subsequent per port configuration will override this configuration setting.

Format

```
vlan port priority all <priority>
```

Mode

```
Global Config
```

4.3.8 vlan priority

This command configures the default 802.1p port priority assigned for untagged packets for a specific interface. The range for the priority is 0-7

Default

0

Format

```
vlan priority <priority>
```

Mode

```
Interface Config
```

4.4 Link Aggregation(802.3ad) Commands

4.4.1 link-aggregation staticcapability

This command enables the support of link-aggregations (static LAGs) on the device. By default, the static capability for all link-aggregations is disabled.

Default

disabled

Format

```
link-aggregation staticcapability
```

Mode

```
Global Config
```

■ no link-aggregation staticcapability

This command disables the support of static link-aggregations (LAGs) on the device.

Default

disabled

Format

```
no link-aggregation staticcapability
```

Mode

```
Global Config
```

4.4.2 show link-aggregation brief

This command displays the static capability of all link-aggregations (LAGs) on the device as well as a summary of individual link-aggregations.

Format

```
show link-aggregation brief
```

Mode

```
Privileged EXEC and User EXEC
```

Static Capability

This field displays whether or not the device has static capability enabled.

For each link-aggregation the following information is displayed:

Name

This field displays the name of the link-aggregation.

Link State

This field indicates whether the link is up or down.

Mbr Ports

This field lists the ports that are members of this link-aggregation, in <slot/port> notation.

Max. num. of LAGs

Displays the maximum number of concurrently configured link aggregations on this device.

Slot no. for LAGs

Displays the slot number for all configured link aggregations on this device.

4.5 Management Commands

These commands manage the switch and show current management settings.

4.5.1 telnet

This command establishes a new outbound telnet connection to a remote host. The host value must be a valid IP address. Valid values for port should be a valid decimal integer in the range of 0 to 65535, where the default value is 23. If [debug] is used, the current telnet options enabled is displayed. The optional line parameter sets the outbound telnet operational mode as ‘linemode’, where by default, the operational mode is ‘character mode’. The echo option enables local echo and only takes effect when the local switch is accessed via the serial connection (V.24).

Format

```
telnet <host> <port> [debug] [line] [echo]
```

Mode

```
Privileged EXEC and User EXEC
```

4.5.2 transport input telnet

This command regulates new telnet sessions. If sessions are enabled, new telnet sessions can be established until there are no more sessions available. If sessions are disabled, no new telnet sessions are established. An established session remains active until the session is ended or an abnormal network error ends the session.

Default

enabled

Format

```
transport input telnet
```

Mode

```
Line Config
```

no transport input telnet

This command disables telnet sessions. If sessions are disabled, no new telnet sessions are established.

Format

```
no transport input telnet
```

Mode

```
Line Config
```

4.5.3 transport output telnet

This command regulates new outbound telnet connections. If enabled, new outbound telnet sessions can be established until it reaches the maximum number of simultaneous outbound telnet sessions allowed.
If disabled, no new outbound telnet session can be established. An established session remains active until the session is ended or an abnormal network error ends it.

Default

enabled

Format

```
transport output telnet
```

Mode

```
Line Config
```

■ no transport output telnet

This command disables new outbound telnet connections. If disabled, no new outbound telnet connection can be established.

Format

```
no transport output telnet
```

Mode

```
Line Config
```

4.5.4 session-limit

This command specifies the maximum number of simultaneous outbound telnet sessions. A value of 0 indicates that no outbound telnet session can be established.

Default

4

Format

```
session-limit <0-5>
```

Mode

```
Line Config
```

■ no session-limit

This command sets the maximum number of simultaneous outbound telnet sessions to the default value.

Format

```
no session-limit
```

Mode

```
Line Config
```

4.5.5 session-timeout

This command sets the telnet session timeout value.The timeout value unit of time is minutes.

Default

```
5
```

Format

```
session-timeout <1-160>
```

Mode

```
Line Config
```

■ no session-timeout

This command sets the telnet session timeout value to the default. The timeout value unit of time is minutes.

Format

```
no session-timeout
```

Mode

```
Line Config
```

4.5.6 bridge address-learning

To enable you to observe the data at all the ports, the Switch allows you to disable the learning of addresses. When the learning of addresses is disabled, the Switch transfers all the data from all ports to all ports. The default value is ensable.

Format

```
bridge address-learning {disable|enable}
```

Mode

```
Global Config
```

4.5.7 bridge aging-time

This command configures the forwarding database address aging timeout in seconds.

Default

30

Format

```
bridge aging-time <10-630>
```

Mode

```
Global Config
```

Seconds

The <seconds> parameter must be within the range of 10 to 630 seconds.

- **no bridge aging-time**
  This command sets the forwarding database address aging timeout to 30 seconds.

Format

```
no bridge aging-time
```

Mode

```
Global Config
```

4.5.8 bridge vlan-learning

With „independent” you set the Shared VLAN Learning mode to Independent. The switch will treat equal MAC source addresses from different VLANs as separate addresses.
With „shared” you set the Shared VLAN Learning mode to Shared. The switch will treat equal MAC source addresses from different VLANs as the same adress.

Format

```
bridge vlan-learning {independent|shared}
```

Mode

```
Global Config
```

4.5.9 ethernet-ip

This command controls the EtherNet/IP function on the switch.
Detailed information you can find in the User Manual Industrial Protocols.

Default

depends on the order code (standard = disable)

Format

```
ethernet-ip admin-state {enable | disable}
```

Mode

```
Global Config
```

Admin-state

`disable` Disables the EtherNet/IP function on this device.
Note: the relevant MIB objects are still accessible.

`enable` Enables the EtherNet/IP function on this device.

4.5.10 network javascriptmode

When the user accesses the switch’s web interface, the switch’s web server will deliver a HTML page that contains JavaScript.

Default

enabled

Format

```
network javascriptmode
```

Mode

```
Privileged EXEC
```

- **no network javascriptmode**
  When the user accesses the switch’s web interface, the switch’s web server will deliver a HTML page that contains no JavaScript.

Format

```
no network javamode
```

Mode

```
Privileged EXEC
```

4.5.11 network parms

This command sets the IP Address, subnet mask and gateway of the router. The IP Address and the gateway must be on the same subnet.

Format

```
network parms <ipaddr> <netmask> [gateway]
```

Mode

```
Privileged EXEC
```

4.5.12 network protocol

This command specifies the network configuration protocol to be used. If you modify this value change is effective immediately. The parameter `bootp` indicates that the switch periodically sends requests to a Bootstrap Protocol (BootP) server or a DHCP server until a response is received. `none` indicates that the switch should be manually configured with IP information.

Independently of the BootP and DHCP settings, HiDiscovery can be configured as an additional protocol.

Default

None

Format

```
network protocol {none | bootp | dhcp | hidiscovery
{off | read-only | read-write}}
```

Mode

```
Privileged EXEC
```

4.5.13 network priority

This command configures the VLAN priority or the IP DSCP value for outgoing management packets. The <ipdscp> is specified as either an integer from 0-63, or symbolically through one of the following keywords: af11,af12,af13,af21,af22,af23,af31,af32,af33,af41,af42,af43,be,cs0, cs1, cs2,cs3,cs4,cs5,cs6,cs7,ef.

Default

0 for both values

Format

```
network priority {dot1p-vlan <0-7> |
ip-dscp <ipdscp> }
```

Mode

```
Privileged EXEC
```

no network priority

This command sets the VLAN priority or the IP DSCP value for outgoing management packets to default which means VLAN priority 0 or IP DSCP value 0 (Best effort).

Format

```
no network priority {dot1p-vlan | ip-dscp }
```

Mode

```
Privileged EXEC
```

4.5.14 profinetio

This command controls the PROFINET IO function on the switch.
Detailed information you can find in the User Manual Industrial Protocols.

Default

depends on the order code (standard = disable)

Format

```
profinetio admin-state {enable | disable}
```

Mode

```
Global Config
```

Admin-state

`disable` Disables the PROFINET IO function on this device.
Note: the relevant MIB objects are still accessible.

`enable` Enables the PROFINET IO function on this device.

4.5.15 serial timeout

This command specifies the maximum connect time (in minutes) without console activity. A value of 0 indicates that a console can be connected indefinitely. The time range is 0 to 160.

Default

5

Format

```
serial timeout <0-160>
```

Mode

```
Line Config
```

■ no serial timeout

This command sets the maximum connect time without console activity (in minutes) back to the default value.

Format

```
no serial timeout
```

Mode

```
Line Config
```

4.5.16 set prompt

This command changes the name of the prompt. The length of name may be up to 64 alphanumeric characters.

Format

```
set prompt <prompt string>
```

Mode

```
Privileged EXEC
```

4.5.17 show ethernet-ip

This command displays the admin state of the EtherNet/IP function.

Format

```
show ethernet-ip
```

Mode

```
Privileged EXEC and User EXEC
```

4.5.18 show network

This command displays configuration settings associated with the switch's network interface. The network interface is the logical interface used for in-band connectivity with the switch via any of the switch's front panel ports. The configuration parameters associated with the switch's network interface do not affect the configuration of the front panel ports through which traffic is switched or routed.

Format

```
show network
```

Mode

```
Privileged EXEC and User EXEC
```

IP Address

The IP address of the interface. The factory default value is 0.0.0.0

Subnet Mask

The IP subnet mask for this interface. The factory default value is 0.0.0.0

Default Gateway

The default gateway for this IP interface. The factory default value is 0.0.0.0

Burned In MAC Address

The burned in MAC address used for in-band connectivity.

Network Configuration Protocol (BootP/DHCP)

Indicates which network protocol is being used. The options are `bootp | dhcp | none`.

DHCP Client ID (same as SNMP System Name)

Displays the DHCP Client ID.

Network Configuration Protocol HiDiscovery

Indicates in which way the HiDiscovery protocol is being used. The options are `off | read-only | read-write`.

Management VLAN ID

Specifies the management VLAN ID.

Management VLAN Priority

Specifies the management VLAN Priority.

Management VLAN IP-DSCP Value

Specifies the management VLAN IP-DSCP value.

Java Script Mode

Specifies if the Switch will use Java Script to start the Management Applet. The factory default is enabled.

4.5.19 show profinetio

This command displays the admin state of the PROFINET IO function.

Format

```
show profinetio
```

Mode

```
Privileged EXEC and User EXEC
```

4.5.20 show serial

This command displays serial communication settings for the switch.

Format

```
show serial
```

Mode

```
Privileged EXEC and User EXEC
```

Serial Port Login Timeout (minutes)

Specifies the time, in minutes, of inactivity on a Serial port connection, after which the Switch will close the connection. Any numeric value between 0 and 160 is allowed, the factory default is 5. A value of 0 disables the timeout.

4.5.21 show snmp-access

This command displays SNMP access information related to global and SNMP version settings. SNMPv3 is always enabled.

Format

```
show snmp-access
```

Mode

```
Privileged EXEC and User EXEC
```

4.5.22 show snmpcommunity

This command displays SNMP community information. Six communities are supported. You can add, change, or delete communities. The switch does not have to be reset for changes to take effect.
The SNMP agent of the switch complies with SNMP Version 1 (for more about the SNMP specification, see the SNMP RFCs). The SNMP agent sends traps through TCP/IP to an external SNMP manager based on the SNMP configuration (the trap receiver and other SNMP community parameters).

Format

```
show snmpcommunity
```

Mode

```
Privileged EXEC
```

SNMP Community Name

The community string to which this entry grants access. A valid entry is a case-sensitive alphanumeric string of up to 32 characters. Each row of this table must contain a unique community name.

Client IP Address -

An IP address (or portion thereof) from which this device will accept SNMP packets with the associated community. The requesting entity's IP address is ANDed with the Subnet Mask before being compared to the IP Address. Note: that if the Subnet Mask is set to

0.0.0.0, an IP Address of 0.0.0.0 matches all IP addresses. The default value is 0.0.0.0

Client IP Mask -

A mask to be ANDed with the requesting entity's IP address before comparison with IP Address. If the result matches with IP Address then the address is an authenticated IP address. For example, if the IP Address = 9.47.128.0 and the corresponding Subnet Mask = 255.255.255.0 a range of incoming IP addresses would match, i.e. the incoming IP Address could equal 9.47.128.0 - 9.47.128.255. The default value is 0.0.0.0

Access Mode

The access level for this community string.

Status

The status of this community access entry.

4.5.23 show snmptrap

This command displays SNMP trap receivers. Trap messages are sent across a network to an SNMP Network Manager. These messages alert the manager to events occurring within the switch or on the network. Six trap receivers are simultaneously supported.

Format

```
show snmptrap
```

Mode

```
Privileged EXEC and User EXEC
```

SNMP Trap Name

The community string of the SNMP trap packet sent to the trap manager. This may be up to 32 alphanumeric characters. This string is case sensitive.

IP Address

The IP address to receive SNMP traps from this device. Enter four numbers between 0 and 255 separated by periods.

Status

A pull down menu that indicates the receiver's status (enabled or disabled) and allows the administrator/user to perform actions on this user entry:

Enable - send traps to the receiver

Disable - do not send traps to the receiver.

Delete - remove the table entry.

4.5.24 show telnet

This command displays outbound telnet settings.

Format

```
show telnet
```

Mode

```
Privileged EXEC and User EXEC
```

Outbound Telnet Connection Login Timeout (minutes)

This object indicates the number of minutes a remote connection session is allowed to remain inactive before being logged off. May be specified as a number from 1 to 160. The factory default is 5.

Maximum Number of Outbound Telnet Sessions

This object indicates the number of simultaneous outbound connection sessions allowed. The factory default is 5.

Allow New Outbound Telnet Sessions

Indicates that new outbound telnet sessions will not be allowed when set to no. The factory default value is yes.

4.5.25 show telnetcon

This command displays inbound telnet settings.

Format

```
show telnetcon
```

Mode

```
Privileged EXEC and User EXEC
```

Telnet Connection Login Timeout (minutes)

This object indicates the number of minutes a remote connection session is allowed to remain inactive before being logged off. May be specified as a number from 1 to 160. The factory default is 4.

Maximum Number of Remote Telnet Sessions

This object indicates the number of simultaneous remote connection sessions allowed. The factory default is 2 (4 for version L2P).

Allow New Telnet Sessions

Indicates that new telnet sessions will not be allowed when set to no. The factory default value is yes.

4.5.26 show trapflags

This command displays trap conditions. Configure which traps the switch should generate by enabling or disabling the trap condition. If a trap condition is enabled and the condition is detected, the switch's SNMP agent sends the trap to all enabled trap receivers. The switch does not have to be reset to implement the changes. Cold and warm start traps are always generated and cannot be disabled.

Format

```
show trapflags
```

Mode

```
Privileged EXEC and User EXEC
```

Authentication Flag

May be enabled or disabled. The factory default is enabled. Indicates whether authentication failure traps will be sent.

Chassis

Indicates whether traps that are related to the chassis functionality of the switch will be sent. These functions include the signal contacts, the ACA, warnings about the temperature, changes in the module map, addition or removal of SFP modules, power failure and the LLDP and SNTP features. May be enabled or disabled.
Default: enabled.

Layer 2 Redundancy

Indicates whether traps that are related to the layer 2 redundancy features of the switch will be sent. The HiPER-Ring and the Redundant Coupling will tell you with these traps when the main line has failed or returned. May be enabled or disabled.
Default: enabled.

Link Up/Down Flag

May be enabled or disabled. The factory default is enabled. Indicates whether link status traps will be sent.

Multiple Users Flag

May be enabled or disabled. The factory default is enabled. Indicates whether a trap will be sent when the same user ID is logged into the switch more than once at the same time (either via telnet or serial port).

Port Security (MAC, IP and 802.1X)

Enable/disable sending port security event traps (for MAC/IP port security as well as for 802.1X).

Spanning Tree Flag

May be enabled or disabled. The factory default is enabled. Indicates whether spanning tree traps will be sent.

4.5.27 snmp-access global

This command configures the global SNMP access setting (for all SNMP versions).

Format

```
snmp-access global {disable|enable|read-only}
```

Mode

```
Global Config
```

disable

Disable SNMP access to this switch, regardless of the SNMP version used.

enable

Enable SNMP read and write access to this switch, regardless of the SNMP version used.

read-only

Enable SNMP read-only access to this switch (disable write access), regardless of the SNMP version used.

4.5.28 snmp-access version

This command configures the SNMP version specific access mode for SNMPv1 and SNMPv2.

Format

```
snmp-access version {all|v1|v2} {disable|enable}
```

Mode

```
Global Config
```

all

Enable or disable SNMP access by all protocol versions (v1 and v2).

v1

Enable or disable SNMP access by v1.

v2

Enable or disable SNMP access by v2.

Note: The SNMPv3 is always allowed and can only be disabled or restricted by the global command (snmp-access global ...).

4.5.29 snmp-server community

This command adds (and names) a new SNMP community. A community name is a name associated with the switch and with a set of SNMP managers that manage it with a specified privileged level. The length of name can be up to 32 case-sensitive characters.

Note: Community names in the SNMP community table must be unique. When making multiple entries using the same community name, the first entry is kept and processed and all duplicate entries are ignored.

Default

Two default community names: Public and Private. You can replace these default community names with unique identifiers for each community. The default values for the remaining four community names are blank.

Format

```
snmp-server community <name>
```

Mode

```
Global Config
```

no snmp-server community

This command removes this community name from the table. The name is the community name to be deleted.

Format

```
no snmp-server community <name>
```

Mode

```
Global Config
```

4.5.30 snmp-server community ipaddr

This command sets a client IP address for an SNMP community. The address is the associated community SNMP packet sending address and is used along with the client IP mask value to denote a range of IP addresses from which SNMP clients may use that community to access the device. A value of 0.0.0.0 allows access from any IP address. Otherwise, this value is ANDed with the mask to determine the range of allowed client IP addresses. The name is the applicable community name.

Default

0.0.0.0

Format

```
snmp-server community ipaddr <ipaddr> <name>
```

Mode

```
Global Config
```

no snmp-server community ipaddr

This command sets a client IP address for an SNMP community to 0.0.0.0. The name is the applicable community name.

Format

```
no snmp-server community ipaddr <name>
```

Mode

```
Global Config
```

4.5.31 snmp-server community ipmask

This command sets a client IP mask for an SNMP community. The address is the associated community SNMP packet sending address and is used along with the client IP address value to denote a range of IP addresses from which SNMP clients may use that community to access the device. A value of 255.255.255.255 will allow access from only one station, and will use that machine's IP address for the client IP Address. A value of 0.0.0.0 will allow access from any IP address. The name is the applicable community name.

Default

0.0.0.0

Format

```
snmp-server community ipmask <ipmask> <name>
```

Mode

```
Global Config
```

no snmp-server community ipmask

This command sets a client IP mask for an SNMP community to 0.0.0.0. The name is the applicable community name. The community name may be up to 32 alphanumeric characters.

Format

```
no snmp-server community ipmask <name>
```

Mode

```
Global Config
```

4.5.32 snmp-server community mode

This command activates an SNMP community. If a community is enabled, an SNMP manager associated with this community manages the switch according to its access right. If the community is disabled, no SNMP requests using this community are accepted. In this case the SNMP manager associated with this community cannot manage the switch until the Status is changed back to Enable.

Default

The default private and public communities are enabled by default. The four undefined communities are disabled by default.

Format

```
snmp-server community mode <name>
```

Mode

```
Global Config
```

no snmp-server community mode

This command deactivates an SNMP community. If the community is disabled, no SNMP requests using this community are accepted. In this case the SNMP manager associated with this community cannot manage the switch until the Status is changed back to Enable.

Format

```
no snmp-server community mode <name>
```

Mode

```
Global Config
```

4.5.33 snmp-server community ro

This command restricts access to switch information. The access mode is read-only (also called public).

Format

```
snmp-server community ro <name>
```

Mode

```
Global Config
```

4.5.34 snmp-server community rw

This command restricts access to switch information. The access mode is read/write (also called private).

Format

```
snmp-server community rw <name>
```

Mode

```
Global Config
```

4.5.35 snmp-server contact

This command configures the system contact.

Format

```
snmp-server contact <system contact>
```

Mode

```
Global Config
```

4.5.36 snmp-server location

This command configures the system location.

Format

```
snmp-server location <system location>
```

Mode

```
Global Config
```

4.5.37 snmp-server sysname

This command configures the system name.

Format

```
snmp-server sysname <system name>
```

Mode

```
Global Config
```

4.5.38 snmp-server enable traps

This command enables the Authentication Trap Flag.

Default

enabled

Format

```
snmp-server enable traps
```

Mode

```
Global Config
```

no snmp-server enable traps

This command disables the Authentication Trap Flag.

Format

```
no snmp-server enable traps
```

Mode

```
Global Config
```

4.5.39 snmp-server enable traps chassis

Configures whether traps that are related to the chassis functionality of the switch will be sent. These functions include the signal contacts, the ACA, warnings about the temperature, changes in the module map, addition or removal of SFP modules, power failure and the LLDP and SNTP features. May be enabled or disabled.
Default: enabled.

Default

enabled

Format

```
snmp-server enable traps chassis
```

Mode

```
Global Config
```

no snmp-server enable traps chassis

This command disables chassis traps for the entire switch.

Format

```
no snmp-server enable traps chassis
```

Mode

```
Global Config
```

4.5.40 snmp-server enable traps l2redundancy

Indicates whether traps that are related to the layer 2 redundancy features of the switch will be sent. The HiPER-Ring and the Redundant Coupling will tell you with these traps when the main line has failed or returned.
May be enabled or disabled.
Default: enabled.

Default

enabled

Format

```
snmp-server enable traps l2redundancy
```

Mode

```
Global Config
```

no snmp-server enable traps l2redundancy

This command disables layer 2 redundancy traps for the entire switch.

Format

```
no snmp-server enable traps l2redundancy
```

Mode

```
Global Config
```

4.5.41 snmp-server enable traps linkmode

This command enables Link Up/Down traps for the entire switch. When enabled, link traps are sent only if the Link Trap flag setting associated with the port is enabled (see ‘snmp trap link-status’ command).

Default

enabled

Format

```
snmp-server enable traps linkmode
```

Mode

```
Global Config
```

no snmp-server enable traps linkmode

This command disables Link Up/Down traps for the entire switch.

Format

```
no snmp-server enable traps linkmode
```

Mode

```
Global Config
```

4.5.42 snmp-server enable traps multiusers

This command enables Multiple User traps. When the traps are enabled, a Multiple User Trap is sent when a user logs in to the terminal interface (EIA 232 (serial port) or telnet) and there is an existing terminal interface session.

Default

enabled

Format

```
snmp-server enable traps multiusers
```

Mode

```
Global Config
```

no snmp-server enable traps multiusers

This command disables Multiple User traps.

Format

```
no snmp-server enable traps multiusers
```

Mode

```
Global Config
```

4.5.43 snmp-server enable traps port-sec

This command enables port security traps. When the traps are enabled, a Port Security Trap is sent if a port security event occurs
(applies to MAC/IP Port Security as well as to 802.1X Port Security).

Default

enabled

Format

```
snmp-server enable traps port-sec
```

Mode

```
Global Config
```

no snmp-server enable traps port-sec

This command disables Port Security traps.

Format

```
no snmp-server enable traps port-sec
```

Mode

```
Global Config
```

4.5.44 snmp-server enable traps stpmode

This command enables the sending of new root traps and topology change notification traps.

Default

enabled

Format

```
snmp-server enable traps stpmode
```

Mode

```
Global Config
```

no snmp-server enable traps stpmode

This command disables the sending of new root traps and topology change notification traps.

Format

```
no snmp-server enable traps stpmode
```

Mode

```
Global Config
```

4.5.45 snmptrap

This command adds an SNMP trap name. The maximum length of name is 32 case-sensitive alphanumeric characters.

Default

The default name for the six undefined community names is Delete.

Format

```
snmptrap <name> <ipaddr>
```

Mode

```
Global Config
```

■ no snmptrap

This command deletes trap receivers for a community.

Format

```
no snmptrap <name> <ipaddr>
```

Mode

```
Global Config
```

4.5.46 snmptrap ipaddr

This command assigns an IP address to a specified community name. The maximum length of name is 32 case-sensitive alphanumeric characters.

Note: IP addresses in the SNMP trap receiver table must be unique. If you make multiple entries using the same IP address, the first entry is retained and processed. All duplicate entries are ignored.

Format

```
snmptrap ipaddr <name> <ipaddrold> <ipaddrnew>
```

Mode

```
Global Config
```

4.5.47 snmptrap mode

This command activates or deactivates an SNMP trap. Enabled trap receivers are active (able to receive traps). Disabled trap receivers are inactive (not able to receive traps).

Format

```
snmptrap mode <name> <ipaddr>
```

Mode

```
Global Config
```

no snmptrap mode

This command deactivates an SNMP trap. Disabled trap receivers are inactive (not able to receive traps).

Format

```
no snmptrap mode <name> <ipaddr>
```

Mode

```
Global Config
```

4.5.48 telnetcon maxsessions

Configure the number of remote telnet connections allowed.

Default

2 (4 for version L2P)

Format

```
telnetcon maxsessions <0-2>
telnetcon maxsessions <0-4>
```
(for version L2P)

Mode

```
Privileged EXEC
```

no telnetcon maxsessions

This command sets the maximum number of telnet connection sessions that can be established to the default value.

Format

```
no telnetcon maxsessions
```

Mode

```
Privileged EXEC
```

4.5.49 telnetcon timeout

This command sets the telnet connection session timeout value, in minutes. A session is active as long as the session has not been idle for the value set. The time is a decimal value from 1 to 160.

Default

5

Format

```
telnetcon timeout <1-160>
```

Mode

```
Privileged EXEC
```

■ no telnetcon timeout

This command sets the telnet connection session timeout value to the default.
Changing the timeout value for active sessions does not become effective until the session is reaccessed. Also, any keystroke activates the new timeout duration.

Format

```
no telnetcon timeout
```

Mode

```
Privileged EXEC
```

4.6 Syslog Commands

This section provides a detailed explanation of the Syslog commands. The commands are divided into two functional groups:

- Show commands display spanning tree settings, statistics, and other information.
- Configuration Commands configure features and options of the device. For every configuration command there is a show command that displays the configuration setting.

4.6.1 logging buffered

This command enables logging to an in-memory log where up to 128 logs are kept.

Default

```
disabled
```

Format

```
logging buffered
```

Mode

```
Global Config
```

no logging buffered

This command disables logging to in-memory log.

Format

```
no logging buffered
```

4.6.2 logging buffered wrap

This command enables wrapping of in-memory logging when full capacity reached. Otherwise when full capacity is reached, logging stops.

Default

```
wrap
```

Format

```
logging buffered wrap
```

Mode

```
Privileged EXEC
```

■ no logging buffered wrap

This command disables wrapping of in-memory logging and configures logging to stop when capacity is full.

Format

```
no logging buffered wrap
```

4.6.3 logging cli-command

This command enables the CLI command Logging feature. The Command Logging component enables the switch software to log all Command Line Interface (CLI) commands issued on the system.

Default

```
enabled
```

Format

```
logging cli-command
```

Mode

```
Global Config
```

no logging cli-command

This command disables the CLI command Logging feature.

Format

```
no logging cli-command
```

4.6.4 logging console

This command enables logging to the console. The <severitylevel> value is specified as either an integer from 0 to 7 or symbolically through one of the following keywords: emergency (0), alert (1), critical (2), error (3), warning (4), notice (5), informational (6), debug (7).

Default

```
disabled; critical
```

Format

```
logging console [severitylevel]
```

Mode

```
Global Config
```

■ no logging console

This command disables logging to the console.

Format

```
no logging console
```

4.6.5 logging host

This command enables logging to a host where up to eight hosts can be configured.

Default

```
Port - 514; Level - Critical;
```

Format

```
logging host <hostaddress> [<port> [<severitylevel>]]
```

Mode

```
Global Config
```

Severity number	Sevirity name	Meaning
0	emergency	Minimum severity to be logged is 0. This is the highest level and will result in all other messages of lower levels not being logged.
1	alert	Minimum severity to be logged is 1.
2	critical	Minimum severity to be logged is 2.
3	error	Minimum severity to be logged is 3.
4	warning	Minimum severity to be logged is 4.
5	notice	Minimum severity to be logged is 5.
6	info	Minimum severity to be logged is 6.
7	debug	Minimum severity to be logged is 7. This is the lowest level and will result in messages of all levels being logged.

Tab. 16: Possible severity levels

4.6.6 logging host reconfigure

The Logging Host Index for which to change the IP Address.

Format

```
logging host reconfigure <hostindex> <hostaddress>
```

Mode

```
Global Config
```

4.6.7 logging host remove

The Logging Host Index to be removed.

Format

```
logging host remove <hostindex>
```

Mode

```
Global Config
```

4.6.8 logging syslog

This command enables syslog logging.

Default

```
disabled
```

Format

```
logging syslog
```

Mode

```
Global Config
```

■ no logging syslog

This command disables syslog logging.

Format

```
no logging syslog
```

4.6.9 logging syslog port

Enter the port number of the syslog server.

Default

```
514
```

Format

```
logging syslog <portid>
```

Mode

```
Global Config
```

4.7 Scripting Commands

Configuration Scripting allows the user to generate text-formatted script files representing the current configuration. These configuration script files can be uploaded to a PC and edited, downloaded to the system and applied to the system. Configuration scripts can be applied to one or more switches with no/ minor modifications.

Use the show running-config command to capture the running configuration into a script. Use the copy command to transfer the configuration script to/ from the switch.

Scripts are intended to be used on systems with default configuration but users are not prevented from applying scripts on systems with non-default configurations.

Note:
- The file extension must be “.cli”.
- A maximum of ten scripts are allowed on the switch.
- The combined size of all script files on the switch shall not exceed 1024 KB.

4.7.1 script apply

This command applies the commands in the script to the switch. We recommend that the system have default configurations but users are not prevented from applying scripts on systems with non-default configurations. The <scriptname> parameter is the name of the script to apply.

Format

```
script apply <scriptname>
```

Mode

```
Privileged EXEC
```

4.7.2 script delete

This command deletes a specified script where the <scriptname> parameter is the name of the script to be deleted. The ‘all’ option deletes all the scripts present on the switch.

Format

```
script delete {<scriptname> | all}
```

Mode

```
Privileged EXEC
```

4.7.3 script list

This command lists all scripts present on the switch as well as the remaining available space.

Format

```
script list [aca]
```

Mode

```
Privileged EXEC
```

Configuration Script

Name of the script.
Without the optional ACA parameter: Listing of the scripts in the switch´s flash memory.
With the optional ACA parameter: Listing of the scripts on the external ACA 21-USB.

Size

Size of the script.

4.7.4 script show

This command displays the contents of a script file. The parameter <scriptname> is the name of the script file.

Format

```
script show <scriptname>
```

Mode

```
Privileged EXEC
```

The format of display is

```
Line <no>: <Line contents>
```

4.7.5 script validate

This command validates a script file by parsing each line in the script file where <scriptname> is the name of the script to validate.The validate option is intended to be used as a tool for script development.
Validation identifies potential problems. It may or may not identify all problems with a given script on any given device.

Format

```
script validate <scriptname>
```

Mode

```
Privileged EXEC
```

4.7.6 selftest ramtest

Enable or disable the ramtest. Default: enabled.

Format

```
selftest ramtest {disable|enable}
```

Mode

```
Global Config
```

selftest ramtest disable

Disable the ramtest.

selftest ramtest enable

Enable the ramtest. This is the default.

4.8 Device Configuration Commands

4.8.1 addport

This command adds one port to the Link Aggregation (LAG). The given interface is a logical slot and port number of a configured Link Aggregation.

Note: Before adding a port to a Link Aggregation, set the physical mode of the port. See ‘speed’ command.

Format

```
addport <logical slot/port>
```

Mode

```
Interface Config
```

4.8.2 adminmode

This command enables the whole Link Aggregation as one single port.

Note: Before adding a port to a Link Aggregation, set the physical mode of the port. See ‘speed’ command.

Format

```
adminmode
```

Mode

```
Interface Config
```

■ no adminmode

This command disables the whole Link Aggregation as one single port.

Format

```
no adminmode
```

Mode

```
Interface Config
```

4.8.3 auto-negotiate

This command enables automatic negotiation on a port. The default value is enable.

Format

```
auto-negotiate
```

Mode

```
Interface Config
```

■ no auto-negotiate

This command disables automatic negotiation on a port.

Format

```
no auto-negotiate
```

Mode

```
Interface Config
```

4.8.4 cable-crossing

Enable or disable the cable crossing function.

Note: The `cable-crossing` settings become effective for a certain port, if `auto-negotiate` is disabled for this port.
The `cable-crossing` settings are irrelevant for a certain port, if `auto-negotiate` is enabled for this port.

Note: The `cable-crossing` function is available for the RS20/RS30/RS40, MS20/MS30, RSR20/RSR30, MACH 1000, Power MICE and OCTOPUS devices.

Format

```
cable-crossing {enable|disable}
```

Mode

```
Interface Config
```

cable-crossing enable

The device swaps the port output and port input of the TP port.

cable-crossing disable

The device does not swap the port output and port input of the TP port.

4.8.5 auto-negotiate all

This command enables automatic negotiation on all ports. The default value is enable.

Format

```
auto-negotiate all
```

Mode

```
Global Config
```

no auto-negotiate all

This command disables automatic negotiation on all ports.

Format

```
no auto-negotiate all
```

Mode

```
Global Config
```

4.8.6 media-module remove

This command logically removes a media-module that has already been physically removed.

Format

```
media-module remove <1..n>
```

Mode

```
Global Config
```

4.8.7 deleteport

This command deletes the port from the link-aggregation (LAG). The interface is a logical slot and port number of a configured link aggregation.

Note: This command has to be issued in the member port's interface config mode.

Format

```
deleteport <logical slot/port>
```

Mode

```
Interface Config
```

4.8.8 deleteport all

This command deletes all configured ports from the link-aggregation (LAG). The interface is a logical slot and port number of a configured link-aggregation.

Format

```
deleteport <logical slot/port> all
```

Mode

```
Global Config
```

4.8.9 macfilter

This command adds a static MAC filter entry for the MAC address <macaddr> on the VLAN <vlanid>. The <macaddr> parameter must be specified as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6.

The restricted MAC Addresses are: 00:00:00:00:00:00, 01:80:C2:00:00:00 to 01:80:C2:00:00:0F, 01:80:C2:00:00:20 to 01:80:C2:00:00:21, and FF:FF:FF:FF:FF:FF.

The <vlanid> parameter must identify a valid VLAN.

Up to 100 static MAC filters may be created.

Format

```
macfilter <macaddr> <vlanid>
```

Mode

```
Global Config
```

- **no macfilter**

  This command removes all filtering restrictions and the static MAC filter entry for the MAC address <macaddr> on the VLAN <vlanid>. The <macaddr> parameter must be specified as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6.

  The <vlanid> parameter must identify a valid VLAN.

Format

```
no macfilter <macaddr> <vlanid>
```

Mode

```
Global Config
```

4.8.10 macfilter adddest

This command adds the interface to the destination filter set for the MAC filter with the given <macaddr> and VLAN of <vlanid>. The <macaddr> parameter must be specified as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6.
The <vlanid> parameter must identify a valid VLAN.

Format

```
macfilter adddest <macaddr> <vlanid>
```

Mode

```
Interface Config
```

no macfilter adddest

This command removes a port from the destination filter set for the MAC filter with the given <macaddr> and VLAN of <vlanid>. The <macaddr> parameter must be specified as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6.

The <vlanid> parameter must identify a valid VLAN.

Format

```
no macfilter adddest <macaddr> <vlanid>
```

Mode

```
Interface Config
```

4.8.11 macfilter adddest all

This command adds all interfaces to the destination filter set for the MAC filter with the given <macaddr> and VLAN of <vlanid>. The <macaddr> parameter must be specified as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6.

The <vlanid> parameter must identify a valid VLAN.

Format

```
macfilter adddest {all | <macaddr> <vlanid>}
```

Mode

```
Global Config
```

no macfilter adddest all

This command removes all ports from the destination filter set for the MAC filter with the given <macaddr> and VLAN of <vlanid>. The <macaddr> parameter must be specified as a 6-byte hexadecimal number in the format of b1:b2:b3:b4:b5:b6.

The <vlanid> parameter must identify a valid VLAN.

Format

```
no macfilter adddest [all | <macaddr> <vlanid>}
```

Mode

```
Global Config
```

4.8.12 monitor session <session-id>

This command configures a probe port and a monitored port for monitor session (port monitoring). The first slot/port is the source monitored port and the second slot/port is the destination probe port. If this command is executed while port monitoring is enabled, it will have the effect of changing the probe and monitored port values.

Format

```
monitor session <session-id> [mode | {source | destination} interface <slot/port>]
```

Mode

```
Global Config
```

- **no monitor session <session-id>**
  This command removes the monitor session (port monitoring) designation from both the source probe port and the destination monitored port and removes the probe port from all VLANs. The port must be manually re-added to any desired VLANs.

Format

```
no monitor session <session-id> [mode]
```

Mode

```
Global Config
```

4.8.13 monitor session <session-id> mode

This command configures the monitor session (port monitoring) mode to enable. The probe and monitored ports must be configured before monitor session (port monitoring) can be enabled. If enabled, the probe port will monitor all traffic received and transmitted on the physical monitored port. It is not necessary to disable port monitoring before modifying the probe and monitored ports.

Default

```
disabled
```

Format

```
monitor session <session-id> mode
```

Mode

```
Global Config
```

no monitor session <session-id> mode

This command sets the monitor session (port monitoring) mode to disable.

Format

```
no monitor session <session-id> mode
```

Mode

```
Global Config
```

4.8.14 monitor session <session-id> source/destination

This command allows you to configure and activate the port mirroring function of the switch. Port mirroring is when the data traffic of a source port is copied to a specified destination port. The data traffic at the source port is not influenced by port mirroring. A management tool connected at the specified port, e.g., an RMON probe, can thus monitor the data traffic of the source port.

Note: In active port mirroring, the specified destination port is used solely for observation purposes.

Default

```
none
```

Format

```
monitor session <session-id> {source | destination}
interface <slot/port>
```

Mode

```
Global Config
```

■ no monitor session <session-id> source/destination

This command resets the monitor session (port monitoring) source/destination.

Format

```
no monitor session <session-id> {source | destina-
tion} interface
```

Mode

```
Global Config
```

4.8.15 link-aggregation

This command configures a new Link Aggregation (LAG) and generates a logical slot/port number for the Link Aggregation. Display this number using the “show link-aggregation”.

Note: Before including a port in a Link Aggregation, set the port physical mode. See ‘speed’ command.

Format

```
link-aggregation <name>
```

Mode

```
Global Config
```

4.8.16 link-aggregation adminmode

This command enables a Link Aggregation (LAG). The interface is a logical slot/port for a configured Link Aggregation. The option `all` sets every configured Link Aggregation with the same administrative mode setting.

Format

```
link-aggregation adminmode all
```

Mode

```
Global Config
```

- **no link-aggregation adminmode**
  This command disables a Link Aggregation (LAG). The interface is a logical slot/port for a configured Link Aggregation. The option `all` sets every configured Link Aggregation with the same administrative mode setting.

Format

```
no link-aggregation adminmode all
```

Mode

```
Global Config
```

4.8.17 link-aggregation linktrap

This command enables link trap notifications for the link-aggregation (LAG). The interface is a logical slot/port for a configured link-aggregation. The option `all` sets every configured link-aggregation with the same administrative mode setting.

Default

```
enabled
```

Format

```
link-aggregation linktrap {<logical slot/port> |
all}
```

Mode

```
Global Config
```

■ no link-aggregation linktrap

This command disables link trap notifications for the link-aggregation (LAG). The interface is a logical unit, slot and port slot and port for a configured link-aggregation. The option `all` sets every configured link-aggregation with the same administrative mode setting.

Format

```
no link-aggregation linktrap {<logical slot/port> |
all]
```

Mode

```
GlobalConfig
```

4.8.18 link-aggregation name

This command defines a name for the link-aggregation (LAG). The interface is a logical slot/port for a configured link-aggregation, and name is an alphanumeric string up to 15 characters. This command is used to modify the name that was associated with the link-aggregation when it was created.

Format

```
link-aggregation name {<logical slot/port> | all |
<name>}
```

Mode

```
Global Config
```

4.8.19 set garp timer join

This command sets the GVRP join time per port and per GARP. Join time is the interval between the transmission of GARP Protocol Data Units (PDUs) registering (or re-registering) membership for a VLAN or multicast group. This command has an effect only when GVRP is enabled. The time is from 10 to 100 (centiseconds). the value 20 centiseconds is 0.2 seconds.

Default

```
20
```

Format

```
set garp timer join <10-100>
```

Mode

```
Interface Config
```

no set garp timer join

This command sets the GVRP join time per port and per GARP to 20 centiseconds (0.2 seconds). This command has an effect only when GVRP is enabled.

Format

```
no set garp timer join
```

Mode

```
Interface Config
```

4.8.20 set garp timer join all

This command sets the GVRP join time for all ports and per GARP. Join time is the interval between the transmission of GARP Protocol Data Units (PDUs) registering (or re-registering) membership for a VLAN or multicast group. This command has an effect only when GVRP is enabled. The time is from 10 to 100 (centiseconds). The value 20 centiseconds is 0.2 seconds.

Default

```
20
```

Format

```
set garp timer join all <10-100>
```

Mode

```
Global Config
```

no set garp timer join all

This command sets the GVRP join time for all ports and per GARP to 20 centiseconds (0.2 seconds). This command has an effect only when GVRP is enabled.

Format

```
no set garp timer join all
```

Mode

```
Global Config
```

4.8.21 set garp timer leave

This command sets the GVRP leave time per port. Leave time is the time to wait after receiving an unregister request for a VLAN or a multicast group before deleting the VLAN entry. This can be considered a buffer time for another station to assert registration for the same attribute in order to maintain uninterrupted service.time is 20 to 600 (centiseconds). The value 60 centiseconds is 0.6 seconds.

Note: This command has an effect only when GVRP is enabled.

Default

```
60
```

Format

```
set garp timer leave <20-600>
```

Mode

```
Interface Config
```

no set garp timer leave

TThis command sets the GVRP leave time per port to 60 centiseconds (0.6 seconds).

Note: This command has an effect only when GVRP is enabled.

Format

```
no set garp timer leave
```

Mode

```
Interface Config
```

4.8.22 set garp timer leave all

This command sets the GVRP leave time for all ports. Leave time is the time to wait after receiving an unregister request for a VLAN or a multicast group before deleting the VLAN entry. This can be considered a buffer time for another station to assert registration for the same attribute in order to maintain uninterrupted service.time is 20 to 600 (centiseconds). The value 60 centiseconds is 0.6 seconds.

Note: This command has an effect only when GVRP is enabled.

Default

```
60
```

Format

```
set garp timer leave all <20-600>
```

Mode

```
Global Config
```

no set garp timer leave all

This command sets the GVRP leave time for all ports to the default 60 centiseconds (0.6 seconds).

Note: This command has an effect only when GVRP is enabled.

Format

```
no set garp timer leave all
```

Mode

```
Global Config
```

4.8.23 set garp timer leaveall

This command sets how frequently *Leave All PDUs* are generated per port. A *Leave All PDU* indicates that all registrations will be unregistered. Participants would need to rejoin in order to maintain registration. The value applies per port and per GARP participation. The time may range from 200 to 6000 (centiseconds). The value 1000 centiseconds is 10 seconds.

Note: This command has an effect only when GVRP is enabled.

Default

```
1000
```

Format

```
set garp timer leaveall <200-6000>
```

Mode

```
Interface Config
```

no set garp timer leaveall

This command sets how frequently *Leave All PDUs* are generated per port to 1000 centiseconds (10 seconds).

Note: This command has an effect only when GVRP is enabled.

Format

```
no set garp timer leaveall
```

Mode

```
Interface Config
```

4.8.24 set garp timer leaveall all

This command sets how frequently *Leave All PDUs* are generated for all ports. A *Leave All PDU* indicates that all registrations will be unregistered. Participants would need to rejoin in order to maintain registration. The value applies per port and per GARP participation. The time may range from 200 to 6000 (centiseconds). The value 1000 centiseconds is 10 seconds.

Note: This command has an effect only when GVRP is enabled.

Default

```
1000
```

Format

```
set garp timer leaveall all <200-6000>
```

Mode

```
Global Config
```

no set garp timer leaveall all

This command sets how frequently *Leave All PDUs* are generated for all ports to 1000 centiseconds (10 seconds). .

Note: This command has an effect only when GVRP is enabled.

Format

```
no set garp timer leaveall all
```

Mode

```
Global Config
```

4.8.25 set gmrp adminmode

This command enables GARP Multicast Registration Protocol (GMRP) on the system. The default value is disable.

Format

```
set gmrp adminmode
```

Mode

```
Privileged EXEC
```

- **no set gmrp adminmode**
  This command disables GARP Multicast Registration Protocol (GMRP) on the system.

Format

```
no set gmrp adminmode
```

Mode

```
Privileged EXEC
```

4.8.26 set gmrp interfacemode

This command enables GARP Multicast Registration Protocol on a selected interface. If an interface which has GARP enabled is enlisted as a member of a Link Aggregation (LAG), GARP functionality will be disabled on that interface. GARP functionality will subsequently be re-enabled if Link Aggregation (LAG) membership is removed from an interface that has GARP enabled.

Default

```
enabled
```

Format

```
set gmrp interfacemode
```

Mode

```
Interface Config
```

- **no set gmrp interfacemode**
  This command disables GARP Multicast Registration Protocol on a selected interface. If an interface which has GARP enabled is enlisted as a member of a Link Aggregation (LAG), GARP functionality will be disabled on that interface. GARP functionality will subsequently be re-enabled if Link Aggregation (LAG) membership is removed from an interface that has GARP enabled.

Format

```
no set gmrp interfacemode
```

Mode

```
Interface Config
```

4.8.27 set gmrp interfacemode

This command enables GARP Multicast Registration Protocol on all interfaces. If an interface which has GARP enabled is enabled for routing or is enlisted as a member of a link-aggregation (LAG), GARP functionality will be disabled on that interface. GARP functionality will subsequently be re-enabled if routing is disabled and link-aggregation (LAG) membership is removed from an interface that has GARP enabled.

Default

```
disabled
```

Format

```
set gmrp interfacemode
```

Mode

```
Global Config
```

no set gmrp interfacemode

This command disables GARP Multicast Registration Protocol on a selected interface.

Format

```
no set gmrp interfacemode
```

Mode

```
Global Config
```

4.8.28 set igmp

This command enables IGMP Snooping on the system. The default value is disable.

Note: The IGMP snooping application supports the following:

- Global configuration or per interface configuration.
- Validation of the IP header checksum (as well as the IGMP header checksum) and discarding of the frame upon checksum error.
- Maintenance of the forwarding table entries based on the MAC address versus the IP address.
- Flooding of unregistered multicast data packets to all ports in the VLAN.

Format

```
set igmp
```

Mode

```
Global Config
```

no set igmp

This command disables IGMP Snooping on the system.

Format

```
no set igmp
```

Mode

```
Global Config
```

4.8.29 set igmp

This command enables IGMP Snooping on a selected interface.

Default

```
enabled
```

Format

```
set igmp
```

Mode

```
Interface Config
```

■ no set igmp

This command disables IGMP Snooping on a selected interface.

Format

```
no set igmp
```

Mode

```
Interface Config
```

4.8.30 set igmp automatic-mode

If enabled, this port is allowed to be set as static query port automatically, if the LLDP protocol has found a switch or router connected to this port. Use the command's normal form to enable the feature, the 'no' form to disable it.

Default

```
disabled
```

Format

```
set igmp automatic-mode
```

Mode

```
Interface Config
```

4.8.31 set igmp forward-all

This command activates the forwarding of multicast frames to this interface even if the given interface has not received any reports by hosts. N. B.: this applies only to frames that have been learned via IGMP Snooping. The purpose is that an interface (e. g. a HIPER Ring's ring port) may need to forward all such frames even if no reports have been received on it. This enables faster recovery from ring interruptions for multicast frames.

Default

```
disabled
```

Format

```
set igmp forward-all
```

Mode

```
Interface Config
```

no set igmp forward-all

This command disables the forwarding of all multicast frames learned via IGMP Snooping on a selected interface.

Format

```
no set igmp forward-all
```

Mode

```
Interface Config
```

4.8.32 set igmp forward-unknown

This command defines how to handle unknown multicast frames.
This command is available for MS20/30 and RS20/30.

Format

```
set igmp forward-unknown {discard|flood|query-
ports}
```

Mode

```
Global Config
```

discard

Unknown multicast frames will be discarded.

flood

Unknown multicast frames will be flooded.

query-ports

Unknown multicast frames will be forwarded only to query ports.

4.8.33 set igmp static-query-port

This command activates the forwarding of IGMP membership report frames to this interface even if the given interface has not received any queries. The purpose is that a port may need to forward such frames even if no queries have been received on it (e. g., if a router is connected to the interface that sends no queries).

Default

```
disabled
```

Format

```
set igmp static-query-port
```

Mode

```
Interface Config
```

■ no set igmp

This command disables the unconditional forwarding of IGMP membership report frames to this interface.

Format

```
no set igmp static-query-port
```

Mode

```
Interface Config
```

4.8.34 set igmp groupmembershipinterval

This command sets the IGMP Group Membership Interval time on the system. The Group Membership Interval time is the amount of time in seconds that a switch will wait for a report from a particular group on a particular interface before deleting the interface from the entry. This value must be greater than the IGMP Maximum Response time value. The range is 3 to 3600 seconds.

Default

```
260
```

Format

```
set igmp groupmembershipinterval <3-3600>
```

Mode

```
Global Config
```

■ no set igmp groupmembershipinterval

This command sets the IGMP Group Membership Interval time on the system to 260 seconds.

Format

```
no set igmp groupmembershipinterval
```

Mode

```
Global Config
```

4.8.35 set igmp interfacemode

This command enables IGMP Snooping on all interfaces. If an interface which has IGMP Snooping enabled is enabled for port-based routing or is enlisted as a member of a link-aggregation (LAG), IGMP Snooping functionality will be disabled on that interface. IGMP Snooping functionality will subsequently be re-enabled if routing is disabled or link-aggregation (LAG) membership is removed from an interface that has IGMP Snooping enabled.

Format

```
set igmp interfacemode
```

Mode

```
Global Config
```

■ no set igmp interfacemode

This command disables IGMP Snooping on all interfaces.

Format

```
no set igmp interfacemode
```

Mode

```
Global Config
```

4.8.36 set igmp maxresponse

This command sets the IGMP Maximum Response time on the system. The Maximum Response time is the amount of time in seconds that a switch will wait after sending a query in response to a received leave message, before deleting the multicast group received in the leave message. If the switch receives a report in response to the query within the maxresponse time, then the multicast group is not deleted. This value must be less than the IGMP Query Interval time value. The range is 1 to 3598 seconds.

Default

```
10
```

Format

```
set igmp maxresponse <1-3598>
```

Mode

```
Global Config
```

Note: the IGMP Querier's max. response time was also set. It is always the same value as the IGMP Snooping max. response time.

- **no set igmp maxresponse**
  This command sets the IGMP Maximum Response time on the system to 10 seconds.

Format

```
no set igmp maxresponse
```

Mode

```
Global Config
```

4.8.37 set igmp querier max-response-time

Configure the IGMP Snooping Querier's maximum response time. The range is 1 to 3598 seconds.

Default

```
10
```

Format

```
set igmp querier max-response-time <1-3598>
```

Mode

```
Global Config
```

Note: The IGMP Snooping max. response time was also set. It is always the same value as the IGMP Querier´s max. response time.

4.8.38 set igmp querier protocol-version

Configure the IGMP Snooping Querier's protocol version (1, 2 or 3).

Default

```
2
```

Format

```
set igmp querier protocol-version {1 | 2 | 3}
```

Mode

```
Global Config
```

4.8.39 set igmp querier status

Configure the IGMP Snooping Querier's administrative status
(enable or disable).

Default

```
disable
```

Format

```
set igmp querier status {enable | disable}
```

Mode

```
Global Config
```

4.8.40 set igmp querier tx-interval

Configure the IGMP Snooping Querier's transmit interval. The range is 2 to 3599 seconds.

Default

```
125
```

Format

```
set igmp querier tx-interval <2-3599>
```

Mode

```
Global Config
```

4.8.41 show garp

This command displays Generic Attributes Registration Protocol (GARP) information.

Format

```
show garp
```

Mode

```
Privileged EXEC and User EXEC
```

GMRP Admin Mode

This displays the administrative mode of GARP Multicast Registration Protocol (GMRP) for the system.

4.8.42 show gmrp configuration

This command displays Generic Attributes Registration Protocol (GARP) information for one or all interfaces.

Format

```
show gmrp configuration {<slot/port> | all}
```

Mode

```
Privileged EXEC and User EXEC
```

Interface

This displays the slot/port of the interface that this row in the table describes.

Join Timer

Specifies the interval between the transmission of GARP PDUs registering (or re-registering) membership for an attribute. Current attributes are a VLAN or multicast group. There is an instance of this timer on a per-Port, per-GARP participant basis. Permissible values are 10 to 100 centiseconds (0.1 to 1.0 seconds). The factory default is 20 centiseconds (0.2 seconds). The finest granularity of specification is 1 centisecond (0.01 seconds).

Leave Timer

Specifies the period of time to wait after receiving an unregister request for an attribute before deleting the attribute. Current attributes are a VLAN or multicast group. This may be considered a buffer time for another station to assert registration for the same attribute in order to maintain uninterrupted service. There is an instance of this timer on a per-Port, per-GARP participant basis. Permissible values are 20 to 600 centiseconds (0.2 to 6.0 seconds). The factory default is 60 centiseconds (0.6 seconds). The finest granularity of specification is 1 centisecond (0.01 seconds).

LeaveAll Timer

This Leave All Time controls how frequently LeaveAll PDUs are generated. A LeaveAll PDU indicates that all registrations will shortly be deregistered. Participants will need to rejoin in order to maintain registration. There is an instance of this timer on a per-Port, per-GARP participant basis. The Leave All Period Timer is set to a random value in the range of LeaveAllTime to 1.5*LeaveAllTime. Permissible values are 200 to 6000 centiseconds (2 to 60 seconds). The factory default is

1000 centiseconds (10 seconds). The finest granularity of specification is 1 centisecond (0.01 seconds).

Port GMRP Mode

Indicates the GMRP administrative mode for the port. It may be enabled or disabled. If this parameter is disabled, Join Time, Leave Time and Leave All Time have no effect. The factory default is disabled.

4.8.43 show igmpsnooping

This command displays IGMP Snooping information. Configured information is displayed whether or not IGMP Snooping is enabled. Status information is only displayed when IGMP Snooping is enabled.

Format

```
show igmpsnooping
```

Mode

`Privileged EXEC and User EXEC`

Admin Mode

This indicates whether or not IGMP Snooping is globally enabled on the switch.

Forwarding of Unknown Frames

This displays if and how unknown multicasts are forwarded.
The setting can be Discard, Flood or Query Ports.
The default is Query Ports.

Group Membership Interval

This displays the IGMP Group Membership Interval. This is the amount of time a switch will wait for a report for a particular group on a particular interface before it sends a query on that interface. This value may be configured.

Multicast Control Frame Count

This displays the number of multicast control frames that are processed by the CPU.

Interfaces Enabled for IGMP Snooping

This is the list of interfaces on which IGMP Snooping is enabled. Additionally, if a port has a special function, it will be shown to the right of its slot/port number. There are 3 special functions: `Forward All`, `Static Query Port` and `Learned Query Port`.

Querier Status (the administrative state).

This displays the IGMP Snooping Querier's administrative status.

Querier Mode (the actual state, read only)

This displays the IGMP Snooping Querier's operating status.

Querier Transmit Interval

This displays the IGMP Snooping Querier's transmit interval in seconds.

Querier Max. Response Time

This displays the IGMP Snooping Querier's maximum response time in seconds.

Querier Protocol Version

This displays the IGMP Snooping Querier's protocol version number.

4.8.44 show mac-filter-table gmrp

This command displays the GARP Multicast Registration Protocol (GMRP) entries in the Multicast Forwarding Database (MFDB) table.

Format

```
show mac-filter-table gmrp
```

Mode

```
Privileged EXEC and User EXEC
```

Mac Address

A unicast MAC address for which the switch has forwarding and or filtering information. The format is 6 or 8 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB. In an IVL system the MAC address will be displayed as 8 bytes.

Type

This displays the type of the entry. Static entries are those that are configured by the end user. Dynamic entries are added to the table as a result of a learning process or protocol.

Description

The text description of this multicast table entry.

Interfaces

The list of interfaces that are designated for forwarding (Fwd:) and filtering (Flt:).

4.8.45 show mac-filter-table igmpsnooping

This command displays the IGMP Snooping entries in the Multicast Forwarding Database (MFDB) table.

Format

```
show mac-filter-table igmpsnooping
```

Mode

```
Privileged EXEC and User EXEC
```

Mac Address

A multicast MAC address for which the switch has forwarding and or filtering information. The format is two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB.

Type

This displays the type of the entry. Static entries are those that are configured by the end user. Dynamic entries are added to the table as a result of a learning process or protocol.

Description

The text description of this multicast table entry.

Interfaces

The list of interfaces that are designated for forwarding (Fwd:) and filtering (Flt:).

4.8.46 show mac-filter-table multicast

This command displays the Multicast Forwarding Database (MFDB) information. If the command is entered with no parameter, the entire table is displayed. This is the same as entering the optional `all` parameter. The user can display the table entry for one MAC Address by specifying the MAC address as an optional parameter.

Format

```
show mac-filter-table multicast <macaddr | all>
```

Mode

```
Privileged EXEC and User EXEC
```

Mac Address

A multicast MAC address for which the switch has forwarding and or filtering information. The format is two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB.

Type

This displays the type of the entry. Static entries are those that are configured by the end user. Dynamic entries are added to the table as a result of a learning process or protocol.

Component

The component that is responsible for this entry in the Multicast Forwarding Database. Possible values are IGMP Snooping, GMRP and Static Filtering.

Description

The text description of this multicast table entry.

Interfaces

The list of interfaces that are designated for forwarding (Fwd:) and filtering (Flt:).

Forwarding Interfaces

The resultant forwarding list is derived from combining all the component’s forwarding interfaces and removing the interfaces that are listed as the static filtering interfaces.

4.8.47 show mac-filter-table static

This command displays the Static MAC Filtering information for all Static MAC Filters. If `all` is selected, all the Static MAC Filters in the system are displayed. If a macaddr is entered, a vlan must also be entered and the Static MAC Filter information will be displayed only for that MAC address and VLAN.

Format

```
show mac-filter-table static {<macaddr> <vlanid> |
all}
```

Mode

```
Privileged EXEC and User EXEC
```

MAC Address

Is the MAC Address of the static MAC filter entry.

VLAN ID

Is the VLAN ID of the static MAC filter entry.

Source Port(s)

Indicates the source port filter set's slot and port(s).

Destination Port(s)

Indicates the destination port filter set's slot and port(s).

4.8.48 show mac-filter-table staticfiltering

This command displays the Static Filtering entries in the Multicast Forwarding Database (MFDB) table.

Format

```
show mac-filter-table staticfiltering
```

Mode

```
Privileged EXEC and User EXEC
```

Mac Address

A unicast MAC address for which the switch has forwarding and or filtering information. The format is 6 or 8 two-digit hexadecimal numbers that are separated by colons, for example 01:23:45:67:89:AB.

Type

This displays the type of the entry. Static entries are those that are configured by the end user. Dynamic entries are added to the table as a result of a learning process or protocol.

Description

The text description of this multicast table entry.

Interfaces

The list of interfaces that are designated for forwarding (Fwd:) and filtering (Flt:).

4.8.49 show mac-filter-table stats

This command displays the Multicast Forwarding Database (MFDB) statistics.

Format

```
show mac-filter-table stats
```

Mode

```
Privileged EXEC and User EXEC
```

Total Entries

This displays the total number of entries that can possibly be in the Multicast Forwarding Database table.

Most MFDB Entries Ever Used

This displays the largest number of entries that have been present in the Multicast Forwarding Database table. This value is also known as the MFDB high-water mark.

Current Entries

This displays the current number of entries in the Multicast Forwarding Database table.

4.8.50 show monitor

This command displays the Port monitoring information for the system.

Format

```
show monitor
```

Mode

```
Privileged EXEC and User EXEC
```

Port Monitor Mode

indicates whether the Port Monitoring feature is enabled or disabled. The possible values are enable and disable.

Probe Port slot/port

is the slot/port configured as the probe port. If this value has not been configured, 'Not Configured' will be displayed.

Monitored Port slot/port

is the slot/port configured as the monitored port. If this value has not been configured, 'Not Configured' will be displayed.

4.8.51 show port

This command displays port information.

Format

```
show port {<slot/port> | all} [name]
```

Mode

```
Privileged EXEC and User EXEC
```

Slot/Port

Valid slot and port number separated by forward slashes.

Name

When the optional command parameter `name` was specified, the output is different. It specifically includes the Interface Name as the second column, followed by other basic settings that are also shown by the normal command without the command parameter `name`.

Type

If not blank, this field indicates that this port is a special type of port. The possible values are:

`Mon -` this port is a monitoring port. Look at the Port Monitoring screens to find out more information.

`LA Mbr -` this port is a member of a Link Aggregation (LAG).

`Probe -` this port is a probe port.

Admin Mode

Indicates the Port control administration state. The port must be enabled in order for it to be allowed into the network. - May be enabled or disabled. The factory default is enabled.

Physical Mode

Indicates the desired port speed and duplex mode. If auto-negotiation support is selected, then the duplex mode and speed will be set from the auto-negotiation process. Note that the port's maximum capability (full duplex -100M) will be advertised. Otherwise, this object will determine the port's duplex mode and transmission rate. The factory default is Auto.

Physical Status

Indicates the port speed and duplex mode.

Link Status

Indicates whether the Link is up or down.

Link Trap

This object determines whether or not to send a trap when link status changes. The factory default is enabled.

Flow

Indicates if enable flow control is enabled on this port.

Device Status

Indicates whether or not the given port's link status is monitored by the device status.

VLAN Prio

This object displays the port VLAN priority.

4.8.52 show link-aggregation

This command displays an overview of all link-aggregations (LAGs) on the switch.

Format

```
show link-aggregation {<logical slot/port> | all}
```

Mode

```
Privileged EXEC and User EXEC
```

Logical slot/port

Valid slot and port number separated by forward slashes.

Name

The name of this link-aggregation (LAG). You may enter any string of up to 15 alphanumeric characters.

Link State

Indicates whether the Link is up or down.

Admin Mode

May be enabled or disabled. The factory default is enabled.

Link Trap Mode

This object determines whether or not to send a trap when link status changes. The factory default is enabled.

STP Mode

The Spanning Tree Protocol Administrative Mode associated with the port or link-aggregation (LAG). The possible values are:

`Disable -` Spanning tree is disabled for this port.

`Enable -` Spanning tree is enabled for this port.

Mbr Ports

A listing of the ports that are members of this link-aggregation (LAG), in slot/port notation. There can be a maximum of eight ports assigned to a given link-aggregation (LAG).

Port Speed

Speed of the link-aggregation port.

Type

This field displays the status designating whether a particular link-aggregation (LAG) is statically or dynamically maintained. The possible values of this field are Static, indicating that the link-aggregation is statically maintained; and Dynamic, indicating that the link-aggregation is dynamically maintained.

Active Ports

This field lists the ports that are actively participating in the link-aggregation (LAG).

4.8.53 show storm-control

This command displays switch configuration information.

Format

```
show storm-control
```

Mode

```
Privileged EXEC and User EXEC
```

Ingress Limiting

May be enabled or disabled. The factory default is disabled.

Ingress Limiter Mode (MACH 4000 and Power MICE only)

Sets the global mode for the ingress limiter. The factory default is: Broadcasts only.

Egress Broadcast Limiting

May be enabled or disabled. The factory default is disabled.

Egress Limiting (all traffic)

May be enabled or disabled. The factory default is disabled.

802.3x Flow Control Mode

May be enabled or disabled. The factory default is disabled.

4.8.54 show storm-control limiters port

This command displays the limiter settings per port. „0“ means that the respective limiter is disabled.

Format

```
show storm-control limiters port {<slot/port>|all}
```

Mode

```
Privileged EXEC and User EXEC
```

Ingress Mode (RS20/RS30, MS20/MS30 and OCTOPUS only)

Shows the mode for the ingress limiter. The factory default is: Broadcasts only.

Ingress Limit

Shows the ingress rate limit. The factory default is: 0.

Egress Broadcast Limit

Shows the egress broadcast rate limit. The factory default is: 0.

Egress Limit (all traffic; RS20/RS30, MS20/MS30 and OCTOPUS only)

Shows the egress rate limit for all frame types. The factory default is: 0.

4.8.55 show vlan

This command displays detailed information, including interface information, for a specific VLAN. The ID is a valid VLAN identification number

Format

```
show vlan <vlanid>
```

Mode

```
Privileged EXEC and User EXEC
```

VLAN ID

There is a VLAN Identifier (VID) associated with each VLAN. The range of the VLAN ID is 1 to 4042.

VLAN Name

A string associated with this VLAN as a convenience. It can be up to 32 alphanumeric characters long, including blanks. The default is blank. VLAN ID 1 always has a name of `Default`. This field is optional.

VLAN Type

Type of VLAN, which can be Default, (VLAN ID = 1), a static (one that is configured and permanently defined), or Dynamic (one that is created by GVRP registration).

Slot/Port

Valid slot and port number separated by forward slashes. It is possible to set the parameters for all ports by using the selectors on the top line.

Current

Determines the degree of participation of this port in this VLAN. The permissible values are:

`Include -` This port is always a member of this VLAN. This is equivalent to registration fixed in the IEEE 802.1Q standard.

`Exclude -` This port is never a member of this VLAN. This is equivalent to registration forbidden in the IEEE 802.1Q standard.

`Autodetect -` Specifies to allow the port to be dynamically registered in this VLAN via GVRP. The port will not participate in this VLAN unless a join request is received on this port. This is equivalent to registration normal in the IEEE 802.1Q standard.

Configured

Determines the configured degree of participation of this port in this VLAN. The permissible values are:

`Include -` This port is always a member of this VLAN. This is equivalent to registration fixed in the IEEE 802.1Q standard.

`Exclude -` This port is never a member of this VLAN. This is equivalent to registration forbidden in the IEEE 802.1Q standard.

`Autodetect -` Specifies to allow the port to be dynamically registered in this VLAN via GVRP. The port will not participate in this VLAN unless a join request is received on this port. This is equivalent to registration normal in the IEEE 802.1Q standard.

Tagging

Select the tagging behavior for this port in this VLAN.

`Tagged -` specifies to transmit traffic for this VLAN as tagged frames.

`Untagged -` specifies to transmit traffic for this VLAN as untagged frames.

4.8.56 show vlan brief

This command displays a list of all configured VLANs.

Format

```
show vlan brief
```

Mode

```
Privileged EXEC and User EXEC
```

VLAN ID

There is a VLAN Identifier (vlanid)associated with each VLAN. The range of the VLAN ID is 1 to 4042.

VLAN Name

A string associated with this VLAN as a convenience. It can be up to 32 alphanumeric characters long, including blanks. The default is blank. VLAN ID 1 always has a name of `Default`. This field is optional.

VLAN Type

Type of VLAN, which can be Default, (VLAN ID = 1), a static (one that is configured and permanently defined), or a Dynamic (one that is created by GVRP registration).

VLAN Creation Time

Displays the time (as the system time up time) when the VLAN was created.

4.8.57 show vlan port

This command displays VLAN port information.

Format

```
show vlan port {<slot/port> | all}
```

Mode

```
Privileged EXEC and User EXEC
```

Slot/Port

Valid slot and port number separated by forward slashes. It is possible to set the parameters for all ports by using the selectors on the top line.

Port VLAN ID

The VLAN ID that this port will assign to untagged frames or priority tagged frames received on this port. The value must be for an existing VLAN. The factory default is 1.

Acceptable Frame Types

Specifies the types of frames that may be received on this port. The options are 'VLAN only' and 'Admit All'. When set to 'VLAN only', untagged frames or priority tagged frames received on this port are discarded. When set to 'Admit All', untagged frames or priority tagged frames received on this port are accepted and assigned the value of the Port VLAN ID for this port. With either option, VLAN tagged frames are forwarded in accordance to the 802.1Q VLAN specification.

Ingress Filtering

May be enabled or disabled. When enabled, the frame is discarded if this port is not a member of the VLAN with which this frame is associated. In a tagged frame, the VLAN is identified by the VLAN ID in the tag. In an untagged frame, the VLAN is the Port VLAN ID specified for the port that received this frame. When disabled, all frames are forwarded in accordance with the 802.1Q VLAN bridge specification. The factory default is disabled.

Default Priority

The 802.1p priority assigned to tagged packets arriving on the port.

4.8.58 shutdown

This command disables a port.

Default

```
enabled
```

Format

```
shutdown
```

Mode

```
Interface Config
```

■ no shutdown

This command enables a port.

Format

```
no shutdown
```

Mode

```
Interface Config
```

4.8.59 shutdown all

This command disables all ports.

Default

```
enabled
```

Format

```
shutdown all
```

Mode

```
Global Config
```

no shutdown all

This command enables all ports.

Format

```
no shutdown all
```

Mode

```
Global Config
```

4.8.60 snmp trap link-status

This command enables link status traps by interface.

Note: This command is valid only when the Link Up/Down Flag is enabled. See ‘snmp-server enable traps linkmode’ command.

Format

```
snmp trap link-status
```

Mode

```
Interface Config
```

■ no snmp trap link-status

This command disables link status traps by interface.

Note: This command is valid only when the Link Up/Down Flag is enabled. See ‘snmp-server enable traps linkmode’ command).

Format

```
no snmp trap link-status
```

Mode

```
Interface Config
```

4.8.61 snmp trap link-status all

This command enables link status traps for all interfaces.

Note: This command is valid only when the Link Up/Down Flag is enabled (see “snmp-server enable traps linkmode”).

Format

```
snmp trap link-status all
```

Mode

```
Global Config
```

■ no snmp trap link-status all

This command disables link status traps for all interfaces.

Note: This command is valid only when the Link Up/Down Flag is enabled (see “snmp-server enable traps linkmode”).

Format

```
no snmp trap link-status all
```

Mode

```
Global Config
```

4.8.62 spanning-tree bpdumigrationcheck

This command enables BPDU migration check on a given interface. The **all** option enables BPDU migration check on all interfaces.

Format

```
spanning-tree bpdumigrationcheck {<slot/port> | all}
```

Mode

```
Global Config
```

no spanning-tree bpdumigrationcheck

This command disables BPDU migration check on a given interface. The `all` option disables BPDU migration check on all interfaces.

Format

```
no spanning-tree bpdumigrationcheck {<slot/port> |
all}
```

Mode

```
Global Config
```

4.8.63 speed

This command sets the speed and duplex setting for the interface.

Format

```
speed {<100 | 10> <half-duplex | full-duplex> | 1000
full-duplex}
```

Mode

```
Interface Config
```

Acceptable values are:

1000f

```
1000BASE-T full duplex
```

100h

```
100BASE-T half duplex
```

100f

```
100BASE-T full duplex
```

10h

```
10BASE-T half duplex
```

10f

```
100BASE-T full duplex
```

4.8.64 storm-control broadcast

This command enables the egress broadcast limiter globally.

Format

```
storm-control broadcast
```

Mode

```
Global Config
```

■ no storm-control broadcast

This command disables the egress broadcast limiter globally.

Format

```
no storm-control broadcast
```

Mode

```
Global Config
```

4.8.65 storm-control egress-limiting

This command enables or disables the egress limiter globally for all frame types.

Format

```
storm-control egress-limiting {disable | enable}
```

Mode

```
Global Config
```

4.8.66 storm-control ingress-limiting

This command enables or disables the ingress limiter globally.

Format

```
storm-control ingress-limiting {disable | enable}
```

Mode

```
Global Config
```

4.8.67 storm-control ingress-mode

This command sets the frame type for the ingress limiter globally to:
BC or BC+MC (MACH 4000 and Power MICE only).

Format

```
storm-control ingress-mode {bc | mc+bc}
```

Mode

```
Global Config
```

4.8.68 storm-control broadcast (port-related)

This command enables the broadcast limiter per port.
Enter the maximum number of broadcasts that the given port is allowed to send (unit: frames per second, min.: 0 (no limit), default: 0 (no limit)).

Format

```
storm-control broadcast <max. broadcast rate>
```

Mode

```
Interface Config
```

4.8.69 storm-control egress-limit

Sets the egress rate limit in kbit/s. "0" means: no limit (RS20/RS30, MS20/MS30, OCTOPUS only).

Format

```
storm-control egress-limit <max. egress rate>
```

Mode

```
Interface Config
```

4.8.70 storm-control ingress-limit

Sets the ingress rate limit in kbit/s. "0" means: no limit.

Format

```
storm-control ingress-limit <max. ingress rate>
```

Mode

```
Interface Config
```

4.8.71 storm-control ingress-mode

This command sets the frame type for the ingress limiter to:
All, BC, BC+MC, BC+MC+uUC (RS20/RS30, MS20/MS30, OCTOPUS only).

Format

```
storm-control ingress-mode {all | bc | mc+bc |
uuc+mc+bc}
```

Mode

```
Interface Config
```

4.8.72 storm-control flowcontrol

This command enables 802.3x flow control for the switch.

Note: This command only applies to full-duplex mode ports.

Default

```
disabled
```

Format

```
storm-control flowcontrol
```

Mode

```
Global Config
```

- **no storm-control flowcontrol**
  This command disables 802.3x flow control for the switch.

  Note: This command only applies to full-duplex mode ports.

Format

```
no storm-control flowcontrol
```

Mode

```
Global Config
```

4.8.73 storm-control flowcontrol per port

This command enables 802.3x flow control for the port.

Note: This command only applies to full-duplex mode ports.

Default

```
disabled
```

Format

```
storm-control flowcontrol
```

Mode

```
Interface Config
```

■ no storm-control flowcontrol per port

This command disables 802.3x flow control for the port.

Note: This command only applies to full-duplex mode ports.

Format

```
no storm-control flowcontrol
```

Mode

```
Interface Config
```

4.8.74 vlan

This command creates a new VLAN and assigns it an ID. The ID is a valid VLAN identification number (ID 1 is reserved for the default VLAN). VLAN range is 1-4042.

Format

```
vlan <1-4042>
```

Mode

```
VLAN database
```

no vlan

This command deletes an existing VLAN. The ID is a valid VLAN identification number (ID 1 is reserved for the default VLAN). VLAN range is 1-4042.

Format

```
no vlan <1-4042>
```

Mode

```
VLAN database
```

4.8.75 vlan0-transparent-mode

Activate the “Transparent Mode“ to be able to switch priority tagged frames without a VLAN affiliation thus with VLAN-ID “0”.
In this mode the VLAN-ID “0” persists in the frame, irrespective of the Port VLAN ID setting in the “VLAN Port“ dialog.
Note for Power MICE and MACH 4000:
In transparency mode devices ignore received vlan tags. Set the vlan membership of the ports to untagged for all vlans.
Note for RS20/RS30, MICE20/MICE30 and OCTOPUS:
In transparency mode devices ignore the configured port vlan id. Set the vlan membership of the ports from vlan 1 to untagged or member.

Format

```
vlan0-transparent-mode {disable|enable}
```

Mode

```
VLAN database
```

4.8.76 vlan acceptframe

This command sets the frame acceptance mode per interface. For VLAN Only mode, untagged frames or priority frames received on this interface are discarded. For Admit All mode, untagged frames or priority frames received on this interface are accepted and assigned the value of the interface VLAN ID for this port. With either option, VLAN tagged frames are forwarded in accordance with the IEEE 802.1Q VLAN Specification.

Default

```
Admit All
```

Format

```
vlan acceptframe <vlanonly | all>
```

Mode

```
Interface Config
```

no vlan acceptframe

This command sets the frame acceptance mode per interface to `Admit All`. For Admit All mode, untagged frames or priority frames received on this interface are accepted and assigned the value of the interface VLAN ID for this port. With either option, VLAN tagged frames are forwarded in accordance with the IEEE 802.1Q VLAN Specification.

Format

```
vlan acceptframe <vlanonly | all>
```

Mode

```
Interface Config
```

4.8.77 vlan database

This command switches into the global VLAN mode.

Default

```
Admit All
```

Format

```
vlan database
```

Mode

```
Global Config
```

4.8.78 vlan ingressfilter

This command enables ingress filtering. If ingress filtering is disabled, frames received with VLAN IDs that do not match the VLAN membership of the receiving interface are admitted and forwarded to ports that are members of that VLAN.

Default

```
disabled
```

Format

```
vlan ingressfilter
```

Mode

```
Interface Config
```

no vlan ingressfilter

This command disables ingress filtering. If ingress filtering is disabled, frames received with VLAN IDs that do not match the VLAN membership of the receiving interface are admitted and forwarded to ports that are members of that VLAN.

Format

```
no vlan ingressfilter
```

Mode

```
Interface Config
```

4.8.79 vlan name

This command changes the name of a VLAN. The name is an alphanumeric string of up to 32 characters, and the ID is a valid VLAN identification number. ID range is 1-4042.

Default

The name for VLAN ID 1 is always Default. The name for other VLANs is defaulted to a blank string.

Format

```
vlan name <1-4042> <name>
```

Mode

```
VLAN database
```

no vlan name

This command sets the name of a VLAN to a blank string. The VLAN ID is a valid VLAN identification number. ID range is 1-4042.

Format

```
no vlan name <1-4042>
```

Mode

```
VLAN database
```

4.8.80 vlan participation

This command configures the degree of participation for a specific interface in a VLAN. The ID is a valid VLAN identification number, and the interface is a valid interface number .

Format

```
vlan participation <exclude | include | auto> <1-4042>
```

Mode

```
Interface Config
```

Participation options are:

include

The interface is always a member of this VLAN. This is equivalent to registration fixed.

exclude

The interface is never a member of this VLAN. This is equivalent to registration forbidden.

auto

The interface is dynamically registered in this VLAN by GVRP. The interface will not participate in this VLAN unless a join request is received on this interface. This is equivalent to registration normal.

4.8.81 vlan participation all

This command configures the degree of participation for all interfaces in a VLAN. The ID is a valid VLAN identification number.

Format

```
vlan participation all <exclude | include | auto> <1-
4042>
```

Mode

```
Global Config
```

Participation options are:

include

The interface is always a member of this VLAN. This is equivalent to registration fixed.

exclude

The interface is never a member of this VLAN. This is equivalent to registration forbidden.

auto

The interface is dynamically registered in this VLAN by GVRP. The interface will not participate in this VLAN unless a join request is received on this interface. This is equivalent to registration normal.

4.8.82 vlan port acceptframe all

This command sets the frame acceptance mode for all interfaces. For VLAN Only mode, untagged frames or priority frames received on this interface are discarded. For Admit All mode, untagged frames or priority frames received on this interface are accepted and assigned the value of the interface VLAN ID for this port. With either option, VLAN tagged frames are forwarded in accordance with the IEEE 802.1Q VLAN Specification.

Default

```
Admit All
```

Format

```
vlan port acceptframe all <vlanonly | all>
```

Mode

```
Global Config
```

■ no vlan port acceptframe all

This command sets the frame acceptance mode for all interfaces to `Admit All`. For Admit All mode, untagged frames or priority frames received on this interface are accepted and assigned the value of the interface VLAN ID for this port. With either option, VLAN tagged frames are forwarded in accordance with the IEEE 802.1Q VLAN Specification.

Format

```
no vlan port acceptframe all
```

Mode

```
Global Config
```

4.8.83 vlan port ingressfilter all

This command enables ingress filtering for all ports. If ingress filtering is disabled, frames received with VLAN IDs that do not match the VLAN membership of the receiving interface are admitted and forwarded to ports that are members of that VLAN.

Default

```
disabled
```

Format

```
vlan port ingressfilter all
```

Mode

```
Global Config
```

- **no vlan port ingressfilter all**
  This command disables ingress filtering for all ports. If ingress filtering is disabled, frames received with VLAN IDs that do not match the VLAN membership of the receiving interface are admitted and forwarded to ports that are members of that VLAN.

Format

```
no vlan port ingressfilter all
```

Mode

```
Global Config
```

4.8.84 vlan port pvid all

This command changes the VLAN ID for all interface.

Default

```
1
```

Format

```
vlan port pvid all <1-4042>
```

Mode

```
Global Config
```

■ no vlan port pvid all

This command sets the VLAN ID for all interfaces to 1.

Format

```
no vlan port pvid all <1-4042>
```

Mode

```
Global Config
```

4.8.85 vlan port tagging all

This command configures the tagging behavior for all interfaces in a VLAN to enabled. If tagging is enabled, traffic is transmitted as tagged frames. If tagging is disabled, traffic is transmitted as untagged frames. The ID is a valid VLAN identification number.

Format

```
vlan port tagging all <1-4042>
```

Mode

```
Global Config
```

- **no vlan port tagging all**
  This command configures the tagging behavior for all interfaces in a VLAN to disabled. If tagging is disabled, traffic is transmitted as untagged frames. The ID is a valid VLAN identification number.

Format

```
no vlan port tagging all <1-4042>
```

Mode

```
Global Config
```

4.8.86 vlan pvid

This command changes the VLAN ID per interface.

Default

```
1
```

Format

```
vlan pvid <1-4042>
```

Mode

```
Interface Config
```

no vlan pvid

This command sets the VLAN ID per interface to 1.

Format

```
no vlan pvid <1-4042>
```

Mode

```
Interface Config
```

4.8.87 vlan tagging

This command configures the tagging behavior for a specific interface in a VLAN to enabled. If tagging is enabled, traffic is transmitted as tagged frames. If tagging is disabled, traffic is transmitted as untagged frames. The ID is a valid VLAN identification number.

Format

```
vlan tagging <1-4042>
```

Mode

```
Interface Config
```

■ no vlan tagging

This command configures the tagging behavior for a specific interface in a VLAN to disabled. If tagging is disabled, traffic is transmitted as untagged frames. The ID is a valid VLAN identification number.

Format

```
no vlan tagging <1-4042>
```

Mode

```
Interface Config
```

4.9 User Account Management Commands

These commands manage user accounts.

4.9.1 disconnect

This command closes a telnet session.

Format

```
    disconnect {<sessionID> | all}
```

Mode

```
    Privileged EXEC
```

4.9.2 show loginsession

This command displays current telnet and serial port connections to the switch.

Format

```
show loginsession
```

Mode

```
Privileged EXEC and User EXEC
```

ID

```
Login Session ID
```

User Name

The name the user will use to login using the serial port or Telnet. A new user may be added to the switch by entering a name in a blank entry. The user name may be up to 8 characters, and is not case sensitive. Two users are included as the factory default, ‘admin’ and ‘user’.

Connection From

IP address of the telnet client machine or EIA-232 for the serial port connection.

Idle Time

Time this session has been idle.

Session Time

Total time this session has been connected.

4.9.3 show users

This command displays the configured user names and their settings. This command is only available for users with readwrite privileges. The SNMPv3 fields will only be displayed if SNMP is available on the system.

Format

```
show users
```

Mode

```
Privileged EXEC
```

User Name

The name the user will use to login using the serial port, Telnet or Web. A new user may be added to the switch by entering a name in a blank entry. The user name may be up to eight characters, and is not case sensitive. Two users are included as the factory default, 'admin' and 'user'

Access Mode

Shows whether the operator is able to change parameters on the switch (Read/Write) or is only able to view them (Read Only). As a factory default, the 'admin' user has Read/Write access and the 'user' has Read Only access. There can only be one Read/Write user and up to five Read Only users.

SNMPv3 AccessMode

This field displays the SNMPv3 Access Mode. If the value is set to ReadWrite, the SNMPv3 user will be able to set and retrieve parameters on the system. If the value is set to ReadOnly, the SNMPv3 user will only be able to retrieve parameter information. The SNMPv3 access mode may be different than the CLI and Web access mode.

SNMPv3 Authentication

This field displays the authentication protocol to be used for the specified login user.

SNMPv3 Encryption

This field displays the encryption protocol to be used for the specified login user.

4.9.4 users defaultlogin

Enter an alphanumeric string of not more than 15 characters.

Format

```
users defaultlogin <listname>
```

Mode

```
Global Config
```

no users name

This command removes an operator.

Format

```
no users default <listname>
```

Mode

```
Global Config
```

Note:

The ‘admin’ user account cannot be deleted.

4.9.5 users login

Enter user name.

Format

```
users login <listname>
```

Mode

```
Global Config
```

Note:

When assigning a list to the 'admin' account, include an authentication method that allows administrative access even when remote authentication is unavailable (use 'authentication login <listname> [method1 [method2 [method3]]]').

no users name

This command removes an operator.

Format

```
no users login <listname>
```

Mode

```
Global Config
```

Note:

The ‘admin’ user account cannot be deleted.

4.9.6 users name

This command adds a new user (account) if space permits. The account <username> can be up to eight characters in length. The name may be comprised of alphanumeric characters as well as the dash (‘-’) and underscore (‘_’). The <username> is not case-sensitive.
Six user names can be defined.

Format

```
users name <username>
```

Mode

```
Global Config
```

no users name

This command removes an operator.

Format

```
no users name <username>
```

Mode

```
Global Config
```

Note:

The ‘admin’ user account cannot be deleted.

4.9.7 users passwd

This command is used to change a password. The password should not be more than eight alphanumeric characters in length. If a user is authorized for authentication or encryption is enabled, the password must be at least eight alphanumeric characters in length. The username and password are not case-sensitive. When a password is changed, a prompt will ask for the former password. If none, press enter.

Default

```
No Password
```

Format

```
users passwd <username>
```

Mode

```
Global Config
```

- **no users passwd**
  This command sets the password of an existing operator to blank. When a password is changed, a prompt will ask for the operator's former password. If none, press enter.

Format

```
no users passwd <username>
```

Mode

```
Global Config
```

4.9.8 users snmpv3 accessmode

This command specifies the snmpv3 access privileges for the specified login user. The valid accessmode values are `readonly` or `readwrite`. The `<username>` is the login user name for which the specified access mode applies. The default is `readwrite` for ‘admin’ user; `readonly` for all other users

Default

```
admin -- readwrite; other -- readonly
```

Format

```
users snmpv3 accessmode <username> <readonly |
readwrite>
```

Mode

```
Global Config
```

- **no users snmpv3 accessmode**

  This command sets the snmpv3 access privileges for the specified login user as `readwrite` for the ‘admin’ user; `readonly` for all other users. The <username> is the login user name for which the specified access mode will apply.

Format

```
no users snmpv3 accessmode <username>
```

Mode

```
Global Config
```

4.9.9 users snmpv3 authentication

This command specifies the authentication protocol to be used for the specified login user. The valid authentication protocols are `none`, `md5` or `sha`. If md5 or sha are specified, the user login password is also used as the snmpv3 authentication password and therefore must be at least eight characters in length. The `<username>` is the login user name associated with the authentication protocol.

Default

```
no authentication
```

Format

```
users snmpv3 authentication <username> <none | md5
| sha>
```

Mode

```
Global Config
```

no users snmpv3 authentication

This command sets the authentication protocol to be used for the specified login user to `none`. The <username> is the login user name for which the specified authentication protocol will be used.

Format

```
users snmpv3 authentication <username>
```

Mode

```
Global Config
```

4.9.10 users snmpv3 encryption

This command specifies the encryption protocol to be used for the specified login user. The valid encryption protocols are des or `none`.
If des is specified, the required key may be specified on the command line. The `key` may be up to 16 characters long. If the `des` protocol is specified but a key is not provided, the user will be prompted for the key. When using the des protocol, the user login password is also used as the snmpv3 encryption password and therefore must be at least eight characters in length.
If `none` is specified, a key must not be provided. The <`username`> is the login user name associated with the specified encryption.

Default

```
no encryption
```

Format

```
users snmpv3 encryption <username> <none |
des[key]>
```

Mode

```
Global Config
```

no users snmpv3 encryption

This command sets the encryption protocol to `none`. The <username> is the login user name for which the specified encryption protocol will be used.

Format

```
no users snmpv3 encryption <username>
```

Mode

```
Global Config
```

4.10 System Utilities

This section describes system utilities.

4.10.1 address-conflict

This command configures the setting for detection possible address conflicts of the agent´s IP address with other devices´ IP addresses in the network.

Format

```
address-conflict {detection-mode {active-only|disable|enable|passive-only}|ongoing-detection {disable|enable} }
```

Mode

```
Global Config
```

detection mode

Configure the device's address conflict detection mode (active-only, disable, enable or passive-only). Default: enable.

ongoing detection

Disable or enable the ongoing address conflict detection.
Default: enable.

4.10.2 cablestatus

This command tests the cable attached to an interface for short or open circuit. During the test the traffic is interrupted on this port.

Format

```
cablestatus <slot/port>
```

Mode

```
Privileged EXEC
```

4.10.3 clear eventlog

Clear the event log. The CLI will ask for confirmation.
Answer `y` (yes) or `n` (no).
The CLI displays the end of this operation.

Format

```
clear eventlog
```

Mode

```
Privileged EXEC
```

4.10.4 traceroute

This command is used to discover the routes that packets actually take when traveling to their destination through the network on a hop-by-hop basis. <ipaddr> should be a valid IP address.
The optional port parameter is the UDP port used as the destination of packets sent as part of the traceroute. This port should be an unused port on the destination system. [port] should be a valid decimal integer in the range of 0 (zero) to 65535. The default value is 33434.

Format

```
traceroute <ipaddr> [port]
```

Mode

```
Privileged EXEC
```

4.10.5 clear arp-table-switch

This command clears the agent´s ARP table (cache).

Format

```
clear arp-table-switch
```

Mode

```
Privileged EXEC
```

4.10.6 clear config

This command resets the configuration in RAM to the factory defaults without powering off the switch.

Format

```
clear config
```

Mode

```
Privileged EXEC
```

4.10.7 clear config factory

This command resets the whole configuration to the factory defaults. Configuration data and scripts stored in nonvolatile memory will also be deleted.

Format

```
clear config factory
```

Mode

```
Privileged EXEC
```

4.10.8 clear counters

This command clears the stats for a specified <slot/port>or for all the ports or for the entire switch based upon the argument.

Format

```
clear counters {<slot/port> | all}
```

Mode

```
Privileged EXEC
```

4.10.9 clear hiper-ring

This command clears the HIPER Ring configuration (deletes it).

Format

```
clear hiper-ring
```

Mode

```
Privileged EXEC
```

4.10.10clear igmpsnooping

This command clears the tables managed by the IGMP Snooping function and will attempt to delete these entries from the Multicast Forwarding Database.

Format

```
clear igmpsnooping
```

Mode

```
Privileged EXEC
```

4.10.11clear mac-addr-table

This command clears the switch's MAC address table (the forwarding database that contains the learned MAC addresses).

Note: this command does not affect the MAC filtering table.

Format

```
clear igmpsnooping
```

Mode

```
Privileged EXEC
```

4.10.12clear pass

This command resets all user passwords to the factory defaults without powering off the switch. You are prompted to confirm that the password reset should proceed.

Format

```
clear pass
```

Mode

```
Privileged EXEC
```

4.10.13clear link-aggregation

This command clears all link-aggregations (LAGs).

Format

```
clear link-aggregation
```

Mode

```
Privileged EXEC
```

4.10.14clear signal-contact

This command clears the signal-contact output configuration.
Switches the signal contact 1´s mode to `auto` and its manual setting to `open`.
Switches the signal contact 2´s mode to `manual` and its manual setting to `closed`.
Enables the monitoring of the power supplies for signal contact 1 only.
Disables the sending of signal contact traps.

Format

```
clear signal-contact
```

Mode

```
Privileged EXEC
```

4.10.15clear ring-coupling

This command clears the ring-coupling configuration.

Format

```
clear ring-coupling
```

Mode

```
Privileged EXEC
```

4.10.16clear vlan

This command resets VLAN configuration parameters to the factory defaults.

Format

```
clear vlan
```

Mode

```
Privileged EXEC
```

4.10.17config-watchdog

If the function is enabled and the connection to the switch is interrupted for longer than the time specified in “timeout [s]”, the switch then loads the last configuration saved.

Format

```
config-watchdog {admin-state {disable|enable}|time-
out <10..600>}
```

Mode

```
Global Config
```

admin-state

Enable or disable the Auto Configuration Undo feature
(default: disabled).

timeout

Configure the Auto Configuration Undo timeout (unit: seconds).

4.10.18copy

This command uploads and downloads to/from the switch. Remote URLs can be specified using tftp. A list of valid commands is provided below. The command can be used to the save the running configuration to nvram by specifying the source as `system:running-config` and the destination as `nvram:startup-config`.

Default

```
none
```

Format

```
copy aca:script <source filename> nvram:script
[target filename]
copy nvram:errorlog <url>
copy nvram:log <url>
copy nvram:script <source filename> aca:script
[target filename]
copy nvram:script <source filename> <url>
copy nvram:startup-config system:running-config
copy nvram:startup-config <url>
copy nvram:traplog <url>
copy system:running-config nvram:startup-config
copy <url> nvram:script <target filename>
copy <url> nvram:startup-config
copy <url> system:image
```

Mode

```
Privileged EXEC
```

4.10.19device-status

This command configures the device status link error monitoring for this port.

Default

```
ignore
```

Format

```
device-status connection-error {ignore|propagate}
```

Mode

```
Interface Config
```

4.10.20device-status

This command configures the device-status.

Format

```
device-status {monitor {aca-removal|all
|connection-error|fan-broken|hiper-ring
|module-removal
|power-supply-1| power-supply-2
|power-supply-3-1|power-supply-3-2
|power-supply-4-1|power-supply-4-2|ring-coupling
|temperature} {error|ignore}
|trap {disable|enable} }
```

Mode

```
Global Config
```

monitor

Determines the monitoring of the selected event or all events.
– `error` If the given event signals an error, the device state will also signal `error`,
– `ignore` Ignore the given event - even if it signals an error, the device state will not signal 'error' because of that.

trap

Configure if a trap is sent when the device status changes its state.
– `enable` enables sending traps,
– `disable` disables sending traps.

4.10.21logout

This command closes the current telnet connection or resets the current serial connection.

Note: Save configuration changes before logging out.

Format

```
logout
```

Mode

```
Privileged EXEC
```

4.10.22ping

This command checks if another computer is on the network and listens for connections. To use this command, configure the switch for network (in-band) connection. The source and target devices must have the ping utility enabled and running on top of TCP/IP. The switch can be pinged from any IP workstation with which the switch is connected through the default VLAN (VLAN 1), as long as there is a physical path between the switch and the workstation. The terminal interface sends, three pings to the target station.

Format

```
ping <ipaddr>
```

Mode

```
Privileged EXEC and User EXEC
```

4.10.23signal-contact

This command configures the signal contact link error monitoring for this port.

Format

```
signal-contact connection-error {disable|enable}
```

Mode

```
Interface Config
```

4.10.24signal-contact

This command configures the signal contacts.

Format

```
signal-contact {1|2|all}
```

```
{mode {auto|device-status|manual}
|monitor {aca-removal|all|connection-error
|fan-broken|hiper-ring|module-removal
|power-supply-1| power-supply-2
|power-supply-3-1|power-supply-3-2
|power-supply-4-1|power-supply-4-2|ring-coupling
|temperature} {disable|enable}
|state {closed|open}
|trap {disable|enable} }
```

Mode

`Global Config`

Contact No.

Selection of the signal contact:
– `1` signal contact 1,
– `2` signal contact 2,
– `all` signal contact 1 and signal contact 2.

mode

Selection of the operational mode:
– `auto` function monitoring,
– `device-status` the device-status determines the signal contact´s status.
– `manual` manually setting the signal contact.

monitor

Enables or disables the monitoring of the selected event or all events.
– `enable` monitoring,
– `disable` no monitoring.

state

Set the manual setting of the signal contact:
– `closed` ,
– `open`.
Only takes immediate effect in manual mode.

trap

Configures the sending of traps concerning the signal contact.
– `enable` enables sending traps,
– `disable` disables sending traps.

4.10.25temperature

This command configures the lower and upper temperature limit for the device. If these limits are exceeded, a trap is sent. The unit for the temperature limit is °C (Celsius), the minimum value is -99, the maximum value is 99. The default for the lower limit is 0, for the upper limit, it is 70. Note: to give the temperature in Fahrenheit, use the suffix f.

Format

```
temperature {lower-limit|upper-limit} <temperature
value> [{c|f}]
```

Mode

```
Global Config
```

lower-limit

Configure the lower temperature limit.

lower-upper

Configure the upper temperature limit.

4.10.26reboot

This command resets the switch (cold start, See “reload” on page 236). Reset means that all network connections are terminated and the boot code executes. The switch uses the stored configuration to initialize the switch. You are prompted to confirm that the reset should proceed. A successful reset is indicated by the LEDs on the switch.

Format

```
reboot
```

Mode

```
Privileged EXEC
```

4.10.27reload

This command resets the switch (warm start, See “reboot” on page 235). Reset means that all network connections are terminated and the boot code executes. The switch uses the stored configuration to initialize the switch. You are prompted to confirm that the reset should proceed. A successful reset is indicated by the LEDs on the switch.

Format

```
reload
```

Mode

```
Privileged EXEC
```

4.11 LLDP - Link Layer Discovery Protocol

These commands show and configure the LLDP parameters in compliance with IEEE 802.1 AB.

4.11.1 show lldp

This command shows all LLDP settings.

Format

```
show lldp
```

Mode

```
Privileged EXEC and User EXEC
```

4.11.2 show lldp config

This command shows all LLDP configuration settings.

Format

```
show lldp config
```

Mode

```
Privileged EXEC and User EXEC
```

4.11.3 show lldp config chassis

This command shows all LLDP configuration settings concerning the entire device.

Format

```
show lldp config chassis
```

Mode

```
Privileged EXEC and User EXEC
```

4.11.4 show lldp config chassis admin-state

Display the LLDP/IEEE802.1AB functionality on this device. If disabled, the LLDP protocol is inactive but the LLDP MIBs can still be accessed.

Format

```
show lldp config chassis admin-state
```

Mode

```
Privileged EXEC and User EXEC
```

4.11.5 show lldp config chassis notification-interval

Display the LLDP minimum notification trap interval (unit: seconds).

Format

```
show lldp config chassis notification-interval
```

Mode

```
Privileged EXEC and User EXEC
```

4.11.6 show lldp config chassis re-init-delay

Display the LLDP configuration's chassis re-initialization delay (unit: seconds).

Format

```
show lldp config chassis re-init-delay
```

Mode

```
Privileged EXEC and User EXEC
```

4.11.7 show lldp config chassis tx-delay

Display the LLDP transmit delay (unit: seconds). It indicates the delay between successive LLDP frame transmissions.

Format

```
show lldp config chassis tx-delay
```

Mode

```
Privileged EXEC and User EXEC
```

4.11.8 show lldp config chassis tx-hold-mult

Display the LLDP transmit hold multiplier, a time-to-live value expressed as a multiple of the LLDP Message Tx Interval (tx-interval).

Format

```
show lldp config chassis tx-hold-mult
```

Mode

```
Privileged EXEC and User EXEC
```

4.11.9 show lldp chassis tx-interval

Display the interval (unit: seconds) at which LLDP frames are transmitted on behalf of this LLDP agent.

Format

```
show lldp chassis tx-interval
```

Mode

```
Privileged EXEC and User EXEC
```

4.11.10show lldp config port

This command shows all LLDP configuration settings and states concerning one or all ports.

Format

```
show lldp config port <{slot/port|all}>
```

Mode

```
Privileged EXEC and User EXEC
```

admin-state

Display the port's LLDP admin state (if LLDP/IEEE802.1AB frames will be transmitted and/or received).

fdb-mode

Display the port's LLDP FDB mode.

hm-mode

Display the port's LLDP Hirschmann mode.

max-neighbors

Display the port's max. no. of LLDP neighbors.

notification

Display the port's LLDP notification (trap) setting.

tlv

Display the port's LLDP TLV settings (they determine which information is included in the LLDP frames that are sent). The command is a group command and will output several lines of data.

4.11.11show lldp config port tlv

This command shows all LLDP TLV configuration settings (if the given information is included in the sent LLDP frames or not) concerning one or all ports.

Format

```
show lldp config port <{slot/port|all}> tlv
```

Mode

```
Privileged EXEC and User EXEC
```

inlinepower

Enable or disable the sending of the port's Power over Ethernet capabilities (PoE, IEEE 802.3af), available for MACH 4000.

link-aggregation

Display the port's LLDP TLV inclusion of Link Aggregation.

mac-phy-config-state

Display the port's LLDP TLV inclusion of MAC Phy. Cfg. State.

max-frame-size

Display the port's LLDP TLV inclusion of Max. Frame Size.

mgmt-addr

Display the port's LLDP TLV inclusion of Management Address.

port-desc

Display the port's LLDP TLV inclusion of Port Description.

port-vlan

Display the port's LLDP TLV inclusion of Port VLAN.

protocol

Display the port's LLDP TLV inclusion of Protocol.

sys-cap

Display the port's LLDP TLV inclusion of System Capabilities.

sys-desc

Display the port's LLDP TLV inclusion of System Description.

sys-name

Display the port's LLDP TLV inclusion of System Name.

vlan-name

Display the port's LLDP TLV inclusion of VLAN Name.

4.11.12show lldp remote-data

This command shows all LLDP remote-data settings and states concerning one or all ports.

Format

```
show lldp remote-data <{slot/port|all}>
```

Mode

```
Privileged EXEC and User EXEC
```

chassis-id

Display the remote data's chassis ID only.

detailed

Display remote data in detailed format (i. e., all available data). Note: most important data is output first (not in alphabetic order of command names). This is the default command if no specific command is given.

ether-port-info

Display the remote data's port Ethernet properties only (group command, outputs: Port Autoneg. Supported, Port Autoneg. Enabled, Port Autoneg. Advertized Capabilities and Port Operational MAU Type).

inlinepower

Displays the remote port's Power over Ethernet capabilities (PoE, IEEE 802.3af). Included are if the remote device is a PSE (Power Source Device) or a PD (Powered Device), if PoE is supported and if the power pairs are selectable.

link-aggregation-info

Display the remote data's link aggregation information only (group command, outputs: Link Agg. Status and Link Agg. Port ID).

mgmt-addr

Display the remote data's management address only.

port-desc

Display the remote data's port description only.

port-id

Display the remote data's port ID only.

summary

Display remote data in summary format (table with most important data only, strings will be truncated if necessary, indicated by an appended '>' character).

sys-desc

Display the remote data's system description only.

sys-name

Display the remote data's system name only.

vlan-info

Display the remote data's VLAN information only (group command, outputs: Port VLAN ID, Membership VLAN IDs and their respective names).

4.11.13lldp

Enable/disable the LLDP/IEEE802.1AB functionality on this device. If disabled, the LLDP protocol will become inactive, but the LLDP MIBs can still be accessed. This command is a shorthand notation for `lldp config chassis admin-state {off|on}` (see "lldp config chassis admin-state" on page 246).

The default setting is `on`.

Format

```
lldp
```

Mode

```
Global Config
```

■ no lldp

Disable the LLDP/IEEE802.1AB functionality on this device.

Format

```
no lldp
```

Mode

```
Global Config
```

4.11.14lldp config chassis admin-state

Configure the LLDP/IEEE802.1AB functionality on this device. If disabled, the LLDP protocol will become inactive, but the LLDP MIBs can still be accessed.

- `off`: Disable the LLDP/IEEE802.1AB functionality.
- `on`: Enable the LLDP/IEEE802.1AB functionality.

The default setting is `on`.

Format

```
lldp config chassis admin-state {off|on}
```

Mode

```
Global Config
```

4.11.15lldp config chassis notification-interval

Configure the LLDP minimum notification interval (the minimum time after a notification trap has been sent until a new trap can be sent, unit: seconds, min.: 5 sec., max.: 3600 sec., default: 5 sec.).

Format

```
lldp config chassis notification-interval
```

Mode

```
Global Config
```

4.11.16lldp config chassis re-init-delay

Configure the LLDP re-initialization delay (unit: seconds, min.: 1 sec., max.: 10 sec., default: 2 sec.).

Format

```
lldp config chassis re-init-delay
```

Mode

```
Global Config
```

4.11.17lldp config chassis tx-delay

Configure the LLDP transmit delay, the delay between successive LLDP frame transmissions (unit: seconds, min.: 1 sec., max.: 8192 sec., default: 2 sec.).

Format

```
lldp config chassis tx-delay
```

Mode

```
Global Config
```

4.11.18lldp config chassis tx-hold-mult

Configure the LLDP transmit hold multiplier, a time-to-live value expressed as a multiple of the LLDP Message Tx Interval (tx-interval), min.: 2, max.: 10, default: 4.

Format

```
lldp config chassis tx-hold-mult
```

Mode

```
Global Config
```

4.11.19lldp chassis tx-interval

Configure the interval at which LLDP frames are transmitted on behalf of this LLDP agent (unit: seconds, min.: 5 sec., max.: 32768 sec., default: 30 sec.)

Format

```
lldp chassis tx-interval
```

Mode

```
Global Config
```

4.11.20clear lldp config all

Clear the LLDP configuration, i. e., set all configurable parameters to default values (all chassis- as well as port-specific parameters at once). Note: LLDP Remote data remains unaffected.

Format

```
clear lldp config all
```

Mode

```
Privileged EXEC
```

4.11.21lldp admin-state

Configure the port's LLDP admin state (if LLDP/IEEE802.1AB frames will be transmitted to and/or received from the standard IEEE multicast address 01:80:c2:00:00:0e).

The default setting is `tx-and-rx`.

Format

```
lldp admin-state <{tx-only|rx-only|tx-and-rx|off}>
```

Mode

```
Interface Config
```

4.11.22lldp fdb-mode

Configure the port's LLDP FDB mode.

The default setting is `autodetect`.

Format

```
lldp fdb-mode <{lldp-only|mac-only|lldp-and-
mac|autodetect}>
```

Mode

```
Interface Config
```

4.11.23lldp hm-mode

Configure the port's LLDP Hirschmann mode (if LLDP/IEEE802.1AB frames will be transmitted to and/or received from the Hirschmann-specific multicast address 01:80:63:2f:ff:0b).

The default setting is `tx-and-rx`.

Format

```
lldp hm-mode <{tx-only|rx-only|tx-and-rx|off}>
```

Mode

```
Interface Config
```

4.11.24lldp max-neighbors

Configure the port's LLDP max. no. of neighbors (min.: 1, max.: 50, default: 10).

Format

```
lldp max-neighbors <1..50 (10)>
```

Mode

```
Interface Config
```

4.11.25lldp notification

Configure the port's LLDP notification setting (on or off, default: off).

Format

```
lldp notification <{off|on}>
```

Mode

```
Interface Config
```

4.11.26lldp tlv link-aggregation

Configure the port's LLDP TLV inclusion of Link Aggregation (on or off, default: on).

Format

```
lldp tlv link-aggregation <{off|on}>
```

Mode

```
Interface Config
```

4.11.27lldp tlv mac-phy-config-state

Configure the port's LLDP TLV inclusion of MAC Phy. Cfg. State (on or off, default: on).

Format

```
lldp tlv mac-phy-config-state <{off|on}>
```

Mode

```
Interface Config
```

4.11.28lldp tlv max-frame-size

Configure the port's LLDP TLV inclusion of Max. Frame Size (on or off, default: on).

Format

```
lldp tlv max-frame-size <{off|on}>
```

Mode

```
Interface Config
```

4.11.29lldp tlv mgmt-addr

Configure the port's LLDP TLV inclusion of Management Address (on or off, default: on).

Format

```
lldp tlv mgmt-addr <{off|on}>
```

Mode

```
Interface Config
```

4.11.30lldp tlv port-desc

Configure the port's LLDP TLV inclusion of Port Description (on or off, default: on).

Format

```
lldp tlv port-desc <{off|on}>
```

Mode

```
Interface Config
```

4.11.31lldp tlv port-vlan

Configure the port's LLDP TLV inclusion of Port VLAN (on or off, default: on).

Format

```
lldp tlv port-vlan <{off|on}>
```

Mode

```
Interface Config
```

4.11.32lldp tlv protocol

Configure the port's LLDP TLV inclusion of Protocol (on or off, default: on).

Format

```
lldp tlv protocol <{off|on (on)}>
```

Mode

```
Interface Config
```

4.11.33lldp tlv sys-cap

Configure the port's LLDP TLV inclusion of System Capabilities (on or off, default: on).

Format

```
lldp tlv sys-cap <{off|on}>
```

Mode

```
Interface Config
```

4.11.34lldp tlv sys-desc

Configure the port's LLDP TLV inclusion of System Description (on or off, default: on).

Format

```
lldp tlv sys-desc <{off|on}>
```

Mode

```
Interface Config
```

4.11.35lldp tlv sys-name

Configure the port's LLDP TLV inclusion of System Name (on or off, default: on).

Format

```
lldp tlv sys-name <{off|on}>
```

Mode

```
Interface Config
```

4.11.36lldp tlv vlan-name

Configure the port's LLDP TLV inclusion of VLAN Name.

Format

```
lldp tlv vlan-name <{off|on}>
```

Mode

```
Interface Config
```

4.12 SNTP - Simple Network Time Protocol

These commands show and configure the SNTP parameters.

4.12.1 show sntp

This command shows all SNTP settings.

Format

```
show sntp
```

Mode

```
Privileged EXEC and User EXEC
```

4.12.2 show sntp anycast

This command shows all SNTP anycast configuration settings.

Format

```
show sntp anycast
```

Mode

```
Privileged EXEC and User EXEC
```

address

Show the SNTP server's anycast destination IP Address.

transmit-interval

Show the SNTP Server's interval for sending Anycast messages (unit: seconds).

vlan

Show the SNTP server's Anycast VLAN ID (used for sending Anycast messages).

4.12.3 show sntp client

This command shows all SNTP anycast configuration settings.

Format

```
show sntp client
```

Mode

```
Privileged EXEC and User EXEC
```

accept-broadcast

Show if the SNTP Client accepts SNTP broadcasts.

offset

Show the local time's offset (in minutes) with respect to UTC (positive values for locations east of Greenwich).

request-interval

Show the SNTP Client's request interval (unit: seconds).

server

Show the SNTP Client's server IP addresses.

server primary

Show the SNTP Client's primary server IP addresses.

server secondary

Show the SNTP Client's redundant server IP addresses.

4.12.4 show sntp operation

This command shows if the SNTP function is enabled or disabled.

Format

```
show sntp operation
```

Mode

```
Privileged EXEC and User EXEC
```

4.12.5 show sntp status

This command shows the SNTP state, synchronization and error messages.

Format

```
show sntp status
```

Mode

```
Privileged EXEC and User EXEC
```

4.12.6 show sntp time

This command shows time and date.

Format

```
show sntp time
```

Mode

```
Privileged EXEC and User EXEC
```

sntp

Show the current SNTP date and UTC time.

system

Show the local system's current date and time.

4.12.7 no sntp

This command disables sntp.

Format

```
no sntp
```

Mode

```
Global Config
```

4.12.8 sntp anycast address

Set the SNTP server's anycast destination IP Address,
default: 0.0.0.0 (none).

Format

```
sntp anycast address <Ziel-IP-Adresse>
```

Mode

```
Global Config
```

- **no sntp anycast address**
  Set the SNTP server's anycast destination IP Address to 0.0.0.0.

Format

```
no sntp anycast address
```

Mode

```
Global Config
```

4.12.9 sntp anycast transmit-interval

The transmit interval in seconds, default: 120.

Format

```
sntp anycast transmit-interval <1-3600>
```

Mode

```
Global Config
```

4.12.10sntp anycast vlan

Set the SNTP server's Anycast VLAN ID used for sending Anycast messages, default: 1.

Format

```
sntp anycast vlan <1-4042>
```

Mode

```
Global Config
```

4.12.11sntp client accept-broadcast

Enable/Disable that the SNTP Client accepts SNTP broadcasts.

Format

```
sntp client accept-broadcast <on | off>
```

Mode

```
Global Config
```

- **no sntp accept-broadcast**
  Disable the SNTP Client accepts SNTP broadcasts.

Format

```
no sntp client accept-broadcast
```

Mode

```
Global Config
```

4.12.12sntp client offset

The offset between UTC and local time in minutes, default: 60.

Format

```
sntp client offset <-1000 to 1000>
```

Mode

```
Global Config
```

4.12.13sntp client request-interval

The synchronization interval in seconds, default: 30.

Format

```
sntp client request-interval <1-3600>
```

Mode

```
Global Config
```

4.12.14no sntp client server

Disable the SNTP client servers.

Format

```
no sntp client server
```

Mode

```
Global Config
```

4.12.15sntp client server primary

Set the SNTP Client's primary server IP Address, default: 0.0.0.0 (none).

Format

```
sntp client server primary <IP-Adresse>
```

Mode

```
Global Config
```

■ no sntp client server primary

Disable the primary SNTP client server.

Format

```
no sntp client server primary
```

Mode

```
Global Config
```

4.12.16sntp client server secondary

Set the SNTP Client's secondary server IP Address, default: 0.0.0.0 (none).

Format

```
sntp client server secondary <IP-Adresse>
```

Mode

```
Global Config
```

- **no sntp client server secondary**
  Disable the secondary SNTP client server.

Format

```
no sntp client server secondary
```

Mode

```
Global Config
```

4.12.17sntp operation

Enable/Disable the SNTP function.

Format

```
sntp operation <on | off>
```

Mode

```
Global Config
```

- **no sntp operation**
  Disable the SNTP Client and Server.

Format

```
no sntp operation
```

Mode

```
Global Config
```

4.12.18sntp time system

Set the current sntp time.

Format

```
sntp time system <YYYY-MM-DD HH:MM:SS>
```

Mode

```
Global Config
```

4.13 PTP - Precision Time Protocol

These commands show and configure the PTP (IEEE 1588) parameters. The operation parameter is available for all devices. All other parameters are additionally available for MS20/30 and Power MICE.

4.13.1 show ptp

This command shows all PTP settings.

Format

```
show ptp
```

Mode

```
Privileged EXEC and User EXEC
```

4.13.2 show ptp configuration

This command shows all global PTP configuration settings.

Format

```
show ptp configuration
```

Mode

```
Privileged EXEC and User EXEC
```

Clock Mode

Show the PTP clock mode.

Preferred Master

Show if the local switch shall be regarded as a preferred master clock (i. e., if it will remain master in the presence of disconnection or connection of other clocks).

Subdomain Name

Show the local PTP subdomain name. The default is "_DFLT".

Sync Interval

Show the PTP sync interval. The sync interval is the interval (in seconds) between successive sync messages issued by a master clock. Valid values are: sec-1, sec-2, sec-8, sec-16 and sec-64. Default is sec-2.

Sync Lower Bound

Show the lower bound for the PTP clock synchronization status (unit: nanoseconds).

Sync Upper Bound

Show the upper bound for the PTP clock synchronization status (unit: nanoseconds).

4.13.3 show ptp operation

This command shows if PTP is enabled/disabled on this device.

Format

```
show ptp operation
```

Mode

```
Privileged EXEC and User EXEC
```

4.13.4 show ptp port

This command shows the PTP port configuration settings.

Format

```
show port [<slot/port>|all]
```

Mode

```
Privileged EXEC and User EXEC
```

Operation

Show if the sending and receiving/processing of PTP synchronization messages is enabled or disabled.

Burst

Show if the burst feature for synchronization runs during a synchronization interval is enabled or disabled.

Status

Show the PTP status for this port.

4.13.5 show ptp status

This command shows the device´s PTP status.

Format

```
show ptp status
```

Mode

```
Privileged EXEC and User EXEC
```

4.13.6 ptp clock-mode

Configure the Precision Time Protocol (PTP, IEEE 1588) clock mode. If the clock mode is changed, PTP will be initialized. The default is "disable“

Format

```
    ptp clock-mode {boundary-clock|simple-mode}
```

Mode

```
    Global Config
```

4.13.7 ptp operation

Enable or disable the Precision Time Protocol (IEEE 1588).
The default is "False“

Format

```
    operation {disable|enable}
```

Mode

```
    Global Config
```

4.13.8 ptp preferred-master

Specify if the local switch shall be regarded as a preferred master clock (i. e., if it will remain master in the presence of disconnection or connection of other clocks).

Format

```
    preferred-master {false|true}
```

Mode

```
    Global Config
```

4.13.9 ptp re-initialize

Re-initialize the clocks in the local subdomain with the currently configured settings. Changes in the subdomain name or the sync interval will only take effect after this command.

Format

```
re-initialize
```

Mode

```
Global Config
```

4.13.10ptp subdomain-name

Enter a Precision Time Protocol subdomain name. The default is "_DFLT". Note: changes are only applied after the 're-initialize' command or after a re-boot if the configuration was saved.

Format

```
subdomain-name <subdomain name>
```

Mode

```
Global Config
```

subdomain name

Enter a PTP subdomain name (up to 16 characters). Valid characters range from hex value 0x21 (!) up to and including hex value 0x7e (~), but excluding
any quotation marks (' or "),
question marks (?) or
backslashes (\).
If it contains exclamation marks (!), enclose the complete name in quotation marks ("). The subdomain name must not be empty. The default is "_DFLT".

4.13.11ptp sync-interval

Configure the Precision Time Protocol sync interval. The sync interval is the interval (in seconds) between successive sync messages issued by a master clock. Valid values are: sec-1, sec-2, sec-8, sec-16, and sec-64. Default is sec-2. Note: changes are only applied after the 're-initialize' command or after a reboot if the configuration was saved.

Format

```
ptp sync-interval {sec-1|sec-2|sec-8|sec-16|sec-64}
```

Mode

```
Global Config
```

4.13.12ptp sync-lower-bound

Configure the lower bound for the PTP clock synchronization (unit: nanoseconds, min.: 0, max.: 1000000000 (10^9), default: 30).
Note: the lower bound always has to be smaller than the upper bound.

Format

```
ptp sync-lower-bound <0-1000000000>
```

Mode

```
Global Config
```

4.13.13ptp sync-upper-bound

Configure the upper bound for the PTP clock synchronization
(unit: nanoseconds, min.: 0, max.: 1000000000 (10^9), default: 5000).
Note: the upper bound always has to be larger than the lower bound.

Format

```
ptp sync-upper-bound <0-1000000000>
```

Mode

```
Global Config
```

4.13.14ptp burst

Enable or disable the the burst feature for synchronization runs during a synchronization interval. Default is disable.

Format

```
ptp burst {disable|enable}
```

Mode

```
Interface Config
```

4.13.15ptp operation

Enable or disable the sending and receiving/processing of PTP synchronization messages. Default is enable.

Format

```
ptp operation {disable|enable}
```

Mode

```
Interface Config
```

4.14 PoE - Power over Ethernet

These commands show and configure the Power over Ethernet (IEEE 802.3af) parameters.
PoE is available for MACH 4002 devices with PoE modules.

4.14.1 show inlinepower

This command shows global Inline Power settings PoE.

Format

```
show inlinepower
```

Mode

```
Privileged EXEC and User EXEC
```

4.14.2 show inlinepower port

This command shows the configuration settings and states per port.

Format

```
show inlinepower port [<slot/port> | all]
```

Mode

```
Privileged EXEC and User EXEC
```

4.14.3 inlinepower

Configure the global Inline Power parameters.

Format

```
inlinepower {admin-mode {disable|enable} |
trap {disable|enable} | threshold  <1-99> }
```

Mode

```
Global Config
```

admin-mode

Configure the global Inline Power administrative setting (enable or disable, default: enable).

trap

Configure the Inline Power notification (trap) setting (enable or disable, default: disable).

threshold

Configure the Inline Power notification (trap) threshold (unit: percent of maximum rated power, valid range: 1-99, default: 90).

4.14.4 inlinepower

Configure the portrelated Inline Power parameters.
Note: The interface name you enter in the `name`-command.

Format

```
inlinepower {admin-mode {disable|enable} |
priority {critical|high|low} }
```

Mode

```
Interface Config
```

admin-mode

Configure the port-related Inline Power administrative setting (enable or disable, default: enable).

priority

Configure the Inline Power priority for this port. In case of power scarcity, inline power on ports configured with the lowest priority is dropped first. Possible values are: critical, high or low, default: low. The highest priority is critical.

4.14.5 clear inlinepower

Reset the Inline Power parameters to default settings.

Format

```
clear inlinepower
```

Mode

```
Privileged EXEC
```

5 CLI Commands: Switching

This section provides detailed explanation of the Switching commands. The commands are divided into two functional groups:

- Show commands display spanning tree settings, statistics, and other information.
- Configuration Commands configure features and options of the switch. For every configuration command there is a show command that displays the configuration setting.

5.1 Spanning Tree Commands

5.1.1 show spanning-tree

This command displays spanning tree settings for the common and internal spanning tree, when the optional parameter “brief” is not included in the command. The following details are displayed.

Format

```
show spanning-tree <brief>
```

Mode

Privileged EXEC and User EXEC

Spanning Tree Adminmode

```
Enabled or Disabled
```

Bridge Priority

```
Configured value.
```

Bridge Identifier

The bridge identifier for the CST (CST = Classical Spanning Tree IEEE 802.1d). It is made up using the bridge priority and the base MAC address of the bridge.

Time Since Topology Change

in seconds

Topology Change Count

Number of times changed.

Topology Change

Boolean value of the Topology Change parameter for the switch indicating if a topology change is in progress on any port assigned to the common and internal spanning tree.

Designated Root

The bridge identifier of the root bridge. It is made up from the bridge priority and the base MAC address of the bridge.

Root Path Cost

Value of the Root Path Cost parameter for the common and internal spanning tree.

Root Port Identifier

Identifier of the port to access the Designated Root for the CST.

Root Port Max Age

Derived value

Root Port Bridge Forward Delay

Derived value

Hello Time

Configured value

Bridge Hold Time

Minimum time between transmission of Configuration Bridge Protocol Data Units (BPDUs)

CST Regional Root

Bridge Identifier of the CST Regional Root. It is made up using the bridge priority and the base MAC address of the bridge.

Regional Root Path Cost

Path Cost to the CST Regional Root.

Associated FIDs

List of forwarding database identifiers currently associated with this instance.

Associated VLANs

List of VLAN IDs currently associated with this instance.

When the “brief” optional parameter is included, this command displays spanning tree settings for the bridge. In this case, the following details are displayed.

Bridge Priority

Configured value.

Bridge Identifier

The bridge identifier for the selected MST instance. It is made up using the bridge priority and the base MAC address of the bridge.

Bridge Max Age

Configured value.

Bridge Hello Time

Configured value.

Bridge Forward Delay

Configured value.

Bridge Hold Time

Minimum time between transmission of Configuration Bridge Protocol Data Units (BPDUs)

5.1.2 show spanning-tree interface

This command displays the settings and parameters for a specific switch port within the common and internal spanning tree. The <slot/port> is the desired switch port. The following details are displayed on execution of the command.

Format

show spanning-tree interface <slot/port>

Mode

Privileged EXEC and User EXEC

Port mode

Enabled or disabled.

Port Up Time Since Counters Last Cleared

Time since port was reset, displayed in days, hours, minutes, and seconds.

STP BPDUs Transmitted

Spanning Tree Protocol Bridge Protocol Data Units sent

STP BPDUs Received

Spanning Tree Protocol Bridge Protocol Data Units received.

RST BPDUs Transmitted

Rapid Spanning Tree Protocol Bridge Protocol Data Units sent

RST BPDUs Received

Rapid Spanning Tree Protocol Bridge Protocol Data Units received.

MSTP BPDUs Transmitted

Multiple Spanning Tree Protocol Bridge Protocol Data Units sent

MSTP BPDUs Received

Multiple Spanning Tree Protocol Bridge Protocol Data Units received.

5.1.3 show spanning-tree mst detailed

This command displays settings and parameters for the specified multiple spanning tree instance. The instance <mstid> is a number that corresponds to the desired existing multiple spanning tree instance ID. The following details are displayed.

Format

show spanning-tree mst detailed <*mstid*>

Mode

Privileged EXEC and User EXEC

MST Instance ID

Valid value: 0

MST Bridge Priority

Valid values: 0-61440 in increments of 4096.

Time Since Topology Change

in seconds

Topology Change Count

Number of times the topology has changed for this multiple spanning tree instance.

Topology Change in Progress

Value of the Topology Change parameter for the multiple spanning tree instance.

Designated Root

Identifier of the Regional Root for this multiple spanning tree instance.

Root Path Cost

Path Cost to the Designated Root for this multiple spanning tree instance

Root Port Identifier

Port to access the Designated Root for this multiple spanning tree instance

Associated FIDs

List of forwarding database identifiers associated with this instance.

Associated VLANs

List of VLAN IDs associated with this instance.

5.1.4 show spanning-tree mst port detailed

This command displays the detailed settings and parameters for a specific switch port within a particular multiple spanning tree instance. The instance <mstid> is a number that corresponds to the desired existing multiple spanning tree instance. The <slot/port> is the desired switch port.

Format

```
show spanning-tree mst port detailed <mstid> <slot/port>
```

Mode

Privileged EXEC and User EXEC

MST Instance ID

Valid value: 0

Port Identifier

Port priority as a two digit hex number followed by the port number as a two digit hex number.

Port Priority

Decimal number.

Port Forwarding State

Current spanning tree state of this port

Port Role

The port´s current RSTP port role.

Port Path Cost

Configured value of the Internal Port Path Cost parameter

Designated Root

The Identifier of the designated root for this port.

Designated Port Cost

Path Cost offered to the LAN by the Designated Port

Designated Bridge

Bridge Identifier of the bridge with the Designated Port.

Designated Port Identifier

Port on the Designated Bridge that offers the lowest cost to the LAN

If 0 (defined as the default CIST ID) is passed as the <mstid>, then this command displays the settings and parameters for a specific switch port within the common and internal spanning tree. The <slot/port> is the desired switch port. In this case, the following are displayed.

Port Identifier

The port identifier for this port within the CST.

Port Priority

The priority of the port within the CST.

Port Forwarding State

The forwarding state of the port within the CST.

Port Role

The role of the specified interface within the CST.

Port Path Cost

The configured path cost for the specified interface.

Designated Root

Identifier of the designated root for this port within the CST.

Designated Port Cost

Path Cost offered to the LAN by the Designated Port.

Designated Bridge

The bridge containing the designated port

Designated Port Identifier

Port on the Designated Bridge that offers the lowest cost to the LAN

Topology Change Acknowledgement

Value of flag in next Configuration Bridge Protocol Data Unit (BPDU) transmission indicating if a topology change is in progress for this port.

Hello Time

The hello time in use for this port.

Edge Port

The configured value indicating if this port is an edge port.

Edge Port Status

The derived value of the edge port status. True if operating as an edge port; false otherwise.

Point To Point MAC Status

Derived value indicating if this port is part of a point to point link.

CST Regional Root

The regional root identifier in use for this port.

CST Port Cost

The configured path cost for this port.

5.1.5 show spanning-tree mst port summary

This command displays the settings of one or all ports within the specified multiple spanning tree instance. The parameter <mstid> indicates a particular MST instance. The parameter {<slot/port> | all} indicates the desired switch port or all ports.

If 0 (defined as the default CIST ID) is passed as the <mstid>, then the status summary is displayed for one or all ports within the common and internal spanning tree.

Format

```
show spanning-tree mst port summary <mstid> {<slot/
port> | all}
```

Mode

Privileged EXEC and User EXEC

MST Instance ID

The MST instance associated with this port. Valid value: 0.

Interface

Valid slot and port number separated by forward slashes.

STP Mode

Current STP mode of this port in the specified spanning tree instance.

Type

Currently not used.

Port Forwarding State

The forwarding state of the port in the specified spanning tree instance

Port Role

The role of the specified port within the spanning tree.

5.1.6 show spanning-tree summary

This command displays spanning tree settings and parameters for the switch. The following details are displayed on execution of the command.

Format

```
show spanning-tree summary
```

Mode

Privileged EXEC and User EXEC

Spanning Tree Adminmode

Enabled or disabled.

Spanning Tree Version

Version of 802.1 currently supported (IEEE 802.1s, IEEE 802.1w, or IEEE 802.1d) based upon the Force Protocol Version parameter

Configuration Name

Configured name.

Configuration Revision Level

Configured value.

Configuration Digest Key

Calculated value.

Configuration Format Selector

Configured value.

MST Instances

List of all multiple spanning tree instances configured on the switch

5.1.7 show spanning-tree vlan

This command displays the association between a VLAN and a multiple spanning tree instance. The <vlanid> corresponds to an existing VLAN ID.

Format

```
show spanning-tree vlan <vlanid>
```

Mode

Privileged EXEC and User EXEC

VLAN Identifier

The VLANs associated with the selected MST instance.

Associated Instance

Identifier for the associated multiple spanning tree instance or "CST" if associated with the common and internal spanning tree

5.1.8 spanning-tree

This command sets the spanning-tree operational mode to enabled.

Default

```
disabled
```

Format

```
spanning-tree
```

Mode

```
Global Config
```

- **no spanning-tree**

  This command sets the spanning-tree operational mode to disabled. While disabled, the spanning-tree configuration is retained and can be changed, but is not activated.

Format

```
no spanning-tree
```

Mode

```
Global Config
```

5.1.9 spanning-tree configuration name

This command sets the Configuration Identifier Name for use in identifying the configuration that this switch is currently using. The <name> is a string of at most 32 characters.

Default

The base MAC address displayed using hexadecimal notation as specified in IEEE 802 standard.

Format

```
spanning-tree configuration name <name>
```

Mode

```
Global Config
```

■ no spanning-tree configuration name

This command resets the Configuration Identifier Name to its default.

Format

```
no spanning-tree configuration name
```

Mode

```
Global Config
```

5.1.10 spanning-tree configuration revision

This command sets the Configuration Identifier Revision Level for use in identifying the configuration that this switch is currently using. The Configuration Identifier Revision Level is a number in the range of 0 to 65535.

Default

```
0
```

Format

spanning-tree configuration revision <0-65535>

Mode

```
Global Config
```

no spanning-tree configuration revision

This command sets the Configuration Identifier Revision Level for use in identifying the configuration that this switch is currently using to the default value, i.e. 0.

Format

```
no spanning-tree configuration revision
```

Mode

```
Global Config
```

5.1.11 spanning-tree edgeport

This command specifies that this port is an Edge Port within the common and internal spanning tree. This will allow this port to transition to Forwarding State without delay.

Format

```
spanning-tree edgeport
```

Mode

```
Interface Config
```

■ no spanning-tree edgeport

This command specifies that this port is not an Edge Port within the common and internal spanning tree.

Format

```
no spanning-tree edgeport
```

Mode

```
Interface Config
```

5.1.12 spanning-tree forceversion

This command sets the Force Protocol Version parameter to a new value. The Force Protocol Version can be one of the following:

- 802.1d - ST BPDUs are transmitted
(IEEE 802.1d functionality supported)
- 802.1w - RST BPDUs are transmitted
(IEEE 802.1w functionality supported)

Default

```
802.1w
```

Format

```
spanning-tree forceversion <802.1d | 802.1w>
```

Mode

```
Global Config
```

- **no spanning-tree forceversion**
This command sets the Force Protocol Version parameter to the default value, i.e. 802.1w.

Format

```
no spanning-tree forceversion
```

Mode

```
Global Config
```

5.1.13 spanning-tree forward-time

This command sets the Bridge Forward Delay parameter to a new value for the common and internal spanning tree. The forward-time value is in seconds within a range of 4 to 30, with the value being greater than or equal to "(Bridge Max Age / 2) + 1".

Default

```
15
```

Format

```
spanning-tree forward-time <4-30>
```

Mode

```
Global Config
```

■ no spanning-tree forward-time

This command sets the Bridge Forward Delay parameter for the common and internal spanning tree to the default value, i.e. 15.

Format

```
no spanning-tree forward-time
```

Mode

```
Global Config
```

5.1.14 spanning-tree hello-time

This command sets the Hello Time parameter to a new value for the common and internal spanning tree. The hellotime <value> is in whole seconds within a range of 1 to 10 with the value being less than or equal to "(Bridge Max Age / 2) - 1".

Default

```
2
```

Format

```
spanning-tree hello-time <1-10>
```

Mode

```
Global Config
```

no spanning-tree hello-time

This command sets the Hello Time parameter for the common and internal spanning tree to the default value, i.e. 2.

Format

```
no spanning-tree hello-time
```

Mode

```
Global Config
```

5.1.15 spanning-tree max-age

This command sets the Bridge Max Age parameter to a new value for the common and internal spanning tree. The max-age value is in seconds within a range of 6 to 40, with the value being less than or equal to "2 times (Bridge Forward Delay - 1)".

Default

```
20
```

Format

```
spanning-tree max-age <6-40>
```

Mode

```
Global Config
```

- **no spanning-tree max-age**
  This command sets the Bridge Max Age parameter for the common and internal spanning tree to the default value, i.e. 20.

Format

```
no spanning-tree max-age
```

Mode

```
Global Config
```

5.1.16 spanning-tree mst

This command sets the Path Cost or Port Priority for this port within the multiple spanning tree instance or in the common and internal spanning tree. If the <mstid> parameter corresponds to an existing multiple spanning tree instance, then the configurations are done for that multiple spanning tree instance. If however 0 (defined as the default CIST ID) is passed as the <mstid>, then the configurations are performed for the common and internal spanning tree instance.
This command accepts the value 0 for the mstid. This command accepts the value 0 for the mstid, meaning the common and internal spanning tree.

If the ‘cost’ token is specified, this command sets the path cost for this port within a multiple spanning tree instance or the common and internal spanning tree instance, depending on the <mstid> parameter. The pathcost can be specified as a number in the range of 1 to 200000000 or auto. If "auto" is specified, the pathcost value will be set based on Link Speed.

If the ‘port-priority’ token is specified, this command sets the priority for this port within a specific multiple spanning tree instance or the common and internal spanning tree instance, depending on the <mstid> parameter. The port-priority value is a number in the range of 0 to 240 in increments of 16.

Default

```
cost : auto; external-cost : auto; port-priority :
128
```

Format

```
spanning-tree mst <mstid> {{cost <1-200000000> |
auto } | {external-cost <1-200000000> | auto } |
port-priority <0-240>}
```

Mode

```
Interface Config
```

■ no spanning-tree mst

This command sets the Path Cost or Port Priority for this port within the multiple spanning tree instance or in the common and internal spanning tree to the respective default values. If the <mstid> parameter corresponds to an existing multiple spanning tree instance, then the configurations are done for that multiple spanning tree instance. If however 0 (defined as the default CIST ID) is passed as the <mstid>, then the con-

figurations are performed for the common and internal spanning tree instance.
This command accepts the value 0 for the mstid. This command accepts the value 0 for the mstid, meaning the common and internal spanning tree.
If the ‘cost’ token is specified, this command sets the path cost for this port within a multiple spanning tree instance or the common and internal spanning tree instance, depending on the <mstid> parameter, to the default value, i.e. a pathcost value based on the Link Speed.
If the ‘port-priority’ token is specified, this command sets the priority for this port within a specific multiple spanning tree instance or the common and internal spanning tree instance, depending on the <mstid> parameter, to the default value, i.e. 128.

Format

```
no spanning-tree mst <mstid> <cost | port-priority>
```

Mode

```
Interface Config
```

5.1.17 spanning-tree mst priority

This command sets the bridge priority for a specific multiple spanning tree instance. The instance <mstid> is a number that corresponds to the desired existing multiple spanning tree instance. The priority value is a number within a range of 0 to 61440 in increments of 4096.
This command accepts the value 0 for the mstid.

If 0 (defined as the default CIST ID) is passed as the <mstid>, then this command sets the Bridge Priority parameter to a new value for the common and internal spanning tree. The bridge priority value again is a number within a range of 0 to 61440. The twelve least significant bits will be masked according to the 802.1s specification. This will cause the priority to be rounded down to the next lower valid priority.

Default

```
32768
```

Format

```
spanning-tree mst priority <mstid> <0-61440>
```

Mode

```
Global Config
```

no spanning-tree mst priority

This command sets the bridge priority for a specific multiple spanning tree instance to the default value, i.e. 32768. The instance <mstid> is a number that corresponds to the desired existing multiple spanning tree instance.
This command accepts the value 0 for the mstid.
If 0 (defined as the default CIST ID) is passed as the <mstid>, then this command sets the Bridge Priority parameter for the common and internal spanning tree to the default value, i.e. 32768.

Format

```
spanning-tree mst priority <mstid>
```

Mode

```
Global Config
```

5.1.18 spanning-tree mst vlan

This command adds an association between a multiple spanning tree instance and a VLAN. The VLAN will no longer be associated with the common and internal spanning tree. The instance <mstid> is a number that corresponds to the desired existing multiple spanning tree instance. The <vlanid> corresponds to an existing VLAN ID.
This command accepts the value 0 for the mstid.

Format

```
spanning-tree mst vlan <mstid> <vlanid>
```

Mode

```
Global Config
```

■ no spanning-tree mst vlan

This command removes an association between a multiple spanning tree instance and a VLAN. The VLAN will again be associated with the common and internal spanning tree. The instance <mstid> is a number that corresponds to the desired existing multiple spanning tree instance. The <vlanid> corresponds to an existing VLAN ID.
This command accepts the value 0 for the mstid.

Format

```
no spanning-tree mst vlan <mstid> <vlanid>
```

Mode

```
Global Config
```

5.1.19 spanning-tree port mode

This command sets the Administrative Switch Port State for this port to enabled.

Default

```
disabled
```

Format

```
spanning-tree port mode
```

Mode

```
Interface Config
```

- **no spanning-tree port mode**
  This command sets the Administrative Switch Port State for this port to disabled.

Format

```
no spanning-tree port mode
```

Mode

```
Interface Config
```

5.1.20 spanning-tree port mode all

This command sets the Administrative Switch Port State for all ports to enabled.

Default

disabled

Format

spanning-tree port mode all

Mode

Global Config

■ no spanning-tree port mode all

This command sets the Administrative Switch Port State for all ports to disabled.

Format

no spanning-tree port mode all

Mode

Global Config

5.2 MRP

The concept of the MRP-Ring enables the construction of high-availability, ring-shaped network structures.

The two ends of a backbone in a line-type configuration can be closed to form a redundant ring - the MRP-Ring - by using the RM function (Redundancy Manager) of the Switch.

It is possible to mix the devices that support this function in any combination within the MRP ring.

If a line section fails, the ring structure of up to 50 switches typically transforms back to a line-type configuration within 150 ms (maximum 500 ms).

5.2.1 show mrp

This command displays the settings and states of the MRP-Ring. The following details are displayed on execution of the command.

Format

```
show mrp [current-domain]
```

Mode

Privileged EXEC and User EXEC

current-domain

Specify the optional keyword "current-domain" to show the current MRP domain's settings. If you omit the keyword "current-domain", the show command will display the settings of all existing MRP domains. Note: currently, it is only possible to configure one MRP domain, so the keyword keyword "current-domain" can be omitted (it exists for future compatibility reasons).

5.2.2 show mrp current-domain

This command displays the settings and states of the MRP-Ring´s current domain. The following details are displayed on execution of the command. If you omit the optional keywords (e. g., advanced-mode), all settings will be displayed.

Format

```
show mrp current-domain [advanced-mode | domain-id
| info | manager-priority | mode | name | operation
| port | summery | vlan]
```

Mode

Privileged EXEC and User EXEC

advanced mode

Show the switch's advanced mode setting for the given MRP domain.

domain-id

Show the given MRP domain's ID.

info

Show status information for the given MRP domain.
Note: the information displayed depends on the switch's mode (Client or Manager) because only a subset of them are useful for each mode.

manager-priority

Show the switch's manager priority for the given MRP domain.

mode

Show the switch's mode for the given MRP domain.

name

Show the given MRP domain's name.

operation

Show the switch's administrative setting for the given MRP domain (enabled or disabled).

port

Show the ports for the given MRP domain

summery

Show a summary for the given MRP domain.

vlan

Show the VLAN ID for the given MRP domain.

5.2.3 mrp

Configure the MRP Ring.

Format

```
mrp
```

Mode

```
Global Config
```

5.2.4 mrp current-domain

Specify that you want to configure the current MRP domain's settings.

Default

```
none
```

Format

```
mrp current-domain {advanced-mode {disable|enable}
| manager-priority <0-65535>
| mode {client|manager} | name <domain-name>
| recovery-delay {500ms|200ms}
| operation {disable|enable}
| port {primary|secondary} <slot/port>
| vlan <0-4042>}
```

Mode

```
Global Config
```

advanced-mode

Enable or disable the switch's advanced mode for the given MRP domain.

manager-priority

Configure the given MRP domain's manager priority (0-65535).

mode

Configure the switch's MRP mode for the given domain (client or manager).
`client`: Switch is client for the given MRP domain.
`manager`: Switch is manager for the given MRP domain.

name

Set a name for the given MRP domain.

recovery-delay

Configure the MRP recovery delay for the given domain.
`500ms`: Recovery delay is 500 ms for the given MRP domain.
`200ms`: Recovery delay is 200 ms for the given MRP domain.

operation

Enable or disable the switch for the given MRP domain.

port

Specify the switch's ports for the given MRP domain (in slot/port notation).
`primary`: Specify the switch's primary port for the given MRP domain.

`secondary`: Specify the switch's secondary port for the given MRP domain.

vlan

Enter the VLAN for the given MRP domain (0 - 4042, default: 0).

5.2.5 mrp delete-domain

Delete current MRP domain.

Format

```
mrp delete-domain current-domain
```

Mode

```
Global Config
```

5.2.6 mrp new-domain

Create a new MRP domain. The configuration will consist of default parameters and its operation will be disabled.

Default

`n/a` not set

Format

```
mrp new-domain (<domain-id> | default-domain)
```

Mode

```
Global Config
```

domain-id

Enter a new MRP domain id. Format: 16 bytes in decimal notation, example: 1.2.3.4.5.6.7.8.9.10.11.12.13.14.15.16
The MRP domain id 0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0 is invalid.

default-domain

Create a default MRP domain (ID: 255.255.255.255.255.255.255.
255.255.255.255.255.255.255.255.255).

5.3 HIPER-Ring

The concept of the HIPER-Ring enables the construction of high-availability, ring-shaped network structures. Within such a ring topology, network components supporting the HIPER-Ring are connected with each other via their ring ports. Exactly one redundancy manager assumes control of the ring.
These commands are for configuring the Hirschmann High Performance Redundancy Ring.

Further information concerning this function you will find in the manual of the switch.

5.3.1 show hiper-ring

This command displays the settings and states of the HIPER-Ring. The following details are displayed on execution of the command.

Format

```
show hiper-ring
```

Mode

Privileged EXEC and User EXEC

info

Display the information about the HIPER-Ring configuration (cabling).

mode

Display the HIPER-Ring mode settings.

port

Display the HIPER-Ring's primary and secondary port properties.

redundancy-state

Display the actual state of the HIPER-Ring redundancy.

HIPER-Ring Redundancy State

Display the state of the HIPER-Ring redundancy manager.

5.3.2 show hiper-ring info

HIPER-Ring setup information.

Format

```
show hiper-ring info
```

Mode

Privileged EXEC and User EXEC

5.3.3 hiper-ring

Configure the HIPER-Ring.

Format

```
hiper-ring
```

Mode

```
Global Config
```

- **no hiper-ring**
  Clear the HIPER Ring configuration (delete it).

Format

```
no hiper-ring
```

Mode

```
Global Config
```

5.3.4 hiper-ring mode

This command sets the HIPER-Ring mode. Possible values are:

- `ring-manager` Set the switch's HIPER Ring mode to Ring Manager.
- `rm` Abbreviation of Ring Manager.
- `ring-switch` Set the switch's HIPER Ring mode to Ring Switch.
- `rs` Abbreviation of Ring Switch.

Default

```
none
```

Format

```
hiper-ring mode <{ring-manager|ring-switch | rs}>
```

Mode

```
Global Config
```

5.3.5 hiper-ring port primary

Enter the switch's primary HIPER Ring port.

Default

`n/a` (not set)

Format

```
hiper-ring port primary (<slot/port>)
```

Mode

```
Global Config
```

5.3.6 hiper-ring port secondary

Enter the switch's secondary HIPER Ring port.

Default

`n/a` not set

Format

```
hiper-ring port primary (<slot/port>)
```

Mode

```
Global Config
```

5.4 Fast-HIPER-Ring

The concept of the Fast-HIPER-Ring enables the construction of high-availability, ring-shaped network structures. Within such a ring topology, network components supporting the Fast-HIPER-Ring are connected with each other via their ring ports. Exactly one redundancy manager assumes control of the ring.
These commands are for configuring the Hirschmann Fast High Performance Redundancy Ring.

Further information concerning this function you will find in the manual of the switch.

5.4.1 show fast-hiper-ring (MACH 1000)

This command displays the settings and states of the HIPER-Ring. The following details are displayed on execution of the command.

Format

```
show fast-hiper-ring
```

Mode

Privileged EXEC and User EXEC

Ring ID

Display the Ring ID.

Mode of Switch (administrative setting)

Display the HIPER-Ring mode administrative settings.

Mode of Switch (real operating state)

Display the HIPER-Ring operation mode.

Ring Name

Display theFast-HIPER-Ring's name.

Number of nodes in the ring

Display the number of nodes in the ring.

Port Number, Primary

Display the HIPER-Ring's primary port number and its properties.

Port Number, Secondary

Display the HIPER-Ring's secondary port number and its properties.

Operation

Display the admin state of the HIPER-Ring configuration.

General Operating States

Display general information concerning the fast-hiper-ring state.

5.4.2 fast-hiper-ring

Configure the Fast-HIPER-Ring.

Format

```
fast-hiper-ring {current-id
{mode {ring-manager|ring-switch} |
operation {disable|enable} |
port {primary|secondary} <slot/port> |
ring-name <ring-name> |
nodes <1-n> |
vlan      <0-4042>} |
delete-id current-id |
new-id    {<id>|default-id}}
```

Mode

```
Global Config
```

current-id

Specify that you want to configure the current Fast-HIPER-Ring ID's settings.

mode

Configure the switch's Fast HIPER-Ring mode for the given ID (ring-manager or ring-switch).

operation

Enable or disable the switch for the given Fast-HIPER-Ring ID.

port

Specify the switch's ports for the given Fast-HIPER-Ring ID.

ring-name

Set a ring name for the given Fast HIPER-Ring ID.

nodes

Specify the number of nodes in the ring for the given Fast HIPER-Ring ID.

vlan

Specify the VLAN for the given Fast HIPER-Ring ID.

delete-id

Delete the given Fast HIPER-Ring ID.

new-id

Create a new Fast HIPER-Ring ID. The configuration will consist of default parameters and its operation will be disabled.

<id>

Enter a new Fast HIPER-Ring ID. Format: a number in the range 1-2147483647 (2^31 - 1). An ID of 0 is invalid.

default-id

Create a default Fast HIPER-Ring ID (1).

5.5 Redundant Coupling

The control intelligence built into the switch allows the redundant coupling of HIPER-Rings and network segments. Two network segments can be connected via two separate paths with one of the following switches:

- RS2-16M,
- RS20/RS30/RS40,
- RSR20/RSR30
- MICE (Rel. 3.0 or higher),
- MS20/MS30,
- Power MICE,
- MACH 1000,
- MACH 3000 (Rel. 3.3 or higher) or
- MACH 4000.

The switch in the redundant line and the switch in the main line inform each other about their operating states by using control frames via the ethernet or via the control line.

Note: For redundancy security reasons, the Rapid Spanning Tree protocol and redundant network/ring coupling may not be enabled simultaneously.

Note: The network that connects the master and the slave must always be a HiPER-Ring. The coupling switch in single mode also must have a HiPER-Ring Configured.

Further information concerning this function you will find in the manual of the switch.

These commands allow you to configure the redundant coupling of network segments.

5.5.1 show ring-coupling

This command displays the settings and states of the network coupling / ring coupling.

To set up a new Ring Coupling configuration when no configuration is currently present (e. g., after a clear command), always set the local port first. Please refer to: ring-coupling port local <slot/port>.

The following details are displayed on execution of the command.

Format

```
show ring-coupling
```

Mode

Privileged EXEC and User EXEC

config

Display the Ring Coupling's configuration
– `single`
– `dual-master-inband`
– `dual-master-outband`
– `dual-slave-inband`
– `dual-slave-outband`.

info

Display information about the Ring Coupling's states:
– `configuration failure`,
– `Extended diagnosis`,
– `redundancy guaranteed`.

operation

Display the Ring Coupling's operation setting
– `on`
– `off`

partner IP

Display the switch's Ring Coupling partner IP address (only valid for remote configurations).

port

Display the switch's Ring Coupling ports
– `local`

– `partner` (only takes effect in dual configurations)
– `control` (only takes effect in outband configurations).

redundancy-mode

Display the Ring Coupling's redundancy mode
– `normal`
– `extended`.

Ring/Network Coupling Mode

Display the Ring/Network Coupling mode
– `ring-only` if you wish to couple a HIPER-Ring.
– `network` if you wish to couple a line-type configuration.

5.5.2 ring-coupling

Configure the redundant coupling of HIPER-Rings / network segments. This command, if called without arguments, lists the available subcommands, their recommended order and tips how to set up a new configuration.

Format

```
ring-coupling
```

Mode

```
Global Config
```

■ no ring-coupling

Clear the ring-coupling configuration (delete it).

Format

```
no ring-coupling
```

Mode

```
Global Config
```

5.5.3 ring-coupling config

This command sets the Ring Coupling configuration.

Possible values are:

- `single` Configure the Ring Coupling's basic setting to single (both coupling ports are local to the switch, switch performs master and slave functions).
- `dual-master-inband` Configure the Ring Coupling's basic setting to dual-master-inband (2nd coupling port is on a remote switch, local switch is master, communication over network).
- `dual-master-outband` Configure the Ring Coupling's basic setting to dual-master-outband (2nd coupling port is on a remote switch, local switch is master, communication over dedicated control port).
- `dual-slave-inband` Configure the Ring Coupling's basic setting to dual-slave-inband (2nd coupling port is on a remote switch, local switch is slave, communication over network).
- `dual-slave-outband` Configure the Ring Coupling's basic setting to dual-slave-outband (2nd coupling port is on a remote switch, local switch is slave, communication over dedicated control port).
- `dmi` Abbreviation for `dual-master-inband`.
- `dmo` Abbreviation for `dual-master-outband`.
- `dsi` Abbreviation for `dual-slave-inband`.
- `dso` Abbreviation for `dual-slave-outband`.

Default

```
none
```

Format

```
ring-coupling conf <{single|dual-master-inband|dual-master-outband|dual-slave-inband|dual-slave-outband|dmi|dmo|dsi|dso}>
```

Mode

```
Global Config
```

5.5.4 ring-coupling net-coupling

Coupling mode refers to the type of coupled network.

Possible values are:

- `network` ,if you wish to couple a line-type configuration.
- `ring-only` ,if you wish to couple a HIPER-Ring.

Default

```
none
```

Format

```
ring-coupling net-coupling <{network|ring-only}>
```

Mode

```
Global Config
```

5.5.5 ring-coupling operation

Configure the Ring Coupling's operation setting. Possible values are:

- `on` Enable the current Ring Coupling configuration.
- `off` Disable the current Ring Coupling configuration.

Default

```
off
```

Format

```
ring-coupling operation <{off|on}>
```

Mode

```
Global Config
```

5.5.6 ring-coupling port

Configure the Ring Coupling's ports. Possible values are:

- `control` Enter the Ring Coupling's control coupling port in outband configurations.
- `local` Enter the Ring Coupling's local coupling port.
- `partner` Enter the Ring Coupling's partner coupling port in single mode configuration.

Default

```
none
```

Format

```
ring-coupling port <{control|local|partner}> <slot/
port>
```

Mode

```
Global Config
```

5.5.7 ring-coupling redundancy-mode

Configure the Ring Coupling's redundancy mode. Possible values are:

- `extended` Slave responds to a failure in the remote ring or network.
- `normal` Slave does not respond to a failure in the remote ring or network.

Default

```
extended
```

Format

```
ring-coupling redundancy-mode <{extended|normal}>
```

Mode

```
Global Config
```

5.6 Port Security

With the Port Securitiy function you can specify for each port from which terminal devices data can be received and sent to other ports. This function protects the network from unauthorized access.

5.6.1 show port-sec mode

Display the MAC/IP Based Port Security global setting for all ports.

Format

```
show port-sec mode
```

Mode

Privileged EXEC and User EXEC

5.6.2 show port-sec port

Display the MAC/IP Based Port Security port-related settings (allowed MAC address, current MAC address, allowed IP address, current action and current port state).

Format

```
show port-sec port <{all|<slot/port>}>
```

Mode

Privileged EXEC and User EXEC

5.6.3 port-sec mode

Configure the global MAC/IP Based Port Security mode:

- `ip-based` Port security is based on a given, allowed source IP address.
- `mac-based` Port security is based on a given, allowed source MAC address.

Format

```
port-sec mode <{ip-based|mac-based}>
```

Mode

```
Global Config
```

5.6.4 port-sec action

Configure the action to be taken if port security is violated at this port.

- `none` No action is taken if port security is violated at this port.
- `port-disable` The port is disabled for traffic if port security is violated.
- `trap-only` A trap is sent if port security is violated at this port (this port remains open for traffic).

Configure the allowed IP source address for this port.
Configure the allowed MAC source address for this port.

Format

```
port-sec {action {none|port-disable|trap-only}
         |allowed-ip <IP1> [IP2 [IP3 [IP4 [IP5
              [IP6 [IP7 [IP8 [IP9 [IP10]]]]]]]]]
          |allowed-mac <MAC1> [MAC2 [MAC3 [MAC4
              [MAC5 [MAC6 [MAC7 [MAC8 [MAC9
              [MAC10]]]]]]]]] }
```

Mode

```
Interface Config
```

- **no port-sec**
  No action is taken if port security is violated at this port.

Format

```
no port-sec
```

Mode

```
Interface Config
```

5.6.5 port-sec allowed-ip

Enter the allowed IP source address for this port, format: nnn.nnn.nnn.nnn (nnn: decimal number 0..255).

Format

```
port-sec allowed-ip <IP Address>
```

Mode

```
Interface Config
```

5.6.6 port-sec allowed-mac

Enter the allowed MAC source address for this port, format: nn:nn:nn:nn:nn:nn (n: hexadecimal digit).

Format

```
port-sec allowed-mac <MAC Address>
```

Mode

```
Interface Config
```

5.6.7 clear port-sec

Clear the MAC/IP Based Port Security by setting each port's security action (applied when port security is violated) to None. Additionally, the global mode is set to MAC Based. Note: this does not clear the 802.1X Port Security.

Format

```
clear port-sec
```

Mode

```
Global Config
```

5.7 DHCP Relay Commands

These commands configure the DHCP Relay parameters. The commands are divided by functionality into these different groups:

- Configuration Commands are used to configure features and options of the switch. For every configuration command there is a show command that will display the configuration setting.
- Show commands are used to display switch settings, statistics and other information.
- No commands clear some or all of the settings to factory defaults.

5.7.1 show dhcp-relay

Display the settings of the BOOTP/DHCP relay.

Format

```
show dhcp-relay [opt82 | port {<slot/port>|all} |
server-address]
```

Mode

Privileged EXEC and User EXEC

5.7.2 dhcp-relay

Set different options for BOOTP/DHCP relay and option 82 inclusion.

Format

```
dhcp-relay {opt82 {operation {disable|enable}|
man-id <Manual Remote ID>|
remote-id-type {client-id|ip|mac|other}|server-
address <Server-ID (1..4)> <Server IP Address>
```

Mode

```
Global Config
```

dhcp-relay opt82 operation {disable|enable}

Enable/Disable option 82 globally. Default: enable.

dhcp-relay opt82 man-id <Manual Remote ID>

Configure the DCHP Relay's Option 82 Manual Value for the Remote ID Type (only effective, if Remote ID is set to „other“). Default: no ID.

dhcp-relay opt82 remote-id-type {client-id|ip|mac|other}

Configure the DCHP Relay's Option 82 Remote ID Type.
Default: mac

dhcp-relay server-address <Server ID (1..4)> <Server IP Address>

Set the server IP address for one of the 4 possible server IDs.
Default: 0.0.0.0

■ no dhcp-relay

Clear the DCHP Relay configuration (set all server addresses to 0.0.0.0).

Format

```
no dhcp-relay
```

Mode

```
Global Config
```

5.7.3 dhcp-relay

Set different port specific options for option 82 inclusion.

Format

```
dhcp-relay {operation {disable|enable} |
hirschmann-agent {disable|enable}}
```

Mode

```
Interface Config
```

dhcp-relay operation {disable|enable}

Enable or disable the DHCP Relay's Option 82 on this port. Default: enable.

dhcp-relay hirschmann-agent {disable|enable}

Enable or disable the forwarding of DHCP requests that are received on this port. Enable this parameter if a Hirschmann DHCP client is connected to this port. Default: disable.
Disable this parameter if a Non-Hirschmann DHCP client is connected to this port (these devices send normal broadcast DHCP requests; this enables the relaying of DHCP broadcast requests that are received on this port)
Enable this parameter if a Hirschmann DHCP client is connected to this port (it will send its own DHCP multicast requests to be relayed by the DHCP relay; this will reduce the load in your network).

5.8 DHCP Server Commands

These commands configure the DHCP server parameters. The commands are divided by functionality into these different groups:

- Configuration Commands are used to configure features and options of the switch. For every configuration command there is a show command that will display the configuration setting.
- Show commands are used to display switch settings, statistics and other information.
- No commands clear some or all of the settings to factory defaults.

5.8.1 DHCP server configuration example

The example shown below has the following task: The IP address is only to be served, if a request is coming via interface 1/1 with specified Mac address.

```
<Hirschmann PowerMICE> >enable
<Hirschmann PowerMICE> #configure
<Hirschmann PowerMICE> <Config>#dhcp-server operation
enable
<Hirschmann PowerMICE> <Config>#dhcp-server pool add 1
static 192.168.0.10
<Hirschmann PowerMICE> <Config>#dhcp-server pool modify
1 mode interface 1/1
<Hirschmann PowerMICE> <Config>#dhcp-server pool modify
1 mode mac 00:80:63:12:34:56
<Hirschmann PowerMICE> <Config>#dhcp-server pool modify
1 option gateway 192.168.0.1
<Hirschmann PowerMICE> <Config>#dhcp-server pool enable
1
<Hirschmann PowerMICE> <Config>#interface 1/1
<Hirschmann PowerMICE> <interface 1/1>#dhcp-server oper-
ation enable
```

This configuration leads to the following result:

```
<Hirschmann PowerMICE> #show dhcp-server pool 1

ID................................ 1
Status............................ Enabled
Start Address..................... 192.168.0.10
End Address....................... 192.168.0.10
Leasetime......................... 86400
Hirschmann Device................. Disabled
Mode.............................. Interface(1/1)
MAC............................... 00:80:63:12:34:56
Options:
Configpath........................
Gateway........................... 192.168.0.1
Subnet Mask....................... 255.255.255.0
WINS.............................. 0.0.0.0
DNS............................... 0.0.0.0
Hostname..........................
```

5.8.2 show dhcp-server

Display DHCP Server global and interface information.

Format

```
show dhcp-server
```

Mode

Privileged EXEC and User EXEC

5.8.3 show dhcp-server operation

Display DHCP Server global information.

Format

```
show dhcp-server operation
```

Mode

Privileged EXEC and User EXEC

5.8.4 show dhcp-server port

Display the DCHP port-related settings for all ports or specific port only.

Format

```
show dhcp-server port {all | <slot/port>}
```

Mode

Privileged EXEC and User EXEC

show dhcp-server port all

Display the DCHP port-related settings for all ports.

show dhcp-server port <slot/port>

Display the DCHP port-related settings for the specified port only.

5.8.5 show dhcp-server pool

Display DHCP server pool information for all pool or detailed information for a specific pool.

Format

```
show dhcp-server pool {all | <id>}
```

Mode

Privileged EXEC and User EXEC

show dhcp-server pool all

Display the DCHP server pool information for all IDs.

show dhcp-server pool <id>

Display the DCHP server pool information for the specified ID only.

5.8.6 dhcp-server operation

Enable or disable the DHCP server globally. Default: disable.

Format

```
dhcp-server operation {disable|enable}
```

Mode

```
Interface Config
```

dhcp-server operation disable

Disable the DHCP server. This is the default.

dhcp-server operation enable

Enable the DHCP server.

5.8.7 dhcp-server pool add <id>

Add a pool with a single IP address (static) or with an IP range (dynamic)

Format

```
dhcp-server pool {add <id> {static <ipaddr>
                 |dynamic <start ipaddr> <end ipaddr>}
```

Mode

```
Global Config
```

dhcp-server pool add <id> {static <ipaddr>}

Add a pool with a single IP address (static).

dhcp-server pool add <id> {dynamic <start ipaddr> <end ipaddr>}

Add a pool with an IP range (dynamic).

5.8.8 dhcp-server pool modify <id> mode

Add or delete one or more pool modes.

Format

```
dhcp-server pool modify <id> mode
            {interface {<all | <slot/port>} 1)
            |mac {none | <macaddr>} 1)
            |clientid {none | <clientid>} 1)
            |relay {none | <ipaddr>}
            |remoteid {none | <remoteid>} 1)
            |circuitid {none | < circuitid >} 1)
            }
```

Mode

```
Global Config
```

dhcp-server pool modify <id> mode interface all 1)

Set pool to all interfaces.

dhcp-server pool modify <id> mode interface <slot/port> 1)

Set pool to a specific interface.

dhcp-server pool modify <id> mode mac none 1)

Use none to remove the mode.

dhcp-server pool modify <id> mode mac <macaddr> 1)

Enter macaddr in xx:xx:xx:xx:xx:xx format.

dhcp-server pool modify <id> mode clientid none 1)

Use none to remove the mode.

dhcp-server pool modify <id> mode clientid <clientid> 1)

Enter clientid in xx:xx:....:xx format.

dhcp-server pool modify <id> mode relay none

Use none to remove the mode.

dhcp-server pool modify <id> mode relay <ipaddr>

Enter IP address of the relay.

dhcp-server pool modify <id> mode remoteid none [1)]

Use none to remove the mode.

dhcp-server pool modify <id> mode remoteid <remoteid> [1)]

Enter remoteid in xx:xx:...:xx format.

dhcp-server pool modify <id> mode circuitid none [1)]

Use none to remove the mode.

dhcp-server pool modify <id> mode circuitid <circuitid> [1)]

Enter circuitid in xx:xx:...:xx format.

[1)] Available for pools with single IP address only.

5.8.9 dhcp-server pool modify <id> option

Modify pool options.

Format

```
dhcp-server pool modify <id> option
                                    {configpath <url>
                                    |{gateway <ipaddr>}
                                    |{netmask <netmask>}
                                    |{wins <ipaddr>}
                                    |{dns <ipaddr>}
                                    |{hostname <name>}
```

Mode

```
Global Config
```

dhcp-server pool modify <id> option configpath <url>

Enter the configpath URL in ’tftp://<servername>/<file>’ format.

dhcp-server pool modify <id> option gateway <ipaddr>

Default gateway. Enter the gateway IP address.

dhcp-server pool modify <id> option netmask <netmask>

Option netmask. Enter the netmask.

dhcp-server pool modify <id> option wins <ipaddr>

Option win. Enter wins IP address.

dhcp-server pool modify <id> option dns <ipaddr>

Option DNS. Enter the DNS IP address.

dhcp-server pool modify <id> option hostname <name>

Option hostname. Enter the host name.

5.8.10 dhcp-server pool modify leasetime

Modify pool leasetime. Enter the leasetime in seconds.

Format

```
dhcp-server pool modify leasetime <seconds>
```

Mode

```
Global Config
```

5.8.11 dhcp-server pool modify <id> hirschmann-device

Set this pool to Hirschmann devices only or to all devices.

Format

```
dhcp-server pool modify <id> hirschmann-device
{enable|disable}
```

Mode

```
Global Config
```

dhcp-server pool modify <id> hirschmann-device disable

Use pool for all devices.

dhcp-server pool modify <id> hirschmann-device enable

Use pool for Hirschmann devices only.

5.8.12 dhcp-server pool enable

Enable a specific pool.

Format

```
dhcp-server pool enable <id>
```

Mode

```
Global Config
```

5.8.13 dhcp-server pool disable

Disable a specific pool.

Format

```
dhcp-server pool disable <id>
```

Mode

```
Global Config
```

5.8.14 dhcp-server pool delete

Delete a specific pool.

Format

```
dhcp-server pool delete <id>
```

Mode

```
Global Config
```

6 CLI Commands: Security

This chapter provides a detailed explanation of the Security commands. The following Security CLI commands are available in the software Switching Package. Use the security commands to configure security settings for login users and port users.

The commands are divided into these different groups:

- Show commands are used to display device settings, statistics and other information.
- Configuration Commands are used to configure features and options of the switch. For every configuration command there is a show command that will display the configuration setting.

6.1 Security Commands

6.1.1 authentication login

This command creates an authentication login list. The `<listname>` is up to 15 alphanumeric characters and is not case sensitive. Up to 10 authentication login lists can be configured on the switch. When a list is created, the authentication method “local” is set as the first method.
When the optional parameters “Option1”, “Option2” and/or “Option3” are used, an ordered list of methods are set in the authentication login list. If the authentication login list does not exist, a new authentication login list is first created and then the authentication methods are set in the authentication login list. The maximum number of authentication login methods is three. The possible method values are `local, radius` and `reject`.
The value of `local` indicates that the user’s locally stored ID and password are used for authentication. The value of `radius` indicates that the user’s ID and password will be authenticated using the RADIUS server. The value of `reject` indicates the user is never authenticated.
To authenticate a user, the authentication methods in the user’s login will be attempted in order until an authentication attempt succeeds or fails.

Note: The default login list included with the default configuration can not be changed.

Note: When assigning a list to the 'admin' account, include an authentication method that allows administrative access even when remote authentication is unavailable.

Format

```
authentication login <listname> [method1 [method2
[method3]]]
```

Mode

```
Global Config
```

- **no authentication login**
  This command deletes the specified authentication login list. The attempt to delete will fail if any of the following conditions are true:
  - The login list name is invalid or does not match an existing authentication login list
  - The specified authentication login list is assigned to any user or to the non configured user for any component
  - The login list is the default login list included with the default configuration and was not created using 'authentication login'.
    The default login list cannot be deleted.

Format

```
no authentication login <listname>
```

Mode

```
Global Config
```

6.1.2 clear dot1x statistics

This command resets the 802.1X statistics for the specified port or for all ports.

Format

```
clear dot1x statistics {<slot/port> | all}
```

Mode

```
Privileged EXEC
```

6.1.3 clear radius statistics

This command is used to clear all RADIUS statistics.

Format

```
clear radius statistics
```

Mode

```
Privileged EXEC
```

6.1.4 dot1x defaultlogin

This command assigns the authentication login list to use for non-configured users for 802.1X port security. This setting is over-ridden by the authentication login list assigned to a specific user if the user is configured locally. If this value is not configured, users will be authenticated using local authentication only.

Format

```
dot1x defaultlogin <listname>
```

Mode

```
Global Config
```

6.1.5 dot1x initialize

This command begins the initialization sequence on the specified port. This command is only valid if the control mode for the specified port is 'auto'. If the control mode is not 'auto' an error will be returned.

Format

```
dot1x initialize <slot/port>
```

Mode

```
Privileged EXEC
```

6.1.6 dot1x login

This command assigns the specified authentication login list to the specified user for 802.1X port security. The <user> parameter must be a configured user and the <listname> parameter must be a configured authentication login list.

Format

```
dot1x login <user> <listname>
```

Mode

```
Global Config
```

6.1.7 dot1x max-req

This command sets the maximum number of times the authenticator state machine on this port will transmit an EAPOL EAP Request/Identity frame before timing out the supplicant. The <count> value must be in the range 1 - 10.

Default

```
2
```

Format

```
dot1x max-req <count>
```

Mode

```
Interface Config
```

■ no dot1x max-req

This command sets the maximum number of times the authenticator state machine on this port will transmit an EAPOL EAP Request/Identity frame before timing out the supplicant.

Format

```
no dot1x max-req
```

Mode

```
Interface Config
```

6.1.8 dot1x port-control

This command sets the authentication mode to be used on the specified port. The control mode may be one of the following.

- `force-unauthorized`: The authenticator PAE unconditionally sets the controlled port to unauthorized. Thus the port is always blocked.
- `force-authorized`: The authenticator PAE unconditionally sets the controlled port to authorized. Thus the port is always opened.
- `auto`: The authenticator PAE sets the controlled port mode to reflect the outcome of the authentication exchanges between the supplicant, authenticator and the authentication server. The port mode is controlled by the protocol.

Default

```
force-authorized
```

Format

```
dot1x port-control {force-unauthorized | force-
authorized | auto}
```

Mode

```
Interface Config
```

no dot1x port-control

This command sets the authentication mode to be used on the specified port to 'auto'.

Format

```
no dot1x port-control
```

Mode

```
Interface Config
```

6.1.9 dot1x port-control all

This command sets the authentication mode to be used on all ports. The control mode may be one of the following.

- `force-unauthorized:` The authenticator PAE unconditionally sets the controlled port to unauthorized. Thus the ports are always blocked.
- `force-authorized:` The authenticator PAE unconditionally sets the controlled port to authorized. Thus the ports are always opend.
- `auto:` The authenticator PAE sets the controlled port mode to reflect the outcome of the authentication exchanges between the supplicant, authenticator and the authentication server. The port mode is controled by the protocol.

Default

```
force-authorized
```

Format

```
dot1x port-control all {force-unauthorized | force-
authorized | auto}
```

Mode

```
Global Config
```

no dot1x port-control all

This command sets the authentication mode to be used on all ports to 'auto'.

Format

```
no dot1x port-control all
```

Mode

```
Global Config
```

6.1.10 dot1x re-authenticate

This command begins the re-authentication sequence on the specified port. This command is only valid if the control mode for the specified port is 'auto'. If the control mode is not 'auto' an error will be returned.

Format

```
dot1x re-authenticate <slot/port>
```

Mode

```
Privileged EXEC
```

6.1.11 dot1x re-authentication

This command enables re-authentication of the supplicant for the specified port.

Default

```
disabled
```

Format

```
dot1x re-authentication
```

Mode

```
Interface Config
```

- **no dot1x re-authentication**
  This command disables re-authentication of the supplicant for the specified port.

Format

```
no dot1x re-authentication
```

Mode

```
Interface Config
```

6.1.12 dot1x system-auth-control

This command is used to enable the dot1x authentication support on the switch. By default, the authentication support is disabled. While disabled, the dot1x configuration is retained and can be changed, but is not activated.

Default

```
disabled
```

Format

```
dot1x system-auth-control
```

Mode

```
Global Config
```

no dot1x system-auth-control

This command is used to disable the dot1x authentication support on the switch.

Format

```
no dot1x system-auth-control
```

Mode

```
Global Config
```

6.1.13 dot1x timeout

This command sets the value, in seconds, of the timer used by the authenticator state machine on this port. Depending on the token used and the value (in seconds) passed, various timeout configurable parameters are set. The following tokens are supported.

- reauth-period: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to determine when re-authentication of the supplicant takes place. The reauth-period must be a value in the range 1 - 65535.
- quiet-period: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to define periods of time in which it will not attempt to acquire a supplicant. The quiet-period must be a value in the range 0 - 65535.
- tx-period: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to determine when to send an EAPOL EAP Request/Identity frame to the supplicant. The quiet-period must be a value in the range 1 - 65535.
- supp-timeout: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to timeout the supplicant. The supp-timeout must be a value in the range 1 - 65535.
- server-timeout: Sets the value, in seconds, of the timer used by the authenticator state machine on this port to timeout the authentication server. The supp-timeout must be a value in the range 1 - 65535.

Defaults

```
reauth-period: 3600 seconds
quiet-period: 60 seconds
tx-period: 30 seconds
supp-timeout: 30 seconds
server-timeout: 30 seconds
```

Format

```
dot1x timeout {{reauth-period <seconds>} | {quiet-
period <seconds>} | {tx-period <seconds>} | {supp-
timeout <seconds>} | {server-timeout <seconds>}}
```

Mode

```
Interface Config
```

- **no dot1x timeout**
  This command sets the value, in seconds, of the timer used by the authenticator state machine on this port to the default values. Depending on the token used, the corresponding default values are set.

Format

```
no dot1x timeout {reauth-period | quiet-period |
tx-period | supp-timeout | server-timeout}
```

Mode

```
Interface Config
```

6.1.14 dot1x user

This command adds the specified user to the list of users with access to the specified port or all ports. The <user> parameter must be a configured user.

Format

```
dot1x user <user> {<slot/port> | all}
```

Mode

```
Global Config
```

- **no dot1x user**
  This command removes the user from the list of users with access to the specified port or all ports.

Format

```
no dot1x user <user> {<slot/port> | all}
```

Mode

```
Global Config
```

6.1.15 radius accounting mode

This command is used to enable the RADIUS accounting function.

Default

```
disabled
```

Format

```
radius accounting mode
```

Mode

```
Global Config
```

no radius accounting mode

This command is used to set the RADIUS accounting function to the default value - i.e. the RADIUS accounting function is disabled.

Format

```
no radius accounting mode
```

Mode

```
Global Config
```

6.1.16 radius server host

This command is used to configure the RADIUS authentication and accounting server.

If the 'auth' token is used, the command configures the IP address to use to connect to a RADIUS authentication server. Up to 3 servers can be configured per RADIUS client. If the maximum number of configured servers is reached, the command will fail until one of the servers is removed by executing the no form of the command. If the optional <port> parameter is used, the command will configure the UDP port number to use to connect to the configured RADIUS server. In order to configure the UDP port number, the IP address must match that of a previously configured RADIUS authentication server. The port number must lie between 1 - 65535, with 1812 being the default value.
If the 'acct' token is used, the command configures the IP address to use for the RADIUS accounting server. Only a single accounting server can be configured. If an accounting server is currently configured, it must be removed from the configuration using the no form of the command before this command succeeds. If the optional <port> parameter is used, the command will configure the UDP port to use to connect to the RADIUS accounting server. The IP address specified must match that of a previously configured accounting server. If a port is already configured for the accounting server then the new port will replace the previously configured value. The port must be a value in the range 1 - 65535, with 1813 being the default value.

Format

```
radius server host {auth | acct} <ipaddr> [<port>]
```

Mode

```
Global Config
```

- **no radius server host**
  This command is used to remove the configured RADIUS authentication server or the RADIUS accounting server. If the 'auth' token is used, the previously configured RADIUS authentication server is removed from the configuration. Similarly, if the 'acct' token is used, the previously configured RADIUS accounting server is removed from the configuration. The <ipaddr> parameter must match the IP address of the previously configured RADIUS authentication / accounting server.

Format

```
no radius server host {auth | acct} <ipaddress>
```

Mode

```
Global Config
```

6.1.17 radius server key

This command is used to configure the shared secret between the RADIUS client and the RADIUS accounting / authentication server. Depending on whether the 'auth' or 'acct' token is used, the shared secret will be configured for the RADIUS authentication or RADIUS accounting server. The IP address provided must match a previously configured server. When this command is executed, the secret will be prompted. The secret must be an alphanumeric value not exceeding 20 characters.

Format

```
radius server key {auth | acct} <ipaddr>
```

Mode

```
Global Config
```

6.1.18 radius server msgauth

This command enables the message authenticator attribute for a specified server.

Default

```
radius server msgauth <ipaddr>
```

Mode

```
Global Config
```

6.1.19 radius server primary

This command is used to configure the primary RADIUS authentication server for this RADIUS client. The primary server is the one that is used by default for handling RADIUS requests. The remaining configured servers are only used if the primary server cannot be reached. A maximum of three servers can be configured on each client. Only one of these servers can be configured as the primary. If a primary server is already configured prior to this command being executed, the server specified by the IP address used in this command will become the new primary server. The IP address must match that of a previously configured RADIUS authentication server.

Format

```
radius server primary <ipaddr>
```

Mode

```
Global Config
```

6.1.20 radius server retransmit

This command sets the maximum number of times a request packet is retransmitted when no response is received from the RADIUS server. The retries value is an integer in the range of 1 to 15.

Default

```
10
```

Format

```
radius server retransmit <retries>
```

Mode

```
Global Config
```

no radius server retransmit

This command sets the maximum number of times a request packet is re-transmitted, when no response is received from the RADIUS server, to the default value, i.e. 10.

Format

```
no radius server retransmit
```

Mode

```
Global Config
```

6.1.21 radius server timeout

This command sets the timeout value (in seconds) after which a request must be retransmitted to the RADIUS server if no response is received. The timeout value is an integer in the range of 1 to 30.

Default

```
6
```

Format

```
radius server timeout <seconds>
```

Mode

```
Global Config
```

- **no radius server timeout**
  This command sets the timeout value (in seconds) after which a request must be retransmitted to the RADIUS server if no response is received, to the default value, i.e. 6.

Format

```
no radius server timeout
```

Mode

```
Global Config
```

6.1.22 show radius accounting

This command is used to display the configured RADIUS accounting mode, accounting server and the statistics for the configured accounting server.

Format

```
show radius accounting [statistics <ipaddr>]
```

Mode

```
Privileged EXEC and User EXEC
```

If the optional token 'statistics <ipaddr>' is not included, then only the accounting mode and the RADIUS accounting server details are displayed.

Mode

Enabled or disabled

IP Address

The configured IP address of the RADIUS accounting server

Port

The port in use by the RADIUS accounting server

Secret Configured

Yes or No

If the optional token 'statistics <ipaddr>' is included, the statistics for the configured RADIUS accounting server are displayed. The IP address parameter must match that of a previously configured RADIUS accounting server. The following information regarding the statistics of the RADIUS accounting server is displayed.

Accounting Server IP Address

IP Address of the configured RADIUS accounting server

Round Trip Time

The time interval, in hundredths of a second, between the most recent Accounting-Response and the Accounting-Request that matched it from the RADIUS accounting server.

Requests

The number of RADIUS Accounting-Request packets sent to this accounting server. This number does not include retransmissions.

Retransmission

The number of RADIUS Accounting-Request packets retransmitted to this RADIUS accounting server.

Responses

The number of RADIUS packets received on the accounting port from this server.

Malformed Responses

The number of malformed RADIUS Accounting-Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators and unknown types are not included as malformed accounting responses.

Bad Authenticators

The number of RADIUS Accounting-Response packets containing invalid authenticators received from this accounting server.

Pending Requests

The number of RADIUS Accounting-Request packets sent to this server that have not yet timed out or received a response.

Timeouts

The number of accounting timeouts to this server.

Unknown Types

The number of RADIUS packets of unknown types, which were received from this server on the accounting port.

Packets Dropped

The number of RADIUS packets received from this server on the accounting port and dropped for some other reason.

6.1.23 show authentication

This command displays the ordered authentication methods for all authentication login lists.

Format

```
show authentication
```

Mode

```
Privileged EXEC and User EXEC
```

Authentication Login List

This displays the authentication login listname.

Method 1

This displays the first method in the specified authentication login list, if any.

Method 2

This displays the second method in the specified authentication login list, if any.

Method 3

This displays the third method in the specified authentication login list, if any.

6.1.24 show authentication users

This command displays information about the users assigned to the specified authentication login list. If the login is assigned to non-configured users, the user “default” will appear in the user column.

Format

```
show authentication users <listname>
```

Mode

```
Privileged EXEC and User EXEC
```

User

This field displays the user assigned to the specified authentication login list.

Component

This field displays the component (User or 802.1X) for which the authentication login list is assigned.

6.1.25 show dot1x

This command is used to show a summary of the global dot1x configuration, summary information of the dot1x configuration for a specified port or all ports, the detailed dot1x configuration for a specified port and the dot1x statistics for a specified port - depending on the tokens used.

Format

```
show dot1x [{summary {<slot/port> | all} | {detail
<slot/port>} | {statistics <slot/port>}]
```

Mode

```
Privileged EXEC and User EXEC
```

If none of the optional parameters are used, the global dot1x configuration summary is displayed.

Administrative mode

Indicates whether authentication control on the switch is enabled or disabled.

If the optional parameter 'summary {<slot/port> | all}' is used, the dot1x configuration for the specified port or all ports are displayed.

Port

The interface whose configuration is displayed.

Control Mode

The configured control mode for this port. Possible values are `force-unauthorized | force-authorized | auto`

Operating Control Mode

The control mode under which this port is operating. Possible values are `authorized | unauthorized`

Reauthentication Enabled

Indicates whether re-authentication is enabled on this port

Key Transmission Enabled

Indicates if the key is transmitted to the supplicant for the specified port

If the optional parameter 'detail <slot/port>' is used, the detailed dot1x configuration for the specified port are displayed.

Port

The interface whose configuration is displayed

Protocol Version

The protocol version associated with this port. The only possible value is 1, corresponding to the first version of the dot1x specification.

PAE Capabilities

The port access entity (PAE) functionality of this port. Possible values are Authenticator or Supplicant.

Authenticator PAE State

Current state of the authenticator PAE state machine. Possible values are Initialize, Disconnected, Connecting, Authenticating, Authenticated, Aborting, Held, ForceAuthorized, and ForceUnauthorized.

Backend Authentication State

Current state of the backend authentication state machine. Possible values are Request, Response, Success, Fail, Timeout, Idle, and Initialize.

Quiet Period

The timer used by the authenticator state machine on this port to define periods of time in which it will not attempt to acquire a supplicant. The value is expressed in seconds and will be in the range 0 and 65535.

Transmit Period

The timer used by the authenticator state machine on the specified port to determine when to send an EAPOL EAP Request/Identity frame to the supplicant. The value is expressed in seconds and will be in the range of 1 and 65535.

Supplicant Timeout

The timer used by the authenticator state machine on this port to timeout the supplicant. . The value is expressed in seconds and will be in the range of 1 and 65535.

Server Timeout

The timer used by the authenticator on this port to timeout the authentication server. The value is expressed in seconds and will be in the range of 1 and 65535.

Maximum Requests

The maximum number of times the authenticator state machine on this port will retransmit an EAPOL EAP Request/Identity before timing out the supplicant. The value will be in the range of 1 and 10.

Reauthentication Period

The timer used by the authenticator state machine on this port to determine when reauthentication of the supplicant takes place. The value is expressed in seconds and will be in the range of 1 and 65535.

Reauthentication Enabled

Indicates if reauthentication is enabled on this port. Possible values are ‘True” or “False”.

Key Transmission Enabled

Indicates if the key is transmitted to the supplicant for the specified port. Possible values are True or False.

Control Direction

Indicates the control direction for the specified port or ports. Possible values are both or in.

If the optional parameter 'statistics **<**slot/port**>**' is used, the dot1x statistics for the specified port are displayed.

Port

The interface whose statistics are displayed.

EAPOL Frames Received

The number of valid EAPOL frames of any type that have been received by this authenticator.

EAPOL Frames Transmitted

The number of EAPOL frames of any type that have been transmitted by this authenticator.

EAPOL Start Frames Received

The number of EAPOL start frames that have been received by this authenticator.

EAPOL Logoff Frames Received

The number of EAPOL logoff frames that have been received by this authenticator.

Last EAPOL Frame Version

The protocol version number carried in the most recently received EAPOL frame.

Last EAPOL Frame Source

The source MAC address carried in the most recently received EAPOL frame.

EAP Response/Id Frames Received

The number of EAP response/identity frames that have been received by this authenticator.

EAP Response Frames Received

The number of valid EAP response frames (other than resp/id frames) that have been received by this authenticator.

EAP Request/Id Frames Transmitted

The number of EAP request/identity frames that have been transmitted by this authenticator.

EAP Request Frames Transmitted

The number of EAP request frames (other than request/identity frames) that have been transmitted by this authenticator.

Invalid EAPOL Frames Received

The number of EAPOL frames that have been received by this authenticator in which the frame type is not recognized.

EAP Length Error Frames Received

The number of EAPOL frames that have been received by this authenticator in which the frame type is not recognized.

6.1.26 show dot1x users

This command displays 802.1X port security user information for locally configured users.

Format

```
show dot1x users <slot/port>
```

Mode

```
Privileged EXEC and User EXEC
```

User

Users configured locally to have access to the specified port.

6.1.27 show radius

This command is used to display the various RADIUS configuration items for the switch as well as the configured RADIUS servers. If the optional token 'servers' is not included, the following RADIUS configuration items will be displayed.

Format

```
show radius [servers]
```

Mode

```
Privileged EXEC and User EXEC
```

Primary Server IP Address

Indicates the configured server currently in use for authentication

Number of configured servers

The configured IP address of the authentication server

Max number of retransmits

The configured value of the maximum number of times a request packet is retransmitted

Timeout Duration

The configured timeout value, in seconds, for request re-transmissions

Accounting Mode

Yes or No

If the optional token 'servers' is included, the following information regarding the configured RADIUS servers is displayed.

IP Address

IP Address of the configured RADIUS server

Port

The port in use by this server

Type

Primary or secondary

Secret Configured

Yes / No

6.1.28 show radius statistics

This command is used to display the statistics for RADIUS or configured server . To show the configured RADIUS server statistic, the IP Address specified must match that of a previously configured RADIUS server. On execution, the following fields are displayed.

Format

```
show radius statistics [ipaddr]
```

Mode

```
Privileged EXEC and User EXEC
```

If ip address is not specified than only Invalid Server Address field is displayed. Otherwise other listed fields are displayed.

Invalid Server Addresses

The number of RADIUS Access-Response packets received from unknown addresses.

Server IP Address

Round Trip Time

The time interval, in hundredths of a second, between the most recent Access-Reply | Access-Challenge and the Access-Request that matched it from the RADIUS authentication server.

Access Requests

The number of RADIUS Access-Request packets sent to this server. This number does not include retransmissions.

Access Retransmission

The number of RADIUS Access-Request packets retransmitted to this RADIUS authentication server.

Access Accepts

The number of RADIUS Access-Accept packets, including both valid and invalid packets, which were received from this server.

Access Rejects

The number of RADIUS Access-Reject packets, including both valid and invalid packets, which were received from this server.

Access Challenges

The number of RADIUS Access-Challenge packets, including both valid and invalid packets, which were received from this server.

Malformed Access Responses

The number of malformed RADIUS Access-Response packets received from this server. Malformed packets include packets with an invalid length. Bad authenticators or signature attributes or unknown types are not included as malformed access responses.

Bad Authenticators

The number of RADIUS Access-Response packets containing invalid authenticators or signature attributes received from this server.

Pending Requests

The number of RADIUS Access-Request packets destined for this server that have not yet timed out or received a response.

Timeouts

The number of authentication timeouts to this server.

Unknown Types

The number of RADIUS packets of unknown types, which were received from this server on the authentication port.

Packets Dropped

The number of RADIUS packets received from this server on the authentication port and dropped for some other reason.

6.1.29 show users authentication

This command displays all user and all authentication login information. It also displays the authentication login list assigned to the default user.

Format

```
show users authentication
```

Mode

```
Privileged EXEC
```

User

This field lists every user that has an authentication login list assigned.

System Login

This field displays the authentication login list assigned to the user for system login.

802.1x Port Security

This field displays the authentication login list assigned to the user for 802.1X port security.

6.1.30 users defaultlogin

This command assigns the authentication login list to use for non-configured users when attempting to log in to the system. This setting is overridden by the authentication login list assigned to a specific user if the user is configured locally. If this value is not configured, users will be authenticated using local authentication only.

Format

```
users defaultlogin <listname>
```

Mode

```
Global Config
```

6.1.31 users login

This command assigns the specified authentication login list to the specified user for system login. The `<user>` must be a configured `<user>` and the `<listname>` must be a configured login list.
If the user is assigned a login list that requires remote authentication, all access to the interface from all CLI, web, and telnet sessions will be blocked until the authentication is complete.
Note that the login list associated with the ‘admin’ user can not be changed to prevent accidental lockout from the switch.

Format

```
users login <user> <listname>
```

Mode

```
Global Config
```

6.2 HTTP Commands

6.2.1 ip http secure-port

This command is used to set the sslt port where port can be 1-65535 and the default is port 443.

Default

```
443
```

Format

```
ip http secure-port <portid>
```

Mode

```
Privileged EXEC
```

■ **no ip http secure-port**
This command is used to reset the sslt port to the default value.

Format

```
no ip http secure-port
```

Mode

```
Privileged EXEC
```

6.2.2 ip http secure-protocol

This command is used to set protocol levels (versions). The protocol level can be set to TLS1, SSL3 or to both TLS1 and SSL3.

Default

```
SSL3 and TLS1
```

Format

```
ip http secure-protocol [SSL3] [TLS1]
```

Mode

```
Privileged EXEC
```

6.2.3 ip http server

This command enables access to the switch through the Web interface. When access is enabled, the user can login to the switch from the Web interface. When access is disabled, the user cannot login to the switch's Web server.

Disabling the Web interface takes effect immediately. All interfaces are effected.

Default

```
enabled
```

Format

```
ip http server
```

Mode

```
Privileged EXEC
```

no ip http server

This command disables access to the switch through the Web interface. When access is disabled, the user cannot login to the switch's Web server.

Format

```
no ip http server
```

Mode

```
Privileged EXEC
```

6.2.4 show ip http

This command displays the http settings for the switch.

Format

```
show ip http
```

Mode

```
Privileged EXEC and User EXEC
```

Secure-Server Administrative Mode

This field indicates whether the administrative mode of secure HTTP is enabled or disabled.

Secure Protocol Level

The protocol level may have the values of SSL3, TSL1, or both SSL3 and TSL1.

Secure Port

This field specifies the port configured for SSLT.

HTTP Mode

THis field indicates whether the HTTP mode is enabled or disabled.

7 Appendix- VLAN Example

LAN switches can segment networks into logically defined virtual workgroups.This logical segmentation is commonly referred as a virtual LAN (VLAN). This logical segmentation of devices provides better LAN administration, security, and management of broadcast activity over the network. Virtual LANs have become an integral feature of switched LAN solutions.

The VLAN example below demonstrates a simple VLAN configuration with Hirschmann.

If a single port is a member of VLANs 2, 3 and 4, the port expects to see traffic tagged with either VLAN 2,3 or 4.
The PVID (Port Virtual Identification) could be something entirely different, for example '12' and things would still work fine, just so incoming traffic was tagged.

Example:
Project A = (VLAN2, ports 1,2)
Project B = (VLAN3, ports 3,4)
Project C = (VLAN4, ports 5,6)
Project P = (VLAN 9, port 7)

VLAN	Command
create VLAN 2	vlan database vlan 2 exit config interface 1/1 vlan participation include 2 exit interface 1/2 vlan participation include 2 exit

Table 17: Creating VLANs

VLAN	Command
create VLAN 3	vlan database vlan 3 exit config interface 0/3 vlan participation include 3 exit interface 0/4 vlan participation include 3 exit
create VLAN 4	vlan database vlan 4 exit config interface 0/5 vlan participation include 4 exit interface 0/6 vlan participation include 4 exit
create VLAN 9	vlan database vlan 9 exit config interface 0/1 vlan participation include 9 exit interface 0/2 vlan participation include 9 exit interface 0/3 vlan participation include 9 exit interface 0/4 vlan participation include 9 exit interface 0/5 vlan participation include 9 exit interface 0/6 vlan participation include 9 exit interface 0/7 vlan participation include 9 exit

Table 17: Creating VLANs

7.1 SOLUTION 1

All traffic entering the ports is tagged traffic. Since the traffic is tagged, the PVID configuration for each port is not a concern.

- The network card configuration for devices on Project A must be set to tag all traffic with 'VLAN 2'
- The network card configuration for devices on Project B must be set to tag all traffic with 'VLAN 3'
- The network card configuration for devices on Project C must be set to tag all traffic with 'VLAN 4'
- The network card configuration for devices on Project P must be set to tag all traffic with 'VLAN 9'

7.2 SOLUTION 2

The network card configuration for devices on Project A, B and C should be set to NOT tag traffic.

To take care of these untagged frames configure the following:

- vlan pvid 2 (in interface 0/1)
- vlan pvid 2 (in interface 0/2)
- vlan pvid 3 (in interface 0/3)
- vlan pvid 3 (in interface 0/4)
- vlan pvid 4 (in interface 0/5)
- vlan pvid 4 (in interface 0/6)

Note: Refer to the release notes for the Hirschmann application level code. The release notes detail the platform specific functionality of the Switching, Routing, SNMP, Config, Management, and Bandwidth Provisioning packages. The suite of features supported by the Hirschmann packages are not available on all the platforms to which Hirschmann has been ported.

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8 Glossary

Numerics

802.1D. The IEEE designator for Spanning Tree Protocol (STP). STP, a link management protocol, is part of the 802.1D standard for media access control bridges. Using the spanning tree algorithm, STP provides path redundancy while preventing endless loops in a network. An endless loop is created by multiple active paths between stations where there are alternate routes between hosts. To establish path redundancy, STP creates a logical tree that spans all of the switches in an extended network, forcing redundant paths into a standby, or blocked, state. STP allows only one active path at a time between any two network devices (this prevents the loops) but establishes the redundant links as a backup if the initial link should fail. If STP costs change, or if one network segment in the STP becomes unreachable, the spanning tree algorithm reconfigures the spanning tree topology and reestablishes the link by activating the standby path. Without spanning tree in place, it is possible that both connections may be simultaneously live, which could result in an endless loop of traffic on the LAN.

802.1P. The IEEE protocol designator for Local Area Network (LAN). This Layer 2 network standard improves support of time critical traffic, and limits the extent of high bandwidth multicast traffic within a bridged LAN. To do this, 802.1P defines a methodology for introducing traffic class priorities. The 802.1P standard allows priority to be defined in all 802 MAC protocols (Ethernet, Token Bus, Token Ring), as well as in FDDI. For protocols (such as Ethernet) that do not contain a priority field, 802.1P specifies a method for indicating frame priority based on the new fields defined in the 802.1Q (VLAN) standard.

802.1Q VLAN. The IEEE protocol designator for Virtual Local Area Network (VLAN). This standard provides VLAN identification and quality of service (QoS) levels. Four bytes are added to an Ethernet frame to allow eight priority levels (QoS) and to identify up to 4096 VLANs. See “VLAN” on page 423 for more information.

A

ABR. See “Area Border Router” on page 408.

Access Control List. An ACL is a database that an Operating System uses to track each user’s access rights to system objects (such as file directories and/or files).

ACL. See “Access Control List” on page 407.

Address Resolution Protocol. An Internet Protocol that dynamically maps Internet addresses to physical (hardware) addresses on a LAN.

Advanced Network Device Layer/ Software. Hirschmann term for the Device Driver level.

Aging. When an entry for a node is added to the lookup table of a switch, it is given a timestamp. Each time a packet is received from a node, the timestamp is updated. The switch has a user-configurable timer that erases the entry after a certain length of time with no activity from that node.

API. See “Application Programming Interface” on page 408.

Application Programming Interface. An API is an interface used by an programmer to interface with functions provided by an application.

Area Border Router. A router located on the border of one or more OSPF areas that connects those areas to the backbone network. ABRs are considered members of both the OSPF backbone and the attached areas. They therefore maintain routing tables describing both the backbone topology and the topology of the other areas. (Cisco Systems Inc.)

ARP. See “Address Resolution Protocol” on page 408.

ASAM. See “ATM Subscriber Access Multiplexer” on page 408.

ASBR. See “Autonomous System Boundary Router” on page 408.

ATM Subscriber Access Multiplexer. A telephone central office multiplexer that supports SDL ports over a wide range of network interfaces. An ASAM sends and receives subscriber data (often Internet services) over existing copper telephone lines, concentrating all traffic onto a single high-speed trunk for transport to the Internet or the enterprise intranet. This device is similar to a DSLAM (different manufacturers use different terms for similar devices). (Cisco Systems Inc.)

Autonomous System Boundary Router. ABR located between an OSPF autonomous system and a non-OSPF network. ASBRs run both OSPF and another routing protocol, such as RIP. ASBRs must reside in a non-stub OSPF area. See also ABR, non-stub area, and OSPF. (Cisco Systems Inc.)

AVL tree. Binary tree having the property that for any node in the tree, the difference in height between the left and right subtrees of that node is no more than 1.

B

BPDU. See “Bridge Protocol Data Unit” on page 409.

BGP. See “Border Gateway Protocol” on page 409.

BootP. See “Bootstrap Protocol.” on page 409.

Bootstrap Protocol. An Internet protocol that enables a diskless workstation to discover its own IP address, the IP address of a BootP server on the network, and a file to be loaded into memory to boot the machine. This enables the workstation to boot without requiring a hard or floppy disk drive.

Border Gateway Protocol. BGP is a protocol for exchanging routing information between gateway host (each with its own router) in a network of autonomous systems. BGP is often the protocol used between gateway hosts on the Internet. The routing table contains a list of known routers, the addresses they can reach, and a cost metric associated with the path to each router so that the best available route is chosen. Hosts using BGP communicate using the Transmission Control Protocol (TCP) and send updated router table information only when one host has detected a change. Only the affected part of the routing table is sent. BGP-4, the latest version, lets administrators configure cost metrics based on policy statements. (BGP-4 is sometimes called BGP4, without the hyphen.) BGP communicates with autonomous (local) networks using Internal BGP (IBGP) since it doesn't work well with IGP. The routers inside the autonomous network thus maintain two routing tables: one for the interior gateway protocol and one for IBGP. BGP-4 makes it easy to use Classless Inter-Domain Routing (Classless Inter-Domain Routing), which is a way to have more addresses within the network than with the current IP address assignment scheme.

Bridge Protocol Data Unit. BPDU is the IEEE 802.1D MAC Bridge Management protocol that is the standard implementation of STP (Spanning Tree Protocol). It uses the STP algorithm to insure that physical loops in the network topology do not result in logical looping of network traffic. Using one bridge configured as root for reference, the BPDU switches one of two bridges forming a network loop into standby mode, so that only one side of a potential loop passes traffic. By examing frequent 802.1d configuration updates, a bridge in the standby mode can switch automatically into the forward mode if the other bridge forming the loop fails.

C

cards.h. A file that instructs the base code driver how to construct the driver.

card_db. A database that contains everything from port maps to module information.

Checksum. A simple error-detection scheme in which each transmitted message is identified with a numerical value based on the number of set bits in the message. The receiving station then applies a formula to the message and checks to make sure the accompanying numerical value is the same. If not, the receiver can assume that the message has been corrupted.

CLI. See “Command Line Interface” on page 410.

Command Line Interface. CLI is a line-item interface for configuring systems. (In the case of Hirschmann, it is one of the user interfaces they have programmed for allowing programmers to configure their system).

Common Open Policy Service Protocol. A proposed standard protocol for exchanging network policy information between a Policy Decision Point (PDP) in a network and Policy Enforcement Points (PEPs) as part of overall Quality of Service (QoS) - the allocation of network traffic resources according to desired priorities of service. The policy decision point might be a network server controlled directly by the network administrator who enters policy statements about which kinds of traffic (voice, bulk data, video, teleconferencing, and so forth) should get the highest priority. The policy enforcement points might be router or layer 3 switches that implement the policy choices as traffic moves through the network. Currently, COPS is designed for use with the Resource Reservation Protocol (RSVP), which lets you allocate traffic priorities in advance for temporary high-bandwidth requirements (for example, video broadcasts or multicasts). It is possible that COPS will be extended to be a general policy communications protocol.

Complex Programmable Logic Device. CPLD is a programmable circuit on which a logic network can be programmed after its construction.

COPS. See “Common Open Policy Service Protocol.” on page 410.

CPLD. See “Complex Programmable Logic Device.” on page 410.

D

DAPI. See “Device Application Programming Interface” on page 411.

Device Application Programming Interface. DAPI is the software interface that facilitates communication of both data and control information between the Application Layer and HAPI, with support from System Support.

DHCP. See “Dynamic Host Configuration Protocol.” on page 411.

Differentiated Services. Diffserv is a protocol for specifying and controlling network traffic by class so that certain types of traffic get precedence - for example, voice traffic, which requires a relatively uninterrupted flow of data, might get precedence over other kinds of traffic. Differentiated Services is the most advanced method for managing traffic in terms of what is called Class of Service (CoS). Unlike the earlier mechanisms of 802.1P tagging and Type of Service (ToS), Differentiated Services avoids simple priority tagging and depends on more complex policy or rule statements to determine how to forward a given network packet. An analogy is made to travel services, in which a person can choose among different modes of travel - train, bus, airplane - degree of comfort, the number of stops on the route, standby status, the time of day or period of year for the trip, and so forth. For a given set of packet travel rules, a packet is given one of 64 possible forwarding behaviors - known as per hop behaviors (PHBs). A six-bit field, known as the Differentiated Services Code Point (DSCP), in the Internet Protocol (Internet Protocol) header specifies the per hop behavior for a given flow of packets. Differentiated Services and the Class of Service approach provide a way to control traffic that is both more flexible and more scalability than the Quality of Service approach.

Diffserv. See “Differentiated Services.” on page 411..

Distance-Vector Multicast Routing Protocol. DVMRP is a distance vector routing protocol used between routers in an intranet. This hop-based protocol describes a method of building multicast trees from the multicast source to all the receivers (or leaves) of the tree.

DVMRP. See “Distance-Vector Multicast Routing Protocol.” on page 411.

Dynamic Host Configuration Protocol. DHCP is a protocol for assigning dynamic IP addresses to devices on a network. With dynamic addressing, a device can have a different IP address every time it connects to the network. In some systems, the device's IP address can even change while it is still connected. DHCP also supports a mix of static and dynamic IP addresses. Dynamic addressing simplifies network administration because the software tracks IP addresses rather than requiring an administrator to manage the task. A new computer can be added to a network without the hassle of manually assigning it a unique IP address.

E

EEPROM. See “Electronically Erasable Programmable Read Only Memory” on page 412.

Electronically Erasable Programmable Read Only Memory. EEPROM is also known as Flash memory. This is re-programmable memory.

F

Fast STP. A high-performance Spanning Tree Protocol. See “STP” on page 422 for more information.

FIFO. First In First Out.

Flash Memory. See “EEPROM” on page 412.

Flow Control. The process of adjusting the flow of data from one network device to another to ensure that the receiving device can handle all of the incoming data. This is particularly important where the sending device is capable of sending data much faster than the receiving device can receive it. There are many flow control mechanisms. One of the most common flow control protocols for asynchronous communication is called xon-xoff. In this case, the receiving device sends a an “xoff” message to the sending device when its buffer is full. The sending device then stops sending data. When the receiving device is ready to receive more data, it sends an “xon” signal.

Forwarding. When a frame is received on an input port on a switch, the address is checked against the lookup table. If the lookup table has recorded the destination address, the frame is automatically forwarded on an output port.

Frame Check Sequence. The extra characters added to a frame for error detection and correction. FCS is used in X.25, HDLC, Frame Relay, and other data link layer protocols.

G

GARP. See “Generic Attribute Registration Protocol.” on page 413.

GARP Information Propagation.

GIP is the propagation of information between GARP participants for the same application in a bridge is carried out by a GIP component.

GARP Multicast Registration Protocol. GMRP provides a mechanism that allows Bridges and end stations to dynamically register (and subsequently, de-register)

Group membership information with the MAC Bridges attached to the same LAN segment, and for that information to be disseminated across all Bridges in the Bridged LAN that support Extended Filtering Services. The operation of GMRP relies upon the services provided by the GARP.

GARP VLAN Registration Protocol. GVRP allows workstations to request admission to a particular VLAN for multicast purposes.

GE. See “Gigabit Ethernet” on page 413.

General Purpose Chip-select Machine. GPCM provides interfacing for simpler, lower-performance memory resources and memory mapped-devices. The GPCM does not support bursting and is used primarily for boot-loading.

Generic Attribute Registration Protocol. GARP provides a generic attribute dissemination capability that is used by participants in GARP Applications (called GARP Participants) to register and de-register attribute values with other GARP Participants within a Bridged LAN. The definition of the attribute types, the values that they can carry, and the semantics that are associated with those values when registered are specific to the operation of the GARP Application concerned.

Gigabit Ethernet. A high-speed Ethernet connection.

GIP. See “GARP Information Propagation” on page 412.

GMRP. See “GARP Multicast Registration Protocol” on page 412.

GPCM. See “General Purpose Chip-select Machine” on page 413.

GVD. GARP VLAN Database.

GVRP. See “GARP VLAN Registration Protocol.” on page 413.

H

.h file. Header file in C code. Contains function and coding definitions.

HAPI. See “Hardware Abstraction Programming Interface” on page 413.

Hardware Abstraction Programming Interface. HAPI is the module that contains the NP specific software that interacts with the hardware.

hop count. The number of routers that a data packet passes through on its way to its destination.

I

ICMP. See “Internet Control Message Protocol” on page 414.

IGMP. See “Internet Group Management Protocol” on page 414.

IGMP Snooping. A series of operations performed by intermediate systems to add logic to the network to optimize the flow of multicast traffic; these intermediate systems (such as Layer 2 switches) listen for IGMP messages and build mapping tables and associated forwarding filters, in addition to reducing the IGMP protocol traffic. See “Internet Group Management Protocol” on page 414 for more information.

Internet Control Message Protocol. ICMP is an extension to the Internet Protocol (IP) that supports packets containg error, control, and informational messages. The PING command, for example, uses ICMP to test an Internet connection.

Internet Group Management Protocol. IGMP is the standard for IP Multicasting on the Internet. IGMP is used to establish host memberships in particular multicast groups on a single network. The mechanisms of the protocol allow a host to inform its local router, using Host Membership Reports, that it wants to receive messages addressed to a specific multicast group. All hosts conforming to Level 2 of the IP Multicasting specification require IGMP.

IP. See “Internet Protocol” on page 414.

IP Multicasting. Sending out data to distributed servers on the MBone (Multicast Backbone). For large amounts of data, IP Multicast is more efficient than normal Internet transmissions because the server can broadcast a message to many recipients simultaneously. Unlike traditional Internet traffic that requires separate connections for each source-destination pair, IP Multicasting allows many recipients to share the same source. This means that just one set of packets is transmitted for all the destinations.

Internet Protocol. The method or protocol by which data is sent from one computer to another on the Internet. Each computer (known as a host) on the Internet has at least one IP address that uniquely identifies it among all other computers on the Internet. When you send or receive data (for example, an e-mail note or a Web page), the message gets divided into little chunks called packets. Each of these packets contains both the sender's Internet address and the receiver's address. Any packet is sent first to a gateway computer that understands a small part of the Internet. The gateway computer reads the destination address and forwards the packet to an adjacent gateway that in turn reads the destination address and so forth across the Internet until one gateway recognizes the packet as belonging to a computer within its immediate neighborhood or domain. That gateway then forwards the packet directly to the computer whose address is specified.

Because a message is divided into a number of packets, each packet can, if necessary, be sent by a different route across the Internet. Packets can arrive in a different order than they were sent. The Internet Protocol just delivers them. It's up to another protocol, the Transmission Control Protocol (TCP) to put them back in the right order. IP is a connectionless protocol, which means that there is no continuing connection between the end points that are communicating. Each packet that travels through the Internet is treated as an independent unit of data without any relation to any other unit of data. (The reason the packets do get put in the right order is because of TCP, the connection-oriented protocol that keeps track of the packet sequence in a message.) In the Open Systems Interconnection (OSI) communication model, IP is in Layer 3, the Networking Layer. The most widely used version of IP today is IP version 4 (IPv4). However, IP version 6 (IPv6) is also beginning to be supported. IPv6 provides for much longer addresses and therefore for the possibility of many more Internet users. IPv6 includes the capabilities of IPv4 and any server that can support IPv6 packets can also support IPv4 packets.

J

Joint Test Action Group. An IEEE group that specifies test framework standards for electronic logic components.

JTAG. See “Joint Test Action Group” on page 415.

L

LAN. See “Local Area Network” on page 416.

LDAP. See “Lightweight Directory Access Protocol” on page 415.

Lightweight Directory Access Protocol. A set of protocols for accessing information directories. LDAP is based on the standards contained within the X.500 standard, but is significantly simpler. Unlike X.500, LDAP supports TCP/IP, which is necessary for any type of Internet access. Although not yet widely implemented, LDAP should eventually make it possible for almost any application running on virtually any computer platform to obtain directory information, such as e-mail addresses and public keys. Because LDAP is an open protocol, applications need not worry about the type of server hosting the directory.

Learning. The bridge examines the Layer 2 source addresses of every frame on the attached networks (called listening) and then maintains a table, or cache, of which MAC addresses are attached to each of its ports.

Link-State. In routing protocols, the declared information about the available interfaces and available neighbors of a router or network. The protocol's topological database is formed from the collected link-state declarations.

LLDP. The IEEE 802.1AB standard for link layer discovery in Ethernet networks provides a method for switches, routers and access points to advertise their identification, configuration and capabilities to neighboring devices that store the data in a MIB (management information base). Link layer discovery allows a network management system to model the topology of the network by interrogating the MIB databases in the devices.

Local Area Network. A group of computers that are located in one area and are connected by less than 1,000 feet of cable. A typical LAN might interconnect computers and peripherals on a single floor or in a single building. LANs can be connected together, but if modems and telephones connect two or more LANs, the larger network constitutes what is called a WAN or Wide Area Network.

M

MAC. (1) Medium Access Control. In LANs, the sublayer of the data link control layer that supports medium-dependent functions and uses the services of the physical layer to provide services to the logical link control (LLC) sublayer. The MAC sublayer includes the method of determing when a device has access to the transmission medium. (2) Message Authentication Code. In computer security, a value that is a part of a message or accompanies a message and is used to determine that the contents, origin, author, or other attributes of all or part of the message are as they appear to be. (*IBM Glossary of Computing Terms*)

Management Information Base.

When SNMP devices send SNMP messages to the management console (the device managing SNMP messages), it stores information in the MIB.

MBONE. See “Multicast Backbone” on page 417.

MDC. Management Data Clock.

MDI. Management Data Interface.

MDIO. Management Data Input/ Output.

MDIX. Management Dependent Interface Crossover.

MIB. See “Management Information Base” on page 416.

MOSPF. See “Multicast OSPF” on page 417.

MPLS. See “Multi-Protocol Label Switching” on page 417.

Multicast Backbone. The MBONE is a virtual network. It is layered on top of portions of the physical Internet to support routing of IP multicast packets since that function has not yet been integrated into many production routers. The network is composed of islands that can directly support IP multicast, such as multicast LANs like Ethernet, linked by virtual point-to-point links called "tunnels". The tunnel endpoints are typically workstation-class machines having operating system support for IP multicast and running the "mrouted" multicast routing daemon.

Multicasting. To transmit a message to specific recipients across a network. A simple example of multicasting is sending an e-mail message to a mailing list. Teleconferencing and videoconferencing also use multicasting, but require more robust protocols and networks. Standards are being developed to support multicasting over a TCP/IP network such as the Internet. These standards, IP Multicast and Mbone, will allow users to easily join multicast groups. Note that multicasting refers to sending a message to a select group whereas broadcasting refers to sending a message to everyone connected to a network. The terms multicast and narrowcast are often used interchangeably, although narrowcast usually refers to the business model whereas multicast refers to the actual technology used to transmit the data.

Multicast OSPF. With a MOSPF specification, an IP Multicast packet is routed based both on the packet's source and its multicast destination (commonly referred to as source/destination routing). As it is routed, the multicast packet follows a shortest path to each multicast destination. During packet forwarding, any commonality of paths is exploited; when multiple hosts belong to a single multicast group, a multicast packet will be replicated only when the paths to the separate hosts diverge. See “OSPF” on page 419 for more information.

Multiplexing. A function within a layer that interleaves the information from multiple connections into one connection.

Multi-Protocol Label Switching.

An initiative that integrates Layer 2 information about network links (bandwidth, latency, utilization) into Layer 3 (IP) within a particular autonomous system—or ISP—in order to simplify and improve IP-packet exchange. MPLS gives network operators a great deal of flexibility to divert and route traffic around link failures, congestion, and bottlenecks. From a QoS standpoint, ISPs will better be able to manage different kinds of data streams based on priority and service plan. For instance, those who subscribe to a premium service plan, or those who receive a lot of streaming media or high-bandwidth content can see minimal latency and packet loss. When packets enter into a MPLS-based network, Label Edge Routers (LERs) give them a label (identifier). These labels not only contain information based on the routing table entry (i.e., destination, bandwidth, delay, and other metrics), but also refer to the IP header field (source IP address), Layer 4 socket number information, and differentiated service. Once this classification is complete and mapped, different packets are assigned to corresponding Labeled Switch Paths (LSPs), where Label Switch Routers (LSRs) place outgoing labels on the packets. With these LSPs, network operators can divert and route traffic based on data-stream type and Internet-access customer.

MT-RJ connector. A type of fiber-optic cable jack that is similar in shape and concept to a standard telephone jack, enabling duplex fiber-optic cables to be plugged into compatible devices as easily as plugging in a telephone cable.

MUX. See “Multiplexing” on page 417.

N

NAT. See “Network Address Translation” on page 418.

Network Address Translation.

Sometimes referred to as Transparent Proxying, IP Address Overloading, or IP Masquerading. Involves use of a device called a Network Address Translator, which assigns a contrived, or logical, IP address and port number to each node on an organization's internal network and passes packets using these assigned addresses.

NM. Network Module.

nm. Nanometer (1 x 10e^{9}) meters.

non-stub area. Resource-intensive OSPF area that carries a default route, static routes, intra-area routes, interarea routes, and external routes. Non-stub areas are the only OSPF areas that can have virtual links configured across them, and are the only areas that can contain an ASBR. Compare with stub area. See also ASAM and OSPF. (Cisco Systems Inc.)

NP. Network Processor.

O

Open Shortest Path First. A link-state (algorithm used by the router to determine the current topology of a network), Interior Gateway (distributes routing information between routers belonging to a single Autonomous System) routing protocol. This protocol's algorithm determines the shortest path from its router to all the other routers in the network. This protocol is rapidly replacing RIP on the Internet.

Open Systems Interconnection.

OSI is a seven (7) layer architecture model for communications systems developed by the ISO for the interconnection of data communications systems. Each layer uses and builds on the services provided by those below it.

Operating System Application Programming Interface. OSAPI is a module within the System Support software that provides a set of interfaces to OS support functions.

OS. Operating System.

OSAPI. See “Operating System Application Programming Interface” on page 419.

OSI. See “Open Systems Interconnection” on page 419.

OSPF. See “Open Shortest Path First” on page 419.

P

PDU. See “Protocol Data Unit” on page 420.

PHY. The OSI Physical Layer: The physical layer provides for transmission of cells over a physical medium connecting two ATM devices. This physical layer is comprised of two sublayers: the Physical Medium Dependent (PMD) sublayer, and the Transmission Convergence (TC) sublayer.

PIM-DM. See “Protocol Independent Multicast – Dense Mode” on page 420.

PMC. Packet Mode Channel.

Port Mirroring. Also known as a roving analysis port. This is a method of monitoring network traffic that forwards a copy of each incoming and outgoing packet from one port of a network switch to another port where the packet can be studied. A network administrator uses port mirroring as a diagnostic tool or debugging feature, especially when fending off an attack. It enables the administrator to keep close track of switch performance and alter it if necessary. Port mirroring can be managed locally or remotely. An administrator configures port mirroring by assigning a port from which to copy all packets and another port where those packets will be sent. A packet bound for or heading away from the first port will be forwarded onto the second port as well. The administrator places a protocol analyzer on the port receiving the mirrored data to monitor each segment separately. The analyzer captures and evaluates the data without affecting the client on the original port. The monitor port may be a port on the same SwitchModule with an attached RMON probe, a port on a different SwitchModule in the same hub, or the SwitchModule processor. Port mirroring can consume significant CPU resources while active. Better choices for long-term monitoring may include a passive tap like an optical probe or an Ethernet repeater.

Protocol Data Unit. PDU is a packet of data passed across a network. The term implies a specific layer of the OSI model and a specific protocol.

Protocol Independent Multicast – Dense Mode. Like DVMRP, PIM-DM uses a flood and prune protocol for building multicast trees. However, unlike DVMRP, PIM-DM uses existing unicast protocols for determing the route to the source.

Q

QoS. See “Quality of Service” on page 420.

Quality of Service. QoS is a networking term that specifies a guaranteed level of throughput. Throughput is the amount of data transferred from one device to another or processed in a specified amount of time - typically, throughputs are measured in bytes per second (Bps).

R

Real-Time Operating System.

RTOS is a component of the OSAPI module that abstracts operating systems with which other systems can interface.

Resource Reservation Setup Protocol. RSVP is a new Internet protocol being developed to enable the Internet to support specified Qualities-of-Service (QoS). Using RSVP, an application will be able to reserve resources along a route from source to destination. RSVP-enabled routers will then schedule and prioritize packets to meet the prioritization assigned by QoS. RSVP is a chief component of a new type of Internet being developed, known broadly as an integrated services Internet. The general idea is to enhance the Internet to support transmission of real-time data.

RFC. Request For Comment.

RIP. See “Routing Information Protocol” on page 420.

Routing Information Protocol.

RIP is the routing protocol used by the routed process on Berkeleyderived UNIX systems. Many networks use RIP; it works well for small, isolated, and topologically simple networks.

RIPng. Routing Information Protocol, new generation.

RMON. Short for remote monitoring, a network management protocol that allows network information to be gathered at a single workstation. Whereas SNMP gathers network data from a single type of Management Information Base (MIB), RMON 1 defines nine additional MIBs that provide a much richer set of data about network usage. For RMON to work, network devices, such as hubs and switches, must be designed to support it. The newest version of RMON, RMON 2, provides data about traffic at the network layer in addition to the physical layer. This allows administrators to analyze traffic by protocol.

RP. Rendezvous Point. Used with IP Multicast.

RPU. Remote Power Unit.

RSVP. See “Resource Reservation Setup Protocol” on page 420.

RTOS. See “Real-Time Operating System” on page 420.

S

SDL. Synchronous Data Link.

Simple Network Management Protocol. SNMP is the protocol governing network management and the monitoring of network devices and their functions. It is not necessarily limited to TCP/IP networks. The versions have the following differences:

SNMPv1 (full): Security is based on community strings.

SNMPsec (historic): Security is based on parties. Few, if any, vendors implemented this version of the protocol, which is now largely forgotten.

SNMPv2p (historic): For this version, much work was done to update the SNMPv1 protocol and the SMIv1, and not just security. The result was updated protocol operations, new protocol operations and data types, and party-based security from SNMPsec.

SNMPv2c (experimental): This version of the protocol is called community string-based SNMPv2. It is an update of the protocol operations and data types of SNMPv2p, and uses community-based security from SNMPv1.

SNMPv2u (experimental): This version of the protocol uses the protocol operations and data types of SNMPv2c and security based on users.

*SNMPv2** (experimental): This version combined the best features of SNMPv2p and SNMPv2u. (It is also called SNMPv2star.) The documents defing this version were never published as RFCs.

SNMPv3 (proposed): This version of the protocol is a combination of user-based security and the protocol operations and data types from SNMPv2p and support for proxies. The security is based on that found in SNMPv2u and SNMPv2*, and updated after much review. The documents defing this protocol will soon be published as RFCs.

SimpleX signaling. SX is one of IEEE 802.3's designations for media. For example, 1000SX indicates 1000 gigabit Ethernet over "short haul" or "short wavelength" optical fiber.

SMC1. A model of Serial Management Controller from Motorola.

SMII. Serial Media Independent Interface.

SNMP. See “Simple Network Management Protocol” on page 421.

SODIMM. Small Outline Dual Inline Memory Module.

SRAM. Static Random Access Memory.

STP. Spanning Tree Protocol. See “802.1D” on page 407 for more information.

stub area. OSPF area that carries a default route, intra-area routes, and interarea routes, but does not carry external routes. Virtual links cannot be configured across a stub area, and they cannot contain an ASBR. Compare with non-stub area. See also ASAM and OSPF. (Cisco Systems Inc.)

SX. See “SimpleX signaling” on page 422.

SYSAPI. See “Systems Application Programming Interface” on page 422.

Systems Application Programming Interface. SYSAPI is a module within the System Support software that provides system-wide routines for network and mbuf support and provides the interface into the system registry.

T

TBI. Ten Bit Interface.

Telnet. A character-based UNIX application that enables users with a Telnet server account to log on to a UNIX computer and utilize its resources.

TFTP. See “Trivial File Transfer Protocol” on page 422.

Trivial File Transfer Protocol.

TFTP is a simple form of the File Transfer Protocol (FTP). TFTP uses the User Datagram Protocol (UDP, a direct protocol used to communicate datagrams over a network with little error recovery) and provides no security features. It is often used by servers to boot diskless workstations, X-terminals, and routers.

Trunking. The process of combing a set of trunks that are traffic-engineered as a unit for the establishment of connections between switching systems in which all of the communications paths are interchangeable.

U

UPM. User Programmable Machine.

UPMA. The first of two UPMs in Motorola's MPC855T processor.

UPMB. The second of two UPMs in Motorola's MPC855T processor.

USP. An abbreviation that represents Unit, Slot, Port.

V

Virtual Local Area Network.

Operating at the Data Link Layer (Layer 2 of the OSI model), the VLAN is a means of parsing a single network into logical user groups or organizations, as if they physically resided on a dedicated LAN segment of their own. In reality, this virtually defined community may have individual members peppered across a large, extended LAN. The VLAN identifier is part of the 802.1Q tag, which is added to an Ethernet frame by an 802.1Q-compliant switch or router. Devices recognizing 802.1Q-tagged frames maintain appropriate tables to track VLANs. The first three bits of the 802.1Q tag are used by 802.1P to establish priority for the packet.

Virtual Router Redundancy Protocol. VRRP specifies an election protocol that dynamically assigns responsibility for a virtual router to one of the VRRP routers on a LAN. The VRRP router controlling the IP address(es) associated with a virtual router is called the Master, and forwards packets sent to these IP addresses. The election process provides dynamic fail-over in the forwarding responsibility should the Master become unavailable. This allows any of the virtual router IP addresses on the LAN to be used as the default first hop router by end-hosts. The advantage gained from using VRRP is a higher availability default path without requiring configuration of dynamic routing or router discovery protocols on every end-host.

VLAN. See “Virtual Local Area Network” on page 423.

vMAN. Virtual Metropolitan Area Network.

VRRP. See “Virtual Router Redundancy Protocol” on page 423.

W

WAN. See “Wide Area Network” on page 424.

Web. Also known as World-Wide Web (WWW) or W3. An Internet client-server system to distribute information, based upon the hypertext transfer protocol (HTTP).

Wide Area Network. A WAN is a computer network that spans a relatively large geographical area. Typically, a WAN consists of two or more local-area networks (LANs).

X

X.500. A directory standard that enables applications like e-mail to access information that can either be central or distributed. The benefit of a directory is the ability to minimize the impact on the user of changes to a network. The standard is broken down under subsequent standards, as follows:

X.501 Models

X.509 Authentication framework

X.511 Abstract service definition

X.518 Procedures for distributed operation

X.519 Protocol specifications

X.520 Selected attribute types

X.521 Selected object types

XModem. One of the most popular file transfer protocols (FTPs). Xmodem is fairly effective at detecting errors. It sends blocks of data together with a checksum and then waits for acknowledgment of the block's receipt. The waiting slows down the rate of data transmission considerably, but it ensures accurate transmission. Xmodem can be implemented either in software or in hardware. Many modems, and almost all communications software packages, support Xmodem. However, it is useful only at relatively slow data transmission speeds (less than 4,800 bps). Enhanced versions of Xmodem that work at higher transmission speeds are known as Ymodem and Zmodem.

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