

Before sending the data any node must

1) Attach source \rightarrow IP, mac, Port address
destination \rightarrow IP, mac, Port address

Lec-12

Switching

- 1) in computer network helps in deciding the best route for data transmission if there are multiple paths in larger network
- 2) one-one connection.

① Circuit switching:-

- 1) A dedicated Path is established b/w sender & receiver
- 2) before data transfer, connection will be established first

3) ex:- Telephone network

- Connection establishment
- data transfer
- Connection disconnection.

② Message switching

- Store and forward mechanism
- Message is transferred as a complete unit & forwarded using store & forward mechanism at the intermediary node.
- not suited for streaming media & real time applications.

③ Package Switching

- internet is a packet switched network
- message is broken into individual chunks called as packets
- - each packet is sent individually
- each packet will have source & destination IP address with sequence numbers
- ⇒ Sequence no.'s will help receiver to
 - Reorder the packets
 - Detect missing packets
 - Send acknowledgements

Approaches

1) Packet Switching Approach

- Datagram Packet switching is also known as connectionless switching
- Each independent entity is called as datagram.
- Datagrams contain destination information & the intermediary devices uses this information to forward datagrams to right destination.
- In datagram Packet Switching approach the path is not fixed. (unlike circuit)
- Intermediate nodes take the routing decisions to forward the packets

(responsible
of intermediary
devices)

② Virtual Circuit Approach

- is also known as connection-oriented switching.
- In the case of virtual circuit switching, a preplanned route is established before the messages are sent.
- call request and call accept packets are used to establish the connection b/w sender and receiver.
- In this approach, the path is fixed for the duration of a logical connection.
(after termination if newly starts we don't know if it use same path it depends upon availability)

Lec-13

Layering in computer networks

Layering means decomposing the problem into more manageable components (Layers).
means breaking bigger into smaller

breaks up sending messages into separate components and activities. Each component handles a different part of the communication.

Advantages

- It provides modular design (we can solve smaller ones effectively)
- Easy to troubleshoot

Protocols

- It is a set of rules that governs data communication.
- Protocols in each layer governs the activities of the data communication.

- reference
- 1) OSI Model
 - 2) TCP/IP Model
- } Layered Architectures

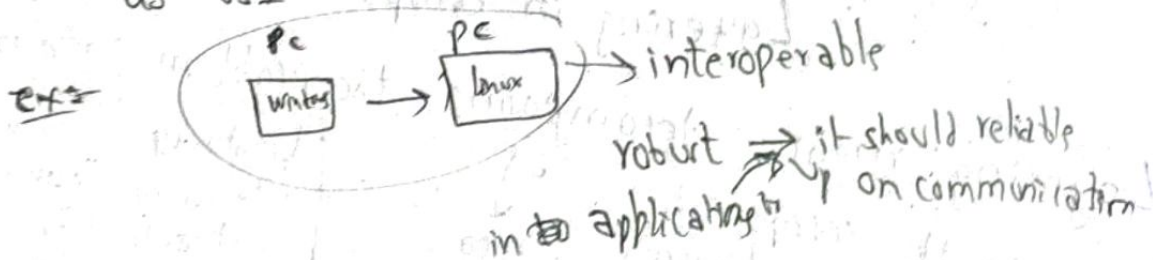
① OSI Model

→ Open System Interconnection
 → it is a model for understanding and designing a network architecture that is flexible, robust, interoperable

- Developed by the international standards for Organisations (ISO)

- OSI model is not a protocol

- it is only guideline and hence it is referred as OSI reference model.



- The purpose of OSI model is to show how to facilitate communication b/w different systems without requiring changes to the logic of the underlying hardware & software.

- OSI model was never fully implemented.

ex- Windows → Linux (any os should understand our data)

→ it is just a guideline.

(two different PCs communicate each other under the guidelines of OSI model)

TCP/IP Model

- Transmission Control Protocol / Internet Protocol
- TCP/IP protocol suite was developed prior to OSI model
- Therefore, the layers in the TCP/IP protocol suite do not exactly match those in OSI model
- TCP/IP is a hierarchical protocol made up of interactive modules, each of which provides a specific functionality.

Lec-14

OSI Reference Model (Part-1)

Layers in OSI reference Model

should not change
order.

Application layer

Awry

Presentation layer

1,229

Session layer

Sausage

Transport layer

throw

Network layer

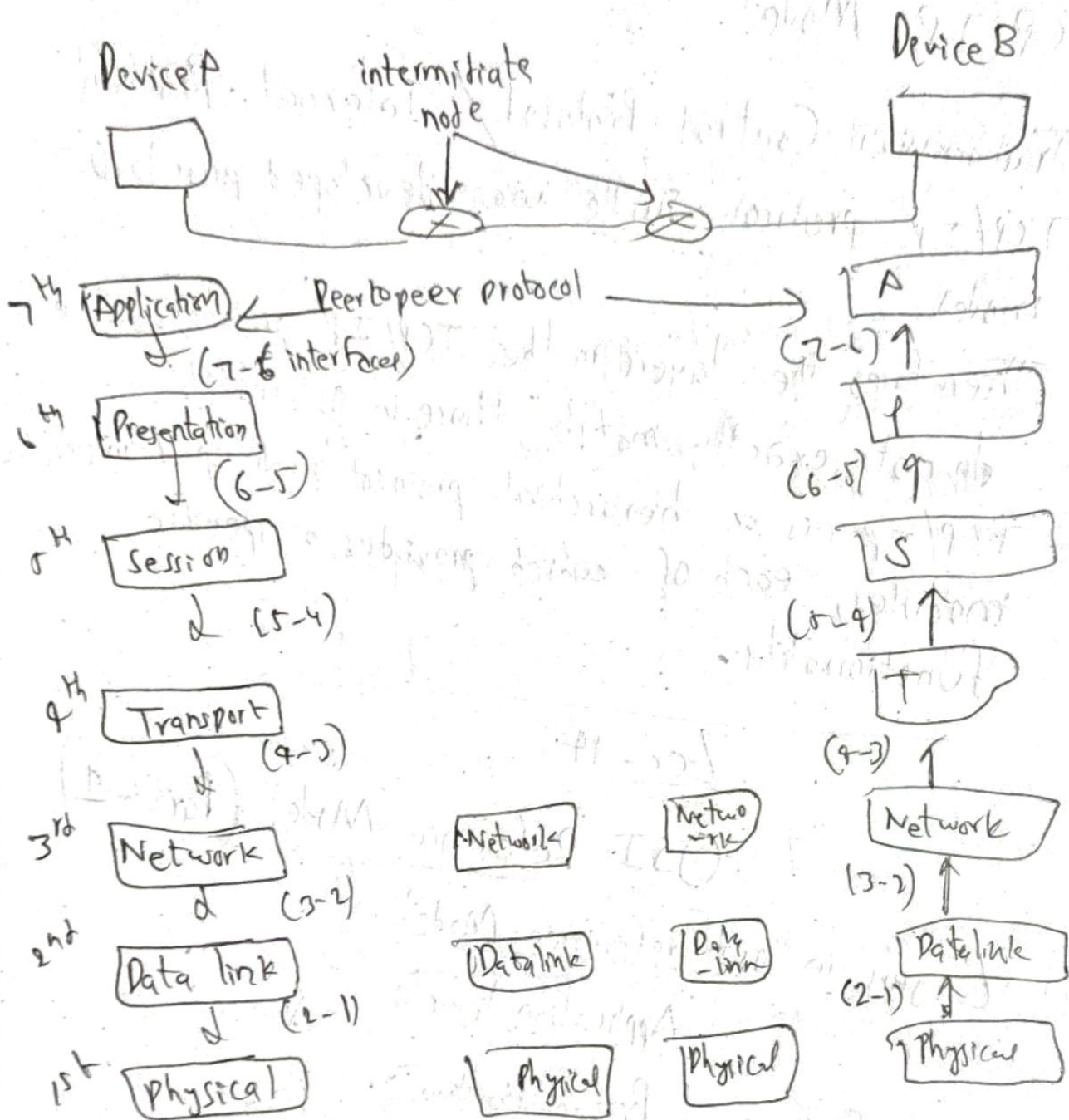
~~that~~ not

Data Link layer

do not

Physical layer

Please



Before sending to intermediary node data passes through different layers, Physical layer then put data to Intern node.

Each layer has its own set of functionalities.

We don't want anyone to access data through application layer (attacker)

Lec-15

OSI Reference model (Part-2)

— how to generate data open application ^(layer) → Pre
↓
Physical ^{layer}

eg:- Application layer generates password to send information to receiver

↓
Presentation (converts it into one format)

↓
Session (session layer activities)

↓
Transport layer (Trans - port info)

↓
Network layer (NL Info, TL Info, ^{address} ~~info~~)

↓
Data link layer (DLL Info, NL Info, TL Info, ~~info~~)

↓
Physical layer (it converts all content into 0's and 1's)
011110110110101001

Application layer

- It enables the user to access the network resources.

⇒ Services provided by application layer

- 1) File Transfer & Access Management (FTAM)
- 2) Mail services
- 3) Directory services

Presentation layer

- it is concerned with the syntax (structure or format) and semantics of the information exchanged b/w two systems.

if n
no. of bits
flowing what's
the 1st bit
represent for
all bit
represent

meaning of
each section

Services

1) Translation

2) encryption

3) Compression

(Converting data into
common format it's
acceptable by sender &
receiver)

if sender sending data it's in
the data is in same format
as the receiver.

is important for
multimedia (audio
video, files)
reducing the
total bits
contained in
the information.

we don't want others to
see it (protecting message)
it through changing
converting which is understandable
by PC's sender will do
decryption.

Session layer

It establishes, maintains, synchronizes the interaction among communicating devices.

Services :

1) Dialog control

2) Synchronization

if two computers are going to communicate each other (that means two processes communicating)

Session layer allows two systems to enter into a dialog.



it is a communication b/w two process to take place either in a half duplex way, or full duplex mode (This kind of activity is called dialog control)

if A system is going to send a 2000 page file and it is advisable to insert a checkpoint after every 100 pages to ensure that 100 page unit is received and acknowledged independently.

In this case, if a crash happens during transmission of a particular page, only that page ~~that~~ can be re-sent

- a action of causing a set of data or file to remain identical in more than one location.

Lec-16

OSI (Part-3)

Transport layer

It is responsible for process to process delivery of the entire message.

So port number (or) Source process ID

going to communicate with this destination process

(Source port number

is attached with the message)

Services

1) Port addressing

2) Segmentation & Reassembly

3) Connection control

4) end-to-end flow control

5) Error control

(It will get reply to sender then it sends information to it process with help of source & destination port numbers)

big message to smaller messages where each number is numbered after reception of all individual messages the computer (receiver) can reassemble all messages

switching networks
(connection b/w two devices)

1) Connection oriented (circuit switch)
2) Connectionless (Datagram packet)

(Speed matching mechanism both agrees on data speed control)

finally whatever transport layer constructs, it has data it will check for errors. we don't want our receiver to accept that data

(transmission errors)

Network layer

- It is responsible for delivery of data from the original source to the destination network

Services

1) logical addressing (IP address)

2) Routing

finding the best route for packet to be transferred

↓
it helps the router to take decision when a packet is received by this router it will have source IP & receiver IP

Data link layer

→ it is responsible for moving data (frames) from one node to another node.

Services

(the data link layer of sender's computer or node) it groups the bits of os & is we call that grouping as frames

frames

Physical addressing (Mac address)

Flow control

Error control

Access control

same as Transport layer

→ When two or more devices are connected to same link

if there is a common

then data link layer protocols are

- link when two or more devices are connected to that same link

necessary to determine which device has control over the link at that time.

if two devices are connected to common link
data link layer only determines which device
has control over this line at particular time.

After the time is over,
then it means it is turn
of another computer to use it.



Physical layer

⇒ It is responsible for transmitting bits over a
medium. It also provides electrical & mechanical
specification.

→ to place that frame (from data link layer)
on medium

1) wired

2) wireless

Services :-

- 1) Physical characteristics of medium
- 2) Representation of bits
- 3) Data rate
- 4) Synchronization of bits
- 5) Line Configuration
- 6) Physical topology

type of
encoding
(how the bits
converted to
signals)

transmission
rate
no. of bits per sec

clock b/w sender & receiver
must also be synchronized

transmission mode

simplex
half duplex
full duplex

Point to point
communication

Point to multipoint
communication

b/w two
nodes
are
channel
only
for them

that common
channel shared
by many devices.