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Electrical Engineering Department

## EE 400, Experiment # 7

### Access Methods, Configuration and Monitoring of Layer-2 Switches

#### Objectives:

The objective of this experiment is to introduce to the students different types of methods of accesses (CLI, menu and web) and commands of layer-2 switches for the purpose of monitoring and basic configuration of these devices.

#### Management Interfaces

Management interfaces enable you to reconfigure the switch and to monitor switch status and performance. The HP Switch 2524 offer the following interfaces:

1. **Menu Interface** – a menu-driven interface offering a subset of switch commands through the built-in VT-100/ANSI console.
2. **CLI** – a Command Line Interface offering the full set of switch commands through the VT-100/ANSI console built into the switch.
3. **Web Browser Interface** – a switch interface offering status information and a subset of switch commands through a standard web browser

#### Accessing the switch thru Menu Interface

##### Starting and Ending a Menu Session

You can access the menu interface using any of the following

- A direct connection to the switch's console port
- A Telnet connection to the switch console from a networked PC or the switch's web browser interface. Telnet requires that an IP address and subnet mask compatible with your network have already been configured on the switch.

##### How to Start a Menu Interface Session

In its factory default configuration, the switch console starts with the CLI prompt. To use the menu interface with Manager Privileges, go to the Manager level prompt and enter the **menu** command.

1. Use one of these methods to connect to the switch:
  1. A PC terminal
  2. Telnet
2. Do one of the following:
  - If you are using Telnet, go to step 3.
  - If you are using a PC terminal, press **enter** one or more times until a prompt appears.
3. When the switch screen appears, do one of the following:
  - If a password has been configured, the password prompt appears. Type the Manager password and press enter. Entering the Manager password gives you manager-level access to the switch. (Entering the Operator password gives you operator-level access to the switch.)
  - If no password has been configured, the CLI prompt appears. Go to the next step.
4. When the CLI prompt appears, display the Menu interface by entering the menu command. For example:

HP2524 # menu

### Advantages of Using the Menu Interface

1. **Provides quick, easy management access** to a menu-driven subset of switch configuration and performance features.
2. **Offers out-of band access** (through the RS-232 connection) to the switch, so network bottlenecks, crashes, lack of configured or correct IP address, and network downtime do not slow or prevent access.
3. **Enables Tenet** (in-band) access to the menu functionality.
4. **Allows faster navigation**, avoiding delays that occur with slower display of graphical objects over a web browser interface.
5. **Provides more security**, configuration information and passwords are not seen on the network.

### Exercise:

1. Select choice number 1 (Status and Counters) in the main menu and then select (General System Information ). Observe the general information about the switch.
2. Select choice number 1 (Status and Counters) in the main menu and then select (Switch Management Address Information). Observe the Management IP address of the of the switch.

3. Select choice number 1 (Status and Counters) in the main menu and then select (Port Status). Observe the status of different ports of the switch.
4. Select choice number 2 (Switch Configuration) in the main menu and then select (System Information). Change the name of the switch and then verify it.
5. Select choice number 2 (Switch Configuration) in the main menu and then select (Port Trunks Settings). Disable your assigned port and then verify it by observing the status of that port. Enable it again and then verify it by observing the status of that port.
6. Select choice number 2 (Switch Configuration) in the main menu and then select (IP Configuration). Change the IP @ and subnet mask of the switch. You will be disconnected. Verify it by logging again using the new IP address.

## **Accessing the Switch thru CLI**

### **Overview**

The CLI is a text-based command interface for configuring and monitoring the switch. The CLI gives you access to the switch's full set of commands while providing the same password protection that is used in the web browser interface and the menu interface.

The CLI is accessed through the switch console and, in the switch's factory default state, is the default interface when you start a console session. You can access the console out-of-band by directly connecting a terminal device to the switch, or in-band by using Telnet from a terminal device.

### **Advantages of Using the CLI**

- Provides access to the complete set of the switch configuration, performance, and diagnostic features
- Offers out-of-band access (through the RS-232 connection) or Telnet (in-band) access.
- Enables quick, detailed system configuration and management access to system operators and administrators experienced in command prompt interfaces.
- Provides help at each level for determining available options and variables.

### **Using the CLI**

The CLI offers these privilege levels to help protect the switch from unauthorized access:

- Operator
- Manager
- Global Configuration
- Context Configuration

## Examples of the Command Prompt

HP2524>	Operator Level
HP2524#	Manager Level
HP2524 (config) #	Global Configuration Number
HP2524 (<context>) #	Context Configuration Levels (port, VLAN)

When you use the CLI to make a configuration change, the switch writes the change to the Running-Config file in volatile memory. This allows you to test your configuration changes before making them permanent. To make changes permanent, you must write to memory save them to the Startup Config file in non-volatile memory. If you reboot the switch without first writing to memory, all changes made since the last reboot or write memory (whichever is later) will be lost.

## Privilege Levels at Logon

Privilege levels control the types of access to the CLI to implement this control. You must set at least a Manager password. Without a Manager password configured, anyone having serial port, Telnet, or web browser access to the switch can reach all CLI levels.

## Operator Privileges

At the Operator level you can examine the current configuration and move between interfaces without being able to change the configuration. A “>” character delimits the Operator-level prompt. For example:

```
HP2524>
```

## Manager Privileges

Manager privileges give you three additional levels of access Manager, Global Configuration, and Context. A “#” character delimits any Manager prompt. For example:

```
HP2524 #
```

- Manager level:** Provides all Operator level privileges plus the ability to perform system-level actions that do not require saving changes to the system configuration file. The prompt for the Manager level contains only the system name and the “#” delimiter, as shown above. To select this level, enter the *enable* command at the Operator level prompt and enter the Manager password, when prompted. For example:

```
HP2524> enable (Enter enable at the Operator prompt.)
HP2524#_ (The Manager prompt)
```

- Global Configuration level:** Provides all Operator and Manager level privileges, and enables you to make configuration changes to any of the switch’s software features. The prompt for the Global Configuration level includes the system name and “(config)”. To select this level, enter *config* command at the Manager prompt. For example:

```
HP2524#_ (Enter config at the Manager prompt.)
```

HP2524 (config) #\_ (The Global Config prompt.)

- **Context Configuration level:** Provides all Operator and Manager privileges, and enables you to make configuration changes in a specific context, such as one or more ports. The prompt for the Context Configuration level includes the system name and the selected context. For example:

HP2524 (eth-1) #

HP2524 (vlan-10) #

The Context level is useful, for example, if you want to execute several commands directed at the same port, or if you want to shorten the command strings for a specific context area. To select this level, enter the specific context at the Global Configuration level prompt. For example, to select the context level for an existing VLAN with the VLAN ID of 10, you would enter the following command and see the indicated result:

HP2524(config)# vlan10

HP2524(vlan-10)#

### Exercise:

1. Use the following command on the prompt and hit enter to go to the privileged mode.

# enable

2. Type (?) on the prompt to get the list of commands available at this stage.
3. Use the following command to observe the running configuration of the switch.

# show config

4. Use the following command to observe the status of interfaces/ports of the switch.

# show interfaces

5. Use the following command to observe the ARP cache of the switch.

# show arp

6. Use the following command to observe the system information of the switch.

# show system-information.

7. Use the following command to enter the global configuration mode.

# configure

8. Type (?) on the prompt to get the list of commands available at this stage.
9. Use the following command to change the name of the switch.

```
(config)# hostname <name-of-switch>
```

10. Use the following command to Enable/disable one of the assigned ports of the switch.

```
(config)# interface <port-number> enable/disable
```

11. Verify the status of the port by Exiting the Global Configuration mode and using (show interfaces) command.
12. Enter the Global Configuration mode again.
13. Use the following command to enter the default VLAN of the switch.

```
(config)# vlan 1
```

14. Use the following command to change the administrative IP @ of the switch.

```
(config-vlan1)# ip address <your-ip-address> <subnet-mask>
```

## Accessing the switch thru Web Interface

### Overview

The HP web browser interface built into the switch lets you easily access the switch from a browser-based PC on your network. This lets you do the following:

- Optimize your network uptime by using the Alert Log and other diagnostic tools.
- Make configuration changes to the switch.
- Maintain security by configuring usernames and passwords.

### General Features

- Switch Configuration:  
Ports, VLANs and Primary VLAN, Fault Detection, Port monitoring (mirroring), System Information, Enable/Disable Multicast Filtering (IGMP) and Spanning Tree, IP, Stacking, Support and Management URLs
- Switch Security:  
Passwords, Authorized IP Managers, Port security and Intrusion Log
- Switch Diagnostics:  
Ping/Link Test, Device reset, Configuration report
- Switch status:  
Port utilization, Port counters, Port status, Alert log
- Switch system information listing

### Starting an HP Web Browser Interface Session with the Switch

You can start a web browser session by using a standalone web browser on a network connection from a PC or UNIX Work station. Type the IP address (or DNS Name) of the switch in the browser Location or Address field.

### Creating Usernames and Password in the Browser Interface

You may want to create both a username and password to create access security for your switch. There are two (2) levels of access to the interface that can be controlled by setting user names and passwords:

- **Operator.** An operator-level username and password allows read-only access to most of the web browser interface, but prevents access to the Security window.
- **Manager.** A Manager-level usernames and password allows full read/write access to the web browser interface.

#### To Set a Password

- 1.) Access the Device Password screen by selecting the **Security** tab.
- 2.) Click in the appropriate box in the device Passwords window and enter user names and passwords. You will be required to repeat the password strings in the confirmation boxes.
- 3.) Click on to activate the user names and passwords.

### Advantage of Using the HP Web Browser Interface

- **Easy access** to the switch from anywhere on the network
- **Familiar browser interface** – locations of window objects consistent with commonly used browsers, uses mouse clicking for navigation, no terminal setup.
- **Many features have all their fields in one screen** so you can view all values at once.
- **More visual cues**, using colors, status bars, device icons, and other graphical objects instead of relying solely on alphanumeric values.
- **Display of acceptable ranges of values available** in configuration list boxes.

### Exercise:

1. Use the web browser to login to web-based management screen of the switch by writing the IP @ of the switch in the URL window. Put the address of the switch in the exception field of the browser.
2. Observe the general information of the switch by clicking the “Status” tab and then clicking “Overview” tab.
3. Observe the statistics of the data of the switch by clicking the “Status” tab and then clicking “Port Counters” tab.
4. Observe the status of ports of the switch by clicking the “Status” tab and then clicking “Port Status” tab.
5. Change the Name of the switch by click “Configurations” tab and then “System Information”.
6. Change the status of one of the assigned ports of the switch by click “Configurations” tab and then “Port configuration”.
7. Change the IP @ of the switch by click “Configurations” tab and then “IP configuration”. You will need to login again with the new IP @.