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Computer Networks

Network Models - Assignment 2

By :

0xSaad / Saad Almalki

Topics

- Introduction to Networks Models
- Introduction to ISO
- OSI Model
- TCP/IP Model
- Layers
- OSI vs TCP/IP
- Protocols and services
- Data Centers

Introduction

Network used Layers and Layered Models for Network Architecture.

Using a layered model for network architecture is not an unusual thing

ISO

ISO stand for the International Standards Organization , Founded in 1947.

It defines worldwide agreement on international standards



ISO and OSI

ISO in 1970s introduced a standard for networks and networks communications.

OSI is “Open Systems Interconnected” network model , Have 7 Layers and used from 1970s to late 1980s (Around 1988) – Mid 1990s (Around 1995).

ISO Another Example

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The screenshot shows the ISO website's header with navigation links: Standards, Sectors, About ISO, Insights & news, Taking part, and Store. Below the header is a large image of server racks in a data center. At the bottom left, there is a red link labeled "← Popular standards". The main content area features the text "ISO/IEC 27000 family" and "Information security management".

← Popular standards

ISO/IEC 27000 family

Information security management

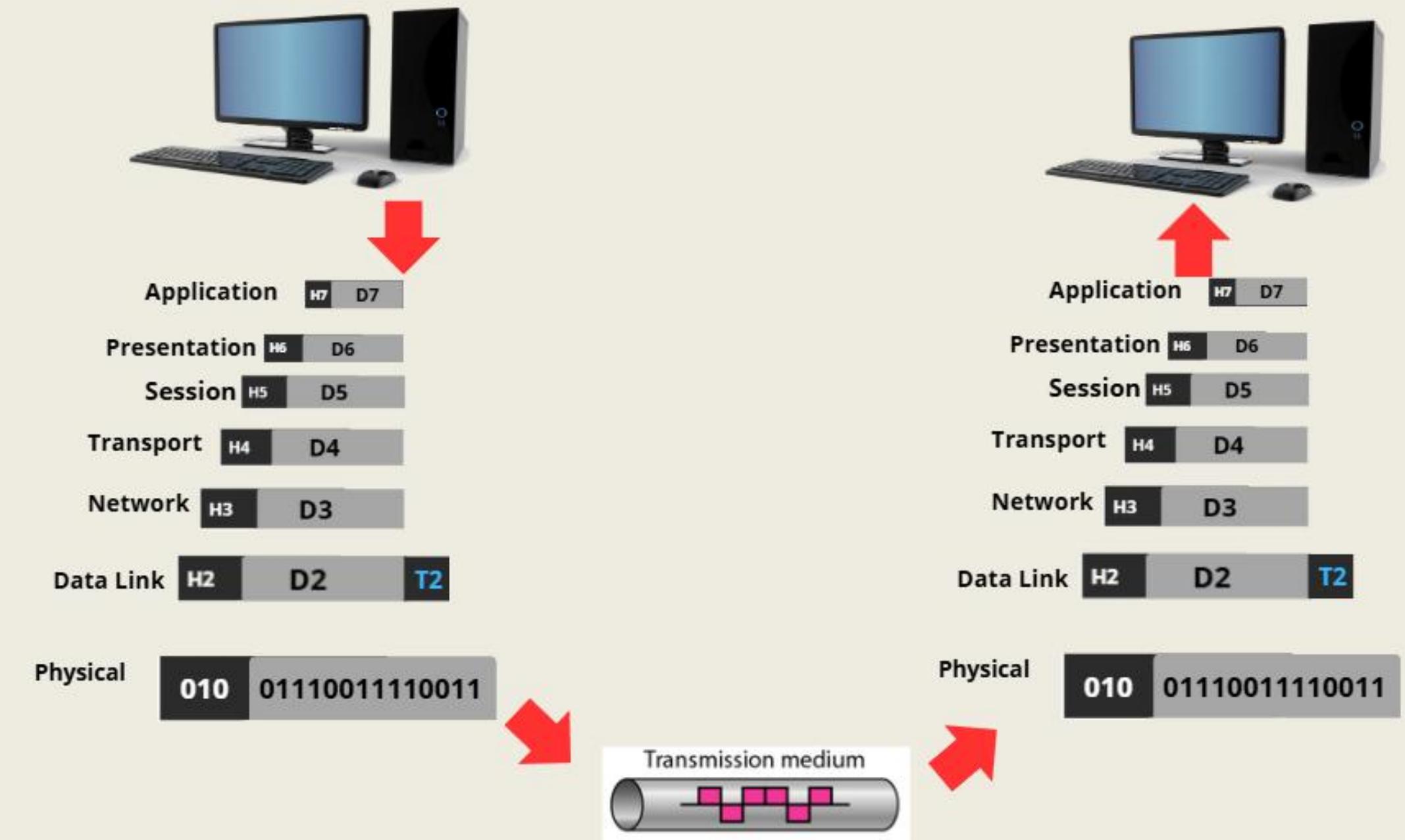
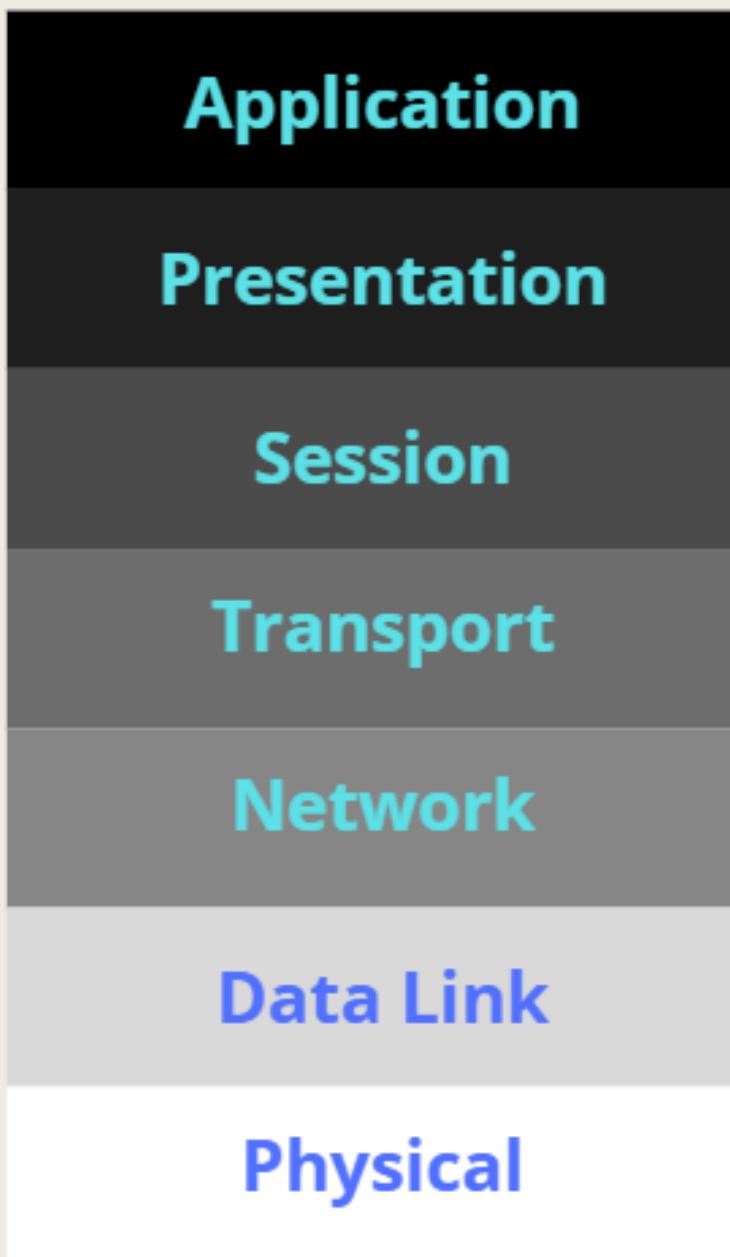
OSI Layers

The OSI model was theoretical and complex in implementation and setup.

There are 7 Layers for OSI model , We will showing and discussing it.

OSI Layers

Data
Data
Data
Data
Segments
Packets
Frames
Binary
Form



OSI vs TCP/IP

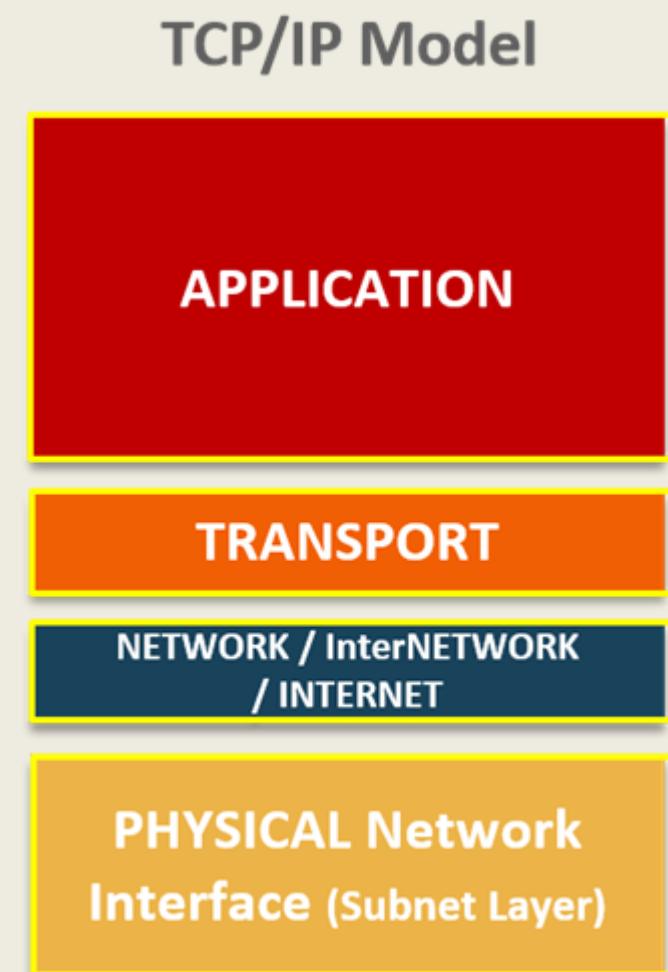
In our modern era, it is commonly used for teaching, explaining, analyzing, and troubleshooting.

This is due to the TCP/IP model, the practical model widely used today.

TCP/IP Layers

The TCP/IP model summarizes the layers in the OSI model

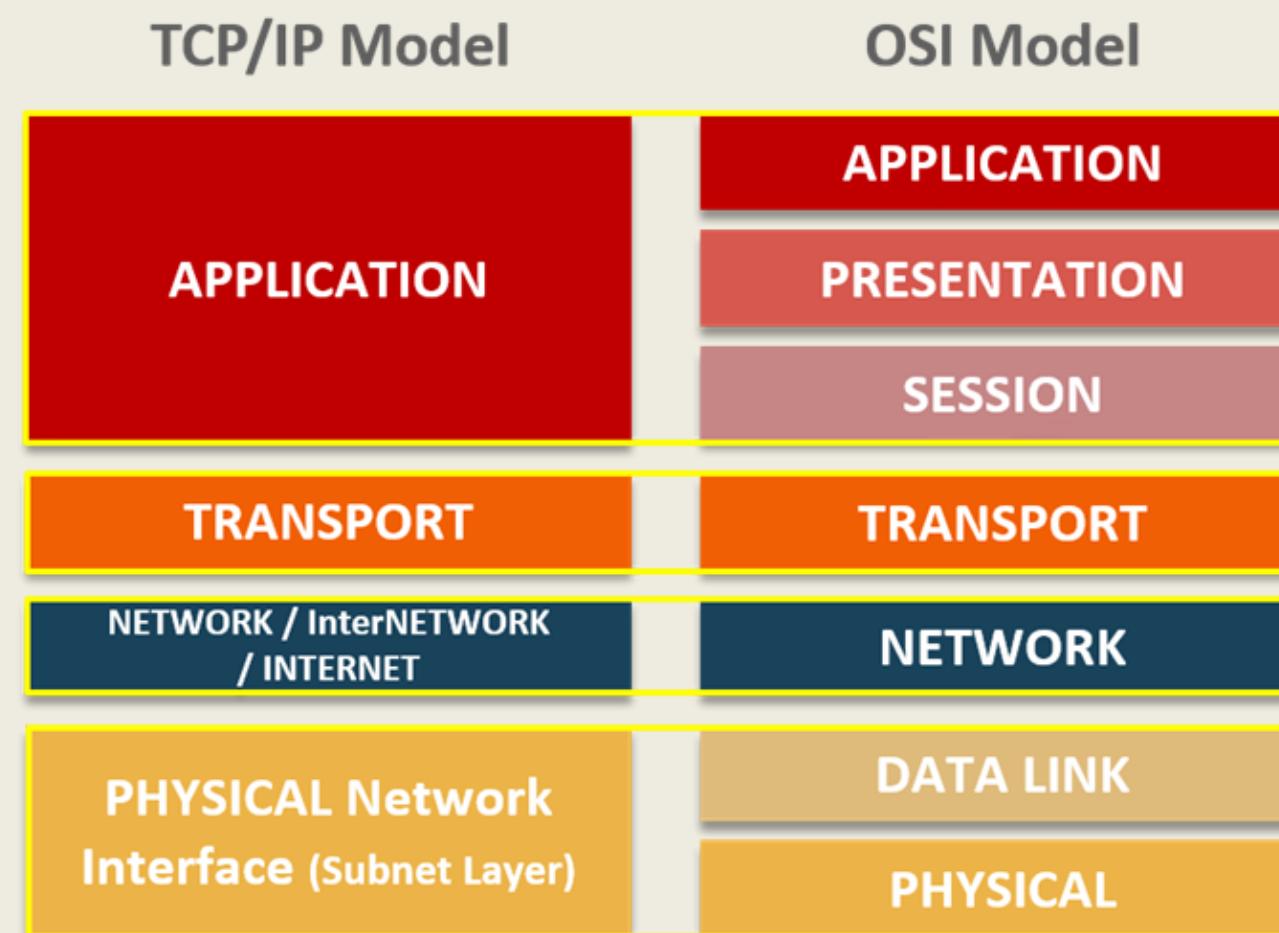
From seven layers to four layers, the four layers consist of five components.



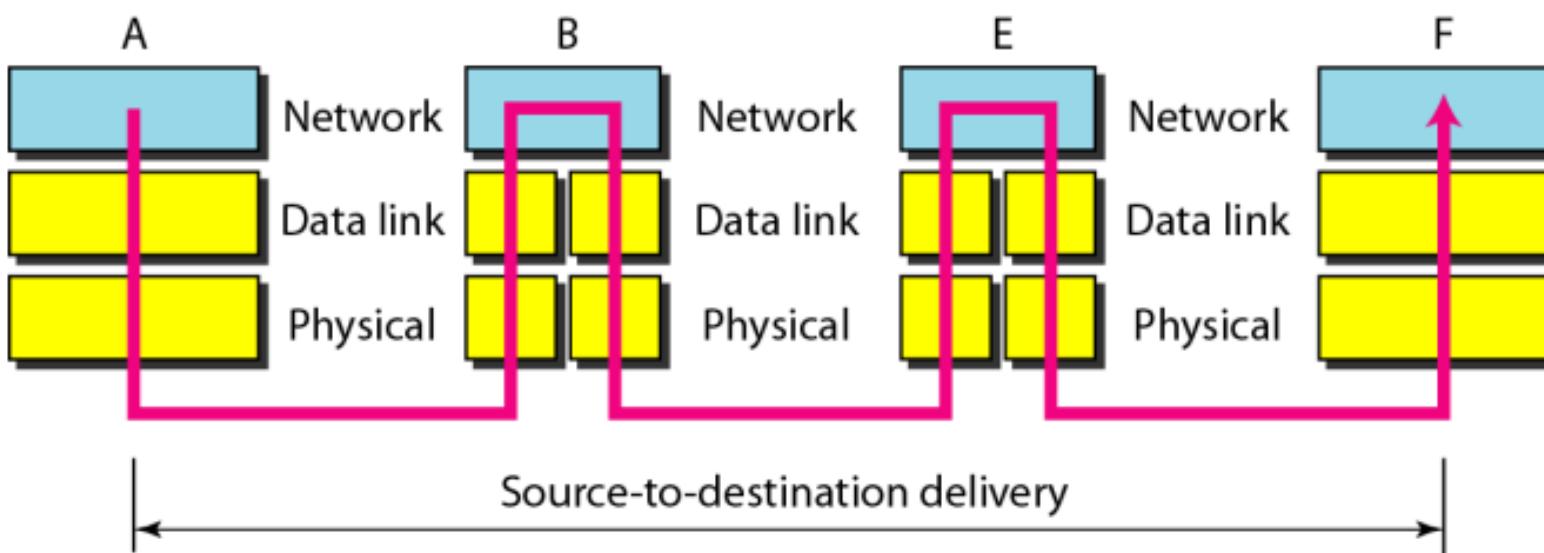
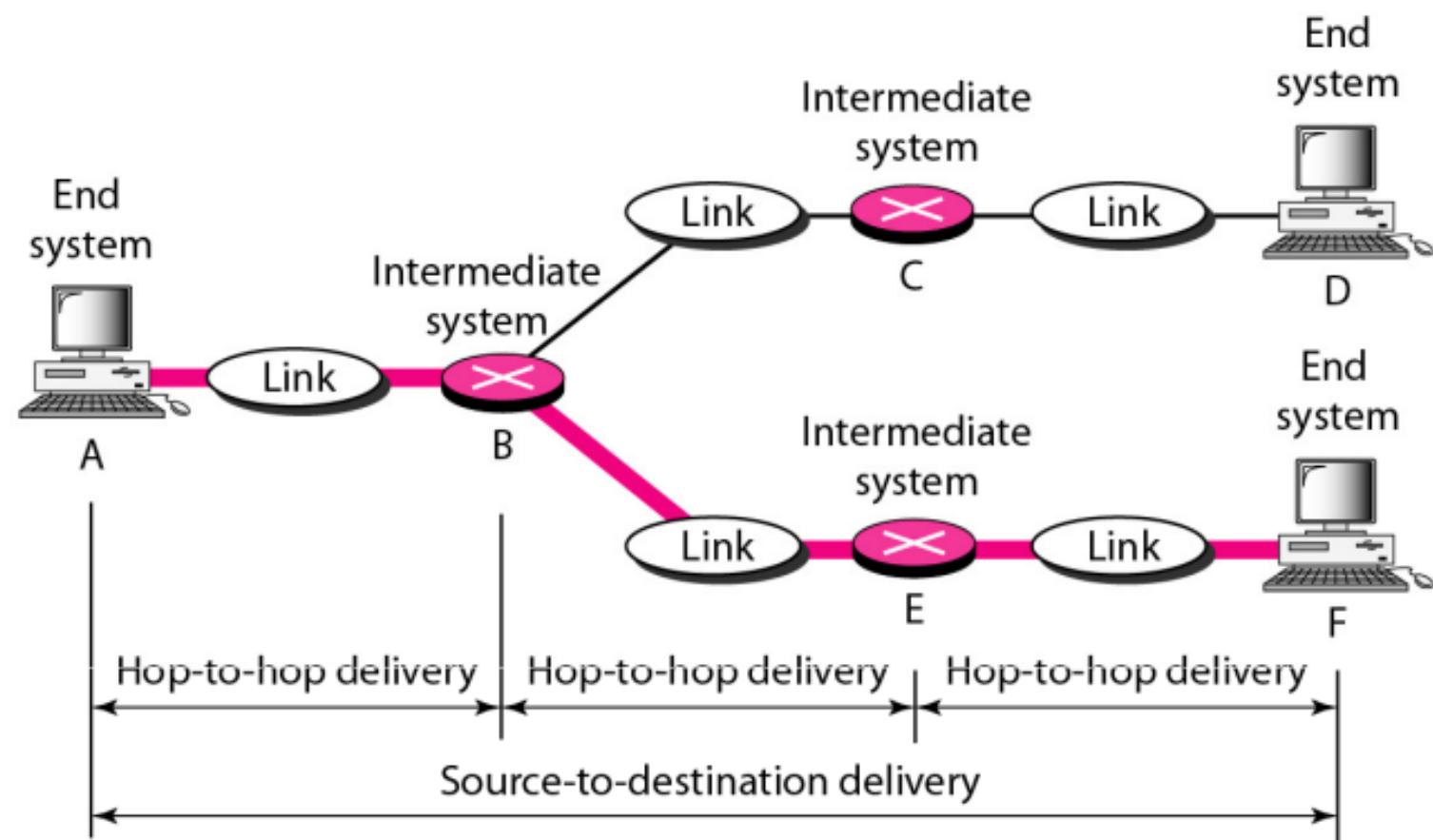
TCP/IP vs OSI

The first three layers are grouped into the Applications layer

The network and transport layer remained the same, due to its importance, while the physical layer and the data link layer combined into one layer for similar tasks.



Delivery operation



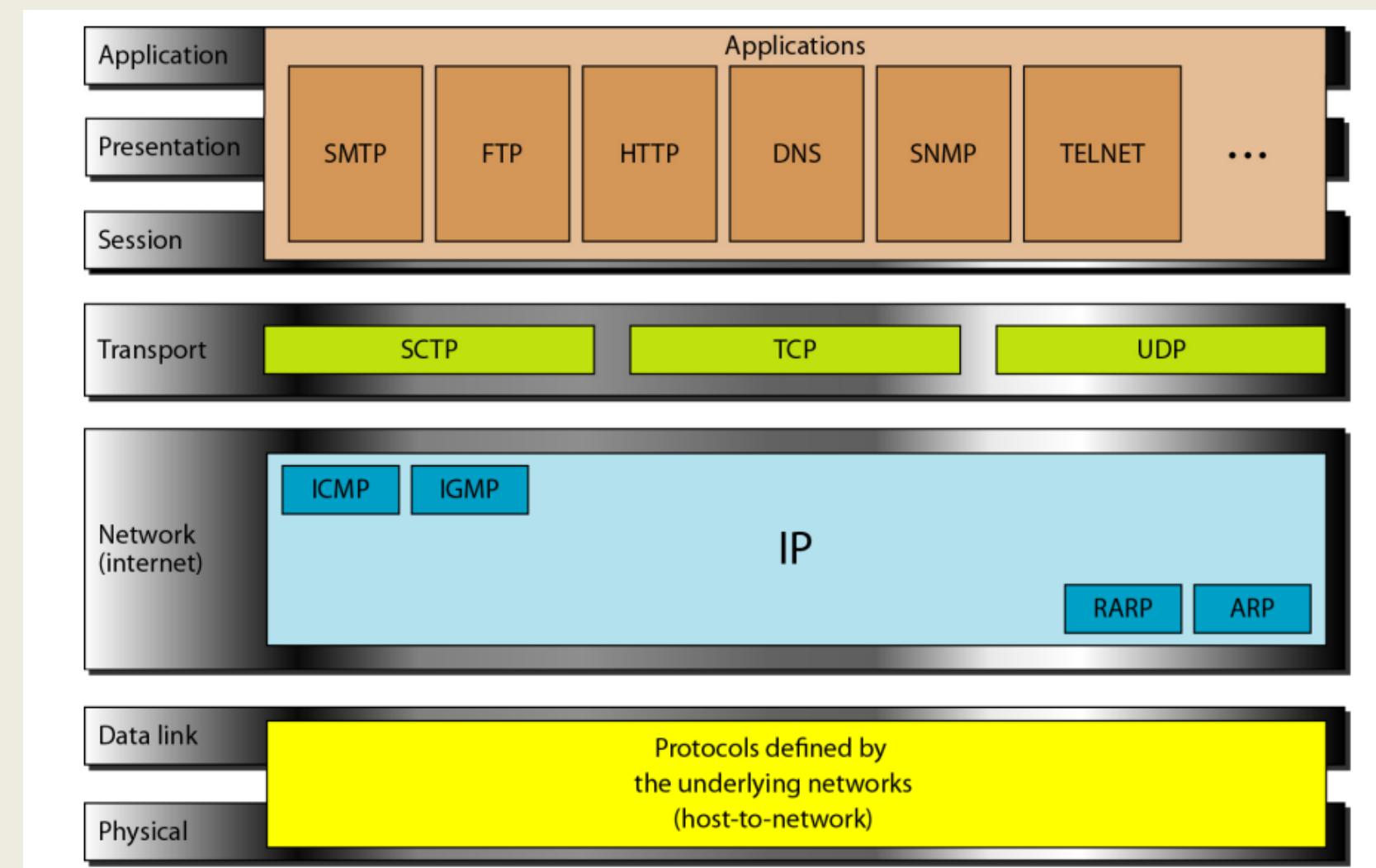
The data-link layer using **Physical Address** to communicate and directing to Network layer , And network using **Logical Address**.

Protocols and Services

All Layers in OSI or TCP/IP Models , Using Protocols

Protocol : Set of rules or systems using to communicate or directs communication

Services : Functions used by the users provided by protocol, usually at the application layer (Example SMTP – HTTP – ...).



Example of Protocols and Abbreviations

MAC (Medium Access Control) : or Physical Address. It's 6 Byte globally unique ID assigned by the manufacturer

IP (Internet Protocol) : Used in network layer to access internet network.

DNS (Domain Name System) : Service translates domain names into IP addresses

NAT (Network Address Translation) : Service translates Private IP address to Public IP address .

SMTP (Simple Mail Transfer Protocol) : Used in Mailing

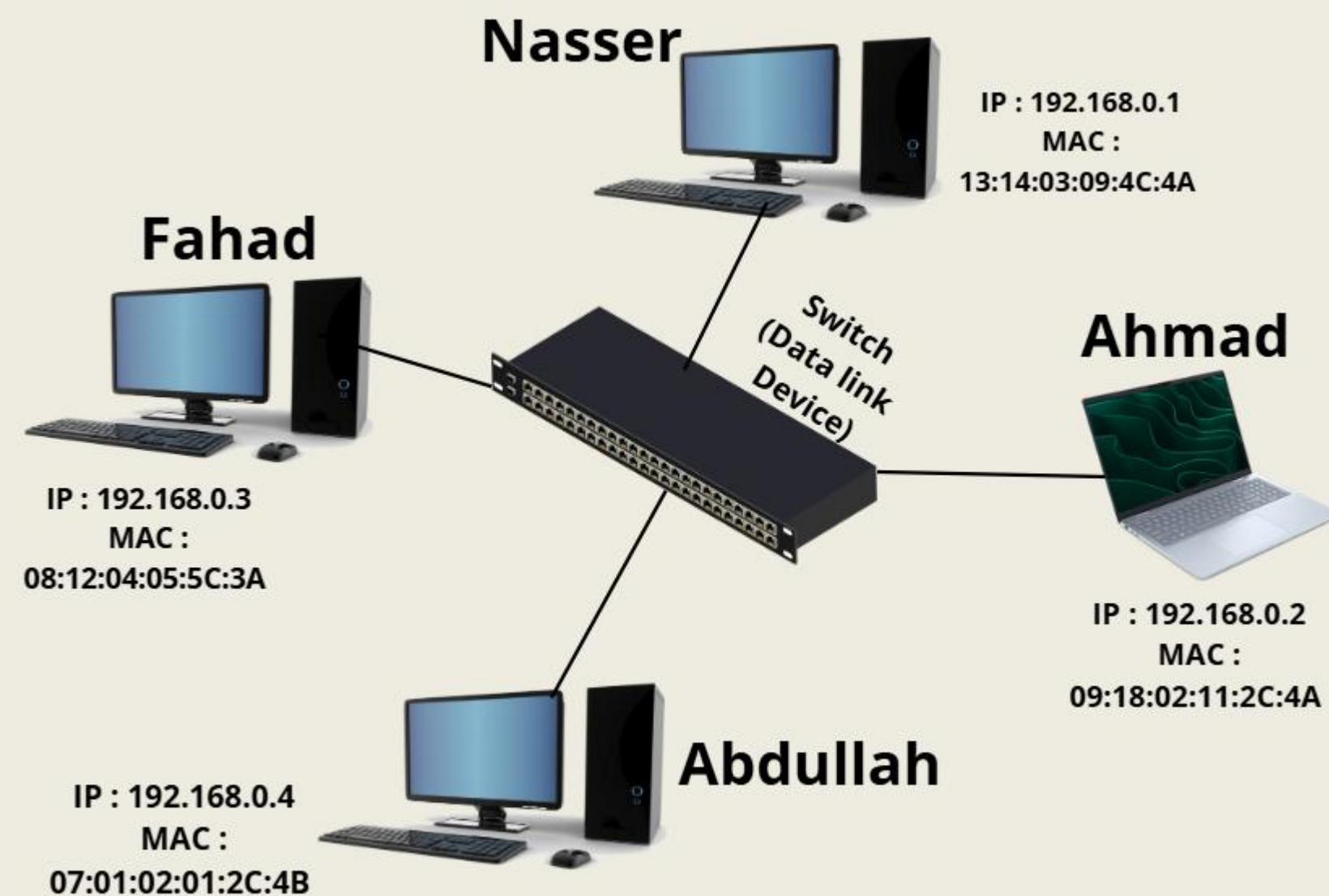
TCP (Transmission Control Protocol) : Protocol in transport layer , Used to Transport control.

FTP (File Transfer Protocol) : Used to transferring files.

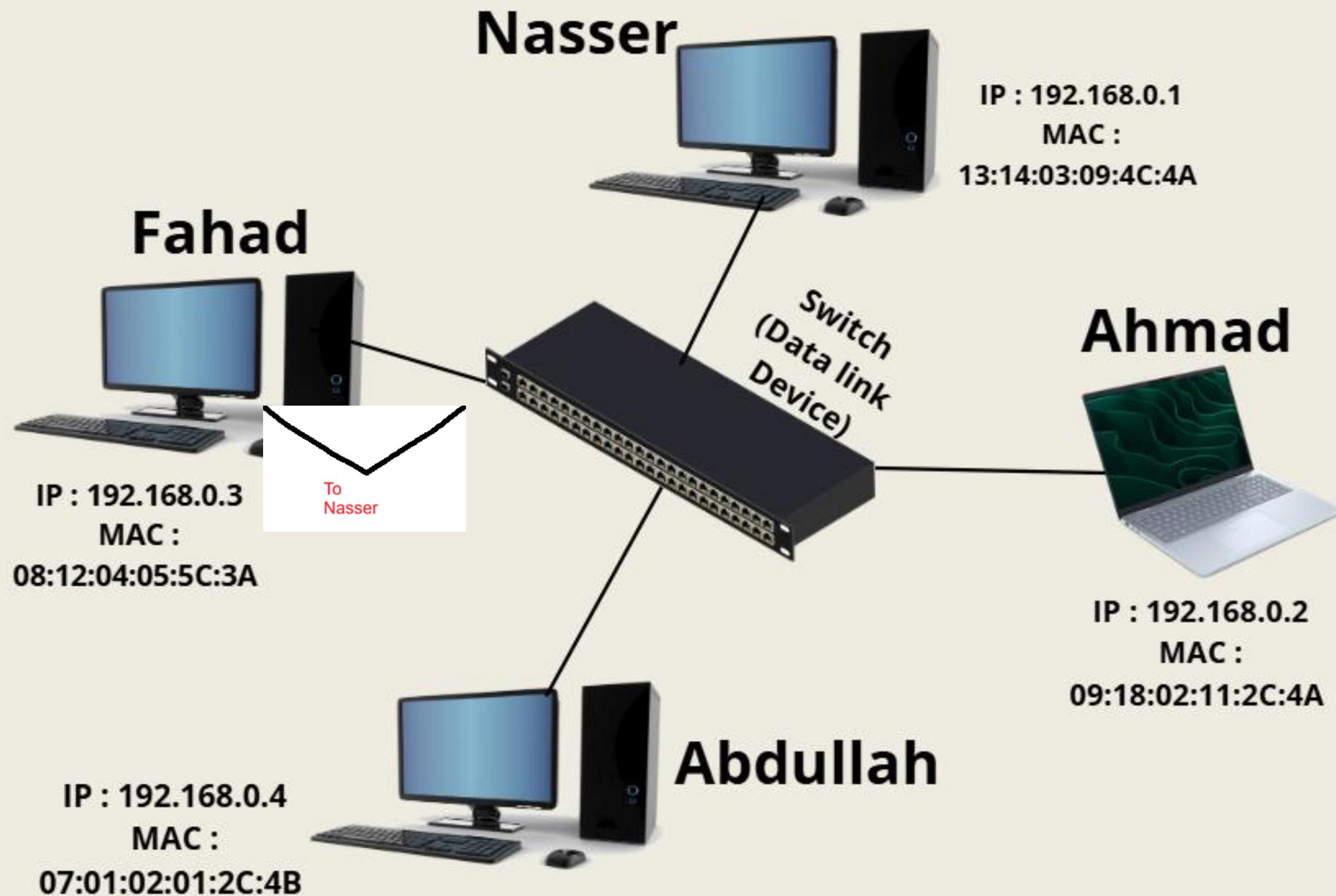
Physical / Logical Addresses

MAC (Medium Access Control) : or Physical Address. It's 6 Byte globally unique ID assigned by the manufacturer

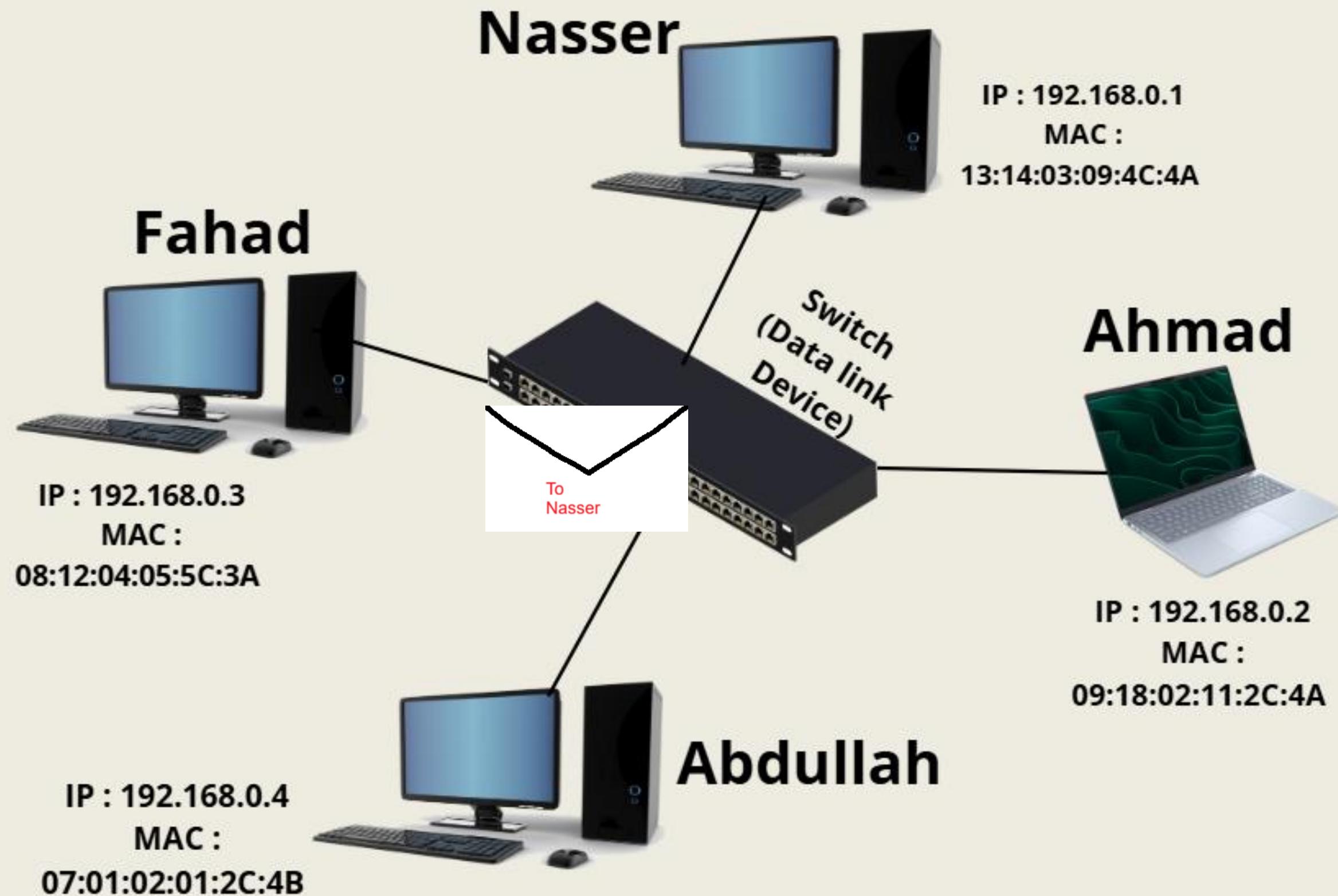
IP (Internet Protocol) : or Logical Address Used in network layer to access internet network.



Example



Example



Example

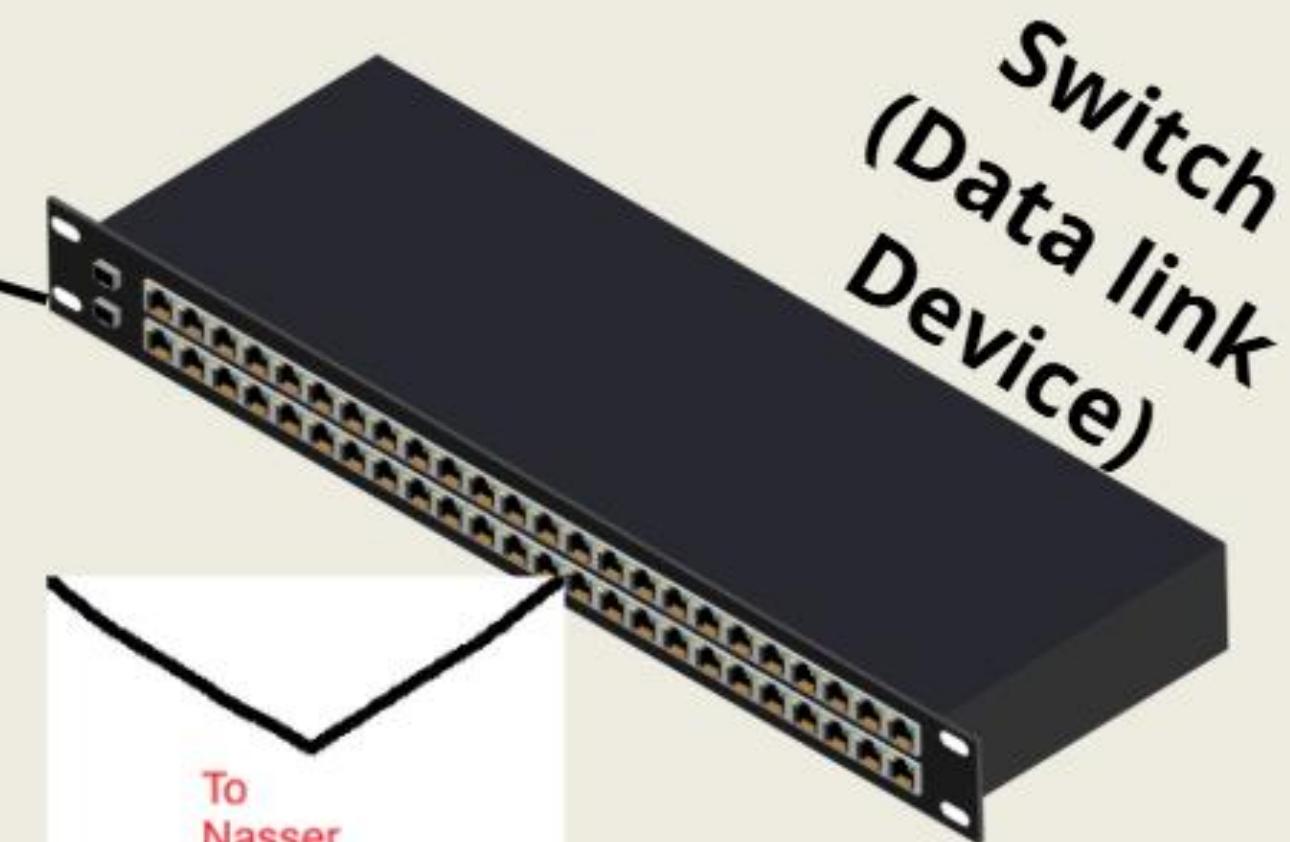
Fahad



192.168.0.3

MAC :

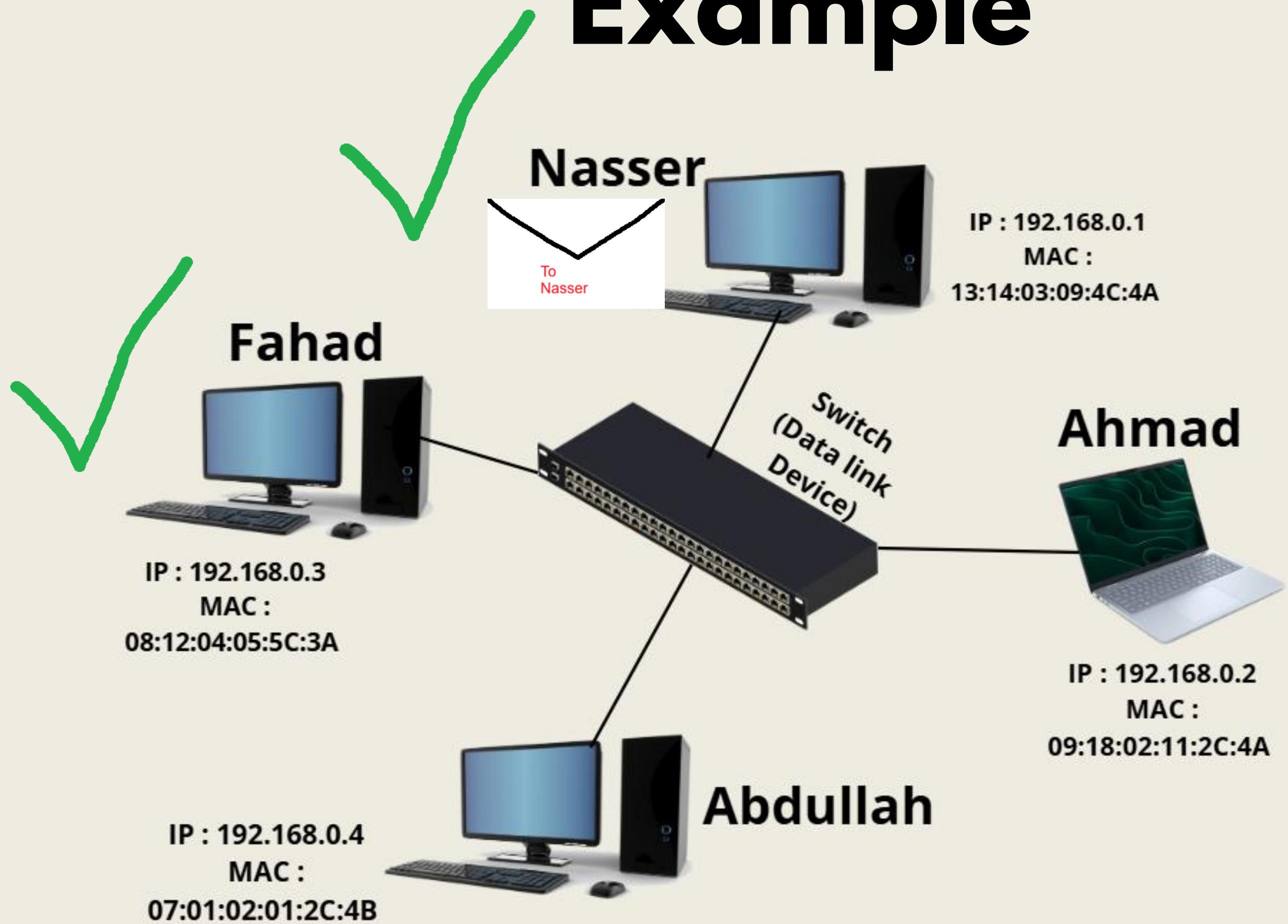
:04:05:5C:3A



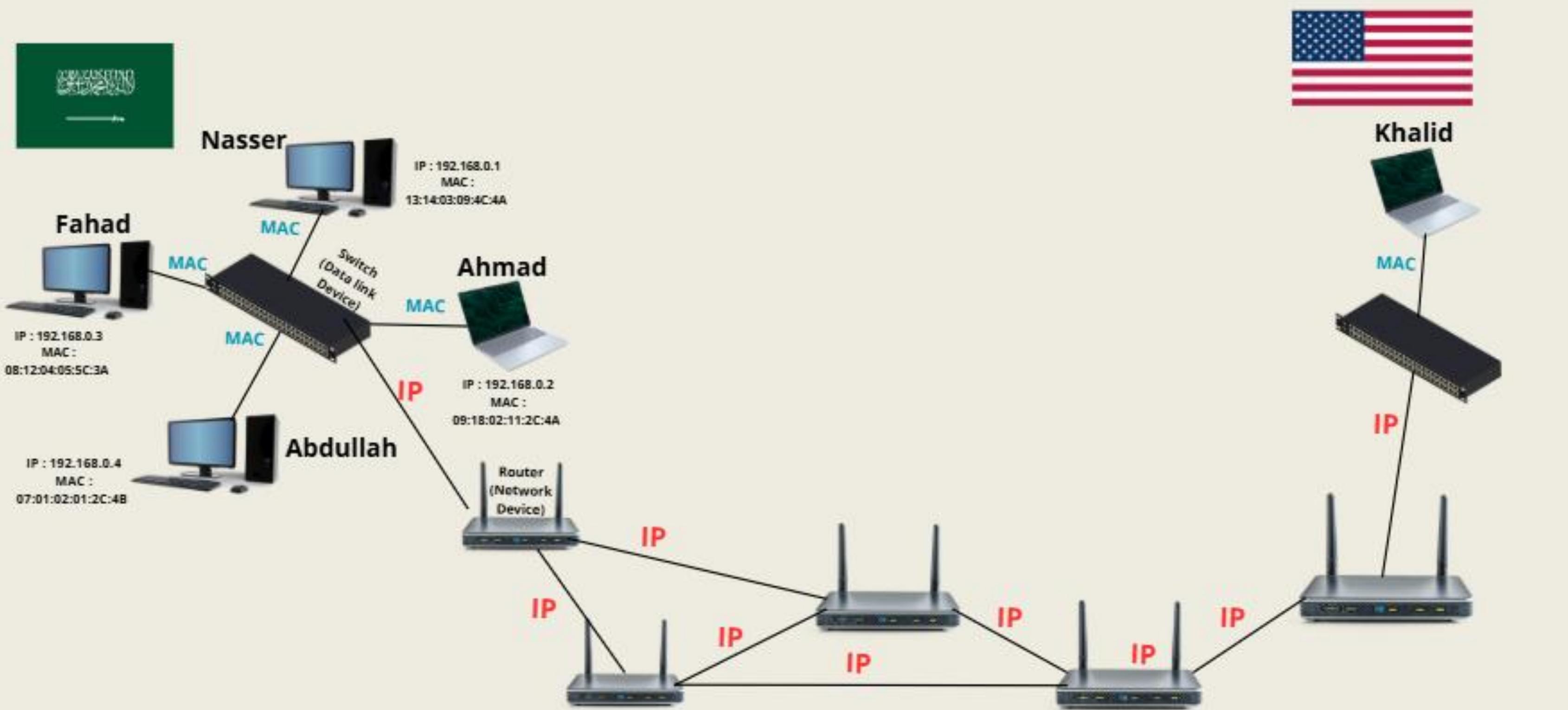
MAC Address

From 08:12:04:05:5C:3A Fahad
To 13:14:03:09:4C:4A Nasser

Example



From Switch to Router



Data Centers

Data center is a pool of resources (Hardware, storage, network) interconnected using a communication network

Used by large organizations for Super computing and Large-scale networks.



Sources

- Taif University - Computer Networks ch.2
- Wikipedia - Data center network architectures
- Geeksforgeeks - Network Models
- Networking for Dummies Book
- Dev.to TCP/IP Model vs OSI Model
- VMWare - Data centers networking

Thanks for listen