

Switch Exploration

A switch has three main functions: Filter, forward, and flood frames. Filtering is the process of deciding which ports should and should not receive a frame. The switch will filter out any ports determined to not need the frame. Once the switch has made a filtering decision, it will forward the frame to the ports that have not been filtered. Lastly, when a switch does not know where a frame should be forwarded to, it will flood it out all ports except the one the frame was received on. The frame is known as a unknown unicast because the destination is unknown to the switch.

Switches logically perform the duties a switch board operators accomplished back in the day. They create logical lines between ports like what can be seen in Figure 1. It is considered logical as the connections from one port to another are not physical.

Question: How does the switch execute its functions?

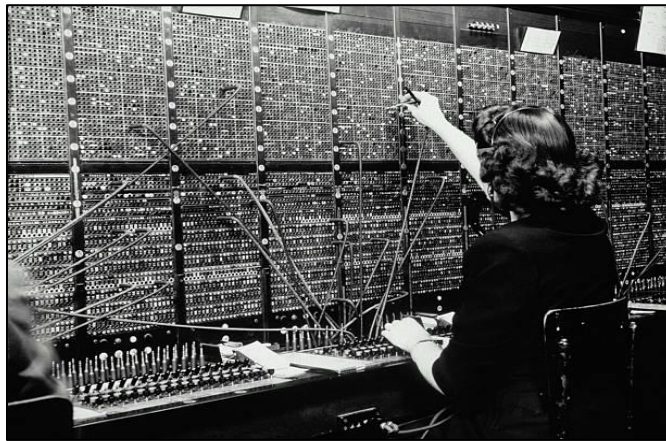


Figure 1 Switch Board Operator Making Physical Connections

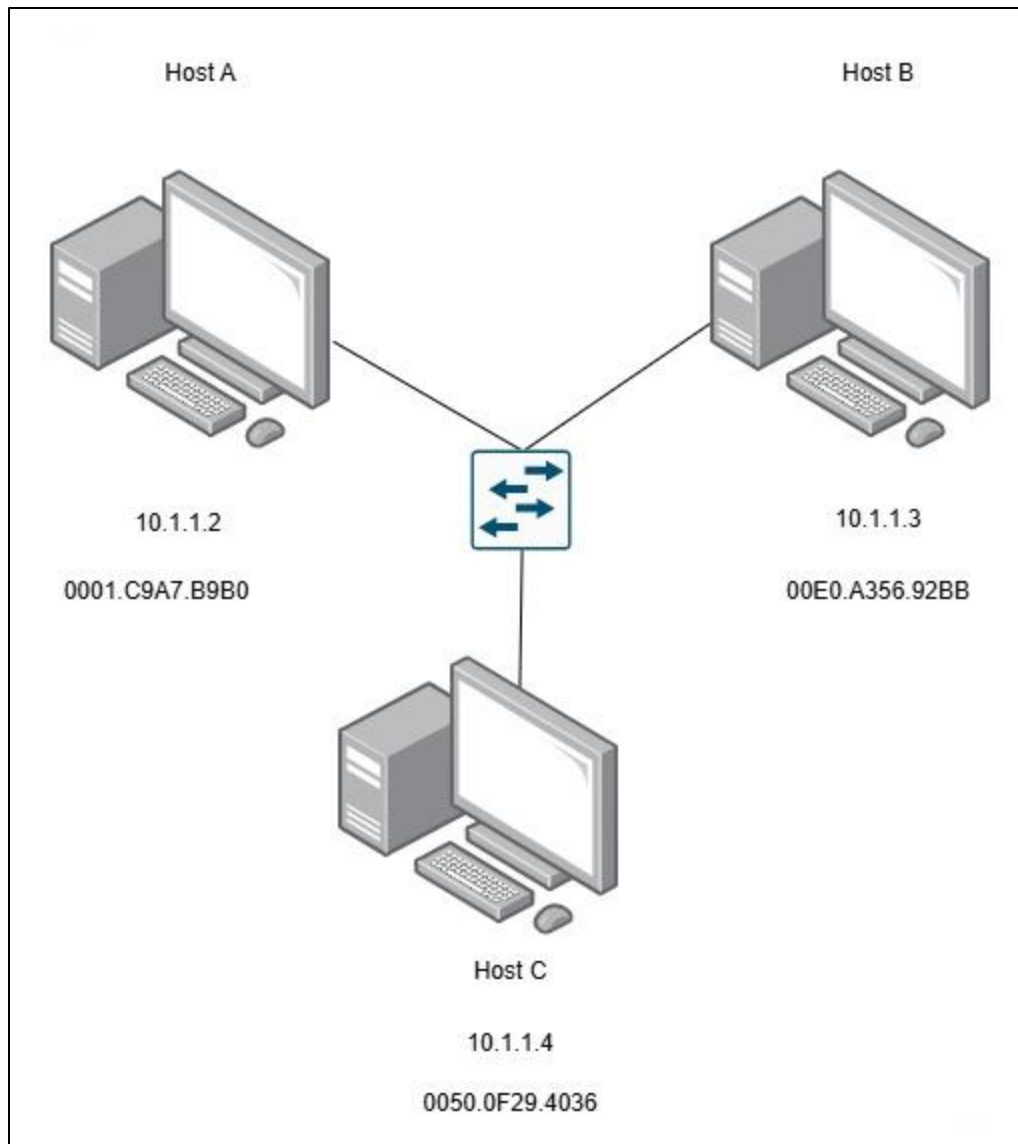


Figure 2 Switch Exploration Topology

TASK 1:

1. Open lab Switch Exploration.
2. Click on the switch and enter **enable** to enter privilege exec mode.
3. Enter the command **show mac address-table**.

As expected, the mac table is empty because the switch has not yet learned the locations and macs of the connected systems.

```
Switch#sh mac address-table
```

Mac Address Table			
Vlan	Mac Address	Type	Ports
----	-----	-----	-----

```
Switch#
```

Figure 2 Empty Mac Address-Table

TASK 2:

1. Select Simulation mode.
2. From Host A, ping Host C
3. Hit play to start the simulation. Pause it once the frame has reached the switch.
4. View the MAC table.

The switch now has an entry in its mac table. Where do you think this information has been learned from? Which systems mac is this?

```
Switch#show mac address-table
```

Mac Address Table			
Vlan	Mac Address	Type	Ports
----	-----	-----	-----
1	0001.c9a7.b9b0	DYNAMIC	Fa0/1

```
Switch#
```

Figure 3 First Mac Table Entry

TASK 3:

1. Restart the simulation. Pause it once the frame has returned to the switch from Host C.
2. View the mac table.

Note that the switch sends the frame out the ports that Host B and C are connected to.

Question: Why did the switch send the frame out both the ports instead of only the one attached to Host B? Is that not a waste of the network currencies? Host B will waste

processing to process a frame not intended for it (addressed to it). Bandwidth is wasted as the frame is sent on a link to a system it was not intended for. Extra traffic on the link with no purpose. Imagine priority traffic needing the link and being held up by frames that should not be.

Answer: The switch flooded the frame to hosts B and C because it had yet to learn exactly where Host C was located. Flooding a frame ensures the destination system specified in the frame, if connected, will receive the frame. Host C's response to Host A's frame allowed the switch to learn which port Host C was located at. The following frames addressed to Host B will now be forwarded out port Fa 0/1. The port connected to Host C has been filtered for those frames.

```
Switch#show mac address-table
      Mac Address Table
-----
Vlan    Mac Address      Type        Ports
----    -
1       0001.c9a7.b9b0    DYNAMIC     Fa0/1
1       0050.0f29.4036    DYNAMIC     Fa0/3
Switch#
```

Figure 4 Second Mac Table Entry

TASK 4:

1. Restart the simulation once again and allow it to play out.

In a similar manner to a switchboard operator, the switch created a logical connection between hosts A and B's ports so that those devices could communicate.

Check out the video walkthrough at <https://youtu.be/jMw8tvshHEE?si=DmqagvsQLZJl4z5K>