

6. ETHERNET LAN SWITCHING : PART 2

An ETHERNET FRAME looks like:

Ethernet Header — DATA (Packet) — Ethernet Trailer

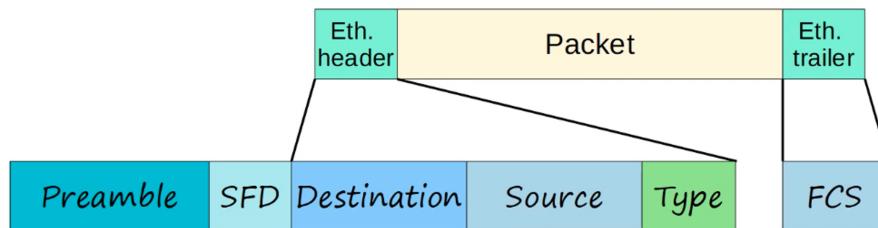


Figure 1: image

The Ethernet Header contains 5 Fields:

Preamble – SFD – Destination – Source – Type/Length 7 bytes – 1 byte – 6 bytes – 6 bytes – 2 bytes

Ethernet Trailer contains 1 Field:

FCS (Frame Check Sequence) = 4 bytes

- The PREAMBLE + SFD is not usually considered part of the ETHERNET HEADER.

THEREFORE the size of the ETHERNET HEADER + TRAILER is 18 bytes
(6 + 6 + 2 + 4 bytes for the FRAME CHECK SEQUENCE)

The MINIMUM size for an ETHERNET FRAME (Header + Payload [PACKET] + Trailer) is 64 BYTES.

64 BYTES - 18 BYTES (Header + Trailer size) = 46 BYTES

THEREFORE the MINIMUM DATA PAYLOAD (PACKET) size is 46 BYTES!

IF the PAYLOAD is LESS than 46 BYTES then PADDING BYTES are added (padding bytes are a series of 0's) until it equals to 46 BYTES.

When a PC sends a packet to a device with an unknown IP address, it uses an ARP Request.

- ARP stands for ‘Address Resolution Protocol’.
- It is used to discover the Layer 2 address (MAC address) of a known Layer 3 address (IP address)

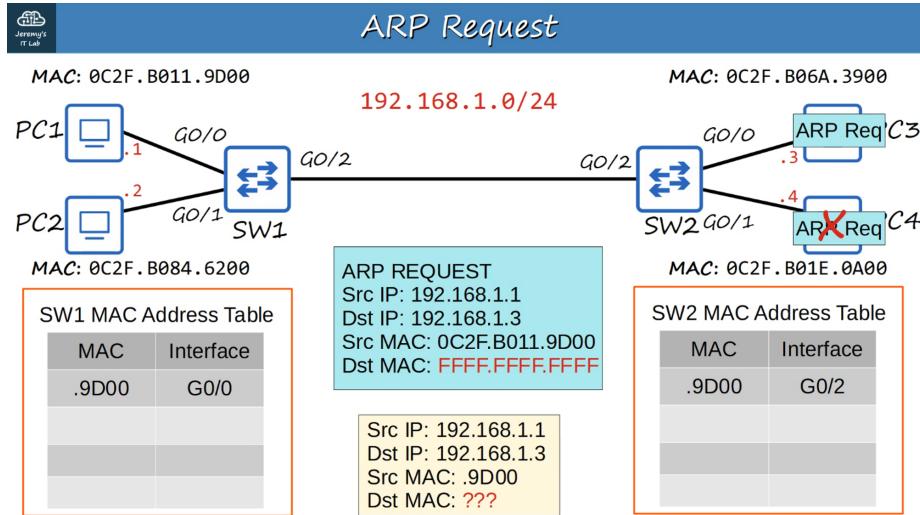


Figure 2: image

- Consists of two messages:
 - ARP REQUEST (Source message)
 - ARP REPLY (Destination message)
- ARP REQUEST is BROADCAST = sent to all hosts on network, except the one it received the request from.

An ARP REQUEST frame has:

- Source IP Address
- Destination IP Address
- Source MAC address
- BROADCAST MAC Address - FFFF.FFFF.FFFF

An ARP REPLY frame has:

- Source IP Address
- Destination IP Address
- Source MAC address
- Destination MAC Address

ARP REPLY is a known UNICAST frame = Sent only to the host that sent the ARP REQUEST.

PING

- A network utility that is used to test reachability
- Measures round-trip time
- Uses two messages:

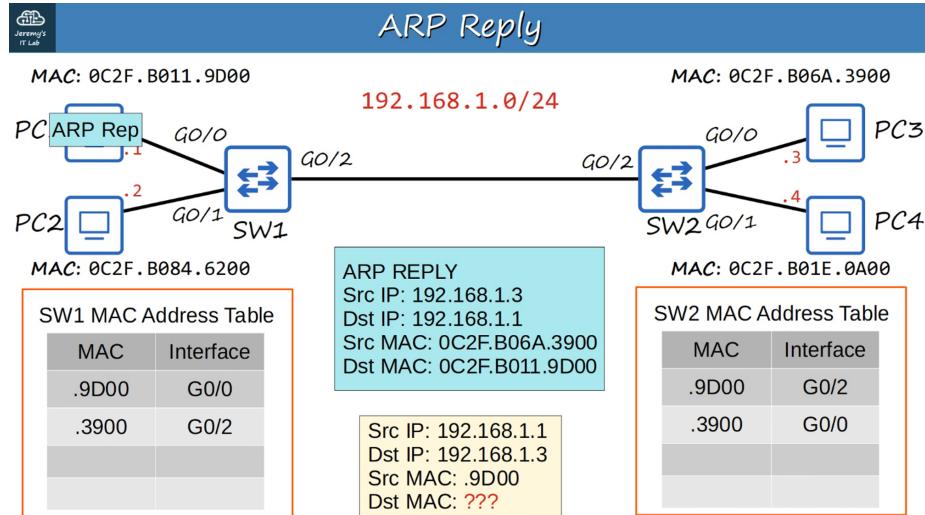


Figure 3: image

- ICMP Echo REQUEST
- ICMP Echo REPLY
- Is UNICAST
- Command to use ping:
 - ping

By Default, a CISCO IOS sends 5 ICMP requests/replies (Default size is 100-bytes)

- A period (.) is a failed ping
- An exclamation mark (!) is a successful ping

USEFUL CISCO IOS COMMANDS (from Privileged EXEC mode)

PC1# show arp // shows hosts ARP table

SW1#show mac address-table // show the switches MAC table

Will show:

Vlan — MAC Address — Type — Ports(interfaces)

(Vlan = Virtual Local Area Network)

SW1# clear mac address-table dynamic

 **ARP Table**

```
C:\Users\user>arp -a

Interface: 169.254.146.29 --- 0x9
  Internet Address      Physical Address      Type
  169.254.255.255        ff-ff-ff-ff-ff-ff    static
  224.0.0.2                01-00-5e-00-00-02    static
  224.0.0.22               01-00-5e-00-00-16    static
  224.0.0.251              01-00-5e-00-00-fb    static
  224.0.0.252              01-00-5e-00-00-fc    static
  239.255.255.250          01-00-5e-7f-ff-fa    static
  255.255.255.255          ff-ff-ff-ff-ff-ff    static

Interface: 192.168.0.167 --- 0xd
  Internet Address      Physical Address      Type
  192.168.0.1            98-da-c4-dd-a8-e4    dynamic
  192.168.0.255          ff-ff-ff-ff-ff-ff    static
  224.0.0.2                01-00-5e-00-00-02    static
  224.0.0.22               01-00-5e-00-00-16    static
  224.0.0.251              01-00-5e-00-00-fb    static
  224.0.0.252              01-00-5e-00-00-fc    static
  239.255.255.250          01-00-5e-7f-ff-fa    static
  255.255.255.255          ff-ff-ff-ff-ff-ff    static
```

Figure 4: image

 **MAC Address Table**

```
SW1#show mac address-table
  Mac Address Table
  -----
  Vlan      Mac Address          Type      Ports
  ----      -----              -----      -----
    1        0c2f.b011.9d00    DYNAMIC   Gi0/0
    1        0c2f.b06a.3900    DYNAMIC   Gi0/2
Total Mac Addresses for this criterion: 2
SW1#
```

Figure 5: image

The screenshot shows a terminal window with the title "Clearing the MAC Address Table". The window displays the following sequence of commands and outputs:

```

SW1#show mac address-table
Mac Address Table
-----
Vlan   Mac Address        Type      Ports
-----  -----  -----  -----
clear mac address-table dynamic
Total Mac Addresses for this criterion: 2
SW1#clear mac address-table dynamic
SW1#show mac address-table
Mac Address Table
-----
Vlan   Mac Address        Type      Ports
-----  -----  -----  -----
SW1#

```

A yellow box highlights the command `clear mac address-table dynamic`. A red box highlights the output of the command `SW1#clear mac address-table dynamic`, which shows that two entries were cleared.

Figure 6: image

// clears the entire switches MAC table. // IF the optional MAC address is used, it will clear the SPECIFIC MAC address.

SW1 #clear mac address-table dynamic interface

// clears the MAC table entry of the Switch by it's **INTERFACE name**.