Omnitron Systems

Command Line Interface
for
All *OmniConverter*® and *RuggedNet*®
Managed Switch Products

USER MANUAL

Firmware Release 2.6

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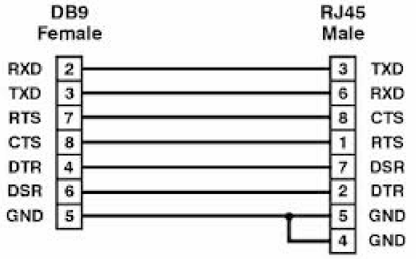
1.0 OVERVIEW

The Command Line Interface (CLI) provides configuration and monitoring for all OmniConverter and RuggedNet managed switch products.

The CLI can be accessed through the serial console port or through the Ethernet ports using Telnet or SSH.

To configure the module using the serial port, attach a DB-9 serial (RS-232) equipped computer with terminal emulation software such as Procomm or Putty to the serial port on the module using a RJ-45 to DB-9 serial cable (not included). Some computers do not come with DB-9 serial port connectors and may require a USB-to-serial port adapter.

The port is a standard RS-232 asynchronous serial interface. The serial ports is configured for 57,600bps, 1 stop, 8 data, parity none. The serial adapter cable pin-outs are illustrated below.



Standard RJ-45 to DB-9 serial cable pin-out

1.1 NEW FEATURES

Firmware 2.6 adds MODBUS functionality

Firmware 2.5 adds hierarchical command line interface.

Firmware 2.4 adds DHCPv6 and DHCPv6 Relay functionality.

Firmware 2.3 adds IPv6, IPv6 Multicast Listener Discovery (MLD) Snooping, Multiple Spanning Tree Protocol (MSTP), PoE power management with LLDP MED and MDI TLV, and PoE Power Multi-Day Scheduler.

2.0 COMMAND LINE INTERFACE (CLI)

Each module is configured with the following defaults:

IPv4

IP Address	192.168.1.220
IP Subnet Mask	255.255.255.0
IP Gateway	192.168.1.1

IPv6

IPv6 Interface	stateless
IPV6 Address	fe80::206:87ff:fe01:ec15
IPV6 Gateway Address	fe80::1

Protocols

IP	enabled
Telnet	enabled
FTP	disabled
DHCP Client	disabled
Flow Control	disabled

Passwords

Serial	public (username: admin)
FTP	public (username: admin)
Telnet	public (username: admin)
SSH	public (default username: admin)

SNMPv1/v2c Communities

Read Community Name	public
Write Community Name	private
SNMPv1/v2c agent	enabled

SNMPv3 Parameters

SNMPv3 agent	enabled
User 1 Type	admin
User 1 Name	admin
User 1 security level	noAuthNoPriv
User 1 privacy password	privateadmin
User 1 privacy encryption	DES
User 1 authentication password	privateadmin
User 1 authentication hashing	MD5
User 2 Type	read-only
User 2 Name	guest
User 2 security level	noAuthNoPriv
User 2 privacy password	publicguest
User 2 privacy encryption	DES
User 2 authentication password	publicguest
User 2 authentication hashing	MD5

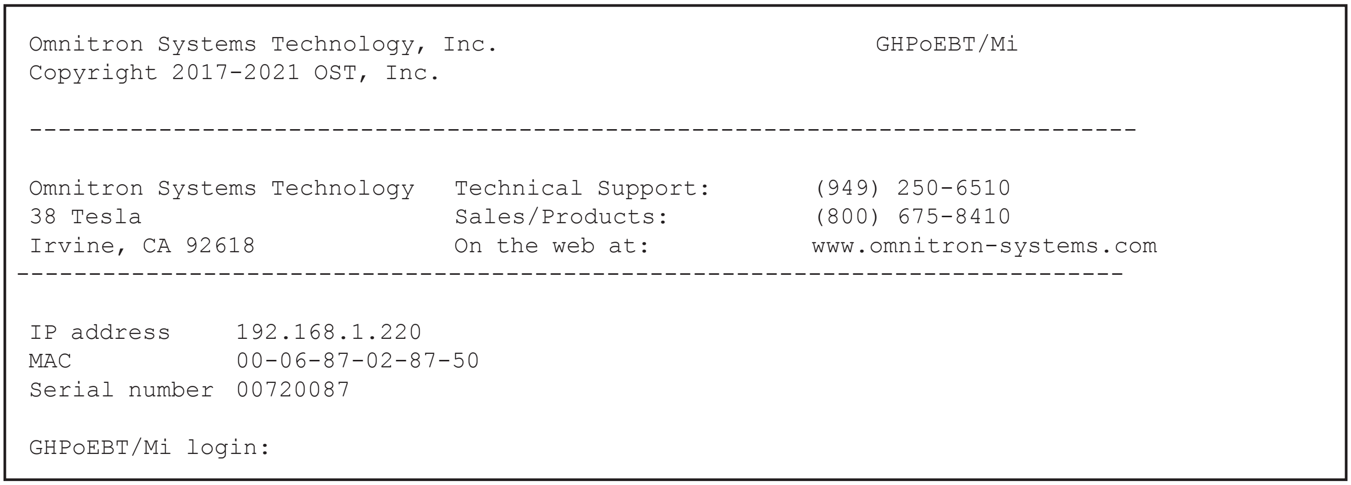
User 3 Type	deny
User 3 Name	guest1
User 3 security level	noAuthNoPriv
User 3 privacy password	publicguest
User 3 privacy encryption	DES
User 3 authentication password	publicguest
User 3 authentication hashing	MD5
User 4 Type	deny
User 4 Name	guest2
User 4 security level	noAuthNoPriv
User 4 privacy password	publicguest
User 4 privacy encryption	DES
User 4 authentication password	publicguest
User 4 authentication hashing	MD5

General SNMP Parameters

SNMP trap type	SNMPv2c
SNMP UDP Trap Port Number	162

The switches support a common password per user account for the Serial Console, Telnet, FTP and SSH. The password is configured using the *user* command. Passwords for SNMPv1 are configured using the *snmp* command. It is highly recommended that the passwords be changed in order to prevent unauthorized access to the module.

Once accessed, the ***Password Entry*** screen is displayed. Type the username and password. Press <*ENTER*>.



```
 Omnitron Systems Technology, Inc.                          GHPoEBT/Mi
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 ------------------------------------------------------------------------------

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 Irvine, CA 92618              On the web at:           www.omnitron-systems.com
------------------------------------------------------------------------------

 IP address     192.168.1.220
 MAC            00-06-87-02-87-50
 Serial number  00720087

 GHPoEBT/Mi login:
```

Module login screen and prompt will vary depending on the model.

A model with two (2) fiber uplink ports and four (4) RJ-45 user ports is used for all examples in this user manual.

For eight (8) RJ-45 port models or models with one (1) fiber uplink, the *-p* command will indicate the port numbers available:

```
-p    physical port list, [pList]: {F1,F2,1..4|all}
-p    physical port list, [pList]: {F1,1..4|all}
-p    physical port list, [pList]: {F1,F2,1..8|all}
-p    physical port list, [pList]: {F1,1..8|all}
```

2.1 CLI COMMANDS

The commands are presented in alphabetical order and are not meant as a configuration guide. Each command has an explanation and configuration example.

Not all commands are valid for all module types. Commands not available for a specific module type will not be displayed in the CLI Command summary list.

Enter *?* or *help* to view the options. Type *exit* to return to the login screen.

```
>

 CLI Command summary
 For more help on a specific command, type the <command> -h

 Command            Description
 ?                  command summary (same as help command)
 aaa                authentication, authorization, accounting configuration
 acl                access control list configuration for management access
 bwp                bandwidth profile configuration
 cabletest          cable test for a copper port
 contact            contact closure status
 cos                class of service configuration
 dir                directory of the existing files
 ethertype          ethertype tag identification configuration
 exit               exit the CLI session
 fwload             firmware load configuration
 h                  command summary (same as help command)
 help               command summary
 igmp               internet group management protocol
 ip                 internet protocol configuration
 lag                link aggregation group configuration
 lldp               link layer discovery protocol (LLDP) configuration
 location           location configuration
 lr                 link redundancy configuration
 mactable           mac table status
 mld                multicast listener discovery protocol configuration
 modbus             modbus protocol configuration
 module             module global configuration
 mrp                media redundancy protocol (MRP) configuration
 nest               hierarchical CLI session
 ping               ping configuration
 port               port attribute configuration
 portaccess         port access configuration
 portstat           port statistic configuration
 protocol           protocol configuration
 pse                power source equipment (PSE) configuration
 restart            restart module
 restore            restore module defaults
 save               save configuration changes into permanent memory
 script             create and execute script files
 serupdate          upload firmware update via the serial port
 sfp                small form pluggable port information
 showconfig         show basic configuration information status
 smtp               smtp configuration
 snmp               simple network management protocol user configuration
 sntp               simple network time protocol configuration
 spantree           spanning tree configuration
 splash             splash screen warning message configuration
 ssh                secure shell configuration
 stormcontrol       storm control configuration
 switch             physical switch configuration
```

```
switchport         vlan interface configuration
syslog             system log message configuration
time               time of day configuration
traphost           snmp trap host configuration
traps              snmp trap configuration
user               user configuration
ver                version status
vlan               vlan configuration
x                  exit the CLI session
zone               time zone list

CLI keyboard shortcuts:
Ctrl+A       move the cursor to the beginning of the line
Ctrl+B       move the cursor backward one character
Ctrl+D       delete the character at the cursor
Ctrl+E       move the cursor to the end of the line
Ctrl+F       move the cursor forward one character
Ctrl+K       erase characters from the cursor to the end of the line
Ctrl+L       redisplay the current line on the console
Ctrl+N       or down arrow, display the next command in the commands history buffer
Ctrl+P       or up arrow, display the previous command in the commands history buffer
Ctrl+R       starts a new line with the same command previously shown
Ctrl+U       delete the whole line
Ctrl+W       delete the word to the left of the cursor
Ctrl+X       erase character from the cursor to the beginning of the line
Esc+F        move the cursor forward one word, skipping white space
Esc+B        move the cursor backward one word, skipping white space
Backspace    remove the character to the left of the cursor

>
```

2.1.1 Authentication, Authorization and Accounting (AAA)

The module supports Authentication, Authorization and Accounting (AAA), Remote Authentication Dial-In User Service (RADIUS), Terminal Access Controller Access-Control System Plus (TACACS+) and Port Based Network Access Control (802.1X).

AAA is a framework for controlling access to computer resources, enforcing policies, auditing usage and providing the information necessary to bill for services. AAA configures the client type method for console, FTP, SSH, Telnet interfaces and the authentication method TACACS+, RADIUS or local.

Remote Authentication Dial-In User Service (RADIUS) is a client/server system that secures networks against unauthorized access. When a user tries to access a specific module, the RADIUS server is contacted for validation of a correct user name and password.

The user receives one of the following responses from the RADIUS server:

ACCEPT - The user is authenticated.

REJECT - The user is not authenticated and is prompted to reenter the username and password, or access is denied.

CHALLENGE - A challenge is issued by the RADIUS server and is attempting to collect additional information from the user including username and password.

CHANGE PASSWORD - A request is issued by the RADIUS server asking the user to select a new password.

RADIUS is a stateless protocol using UDP, running on Port 1812 between the Client and the Server. A shared secret key is used to encrypt passwords and exchange responses between the client and the server.

Terminal Access Controller Access-Control System Plus (TACACS+) is a connection oriented Authentication, Authorization, and Accounting (AAA) protocol. TACACS+ is used to authenticate, authorize, and for accounting of TCP connections.

TACACS+ implements the following functions:

> Authentication is the action of determining the identification of the user (or entity). It also provides complete control of the authentication process through login and password dialog, challenge and response, and messaging support.
>
> Authorization is the action of determining what a user is allowed to do and provides fine-grained control over user capabilities for the duration of the user's session.
>
> Accounting is the action of recording what a user is doing, and/or has done and collects and sends information used for billing, auditing, and reporting to the TACACS+ daemon.

When a user attempts to log in to a device the control passes to the TACACS+ server which provides the challenge and the user provides the response. This is typically user name, password, and other challenge questions. The information passed between the module and the TACACS+ server is encrypted based upon the TACACS+ protocol specification,

The module will eventually receive one of the following responses from the TACACS+ server during the authentication phase:

> ACCEPT - The user is authenticated and service may begin. If the module is configured to require authorization, authorization begins.
>
> REJECT - The user has failed to authenticate. The user may be denied further access, or will be prompted to retry the login sequence depending upon how the TACACS+ server is configured.
>
> ERROR - An error occurred at some time during the authentication. If an ERROR response is received, the module will typically try to use an alternative method for authenticating the user.
>
> CONTINUE - The user is prompted for additional authentication information.

Once the Authentication phase is complete, the Authorization phase begins (if configured on the module). The module again contacts the TACACS+ server and it returns an ACCEPT or RETURN authorization response. If an ACCEPT response is returned, the response contains attributes that are used to direct the services that the user can access.

Port Based Network Access Control is defined in IEEE 802.1X. It uses EAPoL (Ethernet Authentication Protocol over LAN) to communicate between the Supplicant (Client), Authenticator (module) and Authentication Server.

> The Supplicant, or Client, is connected to a port that needs to be authenticated via the EAP Server. EAP Start Frames are sent from the Supplicant to the Authenticator.
>
> The Authenticator, or switch, requests information from the Supplicant and strips the EAP information from the EAP Ethernet frame and places that information into a RADIUS frame and transmits the frames towards the EAP RADIUS server. The Authenticator also passes information from the EAP Server to the Supplicant in the reverse process.
>
> The EAP Server receives the EAP requests and proceeds with the Challenge-Response sequence and finally allows or denies access to the port.

The *aaa* command provides the ability to configure AAA, RADIUS, TACACS+ and 802.1X parameters. To configure AAA, use the *aaa* option from the CLI prompt. A list of options is displayed when the *aaa -h* command is entered.

```
> aaa -h

Description:
   aaa - authentication, authorization, accounting configuration
Syntax:
  aaa [-h]
  aaa -s
  aaa {-dis|-ena} {aaa|guestvlan|radius|tacacs+|802.1x}
  aaa -ty tacacs+ [-host ipHostList] [-key aKey] [-l4 a1,a3] [-to toVal]
  aaa -ty radius [-host ipHostList] [-key aKey] [-l4 a1,a3] [-tran rNum]
          [-to toVal]
  aaa -ty 802.1x -p pList [-ptype pMode] [-auth aTime] [-retry rTime]
          [-vid gVid] [-dis|-ena guestvlan] [-xmode xModeSel]
  aaa -meth authList
  aaa -dall
Switches:
-auth  802.1X reauthorize time in sec, [aTime]: {0..65535}, dflt 3600
       a value of zero indicates that reauthorization is not required
-dall  delete all aaa configured settings and restore defaults
-dis   disable function: {aaa|guestvlan|radius|tacacs+|802.1x}
-ena   enable function: {aaa|guestvlan|radius|tacacs+|802.1x}
         [aaa] authentication, authorization, accounting, dflt disabled
         [guestvlan] 802.1X guest vlan authentication, dflt disabled
         [radius] radius protocol, dflt disabled
         [tacacs+] TACACS+ protocol, dflt disabled
         [802.1x] port based access control (802.1X), dflt disabled
-h     display help information
-host  server ip host list, [ipHostList]: {host1,..,hostn}
-key   server key, [aKey]: 1-63 ASCII characters, dflt not defined
-l4    layer 4 port number list, [a1,a3]
         [a1] authentication/authorization port number: {1..65535}
         [a3] accounting port number: {1..65535}
-meth  authentication method, [authList]: {local,tacacs+,radius}
-p     physical port list, [pList]: {F1,F2,1..4|all}
-ptype port authentication mode, [pMode]: {auto|mac|on|off}, dflt on
         [auto] standard 802.1X authentication on a port
         [mac] 802.1X MAC bypass authentication on a port
         [on] port is always authorized, 802.1X disabled
         [off] port is always unauthorized
-retry 802.1X EAP retry time in sec, [rTime]: {1..60}, dflt 30
-s     show current configuration
-to    server timeout before error declared in sec, [toVal]: {1..60}, dflt 60
-tran  RADIUS server request retry  count, [rNum]: {0..10}, dflt 2
-ty    configuration type: {radius|tacacs+|802.1x}
-vid   guest VLAN ID assignment, [gVid]: {1..4095}
-xmode 802.1X mode, [xModeSel]: {discard|peer|tunnel}
         [discard] 802.1X is disabled, 802.1X frames are discarded
         [peer] 802.1X is enabled and protocol is operating
         [tunnel] 802.1X is disabled, 802.1X frames are tunneled

>
```

The options available using the *aaa* command are shown below.

The *-auth* switch configures the 802.1X reauthorization timer. A zero value disables the timer.

The *-dall* switch deletes all AAA configured setting and restores factory defaults.

The *-dis* and *-ena* switches disables/enables one of the following functions:

aaa Disables/Enables authentication, authorization, and accounting, default is disabled.

guestvlan Disables/Enables guest VLAN access, default is disabled.

radius Disables/Enables RADIUS (RFC 2865, RFC 2866), default is disabled.

tacacs+ Disables/Enables TACACS+, default is disabled.

802.1x Disables/Enables port based access control (IEEE 802.1X), default is disabled

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-host* switch configures the IP address of the host. The *-ty* command specifies the type of host.

The *-key* switch configures the secret key used to encrypt and decrypt AAA PDU information between the host and the server.

The *-l4* switch configures the TCP or UDP port numbers for the AAA protocol in the following order: authentication / authorization port (a1) and accounting port (a3).

The *-meth* switch selects the authentication method (*local, tacacs+, radius or none*).

The *-p* switch selects the port on the module that is associated with the AAA protocol. The default is all ports.

The *-ptype* switch selects the port authentication mode:

auto Configures 802.1X authentication on the port.

mac Configures 802.1X MAC bypass authentication on the port.

on Configures a port to be authorized, disabling 802.1X EAP.

off Configures a port to be unauthorized, blocking the port permanently and disabling 802.1X EAP.

The *-retry* switch configures the 802.1X retry time (1 to 60 seconds) for new EAP request identify PDU. The default time value is 30 seconds.

The *-s* switch displays current AAA settings.

The *-to* switch configures the AAA server wait timeout value in seconds. When the value expires, the server will declare an ERROR. A value of 0 disables the timer. The default value is 60 seconds.

The *-tran* switch configures the number of times the module transmits a server request before an ERROR is declared. The default is 2.

The *-ty* switch configures the AAA protocol type, RADIUS, TACACS+ or 802.1x.

The *-vid* switch configures the guest VLAN ID.

The *-xmode* switch configures how the 802.1x frames are handled.

discard When 802.1X is disabled, 802.1X frames are discarded.

peer When 802.1X is enabled and protocol is operating.

tunnel When 802.1X is disabled, 802.1X frames are tunneled.

To display the configuration, use the *aaa -s* command.

```
> aaa -s

AAA                       disabled

authentication method     local

TACACS+                   disabled
  server(s)
  authentication Port     49
  accounting Port         49
  key
  timeout (sec)           60s

RADIUS                    disabled
  server(s)
  authentication Port     1812
  accounting Port         1813
  key
  timeout (sec)           60s
  number of retries       2

802.1X                    disabled (guest VLAN disabled)
  port F1                 tunnel, on
  port F2                 tunnel, on
  port 1                  tunnel, on
  port 2                  tunnel, on
  port 3                  tunnel, on
  port 4                  tunnel, on

>
```

To configure the IP address of the RADIUS server, use the following command.

```
> aaa -host 192.168.1.1 -ty radius
```

To enable RADIUS, use the *aaa -ena radius* command.

```
> aaa -ena radius
```

2.1.2 Access Control List (ACL)

The *acl* command provides basic traffic filtering capabilities with Access Control Lists (ACL). Access Control Lists can prevent certain traffic from entering or exiting the management port. ACLs can be configured for ARP, ICMP, IP, TCP and UDP protocols. These protocols can be configured to be permitted or denied access. Two hundred individual ACLs can be configured at one time.

The *acl* command provides the ability to configure ACL traffic filtering. To configure ACL, use the *acl* option from the CLI prompt. A list of options is displayed when the *acl -h* command is entered.

```
> acl -h

Description:
  acl - access control list configuration for management access
Syntax:
  acl [-h]
  acl -s
  acl {-dis|-ena}
  acl {-d idx|-dall}
  acl -dflt {deny|permit}
  acl -a -ipsrc ipAddr[/plen|,ipAddrEnd] [-proto {arp|icmp|ip|tcp|udp}]
         [-ty {deny|permit}] [-dst port]
  acl -ins idx -ipsrc ipAddr[/plen|,ipAddrEnd] [-proto {arp|icmp|ip|tcp|udp}]
         [-ty {deny|permit}] [-dst port]
  acl -m idx [-ipsrc ipAddr[/plen|,ipAddrEnd]] [-proto {arp|icmp|ip|tcp|udp}]
         [-ty {deny|permit}] [-dst port]
Switches:
-a     add ACL
-d     delete ACL, [idx]: {1..200}
-dall  delete all ACL configured settings, instances, and restore defaults
-dflt  default for items not found in ACL list: {deny|permit}, dflt permit
-dis   disable ACL processing, dflt
-dst   TCP/UDP destination port, [port]: {-1..65535}
-ena   enable ACL processing
-h     display help information
-ins   insert before ACL, [idx]: {1..199}
-ipsrc source IP address, [ipAddr[/plen|,ipAddrEnd]]
         [ipAddr] IP address (individual or starting address)
         [ipAddrEnd] ending IP address if present (all protocols but arp)
         [plen] subnet mask or prefix length
-m     modify ACL, [idx]: {1..200}
-proto protocol: {arp|icmp|ip|tcp|udp}, dflt ip
-s     show current configuration
-ty    ACL access type: {deny|permit}

>
```

The options available using the *acl* command are shown below.

The *-a* switch adds a new ACL filter.

The *-d* switch deletes an existing ACL filter by index number.

The *-dall* switch deletes all configured ACL filters and restores factory defaults.

The *-dflt* switch selects a default behavior for items not found in the ACL list. The default is permit.

The *-dis* switch disables ACL processing.

The *-dst* switch selects a TCP or UDP destination port number for an ACL filter. A value of *-1* does not select a specific TCP or UDP port.

The *-ena* switch enables ACL processing. If the ACL table is empty, the default behavior (*-dflt*) is applied to all Ethernet frames that enter the module.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-ins* switch inserts before ACL.

The *-ipsrc* switch selects the IP source address for an ACL filter. The source IP address for ARP is the Send IP Address.

The *-m* switch modifies an existing ACL filter.

The *-proto* switch selects the protocol:

arp Selects the ARP protocol.

icmp Selects the ICMP protocol.

ip Selects the IP protocol.

tcp Selects the TCP protocol.

udp Selects the UDP protocol.

The *-s* switch displays the configured ACL filters.

The *-ty* switch selects the ACL access type; permit or deny.

It is recommended that ACL policies be added prior to enabling ACLs to avoid the possible loss of connectivity to the module while accessing the module using the Ethernet interface.

To display the configuration, use the *acl -s* command.

```
> acl -s

ACL processing is Disabled
Default ACL behavior is ‘permit’

>
```

To allow access to a device, the module must be configured to allow (permit) ARP and IP. Since ICMP is part of the IP protocol, it must be explicitly excluded. ACL filters are processed in the order displayed.

```
> acl -dall
> acl -a -ipsrc 172.16.9.1,172.16.9.5 -proto icmp -ty deny
> acl -a -ipsrc 172.16.9.1,172.16.9.5 -proto ip -ty permit
> acl -a -ipsrc 172.16.9.5/24 -proto arp -ty permit
> acl -ena

> acl -s

ACL processing is Enabled
Default ACL behavior is ‘permit’

#    ACL Details
1    172.16.9.1..172.16.9.5 ICMP via mgt1: deny
2    172.16.9.1..172.16.9.5 IP via mgt1: permit
3    172.16.9.5 ARP via mgt1: permit

>
```

2.1.3 Bandwidth Profile (BWP)

The *bwp* command provides the ability to configure and display bandwidth profiles associated with each port. Bandwidth profiles control the amount of bandwidth allowed to each port.

Bandwidth profiles specifies the average rate of committed and excess Ethernet frames allowed into the provider's network. Bandwidth profiles consist of the following parameters:

Committed Information Rate (CIR)

CIR specifies the maximum rate Ethernet frames are delivered per service performance objectives. These frames are referred to as being in-profile (green).

Committed Burst Size (CBS)

CBS is the maximum number of bytes allowed for incoming Ethernet frames maintaining in-profile. The value of CBS will depend on the type of application or traffic being supported. Bursty data applications will require a larger CBS than more constant rate applications.

Egress Committed Information Rate (ECIR)

ECIR specifies the average rate Ethernet frames egress the port. When configuring ECIR, an egress queue type can be specified (starvation queuing - strict/low latency, weighted fair queuing - high latency or mixed). Starvation queuing processes all high priority traffic before any low priority traffic and uses a strict priority scheme. Weighted fair queuing will process high priority traffic more often than low priority traffic. The default weighted fair queuing mix is 33 (high priority), 25, 17, 12, 6, 3, 2, 1 (low priority).

To configure bandwidth profiles, use the *bwp* option from the CLI prompt. A list of options is displayed when the *bwp -h* command is entered.

```
> bwp -h

Description:
  bwp - bandwidth profile configuration
Syntax:
  bwp [-h]
  bwp -s [-p pNum]
  bwp -dall
  bwp -d -p pNum [-cn cName]
  bwp -p pNum [-que qType] [-ecir cirRate[,eQueue]] [-epol pType]
  bwp -p pNum [-cir cirRate] [-cbs cbsSize] [-pol poltype] [-cn cName]
        [-perf|-noper]
  bwp -fwmix qVal
Switches:
-cbs   committed burst size in KB, [cbsSize]: {2..256}, dflt 15
-cir   committed ingress information rate in kb/sec, [cirRate]: {64..1000000},
       dflt 1000000
-cn    class of service name, [cName]: 1-45 ASCII characters
-d     delete a specific configured profile or restore dflt port configuration
-dall  delete all BWP configured bwp settings and restore defaults
-ecir  committed egress information rate, [cirRate[,eQueue]]
        [cirRate] in kb/sec: {0,64..1000000}, where 0=max rate, dflt 1000000
        [eQueue]: {0..7}, dflt blank - port based
-epol  egress policing type, [pType]: {l1,l2,l3}, dflt l2
-fwmix port queue global fairweight mixture, [qVal]: {q7,q6,q5,q4,q3,q2,q1,q0}
        where ‘x’ is a specific queue and qx is a value from 0..100 for the
        specific queue and the sum of all queues is 128 max
-h     display help information
-noper no traffic performance monitoring
-p     port number, [pNum]: {F1|F2|1..4}
-perf  traffic performance monitoring
-pol   policing count type, [polType]: {l1,l2,l3}, dflt is l2
-que   type of egress queue, [qType]: {fairweight|starving|qlist}
        where qlist is {q7,q6,q5,q4,q3,q2,q1,q0}, where qx is ‘sp’ or ‘fw’
        ‘sp’ indicates strict priority, but ‘sp’ can only be selected from
          queue 7 sequentially to a lower queue number
        ‘fw’ indicates fairweight
-s     show current configuration

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *bwp* command are shown below.

The *-cbs* switch sets the Committed Burst Size (maximum number of bytes allowed) of the ingress frames.

The *-cir* switch sets the Committed Information Rate of the ingress frames.

The *-cn* switch defines the name of the Class of Service profile.

The *-d* switch deletes the bandwidth profile.

The *-dall* switch deletes all configured bandwidth profiles.

The *-ecir* switch defines the Committed Information Rate of the egress frames.

The *-epol* switch configures the egress policing type used. The options are L1 or L2. The default is L2.

The *-fxmix* switch defines the global fairweight mix for queues 7 - 0 and is used when *-que fairweight fw* or *-que qlist fw* is selected. All eight egress queue must be defined by the command q7,q6,q5,q4,q3,q2,q1,q0 where qx indicates the weight for the specific queue (0-100 are valid entries. The sum of all weighed values is 128 or less). The queues are separated by a comma (,).

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-noper* switch disable traffic performance monitoring.

The *-p* switch defines the port associated with the bandwidth profile.

The *-perf* switch enables traffic performance monitoring.

The *-pol* switch defines the policing count as layer 1 (frame + interframe gap + preamble), layer 2 or layer 3 frame types on a per port basis.

The *-que* switch defines the type of egress queueing used (fairweight, starving or individually configured).

starving All queues are set up to starving (strict) priority

fairweight All queues are setup for weighted fair queuing using the *fwmix* setting.

qlist Each of the eight queues are set up individually: q7,q6,q5,q4, q3, q2, q1,q0 where qx can be one of two values (sp or fw):

sp Queue is set to strict priority. The listing of strict priority queues starts at highest priority queue (queue 7) and can only be selected from the highest queue sequentially without mixtures of weighted values between strict priority queues.

fw Queue is set to fairweight priority.

The following are some legal combinations:

fw,fw,fw,fw,fw,fw,fw,fw (default fairweight)

sp,sp,sp,sp,sp,sp,sp,sp (default starving)

sp,sp,fw,fw,fw,fw,fw,fw

sp,sp,sp,sp,fw,fw,fw,fw

The following are not a legal combinations:

sp,fw,fw,sp,fw,fw,fw,fw

fw,sp,sp,sp,sp,sp,sp

sp,fw,fw,fw,fw,fw,fw,sp

The actual weight for a queue type of *fw* is from the respective queue weight from the *fwmix* setting.

The *-s* switch displays the current bandwidth profiles.

To display the configuration, use the *bwp -s* command.

```
> bwp -s

Fairweight mix = 33,25,17,12,6,3,2,1

Port F1:
  ingress cir 1000000kbps, cbs 15 kB, L2 policing
  egress cir 1000000kbps, L2 policing, queue type fairweight
  egress queue rate (kbps) q7/q6/q5/q4/q3/q2/q1/q0 =
    1000000/1000000/1000000/1000000/1000000/1000000/1000000/1000000
  PCP classification over IP
  no performance monitoring
Port F2:
  ingress cir 1000000kbps, cbs 15 kB, L2 policing
  egress cir 1000000kbps, L2 policing, queue type fairweight
  egress queue rate (kbps) q7/q6/q5/q4/q3/q2/q1/q0 =
    1000000/1000000/1000000/1000000/1000000/1000000/1000000/1000000
  PCP classification over IP
  no performance monitoring
Port 1:
  ingress cir 1000000kbps, cbs 15 kB, L2 policing
  egress cir 1000000kbps, L2 policing, queue type fairweight
  egress queue rate (kbps) q7/q6/q5/q4/q3/q2/q1/q0 =
    1000000/1000000/1000000/1000000/1000000/1000000/1000000/1000000
  PCP classification over IP
  no performance monitoring
Port 2:
  ingress cir 1000000kbps, cbs 15 kB, L2 policing
  egress cir 1000000kbps, L2 policing, queue type fairweight
  egress queue rate (kbps) q7/q6/q5/q4/q3/q2/q1/q0 =
    1000000/1000000/1000000/1000000/1000000/1000000/1000000/1000000
  PCP classification over IP
  no performance monitoring
Port 3:
  ingress cir 1000000kbps, cbs 15 kB, L2 policing
  egress cir 1000000kbps, L2 policing, queue type fairweight
  egress queue rate (kbps) q7/q6/q5/q4/q3/q2/q1/q0 =
    1000000/1000000/1000000/1000000/1000000/1000000/1000000/1000000
  PCP classification over IP
  no performance monitoring
Port 4:
  ingress cir 1000000kbps, cbs 15 kB, L2 policing
  egress cir 1000000kbps, L2 policing, queue type fairweight
  egress queue rate (kbps) q7/q6/q5/q4/q3/q2/q1/q0 =
    1000000/1000000/1000000/1000000/1000000/1000000/1000000/1000000
  PCP classification over IP
  no performance monitoring

>
```

To configure a bandwidth profile with performance monitoring on Port 1 for 500Mbps, use the following command.

```
> bwp -p 1 -cir 500000 -perf
> bwp -s -p 1

Fairweight mix = 33,25,17,12,6,3,2,1

Port 1:
  ingress cir 500000kbps, cbs 15 kB, L2 policing
  egress cir 1000000kbps, L2 policing, queue type fairweight
  egress queue rate (kbps) q7/q6/q5/q4/q3/q2/q1/q0 =
    1000000/1000000/1000000/1000000/1000000/1000000/1000000/1000000
  PCP classification over IP
  status in profile, receiving 0 kbps, dropped octets 0

>
```

Performance monitoring provides information on the information on in / out of profile traffic based on the bandwidth profile.

2.1.4 Cable Test (CABLETEST)

The *cabletest* command initiates a cable test on fixed RJ-45 copper ports. The test checks for breaks in the cable and reports how far from the source the cable break is detected. The cable test will interrupt service on the selected port.

To initiate a cable test, use the *cabletest* command from the CLI prompt. A list of options is displayed when the *cabletest -h* command is entered.

```
> cabletest -h

Description:
  cabletest - cable test for a copper port
Syntax:
  cabletest [-h]
  cabletest -p pNum
Switches:
-h     display help information
-p     port number, [pNum]: {1..4}

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *cabletest* command are shown below.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-p* switch selects initiating port for the cable test.

NOTE: Ports F1 and F2 are not supported.

In this example, a cable test is initiated on Port 2.

```
> cabletest -p 2

Testing Port number 2: no cable break detected
```

In this example, a cable test is initiate on Port 1 showing a break in the cable.

```
> cabletest -p 1

Testing Port number 1: cable failure detected at 1m from source
```

2.1.5 Contact (CONTACT)

Only supported on the RuggedNet switch products.

The *contact* command provides the ability to display the status of the contact closure and alarm input. It also provides the ability to assign a failure type and name to the contact closure.

To configure and display the contact closure, use the *contact* command from the CLI prompt. A list of options is displayed when the *contact -h* command is entered.

```
> contact -h

Description:
  contact - contact closure status
Syntax:
  contact [-h]
  contact -mode {none|force|input,power,temp}
  contact [-nmc cName] [-nmi cName] [nmo cName]
  contact -s
  contact -dall
Switches:
-dall  delete all ‘contact’ configured settings and restore defaults
-h     display help information
-mode  contact closure alarm output mode: {force,input,none,power,temp}
         [force] output contact is activated
         [input] output contact is activated when digital input is open
         [none] output contact is never activated, dflt
         [power] output contact activated when internal power alarm is detected
         [temp] output contact activated when temperature violation is detected
-nmc   selects the name of the normally closed relay, dflt “”
-nmi   selects the name of the digital input sense, dflt “”
-nmo   selects the name of the normally open relay, dflt “”
-s     show current status

>
```

The options available using the *contact* command are shown below.

The *-dall* switch deletes all contact configured settings and restores factory defaults.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-mode* switch selects the type of error that will cause the output relay to close; force, input, none, power, temp. Multiple selections can be entered.

forced Manually close the relay.

input An error condition is declared when the alarm input is detected as closed.

none Function is disabled.

power An error condition is declared when the internal power is greater or less than 5% of nominal input voltage.

temp An error condition is declared when a temperature violation is detected.

The *-nmc* switch configures the name of the normally closed relay contacts.

The *-nmi* switch configures the name for the alarm input.

The *-nmo* switch configures the name for the normally opened relay contacts.

The *-s* switch displays the input status (open or closed) and contact closure status (not activated, activated). Activated indicates a normally open contact has closed or a normally closed contact has opened. Not activated indicates a normally open contact is open or a normally closed contact is closed.

The alarm contact connector is located on the top of the module and is used to detect the state of external alarm conditions.

The pinout for the alarm contact is shown below.

Pin	Function
1	Normally Open - Output
2	Common - Output
3	Normally Closed - Output
4	Detection - Input
5	Detection - Ground

Alarm Contact Description

To name the alarm input, use the *contact -nmi* command.

```
> contact -nmi “open door alarm”
> contact -s

Digital input status “open door alarm”: open
Contact closure output alarm state: not activated
Contact closure normally open “”
Contact closure normally closed “”
Contact closure output mode: none
  Digital input: N/A
  Power: N/A
  Temperature: N/A

>
```

To configure the alarm relay to activate on the alarm input detection, use the *contact -mode input* command.

```
> contact -mode input
> contact -s

Digital input status “open door alarm”: open
Contact closure output alarm state: activated
Contact closure normally open “”
Contact closure normally closed “”
Contact closure output mode: input
  Digital input: open
  Power: N/A
  Temperature: N/A

>
```

2.1.6 Class of Service (COS)

The *cos* command provides the ability to configure and display Class of Service profiles associated with each port on the module.

To configure class of service, use the *cos* option from the CLI prompt. A list of options is displayed when the *cos -h* command is entered.

```
> cos -h

Description:
  cos - class of service configuration
Syntax:
  cos [-h]
  cos -s [-cn cName]
  cos {-d -cn cName}|{-dall}
  cos -a -cn cName [-pcp pcpList|-dscp dList -class cClass]
         [-mode cMode] [-dflt class]
  cos -m -cn cName [-pcp pcpList|-dscp dList -class cClass]
         [-mode cMode] [-dflt class]
Switches:
-a     add CoS profile
-class class of service (egress queue), [cClass]: {0..7}
         [0..7] adds specific class list, 0=lowest, 7=highest priority
-cn    class of service identifier name, [cName]: 1-45 ASCII characters
-d     delete CoS profile
-dall  delete all CoS configured settings, instances, and restore defaults
-dflt  default class classification, [class]: {0..7}, dflt 1
-dscp  layer 3 IP priority, [dList]: {0..63|none}
         examples: 1 or 1,4 or 1..3 or 2..3,6..7 or none
-h     display help information
-m     modify CoS profile
-mode  mode classification mode, [cMode]: {ip|ipoverl2|l2|l2overip|none}
         [ip] ip only classification
         [ipoverl2] ip classification priority over layer 2 PCP
         [l2] layer 2 PCP classification only
         [l2overip] layer 2 PCP classification over IP, dflt
         [none] neither layer 2 or IP classification are used
-pcp   layer 2 priority bits, [pcpList]: {0..7|none}
         examples: 1 or 1,4 or 1..3 or 2..3,6..7 or none
-s     show current configuration

>
```

The options available using the *cos* command are shown below.

The *-a* switch adds a class of service profile.

The *-class* switch sets the egress queue priority for the ingress frame.

The *-cn* switch defines the name of the class of service profile.

The *-d* switch deletes a class of service profile.

The *-dall* switch deletes all configured CoS profiles and restores factory defaults.

The *-dflt* switch modifies the default class classification. Ingress frames not meeting any configured CoS profile is assigned the default class classification.

The *-dscp* switch defines the profile based on the IP priority bits of the ingress frame.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-m* switch modifies a defined class of service profile.

The *-mode* switch defines the ingress classification mode.

ip Selects the IP only classification (DSCP), layer 2 classification is ignored.

ipoverl2 Selects the IP classification (DSCP) over layer 2 classification (PCP) if both are present.

l2 Selects the layer 2 classification only (PCP), IP classification is ignored.

l2overip Select layer 2 classification (PCP) over IP classification (DSCP) if both are present.

none No classification mode is configured.

On an access port, only untagged frames are accepted with the following format: Data.

On a tunnel port, zero or one tag is allowed for DSCP selection with the following formats: Data Only or Ethertype (8100) and Data.

On a trunk port, zero, one, or two layers of tags are allowed for DSCP selection with the following formats: Data Only or Ethertype (8100) and Data or Ethertype (88a8) and Data or Ethertype (88a8) and Ethertype (8100) and Data or Ethertype (8100) and Ethertype (8100) and Data.

The default CoS classification of Layer2 over IP classification indicates mapping Layer 2 PCP to their respective queues, i.e. PCP 0 to queue 0, PCP 1 to queue 1, etc. and if not tagged then IP DSCP 0x00-0x07 is mapped to queue 0, 0x08-0x0f to queue 1, etc.

If a CoS is assigned to a port those associations that are defined are mapped to the explicit egress queue defined. Received traffic that does not match one of the defined associations is mapped to the default queue.

If no CoS is assigned to a port, the egress frame will use the default CoS classification value of 1. The *-pcp* switch defines the profile based on the PCP bit of the ingress frame.

The *-pcp* switch defines the priority of the PCP bit of the ingress frame.

The *-s* switch displays the current class of service profiles.

Class of Service (CoS) is supported by mapping customer frames into eight egress queues based on using the 3-bit Priority Code Point (PCP) field in the VLAN tag.

The priority of ingress frames correspond to eight possible values or priorities (0 through 7). Each frame is mapped to one of eight egress queues based on the PCP priority field. See the default mapping of PCP value to egress queue.

Quality of Service (QoS) Egress Queuing								
Priority Code Point (PCP)	0	1	2	3	4	5	6	7
Egress Queue (Class)	0	1	2	3	4	5	6	7

Egress Queue vs Frame Priority
(Default Mapping)

Class of Service profiles can use DSCP or PCP fields to reclassify and prioritize the ingress frames.

Differentiated Services Code Point (DSCP) profiles are associated with IP priority bits (ipPri). Values are 0 - 63. Priority Code Point (PCP) profiles are associated with the tagged priority bits (pbits). Values are 0 - 7.

Traffic priority can be re-classified by using the *class* or *pcp* command. The *class* command will re-classify which egress priority queue is used. The *pcp* command re-classifies the priority by changing the PCP value.

Traffic is mapped to eight egress queues based on the PCP values. The CoS commands provides the ability to change the egress queue (*class*) or PCP value (*pcp*) or both. PCP values are 0 - 7, 7 being the highest priority. Class values are 0 - 7, 0 being discard and 7 being the highest egress queue. Class values 0 - 7 correspond to egress queues 0 - 7.

Multiple CoS profile filters with the same name can be configured and applied to a single port by associating the CoS profile with a Bandwidth profile (Section 6.1.3 and 7.3.4.3). If the ingress frame does not meet any of the configured CoS profiles, the ingress traffic will use the default class classification.

In the example below class of service profile is created.

```
> cos -a -cn data      -pcp 0..1   -class 0
> cos -m -cn data      -pcp 2..3   -class 2
> cos -m -cn data      -pcp 4..6   -class 4
> cos -m -cn data      -pcp 7     -class 7
```

To display the configuration, use the *cos -s* command.

```
> cos -s

Class of Service “data”: PCP classification over IP, default class 1
  PCP 0..1, class 0
  PCP 2..3, class 2
  PCP 4..6, class 4
  PCP 7, class 7

>
```

2.1.7 File Directory (DIR)

The *dir* command provides the ability to view/delete the files stored on the module.

To view/delete the files stored on the module, use the *dir* command from the CLI prompt. A list of options is displayed when the *dir -h* command is entered.

```
> dir -h

Description:
  dir - directory of the existing files
Syntax:
  dir [-h]
  dir -d fileName
  dir -s
Switches:
-d      delete file, [fileName]
-h      display help information
-s      show available files

>
```

The options available using the *dir* command are shown below.

The *-d* switch deletes a specific file on the module.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-s* switch displays the files stored on the module.

To display the files stored on the module, use the *dir -s* command.

```
> dir -s

Name                      Size
==================================
current.ini               2746
traplog.txt               44035
previous.ini              2750

Total: 3 items listed (49531 bytes)

>
```

2.1.8 Ethertype (ETHERTYPE)

The *ethertype* command provides the ability to configure the protocol used to encapsulate a VLAN tagged frame. Ethertype is a two-octet field in an Ethernet frame indicating which protocol is used to encapsulate tag information in the frame data.

To configure the Ethertype, use the *ethertype* command from the CLI prompt. A list of options is displayed when the *ethertype -h* command is entered.

```
> ethertype -h

Description:
  ethertype - ethertype tag identification configuration
Syntax:
  ethertype [-h]
  ethertype -s
  ethertype -trunk ethertypeVal
  ethertype -dall
Switches:
-dall  delete all ethertype configured settings and restore defaults
-h     display help information
-trunk provider network Ethertype, [ethertypeVal], dflt 8100
       [ethertypeVal] selects the Ethertype that is used for the selected
       network type, value is entered in hex, typical selection for
       customer networks is 8100, for provider networks 88a8
-s     show current configuration

>
```

The options available using the *ethertype* command are shown below.

The *-dall* switch deletes all configured ethertype settings and restores to factory defaults.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-trunk* switch configures the Ethertype for provider tagged frames. The default is 8100.

The *-s* switch displays the Ethertype configuration of the module.

Use the following commands to configure the S-Tag (Provider Tag) for a Ethertype value of 88a8.

```
> ethertype -trunk 88a8
```

To display the Ethertype configuration, use the *ethertype -s* command.

```
> ethertype -s

tunnel (C-TAG) ethertype value   8100
trunk  (S-TAG) ethertype value   88a8

>
```

2.1.9 Load Firmware (FWLOAD)

The *fwload* command programs the module with a firmware file that is stored on the module or a firmware file downloaded from a tftp server (use the -ip option to configure the tftp server IP address).

To program the firmware stored on the module or tftp server, use the *fwload* command from the CLI prompt. A list of options is displayed when the *fwload -h* command is entered.

```
> fwload -h

Description:
  fwload - firmware load configuration
Syntax:
  fwload [-h]
  fwload -s
  fwload -d fileName
  fwload -f fileName [-t app|bootloader] [-ip tftpServerIp]
Switches:
-d     delete specified firmware file, [fileName]
-f     write specified firmware file, [fileName]
-h     display help information
-ip    TFTP Server ip address, [tftpServerIp]
-s     show current available firmware files
-t     firmware file type: {app|bootloader}, dflt app

>
```

The options available using the *fwload* command are shown below.

The *-d* switch deletes a firmware file on the module.

The *-f* switch selects the firmware file to loaded on the module.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-ip* switch specifies the IP address of the TFTP server used for the upgrading of the firmware on the module.

The *-s* switch displays the list of available files on the module.

The *-t* switch selects the type of file that is upgraded: application or boot loader.

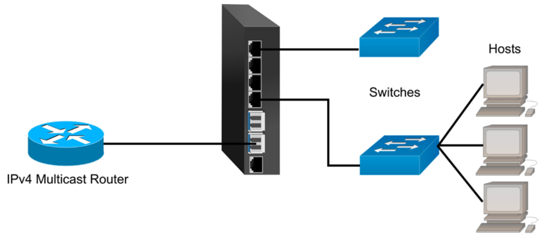
The filename of the application firmware when using the *fwload* command must be the same as the filename used during the FTP process.

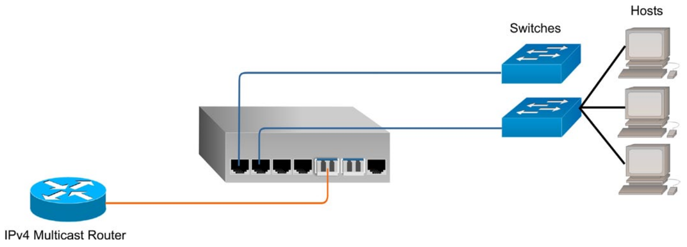
Once the new firmware has been stored on the module, the firmware can be programmed by using the following command:

```
> fwload -f <filename.dat>

Starting upgrade using file filename.dat
Upgrade complete, reboot pending...

>
```

2.1.10 Internet Group Management Protocol (IGMP)

The module supports IGMPv1, v2, or v3 IPv4 snooping based upon RFC 4541, which defines the basic operation of an IGMP snooping switch. IGMP is used to modify the default router behavior for IPv4 Multicast Packets which are flooded to all ports. IGMP provides a method for forwarding IPv4 Multicast Packets to only the ports with hosts that want to receive the packets. IGMP communications occur between IPv4 Multicast Routers and Hosts.





IPv4 Multicast Packets have an address range of 224.0.0.0 to 239.255.255.255.

To configure the IGMP snooping on the module, use the *igmp* command from the CLI prompt. A list of options is displayed when the *igmp -h* command is entered.

```
> igmp -h

Description:
  igmp - internet group management protocol configuration
Syntax:
  igmp [-h]
  igmp -s
  igmp [-dis|-ena flood|snooping] [-to toVal]
  igmp -a -vid vVid [-grp ipAddr -ph hnum -pr rnum [{-dis|ena} aging]]
  igmp -d -vid vVid [-grp ipAddr]
  igmp -m -vid vVid -grp ipAddr [-ph hnum] [-pr rnum] [{-dis|ena} aging]
  igmp -dall
Switches:
-a     add manual forwarding map or IGMP interface
-d     delete existing forwarding map or IGMP interface
-dall  delete all IGMP configured settings, instances, and restore defaults
-dis   disable function: {aging|flood|snooping}
-ena   enable function: {aging|flood|snooping}
         [aging] IGMP route subject to aging out, dflt disable
         [flood] flooding of all unrecognized IGMP groups, dflt disable
         [snooping] IGMP snooping, dflt disable
-grp   IGMP Group Address, [ipAddr]
-h     display help information
-m     modify existing forwarding map
-ph    host port [hnum]: {F1,F2,1..4}
-pr    router port [rnum]: {F1,F2,1..4}
-s     show current configuration
-to    IGMP route aging in seconds, [toVal]: {0..65535}, dflt 60s
-vid   VLAN ID, [vVid]: {1..4095}

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *igmp* command are shown below.

The *-a* switch manually adds a IGMP route.

The *-d* switch deletes an IGMP route.

The *-dall* switch deletes all IGMP configured settings and restore factory defaults.

The *-dis* and *-ena* switches disables/enables aging, flooding and snooping:

aging Disables/Enables aging on a specific IGMP route.

flood Disables/Enables flooding of unrecognized IGMP routes.

snooping Disables/Enables IGMP snooping.

The *-grp* switch selects the specific IGMP multicast IP address group.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-m* switch modifies an existing IGMP route.

The *-ph* switch selects the host port(s) on the module for a defined route.

The *-pr* switch selects the router port(s) on the module for a defined route.

The *-s* switch displays the current IGMP configurations for the module.

The *-to* switch selects the timeout value in seconds to automatically remove a route from the forwarding database.   The timeout never expires with a value of 0.

The *-vid* switch selects the VLAN ID.

NOTE: There are common variables that are shared between the IGMP and MLD protocols. The variables are Snooping (enable / disable), Flooding Unrecognized Groups (enable / disabled) and Route Aging timer. If either protocol changes the shared variables, they will be changed under both protocols (IGMP and MLD). Example: If Snooping is enabled under MLD, Snooping will be enabled under IGMP.

To display the current IGMP configuration, use the *-s* command.

```
> igmp -s

Snooping:          Disabled
IGMP Flooding:     Disabled
Snooping timeout:  60s

IGMP VID Interfaces

>
```

To automatically enable IGMP snooping on a VLAN ID, use the following commands.

```
> igmp -a -vid 1
> igmp -ena snooping
> igmp -s

Snooping:          Enabled
IGMP Flooding:     Disabled
Snooping timeout:  60s

IGMP VID Interfaces
Entry 1 vid 1

>
```

To manually configure a IGMP route, use the *-grp* to define the multicast IP address and the *-pr* and *-ph* to configure the multicast router and host ports.

```
> igmp -a -vid 1 -grp 225.100.100.1 -pr 1 -ph 3
> igmp -ena snooping
> igmp -s

Snooping:          Enabled
IGMP Flooding:     Disabled
Snooping timeout:  60s

IGMP VID Interfaces
Entry 1 vid 1


IP Address      Type     Persistence   Router Port  Host Port   VLAN ID
225.100.100.1   Manual   Static        1            3           1

>
```

2.1.11 IP (IP)

The *ip* command provides the ability to configure the IPv4 and IPv6 parameters on the module. DHCP and DHCP relay (option 82) can also be enabled and/or disabled.

To configure IP, use the *ip* command from the CLI prompt. A list of options is displayed when the *ip -h* command is entered.

```
> ip

Description:
  ip - IP configuration
Syntax:
  ip [-h]
  ip -s
  ip [-addr ipAddr[/plen[,link]] [-net subnet] [-gw gateway] [-dns ipAddr]
  ip [{-dis|-ena} circuitid|dhcp|dhcpv6|dns|ipv4|ipv6|relay|remoteid|stateless|
     v6circuitid|v6relay|v6remoteid] [-rserv ipAddr] [-rtype tsel]
  ip -dall
Switches:
-addr  IP address: [ipAddr][/plen][,link]
        [ipAddr] IP4 or IPv6 address
        [plen] subnet mask or prefix length
        [link] IPv6 address type is link-local, instead of stateful
-dall  delete all IP configured settings and restore defaults
-dns   domain name system ip address, [ipAddr], dflt blank
-dis   disable function: {circuitid|dhcp|dhcpv6|dns|ipv4|ipv6|relay|remoteid|
                        stateless|v6circuitid|v6relay|v6remoteid}
-ena   enable function: {circuitid|dhcp|dhcpv6|dns|ipv4|ipv6|relay|remoteid|
                       stateless|v6circuitid|v6relay|v6remoteid}
        [circuitid] DHCPv4 Relay Agent Circuit ID enable/disable, dflt enabled
        [dhcp] DHCPv4 protocol enable/disable, dflt disabled
        [dhcpv6] DHCPv6 protocol enable/disable, dflt disabled
        [dns] Domain Name System enable/disable, dflt disabled
        [ipv4] IPv4 enable/disable, dflt enabled
        [ipv6] IPv6 enable/disable, dflt enabled
        [relay] DHCPv4 relay agent (option 82) enable/disable, dflt disabled
        [remoteid] DHCPv4 Relay Agent Remote ID enable/disable, dflt enabled
        [stateless] IPv6 stateless enable/disable, dflt enabled
        [v6circuitid] DHCPv6 Relay Interface-ID enable/disable, dflt enabled
        [v6relay] DHCPv6 relay agent enable/disable, dflt disabled
        [v6remoteid] DHCPv6 Relay Agent Remote-ID enable/disable, dflt enabled
-gw    gateway address, [gateway]
-h     display help information
-net   subnet mask, [subnet]
-rserv DHCP Relay Remote Server IPv4 or IPv6 address, [ipAddr]
-rtype DHCP Relay client type, [tsel]: {drop|keep|replace}, dflt replace
-s     show current configuration

>
```

The options available using the *ip* command are shown below.

The *-addr* switch configures the IPv4 and IPv6 addresses of the module.

The *-dall* switch deletes all IP configured settings and restores factory defaults.

The *-dis* and *-ena* switches disables/enables the following:

circuitid	Disables/Enables the Agent Circuit ID for DHCP Option 82 on the module.
dhcp	Disables/Enables DHCPv4 protocol on the module.
dhcpv6	Disables/Enables DHCPv6 protocol on the module.

dns Disables/Enables DNS protocol on the module.

ipv4 Disables/Enables IPv4 protocol on the module.

ipv6 Disables/Enables IPv6 protocol on the module.

relay Disables/Enables DHCPv4 Relay function (option 82) on the module.

remoteid Disables/Enables DHCPv4 Relay Agent Remote ID.

stateless Disables/Enables Stateless operation on the module.

v6circuitid Disables/Enables DHCPv6 Relay Interface-ID enable/disable, dflt enabled

v6relay Disables/Enables DHCPv6 relay agent enable/disable, dflt disabled

v6remoteid Disables/Enables DHCPv6 Relay Agent Remote-ID enable/disable, dflt enabled

The *-gw* switch configures the gateway IP address of the module.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-net* switch configures the subnet mask of the module.

The *-rserv* switch configures the IPv6 address of the DHCP Relay Server.

The *-rtype* switch configures the DHCPv4 Relay Client type; drop, keep or replace.

drop Drops the DHCPv4 relay frame received on a client port.

keep Forwards the DHCPv4 relay frame received on a client to the server port without changing to the DHCP relay options.

replace Updates the DHCPv4 relay frame received on a client port with the configured DHCP relay options before forwarding it to the server port.

The *-s* switch displays the current IP configuration.

Stateful configuration requires a IPv6 service to provide the IPv6 address to the client (module) and requires both client and server to maintain the "state" of the address. Stateless provides auto configuration of IPv6, allowing the client (module) to self configure the IPv6 address. The advantage is that the IPv6 service is not required to store any dynamic state information about any individual clients. A network can use both stateful and stateless auto configuration at the same time.

To configure the IPv4 address on the module, use the *-addr* command.

```
> ip -addr 192.168.1.100
```

To configure the IPv6 address on the module, use the *-dis* and *-addr* commands.

```
> ip -dis stateless
> ip -addr 2001::a0a:652/64
```

To enable the DHCPv6 address on the module, use the *-ena* command.

```
> ip -ena dhcpv6
```

Use the *-s* command to view the IP configuration of the module.

```
> ip -s

IPv4                     enabled
IPv6                     enabled

IP 1
  MAC address            00-06-87-02-86-E0
  IPv4 address           192.168.1.124
  IPv4 subnet mask       255.255.255.0
  IPv4 gateway address   192.168.1.1
  DNS                    disabled
  DNS address            *
  DHCP                   disabled
  Relay                  disabled
  Relay Circuit ID       enabled
  Relay Remote ID        enabled
  Relay type             replace
  Relay server IP        0.0.0.0
  v6Relay                disabled
  v6Relay Circuit ID     enabled
  v6Relay Remote ID      enabled
  IPv6 interface         stateless
  IPv6 address           fe80::206:87ff:fe02:86e0/64
                         ::/64
  IPv6 gateway address   fe80::1
  DHCPv6                 disabled
>
```

DHCPv4 Relay Process

The DHCP Relay Agent relays DHCP messages between DHCP clients and DHCP servers. A DHCP relay agent receives any DHCP broadcasts and forwards them to the specified DHCP server IP address.

1. The DHCP client generates a DHCP request.
2. The DHCP relay agent receives the broadcast DHCP request packet and inserts the relay agent information option (option 82) into the packet. The relay agent information option contains related sub options (Circuit ID and Remote ID).
3. The DHCP relay agent sends the DHCP packet to the DHCP server.
4. The DHCP server receives the packet, uses the sub options to assign IP addresses and other configuration parameters to the packet, and forwards the packet back to the client.
5. The sub option fields are removed by the relay agent and the IP address information is forwarded to the client.

NOTES:

If DHCP Relay Agent Circuit ID is enabled and the DHCP Relay Client Type is set to Replace, the Circuit ID will be set as “br0” instead of the associated port number.

If the module is configured as the 2nd DHCP Relay agent in a network, the unicast DHCP packets from the first DHCP Relay agent are forwarded to the DHCP Server.

DHCPv6 Relay Process

DHCPv6 client obtains an IPv6 address and other network configuration parameters from a DHCPv6 server through a DHCPv6 relay agent.

1. The DHCPv6 client sends a Solicit message to the multicast address FF02::1:2 of all the DHCPv6 servers and relay agents.
2. After the Solicit message is received, the DHCPv6 relay agent encapsulates the message into a Relay-forward message, and sends the message to the DHCPv6 server.
3. When the DHCPv6 server receives the Relay-forward message, the DHCPv6 server:

   Provides an IPv6 address and other required parameters.

   Adds them to the Relay-reply message.

   Sends the Relay-reply message to the DHCPv6 relay agent.
4. Once the DHCPv6 relay agent receives the Relay-reply message, the DHCPv6 relay agent will send the reply to the DHCPv6 client.
5. The DHCPv6 client uses the IPv6 address and other network parameters to complete the network configuration.

2.1.12 Link Aggregation Groups (LAG)

Link Aggregation Groups (LAG) and Link Aggregation Control Protocol (LACP) are methods to provide more than one link between two devices and automate the configuration and maintenance of the links. LAG and LACP are defined in the IEEE 802.1ax standard.

Link aggregation as defined in IEEE 802.1ax groups Ethernet interfaces to build a single link layer interface, called a Link Aggregation Group or bundle.

Grouping multiple links between physical interfaces creates a single logical point-to-point link or LAG. The LAG balances traffic across the member links within an aggregated Ethernet group and effectively increases the uplink bandwidth. Another advantage of link aggregation is increased availability, because the LAG is composed of multiple links. If one link fails, the LAG continues to carry traffic over the remaining links.

LAG needs to be configured manually on each pair of physical interfaces. With LAG, all the interfaces must operate at the same speed and be in full-duplex mode.

Link Aggregation Control Protocol (LACP), when enabled, automates the LAG connectivity.

The main purpose of LACP is to automate the configuration and maintenance of Link Aggregation Groups. LACP dynamically adds or deletes individual links to the aggregated bundle and provides the mechanism for recovery from link failures. LACP helps prevent communication failure by detecting misconfigurations on the local end and remote end of the link.

The *lag* command provides the ability to configure the ports on the module to support Link Aggregation Group and Link Aggregation Control Protocol. A list of options is displayed when the *lag -h* command is entered.

```
> lag -h

Description:
  lag - link aggregation group configuration
Syntax:
  lag [-h]
  lag -s [-ver]
  lag -lp lNum [-ena|-dis {active,fast,key,lag}]
              [-aggrk kVal] [-act aNum]
  lag -p pList [-ppri pNum] [-proto pMode] [-lp lNum] [-clr]
  lag [-ena|-dis lag] [-spri sNum] [-fwd {std|xor}]
  lag -dall
Switches:
-act   maximum number of active ports in a LAG, [aNum]: {1..4}, dflt 4
-aggrk aggregator admin key, [kVal]: {0..65535}
-clr   clear statistic counters
-dall  delete all LAG configured settings and restore defaults
-dis   disable function: {active,fast,key,lag}
-ena   enable function: {active,fast,key,lag}
        [active] LAG active mode, dflt disable (passive)
        [fast] port fast timeout, dflt disable (slow)
        [key] port auto key adjust, dflt enable (auto)
        [lag] LAG module/aggregator enable/disable, dflt disable
-fwd   frame forwarding algorithm: {std|xor}, dflt std
-h     display help information
-lp    aggregator logical port number, [lNum]: {L1..L8}
-p     group port list, [pList]: {F1,F2,1..4}
-ppri  port priority, [pNum]: {0..65535}
-proto LACP protocol configuration, [pMode]: {discard,peer,static,tunnel}
        [discard] LACP is disabled, LACP frames are discarded, LAG is disabled
        [peer] LACP is enabled, LAG is enabled
        [static] LACP is disabled, LAG is enabled
        [tunnel] LACP is disabled, LACP frames are tunneled, LAG is disabled
-s     show current configuration
-spri  system priority, [sNum]: {0..65535}
-ver   verbose show

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *lag* command are shown below.

The *-act* switch selects the maximum number of active ports in a Link Aggregation Group.

The *-aggrk* sets the link aggregation group key.

The *-clr* switch allows the port statistic counters to be cleared to zero.

The *-dall* switch deletes all LAG configured setting and restore to factory defaults.

The *-dis* and *-ena* switches disables/enables one of the following functions:

active	Disables/Enables port active mode and disables port passive mode.
fast	Disables/Enables LACP fast transmission mode and disables slow transmission mode.
key	Disables/Enables automatic key adjustment and disables manual key usage.
lag	Disables/Enables LAG on the module.

The -*fwd* switch configures the frame forwarding algorithm: std or xor.

The -*h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The -*lp* switch sets the logical port number for LAG.

The -*p* switch selects the port to be used for the Link Aggregation Group.

The -*ppri* switch configures the port priority.

The -*proto* switch configures how the LAG protocol will be handled (discard, peer or tunnel)

The -*s* switch displays the configured settings.

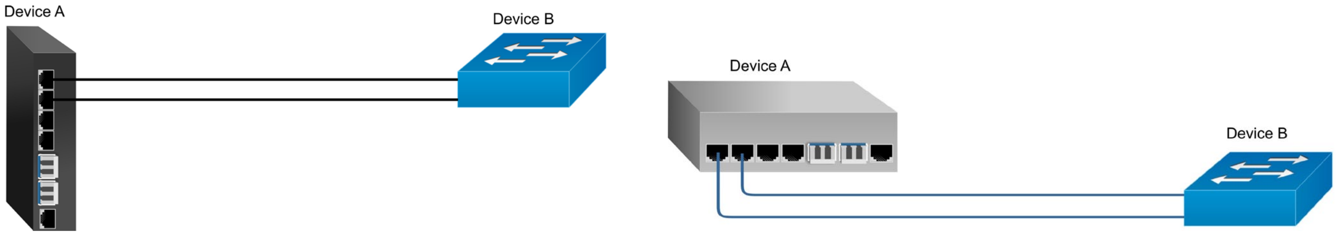
The -*spri* switch configures the system priority.

The -*ver* switch displays the extended status screens.

To display the current LAG configuration, use the *lag -s* command.

```
> lag -s

Link aggregation: disabled
System identification: 00-06-87-02-86-E0
System priority: 0
Frame forwarding: Standard

     LAG         Key   LACP     Tx    Aggr  Max
Aggr  Mode       Type   Role    Rate  Key   Act
==================================================
L1    Disabled   Auto   Passive  Slow  1     4
L2    Disabled   Auto   Passive  Slow  2     4
L3    Disabled   Auto   Passive  Slow  3     4
L4    Disabled   Auto   Passive  Slow  4     4
L5    Disabled   Auto   Passive  Slow  5     4
L6    Disabled   Auto   Passive  Slow  6     4

     LACP      Port  --- Aggregation --  --------- Partner -----------
Port  Protocol  Pri   Status   ID    LP   Sys ID            Port  Pri
========================================================================
F1    Tunnel   32768 Detached  1     L1  00-00-00-00-00-00 0     0
F2    Tunnel   32768 Detached  2     L2  00-00-00-00-00-00 0     0
1     Tunnel   32768 Detached  3     L3  00-00-00-00-00-00 0     0
2     Tunnel   32768 Detached  4     L4  00-00-00-00-00-00 0     0
3     Tunnel   32768 Detached  5     L5  00-00-00-00-00-00 0     0
4     Tunnel   32768 Detached  6     L6  00-00-00-00-00-00 0     0

>
```

The following example configures LACP/LAG on Fiber Port 1 and Fiber Port 2.



```
> lldp -proto tunnel -p f1,f2

> lag -p f1 -ppri 100 -proto peer -lp L1
> lag -p f2 -ppri 200 -proto peer -lp L1
> lag -lp L1 -act 2

> lag -ena lag

> lag -s

Link aggregation: enabled
Link aggregation: enabled
System identification: 00-06-87-02-A5-80
System priority: 0
Frame forwarding: Standard

     LAG         Key    LACP     Tx    Aggr  Max
Aggr  Mode        Type   Role     Rate  Key   Act
==================================================
L1    Disabled   Auto   Passive  Slow  1     2
L2    Disabled   Auto   Passive  Slow  2     4
L3    Disabled   Auto   Passive  Slow  3     4
L4    Disabled   Auto   Passive  Slow  4     4
L5    Disabled   Auto   Passive  Slow  5     4
L6    Disabled   Auto   Passive  Slow  6     4

     LACP      Port  --- Aggregation --  --------- Partner -----------
Port  Protocol  Pri   Status    ID    LP  Sys ID          Port  Pri
========================================================================
F1    Peer     100   Detached  1     L1  00-00-00-00-00-00 0     0
F2    Peer     200   Detached  1     L1  00-00-00-00-00-00 0     0
1     Tunnel   32768 Detached  3     L3  00-00-00-00-00-00 0     0
2     Tunnel   32768 Detached  4     L4  00-00-00-00-00-00 0     0
3     Tunnel   32768 Detached  5     L5  00-00-00-00-00-00 0     0
4     Tunnel   32768 Detached  6     L6  00-00-00-00-00-00 0     0

>
```

2.1.13 Link Layer Discovery Protocol (LLDP)

The IEEE 802.1ab Link Layer Discovery Protocol defines a standard way for Ethernet devices to advertise information about themselves to their neighbors and store information they discover from other device.

The *lldp* command provides the ability to configure the LLDP agent on the module. To configure LLDP, use the *lldp* option from the CLI prompt. A list of options is displayed when the *lldp -h* command is entered.

```
> lldp -h

Description:
  lldp - link layer discovery protocol (LLDP) configuration
Syntax:
  lldp [-h]
  lldp -s [-p pList]
  lldp -dall
  lldp [-txfin tSec] [-txhld tVal] [-txrt tSec]
  lldp -p pList [-mode {rxtx|txonly|rxonly|none}]
         [-tlv {mgt,pdes,sysname,sysdes,syscap}] [-proto pMode]
Switches:
-dall  delete all LLDP configuration settings and restore defaults
-h     display help information
-mode  lldp mode: {rxtx|txonly|rxonly|none}
        [none] neither lldp transmitter or receiver is enabled
        [rxonly] lldp receiver is enabled
        [rxtx] both lldp transmitter and receiver enabled, dflt
        [txonly] lldp transmitter is enabled
-p     port list, [pList]: {F1,F2,1..4}
-proto protocol configuration, [pMode]: {discard, peer, tunnel}
        [discard] LLDP is disabled, LLDP frames are discarded
        [peer] LLDP is enabled and protocol is operating
        [tunnel] LLDP is disabled, LLDP frames are tunneled
-s     show current configuration
-tlv   optional TLVs to send: {mgt,pdes,sysname,sysdes,syscap}
        [mgt] management address, dflt enable
        [pdes] port description, same as Port Name, dflt enable
        [sysname] system name, same as sysName object, dflt enable
        [sysdes] system description, same as sysDescr object, dflt enable
        [syscap] system capabilities, dflt enable
-txfin fast message transmission interval in sec, [tSec]: {1..3600}, dflt 1
-txhld multiplier of txrate for TTL value in PDU, [tVal]: {2..10}, dflt 4
-txrt  lldp normal transmission interval in sec, [tSec]: {5..32768}, dflt 30

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *lldp* command are shown below.

The *-dall* switch deletes all LLDP configuration settings.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-mode* switch configures the port to receive, transmit, or transmit/receive LLDP Protocol Data Units (PDUs).

The *-p* switch associates the port with the LLDP port instance.

The *-proto* switch selects how LLDP PDUs are processed; discard, peer or tunnel.

peer	The port will participate in the LLDP process.
discard	LLDP frames are dropped and no reply is generated.
tunnel	LLDP frames will egress other tunnel ports unchanged.

The *-s* switch displays the current LLDP status.

The *-tlv* switch selects which optional TLVs to include in the transmit LLDP PDUs

mgt	Management address
pdes	Port description, same as Port Name
sysname	System name, same as sysName object
sysdes	System description, same as sysDescr object
syscap	System capabilities

The *-txfin* switch specifies the time interval between transmissions during fast transmission periods. The range is 1 to 3,600 seconds and the default value is 1 second.

The *-txhld* switch configures the variable used as a multiplier of the Normal Transmission Interval to determine the time remaining before information in the outgoing LLDP PDU is no longer valid. The range is 1 to 10 and the default is 4.

The *-txrt* switch configures the transmission frequency of LLDP updates in seconds. The range is 5 to 65,534 seconds and the default is 30 seconds.

NOTES:

LLDP parameters that are not supported are *reinitDelay*, *txFastInit* and and *txCredit*.

The *reinitDelay* sets the time from port disable to reinitialization. This parameter is not set.

The *txFastInit* configures the the number of LLDP PDUs that are transmitted during a fast transmission period. This parameter is set to 4.

The *txCredit* sets the maximum number of consecutive LLDP PDUs that can be transmitted at any time. This parameter is not set.

Use the *lldp -s* command to display the LLDP status.

```
> lldp -s

LLDP configuration:
Normal transmission interval: 30s
TTL value multiplier: 4
Fast LLDP transmission interval: 1s
Number of fast LLDP messages: 4
Reinitialization delay: 1 sec
Capabilities supported: bridge, CVLAN, SVLAN
Capabilities enabled: bridge, CVLAN, SVLAN
Number of times table data inserted: 1
Number of times table data deleted: 0
Number of times table data dropped: 0
Number of times table data aged out: 0
```

```
Port F1 Info:
  LLDP Protocol: Peer
  LLDP Mode: Receive and Transmit Enabled
  LLDP TLVs included: mgt, pdes, sysname, sysdes, syscap
  LLDP Status: LLDP PDUs are not being received
  LLDP PDUs transmitted: 0
  LLDP PDUs received: 0
  LLDP PDUs discarded: 0
  LLDP Port TLVs discarded: 0
  LLDP Port TLVs unrecognized received: 0
  LLDP Port Age Outs: 0

Port F2 Info:
  LLDP Protocol: Peer
  LLDP Mode: Receive and Transmit Enabled
  LLDP TLVs included: mgt, pdes, sysname, sysdes, syscap
  LLDP Status: LLDP PDUs are being received
  LLDP PDUs transmitted: 11
  LLDP PDUs received: 1
  LLDP PDUs discarded: 0
  LLDP Port TLVs discarded: 0
  LLDP Port TLVs unrecognized received: 0
  LLDP Port Age Outs: 0

  For remote MAC address 00:06:87:02:13:f0:
    ChassisID: mac 00:06:87:02:13:f0
    Port ID: component 1
    Time to Live: 120
    Port Description: Port 1
    System Name: XM5
    System Description: 9600-40-B1 v5.3.6 s/n 00713365
    Capabilities: Bridge
    Capabilities enabled: Bridge
    Management Address: IPv4 - 192.168.1.100
    Management Address: IPv6 - fe80:2::206:87ff:fe02:13f0

Port 1 Info:
  LLDP Protocol: Peer
  LLDP Mode: Receive and Transmit Enabled
  LLDP TLVs included: mgt, pdes, sysname, sysdes, syscap
  LLDP Status: LLDP PDUs are not being received
  LLDP PDUs transmitted: 0
  LLDP PDUs received: 0
  LLDP PDUs discarded: 0
  LLDP Port TLVs discarded: 0
  LLDP Port TLVs unrecognized received: 0
  LLDP Port Age Outs: 0

Port 2 Info:
  LLDP Protocol: Peer
  LLDP Mode: Receive and Transmit Enabled
  LLDP TLVs included: mgt, pdes, sysname, sysdes, syscap
  LLDP Status: LLDP PDUs are not being received
  LLDP PDUs transmitted: 7805
  LLDP PDUs received: 0
  LLDP PDUs discarded: 0
  LLDP Port TLVs discarded: 0
  LLDP Port TLVs unrecognized received: 0
  LLDP Port Age Outs: 0
```

```
Port 3 Info:
  LLDP Protocol: Peer
  LLDP Mode: Receive and Transmit Enabled
  LLDP TLVs included: mgt, pdes, sysname, sysdes, syscap
  LLDP Status: LLDP PDUs are not being received
  LLDP PDUs transmitted: 0
  LLDP PDUs received: 0
  LLDP PDUs discarded: 0
  LLDP Port TLVs discarded: 0
  LLDP Port TLVs unrecognized received: 0
  LLDP Port Age Outs: 0

Port 4 Info:
  LLDP Protocol: Peer
  LLDP Mode: Receive and Transmit Enabled
  LLDP TLVs included: mgt, pdes, sysname, sysdes, syscap
  LLDP Status: LLDP PDUs are not being received
  LLDP PDUs transmitted: 0
  LLDP PDUs received: 0
  LLDP PDUs discarded: 0
  LLDP Port TLVs discarded: 0
  LLDP Port TLVs unrecognized received: 0
  LLDP Port Age Outs: 0

>
```

To tunnel LLDP on all ports, use the *lldp -proto tunnel -p all*.

```
LLDP configuration:
Normal transmission interval: 30s
TTL value multiplier: 4
Fast LLDP transmission interval: 1s
Number of fast LLDP messages: 4
Reinitialization delay: 1 sec
Capabilities supported: Bridge, CVLAN, SVLAN
Capabilities enabled: Bridge, CVLAN, SVLAN
Number of times table data inserted: 0
Number of times table data deleted: 0
Number of times table data dropped: 0
Number of times table data aged out: 0

Port F1 Info:
  LLDP Protocol: Tunnel

Port F2 Info:
  LLDP Protocol: Tunnel

Port 1 Info:
  LLDP Protocol: Tunnel

Port 2 Info:
  LLDP Protocol: Tunnel

Port 3 Info:
  LLDP Protocol: Tunnel

Port 4 Info:
  LLDP Protocol: Tunnel
```

2.1.14 Physical Location (LOCATION)

The *location* command provides the ability to configure the physical location of the module including address, city, state, zip code, altitude, latitude and longitude.

To configure the location of the module, use the *location* option from the CLI prompt. A list of options is displayed when the *location -h* command is entered.

```
> location -h

Description:
  location - location configuration
Syntax:
  location [-h]
  location -s
  location [-addr mAddr] [-city mCity] [-state mState] [-post mPost]
           [-lat mLat] [-long mLong] [-alt mAlt]
  location -dall
Switches:
-addr  address, [mAddr]: 1-32 ASCII characters, dflt blank
-alt   altitude, [mAlt]: 1-16 characters, dflt blank
-city  city, [mCity]: 1-32 ASCII characters, dflt blank
-dall  delete all ‘location’ configured settings and restore defaults
-h     display help information
-lat   latitude, [mLat]: {-90.000000..90.000000}, dflt blank
-long  longitude, [mLong]: {-180.000000..180.000000}, dflt blank
-post  postal code/zipcode, [mPost]: 1-16 ASCII characters, dflt blank
-s     shows current configuration
-state state/province, [mState]: 1-32 ASCII characters, dflt blank

>
```

The options available using the *location* command are shown below.

The *-addr* switch configures the physical module address.

The *-alt* switch configures the module altitude for above or below sea level.

The *-city* switch configures the city.

The *-dall* switch deletes all location settings and restores factory defaults.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-lat* switch configures the module latitude from -90.000000 degrees to +90.000000.

The *-long* switch configures the module longitude from -180.000000 degrees to +180.000000.

The *-post* switch configures the postal zone or zip code.

The *-s* switch displays the location settings for the module.

The *-state* switch configures the state.

To configure the location for the module, use the following commands.

```
> location -addr “38 Tesla” -city Irvine -state California -post 92618
> location -s

Address            38 Tesla
City               Irvine
State/province     California
Postal/zipcode     92618
Latitude
Longitude
Altitude

>
```

NOTE: When configuring text based names, such as 38 Tesla, the text name much be in “ ” for the command to be valid (*location -addr “38 Tesla”*). If the text based name does not have any spaces between the words, then “ ” are not necessary (*location -addr* 38_Tesla).

2.1.15 Link Redundancy (LR)

Link Redundancy is only supported on models with 2 fiber or copper uplink ports.

The *lr* command configures the module for link redundancy. When configured for link redundancy, the module will transmit and receive traffic on the primary port (F1) and no traffic on the backup port (F2). When a fiber failure occurs on the primary port, the module will switch over to the backup port within 50msec.

To configure link redundancy, use the *lr* option from the CLI prompt. A list of options is displayed when the *lr -h* command is entered.

```
> lr -h

Description:
  lr - link redundancy configuration
Syntax:
  lr [-h]
  lr -s
  lr [-ena|-dis] [-noret|-ret]
  lr -dall
Switches:
-dall  delete all ‘lr’ configured settings and restore defaults
-dis   disable link redundancy, dflt
-ena   enable link redundancy
-h     display help information
-noret no return to working port
-ret   return to working port, dflt
-s     show current configuration

>
```

The options available using the *lr* command are shown below.

The *-dall* switch deletes all link redundancy configuration settings and restores factory defaults.

The *-dis* and *-ena* switches disable/enable link redundancy.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-noret* switch disables the return to the primary link when the link failure has been resolved.

The *-ret* switch enables the return to the primary link when the link failure has been resolved.

The *-s* switch displays the current configuration.

Use the *lr -s* command to display the link redundancy configuration.

```
> lr -s

Link redundancy: disabled
Return to primary: disabled

Working port: F1
  Status: not available
  Link: not linked

Protection port: F2
  Status: not available
  Link: not linked

>
```

To enable link redundancy and configure the link not to return to the primary link when the link failure has been fixed, use the *lr -ena -noret* command.

```
> lr -ena -noret
```

NOTE: To enable link redundancy using the CLI, the on-board DIP switches must be disabled. Use the *module -dis dipsw* command to disable the DIP-switches.

Use the *lr -s* command to display the link redundancy configuration.

```
> lr -s

Link redundancy: enabled
Return to primary: disabled

Working port: F1
  Status: not available
  Link: not linked

Protection port: F2
  Status: not available
  Link: not linked

>
```

2.1.16 MAC Table (MACTABLE)

The *mactable* command provides the ability to enable/disable MAC learning, add/delete static MAC addresses, clear and display the MAC addresses learned by the module and configure the MAC aging time.

To display the MAC addresses, use the *mactable-s* command from the CLI prompt. A list of options is displayed when the *mactable -h* command is entered.

```
> mactable

Description:
  mactable - mac table status
Syntax:
  mactable [-h]
  mactable -s [-ver] [-p pNum]
  mactable -clr
  mactable [-aging ageTime] [-add macAddress -p pList [-vid vlan]]
           [-del macAddress] [{-dis|-ena} {learning|port}]
  mactable -dall
Switches:
-add   add static MAC address, [macAddress]
-aging mac table aging time in sec, [ageTime]: {10..600} dflt 300
-clr   clear (flushes) the learned MAC addresses
-del   delete static MAC address, [macAddress]
-dall  delete all MAC configured settings, instances, and restore defaults
-dis   disable function: {learning|port}
-ena   enable function: {learning|port}
         [learning] global MAC learning, dflt enable
         [port] clear MAC table when any port link down, dflt enable
-h     display help information
-p     port number, [pNum|pList]: {F1|F2|1..4|L1..L8|all}
         adding a unicast static address is only a single port
         adding a multicast static address can be more than one port
-s     show current status
-ver   verbose show
-vid   trunk VLAN ID, [vlan]: {0..4095}

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *mactable* command are shown below.

The *-add* switch allows the configuration of static MAC address to the MAC table.

The *-aging* switch defines the time before a MAC address expires. The default value is 300 seconds.

The *-clr* switch clears the learned MAC addresses.

The *-del* switch allows the deletion of static MAC address from the MAC table.

The *-dis* and *-ena* switches disable and enable global MAC learning and clearing the MAC table when the link is down.

learning	Enables or disables MAC learning globally on the module.
port	Enables or disables the clearing of the MAC table when any port link down.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-p* switch selects the port number.

The *-s* switch displays the MAC table.

The *-ver* switch displays the extended show.

The *-vid* switch selects the VLAN ID associated with a MAC entry for a trunk port.

To display the learned MAC addresses on the module, use the *mactable -s* command.

```
> mactable -s

MAC aging = 300s
MAC learning = enabled
MAC flush on link down = enabled

Retrieving MAC Table information - please wait

  [0001] 00-06-87-02-cb-a0s  (M1/1);  [0002] 00-08-54-b3-70-48   (P4/1);

2 out of 8192 entries allocated

>
```

2.1.17 MODBUS (MODBUS)

MODBUS is commonly used in industrial environments to monitor, gather, process, and transfer real-time data between devices. Many devices such as PLCs, intelligent devices, sensors, and instruments use MODBUS for SCADA (Supervisory Control And Data Acquisition Systems). SCADA is a system of software and hardware elements that allows industrial organizations to control industrial processes locally or at remote locations.

The MODBUS protocol is a request-response protocol between the Client and Server. A client can request the MODBUS server to act, and the server will respond with that action.

MODBUS awareness on the OmniConverter and RuggedNet products is MODBUS-TCP Server functionality.

To display the MODBUS commands, use the *modbus* command from the CLI prompt. A list of options is displayed when the *modbus -h* command is entered.

```
> modbus -h

Description:
  modbus - protocol configuration
Syntax:
  modbus [-h]
  modbus -s
  modbus [-ena|-dis <tcpserver>] [tsport -pNum] [-sto sTim]
  modbus -dall
Switches:
-dall  delete all ‘modbus’ configured settings and restore defaults
-dis   disable function: {tcpserver}
-ena   enable function: {tcpserver}
         [tcpserver] tcpserver function enable/disable, dflt disable
 -h     display help information
-tsport  modbus tcp server port, [pNum]: {1..65535}, dflt 502
-sto  modbus tcp session timeout [sTim] in seconds: {0..900}, dflt 300
-s     show current configuration

>
```

The options available using the *modbus* command are shown below.

The *-dall* switch deletes all Modbus configured settings and restores factory defaults.

The *-dis* switch disables the Modbus-TCP Server.

The *-ena* switch enables the Modbus-TCP Server.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-tsport* switch configures the TCP port for the Modbus-TCP server function.

The *-sto* switch configures session timeout for the Modbus-TCP client connections.

The -s switch displays the Modbus configuration and any active connections.

To display the MODBUS configuration and active connections, use the *modbus -s* command.

```
>modbus -s

modbus tcp server                  enabled
modbus tcp server port number       502
modbus tcp session timeout          300s
modbus tcp client connection #1     IP 10.10.42.78 Port 52404, active for 347s
modbus tcp client connection #2     IP 10.10.44.251 Port 4420, active for 22s.

>
```

To enable the TCP-Server, use the *modbus -ena* command.

```
>modbus -ena
```

The following Modbus function codes are recognized by the module.

Function Codes	
Function Code	**Function Description**
1 (0x01)	Read Coils; read up to 2000 contiguous coils
2 (0x02)	Read Discrete Inputs; read up to 2000 contiguous discrete inputs
3 (0x03)	Read Holding Registers; read up to 125 consecutive holding registers
4 (0x04)	Read Input Registers; read up to 125 consecutive input registers
5 (0x05)	Write Single Coil
6 (0x06)	Write Single Register
15 (0x0F)	Write Multiple Coils; write a sequence of up to 1968 coils at once.
16 (0x10)	Write Multiple Registers; write 1 to 123 registers in one command
22 (0x16)	Mask Write Register; result = (current AND And_Mask) OR (Or_Mask AND (NOT And_Mask))
23 (0x17)	Read/Write Multiple Registers; perform one read operation and one write operation in a single transaction.

Modbus defines a data model consisting of a set of registers which can be read and written using the Modbus-TCP protocol.

Data Model		
Block Address Range	**Block Name**	**Block Contents**
000001 - 065536	Coils	read-write booleans
100001 - 165536	Discrete Inputs	read-only booleans
300001 - 365536	Input Registers	read-only 16-bit integers (int16_t or uint16_t)
400001 - 465536	Holding Registers	read-write 16-bit integers (int16_t or uint16_t)

Modbus-TCP client applications register mapping.

Aggregate Data Types	
New Data Type Description	**Modbus Mapping**
read-only 32-bit integer (int32_t or uint32_t)	2 Consecutive Input Registers (MSB at offset 3, LSB at offset 0)
read-write 32-bit integer (int32_t or uint32_t)	2 Consecutive Holding Registers (MSB at offset 3, LSB at offset 0)
read-only 64-bit integer (int64_t or uint64_t)	4 Consecutive Input Registers (MSB at offset 3, LSB at offset 0)
read-write 64-bit integer (int64_t or uint64_t)	4 Consecutive Holding Registers (MSB at offset 3, LSB at offset 0)
read-only string (NULL terminated)	((LEN + 1) / 2) Input Register(s)
read-write string (NULL terminated)	((LEN + 1) / 2) Holding Register(s)

Modbus Discrete Input represents a single-bit of read-only state information. This data type is used to report read-only boolean status information from the module.

Discrete Input					
Start Address	**Item Size**	**Num Items**	**Description**	**ON**	**OFF**
1	1	32	Fiber Port 1..32 Linked	Linked	Not Linked
33	1	32	RJ-45 Port 1..32 Linked	Linked	Not Linked
65	1	32	RJ-45 Port 1..32 Full Duplex	FDX	HDX
97	1	32	RJ-45 Port 1..32 Flow Control Enabled	Enabled	Disabled
300	1	1	Alarm relay activation state; RuggedNet Only	Relay Energized	Relay De-energized
301	1	1	Alarm input state ; RuggedNet Only	Open	Closed
400	1	32	PoE Port Powered Status for Port 1..32; PoE Models only	Powering	Not Powering

A Modbus Coil represents a single-bit of read-write state information.

Coil Assignments					
Start Address	**Item Size**	**Num Items**	**Description**	**ON**	**OFF**
1	1	32	Fiber Port 1..32 Enabled	Port Enabled	Port Disabled
33	1	32	RJ-45 Port 1..32 Enabled	Port Enabled	Port Disabled
100	1	1	Reboot Module	Reboot	NA
101	1	1	Reboot Module to Backup Image	Swap+ Reboot	NA
102	1	1	Restore Defaults and Reboot	Restore+ Reboot	NA
103	1	1	Restore Defaults and Reboot with -keep option	RestoreKeep+ Reboot	NA
200	1	1	Clear portstats for all ports	Clear All Counts	NA
201	1	32	Clear portstats for Fiber Port 1..32	Clear Per-Port Counts	NA
233	1	32	Clear portstats for RJ-45 Port 1..32	Clear Per-Port Counts	NA
300	1	1	Save current settings	Save current settings	NA

A Modbus Input Register represents a sixteen-bit word of read-only state information.

Input Register Assignments				
Start Address	**Item Size**	**Num Items**	**Description**	**Data Type**
1	1	1	Magic/Vendor	uint16_t (0x0687)
2	1	1	Format Code	uint16_t (0x100)
100	33	1	Model Name	string(0..64+NULL)
133	33	1	Serial Number	string(0..64+NULL)
166	33	1	Base MAC	string(0..64+NULL)
199	33	1	Model Family	string (0..64+NULL)
232	33	1	Model Number	string (0..64+NULL)
265	5	1	Mfg Date YYYYMMDD	string (0..8+NULL)
270	1	1	Number of Fiber Ports	uint16_t
271	1	1	Number of Copper Ports	uint16_t
272	1	1	Number of PoE Capable Ports	uint16_t
300	64	1	Firmware Version	string(0..127+NULL)
364	64	1	Backup Firmware Version	string(0..127+NULL)
428	64	1	Bootloader Firmware Version	string(0..127+NULL)
600	1	1	Input Voltage A	uint16_t, mV
601	1	1	Input Voltage B (RuggedNet dual input only)	uint16_t, mV
602	1	1	Current Usage	uint16_t, A * 10
603	1	1	Temperature in Celsius	int16_t, C * 10, -3276.8 to 3276.7
700	1	1	CPU Utilization	uint16_t, 0..100%
701	1	1	RAM Utilization	uint16_t, 0..100%
702	1	1	Code Flash Utilization	uint16_t, 0..100%
703	2	1	Uptime (seconds)	uint32_t, 0..2^32-1
800	1	32	PoE Port Power Usage for Port 1..32 (PoE Models Only)	uint16_t (W * 10)
832	1	32	PoE Port Power Class for Port 1..32 (PoE Models Only)	uint16_t
900	1	32	Fiber Port Type 1..32 (1=SFP, 2=FF, 3=LC, 4=UTP)	enum
932	1	32	Fiber Port Speed 1..32 (1=10, 2=100, 3=1000, 4=10000, 5=2500, 6=5000)	enum
964	1	32	Copper Port Speed 1..32 (1=10, 2=100, 3=1000, 4=10000, 5=2500, 6=5000)	enum

Input Register Assignments				
Start Address	Item Size	Num Items	Description	Data Type
1000	4	32	Rx Bytes On Fiber Port 1..32	uint64_t
1128	4	32	Tx Bytes On Fiber Port 1..32	uint64_t
1256	4	32	Rx Frames On Fiber Port 1..32	uint64_t
1384	4	32	Tx Frames On Fiber Port 1..32	uint64_t
1512	4	32	CRC Errors On Fiber Port 1..32	uint64_t
1640	4	32	Tx Pause Frames On Fiber Port 1..32	uint64_t
1768	4	32	Rx Pause Frames On Fiber Port 1..32	uint64_t
1896	4	32	Rx Bytes On RJ-45 Port 1..32	uint64_t
2024	4	32	Tx Bytes On RJ-45 Port 1..32	uint64_t
2152	4	32	Rx Frames On RJ-45 Port 1..32	uint64_t
2280	4	32	Tx Frames On RJ-45 Port 1..32	uint64_t
2408	4	32	CRC Errors On RJ-45 Port 1..32	uint64_t
2536	4	32	Tx Pause Frames On RJ-45 Port 1..32	uint64_t
2664	4	32	Rx Pause Frames On RJ-45 Port 1..32	uint64_t

A Modbus Holding Register represents a sixteen-bit word of read-write state information.

Holding Register Assignments				
Start Address	Item Size	Num Items	Description	Data Type
1	128	1	Chassis Name	string(0..255+NULL)
129	128	1	Module ID	string (0..255+NULL)
257	128	1	System Contact	string(0..255+NULL)
385	128	1	System Location	string(0..255+NULL)
600	33	1	Alarm Digital Input Name (RuggedNet Only)	string (0..64+NULL)
633	33	1	Alarm Relay Normally Open Name (RuggedNet Only)	string (0..64+NULL)
666	33	1	Alarm Relay Normally Close Name (RuggedNet Only)	string (0..64+NULL)
1000	23	32	Fiber Port Name 1..32	string (0..45+NULL)
1736	23	32	Copper Port Name 1..32	string (0..45+NULL)
2500	33	1	Time of Day (24hr): MM/DD/YYYY HH:MM:SS	string(0..64+NULL)
2533	3	1	Time Zone Abbreviation	string(0..5+NULL) - see User Manual or run 'zone -h' for list of valid time zone abbreviations

2.1.18 Multicast Listener Discovery (MLD)

Multicast Listener Discovery (MLD) snooping allows the switch to view MLD packets and make decisions based on their content. MLD uses source-based filtering, which enables hosts and routers to specify which multicast sources should be allowed or blocked for a specific multicast group.

MLD snooping constrains IPv6 multicast traffic at Layer 2 by configuring Layer 2 LAN ports to forward IPv6 multicast traffic only to those ports that want to receive it.

The *mld* command provides the ability to configure MLD on the module.

To configure MLD, use the *mld* command from the CLI prompt. A list of options is displayed when the *mld -h* command is entered.

```
> mld -h

Description:
  mld - multicast listener discovery configuration
Syntax:
  mld [-h]
  mld -s
  mld [-dis|-ena flood|snooping] [-to toVal]
  mld -a -vid vVid [-grp ipAddr -ph hnum -pr rnum [{-dis|ena} aging]]
  mld -d -vid vVid [-grp ipAddr]
  mld -m -vid vVid -grp ipAddr [-ph hnum] [-pr rnum] [{-dis|ena} aging]
  mld -dall
Switches:
-a     add manual forwarding map or MLD interface
-d     delete existing forwarding map or MLD interface
-dall  delete all MLD configured settings, instances, and restore defaults
-dis   disable function: {aging|flood|snooping}
-ena   enable function: {aging|flood|snooping}
         [aging] MLD route subject to aging out, dflt disable
         [flood] flooding of all unrecognized MLD groups, dflt disable
         [snooping] MLD snooping, dflt disable
-grp   MLD Group Address, [ipAddr]
-h     display help information
-m     modify existing forwarding map
-ph    host port [hnum]: {F1,F2,1..4}
-pr    router port [rnum]: {F1,F2,1..4}
-s     show current configuration
-to    MLD route aging in seconds, [toVal]: {0..65535}, dflt 60s
-vid   VLAN ID, [vVid]

>
```

The options available using the *mld* command are shown below.

The *-a* switch configures a forwarding map or MLD interface.

The *-d* switch deletes an existing forwarding map or MLD interface.

The *-dall* switch deletes all MLD configured settings and restores factory defaults.

The *-dis* switch disables MLD route aging, flooding all unrecognized MLD groups, and snooping.

The *-ena* switch enables MLD route aging, flooding all unrecognized MLD groups, and snooping.

Th *-grp* switch configures the IP address of the MLD group.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-m* switch modifies an existing forwarding map.

The *-ph* switch configures the port number that is connected to the MLD host. This can be a single or multiple ports.

The *-pr* switch configures the port number that is connected to the MLD router. This can be a single or multiple ports.

The -s switch displays the status of the MLD configuration.

The *-to* switch configures the MLD route aging time in seconds. The default value is 60 seconds.

The *-vid* switch configures the VLAN ID associated with the MLD group.

NOTE: There are common variables that are shared between the IGMP and MLD protocols. The variables are Snooping (enable / disable), Flooding Unrecognized Groups (enable / disabled) and Route Aging timer. If either protocol changes the shared variables, they will be changed under both protocols (IGMP and MLD). Example: If Snooping is enabled under MLD, Snooping will be enabled under IGMP.

To display the status of the MLD configuration, use the *mld -s* command.

```
> mld -s

Snooping         Disabled
MLD Flooding      Disabled
Snooping timeout  60s

MLD VID Interfaces

>
```

2.1.19 Module Settings (MODULE)

The *module* command provides the ability to configure and display specific module settings. The serial interface baud rate, chassis name, module identifier, and enable/disable hardware DIP-switches can be configured using the *module* command.

To configure the module setting, use the *module* command from the CLI prompt. A list of options is displayed when the *module -h* command is entered.

```
> module -h

Description:
  module - module global configuration
Syntax:
  module [-h]
  module -s [all|led|env|mfg|mod]
  module [-bau baudRate] [-id modId]
        [-nm locationName] [-prmpt pName] [-dis|-ena dipsw]
  module -dall
Switches:
-bau   serial port baud rate, [baudRate]: {1..9}, dflt 8
       1 = 300bps, 2 = 1200bps, 3 = 2400bps, 4 = 4800bps, 5 = 9600bps,
       6 = 19200bps, 7 = 38400bps, 8 = 57600bps, 9 = 115200bps
-dall  delete all ‘module’ configured settings and restore defaults
-dis   disable function: {dipsw}
-ena   enable function: {dipsw}
        [dipsw] DIP switch, dflt enable
-h     display help information
-id    module identification, [modId]: 1-255 ASCII characters
-nm    location name, [locationName]: 1-255 ASCII characters
-prmpt prompt string, [pName]: 0 to 32 ASCII characters
-s     show current configuration: {all|led|env|mfg|mod}

>
```

The options available using the *module* command are shown below.

The *-bau* switch configures the baud rate of the serial interface. The default rate is 57,600bps.

The *-dall* switch restores the factory defaults of all module setting.

The *-dis* switch disables the hardware DIP-switches and allows CLI commands to override the functions.

The *-ena* switch enables the hardware DIP-switches and prevents the CLI commands from overriding the functions.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-id* switch configures the module identifier. The module identifier can be any 1-255 alphanumeric character string.

The *-nm* switch configures the chassis name. The chassis name can be any 1-255 alphanumeric character string.

The *-prmpt* switch configures the name associated with the module prompt.

The *-s* switch displays the module global configuration. Specific parameter can be displayed using the *all, led, env, mfg* or *mod* command.

all	Displays all the information on the module. Default if no option is specified.
led	Displays the status of the LEDs on the module.

env Displays the voltage and temperature parameters.

mfg Displays the manufacturing information.

mod Displays the module specific information.

To display the status of the LED on the module, use the *module -s led* command.

```
> module -s led

 1: Power Supply A     = Grn
 2: Power Supply B     = Grn
 3: Port F1 100+10     = Off
 4: Port F1 1000+10    = Amb, 1Hz
 5: Port F2 100+10     = Off
 6: Port F2 1000+10    = Grn
 7: Port  1 100+10     = Grn
 8: Port  1 1000+10    = Off
 9: Port  1 PSE Act    = Grn, 1Hz
10: Port  2 100+10     = Grn
11: Port  2 1000+10    = Off
12: Port  2 PSE Act    = Grn
13: Port  3 100+10     = Grn
14: Port  3 1000+10    = Off
15: Port  3 PSE Act    = Grn
16: Port  4 100+10     = Off
17: Port  4 1000+10    = Grn
18: Port  4 PSE Act    = Off
```

NOTE: The *module -s led* display will vary depending on the model.

To display all the information about the module, use the *module -s all* command.

```
> module -s all

 1: Power Supply A     = Grn
 2: Power Supply B     = Grn
 3: Port F1 100+10     = Off
 4: Port F1 1000+10    = Amb, 1Hz
 5: Port F2 100+10     = Off
 6: Port F2 1000+10    = Grn
 7: Port  1 100+10     = Grn
 8: Port  1 1000+10    = Off
 9: Port  1 PSE Act    = Grn, 1Hz
10: Port  2 100+10     = Grn
11: Port  2 1000+10    = Off
12: Port  2 PSE Act    = Grn
13: Port  3 100+10     = Grn
14: Port  3 1000+10    = Off
15: Port  3 PSE Act    = Grn
16: Port  4 100+10     = Off
17: Port  4 1000+10    = Grn
18: Port  4 PSE Act    = Off

Model Number: 3319-0-24-2
Serial Number: 20180791
Manufacturing Date: 20180710
Product Revision: 10
Software Revision: v2.x.x

Voltage In PS A: 54.23V
Voltage In PS B: 53.80V
Voltage Out: 3.31V
Total Current: 260mA
Temperature: 51C
CPU Utilization: 12%
RAM Utilization: 44.2MB out of 509MB (8.7%)
Flash Utilization: 204.9MB out of 798MB (25.7%)

Module Type: RuggedNet GHPoE/Mi
Module Identification:
Location Name: GHPoE/Mi
DIP switches: Disabled
Baud rate:  57600 baud
```

To display the environmental information about the module, use the *module -s env* command.

```
> module -s env

Voltage In PS A: 54.67V
Voltage In PS B: 0.00V
Voltage Out: 3.26V
Total Current: 52mA
Temperature: 39C
CPU Utilization: 8%
RAM Utilization: 75.6MB out of 507MB (14.9%)
Flash Utilization: 135.1MB out of 448MB (30.1%)
```

NOTE: The *module -s env* display will vary depending on the model.

When the temperature of the module is less than 0 degrees C, the module temperature reading will display 0 degrees C.

2.1.20 Media Redundancy Protocol (MRP)

IEC 62439-2 defines Media Redundancy Protocol (MRP) as a ring protocol that is used in high availability industrial networks. MRP is implemented as a ring protocol similar to Ethernet Ring Protocol Switch (ERPS), which allows the ring to recover from a single failure.

In an MRP ring, the ring manager is named Media Redundancy Manager (MRM) and the ring clients are named Media Redundancy Clients (MRCs).

MRM and MRC ring ports support three status: disabled, blocked, and forwarding. Disabled ring ports drop all the received frames. Blocked ring ports drop all the received frames except the MRP control frames. Forwarding ring ports forward all the received frames.

During normal operation, the network works in the Ring-Closed status. In this status, one of the MRM ring ports is blocked, while the other is forwarding. Conversely, both ring ports of all MRCs are forwarding. Loops are avoided because the physical ring topology is reduced to a logical stub topology.

In case of failure, the network works in the Ring-Open status. For instance, in case of failure of a link connecting two MRCs, both ring ports of the MRM are forwarding; the MRCs adjacent to the failure have a blocked and a forwarding ring port; the other MRCs have both ring ports forwarding. Also, in the Ring-Open status, the network logical topology is a stub.

To configure MRP, use the *mrp* command from the CLI prompt. A list of options is displayed when the *mrp -h* command is entered.

```
> mrp -h

Description:
  mrp - media redundancy protocol (MRP) configuration
Syntax:
  mrp [-h]
  mrp -s
  mrp {-dis|-ena} mrp
  mrp -p pList {-dis|-ena} {mrp|port}
  mrp -a -pn pName -rp1 pNum -rp2 pNum -role mRole [-dom dId]
                  [-pri priNum] [-rec sTime] [-vid vlanId]
  mrp -m -pn pName [-rp1 pNum] [-rp2 pNum] [-role mRole] [-dom dId]
                  [-pri priNum] [-rec sTime] [-vid vlanId]
  mrp -d -pn pName
  mrp -dall
Switches:
-a     add MRP instance
-d     delete MRP instance
-dall  delete all MRP configured settings, instances, and restore defaults
-dis   disable function: {mrp|port}
         [mrp] global or port MRP, dflt disabled
         [port] forwarding MRP, dflt enabled
-dom   ring domain id, [dId]: 32 hexadecimal characters
-ena   enable function: {mrp|port}
         [mrp] global or port MRP, dflt disabled
         [port] forwarding MRP, dflt enabled
-h     display help information
-m     modify existing MRP profile
-p     port list, [pList]: {F1,F2,1..4}
-pn    MRP profile name, [pName]: 1 to 32 ASCII characters
-pri   ring priority, [priNum]: {0..65535], dflt 40960
-rec   recovery time, [rTime]: {200|500}, dflt 200
-role  role, [mRole]: {mrc|mrm}
-rp1   ring port 1, [pNum]: {F1,F2,1..4}
-rp2   ring port 2, [pNum]: {F1,F2,1..4}
-s     shows current configuration
-vid   MRP vlan id assignment, [vlanId]: {1..4095}, dflt 1

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *mrp* command are shown below.

The *-a* switch adds a new MRP instance. If the ring ports associated with the add command are not MRP ports or are already allocated to another instance, an error message of *rpx port x is not a MRP port* or *rpx port x is already a part of an MRP instance* will be displayed

The *-d* switch deletes an existing MRP instance.

The *-dis* switch disables one of the following functions:

mrp Globally disables MRP if not associated with a port.

mrp Disables a port from being on a MRP ring if associated with a port.

A port cannot be removed from being an MRP port unless the MRP instance is first deleted and generates an error if attempted.

port Disables forwarding of all frames on a port (not participating in normal MRP operations).

The *-dom* switch sets the MRP domain identification number (UUID) via 32 hexadecimal characters. The default value is “FFFFFFFF-FFFF-FFFF-FFFF-FFFFFFFFFFFF”.

The *-ena* switch enables one of the following functions:

mrp Globally enables MRP if not associated with a port.

mrp Enables a port as a MRP ring port if associated with a port.

port Enables normal MRP operations on a port when associated with an MRP instance.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-m* switch modifies an existing MRP instance.

The *-p* switch selects one or more port numbers associated MRP or a MRP instance.

The *-pn* switch sets the MRP profile instance name.

The *-pri* switch sets the MRP instance priority for the manager.

The *-rec* switch sets the MRP maximum recovery time.

The *-role* switch sets the MRP role for the module: MRC or MRM.

mrc Media redundancy client.

mrm Media redundancy manager.

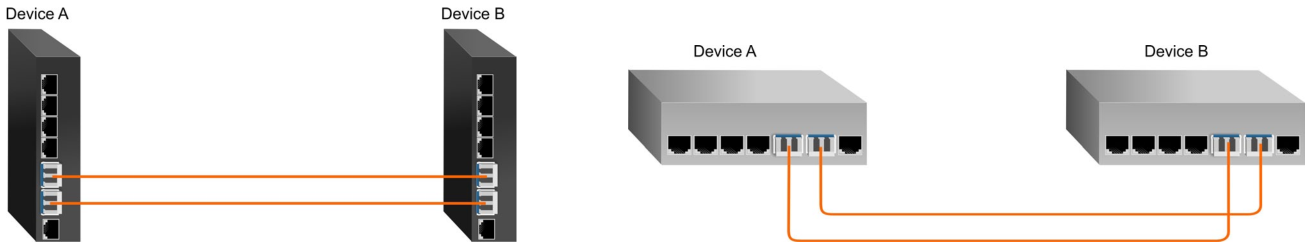
The *-rp1* switch configures the port number for Ring Port 1.

The *-rp2* switch configures the port number for Ring Port 2.

The *-s* switch displays configured settings.

The *-vid* switch selects the VLAN MRP protocol Identification.

The following script is an example of a MRP configuration.



Device A Setup

Device A (Media Redundancy Manager)
CLI Command
> vlan -rem 2..4095 > vlan -add 2
> switchport -p f1 -vid 2 > switchport -p f2 -vid 2 > switchport -p 2 -vid 2 > switchport -p f1 -mode tunnel > switchport -p f2 -mode tunnel > switchport -p 2 -mode tunnel
> mrp -dis mrp > mrp -p f1,f2 -ena mrp > mrp -a -pn M1 -rp1 f1 -rp2 f2 -role mrm -pri 20000 -rec 200 -vid 2   -dom FFFFFFFF-FFFF-FFFF-FFFF-000000000001 > mrp -ena mrp

Module is configured as the Media Redundancy Manager (MRM)

Device B Setup

Device B (Media Redundancy Client)
CLI Command
> vlan -rem 2..4095 > vlan -add 2
> switchport -p f1 -vid 2 > switchport -p f2 -vid 2 > switchport -p 2 -vid 2 > switchport -p f1 -mode tunnel > switchport -p f2 -mode tunnel > switchport -p 2 -mode tunnel
> mrp -dis mrp > mrp -p f1,f2 -ena mrp > mrp -a -pn C1 -rp1 f1 -rp2 f2 -role mrc -rec 200 -vid 2   -dom FFFFFFFF-FFFF-FFFF-FFFF-000000000001 > mrp -ena mrp

Module is configured as the Media Redundancy Client (MRC)

Device A - MRM

```
> mrp -s

MRP                     enabled
MRP associated ports    F1,F2

MRP instance 1 “M1”
  Role                  manager
  Recovery time (ms)    200

  Priority              20000
  Domain ID             FFFFFFFF-FFFF-FFFF-FFFF-000000000001
  Ring port 1           F1
  Ring port 2           F2
  VLAN ID               2

  Ring status           closed
  Ring port 1 status    blocking
  Ring port 2 status    forwarding

  Topology change request interval (ms)  10
  Topology change repeat count           3
  Short test frame interval (ms)         10
  Default test frame interval (ms)       20
  Test monitoring interval count         3

>
```

Ring Port 1 status is indicating the port is blocked and Ring Port 2 status is indicating the port is forwarding traffic.

Device B - MRC

```
> mrp -s

MRP                     enabled
MRP associated ports    F1,F2

MRP instance 1 “M1”
  Role                  client
  Recovery time (ms)    200

  Domain ID             FFFFFFFF-FFFF-FFFF-FFFF-000000000001
  Ring port 1           F1
  Ring port 2           F2
  VLAN ID               2

  Ring status           n/a
  Ring port 1 status    forwarding
  Ring port 2 status    forwarding

  Link down timer interval (ms)          20
  Link up timer interval (ms)            20
  Link change (up or down) count (ms)    4

>
```

Ring Port 1 status and Ring Port 2 status is indicating the port is forwarding traffic.

2.1.21 Nest (NEST)

The *nest* command provides the ability to access the hierarchical commands.

To access the hierarchical command line interface, use the *nest* command from the CLI prompt. A list of options is displayed when the *nest -h* command is entered.

```
> nest -h

Description:
  nest - hierarchical CLI session
Syntax:
  nest
  nest -h
Switches:
-h     display help information

>
```

To access the hierarchical interface, enter *nest* at the > prompt.

```
> nest
Nesting level change accepted

#
```

For more information on the hierarchical command line interface, see the

For information on the hierarchical command line interface, see Hierarchical CLI OmniConverter and RuggedNet switches User Manual (3xxxUM-03).

2.1.22 Ping (PING)

The *ping* command provides the ability to ping network devices connected to the module. This provides a convenient way to verify connectivity through the CLI interface.

To configure ping, use the *ping* command from the CLI prompt. A list of options is displayed when the *ping -h* command is entered.

```
> ping -h

Description:
  ping - ping a remote device
Syntax:
  ping [-h]
  ping [-t] ipAddress [-n count] [-l size] [-to tCount] [-ttl count]
Switches:
-h     display help information
-l     transmit buffer in bytes, [size]: {0..1472}, dflt 32
-n     number of pings, [count]: {0..65536}, dflt 3
-t     ping the specified [ipAddress]
-to    timeout in seconds to wait for each reply, [tCount]: {1..30}, dflt 3
-ttl   time to live, [count]: {1..255}, dflt 64

>
```

The options available using the *ping* command are shown below.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-l* switch defines the size of the ping frame.

The *-n* switch defines the number of pings frames sent. A value of 0 sends pings until interrupted.

The *-t* switch defines the destination IP address.

The *-to* switch configures the time to wait for each reply.

The *-ttl* switch configures the time to live value.

To ping an IP address, use the *ping -t* command.

```
> ping -t 192.168.1.110

Pinging 192.168.1.110 with 32 bytes of data sourced from IP1 (192.168.1.220):

Reply from 192.168.1.110: bytes=32 time=1ms
Reply from 192.168.1.110: bytes=32 time=1ms
Reply from 192.168.1.110: bytes=32 time=1ms

Ping statistics for 192.168.1.110:
    Packets: Sent = 3, Received = 3, Lost = 0 (0% loss),
Approximate round trip times in milliseconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

>
```

2.1.23 Port Attribute (PORT)

The *port* command provides the ability to configure each port with specific parameters.

To configure the attributes of a port, use the *port* command from the CLI prompt. A list of options is displayed when the *port -h* command is entered.

```
> port -h

Description:
  port - port attribute configuration
Syntax:
  port [-h]
  port -s [-p pList]
  port -dall
  port -p pList [-n portName] [-mo pMode] [-loopt lTime]
         [{-dis|-ena} flow|learning|loop|mirror[,sp]|port|secure]
Switches:
-dall  delete configured port attribute settings and restore defaults
-dis   disable function: {flow|learning|loop|mirror|port|secure}
-ena   enable function: {flow|learning|loop|mirror,sp|port|secure}
         [flow] flow control, dflt disable
         [learning] MAC learning, dflt enable
         [loop] loop protection, dflt disable
         [mirror] mirror source port, [sp], dflt disable
         [port] port output, dflt enable
         [secure] drops unknown Multicast/Unicast addresses, dflt disable
-h     display help information
-loopt loop protection transmit interval in sec, [lTime]: {1..60}, dflt 1
-mo    port mode, [pMode]: {[{1000|100|10},]{an|man}[,{fdx|hdx}]}
-n     port name, [portName]: 1-45 ASCII characters
-p     port list, [pList]: {F1,F2,1..4,mgt1|all}
-s     shows current configuration

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *port* command are shown below.

The *-dall* switch deletes all configured port attributes and restores factory default settings.

The *-dis* and *-ena* switches disable or enable the following:

flow	Disables or enables flow control on a port on the module.
learning	Disables or enables MAC learning on a port on the module.
loop	Disables or enables loop protection on a port on the module.
mirror	Disables or enables port mirroring on the module.
port	Disables or enables a port on the module.
secure	Disables or enables the ability to drop unknown Multicast/Unicast addresses on a port on the module.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-loopt* switch configures the loop protection transmit interval from 1-60s.

The *-mo* switch defines configuration of the negotiation, speed and duplex for the RJ-45 copper port.

The *-n* switch defines the name for the selected port.

The *-p* switch defines the port on the module to be used when configuring the attributes.

The *-s* switch displays the attributes associated with each port on the module.

The *-mo* switch provides configuration of the fixed RJ-45 port. The *-mo* switch is a valid switch to configure the fiber ports for AN or MAN only.

The RJ-45 port will operate per the Port Configuration Matrix below.

Port Attribute -mo setting	Port Configuration	RJ-45 Mode of Operation
1000, an, fdx	Based on the link partner	The RJ-45 port is set to auto-negotiation with the following modes advertised: 1000FDX, 1000HDX, 100FDX, 100HDX, 10FDX, 10HDX
1000, an, hdx	Based on the link partner	The RJ-45 port is set to auto-negotiation with the following modes advertised: 1000HDX, 100FDX, 100HDX, 10FDX, 10HDX
100, an, fdx	Based on the link partner	The RJ-45 port is set to auto-negotiation with the following modes advertised: 100FDX, 100HDX, 10FDX, 10HDX
100, an, hdx	Based on the link partner	The RJ-45 port is set to auto-negotiation with the following modes advertised: 100HDX, 10FDX, 10HDX
10, an, fdx	Based on the link partner	The RJ-45 port is set to auto-negotiation with the following modes advertised: 10FDX, 10HDX
10, an, hdx	Based on the link partner	The RJ-45 port is set to auto-negotiation and advertises: 10HDX
1000, man, fdx	Based on the link partner	The RJ-45 port is set to auto-negotiation with the following modes advertised: 1000FDX (When set to 1000, the port is always in AN mode)
1000, man, hdx	Based on the link partner	The RJ-45 port is set to auto-negotiation with the following modes advertised: 1000HDX (When set to 1000, the port is always in AN mode)
100, man, fdx	Man, 100, FDX	The RJ-45 port is set to manual negotiation and is forced to: 100FDX
100, man, hdx	Man, 100, HDX	The RJ-45 port is set to manual negotiation and is forced to: 100HDX
10, man, fdx	Man,10, FDX	The RJ-45 port is set to manual negotiation and is forced to: 10FDX
10, man, hdx	Man, 10, HDX	The RJ-45 port is set to manual negotiation and is forced to: 10HDX

RJ-45 Port Configuration Matrix

NOTE: The module only supports auto-negotiation when configured for 1000. So when the 1000, Man, FDX or 1000, Man, HDX is used, the module still auto-negotiates with its link partner per the table above.

The 1G fiber port will operate per the Port Configuration Matrix below.

Port Attribute -mo setting	Port Configuration	Mode of Operation
an	AN, 1000, FDX	1000M Fiber port set to AN with the followings mode advertised 1000FDX
man	Man, 1000, FDX	1000M Fiber port set to MAN and is forced to 1000FDX

1G Fiber Port Configuration Matrix

10G SFP+ ports are set to full duplex, manual operation.

When loop protection is enabled on a port (*-ena loop -p x*), the port will generate Configuration Test Protocol (CTP) frames. When the module receives its own CTP message either on the generating port or another port, loop prevention will automatically block the port from sending out normal user data until the loop is removed.

When a port is blocked, the port will continue to send out periodic CTP frames in order to determine if the block has been removed. When the module does not receive its own CTP message either on the generating or another port, the port will be unblocked.

When port security is enabled on a port (*-ena secure -p x*), the port will dropped all unknown Unicast and Multicast addresses. When port security is disabled, frames with unknown Unicast and Multicast addresses will be able to transmitted based on VLAN forwarding and learned MAC address forwarding rules.

To configure Port 3 (RJ-45) for 100M FDX manual operation, use the *-mo* command.

```
> port -p 3 -mo 100,man,fdx
```

To configure port F1 for manual operation, use the *-mo* command.

```
> port -p F1 -mo man
```

The example below enables port mirroring of Port 1 to Port 2.

```
> port -p 1 -ena mirror,2
```

To display the port attributes, use the *port -s* command.

```
> port -s

Port F1 is named “Port F1”, MTU 10240 bytes
      Port mode is SFP: Copper 1000, AN, FDX (No link)
      Port flow control is disabled
      Port output is enabled
      MAC learning is enabled: active
      Port mirroring is disabled
      Port security is disabled
      Loop protection is disabled
      Loop protection transmit interval is 1 sec
      Loop protection type: none
Port F2 is named “Port F2”, MTU 10240 bytes
      Port mode is SFP: Fiber 1000, AN, FDX (No link)
      Port flow control is disabled
      Port output is enabled
      MAC learning is enabled: active
      Port mirroring is disabled
      Port security is disabled
      Loop protection is disabled
      Loop protection transmit interval is 1 sec
      Loop protection type: none
Port 1 is named “Port 1”, MTU 10240 bytes
      Port mode is UTP: 1000, AN, FDX (Linked: 1000,FDX,no flow)
      Port flow control is disabled
      Port output is enabled
      MAC learning is enabled: active
      Port mirroring is disabled
      Port security is disabled
      Loop protection is disabled
      Loop protection transmit interval is 1 sec
      Loop protection type: none
```

```
Port 2 is named "Port 2", MTU 10240 bytes
      Port mode is UTP: 1000, AN, FDX (Linked: 1000,FDX,no flow)
      Port flow control is disabled
      Port output is enabled
      MAC learning is enabled: active
      Port mirroring is disabled
      Port security is disabled
      Loop protection is disabled
      Loop protection transmit interval: 1
      Loop protection type: none
Port 3 is named "Port 3", MTU 10240 bytes
      Port mode is UTP: 1000, AN, FDX (No link)
      Port flow control is disabled
      Port output is enabled
      MAC learning is enabled: active
      Port mirroring is disabled
      Port security is disabled
Port 4 is named "Port 4", MTU 10240 bytes
      Port mode is UTP: 1000, AN, FDX (Linked: 100,FDX,no flow)
      Port flow control is disabled
      Port output is enabled
      MAC learning is enabled: active
      Port mirroring is disabled
      Port security is disabled
      Loop protection is disabled
      Loop protection transmit interval: 1
      Loop protection type: none
Management port 1 is named "Mgt1", MTU 1518 bytes
```

2.1.24 Port Access (PORTACCESS)

The *portaccess* command provides the ability to control data access to each port on the module. Port Access can be configured to block (Off) user access or enable (On) user access. Port Access enables an administrator to control user access while maintaining port configuration for easy disabling or enabling of customer service.

To configure port access, use the *portaccess* command from the CLI prompt. A list of options is displayed when the *portaccess -h* command is entered.

```
> portaccess -h

Description:
  portaccess - port access configuration
Syntax:
  portaccess [-h]
  portaccess -s
  portaccess {-ena|-dis} -p pList
  portaccess -dall
Switches:
-dall  delete all 'portaccess' configured settings and restore defaults
-dis   disable port access
-ena   enable port access
-h     display help information
-p     port list, [pList]: {F1,F2,1..4|all}
-s     shows the port access configuration

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *portaccess* command are shown below.

The *-dis* switch disables access to the selected port.

The *-ena* switch enables access to the selected port.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-p* switch selects the port to be enabled or disabled. The default setting is all.

The *-s* switch displays the port access configuration.

To disable Port 2, use the *portaccess -dis -p 2* command.

```
> portaccess -dis -p 2
```

To display the port access configuration, use the *portaccess -s* command.

```
> portaccess -s

Port F1 enabled
Port F2 enabled
Port 1 enabled
Port 2 disabled
Port 3 enabled
Port 4 enabled
```

2.1.25 Port Statistics (PORTSTAT)

The *portstat* command provides the ability to display the port statistics on the module.

To display the port statistics, use the *portstat* command from the CLI prompt. A list of options is displayed when the *portstat -h* command is entered.

```
> portstat -h

Description:
  portstat - port statistic configuration
Syntax:
  portstat [-h]
  portstat -s -p pNum
  portstat -clr -p pNum
Switches:
-clr   clear port statistics
-h     display help information
-p     port number, [pNum]: {F1,F2,1..4|mgt1|all}
-s     shows current status

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *portstat* command are shown below.

The *-clr* switch clears the current port statistics.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-p* switch selects which port statistic is displayed.

The *-s* switch displays the selected port statistics.

To display the port statistics for Fiber Port 1, use the *portstat -s -p f1* command.

```
> portstat -s -p f1

Transmission Counters                     Receive Counters
                                          Packets           2367
 Total Octets       715116                Total Octets      639052
 Good Pkts          1766                  Good Pkts         2367
 Pause Pkts         0                     Pause Pkts        0
 Unicast Pkts       1404                  Unicast Pkts      1346
 Multicast Pkts     362                   Multicast Pkts    625
 Broadcast Pkts     0                     Broadcast Pkts    396
 Errored Pkts       0                     Errored Pkts      0
 Dropped Pkts       0                     Dropped Pkts      0
 Bad Events         0                     FCS Errors        0
 Deferred           0                     Symbol Errors     0
 Collisions:                              CRC/Alignment     0
    Total           0                     Undersized        0
    Single          0                     Oversized         0
    Multiple        0                     Fragments         0
    Late            0                     Jabber            0
    Excessive       0                     Alignment         0

 Transmit Packets by Queue                Receive Packets by Size
 Queue 0            1766                  64 Octets         481
 Queue 1            0                     65-127            499
 Queue 2            0                     128-255           584
 Queue 3            0                     256-511           17
 Queue 4            0                     512-1023          786
 Queue 5            0                     1024-10240        0
 Queue 6            0
 Queue 7            0

 Tx Throughput          0.024 Mbps    Rx Throughput        0.024 Mbps
 Tx Utilization         0.002%        Rx Utilization       0.002%

>
```

2.1.26 Protocol (PROTOCOL)

The *protocol* command provides the ability to enable/disable specific protocols available on the module. FTP, HTTP, HTTPS, IP, serial, Telnet and flow control can be configured using the *protocol* command.

To configure the protocols, use the *protocol* option from the CLI prompt. A list of options is displayed when the *protocol -h* command is entered.

```
> protocol -h

Description:
  protocol - protocol configuration
Syntax:
  protocol [-h]
  protocol -s
  protocol -ena|-dis {flow|ftp|http|https|ip|serial|telnet}
  protocol -cfn filename
  protocol -dall
Switches:
-cfn   SSL/TLS certificate file name, [filename]: 0 to 45 ASCII characters
-dall  delete all ‘protocol’ configured settings and restore defaults
-dis   disable function: {flow|ftp|http|https|ip|serial|telnet}
-ena   enable function: {flow|ftp|http|https|ip|serial|telnet}
        [flow] flow control, dflt disabled
        [ftp] FTP protocol, dflt disabled
        [http] HTTP protocol (web page), dflt enabled
        [https] HTTPS protocol (web page), dflt enabled
        [ip] IP protocol, dflt enabled
        [serial] serial console port, dflt enabled
        [telnet] Telnet protocol, dflt enabled
-h     display help information
-s     show current configuration

>
```

The options available using the *protocol* command are shown below.

The *-cfn* switch sets the SSL/TLS certificate file name for the product.

The *-dis* and -ena switches disables or enables the following:

flow Disables or enables global flow control on the module.
ftp Disables or enables FTP protocol on the module.
http Disables or enables HTTP protocol on the module.
https Disables or enables HTTPS protocol on the module.
ip Disables or enables IPv4 protocol on the module.
serial Disables or enables serial console port on the module.
telnet Disables or enables Telnet protocol on the module.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-s* switch displays the protocol configuration.

To enable FTP, use the following command.

```
> protocol -ena ftp
```

To disable Telnet, use the following command.

```
> protocol -dis telnet
```

If HTTPS is enabled and a certificate file is not configured via the *-cfn* command the self-generated certificate is used. If HTTPS is enabled and a certificate file is configured via the *-cfn* command the user downloaded certificate is used. If HTTPS is enabled SSL 2 & 3 and TLS 1.2 are used for web page access.

To display the configuration of the protocols, use the *protocol -s* command.

```
> protocol -s

IP protocol         enabled
Telnet protocol     enabled
FTP protocol        disabled
http protocol       enabled
https protocol      enabled
Serial console      enabled
Flow control        disabled

Certificate file    self-generated

>
```

2.1.27 Power Sourcing Equipment (PSE)

Only supported on OmniConverter and RuggedNet PoE models.

The *pse* command provides the ability to configure PoE scheduler, heartbeat parameters, LLDP-MED and PoE power settings on each RJ-45 port.

The PoE Scheduler provides the ability to configure the time and day for PoE power to be turned On and Off. Up to 100 scheduling events can be configured with a maximum of 8 per port.

To configure the power sourcing options on the RJ-45 ports for a PoE+ model, use the *pse* command from the CLI prompt. A list of options is displayed when the *pse -h* command is entered.

```
> pse -h

Description:
  pse - power source equipment configuration
Syntax:
  pse [-h]
  pse -s [-p pList]
  pse -p pList [-mode pMode] [-reset]
        [{-ena|-dis} {heartbeat|lldp-med|mdi-tlv}]
        [-i iTime] [-pderr eNum] [-hdfr iTime]
        [-pdint initNum] [-pdip ipAddr] [-pdmo {restart|ignore|shutdown}]
  pse -a -p pList -sched onTime,offTime,sDays [{-ena|-dis} schedule] [-pn pName]
  pse -m -idx sIdx [-p pList] [-sched [onTime],[offTime],[sDays]] [-pn pName]
        [{-ena|-dis} schedule]
  pse {-ena|-dis} schedule
  pse -d -idx sIdx
  pse -dall
Switches:
-a     add a new PoE scheduler
-d     delete an existing PoE scheduler
-dall  delete all PSE configured settings, instances, and restore defaults
-dis   disable function: {heartbeat|lldp-med|mdi-tlv|schedule}
-ena   enable function: {heartbeat|lldp-med|mdi-tlv|schedule}
        [heartbeat] selects heartbeat ping, dflt disabled
        [lldp-med] selects LLDP-MED support for PoE PDs, dflt enabled
        [mdi-tlv] select IEEE MDI TLV support for PoE PDs, dflt enabled
        [schedule] selects scheduled on/off times, dflt enabled
-h     display help information
-hdfr  heartbeat restart defer in sec, [iTime]: {10..300}, dflt 60
-i     heartbeat interval in sec, [iTime]: {1..300}, dflt 1
-idx   PoE scheduler index
-m     modify existing PoE scheduler
-mode  pse mode, [pMode]: {af|at|off}
        [af] selects PSE enabled, advertising 802.3af
        [at] selects PSE enabled, advertising 802.3af/at, dflt
        [off] selects PSE disabled
-p     port list, [pList]: {1..4}
-pderr number consecutive lost heartbeats for error, [eNum]: {1..100}, dflt 3
-pdint number of times to restart PD after error, [initNum]: {0..16384}, dflt 0
        0 = no stop
-pdip  ip address of PD for heartbeat, [ipAddr]
-pdmo  error mode action for PD error: {ignore|restart|shutdown}
        [ignore] no action when error condition is entered, dflt
        [restart] forces a power down and power up on the PSE ports
        [shutdown] shutdown PSE power for errored port
-pn    PoE scheduler profile name, [pName]: 1 to 32 ASCII characters
-reset restart PoE power on selected ports
-s     show current configuration
-sched schedule power on and off time, [onTime,offTime,sDays]
        [onTime] Time of day when power is enabled, in form of “24hr:min:sec”
        [offTime] Time of day when power is disabled in form of “24hr:min:sec”
           example “07:30:00,18:00:00”
        [sDays] Scheduler days, where the list contains one or more of:
          “Sun,Mon,Tue,Wed,Thu,Fri,Sat”, separated by commas, dflt all days

>
```

NOTE: Port number selection will vary depending on the model.

To configure the power sourcing options on the RJ-45 ports for a HPoE or HPoEBT model, use the *pse* command from the CLI prompt. A list of options is displayed when the *pse -h* command is entered.

```
> pse -h

Description:
  pse - power source equipment configuration
Syntax:
  pse [-h]
  pse -s [-p pList]
  pse -p pList [-mode pMode] [-reset]
         [{-ena|-dis} {heartbeat|lldp-med|mdi-tlv}]
         [-i iTime] [-pderr eNum] [-hdfr iTime]
         [-pdint initNum] [-pdip ipAddr] [-pdmo {restart|ignore|shutdown}]
  pse -a -p pList -sched onTime,offTime,sDays [{-ena|-dis} schedule] [-pn pName]
  pse -m -idx sIdx [-p pList] [-sched [onTime],[offTime],[sDays]] [-pn pName]
         [{-ena|-dis} schedule]
  pse {-ena|-dis} schedule
  pse -d -idx sIdx
  pse [{-ena|-dis} pslimit] [-pmax pwrMax]
  pse -dall
Switches:
-a     add a new PoE scheduler
-d     delete an existing PoE scheduler
-dall  delete all PSE configured settings, instances, and restore defaults
-dis   disable function: {heartbeat|lldp-med|mdi-tlv|pslimit|schedule}
-ena   enable function: {heartbeat|lldp-med|mdi-tlv|pslimit|schedule}
         [heartbeat] selects heartbeat ping, dflt disabled
         [lldp-med] selects LLDP-MED support for PoE PDs, dflt enabled
         [mdi-tlv] select IEEE MDI TLV support for PoE PDs, dflt enabled
         [pslimit] selects PSE availability, dflt enabled (global)
         [schedule] selects scheduled on/off times, dflt enabled
-h     display help information
-hdfr  heartbeat restart defer in sec, [iTime]: {10..300}, dflt 60
-i     heartbeat interval in sec, [iTime]: {1..300}, dflt 1
-idx   PoE scheduler index
-m     modify existing PoE scheduler
-mode  pse mode, [pMode]: {af|at|auto|force|off}
         [af] selects PSE enabled, advertising 802.3af
         [at] selects PSE enabled, advertising 802.3af/at
         [auto] selects PSE enabled, advertising max power possible, dflt
         [force] selects PSE enabled and supplying up to 100W of power
         [off] selects PSE disabled
-p     port list, [pList]: {1..4}
-pderr number consecutive lost heartbeats for error, [eNum]: {1..100}, dflt 3
-pdint number of times to restart PD after error, [initNum]: {0..16384}, dflt 0
         0 = no stop
-pdip  ip address of PD for heartbeat, [ipAddr]
-pdmo  error mode action for PD error: {ignore|restart|shutdown}
         [ignore] no action when error condition is entered, dflt
         [restart] forces a power down and power up on the PSE ports
         [shutdown] shutdown PSE power for errored port
-pmax  specifies maximum module PSE power (watts), [pwrMax]: {1..n}, dflt 125W
-pn    PoE scheduler profile name, [pName]: 1 to 32 ASCII characters
-reset restart PoE power on selected ports
-s     show current configuration
-sched schedule power on and off time, [onTime,offTime,sDays]
         [onTime] Time of day when power is enabled, in form of “24hr:min:sec”
         [offTime] Time of day when power is disabled in form of “24hr:min:sec”
            example “07:30:00,18:00:00”
         [sDays] Scheduler days, where the list contains one or more of:
           “Sun,Mon,Tue,Wed,Thu,Fri,Sat”, separated by commas, dflt all days
```

NOTE: Port number selection will vary depending on the model.

The options available using the *pse* command are shown below.

The *-a* switch adds a new PoE scheduling profile.

The *-d* switch deletes an existing PoE scheduling profile.

The *-dis* and *-ena* switches disable or enable PSE functions on the module.

heartbeat Disables/enables the heartbeat signal used to verify connectivity to the PD. *heartbeat* is disabled by default.

lldp-med Disable/enables LLDP-MED support for PoE PDs.

mdi-tlv Disables/enables IEEE MDI TLV support for PoE PDs.

***pslimit* is only available on OmniConverter and RuggedNet HPoE or HPoEBT models.**

pslimit Disables/enables PSE power limit. When enabled the module will not allow a powered device(PD) to request/draw more than the module is capable of providing. The port will be limited to available PSE power.

schedule Disables/enables PSE power scheduler. PoE power on each port can be enabled or disabled based upon the Time of Day. PoE power can be scheduled to be turned ON and OFF multiple times during the day.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-hdfr* switch selects the transmission interval delay before heartbeat pings are restarted after a reset.

The *-i* switch configures the transmission interval of the heartbeat signal. The default value is 1 second.

The *-m* switch modifies an existing PoE schedule.

The *-mode* switch configures the power sourcing mode for the port. PoE power can be disabled, auto detect to 802.3af, auto detect to 802.3af/at, Forced ON or advertise max power.

auto detect 802.3af Enables the PSE function and advertise 802.3af mode (15W).

auto detect 802.3at Enable the PSE function and advertise 802.3af/at mode (30W).

***auto* is only available on OmniConverter and RuggedNet HPoE or HPoEBT models.**

auto Enable the maximum PSE power per the negotiated class will be available. 802.3bt detection/negotiation supports classification up to class 8 devices.

***force* is only available on OmniConverter and RuggedNet HPoE or HPoEBT models.**

force PSE power (60W or 100W depending on the model) is applied regardless of the advertised state of the PD. This feature allows interoperability with pre-802.3bt products.

off Disables the PSE function.

The *-p* switch selects the port number.

The *-pderr* switch configures the number of consecutive lost heartbeats before an error condition is declared. The default value is 3 lost heartbeat signals.

The *-pdint* switch configures the number of times a PD is restarted when *pdmode* is set to restart. The default value is 0 indicating no limit to the number of restarts.

The *-pdip* switch configures the IP address of the PD. The IP address of the PD is used for the heartbeat signal.

The *-pdmo* switch configures what action is taken when a heartbeat error condition is detected.

ignore Indicates the error condition is ignored. *ignore* is the default setting.

restart Indicates the power to the selected port (PD) is cycled Off and On.

shutdown Indicates the power to the selected port (PD) is turned Off.

The *pmax* is only available on OmniConverter and RuggedNet HPoE or HPoEBT models.

The *-pmax* switch specifies the maximum PSE power for the module.

The *-pn* switch configures the name of the scheduling profile.

The *-reset* switch removes and reapplies power to the selected port.

The *-s* switch displays the PSE configuration.

The *-sched* switch sets the time when power is applied during the day and when the power is turned off for each port.

To reset the power to Port 1, use the following command.

```
> pse -reset -p 1
```

To schedule a time for PSE power to be turned ON (7:00AM) and OFF (7:00PM) on Port P1, use the following command.

```
> pse -a -sched “07:00:00,19:00:00” -p 1 -ena schedule
```

Use the *pse -s* command to display the PSE configuration. Only the status for Port 1 is shown.

```
> pse -s

Total power available: 125W
Total power supplied: 0.0000W
PSE power limit: enabled

Port 1 PSE status
     PSE port: enabled
     PSE port mode: auto
     LLDP-MED: enabled
     IEEE MDI TLV: enabled
     PD mode/status: not detected
     Voltage supplied:   0.00V
     Current supplied:   0.00mA

     Heartbeat: disabled
     Heartbeat IP address: 0.0.0.0
     Heartbeat interval: 1s
     Heartbeat detection: 3 lost responses
     Heartbeat error action: Ignore
     Heartbeat number of restarts: 0
     Heartbeat defer time after port restart: 60s
     Heartbeat status: Disabled

PoE Scheduler: Globally enabled
1, “”, enabled, time on: 07:00:00 time off: 19:00:00 days: Sun,Mon,Tue,Wed,Thu,Fri,Sat
ports: 1
```

2.1.28 Restart (RESTART)

The *restart* command provide the ability to restart (warm boot) the module.

Use the *restart* option from the CLI prompt to restart the module. A list of options is displayed when the *restart -h* command is entered.

```
> restart -h

Description:
  restart - restart module
Syntax:
  restart [-h]
  restart -boot [-back]
Switches:
-back  reboot from backup application image
-boot  warm boot the module
-h     display help information

>
```

The options available using the *restart* command are shown below.

The *-back* switch makes the backup application image active.

The *-boot* switch performs a warm boot on the module.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

To restart the module, use the *restart -boot* command.

```
> restart -boot
```

To swap the backup and current images and restart the module, use the *restart -boot -back* command.

```
> restart -boot -back
```

2.1.29 Restore to Factory Defaults (RESTORE)

The *restore* command provides the ability to restore the module to factory default settings.

Use the *restore* option from the CLI prompt to restore factory defaults. A list of options is displayed when the *restore -h* command is entered.

```
> restore -h

Description:
  restore - restore module defaults
Syntax:
  restore [-h]
  restore -s
  restore -a [fName]
  restore -d [fName]
  restore -r rType [-keep]
Switches:
-a     add new local default settings file based upon current settings
-d     delete current local default settings file
-h     display help information
-keep  restore all but IP based settings IP address, subnet, gateway
-r     restore default, [rType]: {factory|file,fName|local|previous}
-s     show current configuration files

>
```

The options available using the *restore* command are shown below.

The *-a* switch creates a new local configuration file.

The *-d* switch deletes the current local configuration file.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-keep* switch maintains the current IP setting after the module has been restored to factory defaults.

The *-r* switch restores the module to factory defaults or to a configuration file stored on the module.

The *-s* switch displays the restore status.

To create a local configuration file based on the current module configuration, use the *restore -a* command.

```
> restore -a
```

To display the restore status, use the *restore -s* command.

```
> restore -s

Name                   Size
===============================
discard.ini             2434
previous.ini            2793
current.ini             2794

>
```

To restore the module to factory default settings, use the *restore -r factory* command.

The module is rebooted and the factory default settings are restored.

2.1.30 Save (SAVE)

To save the changes when using the CLI, use the *save* command from the CLI prompt. A list of options is displayed when the *save -h* command is entered.

```
> save -h

Description:
  save - save configuration changes into permanent memory
Syntax:
  save
  save -h
  save -s
Switches:
-h     display help information
-s     show current status

>
```

The options available using the *save* command are shown below.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-s* switch displays the current state of the changes made to the module.

Use the *save -s* command to see if the recent changes have been saved.

```
> save -s

Save status: some parameters have been changed and have not been stored into Permanent
 memory

>
```

To save the changes, use the *save* command.

```
> save

> save -s

Save status: all parameters have been stored into Permanent memory

>
```

NOTE: If power is removed before the *save* command is initiated, the changes made with the CLI are lost.

2.1.31 Create and Run a Script File (SCRIPT)

The *script* command provides the ability to create, run and save a configuration file to the module. After a file has been opened, all typed CLI commands are written to the file. None of the commands typed are executed, only written to the open file. After the file is closed, the *-run* command can be used to execute the saved CLI commands.

To create a script file on the module, use the *script* command from the CLI prompt. A list of options is displayed when the *script -h* command is entered.

```
> script -h

Description:
  script - create and execute script files
Syntax:
  script [-h]
  script -s
  script -d scriptName.osf
  script -close
  script -open scriptName.osf
  script -run scriptName.osf
  script -type scriptName.osf
Switches:
-close close the currently open script file
-d     delete script file, [scriptName.osf]
-h     display help information
-open  open script file, [scriptName.osf]
-run   execute script file, [scriptName.osf]
-s     show current script file list
-type  type the selected file, [scriptName.osf]

>
```

The options available using the *script* command are shown below.

The *-close* switch stops the capture of all typed commands and saves the file.

The *-d* switch allows a script file to be deleted.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-open* switch starts the capture of all typed commands.

The *-run* switch executes the script file.

The *-s* switch displays the scripts files stored on the module.

The *-type* switch displays the contents of the selected script file.

To create a script file, use the *-open* command. The filename must have the .osf extension.

```
> script -open Config.osf
```

All CLI commands typed after the file has been opened is automatically saved in the file. Once complete with the configuration, close the file using the *-close* command.

```
> script -close
```

To execute the script file, use the *script -run <filename>* command.

2.1.32 Firmware Update using Serial Console (SERUPDATE)

The *serupdate* command allows the firmware to be updated from the serial console port using the xmodem protocol.

To update the firmware using the serial console port, use the *serupdate* command from the CLI prompt. A list of options is displayed when the *serupdate -h* command is entered.

```
> serupdate -h

Description:
  serupdate - upload firmware update via the serial port
Syntax:
  serupdate [-h]
  serupdate -s
  serupdate [-trans]
Switches:
-h     display help information
-s     show current selection
-trans transfer the selected file

>
```

The options available using the *serupdate* command are shown below.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-s* switch displays the method of transfer and status.

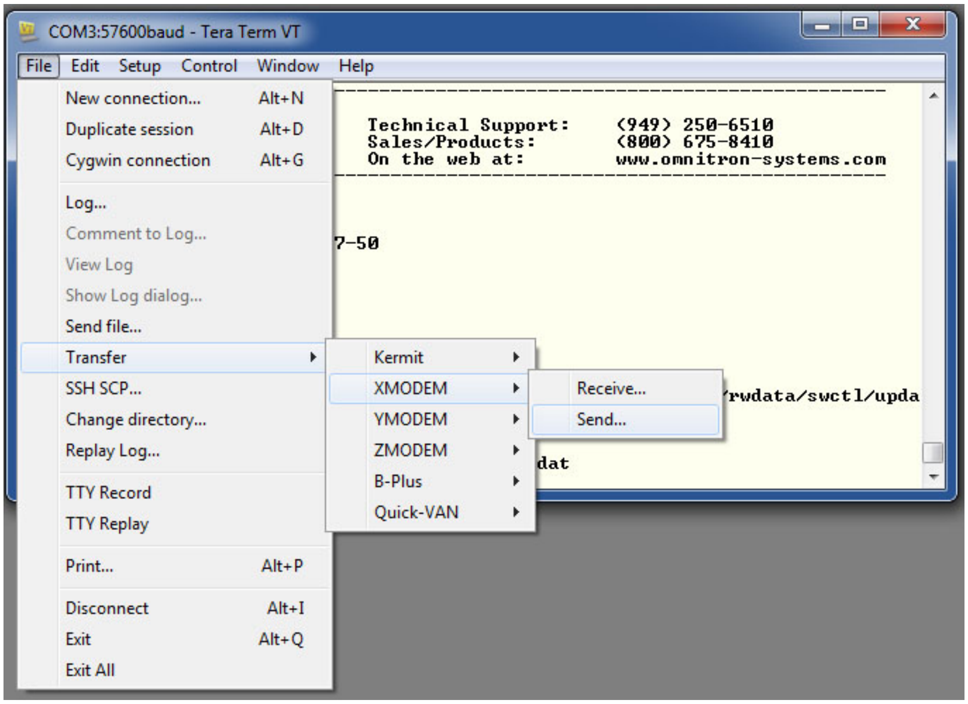
The *-trans* switch starts the xmodem process of updating the firmware using the serial console port.

To update the firmware on the module, use the following command.

```
> serupdate -trans

rc = Firmware download started to destination /usr/bin/rx -bv /rwdata/swctl/updates/fw.dat

rx: ready to receive /rwdata/swctl/updates/fw.dat
```

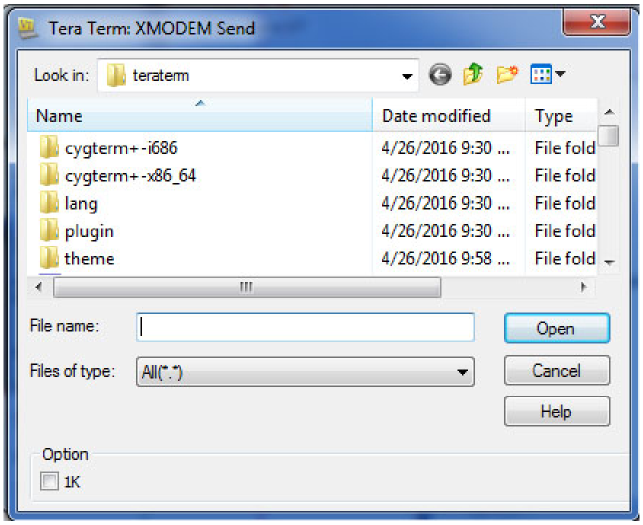
The module is ready to receive the firmware using xmodem protocol. Using TeraTerm or Procomm, transfer the firmware to the module.

NOTE: OmniConverter GPoE+/M 8 Port RJ-45 Fixed Fiber models (9520-x-x8-xx - 9531-x-x8-xx) and RuggedNet GPoE+/Mi 8 Port RJ-45 Fixed Fiber models (9540-x-x8-xx - 9551-x-x8-xx) with firmware 2.3.9 cannot be downgraded to any firmware revision. The models can be upgraded from 2.3.9.



```
----------------------------------------------------------------
    Technical Support:    (949) 250-6510
    Sales/Products:       (800) 675-8410
    On the web at:        www.omnitron-systems.com
----------------------------------------------------------------

7-50

                                                  rwdata/swctl/upda

dat
```

Select the location of the firmware file.



Name	Date modified	Type
cygterm+-i686	4/26/2016 9:30 ...	File fold
cygterm+-x86_64	4/26/2016 9:30 ...	File fold
lang	4/26/2016 9:30 ...	File fold
plugin	4/26/2016 9:30 ...	File fold
theme	4/26/2016 9:58 ...	File fold

File name:

Files of type: All(*.*)

□ 1K

Updating the firmware using the serial console port can take a very long time. Please be patient when updating the firmware using the serial console port.

2.1.33 SFP (SFP)

Only supported on models with SFP ports.

The *sfp* command displays the digital diagnostic information on the selected SFP port.

To display the digital diagnostic information, use the *sfp* command from the CLI prompt. A list of options is displayed when the *sfp -h* command is entered.

```
> sfp -h

Description:
  sfp - small form pluggable port information
Syntax:
  sfp [-h]
  sfp -list
  sfp -s [-p pList]
Switches:
-h     display help information
-list  list all SFP part numbers installed
-p     port list, [pList]: {F1,F2}
-s     show current status

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *sfp* command are shown below.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-list* switch lists the SFP transceivers installed in the module.

The *-p* switch selects the SFP port number.

The *-s* switch displays the digital diagnostic information for the selected port.

To display the SFP transceivers installed in the module, use the *sfp -list* command.

```
> sfp -list

Port = F1:  Omnitron, p/n 7207-1, s/n A129070363
Port = F2:  Omnitron, p/n 7207-1, s/n B909050136

>
```

To display the information for Fiber Port 1, use the *sfp -s -p f1* command.

```
> sfp -s -p f1

Port = F1

Address A0 Page Contents
====================================================
00: 03 04 07 00 00 00 02 12 00 01 01 01 0D 00 0C 78 ...............x
10: 00 00 00 00 4F 6D 6E 69 74 72 6F 6E 20 53 79 73 ....Omnitron Sys
20: 74 65 6D 73 00 00 06 87 37 32 30 37 2D 31 20 20 tems....7207-1
30: 20 20 20 20 20 20 20 20 30 31 30 30 05 1E 00 03         0100....
40: 00 1A 00 00 45 35 32 39 30 36 30 36 33 39 20 20 ....E529060639
50: 20 20 20 20 31 34 30 36 30 35 20 20 58 B0 01 70     140605  X..p
60: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
70: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20
80: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
90: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
A0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
B0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
C0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
D0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
E0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
F0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................

Address A2 Page Contents
====================================================
00: 5A 00 F6 00 55 00 FB 00 92 7C 6B 6C 8A AC 72 10 Z...U....|kl..r.
10: 2A 91 02 8E 25 8F 02 C1 12 54 01 A2 0E 8F 02 0E *...%.0...T......
20: 94 C7 01 7E 76 2E 02 F9 00 00 00 00 00 00 00 00 ...~v...........
30: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
40: 00 00 00 00 3E 29 A4 59 BE 29 A4 59 03 E6 F6 3C ....>).Y.).Y...<
50: 01 B1 00 00 01 00 FB 00 01 00 01 F4 00 00 00 35 ...............5
60: 39 30 80 80 0A 08 06 58 2C 00 00 00 00 00 00 F8 90.....X,.......
70: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
80: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
90: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
A0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
B0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
C0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
D0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
E0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................
F0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ................

SFP Type: 1000BASE-LX
Bit rate: 1300 Mbps
Wavelength: 1310nm
Link length: 120m
Vendor Name: Omnitron Systems
Vendor Part Number: 7207-1
Vendor Serial Number: E529060639
Date Code: 06/05/2014

Temperature: 41.7C
Vcc: 3.3v
Bias current: 15.0ma
Tx power: -6.2 dBm
Rx power: -7.2 dBm

>
```

2.1.34 Display the Common Configuration Parameters (SHOWCONFIG)

The *showconfig* command displays the commonly configured parameters on the module. The parameters that are displayed are: *ver*, *ip*, *port*, *protocol*, *time*, *module*, *pse*, *sfp, acl, bwp, cos, ethertype, switchport, vlan* and *traphost*.

To display the parameters, use the *showconfig* command from the CLI prompt. A list of options is displayed when the *showconfig -h* command is entered.

```
> showconfig -h

Description:
  showconfig - show basic configuration information status
Syntax:
  showconfig [-h]
  showconfig -s [-ver]
Switches:
-h     display help information
-s     show current configuration
-ver   verbose show

>
```

The options available using the *showconfig* command are shown below.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-s* switch displays the current state of each *showconfig* parameter.

The *-ver* switch displays additional commands (*contact, lr, rstp, lag, mrp, switch, portaccess, user, save, aaa, igmp, lldp, sntp, ssh, smtp, snmp, stormcontrol* and *traps*).

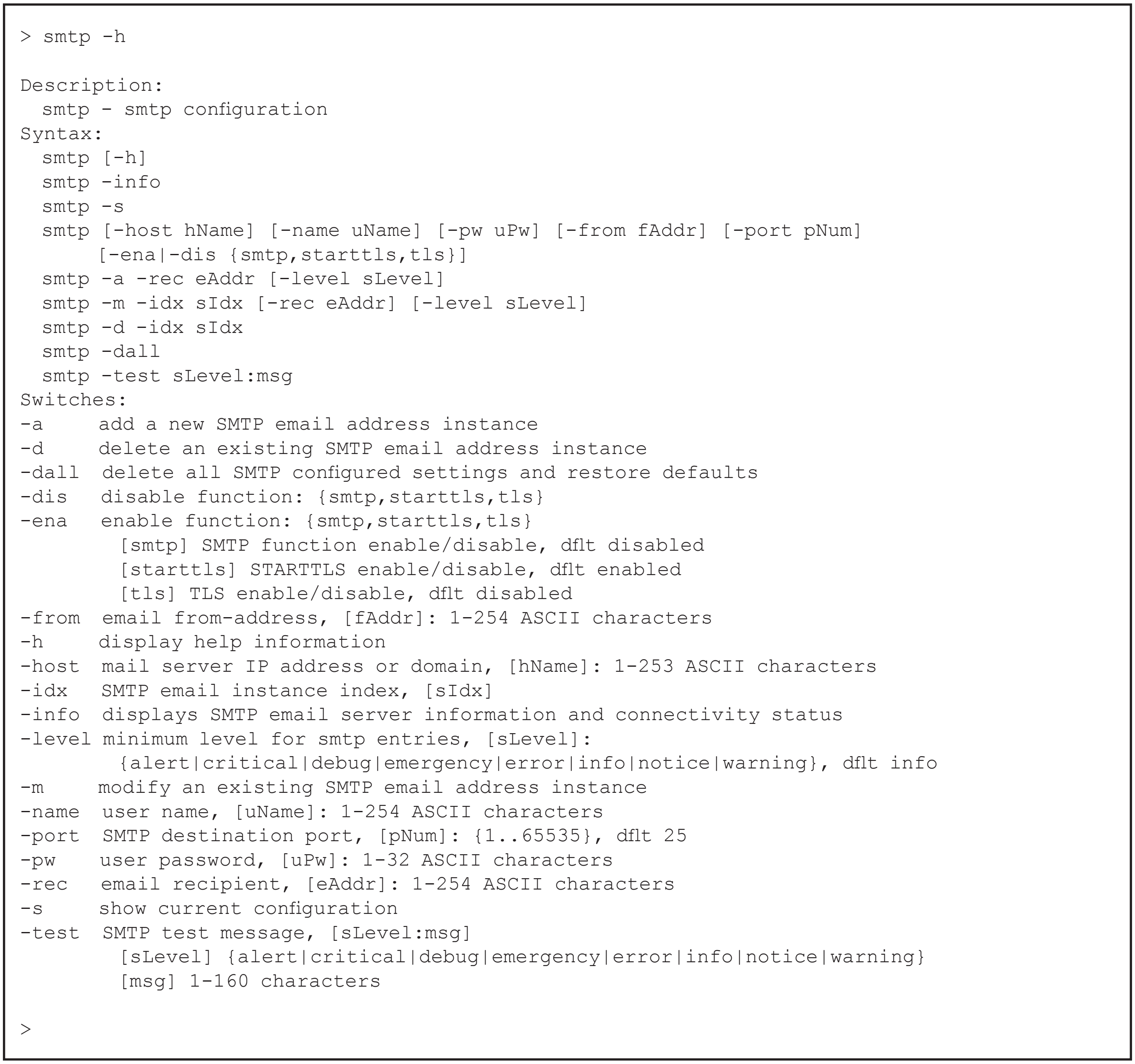
Use the *showconfig -s* command to display the configuration of the module.

2.1.35 Simple Mail Transfer Protocol (SMTP)

The *smtp* command provides the ability to configure the Simple Mail Transfer Protocol (SMTP) parameters on the module. The SMTP is a communication protocol for electronic mail transmission.

When using Simple Mail Transfer Protocol (SMTP) to send mail, it optionally uses a combination of StartTLS and Transport Layer Security (TLS) or Secure Sockets Layer (SSL) to encrypt the mail. StartTLS is a protocol command used to inform the email server that the email client wants to upgrade from an insecure connection to a secure one using TLS or SSL.

To configure the module to support SMTP, use the *smtp* command from the CLI prompt. A list of options is displayed when the *smtp -h* command is entered.



```
> smtp -h

Description:
  smtp - smtp configuration
Syntax:
  smtp [-h]
  smtp -info
  smtp -s
  smtp [-host hName] [-name uName] [-pw uPw] [-from fAddr] [-port pNum]
       [-ena|-dis {smtp,starttls,tls}]
  smtp -a -rec eAddr [-level sLevel]
  smtp -m -idx sIdx [-rec eAddr] [-level sLevel]
  smtp -d -idx sIdx
  smtp -dall
  smtp -test sLevel:msg
Switches:
-a     add a new SMTP email address instance
-d     delete an existing SMTP email address instance
-dall  delete all SMTP configured settings and restore defaults
-dis   disable function: {smtp,starttls,tls}
-ena   enable function: {smtp,starttls,tls}
         [smtp] SMTP function enable/disable, dflt disabled
         [starttls] STARTTLS enable/disable, dflt enabled
         [tls] TLS enable/disable, dflt disabled
-from  email from-address, [fAddr]: 1-254 ASCII characters
-h     display help information
-host  mail server IP address or domain, [hName]: 1-253 ASCII characters
-idx   SMTP email instance index, [sIdx]
-info  displays SMTP email server information and connectivity status
-level minimum level for smtp entries, [sLevel]:
         {alert|critical|debug|emergency|error|info|notice|warning}, dflt info
-m     modify an existing SMTP email address instance
-name  user name, [uName]: 1-254 ASCII characters
-port  SMTP destination port, [pNum]: {1..65535}, dflt 25
-pw    user password, [uPw]: 1-32 ASCII characters
-rec   email recipient, [eAddr]: 1-254 ASCII characters
-s     show current configuration
-test  SMTP test message, [sLevel:msg]
         [sLevel] {alert|critical|debug|emergency|error|info|notice|warning}
         [msg] 1-160 characters

>
```

The options available using the *smtp* command are shown below.

The *-a* switch adds a new SMTP email address instance.

The *-d* switch deletes an existing SMTP instance.

The *-dall* switch deletes all SMTP settings and restores factory defaults.

The *-dis* switch disables SMTP event forwarding, StartTLS and TLS.

The *-ena* switch enables SMTP event forwarding, StartTLS and TLS.

The *-from* switch configures the email address of the person the email is from.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-host* switch configures the IP address of the SMTP mail server or domain.

The *-idx* switch configures the instance index number.

The *-info* switch displays the SMTP email server information and connectivity status.

The *-level* switch configures the syslog minimum severity error for forwarding events: emergency (highest), alert, critical, error, warning, notice, info (informational), debug (lowest). Only events that have a severity level greater than or equal to the configured level will be generated as an email.

The *-m* switch modifies an existing instance.

The *-name* switch configures the user name to be used to log into the email server.

The *-port* switch configures the SMTP port number. The default port number is 25.

The *-pw* switch configures the password for the selected email account.

The *-rec* switch configures one or more email recipients.

The *-s* switch displays the configured settings.

The *-test* switch send a test email to the email server at the specified severity level.

To display the SMTP parameters, use the *smtp -s* command.

```
> smtp -s

SMTP forwarding        disabled
SMTP host              “”
SMTP user name         “”
SMTP from address      “”
SMTP password          *****
SMTP port number       25
TLS protocol           disabled
TLS STARTTLS option    enabled
Email recipients       none configured

>
```

To configure SMTP forwarding, use the following command examples.

```
> smtp -host 192.168.1.1 -from jsmith@gmail.com
> smtp -name abc@xyz.com -pw 123456
> smtp -a -rec bill@gmail.com

Email recipient 1 added

> smtp -ena smtp
> smtp -s

SMTP forwarding        enabled
SMTP host             192.168.1.1
SMTP user name         abc@xyz.com
SMTP from address      jsmith@gmail.com
SMTP password          *****
SMTP port number       25
TLS protocol           disabled
TLS STARTTLS option    enabled
Email recipient 1      bill@gmail.com, severity info

>
```

2.1.36 Simple Network Management Protocol (SNMP)

The *snmp* command provides the ability to configure the SNMP parameters on the module.

To configure the module to support Simple Network Management Protocol (SNMP), use the *snmp* command from the CLI prompt. A list of options is displayed when the *snmp -h* command is entered.

```
> snmp -h

Description:
  snmp - simple network management protocol user configuration
Syntax:
  snmp [-h]
  snmp -s
  snmp [-rd pw] [-wr pw] [-ena|-dis {snmpv1|snmpv3}]
  snmp -user uNum [-typ uTyp] [-name uName] [-auth aPw] [-priv pPw] [-sec uSec]
       [-atype aTy] [-ptype pTy]
  snmp -dall
Switches:
-atype authentication type, [aTy]: {md5|sha}, dflt md5
-auth  authentication password, [aPw]: 8-32 ASCII characters
-dall  delete all SNMP configured settings and restore defaults
-dis   disable function: {snmpv1|snmpv3}
-ena   enable function: {snmpv1|snmpv3}
         [snmpv1] SNMPv1/v2c protocol, dflt enabled
         [snmpv3] SNMPv3 protocol, dflt enabled
-h     display help information
-name  user name, [uName]: 1-32 ASCII characters
-priv  privacy password, [pPw]: 8-32 ASCII characters
-ptype privacy type, [pTy]: {aes|des}, dflt des
-rd    read community name, [pw]: 1-32 ASCII characters
-s     show current configuration
-sec   user security level, [uSec]: {noAuthNoPriv,authNoPriv,authPriv}
-typ   user type, [uTyp]: {admin|deny|readonly|readwrite}
-user  user number, [uNum]: {1..4}
-wr    write community name, [pw]: 1-32 ASCII characters

>
```

The options available using the *snmp* command are shown below.

The *-atype* switch configures the authentication hashing method; MD5 or SHA.

The *-auth* switch configures the SNMPv3 authentication password for the selected user. Authentication password can be any 8-32 alphanumeric character string. The default setting is publicguest.

The *-dis* switch disables SNMPv1 and SNMPv3.

The *-ena* switch enables SNMPv1 and SNMPv3.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-name* switch configures the user name for the selected user.

The *-priv* switch configures the privacy password for the selected user.

The *-ptype* switch configures the privacy password encryption algorithm; AES or DES.

The *-rd* switch configures the SNMPv1/2c Read Community Name . The SNMP Read Community Name is necessary for reading (get) data from the module. The name can be any 1-32 alphanumeric character string. The default setting is public.

The *-s* switch displays the SNMP configuration parameters.

The *-sec* switch configures the security level for the selected user

noAuthNoPriv Allows access without authentication and without privacy.

authNoPriv Allows access with authentication, but without privacy.

authPriv Allows access with authentication and with privacy. Authentication and privacy uses different algorithms for encrypting and decrypting SNMPv3 packets.

The *-typ* switch configures the SNMP user type for a user account; admin, read-write, read-only or deny.

admin An admin user has full read/write privileges including user name and password changes.

read-write A read-write user has full read/write privileges with the exception of user name and password operations.

read-only A read-only user can only view the configuration of the module and will not be allowed to make any changes.

deny A deny user does not have any access to the module.

The *-user* switch configures the user number used for the configuration parameters.

The *-wr* switch configures the SNMPv1/2c Write Community Name . The SNMP Write Community Name is necessary for writing (set) data to the module. The name can be any 1-32 alphanumeric character string. The default setting is private.

To change the write community name, use the following command.

```
> snmp -wr public
```

To display the SNMP parameters, use the *snmp -s* command.

```
> snmp -s

SNMPv1/v2c agent                 enabled
SNMPv3 agent                     enabled
Read community name              *****
Write community name             *****

User 1 type                      admin
User 1 name                      admin
User 1 security level            noAuthNoPriv
User 1 privacy password          *****
User 1 privacy encryption        DES
User 1 authentication password   *****
User 1 authentication hashing    MD5

User 2 type                      read-only
User 2 name                      guest
User 2 security level            noAuthNoPriv
User 2 privacy password          *****
User 2 privacy encryption        DES
User 2 authentication password   *****
User 2 authentication hashing    MD5

User 3 type                      read-only
User 3 name                      guest1
User 3 security level            noAuthNoPriv
User 3 privacy password          *****
User 3 privacy encryption        DES
User 3 authentication password   *****
User 3 authentication hashing    MD5

User 4 type                      read-only
User 4 name                      guest2
User 4 security level            noAuthNoPriv
User 4 privacy password          *****
User 4 privacy encryption        DES
User 4 authentication password   *****
User 4 authentication hashing    MD5

>
```

2.1.37 Simple Network Time Protocol (SNTP)

The *sntp* command provides the ability to configure the module to request the time and day from a SNTP server.

To configure the module to support Simple Network Time Protocol (SNTP), use the *sntp* command from the CLI prompt. A list of options is displayed when the *sntp -h* command is entered.

```
> sntp -h

Description:
  sntp - simple network time protocol configuration
Syntax:
  sntp [-h]
  sntp -s
  sntp -dall
  sntp [-ena|-dis ntp|sntp] [-i iTime] [-z zoneVal] [-ip1 serverIP]
       [-ip2 serverIP]
Switches:
-dall  delete all SNTP configured settings and restore defaults
-dis   disable function: {ntp|sntp}
-ena   enable function: {ntp|sntp}
         [ntp] Network Time Protocol
         [sntp] Simple Network Time Protocol
-h     display help information
-i     time server request interval in minutes, [iTime]: {1..60}, dflt 8
-ip1   time server IP address 1, [serverIP]
-ip2   time server IP address 2, [serverIP]
-s     show current configuration
-z     time zone selection, [zoneVal]

To get help screen on time zone values type “zone -h”

>
```

The options available using the *sntp* command are shown below.

The *-dall* switch deletes all settings and restores factory defaults.

The *-dis* and *-ena* switches disable or enable SNTP or NTP on the module.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-i* switch defines the time interval between SNTP requests.

The *-ip1* and *-ip2* switches define the IP addresses of the SNTP servers.

The *-s* switch displays the SNTP configuration.

The *-z* switch defines the time zone.

To enable SNTP services and assign the SNTP server IP address, use the *-ena* and *-ip1* commands.

```
> sntp -ena sntp -ip1 192.168.1.240
```

To display the SNTP configuration, use the *sntp -s* command.

```
> sntp -s

SNTP service is enabled, query interval is 8 minutes
Time zone PST (Pacific Standard Time)
Time server 1 IP is 192.168.1.240
Time server 2 IP is 255.255.255.255 (not configured)
```

2.1.38 Spanning Tree Protocol (SPANTREE)

Multiple Spanning Tree Protocol (MSTP) is a protocol that creates multiple spanning trees (instances) for each VLAN. This allows each VLAN to be configured with a root bridge and forwarding topology.

The *spantree* command provides the ability to configure Multiple Spanning Tree Protocol (MSTP).

To configure Multiple Spanning Tree Protocol, use the *spantree* command from the CLI prompt. A list of options is displayed when the *spantree -h* command is entered.

```
> spantree -h

Description:
  spantree - spanning tree configuration
Syntax:
  spantree [-h]
  spantree -s [-p pList]
  spantree -dall
  spantree [-bage timeout] [-hello time] [-fwd time] [-bpri bPri]
           [-ena|-dis stp]
  spantree -p pList [-ppri pPri] [-pcost pCost] [-proto pMode]
       [-ena|-dis {bpduguard,portfast,rootguard}
  spantree -a -pn pName -vid vList -p pList [-proto pMode]
  spantree -d -pn pName
Switches:
-a     add new MSTP instance
-bage  bridge aging timeout in sec, [timeout]: {6..40}, dflt 20
-bpri  bridge priority, [bPri]: {0..61440}, dflt 32768, multiples of 4096
-d     delete MSTP instance
-dall  delete all “spantree” configured settings, instances, & restore defaults
-dis   disable function: {bpduguard,portfast,rootguard,stp}
-ena   enable function: {bpduguard,portfast,rootguard,stp}
         [bpduguard] port is disabled when BPDU received, dflt disabled
         [portfast] forwarding immediately & bypass listening, dflt disabled
         [rootguard] port is disabled if designated as root, dflt disabled
         [stp] Spanning Tree on module, dflt disabled
-fwd   forward delay time in sec, [time]: {4..30}, dflt 15
-h     display help information
-hello time between configuration message in sec, [time]: {1..5}, dflt 2
-p     port list, [pList]: {F1,F2,1..4|all}
-pcost port path cost [pCost]: {1..200,000,000}, dflt 20000
-pn    spanning tree instance name, [pName]: 1 to 32 ASCII characters
-ppri  port priority, [pPri]: {0..240} dflt 128, multiples of 16
-proto protocol configuration, [pMode]: {discard|mstp|rstp|tunnel}
         [discard] RSTP/MSTP are disabled, BPDU frames are discarded
         [mstp] MSTP is enabled and protocol is operational
         [rstp] RSTP is enabled and protocol is operating
         [tunnel] RSTP/MSTP are disabled, BPDU frames are tunneled
-s     show current configuration
-vid   VLAN list: {1..4095}

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *spantree* command are shown below.

The *-a* switch adds a MSTP instance.

The *-bage* switch defines the time period before the MAC addresses are removed from the table.

The *-bpri* switch defines the bridge priority ID for the port. The root bridge is the port with the lowest bridge priority ID.

The *-d* switch deletes a MSTP instance.

The *-dall* switch deletes all Spanning Tree settings and restore factory defaults.

The *-dis* switch disables BPDU Guard (bpduguard), Port Fast (portfast), Root Guard (rootguard) and Spanning Tree (stp).

The *-ena* switch enables BPDU Guard (bpduguard), Port Fast (portfast), Root Guard (rootguard) and Spanning Tree (stp).

The *-fwd* switch defines the time before a port transitions to a forwarding state.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-hello* switch defines the time period between hello-time Bridge Protocol Data Units (BPDUs).

The *-p* switch defines the port associated with spanning tree protocol.

The *-pcost* switch defines the cost of the path. The path cost is based on the speed of the physical interface speed.

The *-pn* switch configures the name of the instance.

The *-ppri* switch defines the priority of the port. The state of the port is determined by the port cost and port priority values.

The *-proto* switch configures the protocols.

discard	RSTP/MSTP protocols are disabled.
mstp	MSTP is enabled and the protocol is operating.
rstp	RSTP is enabled and the protocol is operating.
tunnel	RSTP/MSTP protocols are disabled. BPDU frames are tunneled.

The *-s* switch displays the current Rapid Spanning Tree configuration.

The *-vid* switch configures the VLAN associated with the Spanning Tree instance.

Bridge Priority (*-bpri*):

The bridge with the lowest priority is elected as the root bridge for the domain. The Bridge Priority can be modified in increments of 4096 from 0 to 61,440. The default Bridge Priority is 32,768.

Bridge Age Time:

The amount of time a module saves configuration BPDUs. A value from 6 - 40 seconds is valid. The default Max Age Time is 20 seconds.

Hello Time (*-hello*):

The Root sends configuration BPDUs every 2 seconds. A value from 1 - 5 seconds is valid. The default Hello Time is 2 seconds.

Forward Delay (*-fwd*):

The time interval for listening and learning states. A value from 4 - 30 seconds is valid. The default Forward Delay is 15 seconds.

MAC Address Aging (*-bage*):

The time before the MAC address is removed from the MAC table. A value from 10 - 630 seconds is valid. The default MAC Aging Time is 300 seconds.

Port Priority (*-ppri*):

If two paths have the same port cost, the bridges must select a preferred path. Port Priority is used to determine the preferred path. A value from 0 - 240 (in increments of 16), with 240 being the highest priority, is allowed. The default Port Priority is 128.

Path Cost (*-pcost*):

The cost of a port is typically based on port speed. The faster the port, the lower the port cost. See table below. A value from 1 - 200,000,000 is valid. The default Path Cost is 20,000.

BPDU Guard (*bpduguard***)**

BPDU Guard is used to protect the Spanning Tree Topology from BPDU related attacks. BPDU Guard must be enabled on a port that should never receive a BPDU from the connected device.

Port Fast (*portfast*)

Port Fast allows ports to enter a forwarding state in four seconds. Port Fast allows faster convergence on ports that are attached to end stations and do not present the potential to cause forwarding loops.

Root Guard (*rootguard*)

Root Guard ensures that the port on which root guard is enabled is the designated port.

To configure port priority and path cost, use the *-pcost* and *-ppri* commands.

```
> spantree -p 1 -pcost 10000 -ppri 96
```

Spanning Tree Protocol uses path cost and port priority to determine the best path. The table below shows the recommended path cost based on link speed.

Link Speed	Recommended Value
10Mbps	2,000,000
100Mbps	200,000
1Gbps	20,000
10Gbps	2,000
100Gbps	200

Recommended Port Cost vs Link Speed

The port with the lowest path cost has the highest priority.

By default, Spanning Tree Protocol is tunneled. Use the *-proto* command to change the way the module handles the protocols.

To display spanning tree configuration, use the *rstp -s* command.

```
> spantree -s

Bridge Spanning Tree Global Configuration
==============================================
Spanning tree                         Disabled
Bridge Id
Designated Root
Bridge Priority                          32768
Bridge Max Age                              20
Hello Time                                   2
Forward Delay                               15

Port F1 Configuration
==============================================
Port Type                               Tunnel
Spanning Tree Port State                   N/A
Port Priority                              128
Path Cost                                20000
BPDU Guard                            Disabled
Port Fast                             Disabled
Root Guard                            Disabled

Port F2 Configuration
==============================================
Port Type                               Tunnel
Spanning Tree Port State                   N/A
Port Priority                              128
Path Cost                                20000
BPDU Guard                            Disabled
Port Fast                             Disabled
Root Guard                            Disabled

Port 1 Configuration
==============================================
Port Type                               Tunnel
Spanning Tree Port State                   N/A
Port Priority                              128
Path Cost                                20000
BPDU Guard                            Disabled
Port Fast                             Disabled
Root Guard                            Disabled

Port 2 Configuration
==============================================
Port Type                               Tunnel
Spanning Tree Port State                   N/A
Port Priority                              128
Path Cost                                20000
BPDU Guard                            Disabled
Port Fast                             Disabled
Root Guard                            Disabled
```

```
Port 3 Configuration
=============================================
Port Type                              Tunnel
Spanning Tree Port State                  N/A
Port Priority                             128
Path Cost                               20000
BPDU Guard                           Disabled
Port Fast                            Disabled
Root Guard                           Disabled

Port 4 Configuration
=============================================
Port Type                              Tunnel
Spanning Tree Port State                  N/A
Port Priority                             128
Path Cost                               20000
BPDU Guard                           Disabled
Port Fast                            Disabled
Root Guard                           Disabled

MSTP Instances
  None

>
```

2.1.39 Entry Screen Message Display (SPLASH)

The *splash* command provides the ability to configure a message that is displayed after the module has been restarted or rebooted. The message is displayed after the Entry screen is displayed.

To configure the module with a message, use the *splash* command from the CLI prompt. A list of options is displayed when the *splash -h* command is entered.

```
> splash

Description:
  splash - splash screen warning message configuration
Syntax:
  splash [-h]
  splash -s
  splash -warn wMsg
Switches:
-h     display help information
-s     show current status
-warn  warning message, [wMsg]: 0 to 255 ASCII characters

>
```

The options available using the *splash* command are shown below.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-s* switch displays the current message.

The *-warn* switch configures the message.

To configure a message, use the *splash -warn* command.

```
> splash -warn “This product is for the use of authorized users only. Individuals using this
product without authority are subject to monitoring of their activities.”

> splash -s

This product is for the use of authorized user only.  Individuals using this product without
authority are subject to monitoring of their activities.

>
```

```
Omnitron Systems Technology, Inc.                          GHPoE/Mi
Copyright 2017-2021 OST, Inc.

------------------------------------------------------------------------------

Omnitron Systems Technology   Technical Support:       (949) 250-6510
38 Tesla                      Sales/Products:          (800) 675-8410
Irvine, CA 92618              On the web at:           www.omnitron-systems.com
------------------------------------------------------------------------------


IP address    192.168.1.220
MAC           00-06-87-02-87-50
Serial number 00720087

This product is for the use of authorized user only.  Individuals using this product without
authority are subject to monitoring of their activities.

GHPoE/Mi login:
```

2.1.40 Secure Shell (SSH)

Secure Shell (SSH) protocol provides authentication, encryption, and the integrity of data transmitted over a network. SSH uses public-key cryptography to authenticate the remote devices and allows the remote devices to authenticate the user. The module supports SSH Version 2.

To configure SSH, use the *ssh* command from the CLI prompt. A list of options is displayed when the *ssh -h* command is entered.

```
> ssh -h

Description:
  ssh - secure shell configuration
Syntax:
  ssh [-h]
  ssh -dall
  ssh -s [-ver]
  ssh [{-dis|-ena} {dsa|pwd|rsa|sftp|ssh}]
      [-tcp tPort] [-genk]
Switches:
-dall  delete all SSH configured settings and restore defaults
-dis   disable function: {dsa|pwd|rsa|sftp|ssh}
-ena   enable function:  {dsa|pwd|rsa|sftp|ssh}, dflt all enabled
        [dsa] DSA key authentication
        [pwd] plain text password entry authentication
        [rsa] RSA key authentication
        [sftp] secure file transfer protocol (scp v2)
        [ssh] secure shell protocol
-genk  generate public/private keys
-h     display help information
-s     show current configuration
-tcp   tcp port, [tPort]: {1..65535}, dflt 22
-ver   verbose show

>
```

The options available using the *ssh* command are shown below.

The *-dall* switch deletes all SSH settings and restores factory defaults.

The *-dis* and *-ena* switches disable or enable specific authentication methods and file transfer functions.

The *-genk* switch generates the public/private key pair. It takes time to generate the public and private keys. Please be patient when using this command.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-s* switch displays the current configuration.

The *-tcp* switch defines the TCP port used for the SSH session.

The *-ver* switch displays the extended public key screen.

The SSH function supports password (plain text) and public key authentication methods. Password is plain text entered in the client application. RSA is a public key generated via the Rivest, Shamir and Adleman algorithm and DSA is a public key generated via the Digital Signature Algorithm.

The default username is admin and the default password is public.

To enable SSH, and set TCP Port 23, use the *-ena* and *-tcp* commands.

```
> ssh -ena ssh -tcp 23
```

To regenerate the public and private keys, use the *-genk* command.

```
> ssh -genk
```

NOTE: It takes time to generate the public and private keys. Please be patient when using this command.

To display the SSH configuration, use the *ssh -s* command.

```
> ssh -s

SSH v2                         enabled
RSA fingerprint                a7:53:4d:86:69:fe:e6:f3:96:5b:ca:54:a1:be:47:e8
DSA fingerprint                94:6c:52:12:17:e9:ad:a6:ec:34:50:7a:67:0c:08:d4
TCP port number                22
SFTP                           enabled
Plain text authentication      enabled
RSA authentication             enabled
DSA authentication             enabled

>
```

2.1.41 Storm Prevention (STORMCONTROL)

The *stormcontrol* command provides the ability to configure storm prevent for broadcast, multicast and unicast traffic on each port. When configured, traffic will be blocked when the traffic reaches a certain configurable threshold.

To configure storm prevention on the module, use the *stormcontrol* command from the CLI prompt. A list of options is displayed when the *stormcontrol -h* command is entered.

```
> stormcontrol -h

Description:
  stormcontrol - storm control configuration
Syntax:
  stormcontrol [-h]
  stormcontrol -s [-p pList]
  stormcontrol -p pList [{-dis|-ena} {broadcast,multicast,unicast}]
                [[-level high[,low]]|[-bps high[,low]]
  stormcontrol -dall
Switches:
-bps   interface bits per second level threshold: {high,low}
        [high] rising level threshold, {100000..1000000000}
        [low] falling level threshold, {100000..1000000000}
-dall  delete all 'stormcontrol' configured settings and restore defaults
-dis   disable function: {broadcast,multicast,unicast}
-ena   enable function: {broadcast,multicast,unicast}
        [broadcast] broadcast storm control, dflt disable
        [multicast] multicast frame storm control, dflt disable
        [unicast] unicast frame storm control, dflt disabled
-h     display help information
-level interface level threshold percentage: {high,low}
        [high] rising level threshold, {0.01..100.00}
        [low] falling level threshold, {0.01..100.00}
-p     port list, [pList]: {F1,F2,1..4|all}
-s     show current configuration

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *stormcontrol* command are shown below.

The *-bps* switch configures the interface high threshold and the optional low threshold values in bits per second.

The *low* value if configured will be less than or equal to the *high* value. If the *low* value is not configured it will be treated as equal to the *high* value.

The *-dall* switch deletes all storm control settings and restores factory defaults.

The *-dis* switch disables one or more of the following functions:

broadcast Disables broadcast frame storm control.

multicast Disables multicast frame storm control.

unicast Disables unicast frame storm control

The *-ena* switch enables one or more of the following functions:

broadcast Enables broadcast frame storm control.

multicast Enables multicast frame storm control.

unicast Enables unicast frame storm control

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-level* switch configures the interface high threshold and the optional low threshold values in percentage of the interface maximum speed.

> The *low* value if configured will be less than or equal to the *high* value. If the *low* value is not configured it will be treated as equal to the *high* value.

The *-p* switch configures one or more physical ports on the module.

The *-s* switch displays the current configuration.

The enable broadcast storm prevention on port F2 at a 50% threshold, use the following command.

```
> stormcontrol -p f2 -level 50.0 -ena broadcast
```

To display the storm prevention configuration, use the *stormcontrol -s* command.

```
> stormcontrol -s -p f2

Port F2
  Threshold high              50.00 %
  Threshold low               n/a
  Broadcast storm control     enabled
  Multicast storm control     disabled
  Unicast storm control       disabled
  Status                      not blocking receiving 0.00 %

>
```

2.1.42 DIP-Switch Configuration (SWITCH)

The *switch* command provides the ability to configure and display the DIP-switches on the module.

To configure the DIP-switches on the module, use the *switch* command from the CLI prompt. A list of options is displayed when the *switch -h* command is entered.

```
> switch -h

Description:
  switch - physical switch configuration
Syntax:
  switch [-h]
  switch -s
  switch -ena|-dis {hw|{sw,sNum}}
  switch -dall
Switches:
-dall  delete all “switch” configured settings and restore defaults
-dis   disable function: {hw|{sw,sNum}}
-ena   enable function: {hw|{sw,sNum}}
         [hw] hardware DIP switch function, dflt enabled
         [sw] software DIP switch function
           [sNum] software DIP switch number to enable or disable: {1..8|all}
-h     display help information
-s     show current configuration

>
```

The options available using the *switch* command are shown below.

The *-dall* switch deletes all configured switch setting and restores factory defaults.

The *-dis* switch disables (Off) the selected switch number.

The *-ena* switch enables (On) the selected switch number.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-s* switch displays the configuration of the DIP-switches.

To enable DIP-switch 2, use the *switch -ena* 2 command.

```
> switch -dis hw
> switch -ena sw,2
```

To display the configuration of the DIP-switches, use the *switch -s* command.

```
> switch -s

Switch ON Condition       OFF Condition       H/W    Soft
 1:    Dual switch        Single switch       Off    Off
 2:    Directed switch    Normal switch       Off    On
 3:    Redundant uplink   No redundant uplink Off    Off
 4:    Return to primary  No return           Off    Off
 5:    MAC learning Off   MAC learning On     Off    Off
 6:    Force PoE Power    Auto PoE Power      Off    Off
 7:    L2CP discard       L2CP tunnel         Off    Off
 8:    PoE with reset     PoE with no reset   Off    Off

Hardware DIP switches:  disabled

>
```

DIP-switch settings above are for an OmniConverter and RuggedNet 10GPoEBT, GHPoE and GHPoEBT model.

```
> switch -s

Switch ON Condition       OFF Condition       H/W    Soft
 1:    Dual switch        Single switch       Off    Off
 2:    Directed switch    Normal switch       Off    On
 3:    Redundant uplink   No redundant uplink Off    Off
 4:    Return to primary  No return           Off    Off
 5:    MAC learning Off   MAC learning On     Off    Off
 6:    Pause On           Pause Off           Off    Off
 7:    L2CP discard       L2CP tunnel         Off    Off
 8:    PoE with reset     PoE with no reset   Off    Off

Hardware DIP switches:  disabled

>
```

DIP-switch settings above are for an OmniConverter and RuggedNet 10GPoE+ and GPoE+ model.

```
> switch -s

Switch ON Condition       OFF Condition       H/W    Soft
 1:    Dual switch         Single switch       Off    Off
 2:    Directed switch     Normal switch       Off    On
 3:    Redundant uplink    No redundant uplink Off    Off
 4:    Return to primary   No return           Off    Off
 5:    MAC learning Off    MAC learning On     Off    Off
 6:    Pause On            Pause Off           Off    Off
 7:    L2CP discard        L2CP tunnel         Off    Off
 8:    SW8 On              SW8 Off             Off    Off

Hardware DIP switches:  disabled

>
```

DIP-switch settings above are for an OmniConverter and RuggedNet 10G/M, 10G/Mi, G/M and G/Mi model.

2.1.43 VLAN Interface Configuration (SWITCHPORT)

The *switchport* command provides the ability to configure VLAN interfaces on the module.

To configure the VLAN interfaces, use the *switchport* command from the CLI prompt. A list of options is displayed when the *switchport -h* command is entered.

```
> switchport

Description:
  switchport - vlan interface configuration
Syntax:
  switchport [-h]
  switchport [-p pList] -s
  switchport -p pNum -mode {access|tunnel|trunk}
  switchport -p pNum -vid vlanId
  switchport -p pNum -nvlan vlanId
  switchport -p pNum {-add|-rem|-allow} vlanList
  switchport -dall
Switches:
-add   trunk port add VLAN ID list, [vlanList]: {1..4095|all}
-allow trunk port replace current list, [vlanList]: {1..4095|all}
-dall  delete all 'switchport' configured settings and restore defaults
-h     display help information
-mode  port mode type: {access|tunnel|trunk}
        [access] access port type
        [trunk] trunk port type
        [tunnel] tunnel port type
-nvlan native vlan assignment for trunk port, [vlanId]: {0..4095}
        vlanId set to 0 removes the native vlan configuration
-p     port number, [pNum|pList]: {F1|F2|1..4|mgt1}
-rem   trunk port remove VLAN ID, [vlanList]: {1..4095|all}
-s     show current configuration
-vid   vlan id assignment for access/tunnel port, [vlanId]: {1..4095}

>
```

NOTE: Port number selection will vary depending on the model.

The options available using the *switchport* command are shown below.

The *-add* switch adds one or more VLANs to an existing trunk port VLAN list.

The *-allow* switch replaces the current VLANs on a trunk port with the provided VLAN list.

The *-dall* switch deletes all configured setting and restores factory defaults.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-mode* switch configures the port type; access, trunk or tunnel.

trunk When configured as a trunk port:
Ingress: The trunk VLAN is removed
Egress: The trunk VLAN is added

tunnel When configured as a tunnel port:
Ingress: Untagged and tagged traffic is accepted
Egress: Traffic follows the assigned VID

access When configured as an access port:
Ingress: Accepts only untagged traffic
Egress: Traffic follows the assigned VID

The *-nvlan* switch configures the trunk port with native VLAN assignment.

The *-p* switch selects the port number for assignment.

The *-rem* switch removes one or more VLANs from an existing trunk port VLAN list.

The *-s* switch displays the VLAN configuration.

The *-vid* switch configures a VLAN ID to an access or tunnel port.

NOTE: By default, traffic is allowed to ingress/egress a trunk port unless it is restricted.

When a native VLAN is configured, all untagged traffic on the trunk port is set to the VLAN ID associated with the native VLAN. Traffic assigned to a native VLAN when transmitted on a trunk port is untagged. Untagged traffic received on a trunk port is assigned to the VLAN associated with the native VLAN.

To display the VLAN configuration of the module, use the *switchport -s* command.

```
> switchport -s

Port F1 is an access port type, associated with VLAN ID 1
Port F2 is an access port type, associated with VLAN ID 1
Port 1 is an access port type, associated with VLAN ID 1
Port 2 is an access port type, associated with VLAN ID 1
Port 3 is an access port type, associated with VLAN ID 1
Port 4 is an access port type, associated with VLAN ID 1
Mgt1 is an access port type associated with VLAN ID 1

>
```

To configure an access port with a VLAN ID, use the following command.

```
> vlan -add 100
> switchport -p 1 -vid 100
> switchport -s -p 1

Port 1 is an access port type, associated with VLAN ID 100

>
```

NOTE: VLANs must be added using the *vlan* command before they can be associated with a port.

To configure Uplink Port 1 (F1) as a trunk port, use the following command.

```
> switchport -p f1 -mode trunk
> switchport -s -p f1

Port F1 is a trunk port type, native VLAN ID 1
  included VLANs: 1..4095

>
```

2.1.44 Syslog Server Configuration (SYSLOG)

Syslog is a standard for message logging per RFC 5424. It is used to manage system logs and alerts.

To configure syslog, use the *syslog* command from the CLI prompt. A list of options is displayed when the *syslog -h* command is entered.

```
> syslog -h

Description:
  syslog - system log message configuration
Syntax:
  syslog [-h]
  syslog -s [-log lNum]
  syslog [-ena|-dis] [-ip serverNumIp] [-erase] [-level sLevel] [-fac fCode]
  syslog -test sLevel:message
  syslog -dall
Switches:
-erase erase all current syslog local entries
-dall  delete all syslog configured settings and restore defaults
-dis   disable syslog on the module, dflt
-ena   enable syslog on the module
-fac   facility, [fCode]: {16..23}, dflt 23
-h     display help information
-ip    syslog server IP address, [serverNumIP], dflt 192.168.1.221
-level minimum level for syslog entries, [sLevel]:
        {alert|critical|debug|emergency|error|info|notice|warning}, dflt info
-log   show the log entries, [lNum]: {1..1000|all}, dflt 10
-s     show current configuration
-test  generate test syslog entry, [sLevel:message]
        [sLevel] syslog level
        [message]: 1 to 127 characters

>
```

The options available using the *syslog* command are shown below.

The *-dall* switch deletes all configured setting and restores factory defaults.

The *-dis* switch disables the syslog functionality.

The *-ena* switch enables the syslog functionality. This includes writing to the syslog server.

The *-erase* switch erases all the entries in the current syslog.

The *-fac* switch configures the facility code. The default value is 23.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-ip* switch configures the syslog server IP address.

The *-level* switch selects the syslog minimum severity error for logging errors.

alert A condition that should be corrected immediately.

critical Hard device errors.

debug Messages that contain information normally of use only when debugging a program.

emergency A panic condition.

error Error conditions.

info Informational messages.

notice Conditions that are not error conditions, but that may require special handling.

warning Warning conditions.

The *-log* switch displays specific number of syslog entries. The default value is 10.

The *-s* switch displays the syslog configuration and the last 10 entries.

The *-test* switch generates a test syslog entry for a specific severity and a specific message.

To configure the IP address of the syslog server and enable syslog, use the following command.

```
> syslog -ip 192.168.1.100 -ena
```

To display the syslog configuration and last 10 entries, use the *syslog -s* command.

```
> syslog -s

Status                     enabled
Server IP address          192.168.1.100
Severity logging level     Info
Facility code              23
Number of local entries    6

Number of entries
  Debug       0
  Info        0
  Notice      0
  Warning     4
  Error       2
  Critical    0
  Alert       0
  Emergency   0

ID           Level     Time                      Message
==================================================================
6            Warning   01/02/2000 04:05:56 PM    Link up port F2
5            Warning   01/02/2000 04:05:55 PM    PoE status port 2 error 0
4            Warning   01/02/2000 04:05:53 PM    Link up port 2
3            Error     01/02/2000 04:05:52 PM    Link down port F2
2            Warning   01/02/2000 04:05:49 PM    PoE status port 2 error 0
1            Error     01/02/2000 04:05:49 PM    Link down port 2

>
```

The module retains the last 1000 entries.

2.1.45 Time (TIME)

The *time* command provides the ability to set or display the time of day on the module.

To configure time on the module, use the *time* command from the CLI prompt. A list of options is displayed when the *time -h* command is entered.

```
> time -h

Description:
  time - time of day configuration
Syntax:
  time [-h]
  time -s
  time -z zoneVal
  time -a timeOfDay [-z zoneVal]
Switches:
-a     set the time of day, [timeOfDay]: “month/day/year 24hr:min:sec”
       example “12/01/2015 13:10:00”
-h     display help information
-s     show current configuration
-z     time zone, [zoneVal]

>
```

The options available using the *time* command are shown below.

The *-a* switch sets the time of day.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-s* switch displays the current time of day.

The *-z* switch defines the time zone.

The example below sets the time of day.

```
> time -a “10/10/2019 07:55:00”
```

To display the time of day, use the *time -s* command.

```
> time -s

Time of day: 10/10/2019 07:55:00 PM Pacific Standard Time
sysUpTime: 41191600 (4 days 18 hours 25 minutes 16 secs)

>
```

2.1.46 SNMP Trap Host (TRAPHOST)

SNMP traps report events that occur during the operation of a network, and may require the attention of the network administrator. The module is capable of sending SNMP traps to eight different SNMP Trap Hosts (IP addresses).

The *traphost* command provides the ability to configure the IP addresses of the SNMP Trap Hosts.

To configure the Trap Hosts, use the *traphost* command from the CLI prompt. A list of options is displayed when the *traphost -h* command is entered.

```
> traphost -h

Description:
  traphost - snmp trap host configuration
Syntax:
  traphost [-h]
  traphost -s
  traphost -host hNum [-ip ipAddr] [-port pNum]
  traphost -dall
Switches:
-dall  delete all SNMP trap hosts configured settings and restore defaults
-h     display help information
-host  traphost number, [hNum]: {1..8}
-ip    trap host IP address, [ipAddr]
-port  trap port number, [pNum]: {1..65535}, dflt 162
-s     show current configuration

>
```

The options available using the *traphost* command are shown below.

The *-dall* switch deletes configured trap hosts and resets the setting to factory default. The default setting is 255.255.255.255.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-host* switch selects the Trap Host number to be configured. Eight different Traps Hosts can be configured.

The *-ip* switch configures the IP address for the selected Trap Host.

The *-port* switch configures the UDP trap port number.

The *-s* switch displays the SNMP Trap Host settings.

To configure the IP address for Trap Host 1, use the following command.

```
> traphost -host 1 -ip 192.168.1.100
> traphost -s

Trap host #1 IP address 192.168.1.110, UDP port: 162
Trap host #2 IP address 255.255.255.255 (not configured)
Trap host #3 IP address 255.255.255.255 (not configured)
Trap host #4 IP address 255.255.255.255 (not configured)
Trap host #5 IP address 255.255.255.255 (not configured)
Trap host #6 IP address 255.255.255.255 (not configured)
Trap host #7 IP address 255.255.255.255 (not configured)
Trap host #8 IP address 255.255.255.255 (not configured)

>
```

2.1.47 SNMP Traps (TRAPS)

The *traps* command provides the ability to enable/disable specific module traps. By default, all traps are enabled.

To enable traps, use the *traps* option from the CLI prompt. A list of options is displayed when the *traps -h* command is entered.

```
> traps -h

Description:
  traps - snmp trap configuration
Syntax:
  traps [-h]
  traps -s
  traps [-dall]|[-ena|-dis tNum]
  traps -log [-clr] [-ver]
  traps [-type {snmpv2c|snmpv3}] [-user uNum]
  traps -gen tNum
Switches:
-clr   clear trap log
-dall  delete all 'traps' configured settings and restore defaults
-dis   disable selected trap number, [tNum]: {1..63|all}
-ena   enable selected trap number, [tNum]: {1..63|all}
-gen   generate trap, [tNum]: {1..63}
-h     display help information
-log   display log entries
-s     show current configuration
-type  trap generation type: {snmpv2c|snmpv3}, dflt snmpv2c
-user  trap generation SNMP user,[uNum]: {1..4}, dflt 1
-ver   verbose show

>
```

The options available using the *traps* command are shown below.

The *-clr* switch clears the current trap log entries.

The *-dall* switch restores all traps to default settings.

The *-dis* switch defines which trap types will be disabled.

The *-ena* switch defines which trap types will be enabled.

The *-gen* switch generates a specific trap number. Traphost must be configured to receive the generated trap.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-log* switch displays the last 100 trap entries.

The *-s* switch displays the current trap configuration.

The *-type* switch configures the generation type of the trap; SNMPv2c or SNMPv3.

The *-user* switch configures the user number for the trap generation.

The *-ver* switch displays the extended help.

Individual traps can be enabled or disabled by entering the name of the traps after the *ena/dis* command.

The example below disables the link down (#6) trap.

```
> traps -dis 6
```

To display the traps, use the *traps -s* command.

```
> traps -s

SNMP trap type: SNMPv2c
SNMP trap gen user: 1
Severity Level: all

Trap Type                                 Status    Severity
============================================================
1    Module cold start                    Enabled   Notice
2    Module reset                         Enabled   Warning
4    Module power removed                 Enabled   Warning
5    Module power applied                 Enabled   Warning
6    Link down                            Enabled   Error
7    Link up                              Enabled   Warning
8    Primary link up                      Enabled   Info
9    Primary link down                    Enabled   Error
10   Secondary link up                    Enabled   Info
11   Secondary link down                  Enabled   Info
12   Standby link up                      Enabled   Info
13   Standby link down                    Enabled   Info
14   Loop prevention block                Enabled   Warning
15   Loop prevention clear                Enabled   Info
16   Hardware DIP switch change           Enabled   Info
17   Software DIP switch change           Enabled   Info
18   Output relay change                  Enabled   Warning
19   Input pin status change              Enabled   Warning
20   Module configuration change          Enabled   Warning
21   Module over temperature              Enabled   Critical
22   Module temperature normal            Enabled   Info
23   Module voltage out of range          Enabled   Error
24   Module voltage range normal          Enabled   Info
25   PoE status error                     Enabled   Warning
26   PoE status normal                    Enabled   Info
27   ACL access denied                    Enabled   Warning
28   Telnet authentication failure        Enabled   Warning
29   Telnet session started               Enabled   Info
30   Telnet session stopped               Enabled   Info
31   FTP authentication failure           Enabled   Warning
32   FTP session started                  Enabled   Info
33   FTP session stopped                  Enabled   Info
34   Serial console port session started  Enabled   Info
35   Serial console port session stopped  Enabled   Info
36   SSH authentication failure           Enabled   Warning
37   SSH session started                  Enabled   Info
38   SSH session stopped                  Enabled   Info
39   Wrong password count exceeded        Enabled   Warning
40   SFP inserted                         Enabled   Info
41   SFP removed                          Enabled   Notice
42   SFP Tx low threshold                 Enabled   Error
43   SFP Tx high threshold                Enabled   Error
44   SFP Tx bias current low threshold    Enabled   Error
45   SFP Tx bias current high threshold   Enabled   Error
46   SFP 3.3V low threshold               Enabled   Error
```

```
47   SFP 3.3V high threshold               Enabled   Error
48   SFP temperature low threshold         Enabled   Error
49   SFP temperature high threshold        Enabled   Error
50   SFP Rx low threshold                  Enabled   Error
51   SFP Rx high threshold                 Enabled   Error
52   SFP normal                            Enabled   Info
53   Module configuration file corrupted   Enabled   Info
54   Rate limiting violation               Enabled   Info
55   Rate limiting normal                  Enabled   Info
56   Storm control violation               Enabled   Info
57   Storm control clear                   Enabled   Info
58   Loop prevention block                 Enabled   Info
59   Loop prevention clear                 Enabled   Info

>
```

To view the trap log, use the *traps -log* command.

```
> traps -log
Date/Time              Trap # / Description
==================================================================================
01/29/2000 07:10:51 PM  34:  Serial console port session started user admin
01/29/2000 07:10:13 PM  25:  PoE status port 4 error 2
01/29/2000 07:10:07 PM  25:  PoE status port 4 error 1
01/29/2000 06:51:32 PM  35:  Serial console port session stopped user admin
01/29/2000 06:40:59 PM  25:  PoE status port 4 error 2
01/29/2000 06:40:49 PM  25:  PoE status port 4 error 1
01/29/2000 06:40:25 PM  34:  Serial console port session started user admin
01/29/2000 06:30:48 PM  25:  PoE status port 4 error 2
01/29/2000 06:30:43 PM  25:  PoE status port 4 error 1
01/29/2000 06:24:02 PM  25:  PoE status port 4 error 2
```

2.1.48 User Configuration (USER)

The *user* command provides the ability to create and modify user accounts. Up to sixteen user accounts can be configured.

To create or modify user accounts, use the *user* command from the CLI prompt. A list of options is displayed when the *user -h* command is entered.

```
> user

Description:
  user - user configuration
Syntax:
  user [-h]
  user -s
  user [-lto timeout] [-ato timeout] [-artry count] [-fsto timeout]
  user {-d -name uName|-dall}
  user -a -typ uTyp -name uName -pw uPw [-sto timeout]
  user -m [-name uName] [-typ uTyp] [-nname uName] [-pw uPw]
       [-sto timeout] [-kfn filename]
  user -ena|-dis strongpassword
Switches:
-a     add user
-artry number of authentication retries, [count]: {1..5}, dflt 5
-ato   authentication timeout in sec, [timeout]: {0..300}, dflt 300
-d     delete user
-dall  deletes all users except the logged in user and restores defaults
-dis   disable function: {strongpassword}
-ena   enable function: {strongpassword}
         [strongpassword] strong password is only accepted, dflt disabled
-fsto  ftp session timeout value in sec, [timeout]: {0..3600}, dflt 300
-h     display help information
-kfn   SSH key file name, [filename]: 0 to 45 ASCII characters
-lto   lockout timeout in sec, [timeout]: {1..300}, dflt 300
-m     modify user
-name  user name, [uName]: 1-32 ASCII characters
-nname new user name, [uName]: 1-32 ASCII
-pw    user password, [uPw]: 1-32 ASCII characters
-s     show current configuration
-sto   session timeout value in sec, [timeout]: {0..3600}, dflt 300
-typ   user type, [uTyp]: {admin|deny|readonly|readwrite}

>
```

The options available using the *user* command are shown below.

The *-a* switch is used to add a user with a unique name and password.

The *-artry* switch defines the number of authentication attempts that a client is allowed to make before authentication lockout.

The *-ato* switch defines the time allowed for the completion of an authentication attempt.

The *-d* switch deletes a user profile by selecting the user number or user name.

The *-dall* switch deletes all user profiles except the currently logged in user.

The *-dis* and *-ena* switches disables or enables strong password control. Password strength is based on the password length of a minimum of eight (8) characters, at least one (1) upper case letter, at least one (1) number or special symbol. When enabled the password must be considered strong or very strong. If not, the password will be rejected and a message of “Password rejected because it is not strong enough” will be displayed.

The *-fsto* switch configures the FTP session timeout value in seconds.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-kfn* switch defines the username and filename for a specific user.

The *-lto* switch configures the lockout timer for a specific user. The default timeout is 300 seconds.

The *-m* switch allows the user account to be modified.

The *-name* switch is used to define the name of a new user.

The *-nname* switch is used to modify the name of a user profile.

The *-pw* switch is used to set the password for a new user. This password is used for Serial, FTP, Telnet and SSH.

The *-s* switch displays the user configuration.

The *-sto* switch configures the session timeout value for a specific user. The default timeout is 300 seconds.

The *-typ* switch configures the user access type. Each user name can be configured as:

admin An admin user has full read/write privileges including user name and password changes.

read-write A read-write user has full read/write privileges with the exception of user name and password operations.

read-only A read-only user can only view the configuration of the module and will not be allowed to make any changes.

deny A deny user does not have any access to the module.

NOTES:

Username must contain 1-32 characters and may contain a-z, A-Z, 0-9 and the special characters dash (-), underscore (_) and period (.).

Passwords must contain 1-32 printable characters and may contain a-z, A-Z, 0-9 and the special characters ! # $ % & ‘ ( ) * + , / : ; < = > ? @ [\ ] ^ ` { | } ~ and space and the ‘New Password (again)’ must match.

When changing the session timeout value using the *-sto* command, the new value will not take effect until the user logs out and logs back in.

To display the user configuration, use the *user -s* command.

```
> user -s

Authentication retries       5
Authentication timeout       300s
FTP Session timeout          300s
Lockout timeout              300s
Strong password check        disabled

User 1 name                  admin
User 1 type                  admin
User 1 password              *****
User 1 SSH keyfile
User 1 session timeout       300s
User 1 status                serial console port active for 1723s
```

To change the login name, use the *user -m* command.

```
> user -m -name admin -nname Doug
```

2.1.49 Firmware Version (VER)

The *ver* command provides the ability to display the firmware version currently running on the module.

A list of options is displayed when the *ver -h* command is entered.

```
> ver -h

Description:
  ver - version status
Syntax:
  ver [-h]
  ver -s
Switches:
-h     display help information
-s     show current status

>
```

The options available using the *ver* command are shown below.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-s* switch displays the firmware version on the module.

To display the firmware version on the module, use the *ver -s* command.

```
> ver -s

Model number      3319B-0-24-2
Firmware          v2.x.x  Oct 15 2021, 10:42:38
Bootstrap         v2.x.x
                  prodRev 10 hwRev 10 pcbRev 00ac0100 appAP 0 caps(0x1000067 mtype 168)

>
```

Model number will vary depending on the model.

2.1.50 VLAN Table (VLAN)

The *vlan* command adds and displays the configured VLANs on the module.

A list of options is displayed when the *vlan -h* command is entered.

```
> vlan -h

Description:
  vlan - vlan configuration
Syntax:
  vlan [-h]
  vlan -s
  vlan -add vlanId [-vname vlanName]
  vlan -rem vlanList
  vlan -mod vlanId -vname vlanName
  vlan -dall
Switches:
-add   add a VLAN ID, [vlanId]: {1..4095}
-dall  delete all VLAN configured settings, instances, and restore defaults
-h     display help information
-mod   modify an existing VLAN ID, [vlanId]: {1..4095}
-rem   remove selected VLANs, [vlanList]: {1..4095|all}
-s     show configuration
-vname VLAN name, [vlanName]: 1-64 ASCII characters

>
```

The options available using the *vlan* command are shown below.

The *-add* switch adds a new VLAN instance.

The *-dall* switch deletes all VLAN configuration setting and restores factory defaults.

The *-h* switch displays the help screen presented above. It is static and provides help information for the specific command.

The *-mod* switch modifies the name of an existing VLAN instance.

The *-rem* switch deletes one or more existing VLAN instances.

The *-s* switch displays the VLAN configuration on the module.

The *-vname* switch specifies a VLAN ID name.

To configure a VLAN instance, use the following command.

```
> vlan -add 200 -vname Video
> vlan -s

VLAN ID 1 “VLAN1”
VLAN ID 100 “data”
VLAN ID 200 “Video”

>
```

Use the *switchport* command to assign the VLAN IDs to specific port numbers.

2.1.51 Zone (ZONE)

The *zone* command displays the list of time zone values.

To display the time zone values, use the *zone -h* command from the CLI prompt.

```
> zone -h

Zone   Full name                        Location     Time Adjustment
================================================================================
GMT    Greenwich Mean Time              Europe       UTC
UTC    Coordinated Universal Time       Europe       UTC
WET    Western European Time            Europe       UTC
Z      Zulu Time Zone                   Military     UTC
N      November Time Zone               Military     UTC - 01 hour
O      Oscar Time Zone                  Military     UTC - 02 hours
HAT    Heure Avancée de Terre-Neuve     N America    UTC - 02:30 hours
NDT    Newfoundland Daylight Time       N America    UTC - 02:30 hours
ADT    Atlantic Daylight Time           N America    UTC - 03 hours
HAA    Heure Avancée de l’Atlantique    N America    UTC - 03 hours
P      Papa Time Zone                   Military     UTC - 03 hours
HNT    Heure Normale de Terre-Neuve     N America    UTC - 03:30 hours
NST    Newfoundland Standard Time       N America    UTC - 03:30 hours
AST    Atlantic Standard Time           N America    UTC - 04 hours
EDT    Eastern Daylight Time            N America    UTC - 04 hours
HAE    Heure Avancée de l’Est           N America    UTC - 04 hours
HNA    Heure Normale de l’Atlantique    N America    UTC - 04 hours
Q      Quebec Time Zone                 Military     UTC - 04 hours
EST    Eastern Standard Time            N America    UTC - 05 hours
CDT    Central Daylight Time            N America    UTC - 05 hours
HAC    Heure Avancée du Centre          N America    UTC - 05 hours
HNE    Heure Normale de l’Est           N America    UTC - 05 hours
R      Romeo Time Zone                  Military     UTC - 05 hours
MDT    Mountain Daylight Time           N America    UTC - 06 hours
CST    Central Standard Time            N America    UTC - 06 hours
HAR    Heure Avancée des Rocheuses      N America    UTC - 06 hours
HNC    Heure Normale du Centre          N America    UTC - 06 hours
S      Sierra Time Zone                 Military     UTC - 06 hours
PDT    Pacific Daylight Time            N America    UTC - 07 hours
HAP    Heure Avancée du Pacifique       N America    UTC - 07 hours
HNR    Heure Normale des Rocheuses      N America    UTC - 07 hours
MST    Mountain Standard Time           N America    UTC - 07 hours
T      Tango Time Zone                  Military     UTC - 07 hours
PST    Pacific Standard Time            N America    UTC - 08 hours
AKDT   Alaska Daylight Time             N America    UTC - 08 hours
HAY    Heure Avancée du Yukon           N America    UTC - 08 hours
HNP    Heure Normale du Pacifique       N America    UTC - 08 hours
U      Uniform Time Zone                Military     UTC - 08 hours
```

Only a partial list is shown.

3.0 APPENDIX A: FIRMWARE UPDATE

3.1 OVERVIEW

Appendix A describes the procedure for updating the firmware using ftp and web interface.

3.2 SAVE CURRENT SETTINGS

Under normal circumstances the current configuration of the module will carry forward to the new version during the update, however, extreme events such as a power outage can lead to settings being lost. Prior to upgrading, it is recommended that the settings be recorded. The settings can be viewed using the Command Line Interface (CLI) over Telnet.

3.3 COPY THE FILES TO YOUR HARD DRIVE

The files should be copied to a convenient location on the hard drive of the workstation. The name of the firmware file is similar to swctl-bsp-prod.dat.

Depending on the operating system of the workstation and/or FTP installation, the name of the files may need to be renamed to the “DOS 8.3 Format”. Rename the swctl-bsp-prod.dat to switch.dat and store the files in the root or c:\ directory.

Renaming the file will allow the new file to overwrite the old file, saving memory allocation space on the module. **Filenames must not contain any spaces**.

3.4 UPDATING THE FIRMWARE USING FTP

FTP can be used to update the firmware over a network. Verify the following parameters:

- IP Protocol is turned On and the module has a valid IP Address
- FTP Protocol turned On and a password has been configured

Access the module using Telnet or Serial Console. The default user name and password is: admin, public

NOTE: OmniConverter GPoE+/M 8 Port RJ-45 Fixed Fiber models (9520-x-x8-xx - 9531-x-x8-xx) and RuggedNet GPoE+/Mi 8 Port RJ-45 Fixed Fiber models (9540-x-x8-xx - 9551-x-x8-xx) with firmware 2.3.9 cannot be downgraded to any firmware revision. The models can be upgraded from 2.3.9.

Verify the IP address of the module by using the *ip* command.

```
> ip -s

IPv4                    enabled
IPv6                    enabled

IP 1
  MAC address           00-06-87-02-86-E0
  IPv4 address          192.168.1.124  (192.168.1.124)
  IPv4 subnet mask      255.255.255.0  (255.255.255.0)
  IPv4 gateway address  192.168.1.1  (*)
  DNS                   disabled
  DNS address           *
  DHCP                  enabled
  Relay                 disabled
  Relay Circuit ID      enabled
  Relay Remote ID       enabled
  Relay type            replace
  Relay server IP       0.0.0.0
  v6Relay               enabled
  v6Relay Circuit ID    enabled
  v6Relay Remote ID     enabled
  IPv6 interface        stateless
  IPv6 address          fe80::206:87ff:fe02:86e0/64
                        ::/64
  IPv6 gateway address  fe80::1
  DHCPv6                disabled
```

To enable FTP, use the *protocol* command.

```
> protocol -ena ftp
```

The default ftp password is public. To change the password, use the *user* command.

```
> user -m -name admin -pw <new passord>
```

To upgrade the application firmware, open a command window and enter the following commands. Bold lettering indicates information to be entered.

> **ftp 192.168.1.220**   <enter module's IP address>

Connected to 192.168.1.220

220 FTP server ready

User (192.168.1.220:(none)): **admin**   <enter login username>

331 User admin OK. Password required

Password: **public**   <enter ftp password>

230 OK. Current directory is /home/admin

ftp> **cd updates**

250 OK. Current directory is /rwdata/swctl/updates

ftp> **bin**

250 OK. Current directory is /rwdata/swctl/updates

ftp> **put <location and filename of the application firmware>**   <enter firmware filename>

200 OK

200 PORT command successful

150 Connecting to port 64533

226-File successfully transferred

226 5.030 seconds (measured here), 6.28 Mbytes per second

ftp: 33112213 bytes sent in 4.97Seconds 6658.40Kbytes/sec.

ftp>**quit**

When the file transfer is complete, the module verifies the file, programs the flash memory and automatically restarts with the newly loaded firmware.

NOTE: Do not remove power during the upgrade procedure until the module has rebooted with the new firmware.

Verify the firmware has been upgraded by using the *ver -s* command.

```
> ver -s

Model number      3342B-0-14-2Z
Firmware          v2.2.x  Oct 15 2021, 10:42:38
Bootstrap         v2.x.x
                  prodRev 10 hwRev 10 pcbRev 00ac0100 appAP 0 caps(0x1000067 mtype 168)
```

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5.0 CUSTOMER SUPPORT INFORMATION

If you encounter problems while installing this product, contact Omnitron Technical Support:

Phone: (949) 250-6510
Fax: (949) 250-6514
Address: Omnitron Systems Technology, Inc.
38 Tesla
Irvine, CA 92618, USA
Email: support@omnitron-systems.com
URL: www.omnitron-systems.com