Layer 2 Switching

Introduction

Layer 2 refers to the Data Link layer of the commonly-referenced multilayered communication model, Open Systems Interconnections (OSI). The data link layer is concerned with moving data across the physical links in the network. In a network, the switch is a device that redirects data messages at the layer 2 level, using the destination Media Access Control (MAC) address to determine where to direct the message.

The data link layer contains two sub layers that are described in the IEEE-802 LAN standards:

- Media Access Control
- Logical Link Control

Layer 2 Functions

Layer 2 switches effectively provide the same functionality like bridges. They are similar to multiport bridges in that they learn and forward frames on each port. The major difference is the involvement of hardware that ensures that multiple switching paths inside the switch can be achieve at the same time.

There are three distinct functions of layer 2 switching:

- Address learning
- Forward/filter decisions
- Loop Avoidance

Address Learning: Layer 2 switches remember the source hardware address of each frame received on an interface, and they enter this information into a MAC database called a forward/filter table.

Forward/filter decisions: When a frame is received on an interface, the switch looks at the destination hardware address and finds the exit interface in the MAC database. The frame is only forwarded out the specified port.

Loop Avoidance: If multiple connections between switches are created for redundancy purposes, network loops can occur. Spanning Tree Protocol (STP) is used to stop network loops.

Introduction to Switches

It is a interconnectivity device which is used to connect devices together in the network like hubs, but it is more advanced than hubs. It is also known as Intelligent Hub.

- Layer **2** device
- It is responsible to filter and forward data packets through the network.
- It is a update version of **bridge**, it includes superior throughput performance, higher port density and greater flexibility.
- Responsible to forward data frames on the basis of **mac-address**.
- Responsible to maintain **Mac-table**, in which it stores the mac addresses of all connected hosts.
- Because it maintains mac-table, so it also known as **intelligent hub**.
- It has in-built chip named **ASIC** (Application specific Integrated Circuit) to store mac-table.
- Perform switching between network devices.
- Responsible to forward the data packet up to the correct or actual host in the network by verifying the mac-address of source and destination in its mac-table, and not responsible to broadcast the data packet to all its ports like hubs.
- It has higher number of ports then hub and bridges.

Types of Switches:

- Manageable Switches
- Non- manageable Switches

Types of Switches on the basis of error handling:

- Cut-through Switches
- Store and Forward Switches
- Straight or Fragment free Switches.

Basic Switch Commands and Configuration

To login into privilege mode ***Switch> enable***
To enter Configuration mode ***Switch# configure terminal***
Open a telnet connection ***Switch# telnet <ip address>***
Send echo messages: ***Switch# ping <ip address>***
List the contents of running-config ***Switch# show running-config***

Copy the content of running-config to startup-config ***Switch# copy running-config startup-config***
Write running configuration to memory, network, or terminal ***Switch# write***
MAC forwarding table ***Switch# show mac-address-table***
Spanning tree topology ***Switch# show spanning-tree***
VLAN status ***Switch# show vlan***
Display information about flash: file system ***Switch# show flash***
Set system's network name ***Switch(config)# hostname <hostname>***
Set Enable Password ***Switch(config)# enable password <password>***

Set Enable Secret Password ***Switch(config)# enable secret <password>***
Enable Login Authentication & Set Password on Line Console ***Switch(config)# line console 0*** ***Switch(config-line)# password <password>*** ***Switch(config-line)# login***
Enable User-based Login Authentication & Set Password on Line Console ***Switch(config)# line console 0*** ***Switch(config-line)# password <password>*** ***Switch(config-line)# login local***
Enable Remote Access & Set Password on Line VTY ***Switch(config)# line vty 0 15*** ***Switch(config-line)# password <password>***
Creating User & Set Password ***Switch(config)# username <username> password <password>***