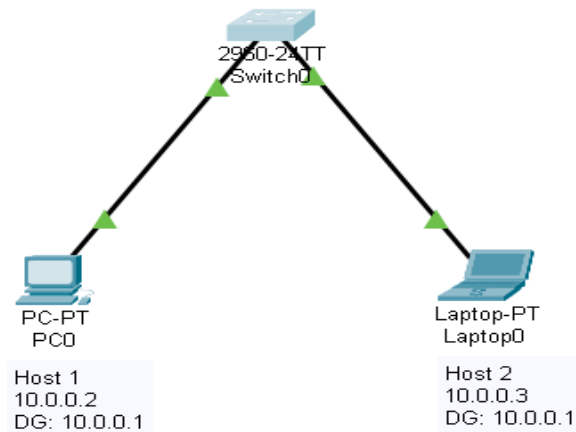


Network Topologies

Topology 1:

1. Created a network topology with a layer 2 switch and two hosts are connected and each host assigned with an ip address and this is a class A network



2 . To check the ip address of the host 1 or PC0 used the command “ipconfig”

3. And then checked the arp cache for the mac addresses of the hosts that are connected in this network.

```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: FE80::209:7CFF:FE64:51B4
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 10.0.0.2
    Subnet Mask . . . . .: 255.0.0.0
    Default Gateway . . . . .: ::
                                10.0.0.1

Bluetooth Connection:

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address . . . . .: ::
    IPv6 Address . . . . .: ::
    IPv4 Address . . . . .: 0.0.0.0
    Subnet Mask . . . . .: 0.0.0.0
    Default Gateway . . . . .: ::
                                0.0.0.0

C:\>arp -a
No ARP Entries Found
C:\>
```

4. I have got the ip address and also there are no entries in ARP cache because till now it hasn't communicated with other hosts so now it will do ARP broadcast.

5. Before doing address we can see that the mac-address table is empty in the layer 2 switch we can see that by using command “**show mac address-table dynamic**”

```
Switch>
Switch>en
Switch#sh
Switch#show mac
Switch#show mac add
Switch#show mac address-table dyna
Switch#show mac address-table dynamic
      Mac Address Table
-----
Vlan    Mac Address      Type    Ports
----    -
Switch#
```

Copy Paste

6. After ARP broadcast the switch will be updated and also in the device cache also we can see the arp records.

```
Switch>
Switch>en
Switch#sh
Switch#show mac
Switch#show mac add
Switch#show mac address-table dyna
Switch#show mac address-table dynamic
      Mac Address Table
-----
Vlan    Mac Address      Type    Ports
----    -
Switch#show mac address-table dynamic
      Mac Address Table
-----
Vlan    Mac Address      Type    Ports
----    -
      1    0004.9aad.88d4    DYNAMIC Fa0/2
      1    0009.7c64.51b4    DYNAMIC Fa0/1
Switch#
```

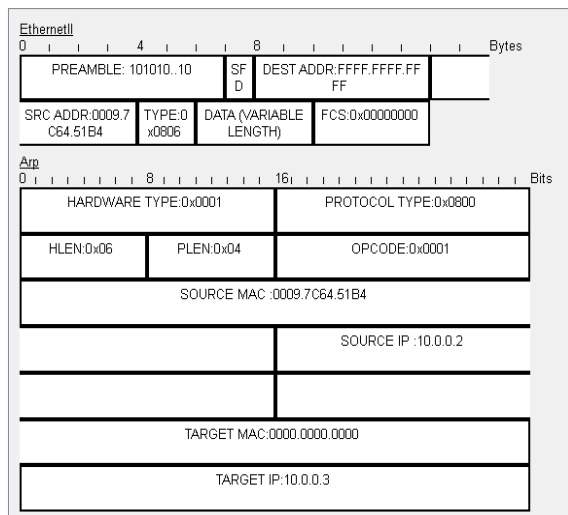
Copy Paste

Switch mac-address Table

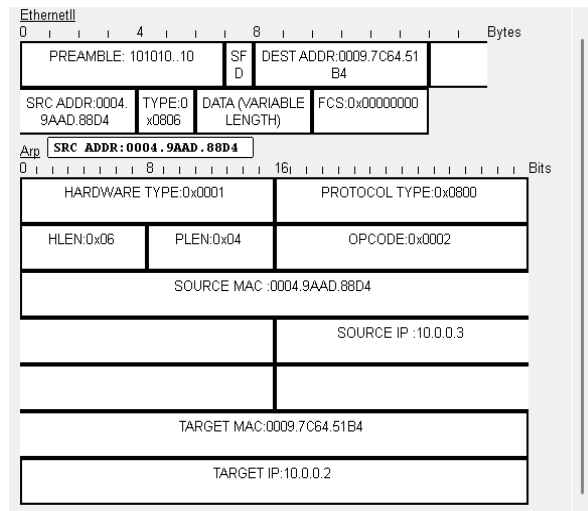
```
C:\>arp -a
No ARP Entries Found
C:\>arp -a
      Internet Address      Physical Address      Type
      10.0.0.3              0004.9aad.88d4        dynamic

C:\>|
```

ARP cache in Host

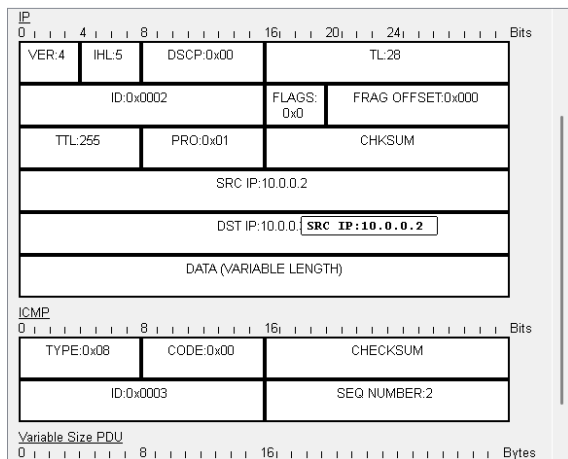


Before ARP Broadcast

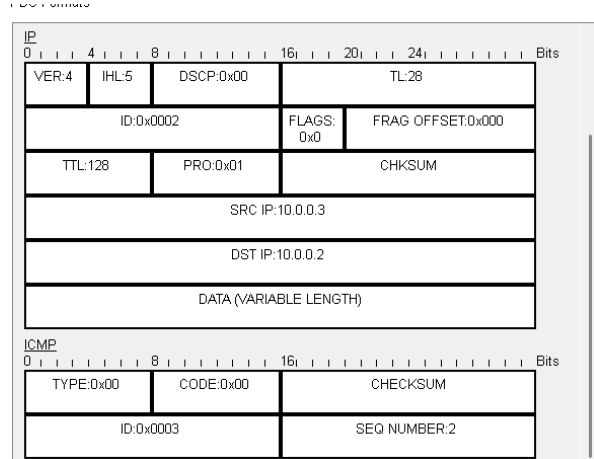


After ARP Broadcast

- When the host does not find the MAC address in its ARP cache, it sends an ARP Request, which the switch forwards as a broadcast.
- Before broadcasting, the host's MAC address will not be present in the ARP protocol header as the destination. In the Ethernet II frame, the destination MAC will be FFFF:FFFF:FFFF, and in the ARP header, the Target MAC will be 0000:0000:0000. Once the ARP Reply is received after broadcasting, the destination MAC address will be known.
- After broadcasting, we can see that Host2 sends the ARP Reply to Host1. The ARP Reply contains the source IP as 10.0.0.3 and the target IP as 10.0.0.2.
- In this ARP Reply, the source MAC address belongs to Host2, and the reply is sent to the target Host1, whose IP address is 10.0.0.2 the one that initiated the ARP broadcast.
- When we try to ping from 10.0.0.2 to 10.0.0.3, this ARP exchange updates the ARP cache of both hosts as well as the MAC address table of the switch.
- After this, the hosts will directly communicate using unicast with the help of the MAC address table and ARP cache.



ICMP Request



ICMP Response

- ICMP is a protocol used to diagnose network issues and check for errors before sending data.
- Ping and tracert are the utilities that use ICMP to achieve this.
- When we ping a destination, the ICMP message type is 0x08 (Echo Request), and the ICMP packet is sent to the destination.
- The response from the destination is an Echo Reply with type 0x00 and the same code as the Echo Request.
- If there is no error, we receive the Echo Reply. If there is an issue, we may get error messages such as Destination Host Unreachable or Destination Port Unreachable.
- Each ICMP error message has a specific type—for example, type 0x03 is Destination Unreachable, and type 0x11 is Time to Live Exceeded.
- There are many such ICMP error messages, each identified by a different type value.