Computer Networks (CSC305)

Course Outline:

- Overview of Data Communication and Networking
- Physical Layer
- Data Link Layer
  - Logical Link Control (LLC)
  - Medium Access Control (MAC)
- Network Layer
- Transport Layer
- Application Layer

Computer Networks (CSC305)

References:

- Data Communication and Network
  - B. Forouzan (McGraw-Hill Publications)
- Computer Networks
  - Andrew S. Tanenbaum (Pearson Education Asia)
- Data and Computer Communications
  - William Stallings (Pearson Education Asia)

Computer Networks (CSC305)

Distribution of Marks:

Component	Marks	Number of Questions	Duration	Scheduled Date	Scheduled Time
Quiz – I	10	≈ 30 MCQ	20 Mins	23 February 2024	From 1:15 PM
Mid Semester	32	Descriptive	120 Mins	To be announced	To be announced
Quiz – II	10	≈ 30 MCQ	20 Mins	24 April 2024	From 1:15 PM
End Semester	48	Descriptive	180 Mins	To be announced	To be announced

Total Marks	100

Computer Networks Lab (CSC307)

Course Outline:

- Socket Programming	4 Weeks
- NS-3 Programming	4 Weeks
- CISCO Packet Tracer	2 Weeks
- Network Protocols & Tools	3 Weeks

Computer Networks Lab (CSC307)

Distribution of Marks:

Component	Marks	Number of Questions	Duration	Scheduled Date	Scheduled Time
Continuous Assessment	39	13 to 20	26 Hours	Regular Lab Date	Regular Lab Time
Quiz	11	≈ 30 MCQ	20 Mins	16th April 2024	12:15 PM to 12:35 PM
End Semester	50	1 to 2	120 Mins	23rd April 2024	10 AM to 12 Noon

Total Marks	100

Computer Networks Lab (CSC307)

Group Division:

Group No	From	To	
1	20JE1092	21JE0172	NLHC LAB 1
2	21JE0195	21JE0293	
3	21JE0298	21JE0363	
4	21JE0367	21JE0474	
5	21JE0475	21JE0577	
6	21JE0582	21JE0726	
7	21JE0727	21JE0922	
8	21JE0930	21JE1037	
9	21JE1038	19JE0056	NLHC LAB 3
10	19JE0063	19JE0951	

Computer Networks (CSC305)

Course Outline:

- √**Overview of Data Communication and Networking**
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Overview of Data Communication and Networking

Data Communication is the **exchange of data** (in the forms of 0s and 1s) between to devices via some form of transmission medium.

Effectiveness of a Data Communication system depends on:

- Delivery
- Accuracy
- Timeliness

Overview of Data Communication and Networking

Data Communication system is made up of **five components**:

- Message
- Sender
- Receiver
- Medium
- Protocol

Overview of Data Communication and Networking

Networks:

- A network is a set of devices (often referred to as nodes) connected by media links.
- Networking is the sharing of information and services.

Network Criteria:

To be considered effective and efficient, a network must meet a number of criteria.

- Performance
- Reliability
- Security

Overview of Data Communication and Networking

Network Criteria:

- **Performance** -

  Can be measured in many ways, including **transit time** and **response time**.

  Other factors are:

  - Number of users
  - Type of transmission medium
  - Hardware
  - Software

Overview of Data Communication and Networking

- **Reliability** -

  In addition to **accuracy of delivery**, network reliability is measured by:

  - Frequency of failure
  - Recovery time of a network after a failure
  - Catastrophe

- **Security** -

  Protecting data from:

  - Unauthorized access
  - Viruses

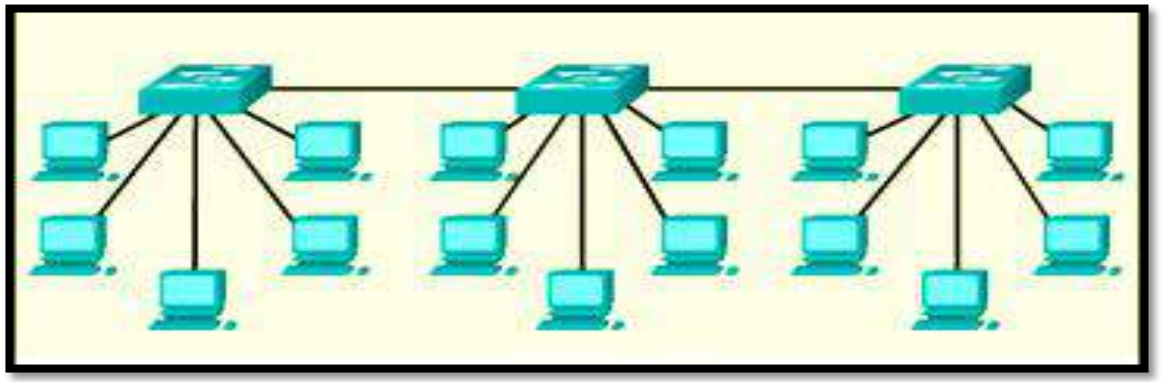
Overview of Data Communication and Networking

Network Design Goals:

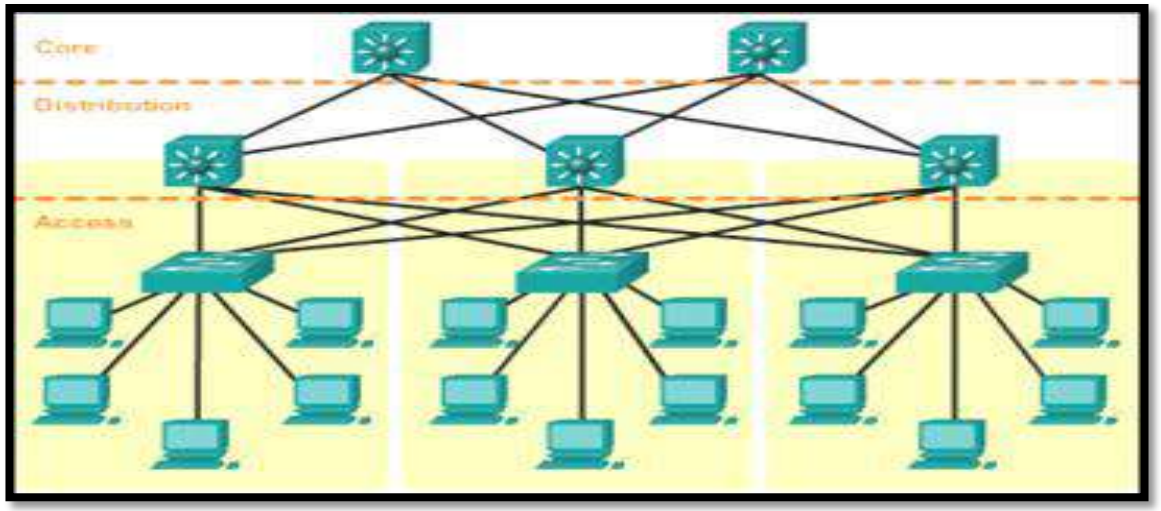
- Scalability
- Availability
- Performance
- Security
- Manageability
- Adaptability
- Affordability

Overview of Data Communication and Networking

FLAT NETWORK



HIERARCHICAL NETWORK



A good network design is hierarchical, with a clear separation of functions. It may comprise of three layers:

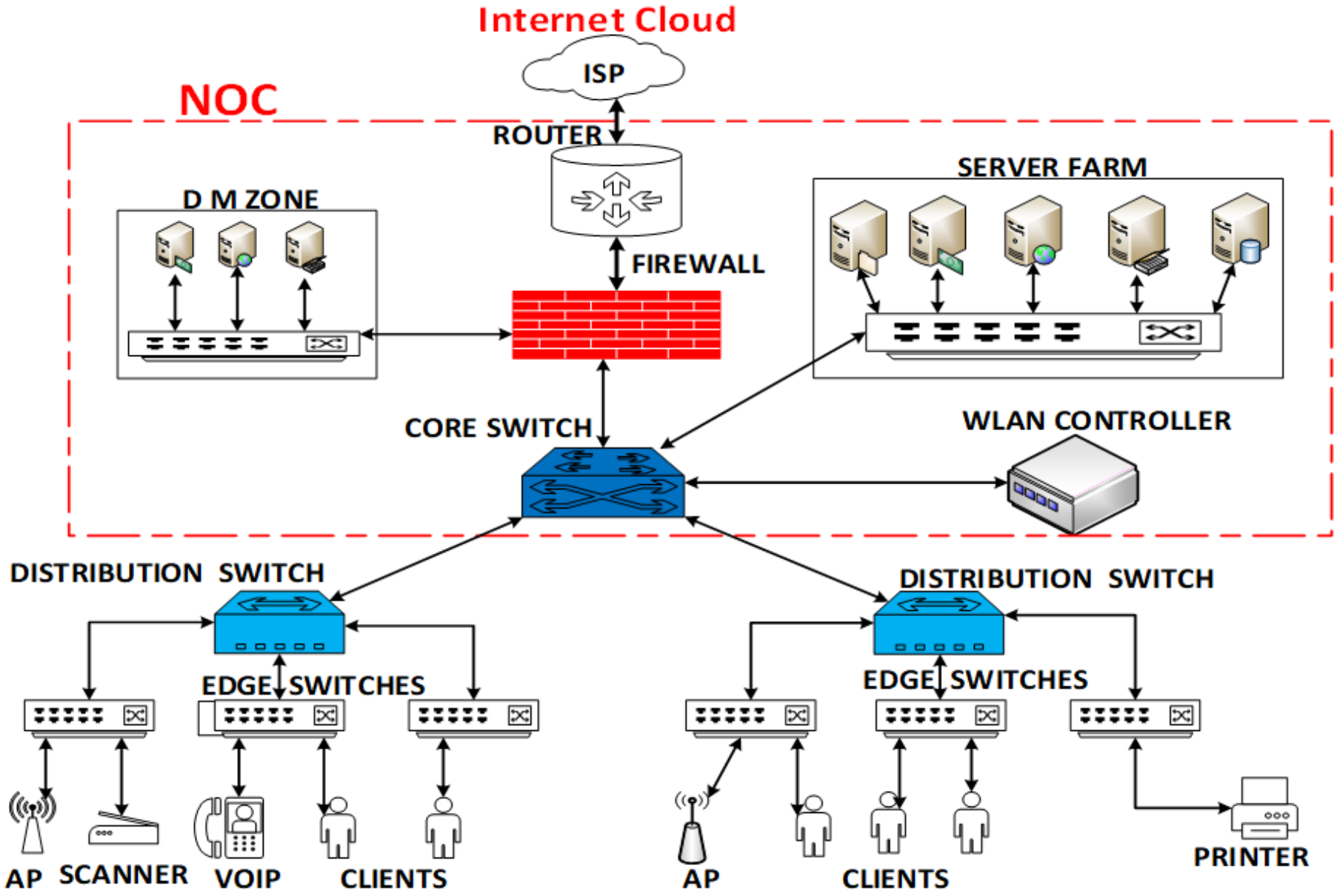
- CORE LAYER
- DISTRIBUTION LAYER
- ACCESS LAYER

Overview of Data Communication and Networking

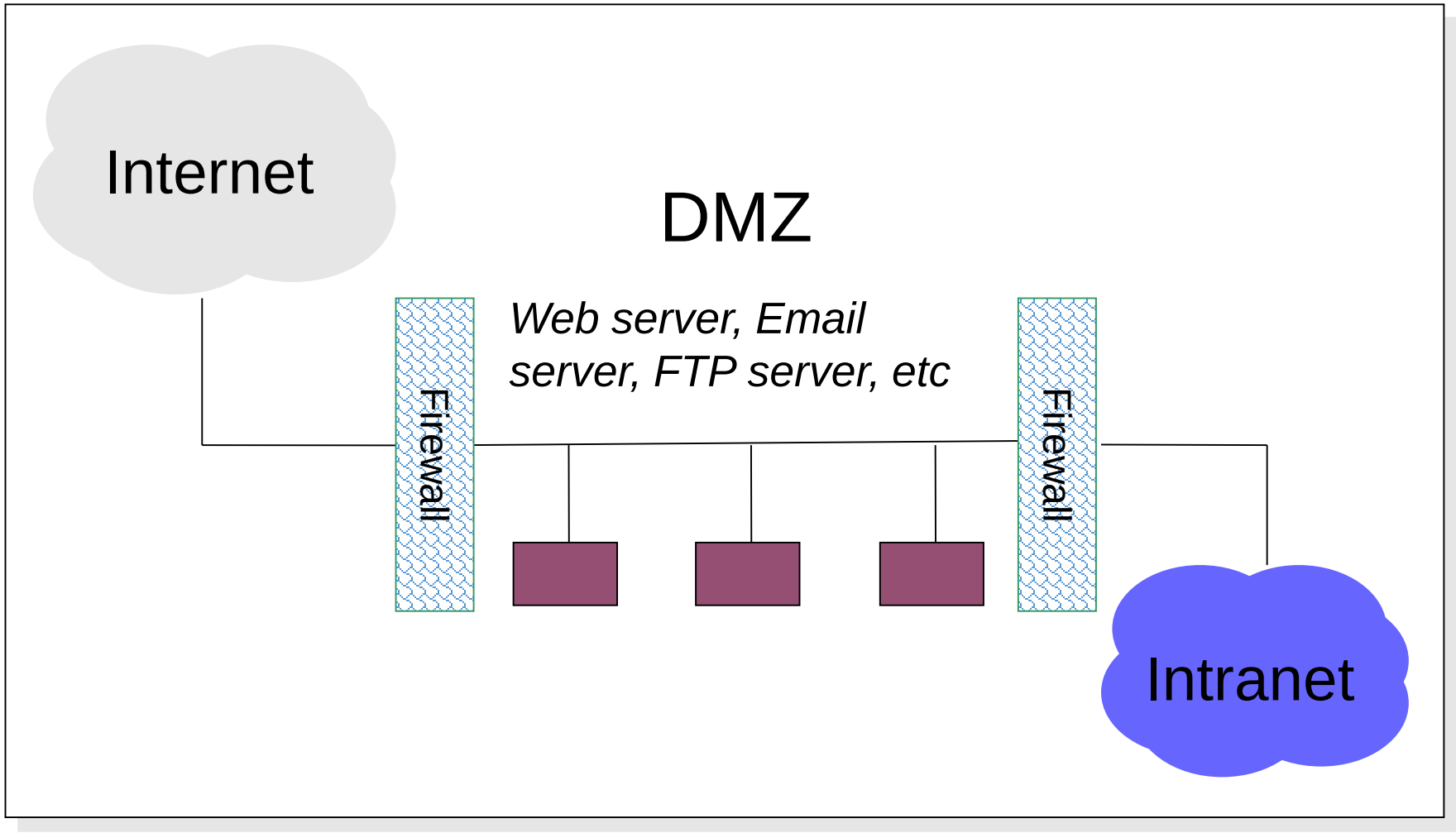
NETWORK DESIGN & DEPLOYMENT PHASES

Phase-1	Requirement Assessment, Proper Planning and Site Survey
Phase-2	Cable Plant and Wiring Closets
Phase-3	IP and VLAN Design
Phase-4	Installation of Active Components
Phase-5	Testing
Phase-6	Network & Security Audit

Campus Network Schematic
(without redundancy)

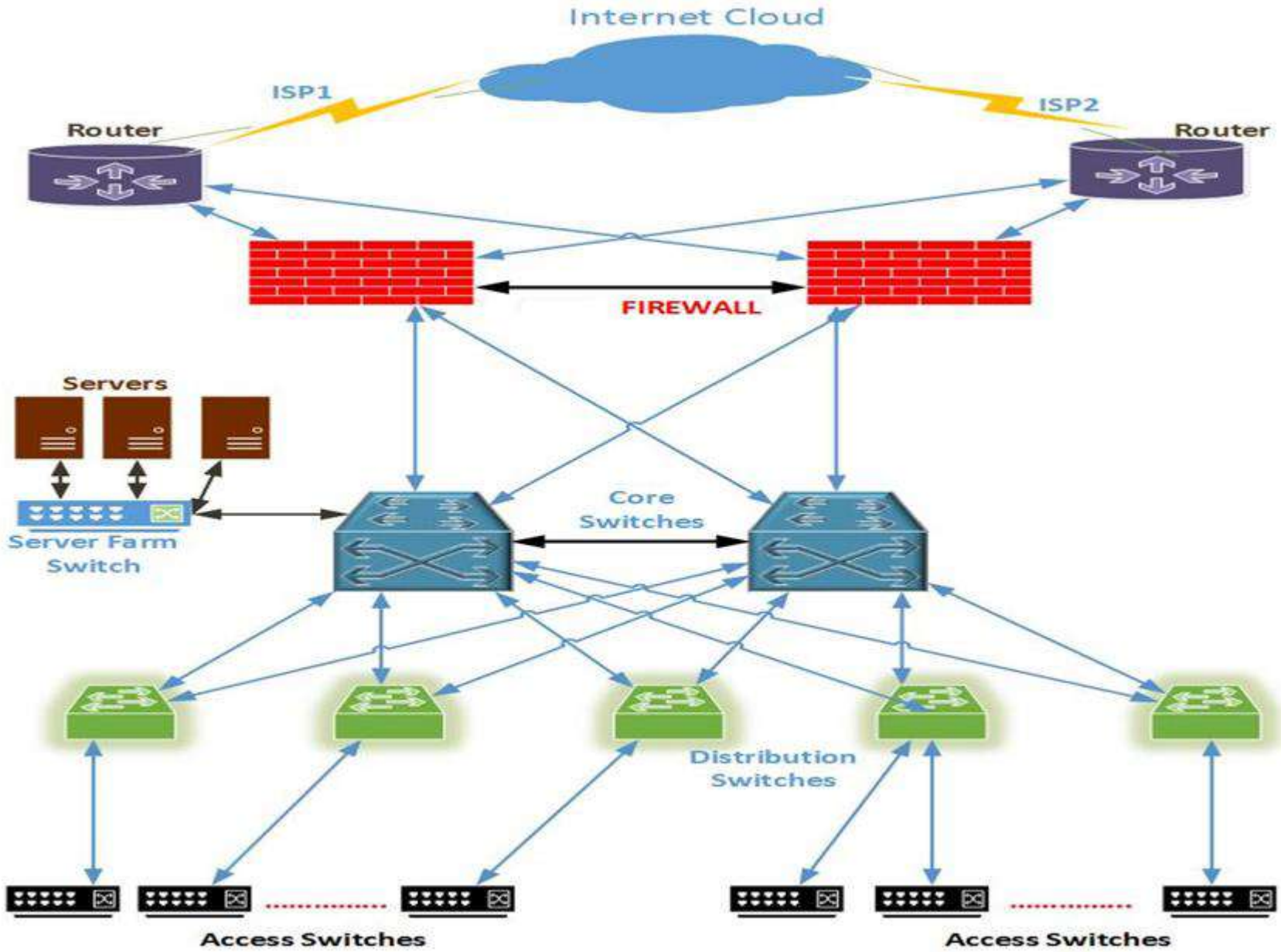


DEMILITIRASED ZONE (DMZ)



It separates an internal LAN from other untrusted networks, usually the Internet.

Resilient Campus Network

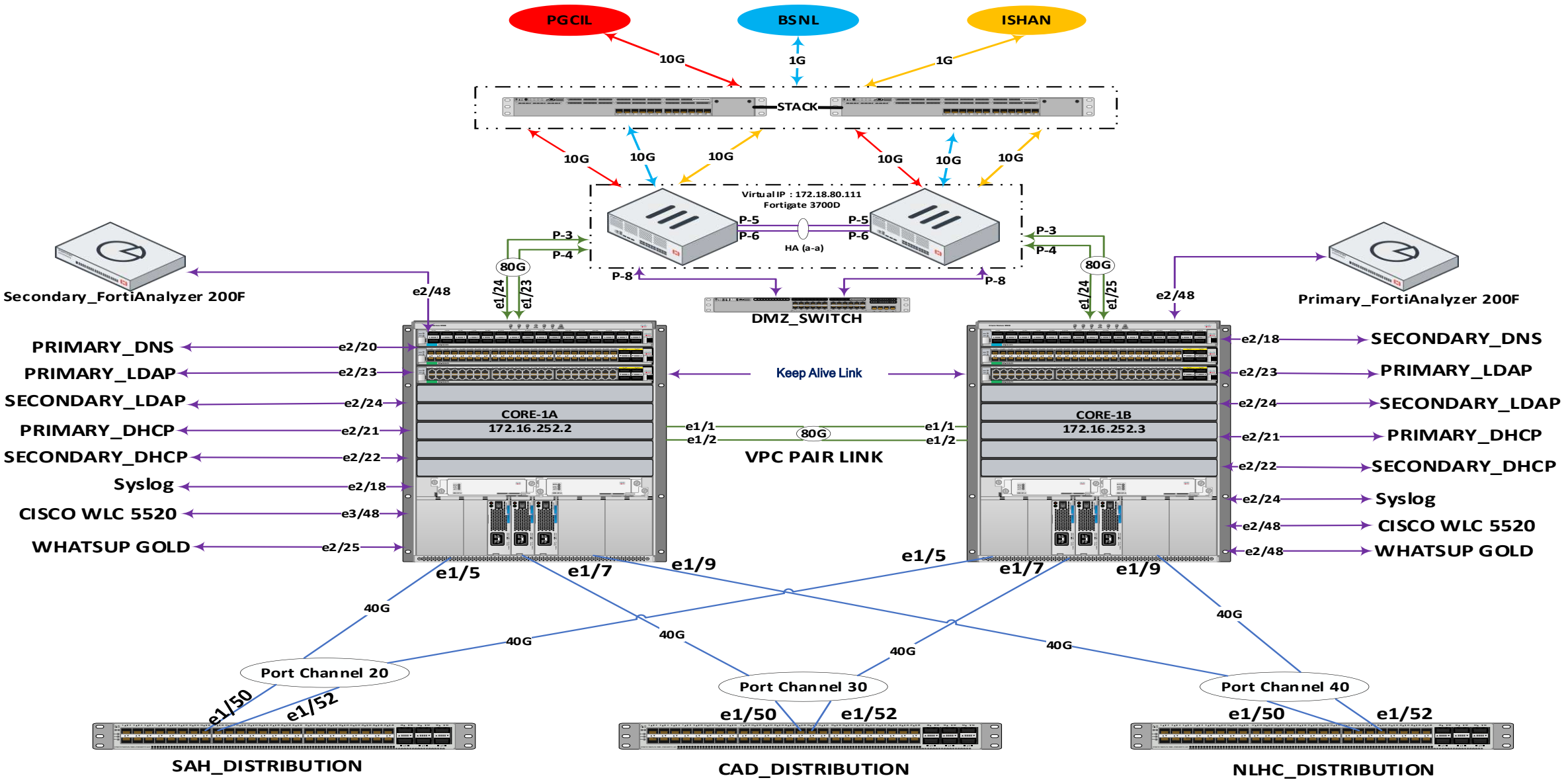


Internet Bandwidth, IIT(ISM), Dhanbad

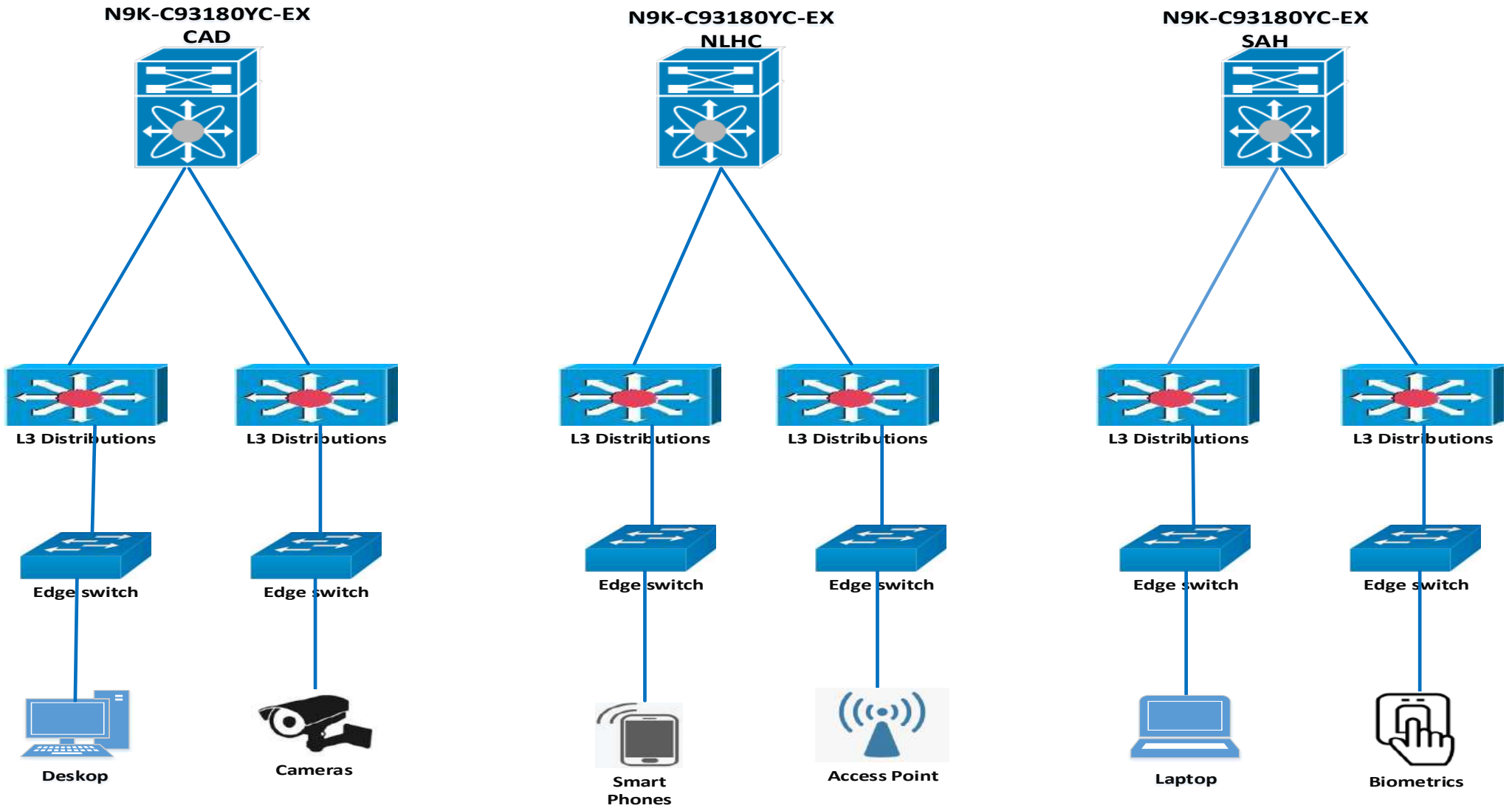
Total 7Gbps from following three ISP's:

- PGCIL 5Gbps
- Ishan Netsol Pvt. Ltd. 1Gbps
- BSNL 1Gbps under NKN

Network Connectivity, IIT(ISM), Dhanbad



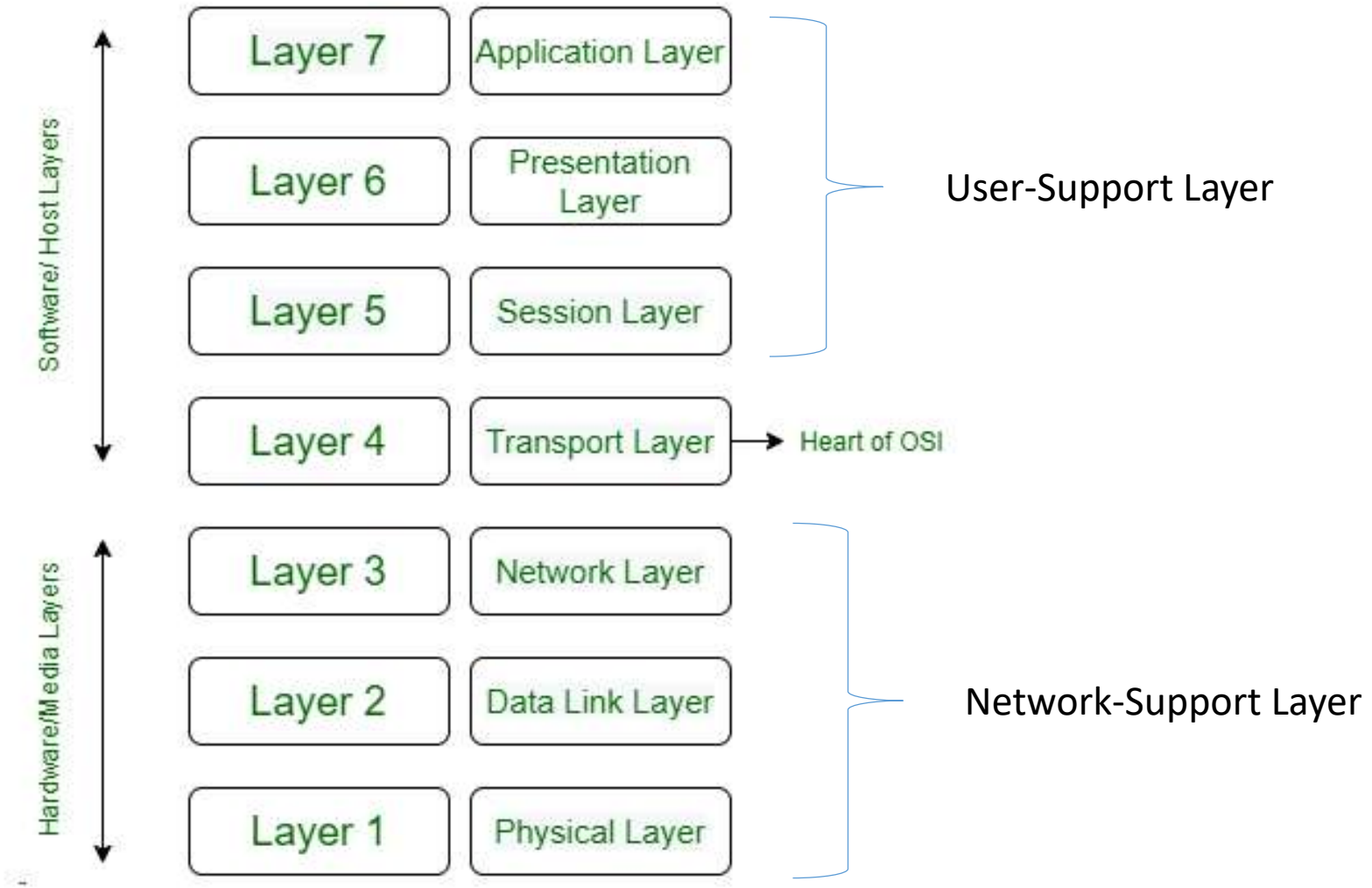
Network Connectivity, IIT(ISM), Dhanbad



OSI Reference Model

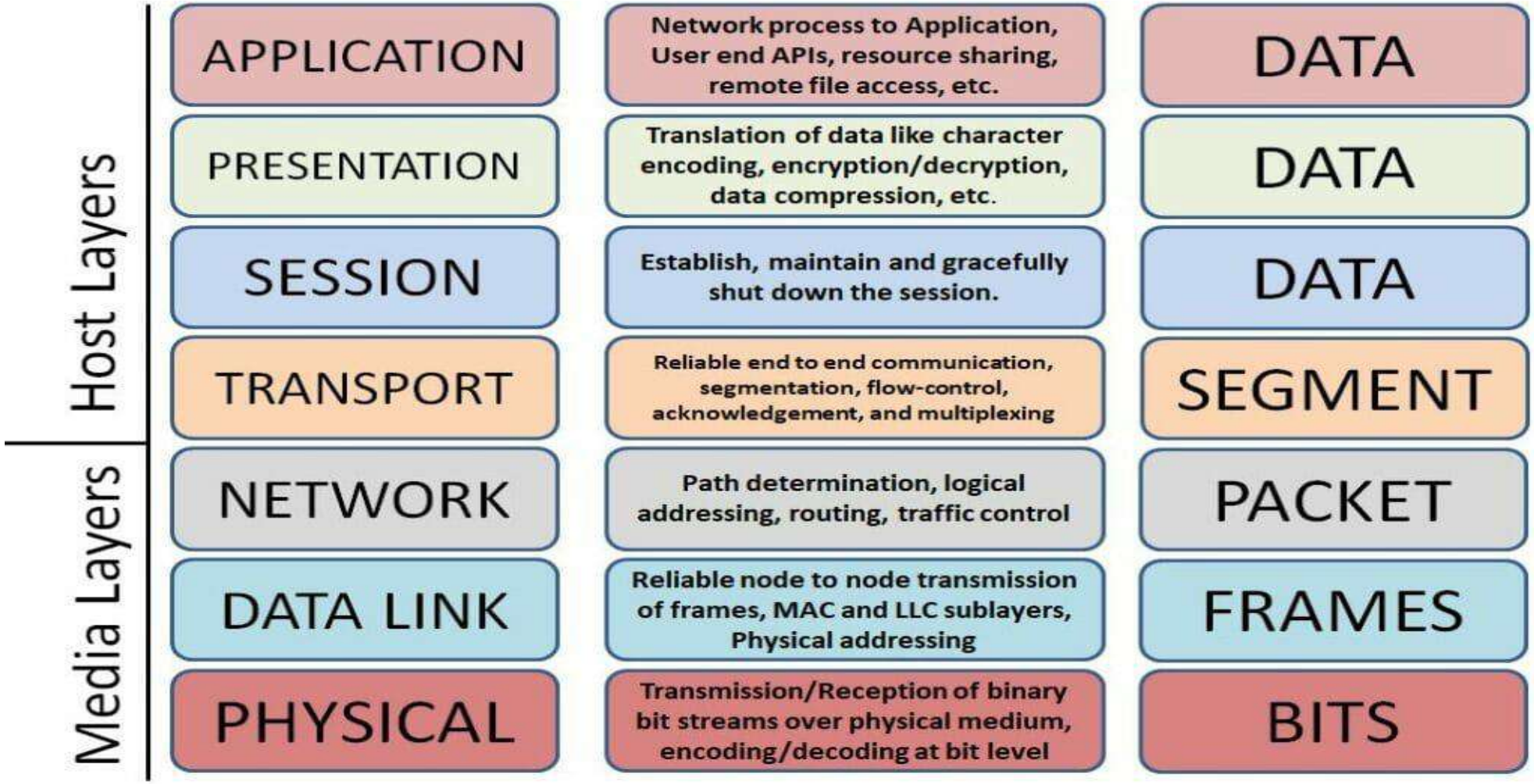
- Established in 1947.
- Established by International Standards Organization (ISO).
- ISO Standard that covers all aspects of network communications in the **Open Systems Interconnection (OSI) model**.
- **OSI model is not a protocol**; it is a model for understanding and designing a network architecture that is *flexible, robust* and *interoperable*.

OSI is a Layered Framework.

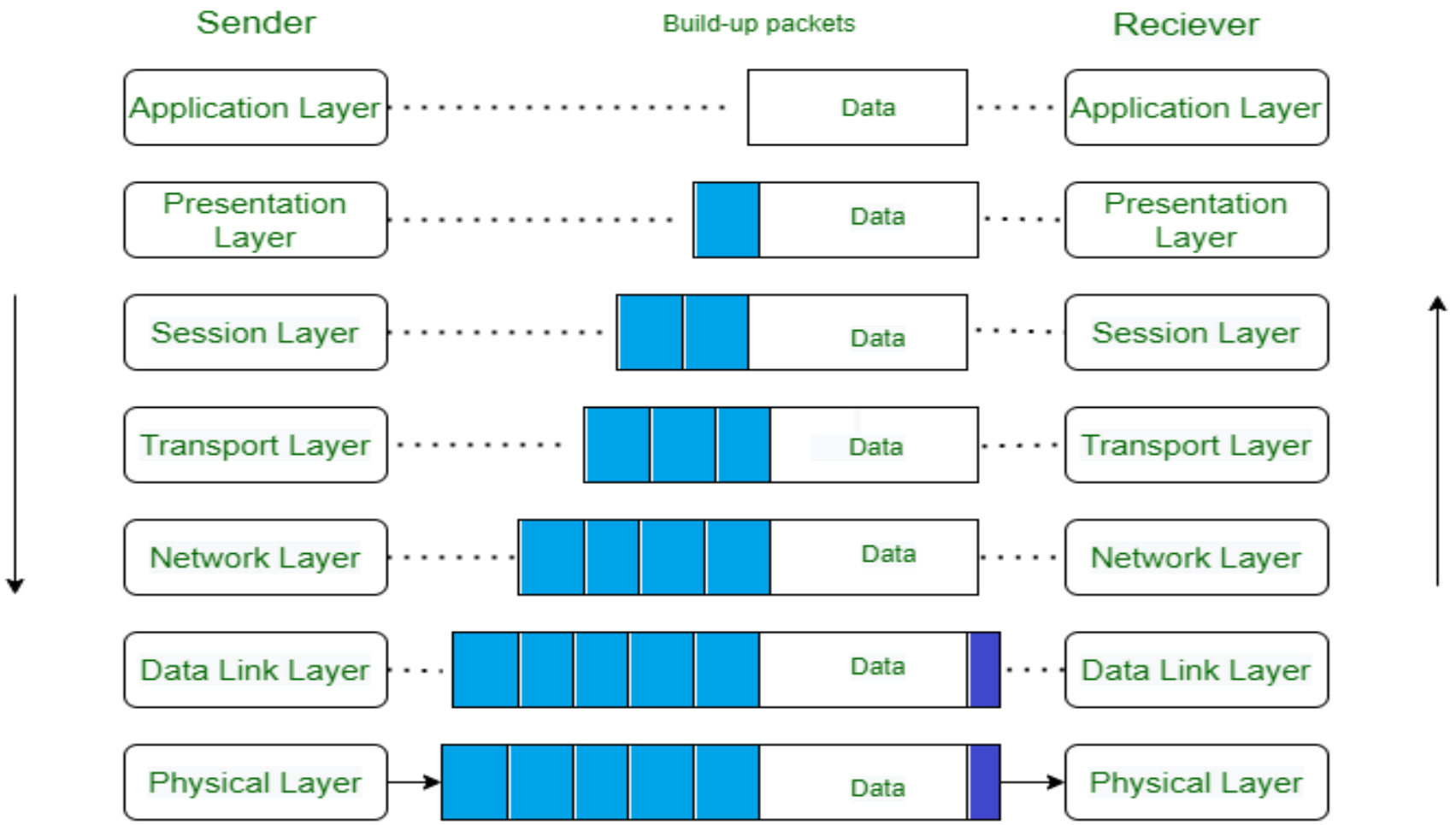


Please **D**o **N**ot **T**ouch **S**teve's **P**et **A**lligator

OSI Reference Model

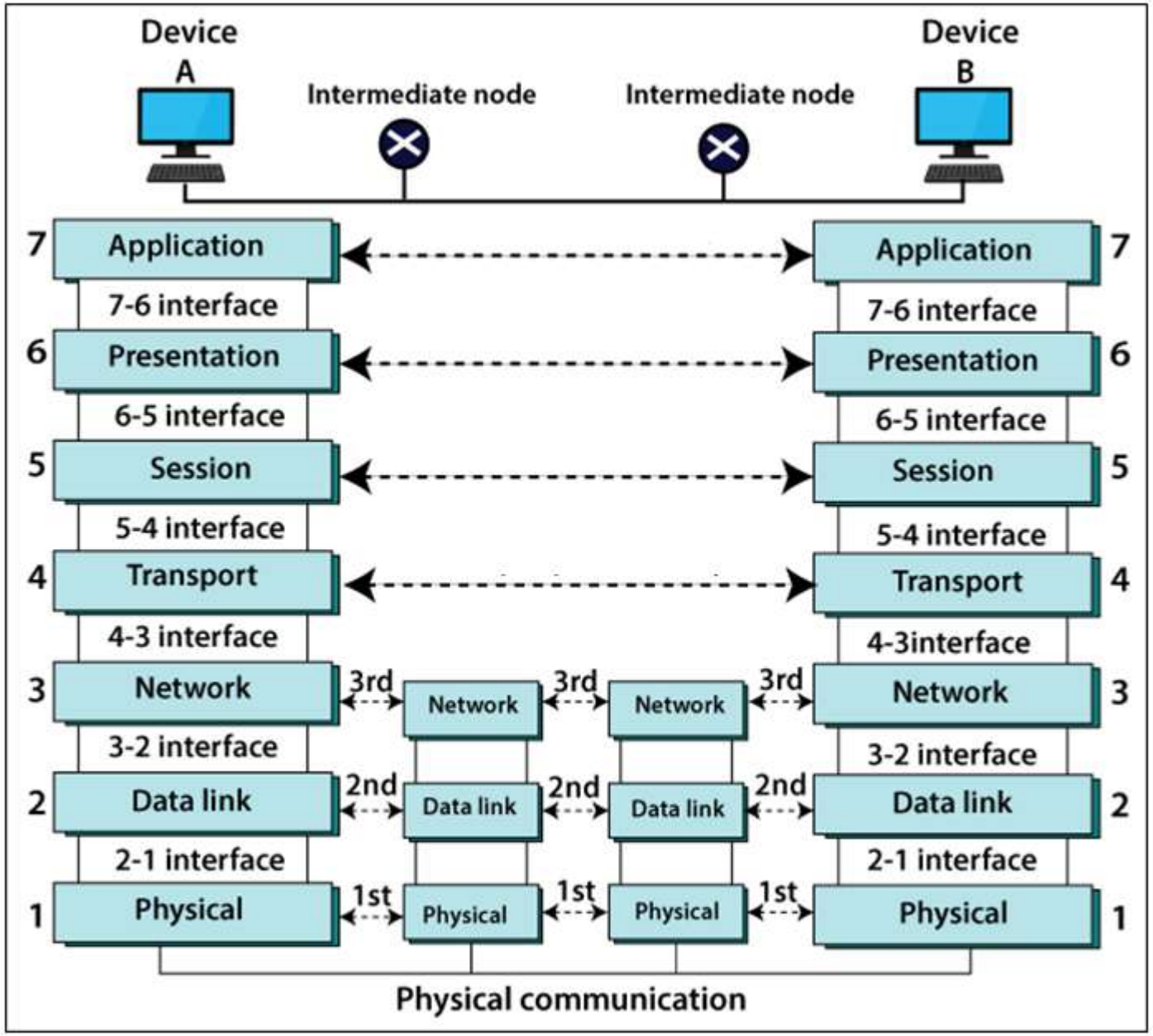


OSI Reference Model

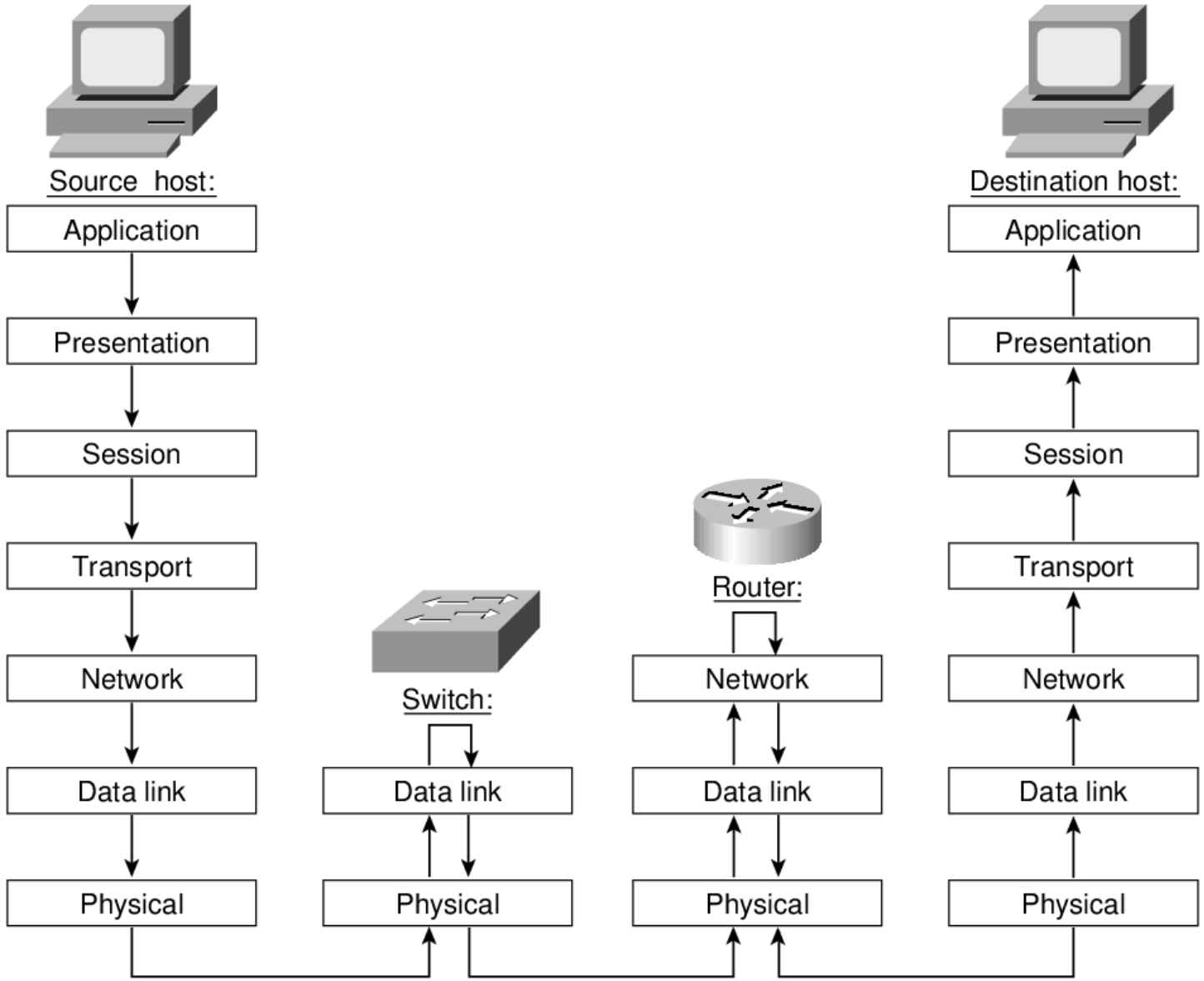


- **Headers are added to the data at Layers 6, 5, 4, 3, and 2.**
- **Trailers are usually added at Layer 2.**

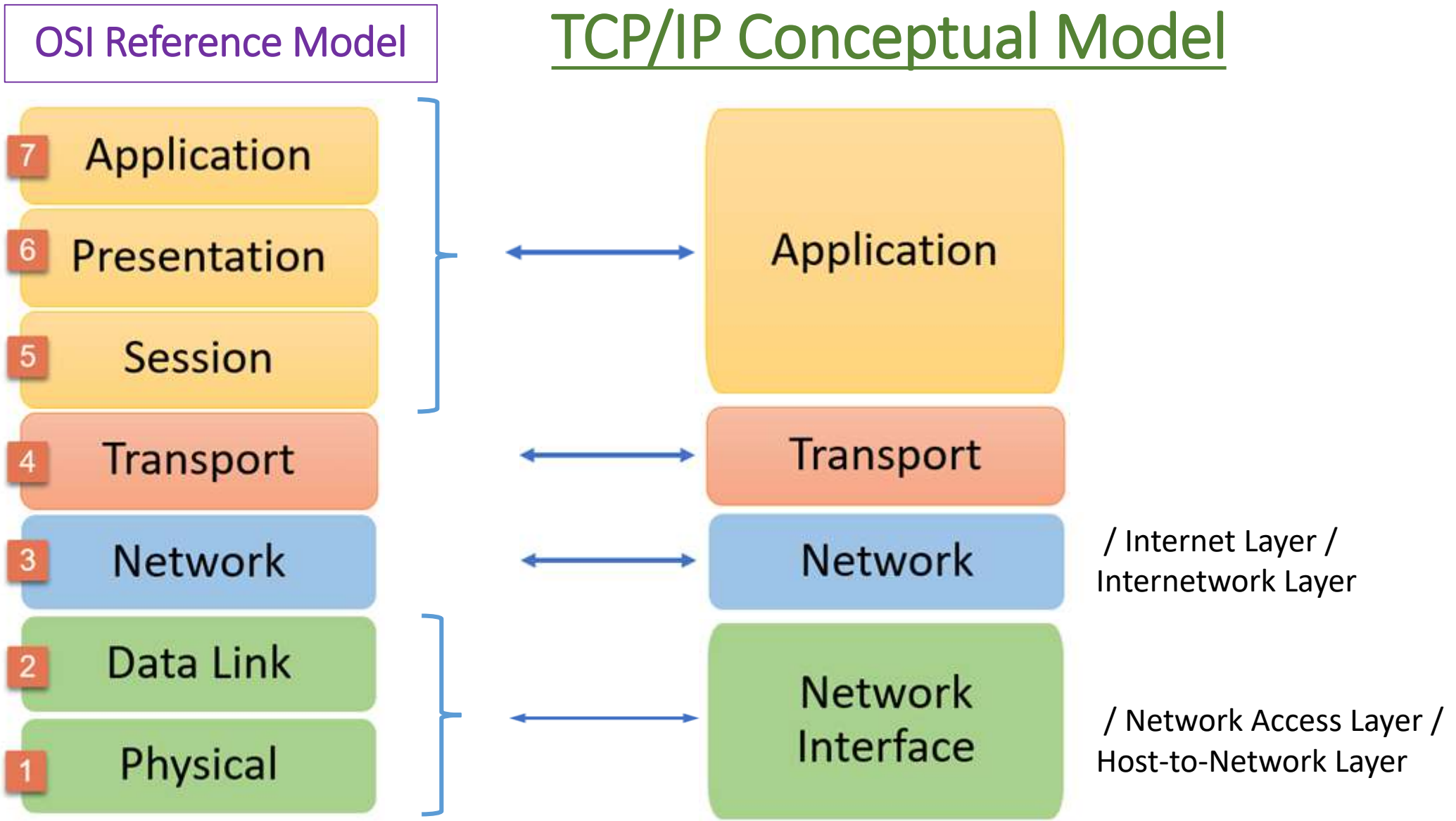
OSI Reference Model



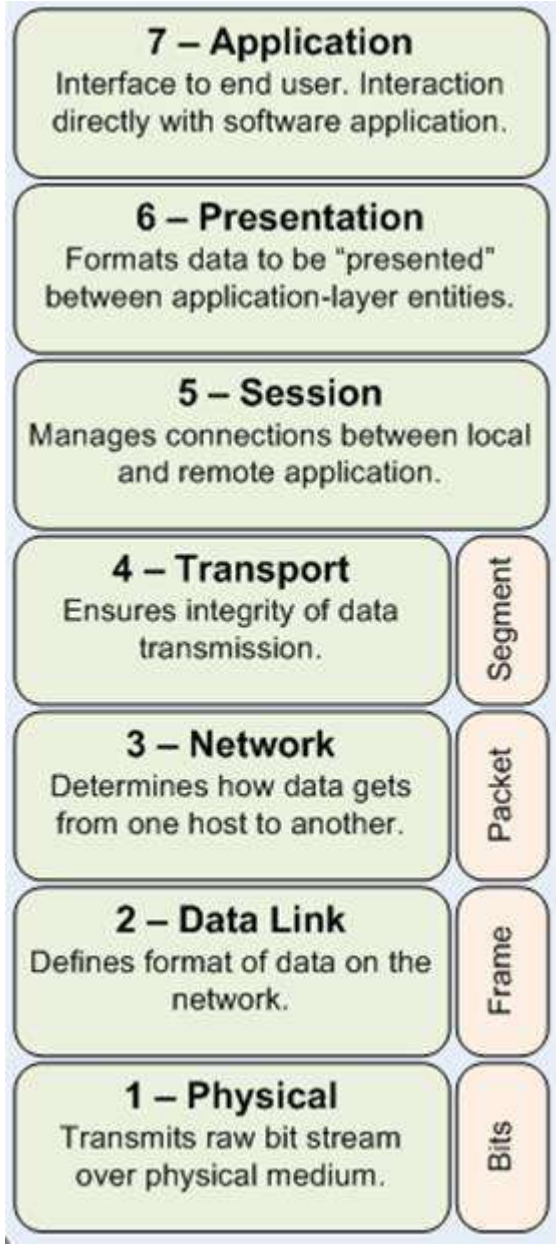
OSI Reference Model



TCP/IP Conceptual Model



Computer Networks (CSC305)



Message Formation
Session Management, Encryption, Data Compression.

DNS, SMTP, POP, FTP, WWW, HTTP

End-to-End Transport Services
Addressing, Reliable Delivery, Error Control, Flow Control.

TCP, UDP

Host –to-Host Delivery
Packet Switching, Routing Algorithms, Congestion Control Algorithms, Network and internet devices.

IPv4, IPv6, ARP, RARP, BOOTP, ICMP, IGMP, DHCP

Node-to-Node Delivery
Framing, Error Control, Flow Control, Errors, Addressing, MAC Protocols.

HDLC, Pure & Slotted ALOHA, CSMA, CSMA/CD, CSMA/CA, IEEE 802 Project, TDMA, FDMA & CDMA

Cabling/Network Interface
Connection Types, Topology, Signalling, Synchronization, Multiplexing, Switching, Transmission Media.