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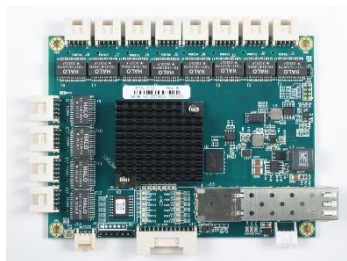


Manual

Diamond Systems

Epsilon-12G2

**Rugged Standalone COM Express module with wide voltage input and serial management port
Acquisition Extension Card**



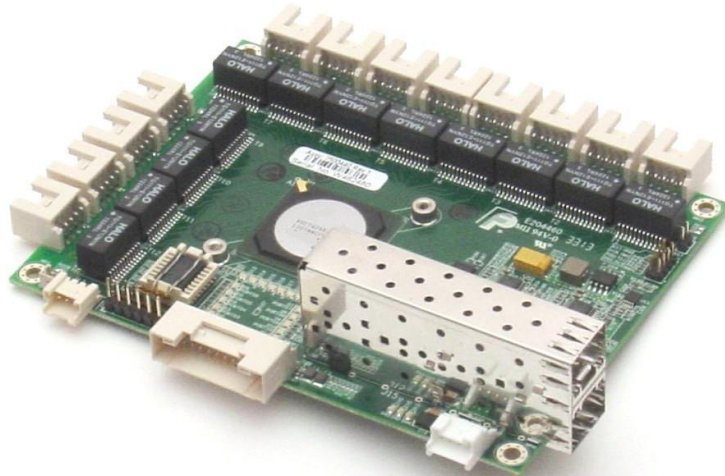
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Epsilon-12G2 User Manual

Managed 14-Port Gigabit Ethernet Switch

Part Number 7460440



Revision	Date	Comment
A.00	11/27/2013	Initial release
A.01	9/3/2014	Minor update
A.02	3/22/2016	Updated section 7.1 (Command Line Interface)
A.03	4/4/2017	Correction in console login

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1. IMPORTANT SAFE HANDLING INFORMATION



WARNING!

ESD-Sensitive Electronic Equipment

Observe ESD-safe handling procedures when working with this product.

Always use this product in a properly grounded work area and wear appropriate ESD-preventive clothing and/or accessories.

Always store this product in ESD-protective packaging when not in use.

Safe Handling Precautions

The Epsilon-12G2 board contains a high density connector with many connections to sensitive electronic components. This creates many opportunities for accidental damage during handling, installation and connection to other equipment. The list here describes common causes of failure found on boards returned to Diamond Systems for repair. This information is provided as a source of advice to help you prevent damaging your Diamond (or any vendor's) boards.

ESD damage – This type of damage is usually almost impossible to detect, because there is no visual sign of failure or damage. The symptom is that the board eventually simply stops working, because some component becomes defective. Usually the failure can be identified and the chip can be replaced. To prevent ESD damage, always follow proper ESD-prevention practices when handling computer boards.

Damage during handling or storage – On some boards we have noticed physical damage from mishandling. A common observation is that a screwdriver slipped while installing the board, causing a gouge in the PCB surface and cutting signal traces or damaging components.

Another common observation is damaged board corners, indicating the board was dropped. This may or may not cause damage to the circuitry, depending on what is near the corner. Most of our boards are designed with at least 25 mils clearance between the board edge and any component pad, and ground / power planes are at least 20 mils from the edge to avoid possible shorting from this type of damage. However these design rules are not sufficient to prevent damage in all situations.

A third cause of failure is when a metal screwdriver tip slips, or a screw drops onto the board while it is powered on, causing a short between a power pin and a signal pin on a component. This can cause overvoltage / power supply problems described below. To avoid this type of failure, only perform assembly operations when the system is powered off.

Sometimes boards are stored in racks with slots that grip the edge of the board. This is a common practice for board manufacturers. However our boards are generally very dense, and if the board has components very close to the board edge, they can be damaged or even knocked off the board when the board tilts back in the rack. Diamond recommends that all our boards be stored only in individual ESD-safe packaging. If multiple boards are stored together, they should be contained in bins with dividers between boards. Do not pile boards on top of each other or cram too many boards into a small location. This can cause damage to connector pins or fragile components.

Power supply wired backwards – Our power supplies and boards are not designed to withstand a reverse power supply connection. This will destroy each IC that is connected to the power supply (i.e. almost all ICs). In this case the board will most likely will be unrepairable and must be replaced. A chip destroyed by reverse power or by excessive power will often have a visible hole on the top or show some deformation on the top surface due to vaporization inside the package. **Check twice before applying power!**

Overvoltage on analog input – If a voltage applied to an analog input exceeds the design specification of the board, the input multiplexor and/or parts behind it can be damaged. Most of our boards will withstand an erroneous connection of up to $\pm 35V$ on the analog inputs, even when the board is powered off, but not all boards, and not in all conditions.

Overvoltage on analog output – If an analog output is accidentally connected to another output signal or a power supply voltage, the output can be damaged. On most of our boards, a short circuit to ground on an analog output will not cause trouble.

Overvoltage on digital I/O line – If a digital I/O signal is connected to a voltage above the maximum specified voltage, the digital circuitry can be damaged. On most of our boards the acceptable range of voltages connected to digital I/O signals is 0-5V, and they can withstand about 0.5V beyond that (-0.5 to 5.5V) before being damaged. However logic signals at 12V and even 24V are common, and if one of these is connected to a 5V logic chip, the chip will be damaged, and the damage could even extend past that chip to others in the circuit.

2. INTRODUCTION

Epsilon-12G2 is a managed, 14-Port Gigabit Ethernet Switch with wide power supply voltage input and a serial management port. Epsilon-12G2 offers twelve 10/100/1000Mbps copper twisted pair ports, one 1G SFP socket, and one 2.5G SFP socket on a COM Express format board. The board is standalone, so no bus connectors are required. An RS-232 interface is provided to enable communication between the on-board management microcontroller and a host processor through a command line interface (CLI). A wide-range DC power supply is built into the board to allow it to be used with industrial power sources as well as the typical embedded +5V supply.

Highly Advanced Gigabit Ethernet Switch

Epsilon-12G2 is a standalone 14-port Gigabit Ethernet managed switch in the COM Express form factor. It delivers a comprehensive, end-to-end carrier Ethernet solution supporting MEF service delivery and timing over packet solutions for IEEE 1588 and synchronous Ethernet.

Layer 2+ Managed Switch

Epsilon-12G2's Ethernet switch chip includes a built-in microcontroller for configuration and management. It can be accessed either through the on-board RS-232 port or one of the Ethernet ports.

Wide Power DC/DC Power Supply

Epsilon-12G2 can be powered through a wide voltage +5-40V DC/DC power supply input.

Rugged Design

Extended temperature operation of -40°C to +85°C is tested and guaranteed. Epsilon-12G2 was designed with harsh applications in mind. Latching connectors provide increased reliability.

Software Support

The Epsilon-12G2 switch is ready to plug into your application without any driver installation or firmware upgrades. An intuitive GUI web interface and a command line interface provide means for configuring and managing the switch.

2.1 Main Feature List

- ◆ 12 10/100/1000Mbps copper Ethernet ports with nonblocking wire-speed performance
- ◆ 1 1G SFP socket and 1 2.5G SFP socket
- ◆ Dual leaky bucket policers with remarking and statistics
- ◆ Jumbo frame support at all speeds
- ◆ 8K MAC addresses and 4K VLANs (IEEE 802.1Q), as well as 8K IPv4 and IPv6 multicast group support
- ◆ Flexible link aggregation support based on Layer-2 through Layer-4 information (IEEE 802.3ad)
- ◆ Multicast and broadcast storm control, as well as flooding control
- ◆ RSTP and MSTP
- ◆ 8 priorities and 8 QoS queues per port with scheduling
- ◆ Shaping/policing per queue and per port
- ◆ Multiple protocol support: IEEE 802.1d, IEEE 802.1w, IEEE 802.1s, and IEEE 802.1X
- ◆ Built-in 416MHz MIPS 24KEC microcontroller for configuration and management
- ◆ RS-232 serial port provides out-of-band management interface
- ◆ Can operate autonomously or in conjunction with a host SBC
- ◆ Wide input voltage range: +5-40VDC input
- ◆ COM Express form factor (95 x 125mm)

2.2 Mechanical and Environmental

- ◆ COM Express compliant form factor including:
 - ◆ Board dimensions
 - ◆ Mounting holes
 - ◆ Component height
 - ◆ -40°C to +85°C ambient operating temperature

2.3 Products

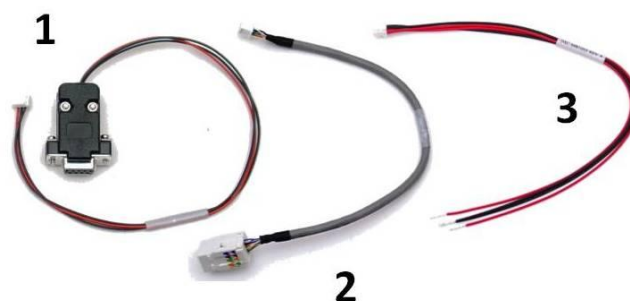
The table below lists the model number and description for the Epsilon-12G2 and its associated cable kit.

<i>Model Number</i>	<i>Description</i>
EPS-12G2	14-Port Gigabit Ethernet Switch, COM Express form factor, -40°C to +85°C operating temperature
CK-EPS12G2	Epsilon-12G2 Cable Kit

2.4 Cable List

The contents of the Epsilon-12G2 Cable Kit, CK-EPS12G2, are shown below.

<i>Number</i>	<i>Part Number</i>	<i>Quantity</i>	<i>Description</i>
1	6981050	1	Serial cable
2	6981052	12	Ethernet cable (1 per port)
3	6981053	1	Power cable



3. FUNCTIONAL OVERVIEW

Functional Block Diagram

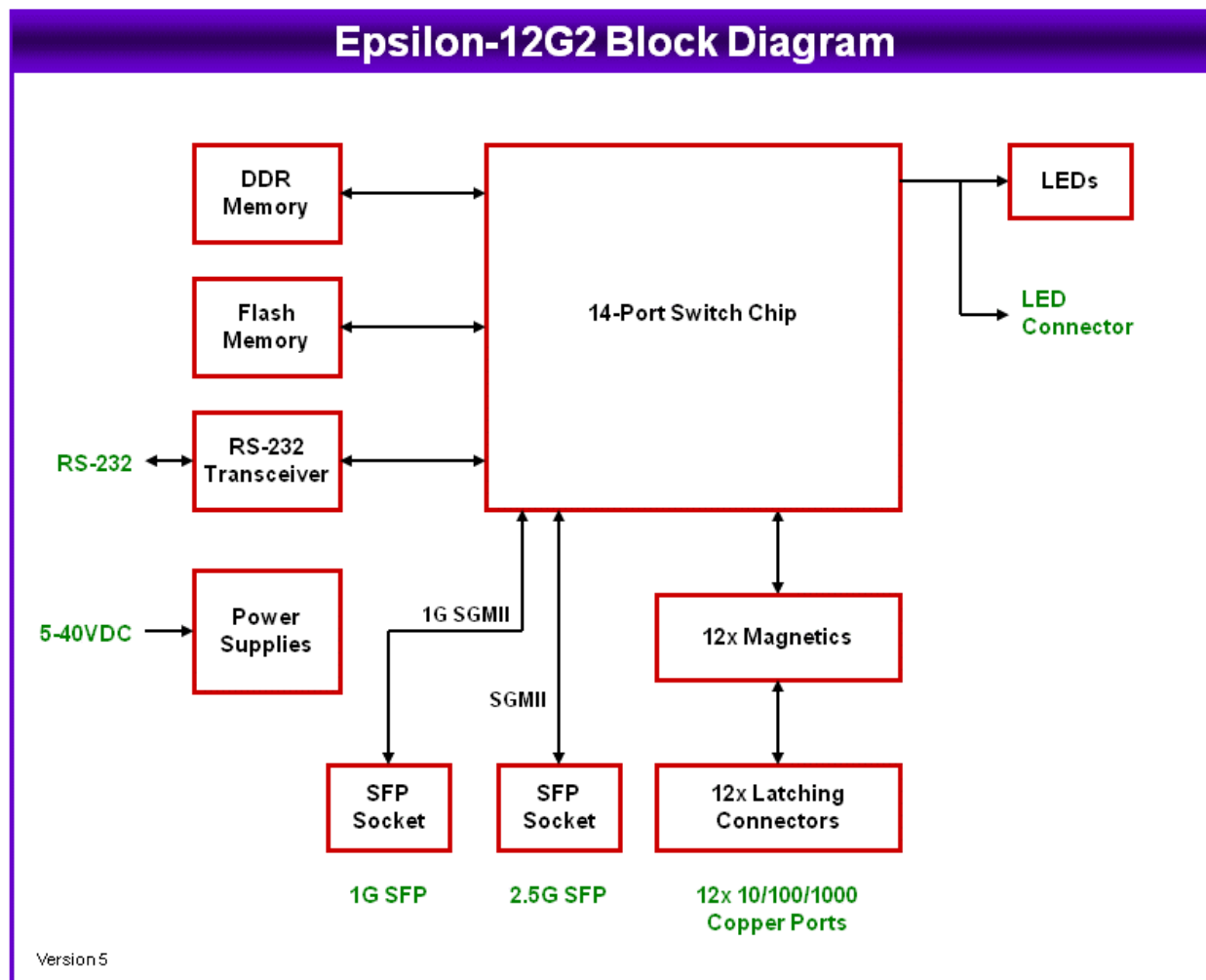


Figure 1. Functional Block Diagram

Epsilon-12G2 is an 14-Port managed Gigabit Ethernet switch module offering 10/100/1000Mbps copper twisted pair ports, one 1G SFP socket, and one 2.5G SFP socket on a COM Express form factor board. Epsilon-12G2 operates standalone, requiring no connection to a single board computer in the stack.

Epsilon-12G2 is a Layer 2+ managed Ethernet switch with built-in microcontroller and memory for configuration and management. The Flash memory holds dual application images along with the boot code, The SRAM is used for program execution and storing the MAC addresses. The EEPROM holds the configuration parameters. .

An RS-232 interface is provided to enable communication between the on-board management microcontroller and a host processor through a CLI interface. The microcontroller is also accessible through one of the Ethernet ports via a web management interface.

Power is provided through the +5-40VDC wide-range DC power supply built into the board, enabling use with industrial power sources.

4. BOARD OUTLINE AND LAYOUT

The following image shows the locations for all connectors and jumpers which are described in the next sections.

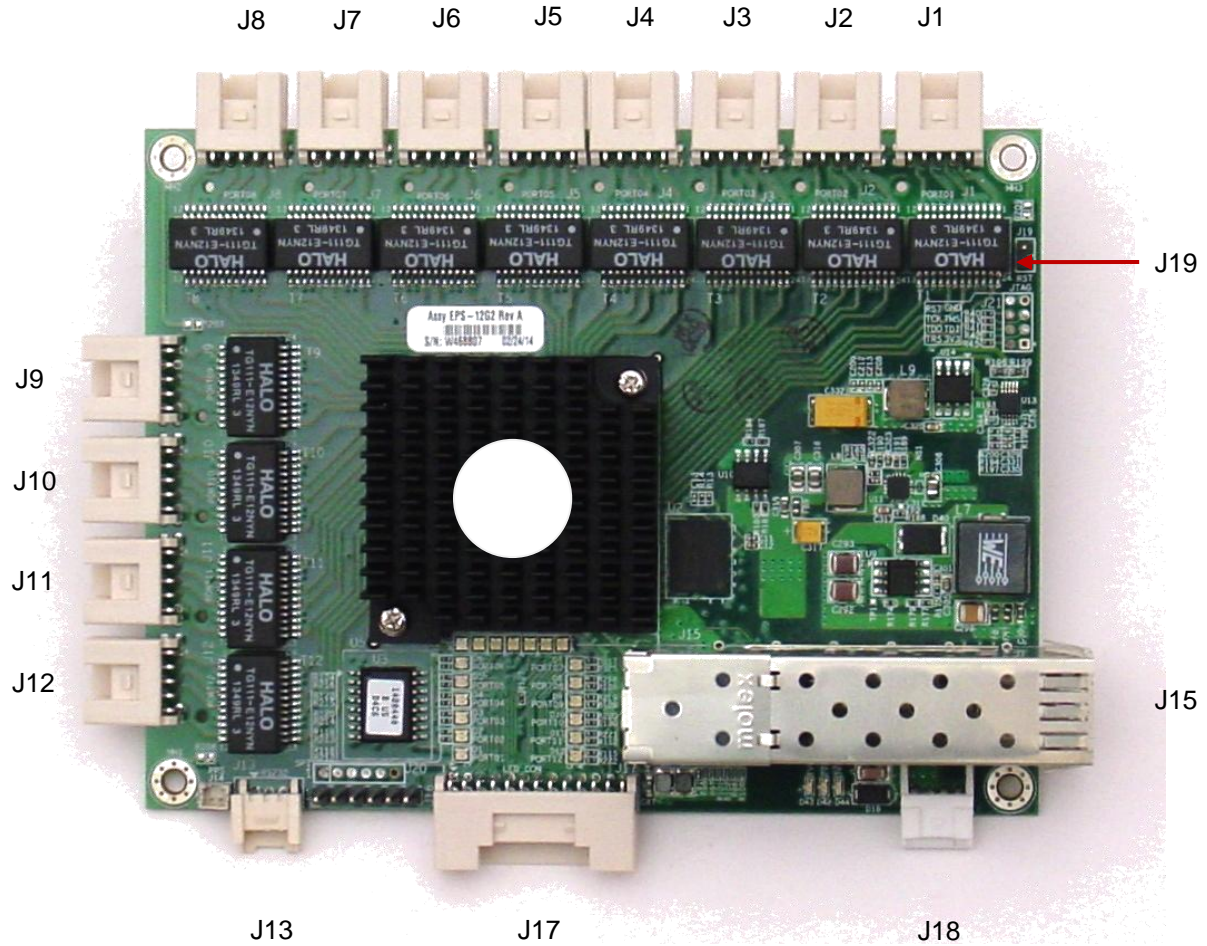


Figure 2. Epsilon-12G2 (Connectors and Jumpers)

5. CONNECTOR AND JUMPER LIST

5.1 Connector List

The following table summarizes the functions of Epsilon-12G2's interface connectors. Refer to the Figure 2 for the locations of these connectors on Epsilon-12G2. Signal functions relating to all of Epsilon-12G2's interface connectors are discussed in greater detail in Section 6 of this document. Other connectors and jumper blocks on Epsilon-12G2 are reserved for Diamond Systems' use only.

<i>Connector</i>	<i>Function</i>
J1-J12	Gigabit Ethernet (x12)
J13	RS-232 Serial Interface
J15	Dual SFP Ethernet sockets
J17	LED Status Signals and Resets
J18	Power In

5.2 Jumper Block

The following table summarizes the functions of Epsilon-12G2's jumper block, J19. Refer to the drawing in Section 4 for the location of this jumper block on Epsilon-12G2.

<i>Jumper J19 Pins</i>	<i>Function</i>
1&2	Reset: Install jumper and apply power to reset the switch

6. CONNECTOR PINOUT AND PIN DESCRIPTION

6.1 Ethernet (J1-J12)

Epsilon-12G2 contains twelve right-angle, locking pin headers for the twelve Ethernet ports. Each port has the same style and pinout. Each signal is associated with a particular color inside of the Diamond Systems' cable part number 6981502. The color coding for this cable follows the TIA/EIA 568B standard.

DD+	1	2	DD-
DC+	3	4	DC-
DB+	5	6	DB-
DA+	7	8	DA-
Ground	9	10	Ground

Connector Type: 2mm dual row right-angle, locking pin header with tin plating

Mating Connector: JST Sales America PUDP-10V-S housing with SPUD-002T-P0.5 terminals

6.2 Serial Interface (J13)

Epsilon-12G2 contains an RS-232 connector, J12 that connects the on-board MIPS 24KEC microcontroller to an external serial port.

1	Ground
2	TxD Out
3	RxD In

Connector Type: 2mm single row right-angle, locking pin header with tin plating

Mating Connector: Molex Connector 35507-0300 housing with 50212-8100 terminals

6.3 SFP Socket (J15)

Connector J15 offers one dual SFP stacking socket. This socket provides two industry standard SerDes interfaces for two additional 1G or 2.5G copper or optical SFP Ethernet ports. The 1G port is the top port in the socket and the 2.5G port is the bottom port.

6.4 LED Status Signals (J17)

Connector J17 provides access to the Ethernet LED signals for each of the twelve ports. LEDs may be directly connected to these signals without requiring any current-limiting resistors. The 3.3V supply required for the LEDs is also provided by the connector. The control signals pull the LED pin low to turn it on. To use J17 to operate an LED externally to Epsilon-12G2, connect the LED's anode (+) to the 3.3V pin (J17 pin 25). Connect the LED's cathode (-) to the corresponding control signal on connector J17.

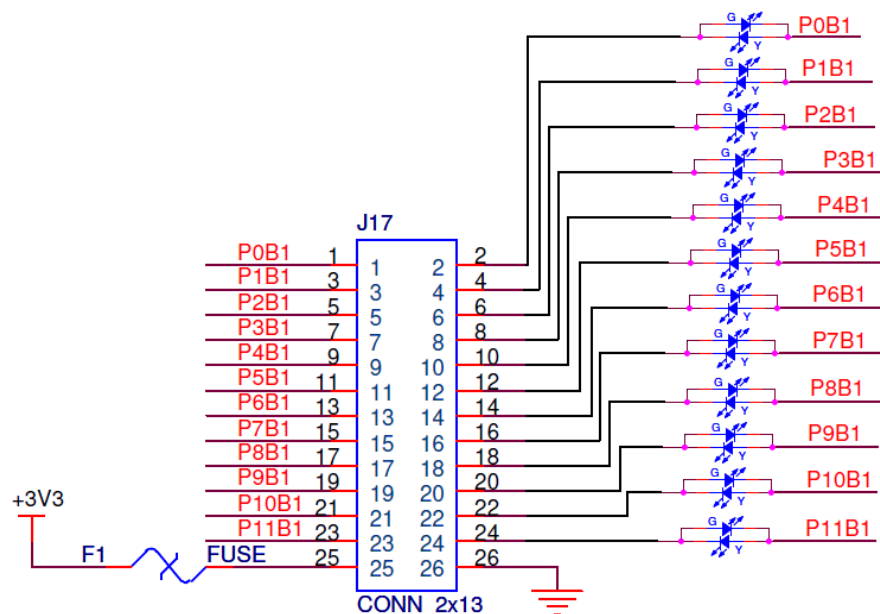
The on board activity LED is a green LED (LTST-C190GKT) with a typical forward voltage of 2.1V and a maximum of 2.6V with a 20mA If. The on board speed LED is a Yellow LED (LTST-C190YKT) with the same characteristics. The control signal is capable of sinking a maximum of 18mA. The series resistor is 330 ohms, which gives an If of about 3.6mA. When an LED is connected to connector J17, it is in parallel with the on board LED. If the external LED has about the same forward voltage, the current will be cut in half. If the external LED has a lower forward voltage, it will dominate the on-board LED and be brighter. Therefore, if the external LED is not bright enough use an external LED with a lower forward voltage.

Port0_LED1	1	2	Port0_LED2
Port1_LED1	3	4	Port1_LED2
Port2_LED1	5	6	Port2_LED2
Port3_LED1	7	8	Port3_LED2
Port4_LED1	9	10	Port4_LED2
Port5_LED1	11	12	Port5_LED2
Port6_LED1	13	14	Port6_LED2
Port7_LED1	15	16	Port7_LED2
Port8_LED1	17	18	Port8_LED2
Port9_LED1	19	20	Port9_LED2
Port10_LED1	21	22	Port10_LED2
Port11_LED1	23	24	Port11_LED2
+3.3V	25	26	GND

Connector Type: 2mm dual row right-angle, locking pin header with tin plating

Mating Connector: JST Sales America PUDP-26V-S housing with SPUD-002T-P0.5 terminals

Following is a diagram illustrating how to wire J17 to external LEDs.



6.5 Input Power (J18)

Input power is supplied through connector J18. Epsilon-12G2 has a +5V to +40VDC wide voltage input. The pinout for J14 is:

1	+Vin
2	+Vin
3	Ground
4	Ground

Connector Type: 2mm single row right-angle, locking pin header with tin plating

Mating Connector: JST Sales America PAP-04V-S housing with SPHD-001T-P0.5 terminals

7. SOFTWARE INTERFACES

7.1 Command Line Interface

The command line interface (CLI) is a modal, line-based interface with no screen editing features where commands are executed immediately upon end-of-line. Privilege levels can be implemented for certain operations where users have to have a certain privilege in order to exercise that operation. The CLI can be accessed directly via the serial connection. The user must log in before CLI commands can be executed.

7.1.1 Making an Initial Connection

Serial line configuration:

115200 baud
8 bit data
No parity
1 stop bit

Login information

```
Username: admin
Password: {none}
```

The IP address, mask and gateway must be set according to your environment or you can enable IP and DHCP if your environment includes a DHCP server. For example:

```
# configure terminal
(config)# interface vlan 1
(config-if-vlan)# ip address dhcp
(config-if-vlan)# end
```

Below example depicts configuration of static IP address,

```
# configure terminal
(config)# interface vlan 1
(config-if-vlan)# ip address 192.0.2.1 255.255.255.0
(config-if-vlan)# end
```

Display the IP address to confirm:

```
# show ip interface brief
Vlan Address                Method  Status
-----
  1 192.0.2.1                Manual  UP
#
```

7.1.2 General Command Groups

The following groups of general commands are available in the command line interface (CLI).

```
# ?
clear          Reset functions
configure     Enter configuration mode
copy          Copy from source to destination
debug         Debugging functions
delete        Delete one file in flash: file system
dir           Directory of all files in flash: file system
disable       Turn off privileged commands
do            To run exec commands in config mode
dot1x         IEEE Standard for port-based Network Access Control
enable        Turn on privileged commands
exit          Exit from EXEC mode
firmware      Firmware upgrade/swap
help          Description of the interactive help system
ip            IPv4 commands
logout        Exit from EXEC mode
more          Display file
no            Negate a command or set its defaults
ping          Send ICMP echo messages
reload        Reload system.
send          Send a message to other tty lines
show          Show running system information
terminal      Set terminal line parameters
#
```

You may get help by pressing the ? key or entering *help*. The help info depends on the context:

- At top level, a list of command groups is displayed.
- At group level, a list of the command syntaxes for the current group is displayed.
- If the help command is issued for a specific command, the command syntax and a description of the command are shown

7.1.3 IP Commands

```
(config)# ip http secure-redirect
(config)# ip http secure-server
(config)# ip igmp snooping
(config)# ip igmp snooping vlan <v_vlan_list>
(config)# ip igmp unknown-flooding
(config)# ip route <v_ipv4_addr> <v_ipv4_netmask> <v_ipv4_gw>
(config)# ip dhcp retry interface vlan <vlan_id>
(config)# no ip http secure-redirect
(config)# no ip http secure-server
(config)# no ip igmp snooping
(config)# no ip igmp snooping vlan [ <v_vlan_list> ]
```

```
(config)# no ip igmp unknown-flooding
(config)# no ip route <v_ipv4_addr> <v_ipv4_netmask> <v_ipv4_gw>
# clear ip arp
# clear ip igmp snooping [ vlan <v_vlan_list> ] statistics
# clear ip statistics [ system ] [ interface vlan <v_vlan_list> ] [ icmp ] [ icmp-msg <type> ]
# show ip arp
# show ip http server secure status
# show ip igmp snooping [ vlan <v_vlan_list> ] [ group-database [ interface ( <port_type> [ <v_port_type_list> ] ) ] [
sfm-information ] ] [ detail ]
# show ip igmp snooping mrouter [ detail ]
# show ip interface brief
# show ip route
# show ip statistics [ system ] [ interface vlan <v_vlan_list> ] [ icmp ] [ icmp-msg <type> ]
```

7.1.4 MAC Commands

```
(config)# mac address-table aging-time <v_0_10_to_1000000>
(config)# mac address-table static <v_mac_addr> vlan <v_vlan_id> interface ( <port_type> [
<v_port_type_list> ] )
(config)# no mac address-table aging-time
(config)# no mac address-table static <v_0_10_to_1000000>
(config)# no mac address-table static <v_mac_addr> vlan <v_vlan_id> interface ( <port_type> [
<v_port_type_list> ] )
# clear mac address-table
# show mac address-table [ conf | static | aging-time | { { learning | count } [ interface ( <port_type> [
<v_port_type_list> ] ) ] } | { address <v_mac_addr> [ vlan <v_vlan_id> ] } | vlan <v_vlan_id_1> | interface (
<port_type> [ <v_port_type_list_1> ] ) ]
```

7.1.5 VLAN/PVLAN Commands

```
(config)# interface vlan <vlist>
(config)# no interface vlan <vlist>
(config)# no vlan { { ethertype s-custom-port } | <vlan_list> }
(config)# vlan <vlist>
(config)# vlan ethertype s-custom-port <etype>
# show interface vlan [ <vlist> ]
# show pvlan [ <pvlan_list> ]
# show pvlan isolation [ interface ( <port_type> [ <plist> ] ) ]
# show vlan [ id <vlan_list> | name <name> | brief ]
# show vlan status [ interface ( <port_type> [ <plist> ] ) ] [ combined | admin | nas | mvr | voice-vlan | mstp | erps |
vcl | evc | gvrp | all | conflicts ]
```

7.1.6 dot1x (IEEE Standard for port-based Network Access Control)

```
(config)# dot1x authentication timer inactivity <v_10_to_100000>
(config)# dot1x authentication timer re-authenticate <v_1_to_3600>
(config)# dot1x re-authentication
(config)# dot1x system-auth-control
(config)# dot1x timeout quiet-period <v_10_to_1000000>
(config)# dot1x timeout tx-period <v_1_to_65535>
(config)# no dot1x authentication timer inactivity
(config)# no dot1x authentication timer re-authenticate
(config)# no dot1x re-authentication
(config)# no dot1x system-auth-control
(config)# no dot1x timeout quiet-period
(config)# no dot1x timeout tx-period
# clear dot1x statistics [ interface ( <port_type> [ <v_port_type_list> ] ) ]
# dot1x initialize [ interface ( <port_type> [ <plist> ] ) ]
# show dot1x statistics { eapol | radius | all } [ interface ( <port_type> [ <v_port_type_list> ] ) ]
```

```
# show dot1x status [ interface ( <port_type> [ <v_port_type_list> ] ) ] [ brief ]
```

7.1.7 LACP Commands

```
(config)# lacp system-priority <v_1_to_65535>
(config)# no lacp system-priority <v_1_to_65535>
# clear lacp statistics
# show lacp { internal | statistics | system-id | neighbour }
```

7.1.8 LLDP Commands

```
(config)# lldp holdtime <val>
(config)# lldp reinit <val>
(config)# lldp timer <val>
(config)# lldp transmission-delay <val>
(config)# no lldp holdtime
(config)# no lldp reinit
(config)# no lldp timer
(config)# no lldp transmission-delay
# clear lldp statistics
# show lldp eee [ interface ( <port_type> [ <v_port_type_list> ] ) ]
# show lldp neighbors [ interface ( <port_type> [ <v_port_type_list> ] ) ]
# show lldp statistics [ interface ( <port_type> [ <v_port_type_list> ] ) ]
```

7.1.9 Access Management Commands

```
(config)# access management <access_id> <access_vid> <start_addr> [ to <end_addr> ] { [ web ] [ snmp ] | all }
(config)# no access management
(config)# no access management <access_id_list>
# clear access management statistics
# show access management [ statistics | <access_id_list> ]
```

6.5.8 Access-list Commands

```
(config)# access-list rate-limiter [ <rate_limiter_list> ] { pps <pps_rate> | 100pps <pps100_rate> | kpps
<kpps_rate> | 100kbps <kpbs100_rate> }
(config)# default access-list rate-limiter [ <rate_limiter_list> ]
(config)# no access-list ace <ace_list>
# clear access-list ace statistics
# show access-list [ interface [ ( <port_type> [ <v_port_type_list> ] ) ] ] [ rate-limiter [ <rate_limiter_list> ] ] [ ace
statistics [ <ace_list> ] ]
# show access-list ace-status [ static ] [ link-oam ] [ loop-protect ] [ dhcp ] [ ptp ] [ upnp ] [ arp-inspection ] [ evc ] [
mep ] [ ipmc ] [ ip-source-guard ] [ ip-mgmt ] [ conflicts ] [ switch <switch_list> ]
```

7.1.10 Logging Commands

```
(config)# logging host <v_word45>
(config)# logging level { info | warning | error }
(config)# logging on
(config)# no logging host
(config)# no logging on
# clear logging [ info ] [ warning ] [ error ] [ switch <switch_list> ]
# show logging <log_id> [ switch <switch_list> ]
# show logging [ info ] [ warning ] [ error ] [ switch <switch_list> ]
```

7.1.11 Spanning-tree Commands

```
(config)# spanning-tree aggregation
(config)# spanning-tree edge bpdu-filter
```



```
(config)# spanning-tree edge bpdu-guard
(config)# spanning-tree mode { stp | rstp | mstp }
(config)# spanning-tree recovery interval <interval>
(config)# spanning-tree transmit hold-count <holdcount>
(config)# no spanning-tree edge bpdu-filter
(config)# no spanning-tree edge bpdu-guard
(config)# no spanning-tree mode
(config)# no spanning-tree recovery interval
(config)# no spanning-tree transmit hold-count
# clear spanning-tree { { statistics [ interface ( <port_type> [ <v_port_type_list> ] ) ] } | { detected-protocols [
interface ( <port_type> [ <v_port_type_list_1> ] ) ] } } }
# show spanning-tree [ summary | active | { interface ( <port_type> [ <v_port_type_list> ] ) } | { detailed [ interface
( <port_type> [ <v_port_type_list_1> ] ) ] } | { mst [ configuration | { <instance> [ interface ( <port_type> [
<v_port_type_list_2> ] ) ] } ] } ] }
```

7.1.12 Green-Ethernet Commands

```
(config)# green-ethernet eee optimize-for-power
(config)# green-ethernet led interval <v_0_to_24> intensity <v_0_to_100>
(config)# green-ethernet led on-event { [ link-change <v_0_to_65535> ] [ error ] } *1
(config)# no green-ethernet eee optimize-for-power
(config)# no green-ethernet led interval <0~24>
(config)# no green-ethernet led on-event [ link-change ] [ error ]
# show green-ethernet [ interface ( <port_type> [ <port_list> ] ) ]
# show green-ethernet eee [ interface ( <port_type> [ <port_list> ] ) ]
# show green-ethernet energy-detect [ interface ( <port_type> [ <port_list> ] ) ]
# show green-ethernet short-reach [ interface ( <port_type> [ <port_list> ] ) ]
```

7.1.13 Thermal-protect Commands

```
(config)# no thermal-protect prio <prio_list>
(config)# thermal-protect prio <prio_list> temperature <new_temp>
# show thermal-protect [ interface ( <port_type> [ <port_list> ] ) ]
```

7.1.14 Loop-protect Commands

```
(config)# loop-protect
(config)# loop-protect shutdown-time <t>
(config)# loop-protect transmit-time <t>
(config)# no loop-protect
(config)# no loop-protect shutdown-time
(config)# no loop-protect transmit-time
# show loop-protect [ interface ( <port_type> [ <plist> ] ) ]
```

7.1.15 QoS Commands

```
(config)# no qos qce <qce_id_range>
(config)# no qos storm { unicast | multicast | broadcast }
(config)# qos storm { unicast | multicast | broadcast } { { <rate> [ kfps ] } | { 1024 kfps } }
# show qos [ { interface [ ( <port_type> [ <port> ] ) ] } | wred | { maps [ dscp-cos ] [ dscp-ingress-translation ] [
dscp-classify ] [ cos-dscp ] [ dscp-egress-translation ] } | storm | { qce [ <qce> ] } ] }
```

7.1.16 Privilege Commands

```
(config)# privilege { exec | configure | config-vlan | line | interface | if-vlan | ipmc-profile | snmps-host | stp-aggr |
dhcp-pool | rfc2544-profile } level <privilege> <cmd>
(config)# no privilege { exec | configure | config-vlan | line | interface | if-vlan | ipmc-profile | snmps-host | stp-aggr |
dhcp-pool | rfc2544-profile } level <0-15> <cmd>
# show privilege
```

7.1.17 SNMP Commands

```
(config)# snmp-server
(config)# snmp-server access <group_name> model { v1 | v2c | v3 | any } level { auth | noauth | priv } [ read
(config)# <view_name> ] [ write <write_name> ]
(config)# snmp-server community v2c <comm> [ ro | rw ]
(config)# snmp-server community v3 <v3_comm> [ <v_ipv4_addr> <v_ipv4_netmask> ]
(config)# snmp-server contact <v_line255>
(config)# snmp-server engine-id local <engineID>
(config)# snmp-server host <conf_name>
(config)# snmp-server location <v_line255>
(config)# snmp-server security-to-group model { v1 | v2c | v3 } name <security_name> group <group_name>
(config)# snmp-server trap
(config)# snmp-server user <username> engine-id <engineID> [ { md5 <md5_passwd> | sha <sha_passwd> } [
priv { des | aes } <priv_passwd> ] ]
(config)# snmp-server version { v1 | v2c | v3 }
(config)# snmp-server view <view_name> <oid_subtree> { include | exclude }
(config)# no snmp-server
(config)# no snmp-server access <group_name> model { v1 | v2c | v3 | any } level { auth | noauth | priv }
(config)# no snmp-server community v2c
(config)# no snmp-server community v3 <community>
(config)# no snmp-server contact
(config)# no snmp-server engine-id local
(config)# no snmp-server host <conf_name>
(config)# no snmp-server location
(config)# no snmp-server security-to-group model { v1 | v2c | v3 } name <security_name>
(config)# no snmp-server trap
(config)# no snmp-server user <username> engine-id <engineID>
(config)# no snmp-server version
(config)# no snmp-server view <view_name> <oid_subtree>
# show snmp
# show snmp access [ <group_name> { v1 | v2c | v3 | any } { auth | noauth | priv } ]
# show snmp community v3 [ <community> ]
# show snmp host [ <conf_name> ] [ system ] [ switch ] [ interface ] [ aaa ]
# show snmp mib context
# show snmp mib ifmib ifIndex
# show snmp security-to-group [ { v1 | v2c | v3 } <security_name> ]
# show snmp user [ <username> <engineID> ]
# show snmp view [ <view_name> <oid_subtree> ]
```

7.1.18 SNTP Commands (config)# sntp

```
(config)# sntp server ip-address { <ipv4_var> }
(config)# no sntp
(config)# no sntp server
# show sntp status
```

7.1.19 Radius Server Commands

```
(config)# radius-server attribute 32 <id>
(config)# radius-server attribute 4 <ipv4>
(config)# radius-server deadtime <minutes>
(config)# radius-server host <host_name> [ auth-port <auth_port> ] [ acct-port <acct_port> ] [ timeout <seconds> ]
[ retransmit <retries> ] [ key <key> ]
(config)# radius-server key <key>
(config)# radius-server retransmit <retries>
(config)# radius-server timeout <seconds>
(config)# no radius-server attribute 32
```

```
(config)# no radius-server attribute 4
(config)# no radius-server deadtime
(config)# no radius-server host <host_name> [ auth-port <auth_port> ] [ acct-port <acct_port> ]
(config)# no radius-server key
(config)# no radius-server retransmit
(config)# no radius-server timeout
# show radius-server [ statistics ]
# show running-config [ all-defaults ]
# show running-config feature <feature_name> [ all-defaults ]
# show running-config interface ( <port_type> [ <list> ] ) [ all-defaults ]
# show running-config interface vlan <list> [ all-defaults ]
# show running-config line { console | vty } <list> [ all-defaults ]
# show running-config vlan <list> [ all-defaults ]
```

7.1.20 Banner Commands (Defines a login banner)

```
(config)# banner [ motd ] <banner>
(config)# banner exec <banner>
(config)# banner login <banner>
(config)# no banner [ motd ]
(config)# no banner exec
(config)# no banner login
```

7.1.21 Terminal Commands

```
(# no terminal editing
# no terminal exec-timeout
# no terminal history size
# no terminal length
# no terminal width
# terminal editing
# terminal exec-timeout <min> [ <sec> ]
# terminal help
# terminal history size <history_size>
# terminal length <lines>
# terminal width <width>
```

7.1.22 Reload

```
# reload { { cold | warm } [ sid <usid> ] } { defaults [ keep-ip ] }
```

7.1.23 Firmware Commands

```
# firmware swap
# firmware upgrade <tftpserver_path_file>
```

7.1.24 Ping Commands

```
# ping ip <v_ip_addr> [ repeat <count> ] [ size <size> ] [ interval <seconds> ]
```

7.1.25 Debug Commands

```
(config)# line { <0~16> | console 0 | vty <0~15> }
# no debug prompt
# debug prompt <debug_prompt>
```

7.1.26 Security Commands

```
(config)# no aaa authentication login {console | http}
```

```
(config)# password encrypted <encyr_password>
(config)# password none
(config)# password unencrypted <password>
(config)# enable password [ level <priv> ] <password>
(config)# enable secret { 0 | 5 } [ level <priv> ] <password>
(config)# no enable password [ level <priv> ]
(config)# no enable secret { [ 0 | 5 ] } [ level <priv> ]
# show aaa
# show port-security port [ interface ( <port_type> [ <v_port_type_list> ] ) ]
# show port-security switch [ interface ( <port_type> [ <v_port_type_list> ] ) ]
(config)# aaa authentication login {console | http} {{local | radius} [ {local | radius} ] }
```

7.1.27 Monitor

```
(config)# monitor destination interface <port_type> <in_port_type>
(config)# monitor source { { interface ( <port_type> [ <v_port_type_list> ] ) } | { cpu [ <cpu_switch_range> ] } } {
both | rx | tx }
(config)# no monitor destination
(config)# no monitor source { { interface ( <port_type> [ <v_port_type_list> ] ) } | { cpu [ <cpu_switch_range> ] } }
```

7.2 Examples

7.2.1 IP Configuration

Below example depicts configuration of static IP address,

```
# configure terminal
(config)# interface vlan 1
(config-if-vlan)# ip address 166.20.234.1 255.255.0.0
(config-if-vlan)# end
```

Display the IP address to confirm:

```
# show ip interface brief
Vlan Address Method Status
-----
1 166.20.234.1 Manual UP
#
```

7.2.2 Port Configuration

Individual ports can be configured to different speed. Following example shows configuring speed as 100 Mbps for port 1.

```
# configure terminal
(config)# interface GigabitEthernet 1/1
(config-if)# speed ?
10 10Mbps
100 100Mbps
1000 1Gbps
auto Auto negotiation
(config-if)# speed 100
(config-if)# end
```

```
#
```

7.2.3 Change Switch Password

Following example shows setting of new password,

```
# configure terminal
(config)# password unencrypted <password>
(config)# exit
#
```

7.2.4 Set up VLANs

Virtual LANs (VLANs) are used to divide the network into separate logical areas. VLANs can also be considered as broadcast domains.

Following example shows setting up VLAN2 and VLAN3 with switch port mode set to access.

```
#configure terminal
(config)# vlan 2
(config)# vlan 3
```

Set access port, in this case it's assumed that port 1~3 are connected to PC. The PVID of each port is different.

```
#configure terminal
(config)# interface GigabitEthernet 1/2
(Config-if)# switchport mode access
(Config-if)# switchport access vlan 2
(config)# exit
(config)# interface GigabitEthernet 1/3
(Config-if)# switchport mode access
(Config-if)# switchport access vlan 3
(config)# exit
```

To verify created VLAN

```
# show vlan
VLAN  Name                               Interfaces
----  -
1     default                               Gi 1/1,4-6
2     VLAN0002                              Gi 1/2
3     VLAN0003                              Gi 1/3
```

As shown above, VLAN2 is created with the name VLAN0002 and a port 2 assigned to VLAN2. Similarly port 3 assigned to VLAN0003. Remaining ports 1 & 4 to 6 are by default assigned to VLAN 1

7.2.5 SNMP configuration

Following example depicts the configuration of SNMP,

To enable the SNMP mode operation

```
# configure terminal
(config)# snmp-server
(config)# exit
#
```

SNMP Trap configuration,

```
# configure terminal
(config)# snmp-server host Example
(config-snmp-host)# host 166.20.234.20
(config-snmp-host)# exit
(config)# exit
#
```

7.2.6 Mirroring

For debugging network problems or monitoring network traffic, the switch system can be configured to mirror frame from multiple ports to a mirror port. Following example depicts Mirror traffic of Port 2 and 3 (Rx) & 4 to 6 (Rx) to Port 1.

```
# configure terminal
(config)# monitor destination interface GigabitEthernet 1/1
(config)# monitor source interface GigabitEthernet 1/2-3 rx
(config)# monitor source interface GigabitEthernet 1/4-6 tx
```

7.2.7 Setup QoS

Quality of Service (QoS) refers to the capability of a network to provide better service to selected network traffic over various technologies, including Frame Relay, Asynchronous Transfer Mode (ATM), Ethernet and 802.1 networks, SONET, and IP-routed networks that may use any or all of these underlying technologies.

Following example shows setting up the QoS, all traffic coming on port 1 is mapped to QoS class (CoS) 2 and PCP is set as 1.

```
# configure terminal
(config)# interface GigabitEthernet 1/1
(config-if)# qos cos 2
(config-if)# qos pcp 1
(config-if)# end
```

7.2.8 Factory defaults

User can reset the configuration of the switch by below command. Only the IP configuration is retained.

```
# reload defaults
#
```

7.3 Web Interface

The web interface offers an alternate user interface to the CLI. The web interface is in-band and requires use of one of the Ethernet ports. This port provides simultaneous web management and normal usage. The same commands with the same functionality can be accessed via either interface.

From the WEB interface it is possible to, among other things:

- Set port mode
- Enable/disable flow control
- Configure simple port-based VLAN
- Configure aggregation groups
- Configure LACP parameters
- Configure RSTP parameters
- Configure QoS
- Read and clear statistics counters
- Monitor LACP status
- Monitor RSTP status
- Configure and monitor 802.1X
- Configure and monitor IGMP snooping (if defined for switch device)
- Configure source-IP address and DHCP server filter
- Upgrade software

All operations are password protected. The password must be entered at login. The password is the same as is being used in the command line interface.

The IP mode is disabled in the factory default configuration. To be able to use the WEB interface, the IP must be enabled and configured via the command line interface. The IP address, mask and gateway must be set according to your environment or you can enable IP and DHCP if your environment include a DHCP server.

Example of enabling the WEB interface via the command line interface:

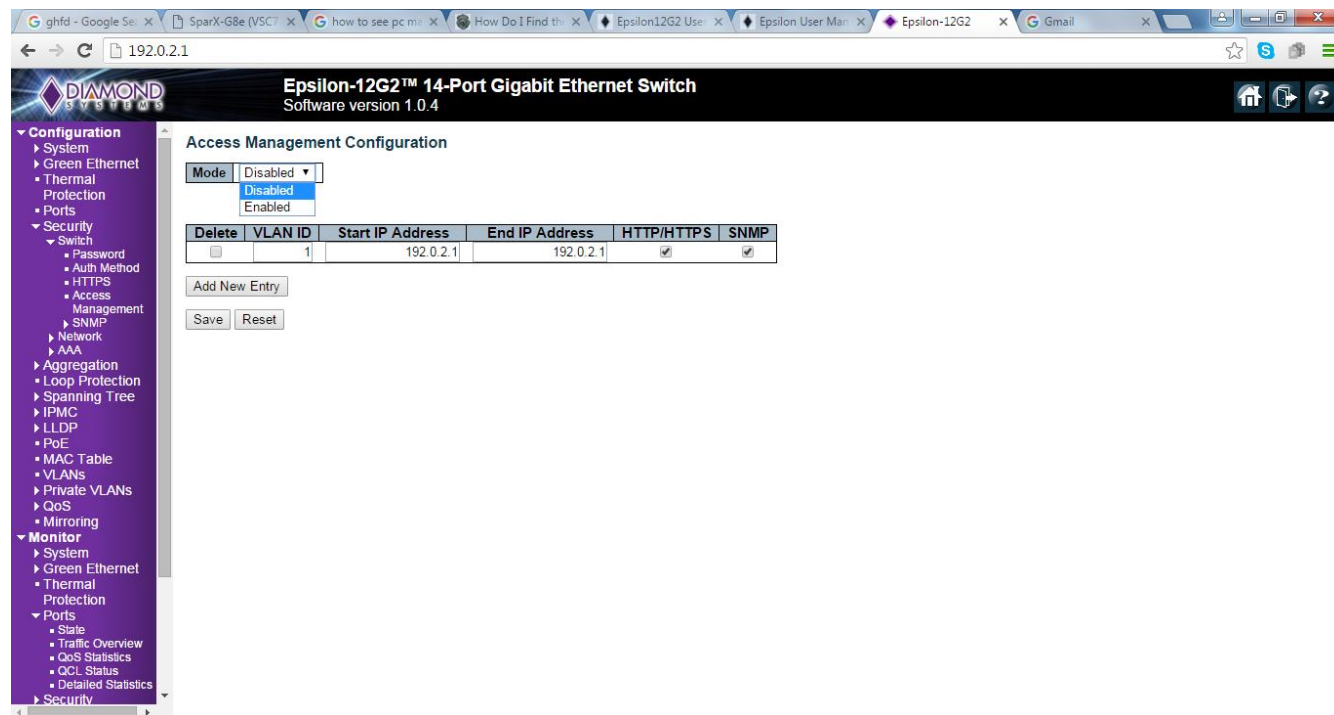
```
>ip setup 10.10.129.189 255.255.252.0 10.10.128.14 1
>ip mode enable
```

There is an extensive on-line help facility available in the web interface that describes each command, what it does and how to use it.

7.3.1 Web Interface Activation / Deactivation

The web interface can be activated and deactivated through either the command line interface or the web Control Panel.

Using the Control Panel, in the Configuration/Security/Switch/Access Management Configuration screen, first ensure the mode is set to Disabled as shown below. This is the default mode. If it is not set to Disabled, set it as Disabled and click Save.



This configuration should be stored on the switch with the following CLI command:

#copy startup-config flash:{filename}

To disable web access of the switch, in the Control Panel navigate to the Configuration/Security/Switch/Access Management Configuration screen, change the mode to Enabled and click Save.

Now there is no access to the switch using the web interface. To store this configuration in flash as the standard configuration on startup, enter the following command in the CLI:

#copy running-config startup-config

To allow web access of the switch in the future, enter the following commands in the CLI:

#copy startup-config flash:backup_config

#copy flash:{filename} startup-config

Then reboot the switch.

8. SPECIFICATIONS

The specifications for Epsilon-12G2 are summarized in the following table.

Ethernet switch	14-port, layer 2+ switch Built-in 416MGz MIPS 24KEC microcontroller for configuration and management
Number of ports	12 10/100/1000Mbps copper Ethernet ports with non-blocking wire-speed performance 1 1G SFP socket 1 2.5G SFP socket
On-board memory	4Mb packet memory Shared memory buffer with per-port and CoS memory management
MEF	Hierarchical MEF compliant policing and scheduling MEF E-Lane, E-Line, and E-Tree services
Frame buffer	Jumbo frame support at all speeds
VLAN	IEEE 802.1Q VLAN switch with 8K MACs and 4K VLANs Push/pop up to two VLAN tags Independent and shared VLAN learning (IVL, SVL)
Multicast	IPv4 and IPv6 multicast group support
Remarking	Dual leaky bucket policers with remarking and statistics
Classifier	8 priorities and 8 CoS queues per port with strict or deficit-weighted round robin scheduling Shaping/policing per queue and per port
Storm control	Policing with storm control and MC/BC protection
Link aggregation	IEEE 802.3ad
Security	Advanced security and prioritization available through multistage TCAM engine
RSTP	Rapid spanning tree protocol (IEEE 802.1W) and MTSP
Power management	ActiPHY and PerfectReach power management; VeriPHY cable diagnostics
Serial port	1 RS-232 for host interface
Indicator LEDs	28 status LEDs, 2 per port 2 GPIO
Standalone Capable	Can operate as a standalone network switch or in combination with a host computer
Power Input	+5-40V DC/DC power supply
Power consumption	9.2W maximum with all ports active, approximately 0.26W less for each inactive port
Form factor	COM Express (95mm x 125mm)
Operating temp	-40°C to +85°C (-40°F to +185°F)
Weight	4.9oz (138.9g) with heatsink
RoHS	Compliant

The timing specifications for the board are summarized in the following table.

Time to Login and alive LED flashing after power-on, power cycle, or reboot	8 sec
Time for ports to reconnect after power-on, power cycle, or reboot	15 sec
Time for all ports to start passing data after power-on, power cycle, or reboot	<30 sec. (typical 24-26 sec)
Time for all ports to start passing data after restoring factory defaults	8 sec

APPENDIX A SUPPORTED MIBS

Epsilon-12G2 supports the following management information bases (MIBs). Each MIB contains definitions and information regarding the properties of managed resources and the services that the agents support. Epsilon-12G2 supports both WebStax and CEServices MIBs as shown below.

WebStax 3.40 MIBs:

- LLDP
- RFC1213 Interfaces
- RFC1213 IP
- RFC1213 SNMP
- RFC1213 System
- RFC1213 TCP
- RFC1213 UDP
- RFC3635 Transmission
- RFC4188 Dot1D

CEServices 3.40 MIBs:

- IEEE 802.1X
- LACP
- LLDP
- LLDP-MED
- RFC1213 Interfaces
- RFC1213 IP
- RFC1213 SNMP
- RFC1213 System
- RFC1213 TCP
- RFC1213 UDP
- RFC2819 RMON Alarm
- RFC2819 RMON Event
- RFC2819 RMON History
- RFC2819 RMON Statistics
- RFC2863 IF
- RFC3414 USMSTATS
- RFC3414 USMUSER
- RFC3415 VACMACCESSTABLE
- RFC3415 VACMCONTEXTTABLE
- RFC3415 VACMMIBVIEWS
- RFC3415 VACMSECURITYTOGROUPTABLE
- RFC3635 Transmission
- RFC3636 MAU
- RFC4133 ENTITY
- RFC4188 Dot1D
- RFC4668 RADIUS
- RFC4670 RADIUS
- RFC4878 LINK OAM
- RFC5519 MGMD

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