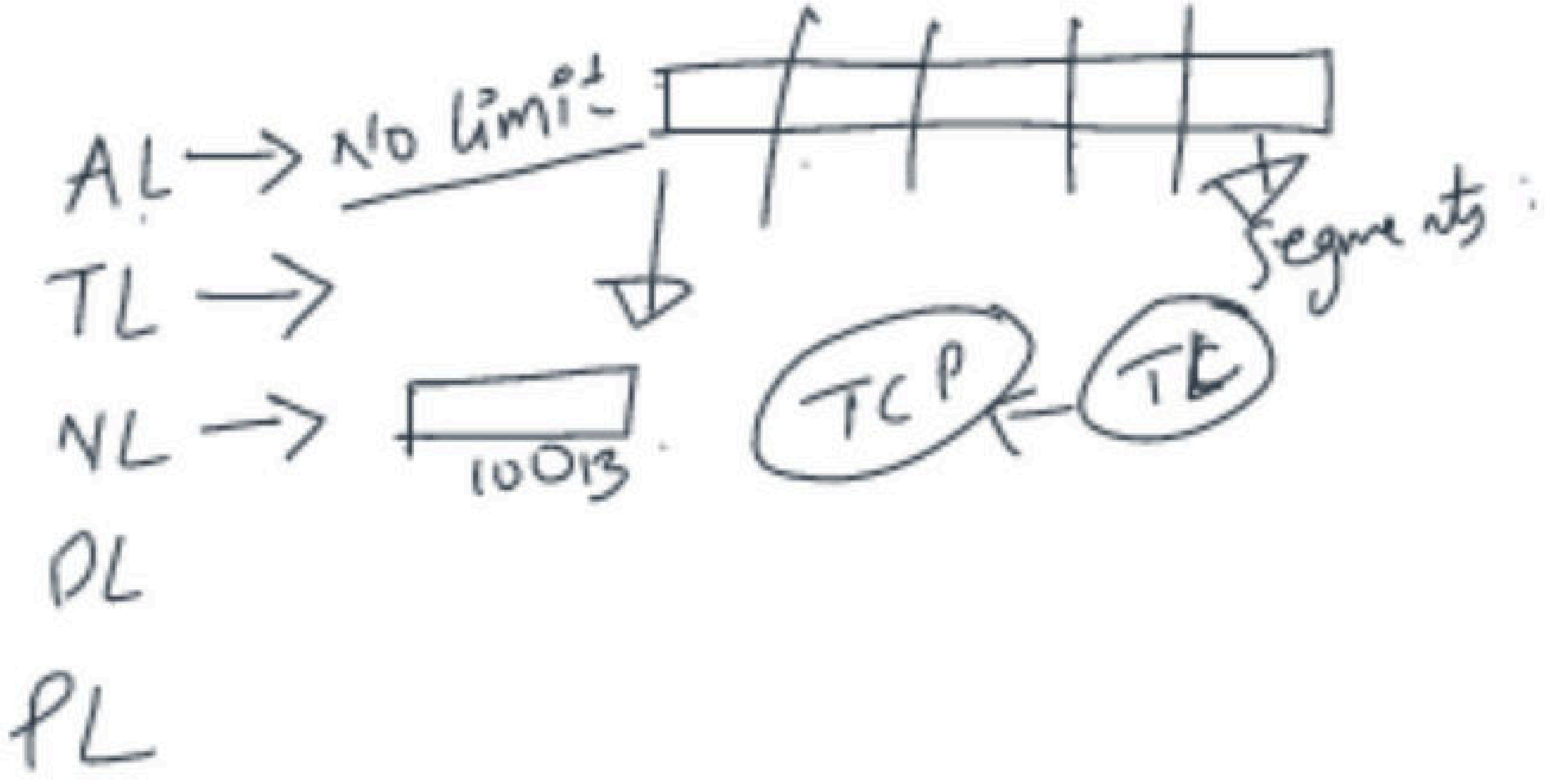
Fragmentation with Numerical Example - Part I

Complete Course on Computer Networks - Part II

Ravindrababu Ravula • Lesson 11 • Mar 2, 2021

Functions of Transport layer

- End – End Connectively ✓
- Flow Control ✓
- Error Control ✓
- Segmentation ✓
- Multiplexing and Demultiplexing
- Congestion Control



Segmentation means to divide something into pieces. When data arrives at the transport layer from the upper layers, it is taken then divided into segments. That is why data at this layer is called segments rather than data.

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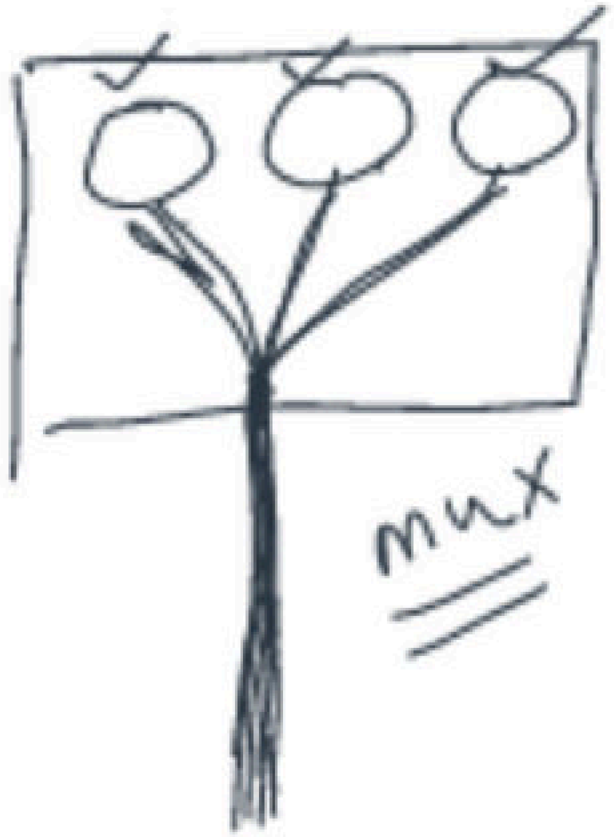
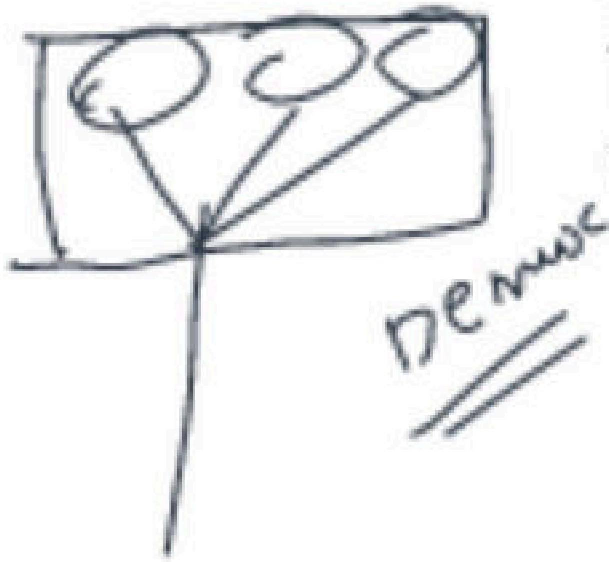


Transport layer gathers chunks of data it receives from different sockets and encapsulate them with transport headers. Passing these resulting segments to the network layer is called multiplexing.

The reverse process which is delivering data to the correct socket by the transport layer is called demultiplexing.
This is done by port nos.
We will see about this in further lectures.



SPA
Port number

Functions of Transport layer

- End – End Connectively
- Flow Control
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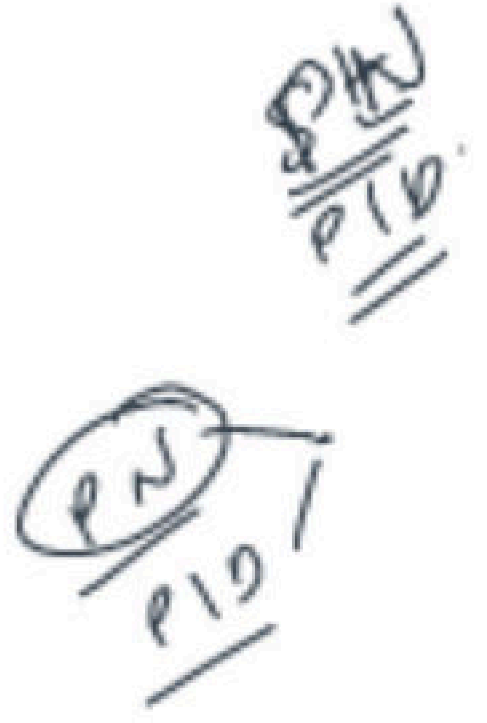
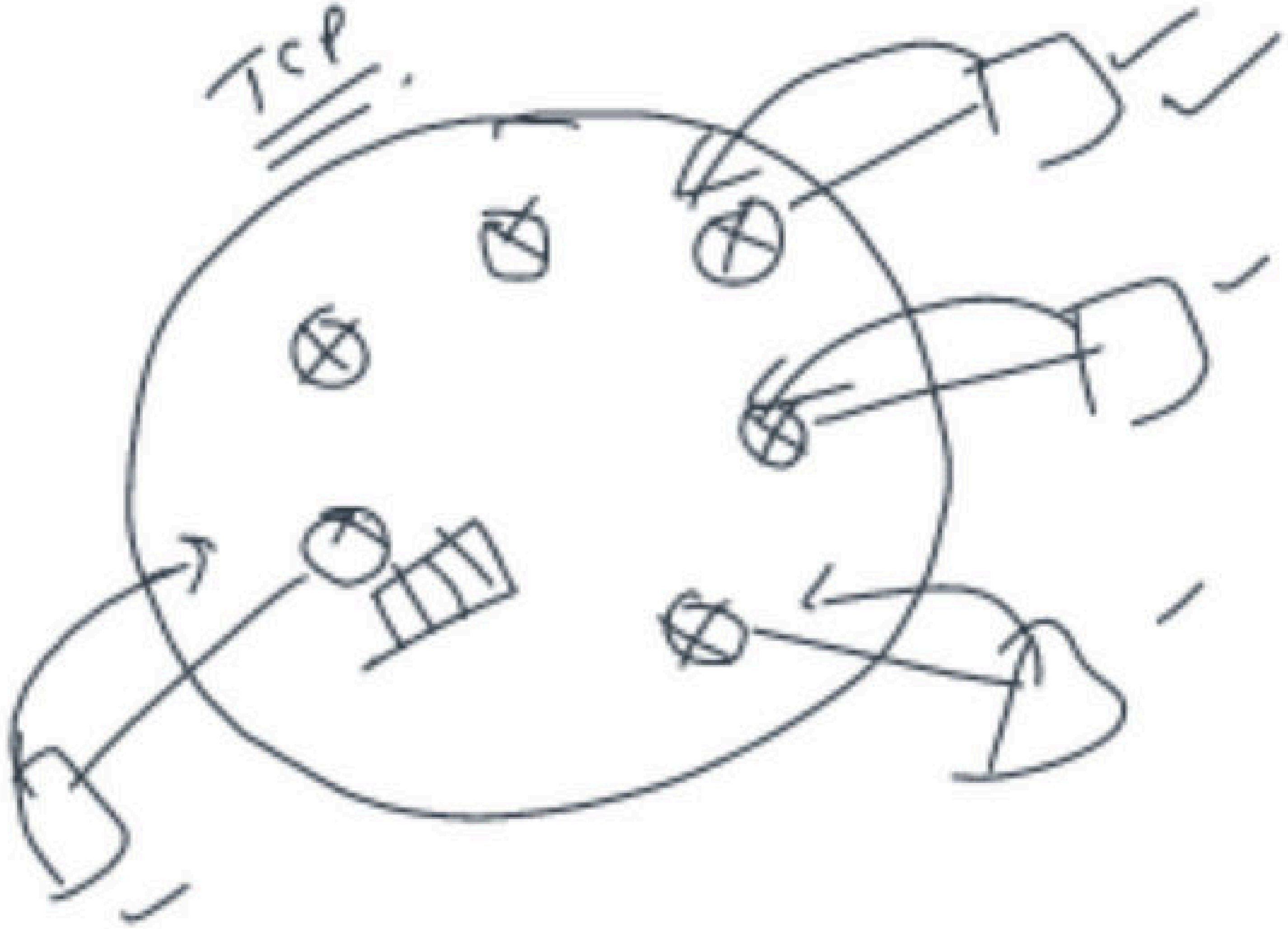
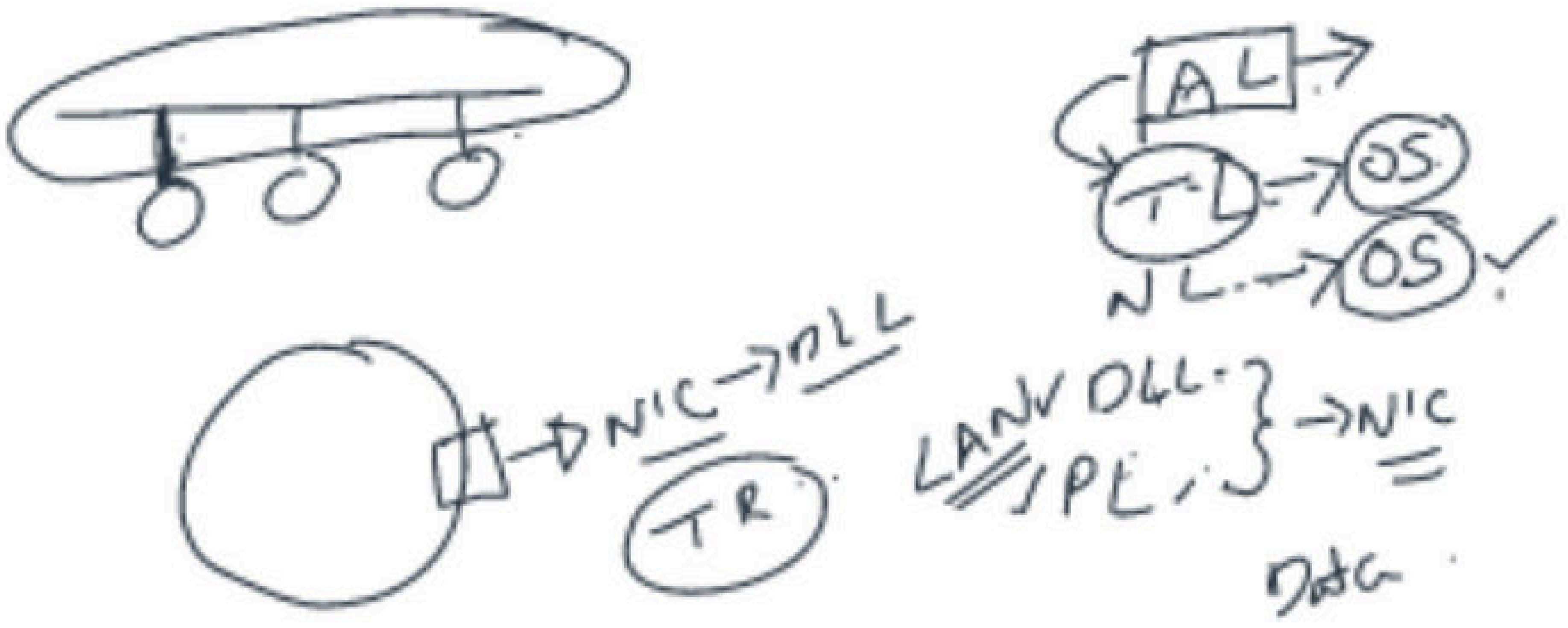
- Congestion Control

What is congestion?
A state occurring in network layer when the message traffic is so heavy that it slows down network response time.

Transport Layer has various algorithms to control this, We will see that in the coming lectures.

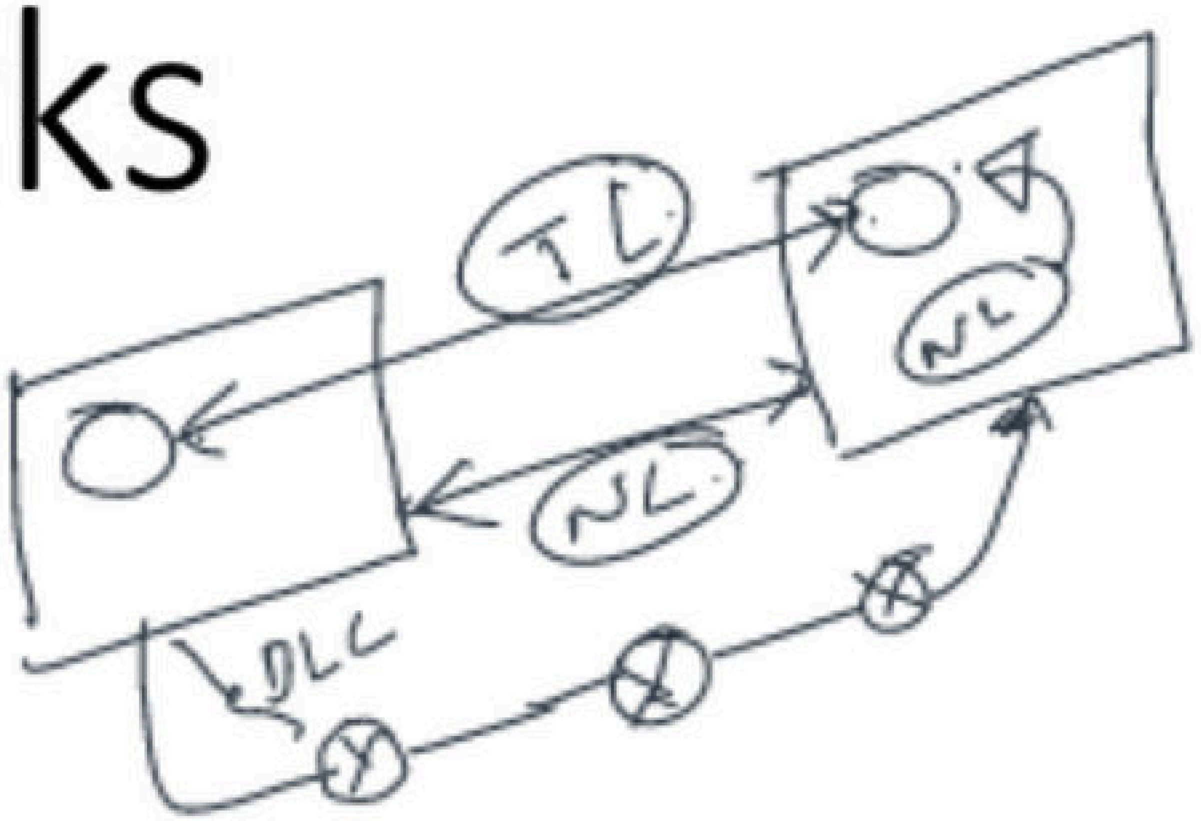




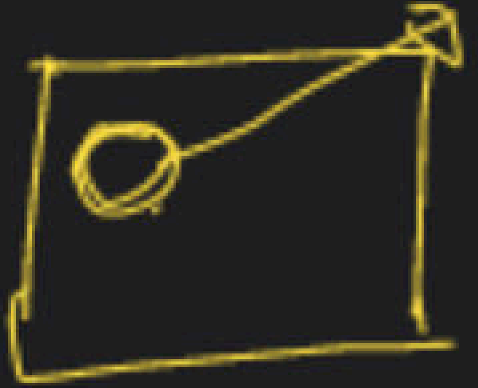


Computer Networks

How all Layers Work Together



www.G.com ✓



IP1

DNS

↓

IPD

≠

↓

ISP → IP1 Sm1 IPD IPDG

IP1

Sm1

And: N.ID1

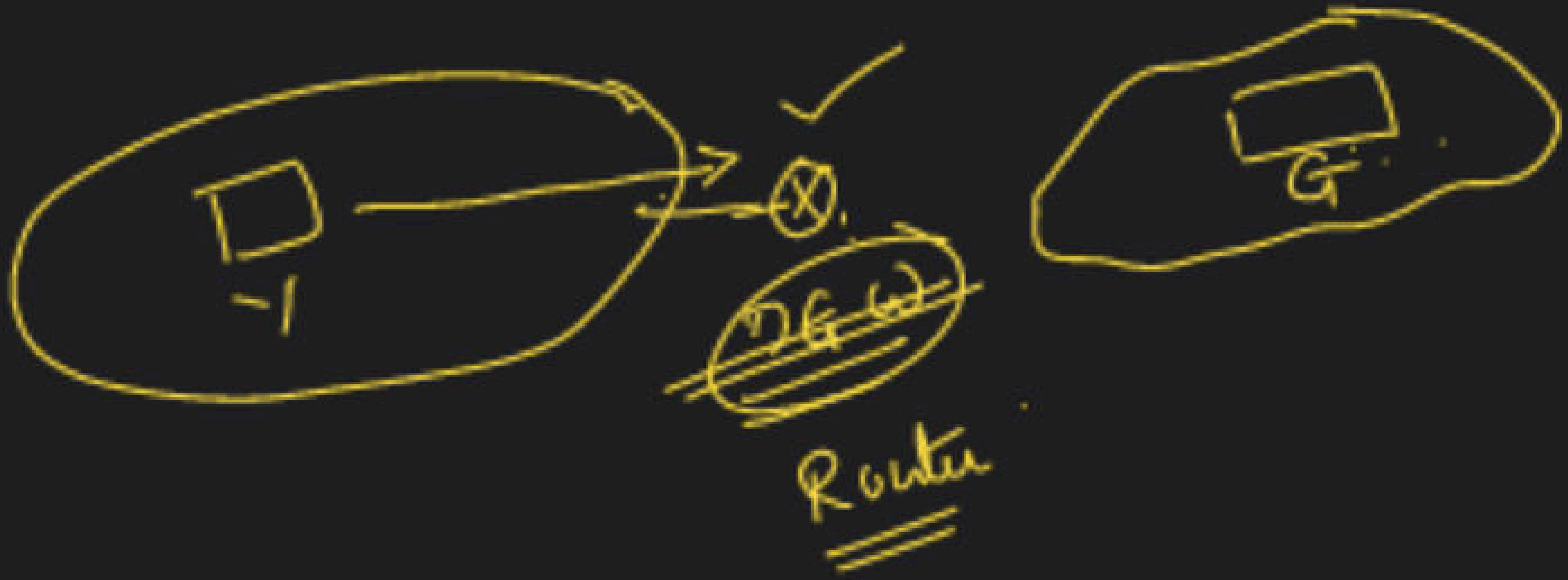
=

IPG

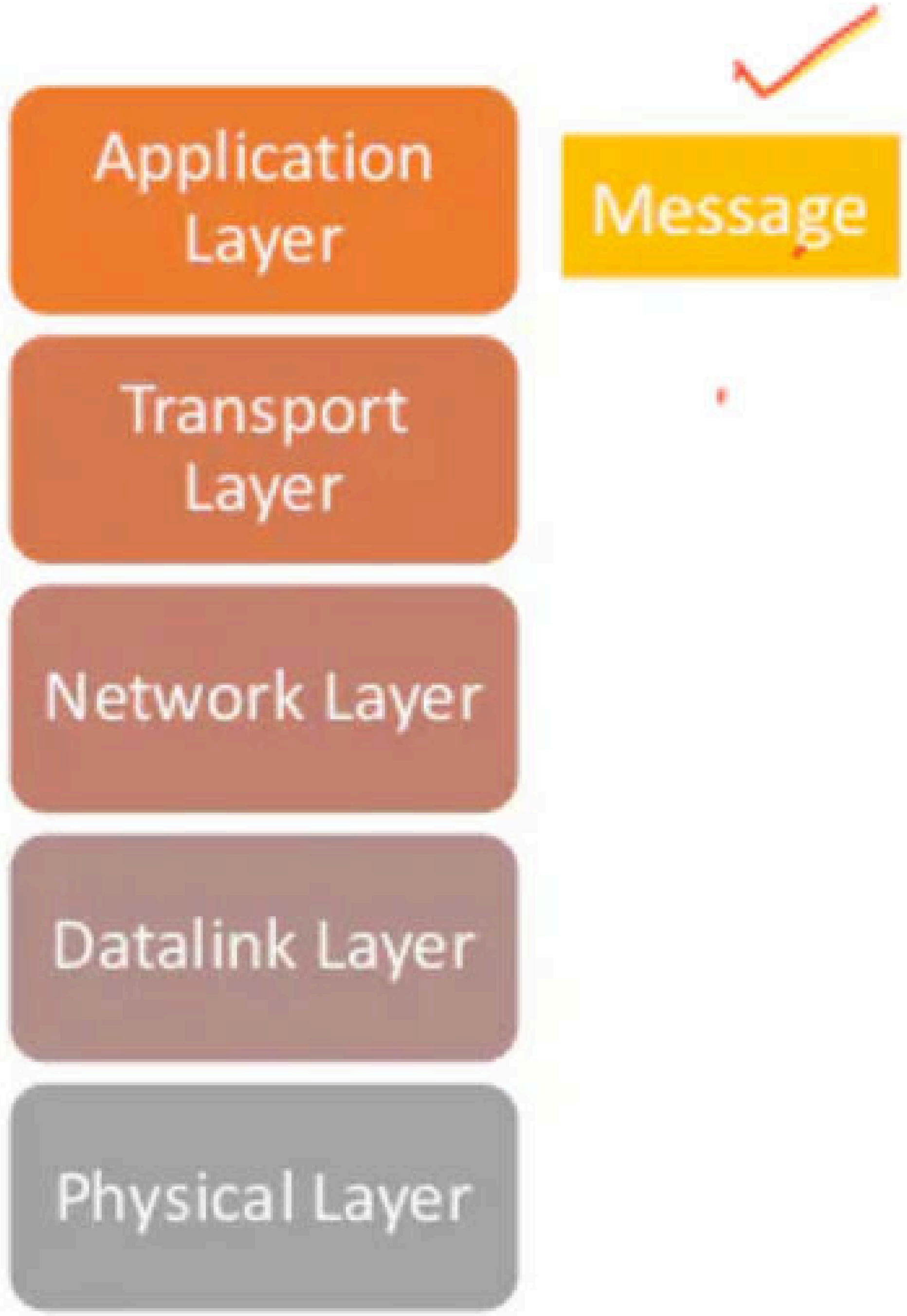
Sm1

And: NIDG1

≠



Network of G ≠ N/w of You.



Application Layer

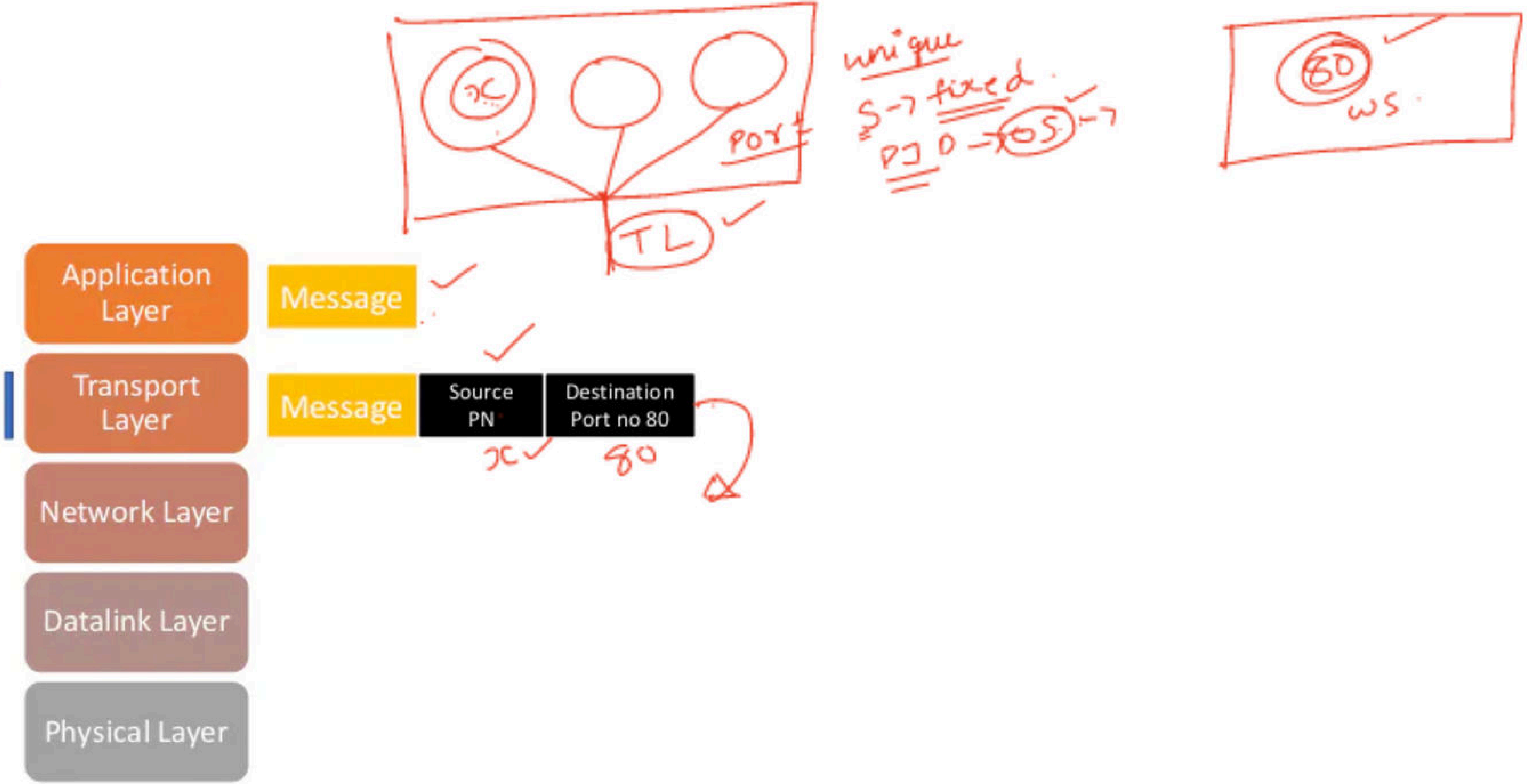
Transport Layer

Network Layer

Datalink Layer

Physical Layer

Message



Application Layer

Message

Transport Layer

Message

Source PN

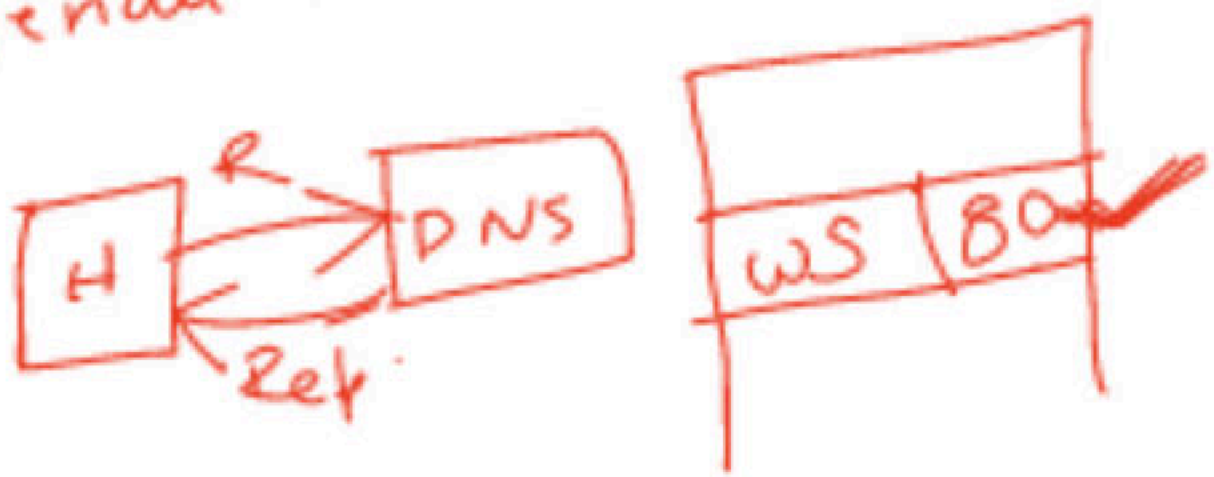
Destination Port no 80

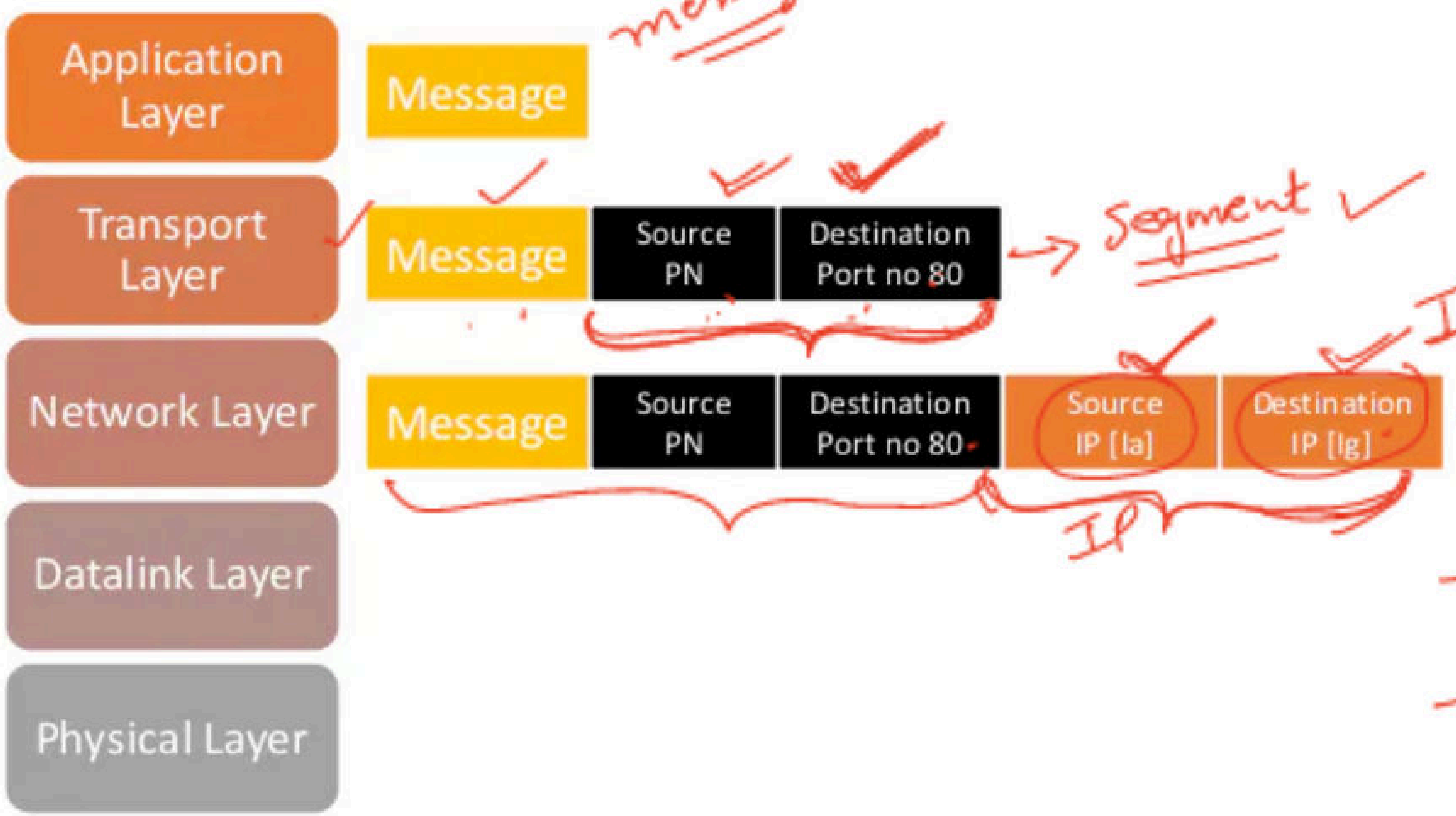
Network Layer

Datalink Layer

Physical Layer

Sendu -> D -> PNO





message

-> Segment

Packet

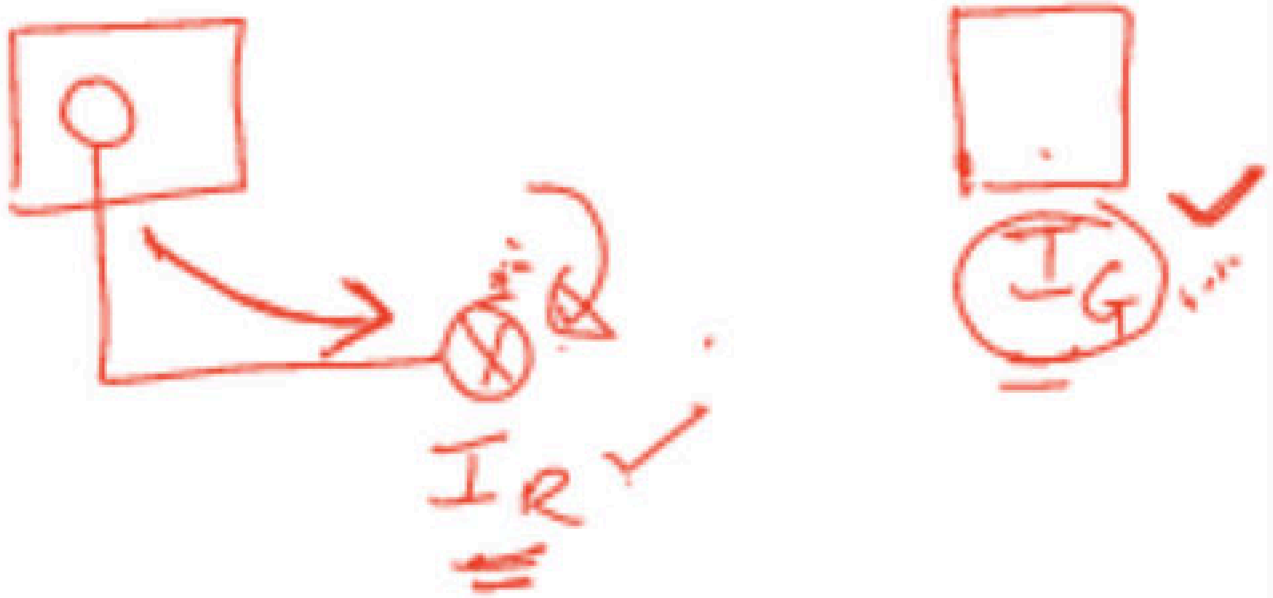
-> Datagram

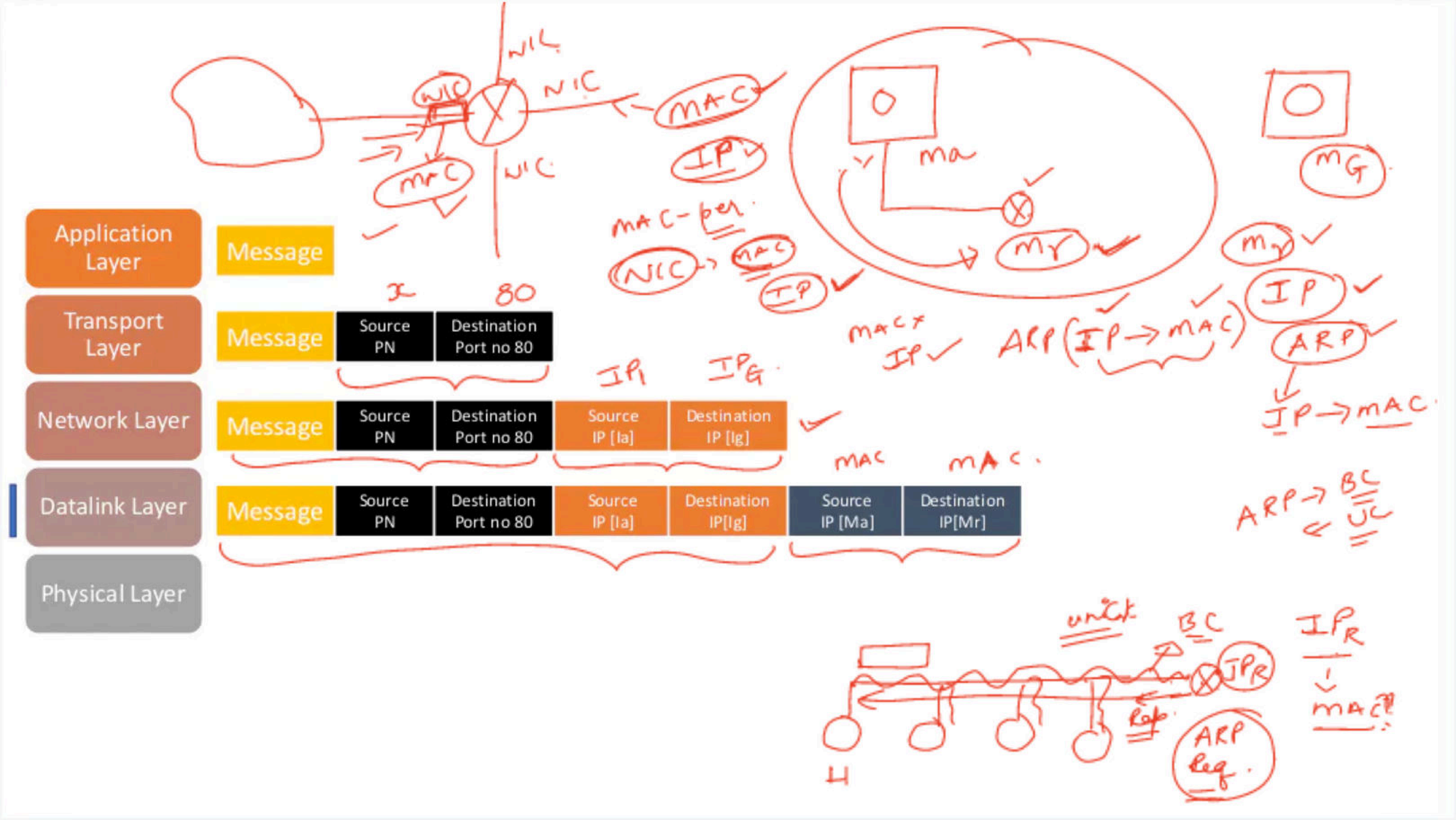
SIP -> ISP

DIP ->

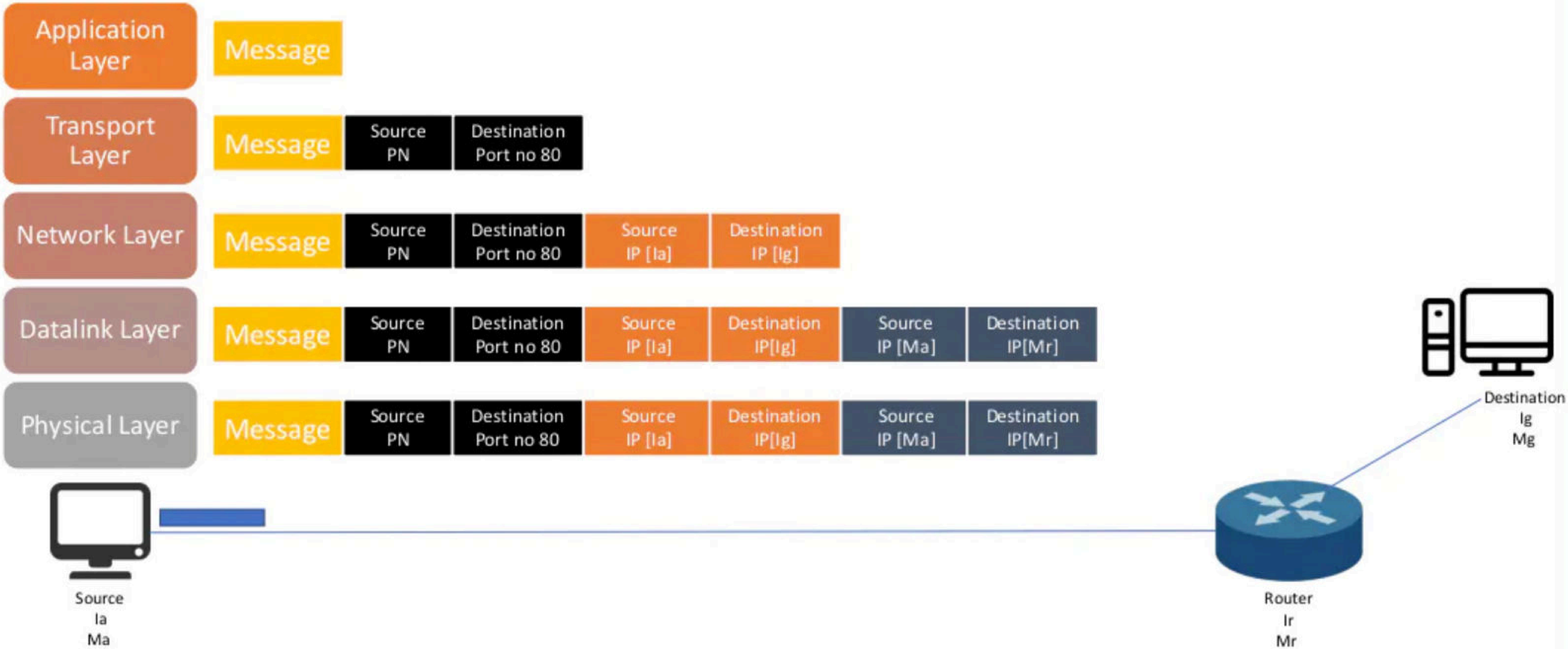
-> Frame

-> MTU

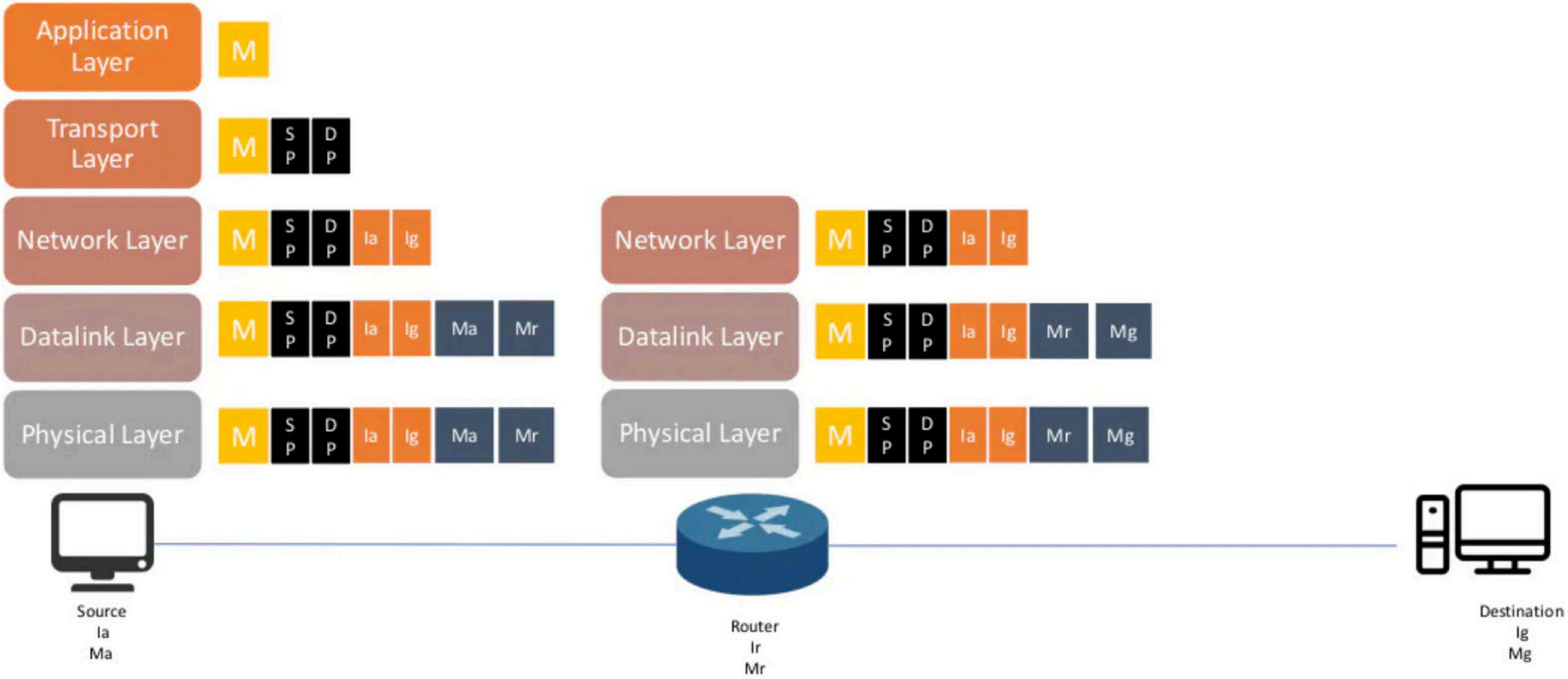


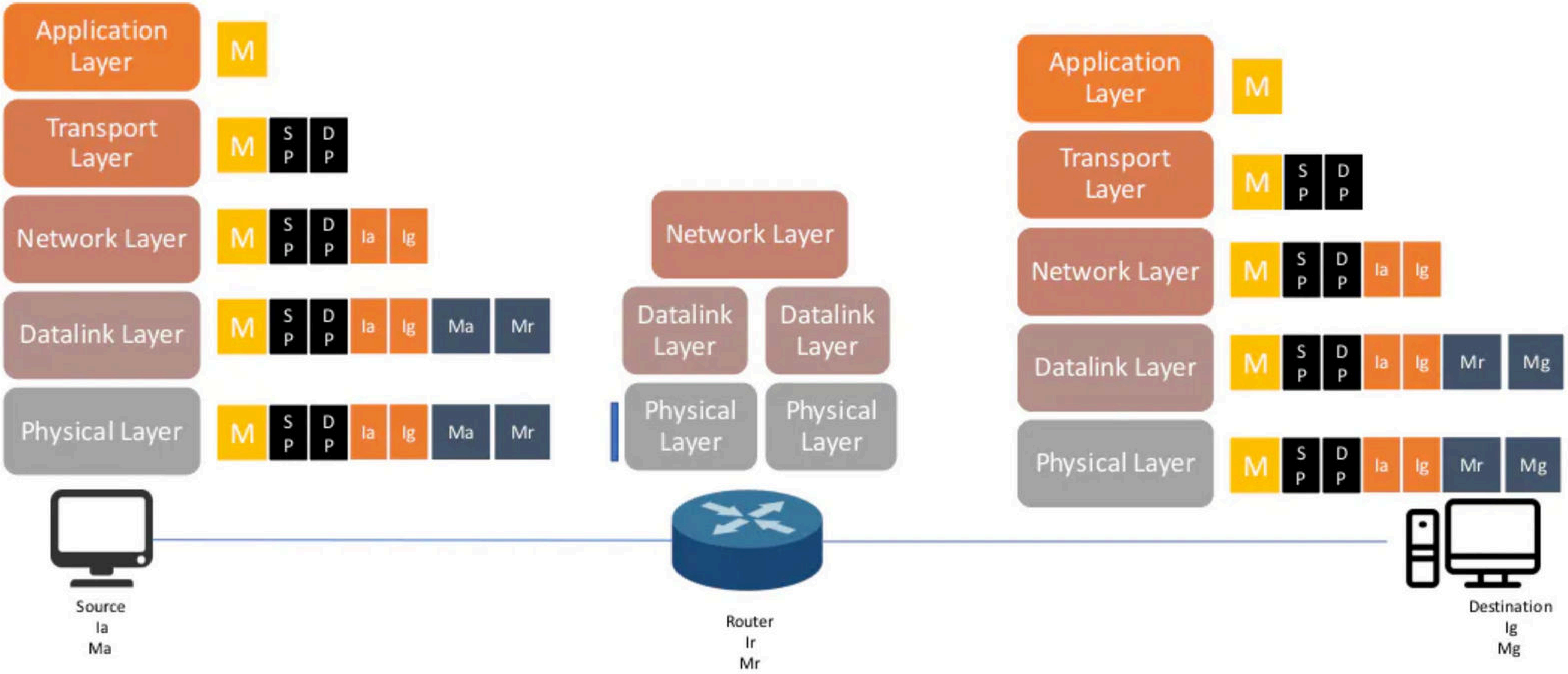


Application Layer	Message						
Transport Layer	Message	Source PN	Destination Port no 80				
Network Layer	Message	Source PN	Destination Port no 80	Source IP [Ia]	Destination IP [Ig]		
Datalink Layer	Message	Source PN	Destination Port no 80	Source IP [Ia]	Destination IP[Ig]	Source IP [Ma]	Destination IP[Mr]
Physical Layer							



Application Layer	Message						
Transport Layer	Message	Source PN	Destination Port no 80				
Network Layer	Message	Source PN	Destination Port no 80	Source IP [Ia]	Destination IP [Ig]		
Datalink Layer	Message	Source PN	Destination Port no 80	Source IP [Ia]	Destination IP[Ig]	Source IP [Ma]	Destination IP[Mr]
Physical Layer	Message	Source PN	Destination Port no 80	Source IP [Ia]	Destination IP[Ig]	Source IP [Ma]	Destination IP[Mr]





Application Layer
M

Transport Layer
M S P D P

Network Layer
M S P D P Ia Ig

Datalink Layer
M S P D P Ia Ig Ma Mr

Physical Layer
M S P D P Ia Ig Ma Mr

Source
Ia
Ma

Network Layer

Datalink Layer

Datalink Layer

Physical Layer

Physical Layer

Router
Ir
Mr

Application Layer
M

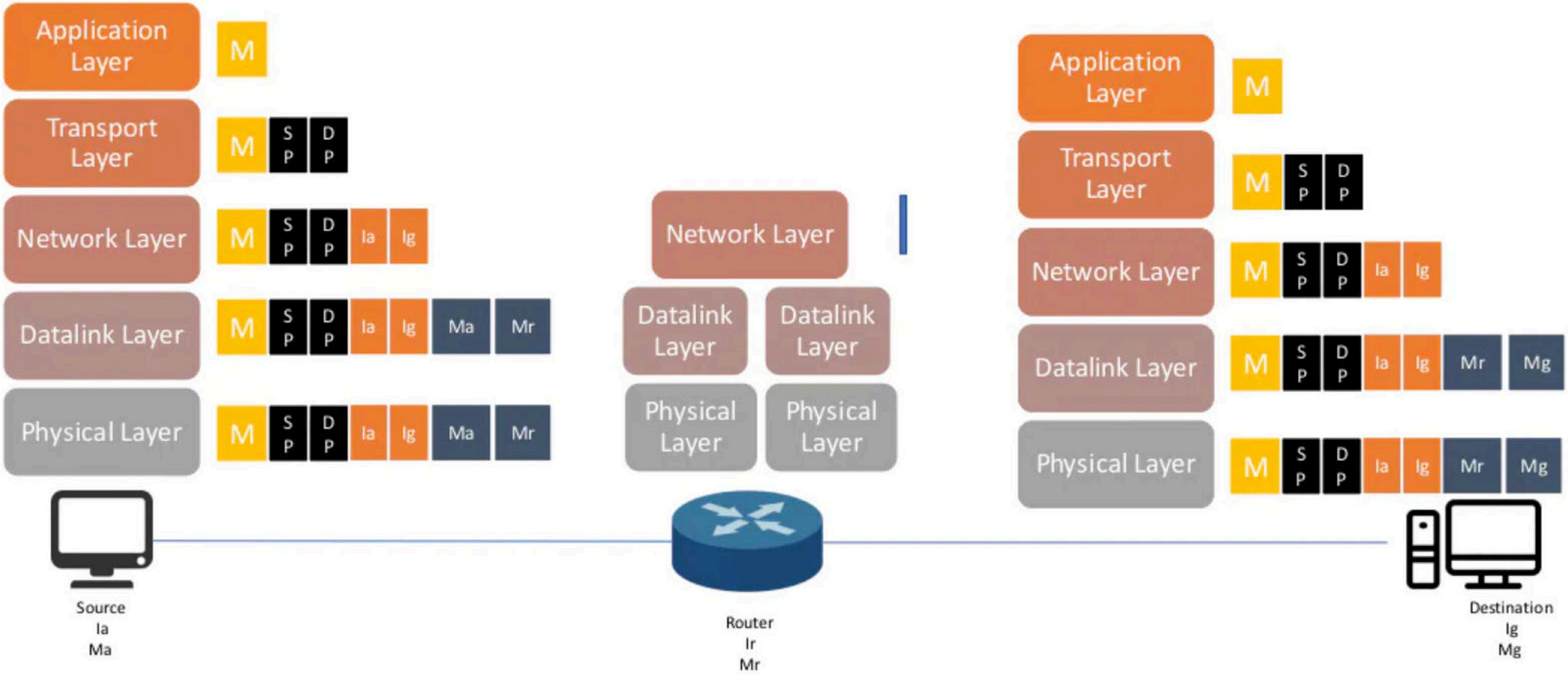
Transport Layer
M S P D P

Network Layer
M S P D P Ia Ig

Datalink Layer
M S P D P Ia Ig Mr Mg

Physical Layer
M S P D P Ia Ig Mr Mg

Destination
Ig
Mg



Application Layer
M

Transport Layer
M SP DP

Network Layer
M SP DP Ia Ig

Datalink Layer
M SP DP Ia Ig Ma Mr

Physical Layer
M SP DP Ia Ig Ma Mr

Source
Ia
Ma

Network Layer

Datalink Layer
Datalink Layer

Physical Layer
Physical Layer

Router
Ir
Mr

Application Layer
M

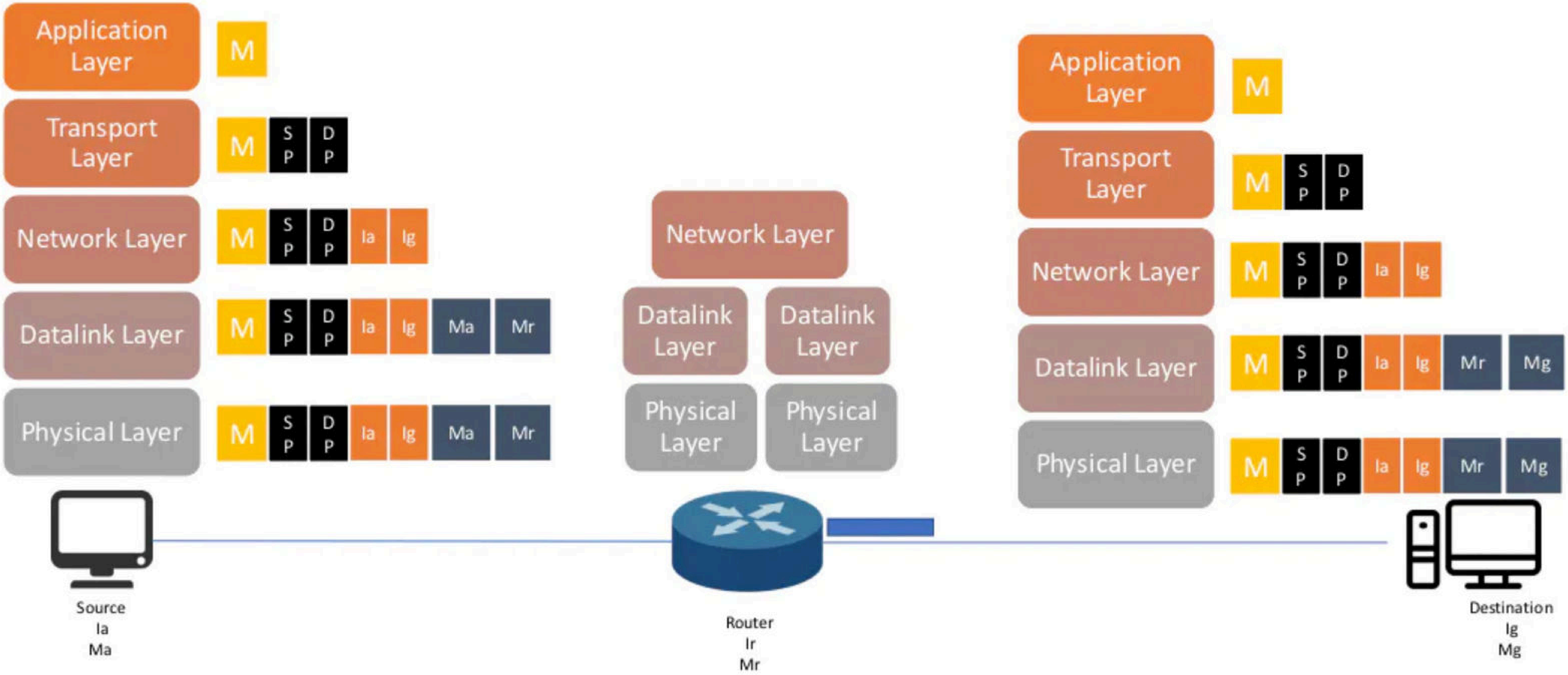
Transport Layer
M SP DP

Network Layer
M SP DP Ia Ig

Datalink Layer
M SP DP Ia Ig Mr Mg

Physical Layer
M SP DP Ia Ig Mr Mg

Destination
Ig
Mg



Application Layer M

Transport Layer M SP DP

Network Layer M SP DP Ia Ig

Datalink Layer M SP DP Ia Ig Ma Mr

Physical Layer M SP DP Ia Ig Ma Mr

Source
Ia
Ma

Network Layer

Datalink Layer Datalink Layer

Physical Layer Physical Layer

Router
Ir
Mr

Application Layer M

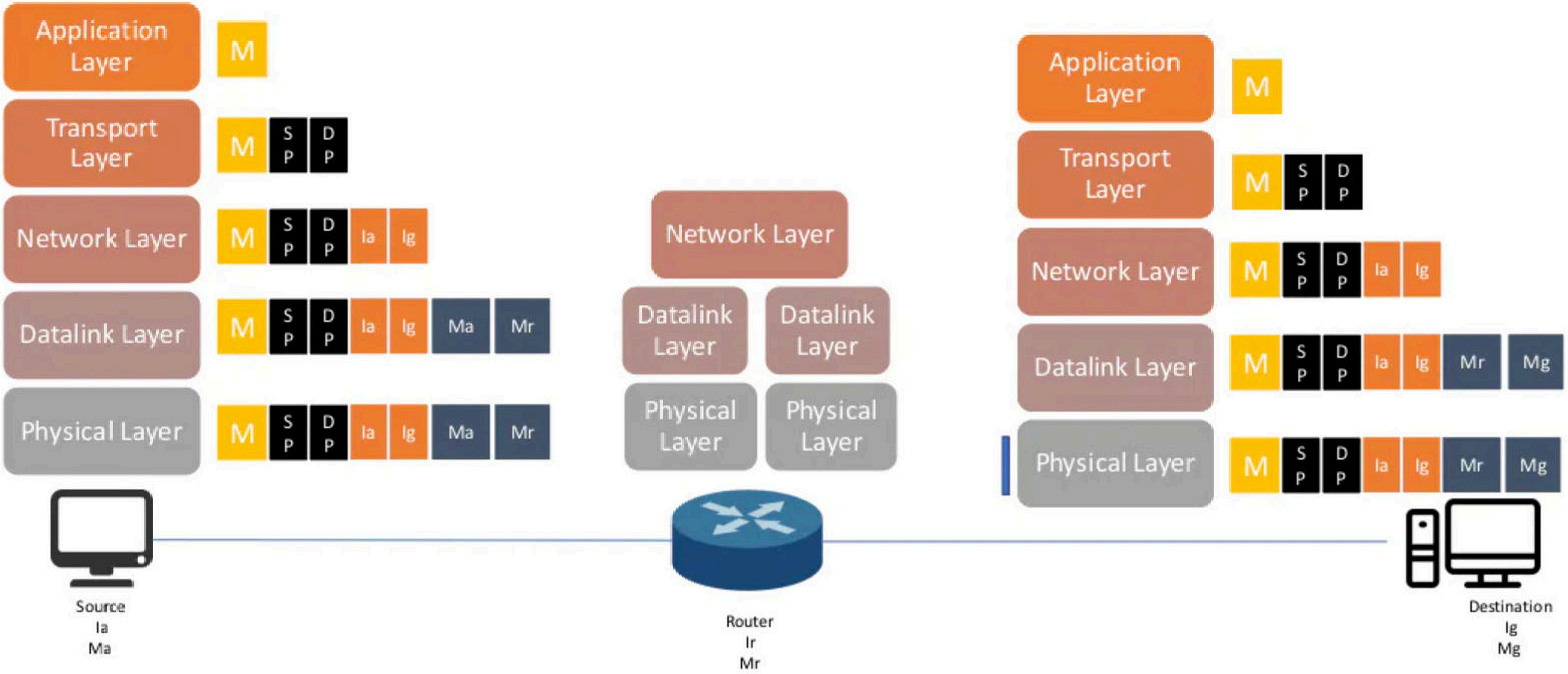
Transport Layer M SP DP

Network Layer M SP DP Ia Ig

Datalink Layer M SP DP Ia Ig Mr Mg

Physical Layer M SP DP Ia Ig Mr Mg

Destination
Ig
Mg



Computer Networks

Session Layer

Functions of Session Layer

- Authentication and Authorisation
- Checkpointing
- Synchronisation
- Dialog control

Functions of Session Layer

- Authentication and Authorization
- Checkpointing
- Synchronisation
- Dialog control

Authentication is the process of recognizing a user’s identity. It is the mechanism of associating an incoming request with a set of identifying credentials. The credentials provided are compared to those on a file in a database of the authorized user’s information on a local operating system or within an authentication server.

Authorization is is the process of granting or denying access to a network resource which allows the user access to various resources based on the user's identity.

Functions of Session Layer

- Authentication and Authorisation
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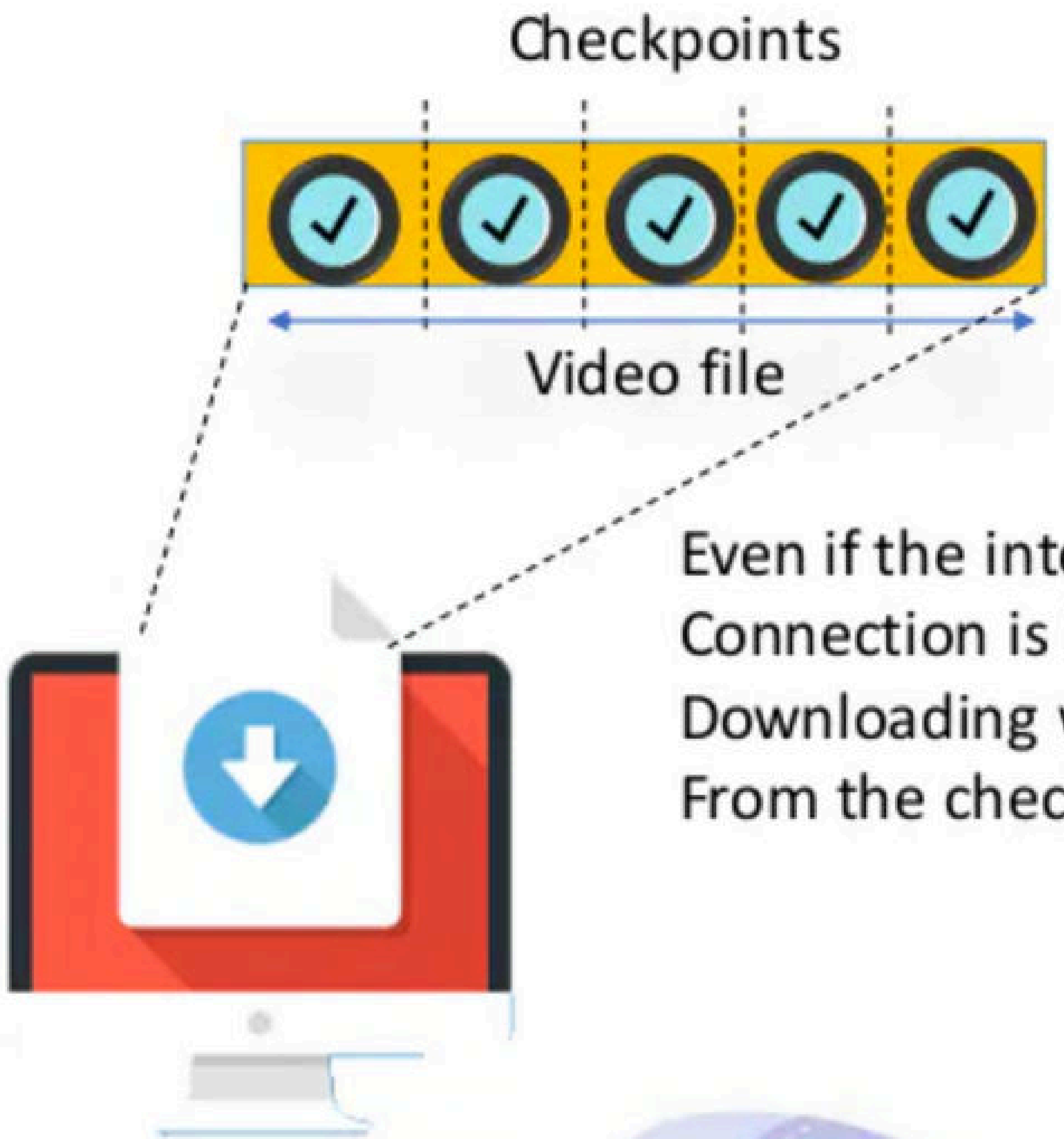
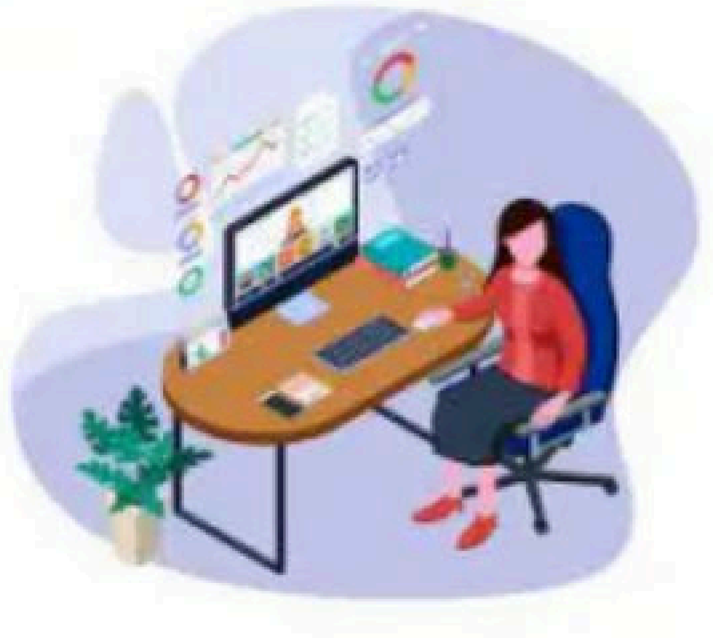
- Dialog control



Even if the internet
Connection is lost,
Downloading will resume
From the checkpoint.



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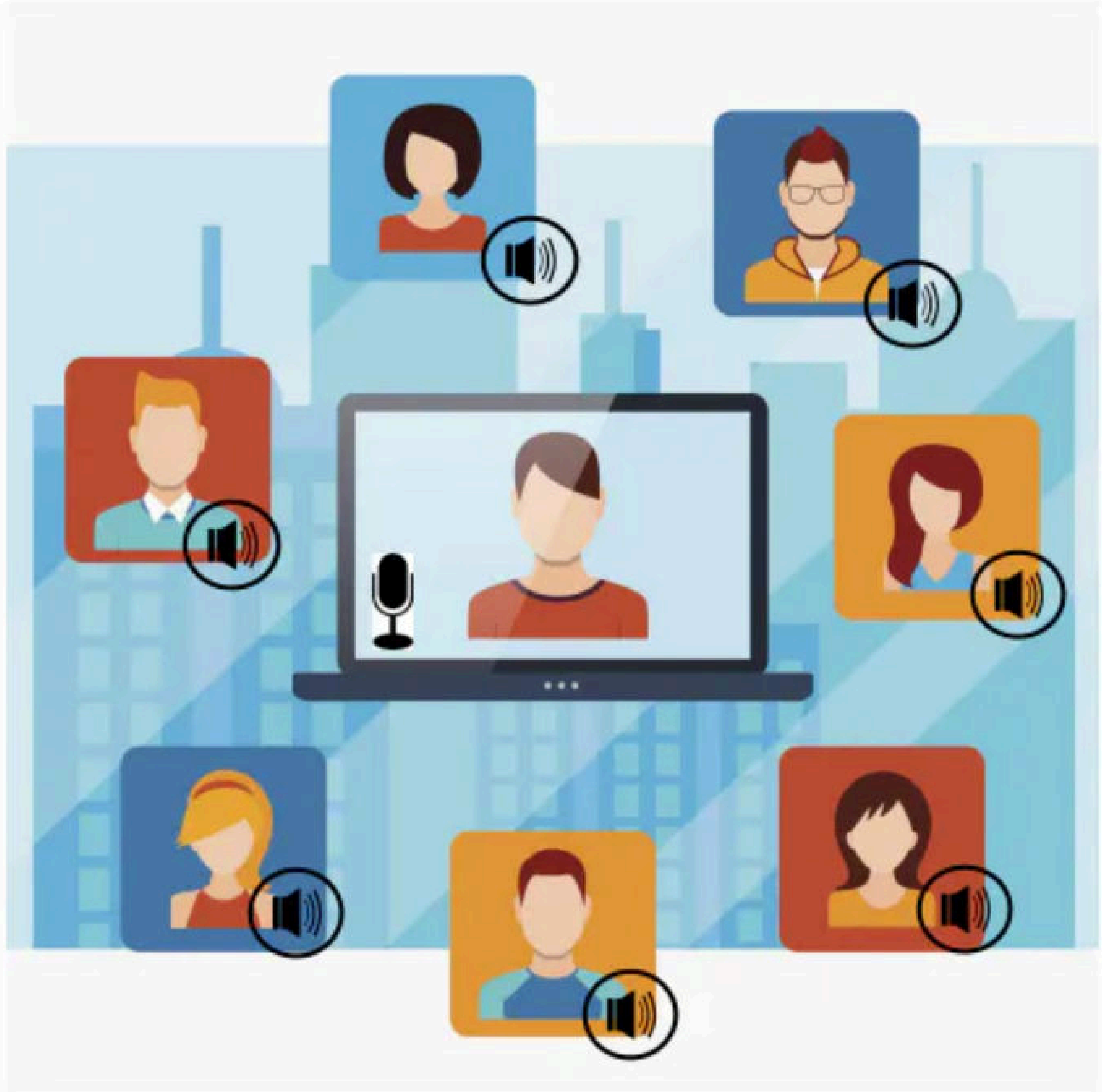
Video conferencing – Only one person must speak at once



Computer Networks

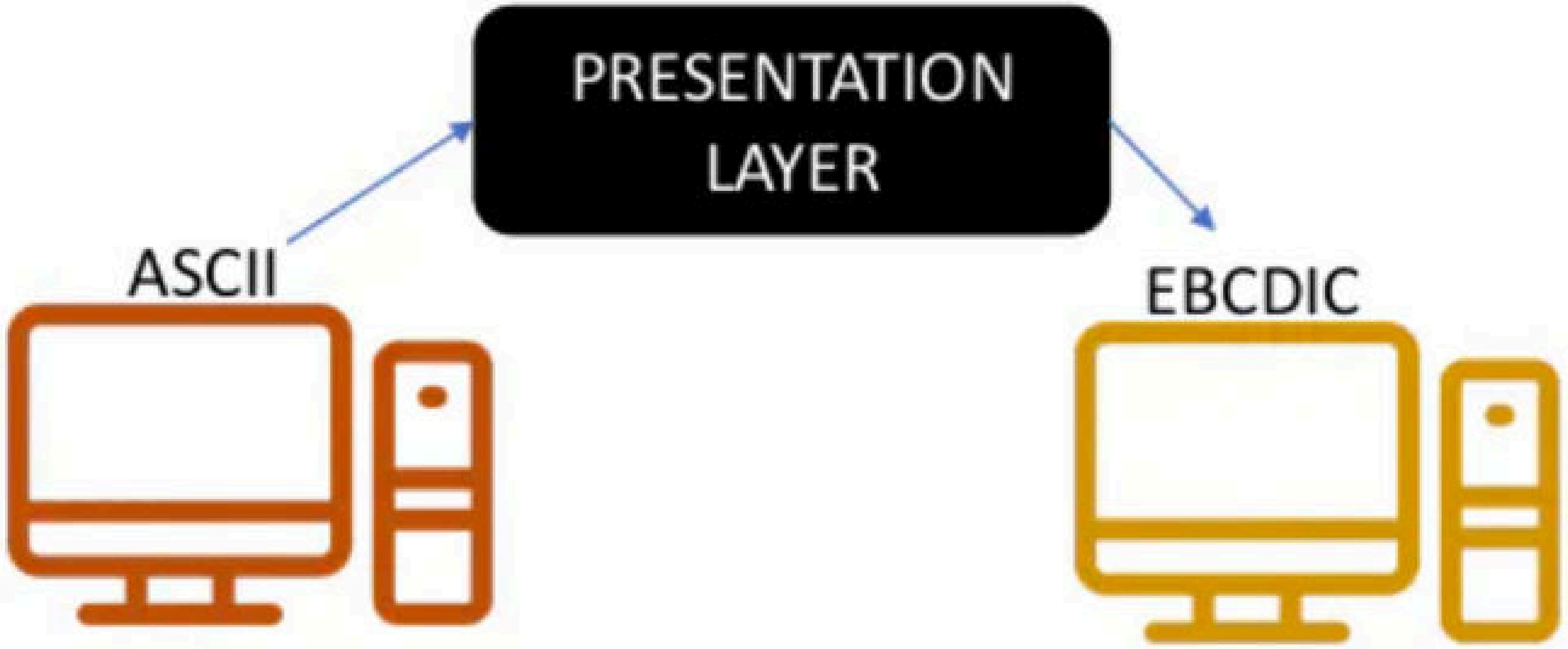
Presentation Layer and GATE 2014 question

Functions of Presentation Layer

- Data Translation
- Encryption and Decryption
- Data compression

Functions of Presentation Layer

- Data Translation
- Encryption and Decryption
- Data compression



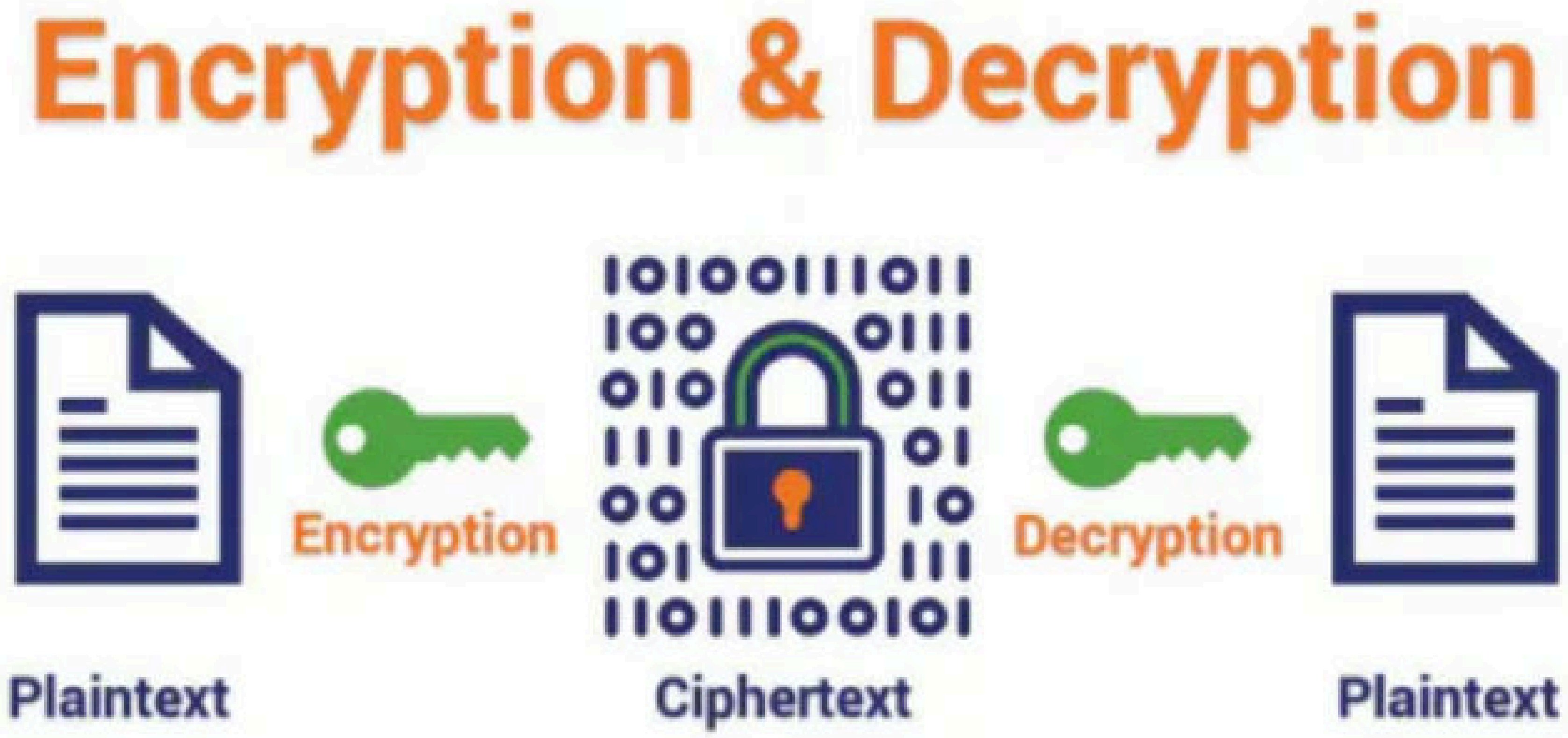
PRESENTATION LAYER

ASCII

EBCDIC

Functions of Presentation Layer

- Data Translation
- Encryption and Decryption
- Data compression



Functions of Presentation Layer

- Data Translation
- Encryption and Decryption
- Data compression

GATE 2014

An IP machine Q has a path to another IP machine H via three IP routers R1, R2, and R3.

Q—R1—R2—R3—H

H acts as an HTTP server, and Q connects to H via HTTP and downloads a file. Session layer encryption is used, with DES as the shared key encryption protocol. Consider the following four pieces of information:

[I1] The URL of the file downloaded by Q

[I2] The TCP port numbers at Q and H

[I3] The IP addresses of Q and H

[I4] The link layer addresses of Q and H

Which of I1, I2, I3, and I4 can an intruder learn through sniffing at R2 alone?

A) Only I1 and I2

B) Only I1

C) Only I2 and I3

D) Only I3 and I4

GATE 2014

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Which of I1, I2, I3, and I4 can an intruder learn through sniffing at R2 alone?

A) Only I1 and I2

B) Only I1

C) Only I2 and I3

D) Only I3 and I4

Answer:

An Intruder can't learn [I1] through sniffing at R2 because URLs and Download are functioned at Application layer of OSI Model.

An Intruder can learn [I2] through sniffing at R2 because Port Numbers are encapsulated in the payload field of IP Datagram.

An Intruder can learn [I3] through sniffing at R2 because IP Addresses and Routers are functioned at network layer of OSI Model.

An Intruder can't learn [I4] through sniffing at R2 because it is related to Data Link Layer of OSI Model.