A unique opportunity for you to be mentored by Amazonians

BeSA

Become a Solutions Architect

Batch 04

Week 3

22-July-2023

Today's Session

Week 3
22-July

Agenda

- Physical vs. Logical Addressing
- Network Devices
  - Switch
    - How a switch switches?
  - Router
    - How a router routes?
- Terminologies

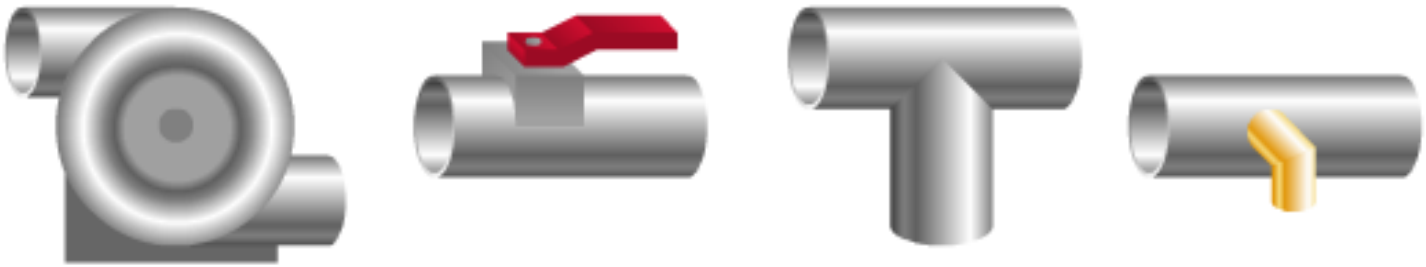
Physical vs Logical Addressing

- Mobile No.
  - 10 digit logical addresses
  - Assigned by mobile service provider
  - Format: 0123456789
- IMEI Number
  - International Mobile Equipment Identity
  - 15-digit physical address
  - Assigned by device manufacturer
  - Format: AA-BBBBBB-CCCCCC-D
- IP Addresses
  - Logical Addresses
  - Mostly assigned by DHCP server
  - Can be assigned manually
  - Format: x.x.x.x (32 bit)
  - Format: y:y:y:y:y:y:y:y (128 bit)
- MAC Addresses
  - Media Access Control
  - Physical Addresses
  - Assigned by device manufacturer
  - Format: XX:XX:XX:XX:XX:XX (48/64 bit)

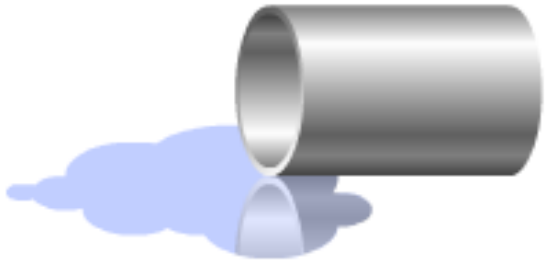
Some analogies

Bandwidth is like pipewidth.

Network devices are like pumps, valves, fittings, and taps.

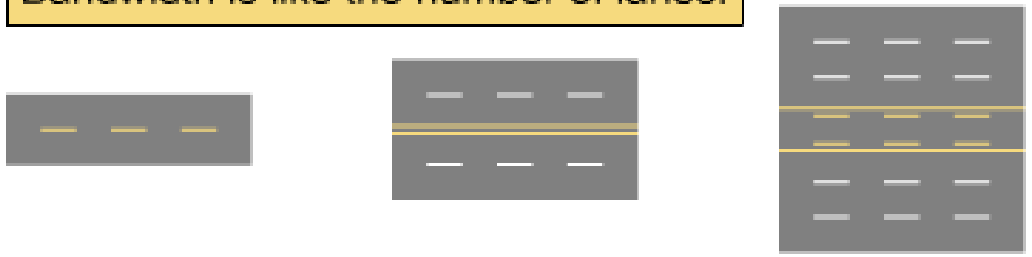


Packets are like water.



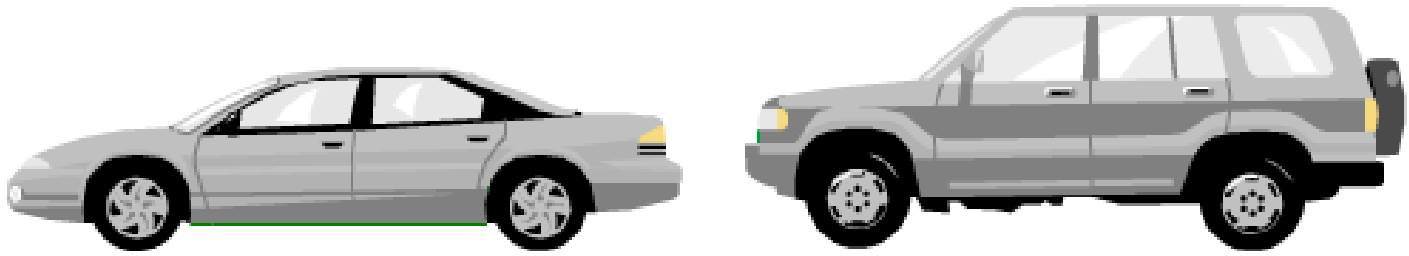
Some analogies

Bandwidth is like the number of lanes.

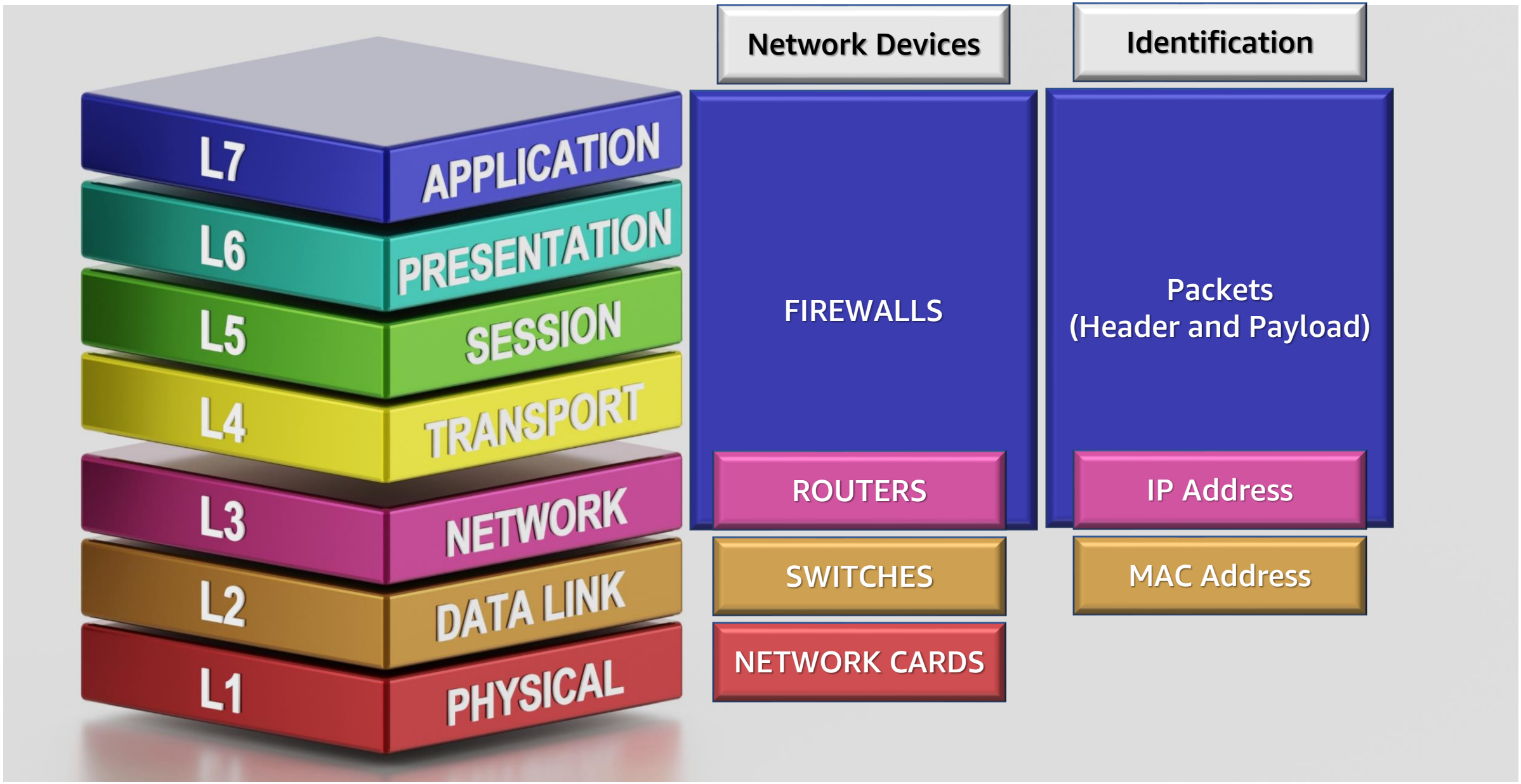


Network devices are like on-ramps, traffic signals, signs, and maps.

Packets are like vehicles.

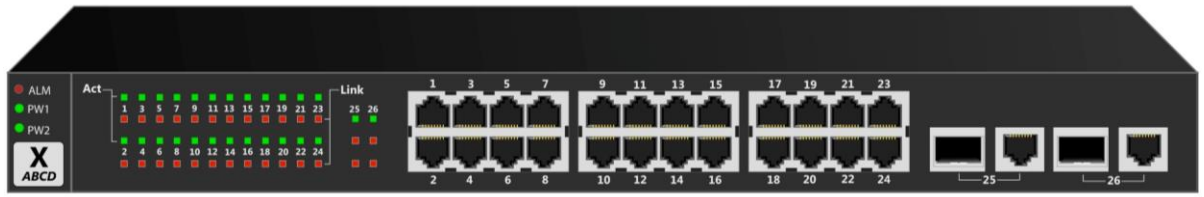


OSI Model


L7
APPLICATION
L6
PRESENTATION
L5
SESSION
L4
TRANSPORT
L3
NETWORK
L2
DATA LINK
L1
PHYSICAL
Network Devices
FIREWALLS
ROUTERS
SWITCHES
NETWORK CARDS
Identification
Packets
(Header and Payload)
IP Address
MAC Address

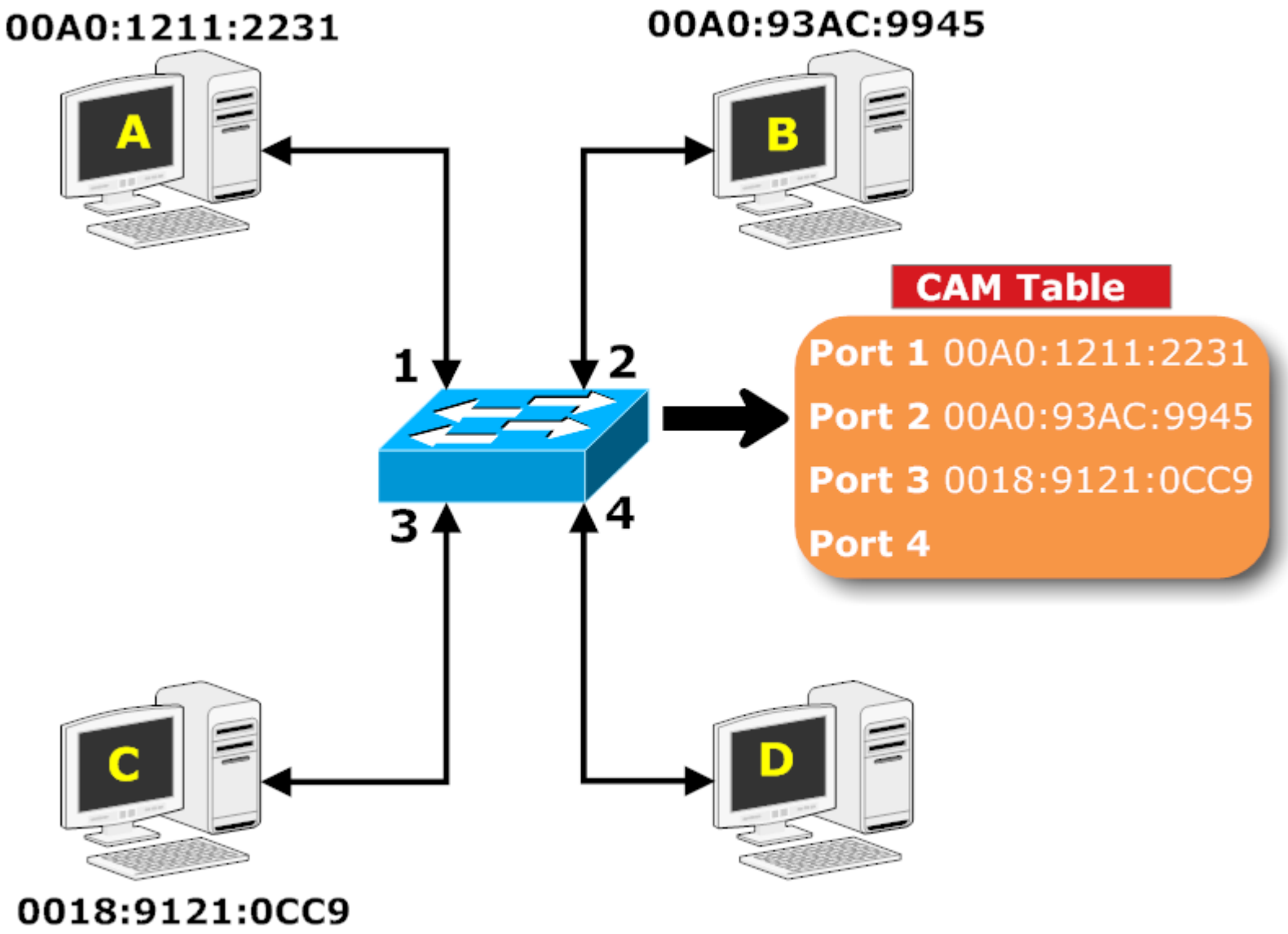
Switches

- A network switch forwards data between connected devices.
- Managed vs. Unmanaged switches



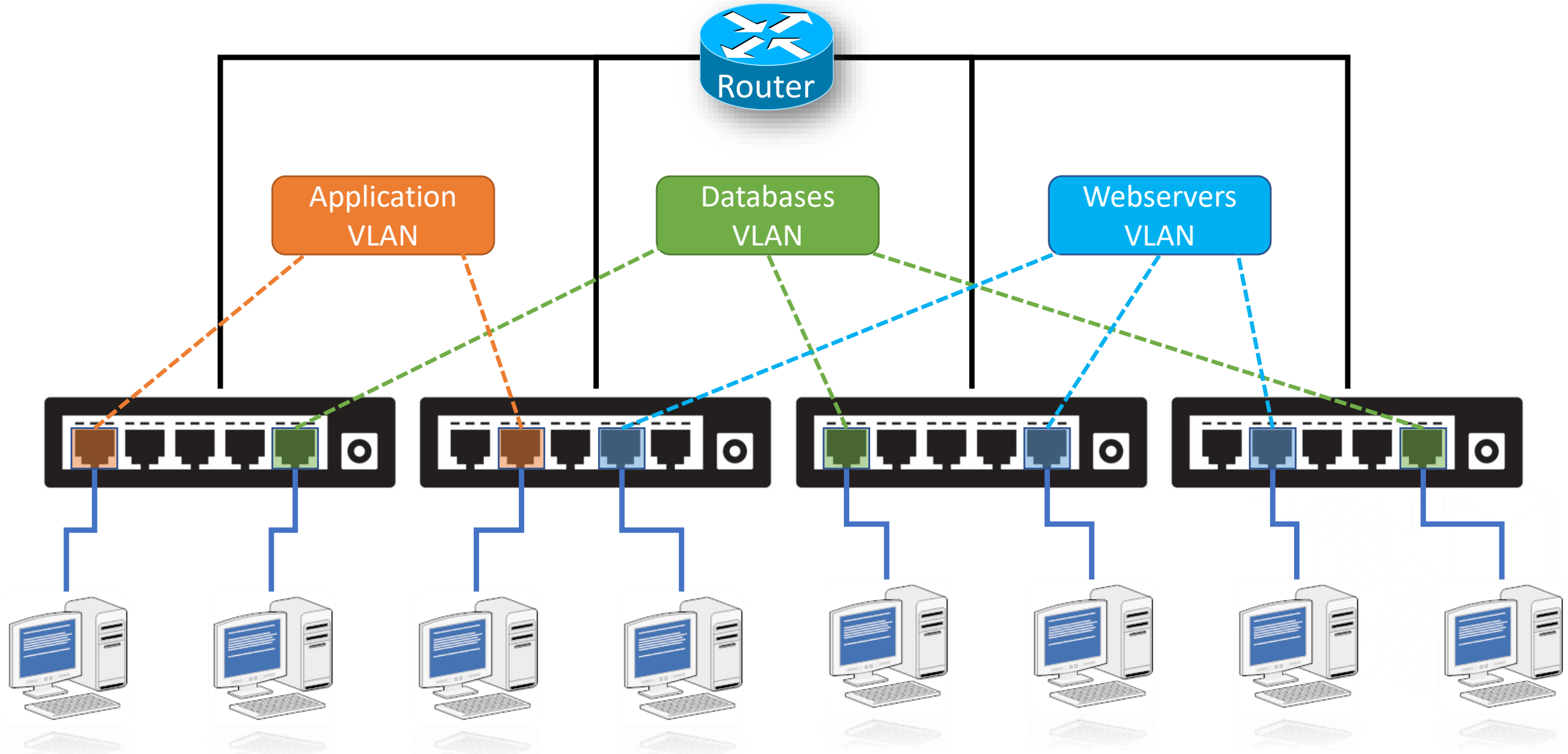
How a switch switches?

- A switch maintains a CAM Table (Content Addressable Memory) by learning MAC addresses of each devices connected at its ports.
- Mostly in 15-30 seconds switch learns all MAC address tables
- If switch at first not knows the MAC address of a particular device it uses broadcast



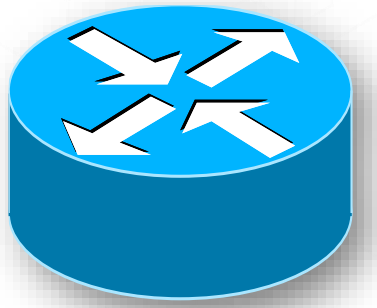
Virtual LAN (VLAN)

- VLANs break up one physical Switch into multiple logical switches.



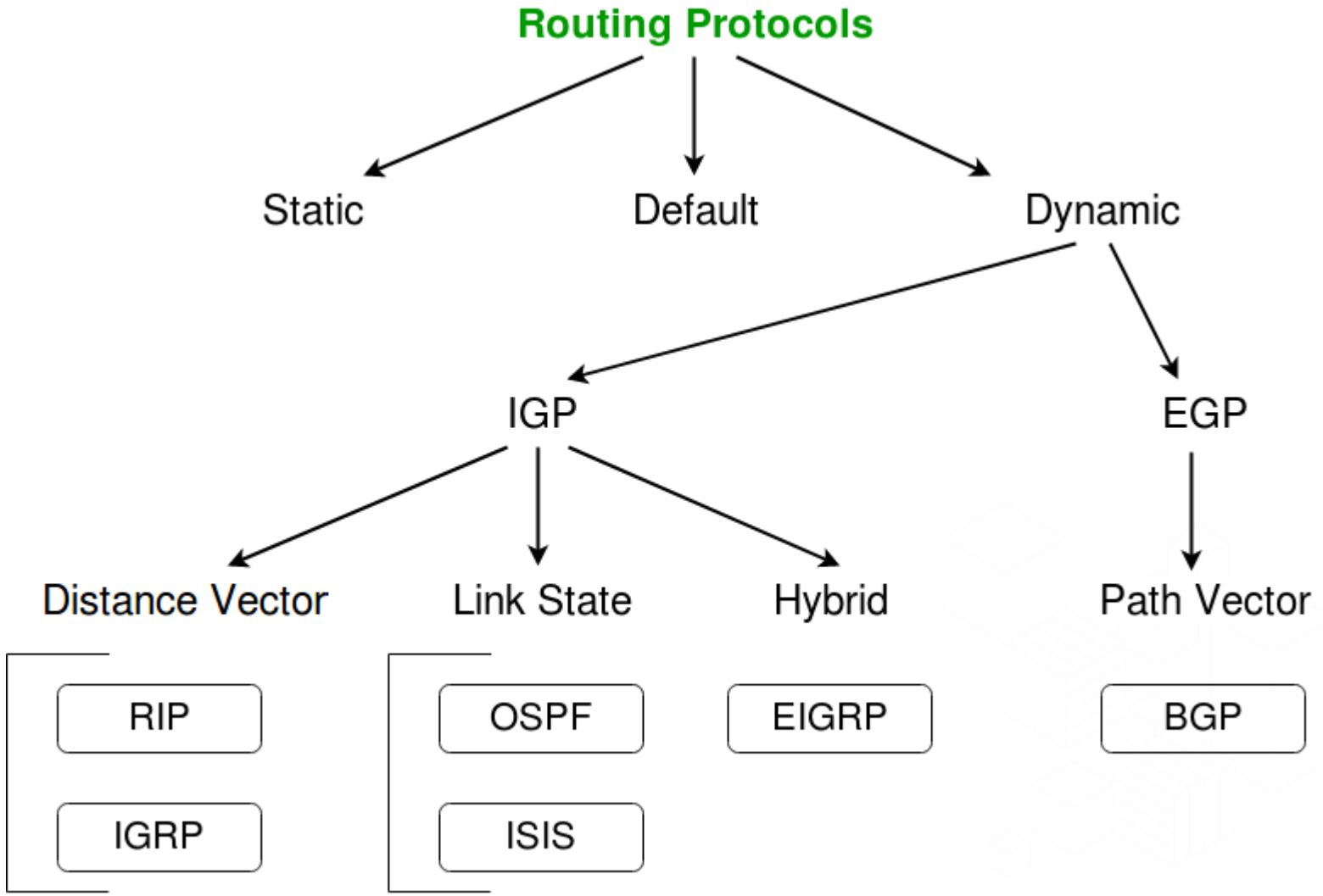
What is a Router?

- A Router is a device which makes communication possible between different networks.
- Router is a special type of computer whose software and hardware are usually tailored to the tasks of routing and forwarding information.
- Routing is the process of moving packets from one network to another network.
- Routing involves two basic activities
  - Determining best paths
  - Forwarding packets through these paths



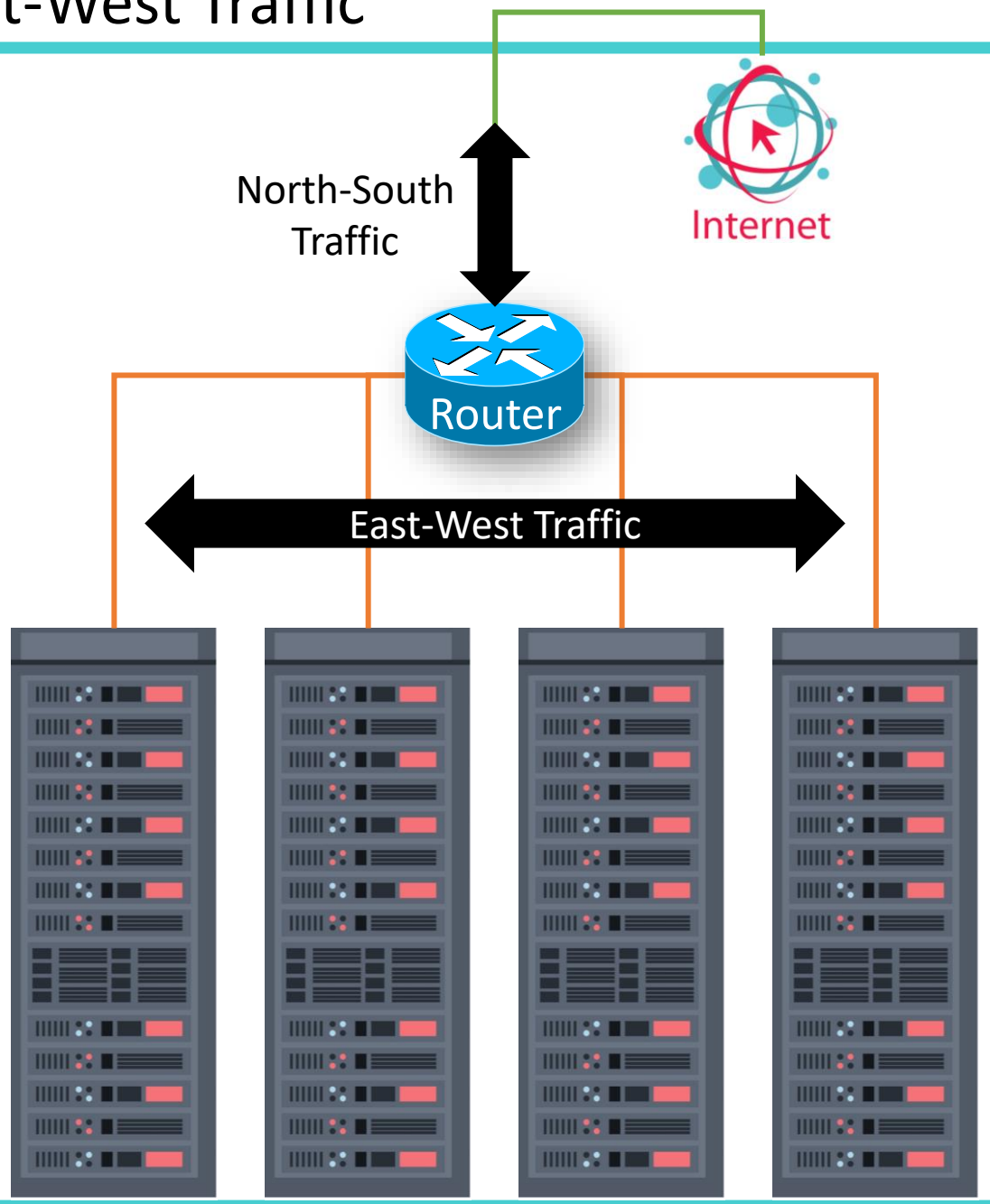
Routing Protocols

- Routing protocols allows routers to exchange routing information.
  - IGRP
  - EIGRP
  - RIP
  - BGP
  - OSPF

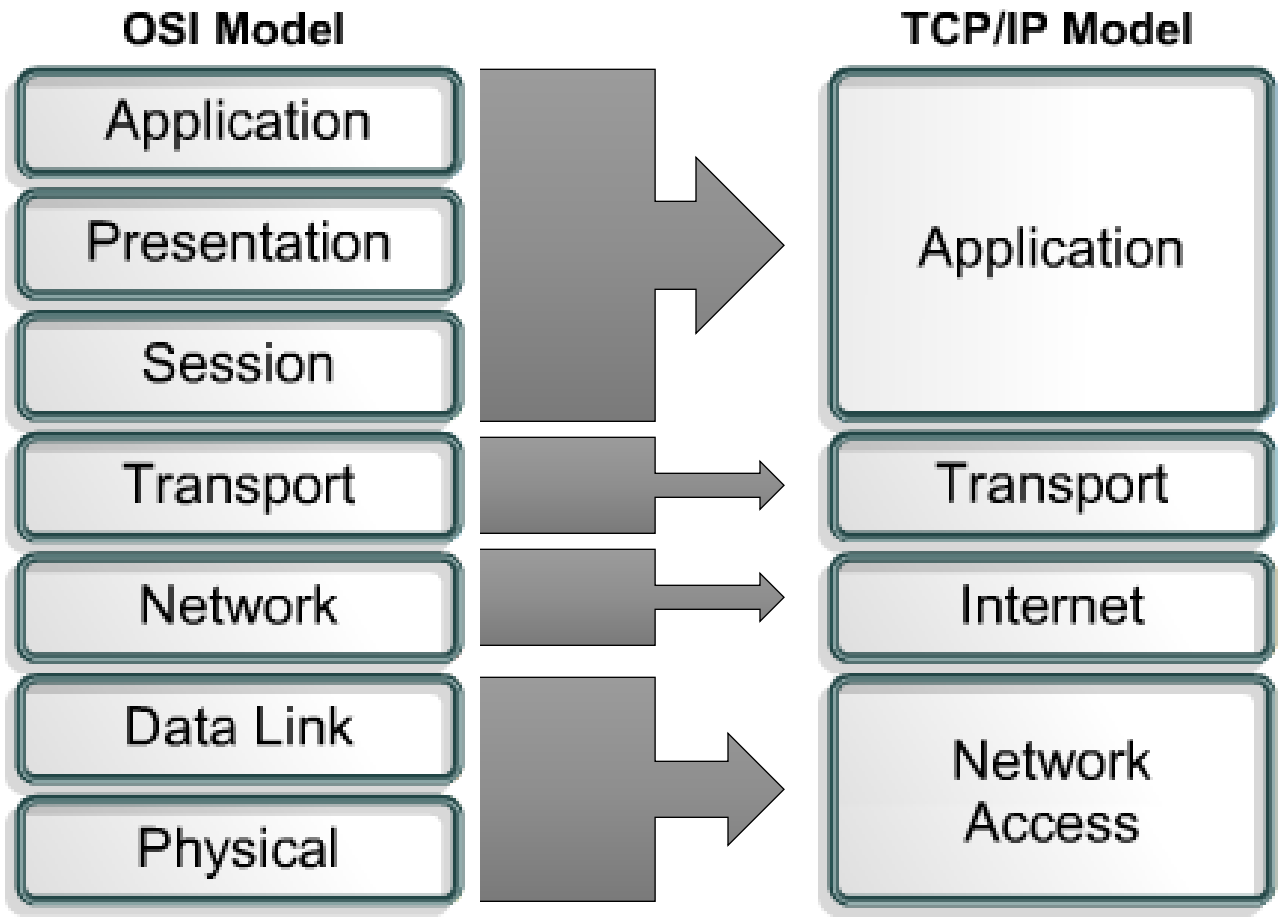


Terminologies

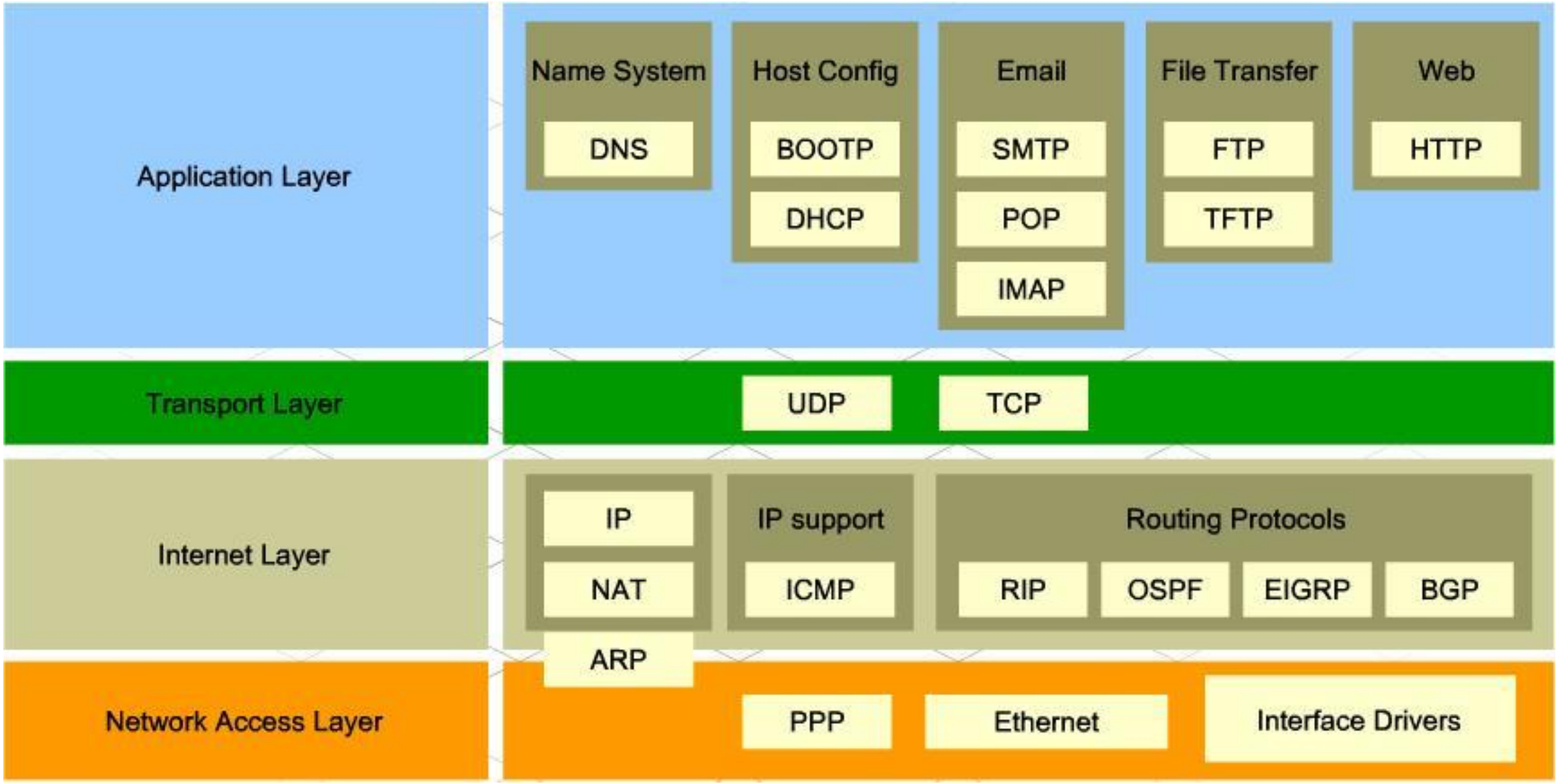
North-South and East-West Traffic



TCPI/IP Stack



TCP/IP from Inside



TCP & UDP Communication

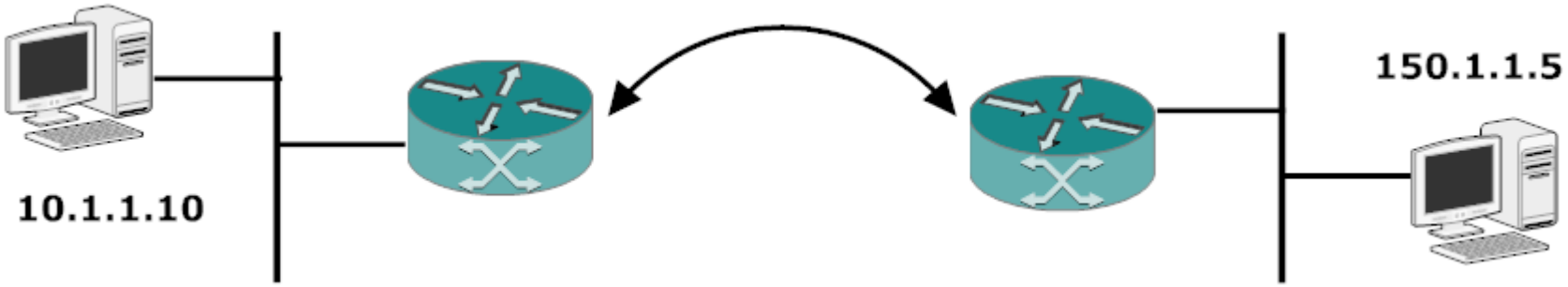
TCP or UDP
IP Address **x.x.x.x**
MAC Address **xx.xx.xx.xx.xx.xx**

Transport
Network
Data Link
Physical

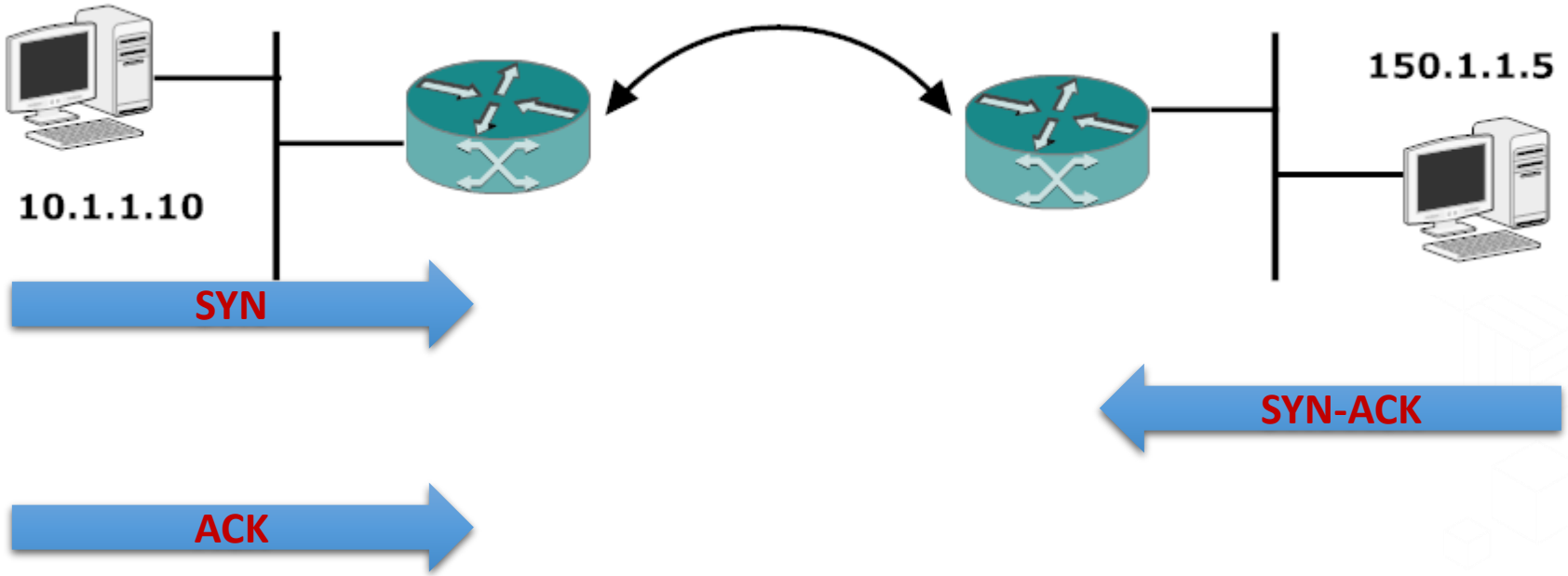
TCP	UDP
Builds connection	Connectionless
Uses Sequence Number	Best effort delivery
Reliable (uses ACKs)	Unreliable

How UDP & TCP Works?

- UDP



- TCP (3 way handshake)



TCP & UDP usage

- The protocols that use TCP include:
  - FTP (File Transfer Protocol)
  - HTTP (Hypertext Transfer Protocol)
  - SMTP (Simple Mail Transfer Protocol)
  - Telnet

- The protocols that use UDP include:
  - TFTP (Trivial File Transfer Protocol)
  - SNMP (Simple Network Management Protocol)
  - DHCP (Dynamic Host Control Protocol)
  - DNS (Domain Name System)

TCP Acknowledgement

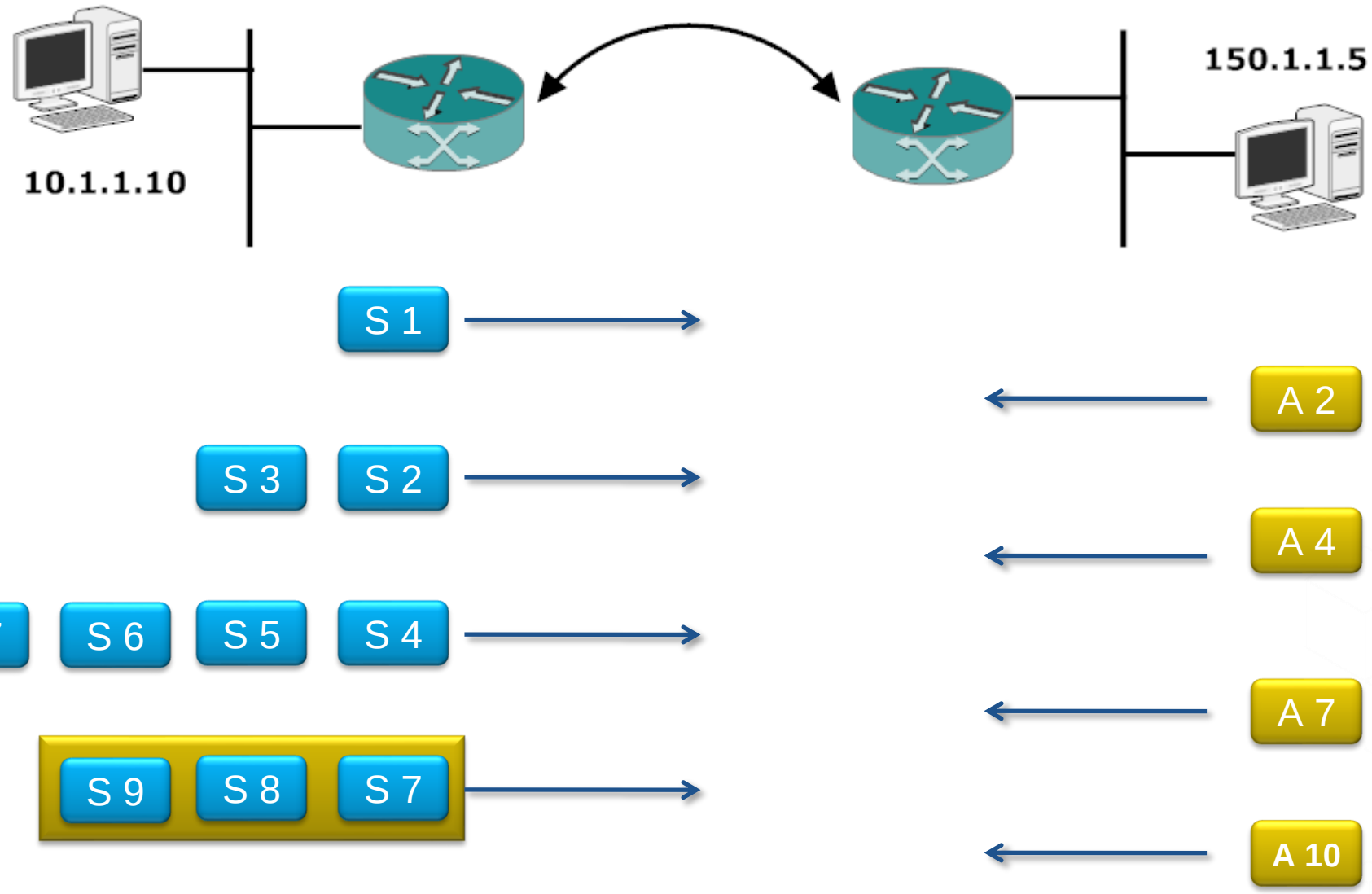
SEQ 10 →

← SEQ 5 | ACK 11

SEQ 11 | ACK 6 →

← SEQ 6 | ACK 12

TCP Windowing



Port Numbers

- Every time an application communictate over the network, it must not only choose the protocol but it also has to generate some port numbers

- The port numbers are divided into three ranges:

  - The Well Known Ports are those from 0 through 1023.
  - The Registered Ports are those from 1024 through 49151
  - The Dynamic and/or Private Ports are from 49152 through 65535

Some common port numbers

- TCP
  - 21 FTP
  - 22 SSH
  - 23 Telnet
  - 25 SMTP
  - 53 DNS Server
  - 80 HTTP
  - 110 POP3
  - 443 HTTPS
- UDP
  - 53 DNS Client
  - 69 TFTP

TCP Applications are more common than UDP

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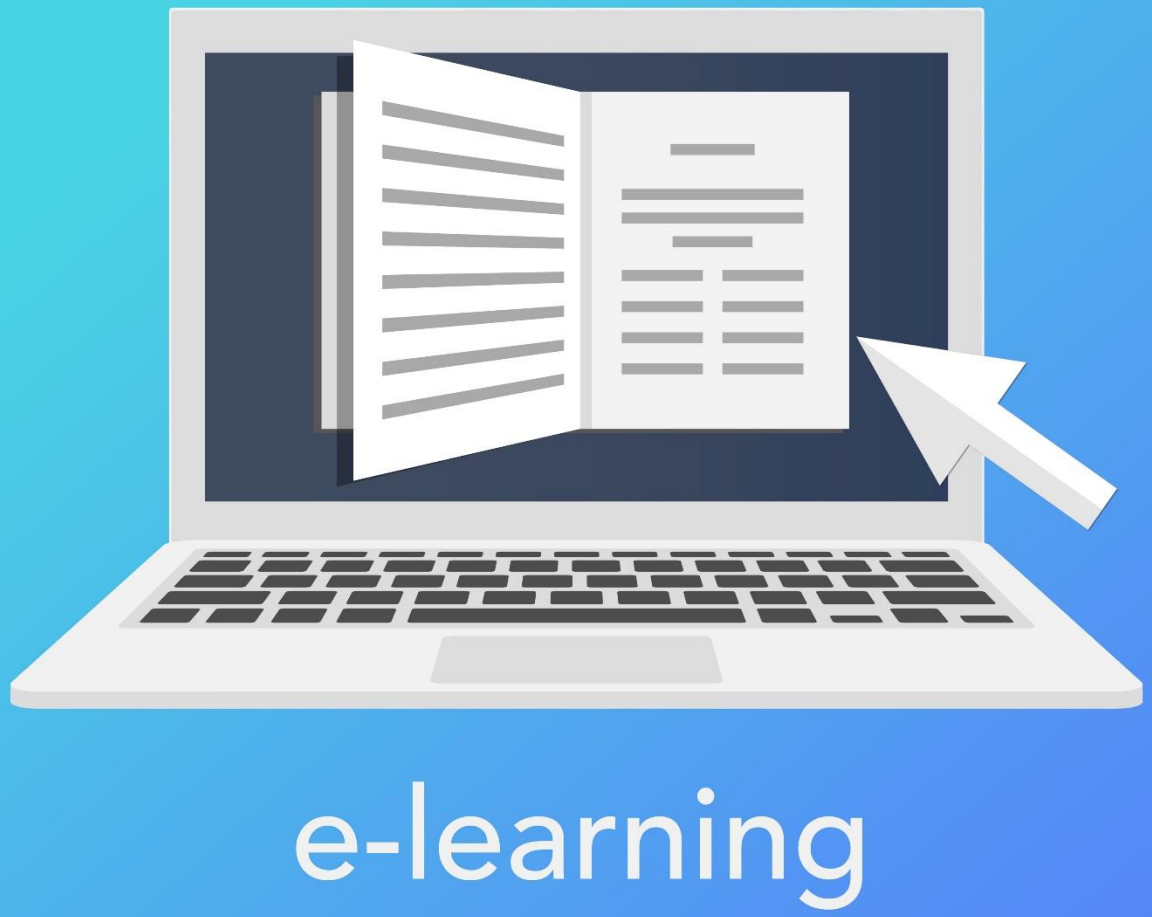
5 Minutes Break

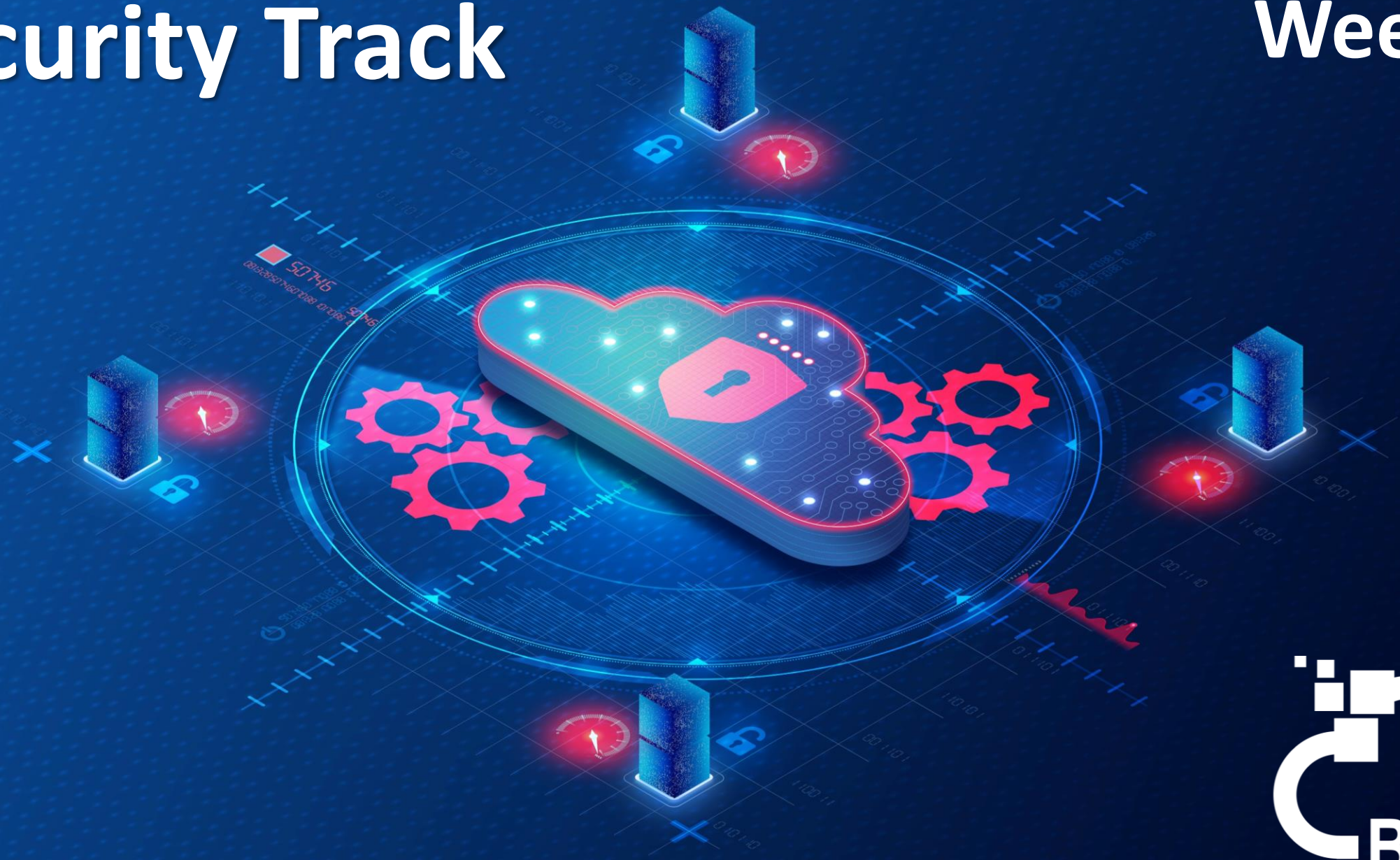
If you are back type in chat…

Your favourite e-learning portal?



Security Track

Week 3



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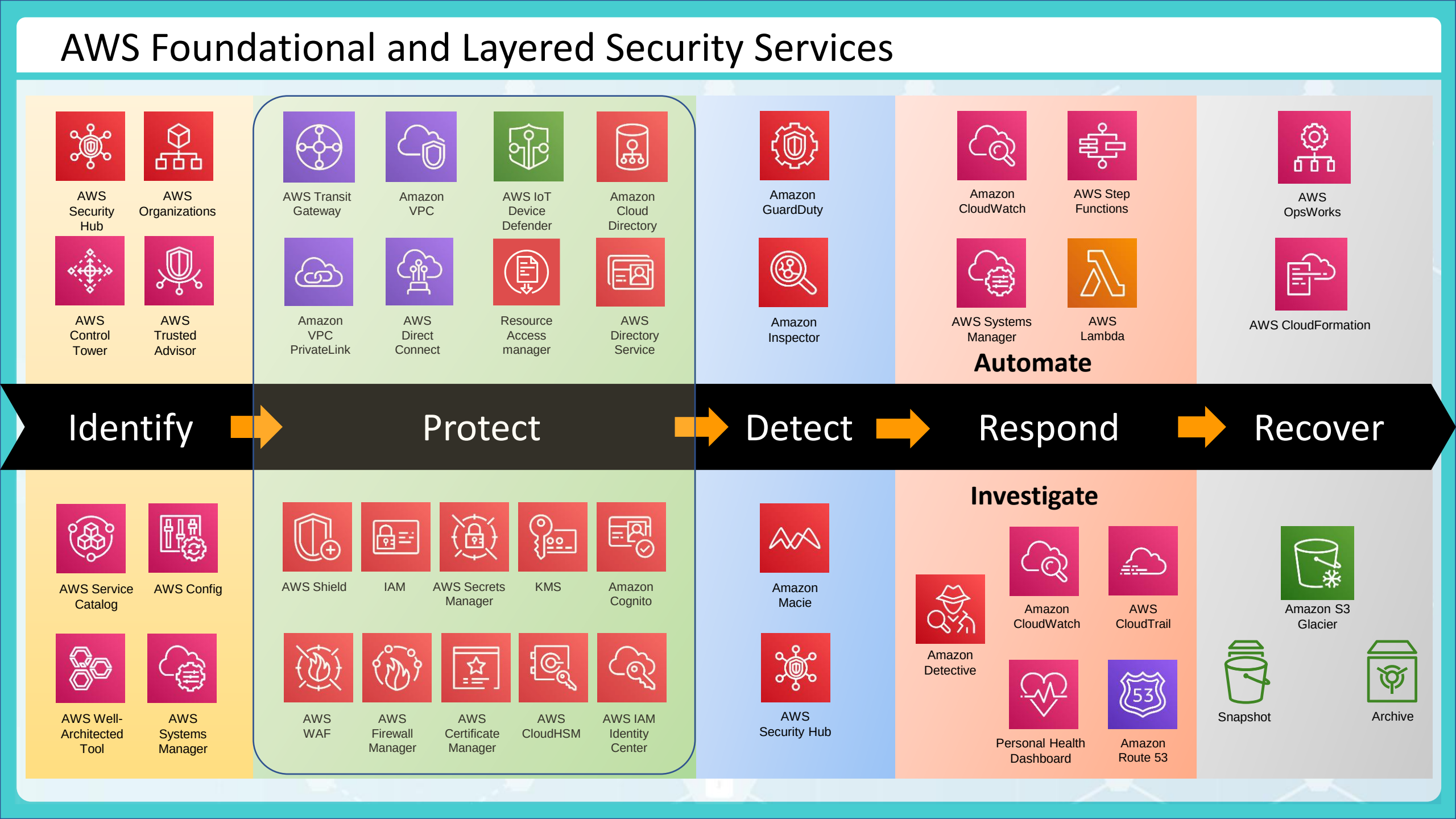
AWS Foundational and Layered Security Services



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