TCP/IP Protocol Suite

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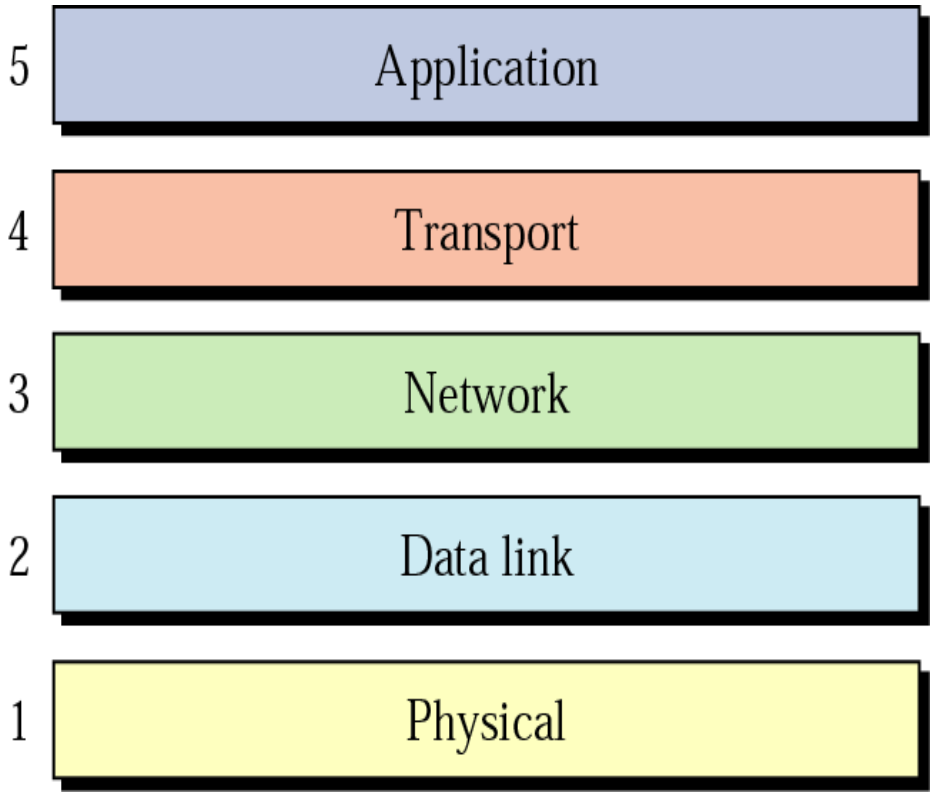
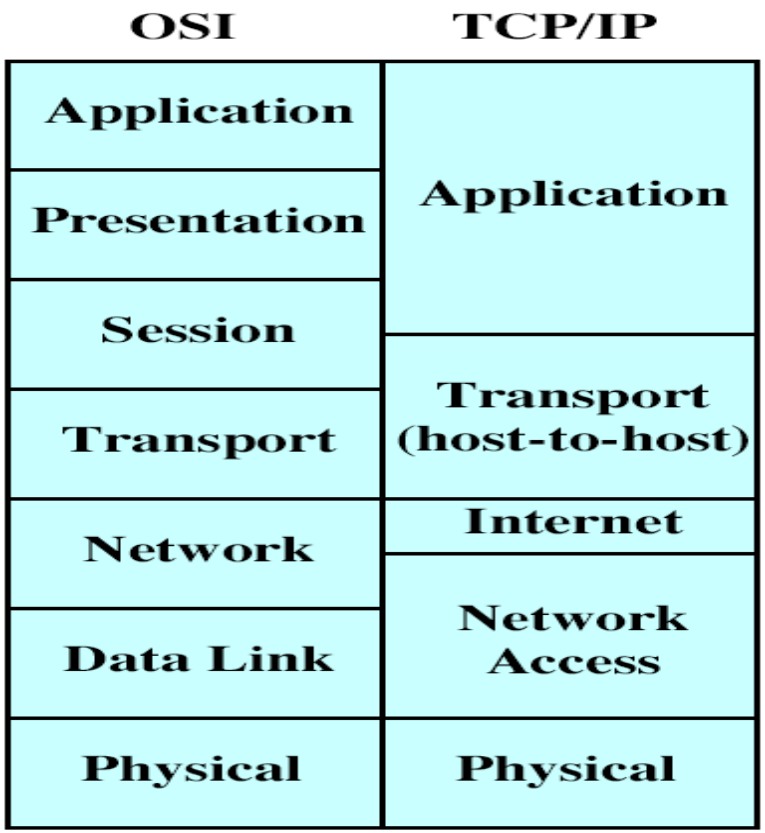
- The Internet Protocol Suite (commonly known as TCP/IP) is the set of communications protocols used for the Internet and other similar networks.
- It is named from two of the most important protocols in it:
- the Transmission Control Protocol (TCP) and
- the Internet Protocol (IP), which were the first two networking protocols defined in this standard.

TCP/IP

- Transmission Control Protocol/Internet Protocol
- Developed by DARPA
- No official protocol standard



TCP/IP - OSI Comparison



TCP/IP Protocols

OSI Layer Equivalent	TCP/IP Layer	TCP/IP Protocol Examples
Application, session, presentation	Application	NFS, NIS, DNS, LDAP, telnet, ftp, rlogin, rsh, rcp, RIP, RDISC, SNMP, and others
Transport	Transport	TCP, UDP, SCTP
Network	Internet	IPv4, IPv6, ARP, ICMP
Data link	Data link	PPP, IEEE 802.2
Physical	Physical network	Ethernet (IEEE 802.3), Token Ring, RS-232, FDDI, and others

Physical Network Layer

- The physical layer is responsible for movements of individual bits from one hop (node) to the next.
- The **physical network layer** specifies the characteristics of the hardware to be used for the network. For example, physical network layer specifies the physical characteristics of the communications media.
- The physical layer of TCP/IP describes hardware standards such as IEEE 802.3, the specification for Ethernet network media, and RS-232, the specification for standard pin connectors.

Data Link Layer

- The data link layer is responsible for moving frames from one hop (node) to the next over the link.
- The link can be Wired LAN/WAN or Wireless LAN/WAN.
- Some protocols provides complete error detection and correction, some protocols provide only error correction.
- At the Datalink layer addresses are called MAC Address.
- Examples of data-link layer protocols are Ethernet IEEE 802.2 framing and Point-to-Point Protocol (PPP) framing.

Internet/Network Layer

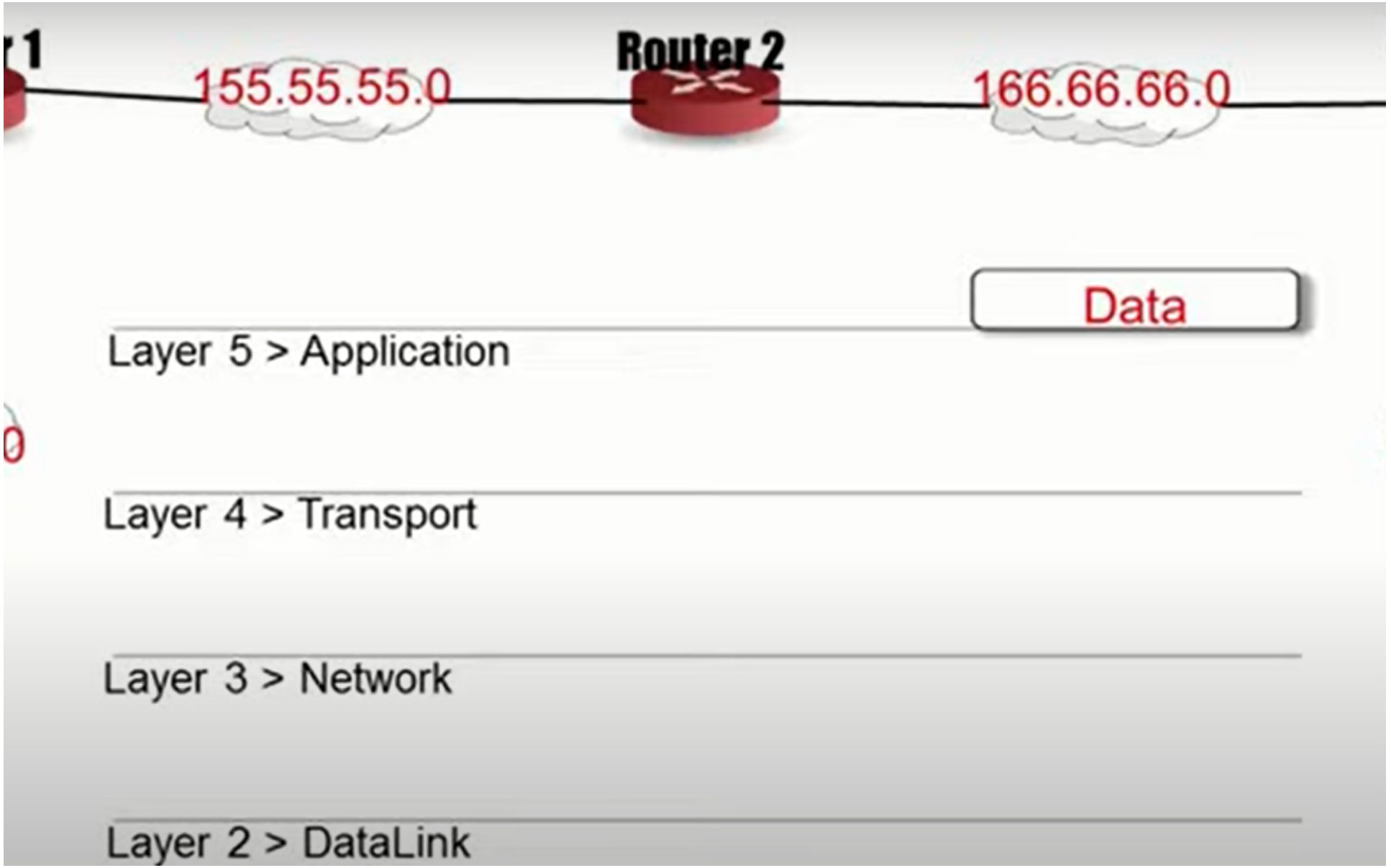
- The Internet layer, also known as the **network layer** or **IP layer**, accepts and delivers packets for the network.
- The network layer is responsible for the delivery of individual packets from the source host to the destination host across multiple network.
- The network layer also response for routing the packet.
- This layer includes the powerful Internet Protocol (IP), the Address Resolution Protocol (ARP), and the Internet Control Message Protocol (ICMP).

Transport Layer

- The transport layer is responsible for the delivery of a message from one process to another.
- At the Transport layer addresses are called Port Address.
- TCO/IP model defines 3 protocols :
    - TCP (Transmission Control Protocol)
    - UDP (User Datagram Protocol)
    - SCTP(Stream Control Transmission Protocol)

Application Layer

- The application layer exchange messages between each other.
- TCP/IP model defines the following protocols:
  - FTP:File transfer protocol is used for transferring files from one host to another .
  - Telnet: A service that enables users on the internet to log onto remote systems from their own host system.
  - HTTP: Hyper text transfer protocol used for network file transfers in WWW environment
  - SMTP: Simple mail transfer protocol used to send electronic mail on the internet.


1
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Router 2
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Data
Layer 5 > Application
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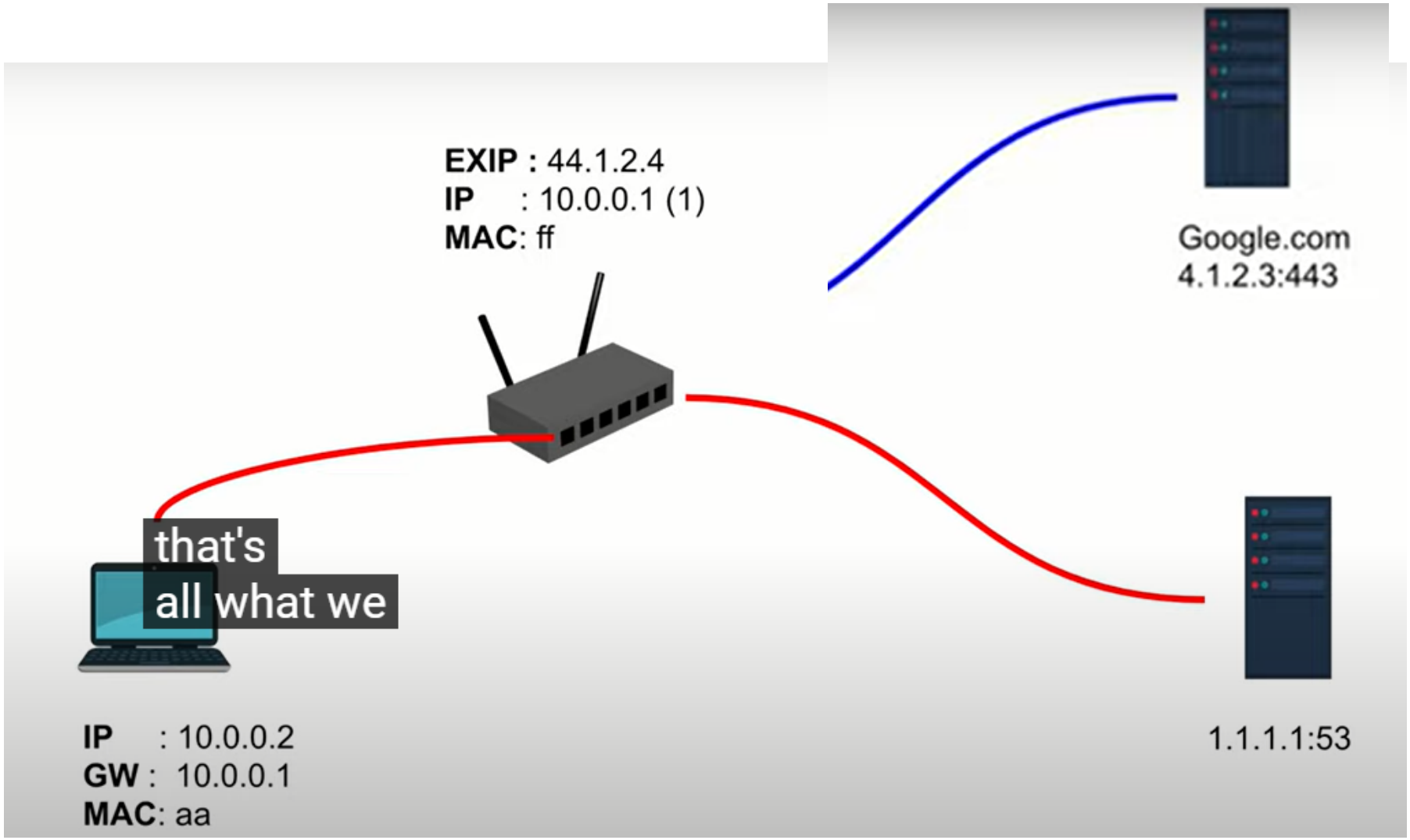
Layer 4 > Transport
Layer 3 > Network
Layer 2 > DataLink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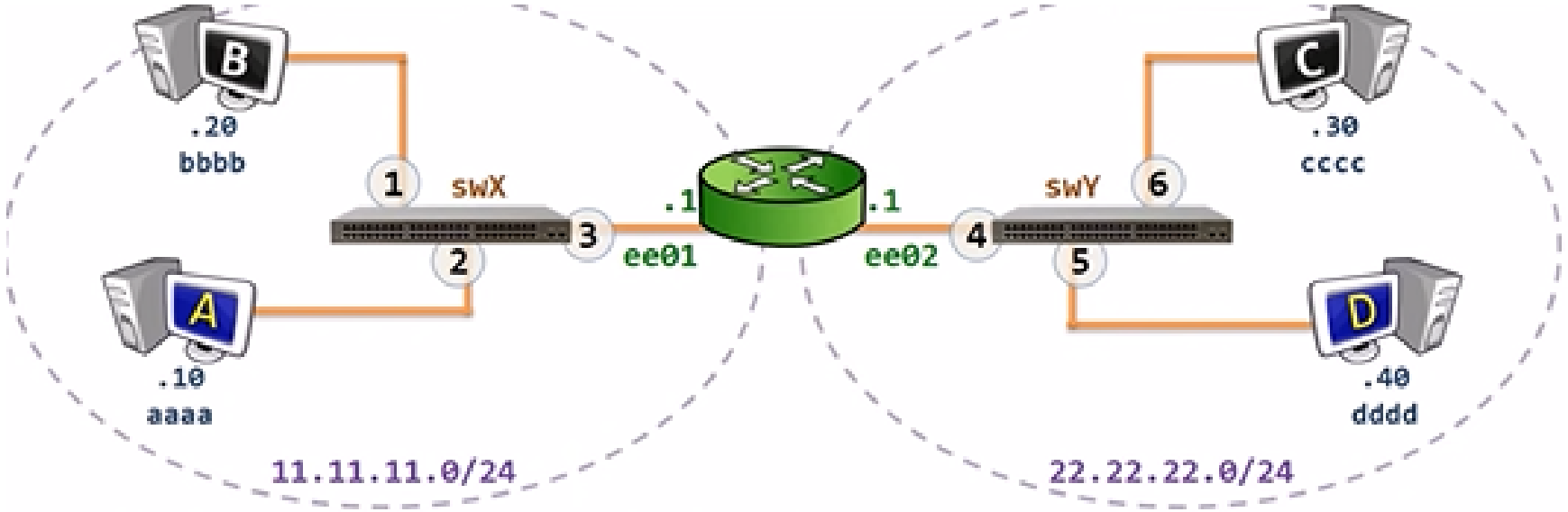
MAC: ff
Google.com
4.1.2.3:443
that's
all what we
IP : 10.0.0.2
GW : 10.0.0.1
MAC: aa
1.1.1.1:53



- **ARP Table** – mapping of **IP addresses** to **MAC addresses**
- **MAC Address Table** – mapping of **Switchports** to **MAC addresses**
- **Routing Table** – mapping of **IP Networks** to **Interfaces**