Ethernet LAN Switching

- LANS: (Local Area Networks) network contained with the same area.
Routers connect different LANs and not switches.
- Frame PDU of data link layer:
- header:
1- Preamble → 7 bytes of alternating ones and zeroes to synchronize receivers' clocks [10101010].
2- SFD → start frame delimiter is a one byte to indicate the end of preamble [10101011].
3- Dest, Source → 6 bytes mac addresses.
4- 2 bytes length field if smaller than 1500 and type field if larger than 1536.
tailer:
FCS (frame check sequence): a 4 bytes CRC check for received data corruption detection.
Preamble + SFD are usually not considered a part of Ethernet header but included with Ethernet frame.
Minimum encapsulated packet size (payload) is 46 bytes otherwise zero bytes padding are added.
Minimum packet size is 64 bytes otherwise padding is added.

MAC (Media Access Control) address or BIA (burned in address)
Globally unique and can be locally unique.
The first three bytes is OUI (organizationally unique identifier).
The last three bytes are unique to each device.
Has 12 hexadecimal chars.
Unicast frame: for a single target.
Dynamically learned mac address: detected by switch automatically through source MAC address   of frame and added to MAC address table (MAC → Interface).
For unknown unicast frames that are not in mac address table frame is flooded
Known frames are forwarded.
Mac addresses are removed from MAC address table after 5 minutes of inactivity.(Aging).

ARP (address resolution protocol) to discover layer 2 address (MAC) of a known layer 3 address (IP)
ARP request is a broadcast while ARP response is a unicast.
FFFF.FFFF.FFFF.FFFF → broadcast MAC address.
arp -a command to show ARP table: Internet address → IP, Physical address → MAC, type static → default entry and dynamic learned via ARP.

Ping → a network utility to test reachability and round trip time using ICMP echo request and ICMP echo reply and must know mac address of destination thus ARP is used first.
ping <ip-address> (size <size>) optional.
Typically 5 requests are sent of default size 100 bytes . → failing ping and ! → successful ping
In cisco ios ARP command is show arp from privileged exec mode.
Show mac address-table is the command to show MAC address table.
Result : VLAN (virtual LAN) Mac address , type , port.
Clear mac address-table dynamic (address <address> optional) or (interface <interface-id>optional) → command to remove dynamic mac addresses from MAC address table.