OSI Model and TCP/IP Stack

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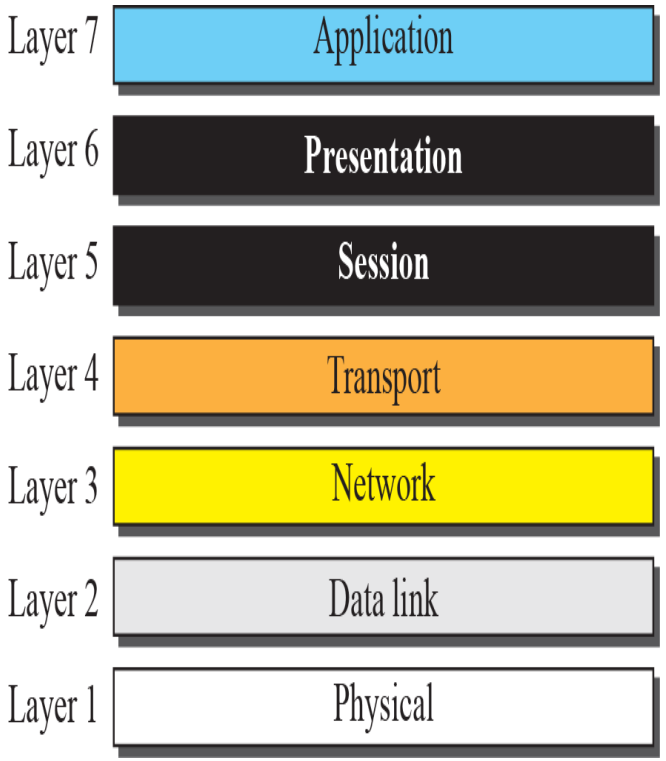
OSI MODEL

- *An ISO guideline/standard/reference that covers all aspects of network communications is the Open Systems Interconnection (OSI) model.*



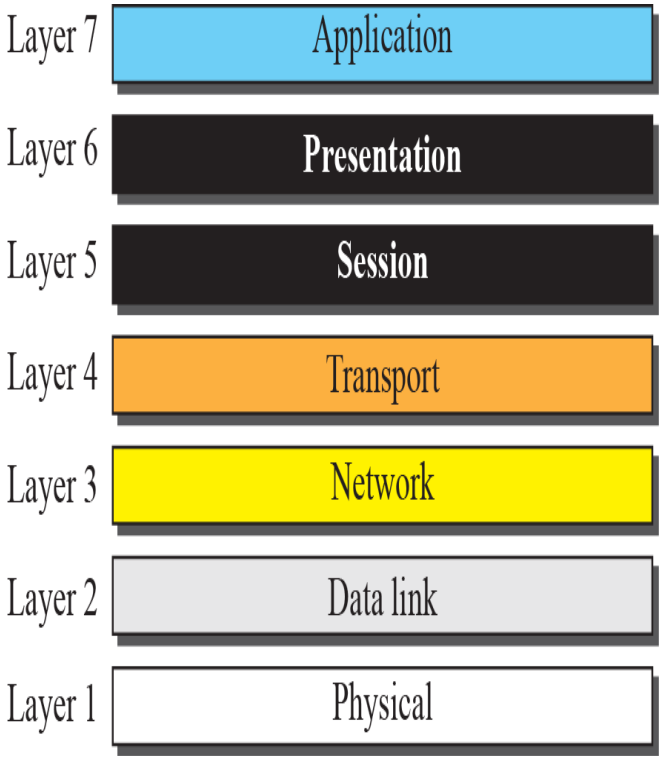
Theoretical OSI Model

- ***An open system is a set of protocols that allows any two different systems to communicate regardless of their underlying architecture.***
  - ❖ ***A protocol is a set of rules that govern data communications.***
  - ❖ *The Open System Interconnection Model is **conceptual** model that **characterizes** and **standardizes** the communication functions of a telecommunication system regardless to its underlying architecture (internal structure technology).*

OSI MODEL

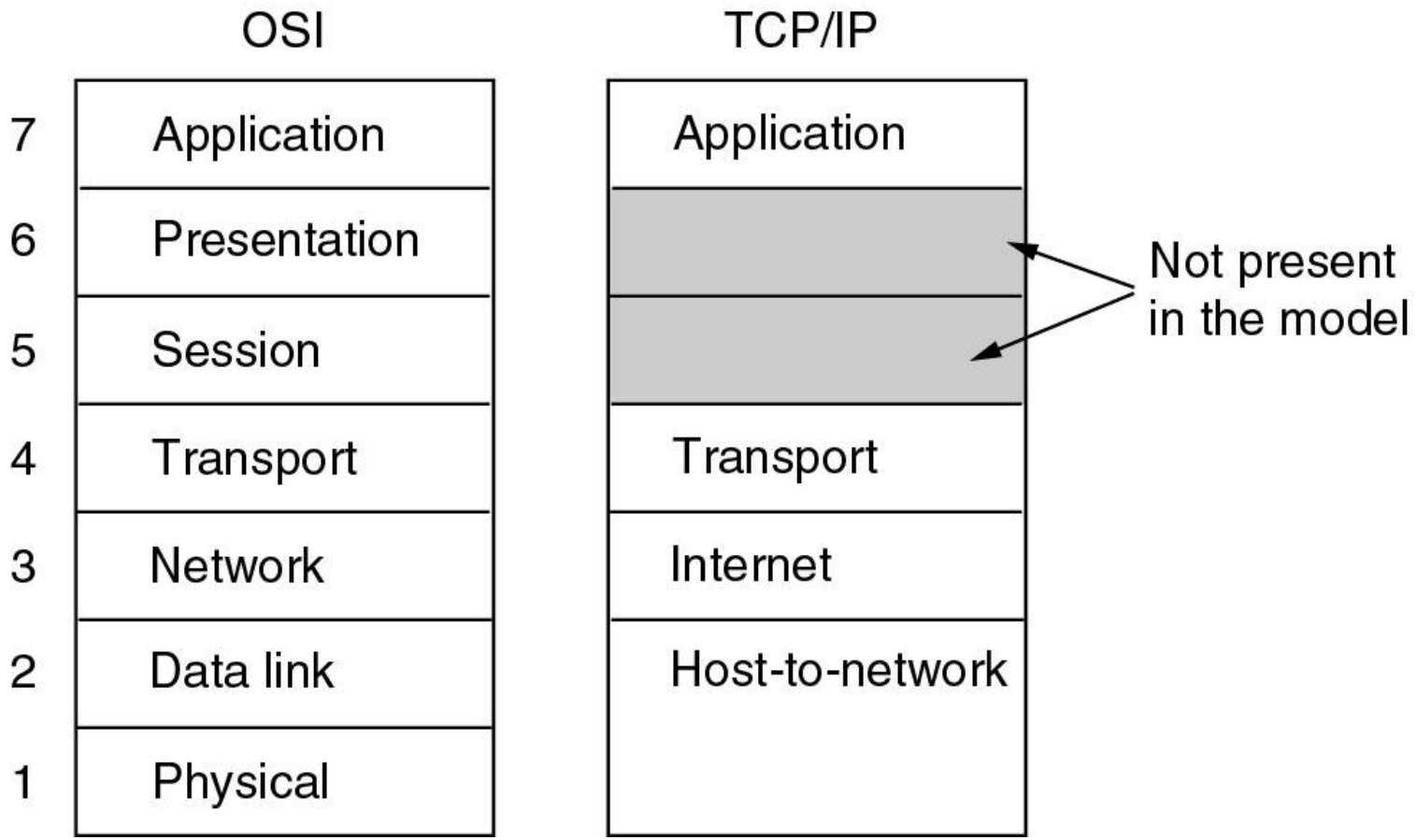
Key Points of OSI Model:

- *Description of networking subsystem*
- *OSI Model is just a guideline*
- *Layer is a complete logical functionality of a networking subsystem*
- *Each layer is associated with some function*
- *Functions of layers do not overlap across multiple layers*

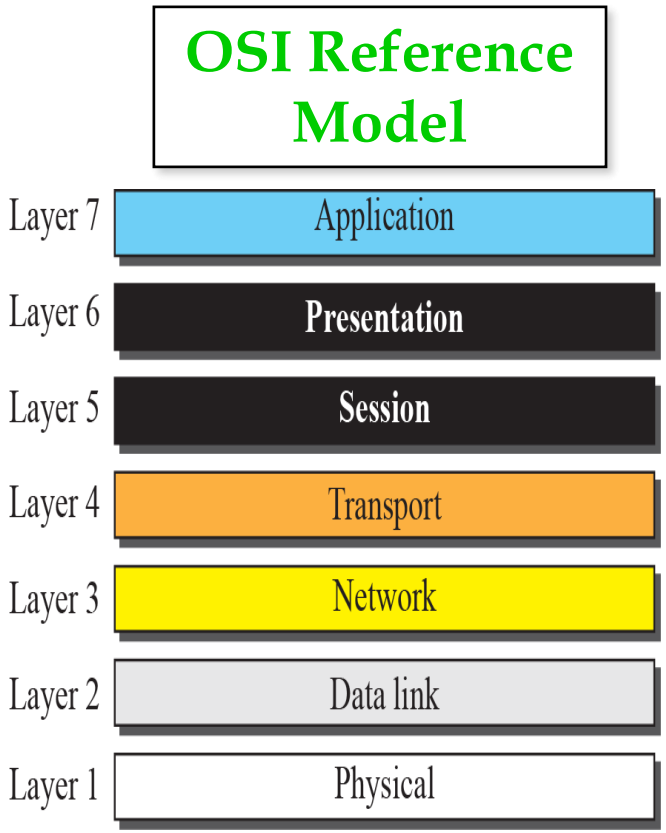


REFERENCE MODELS

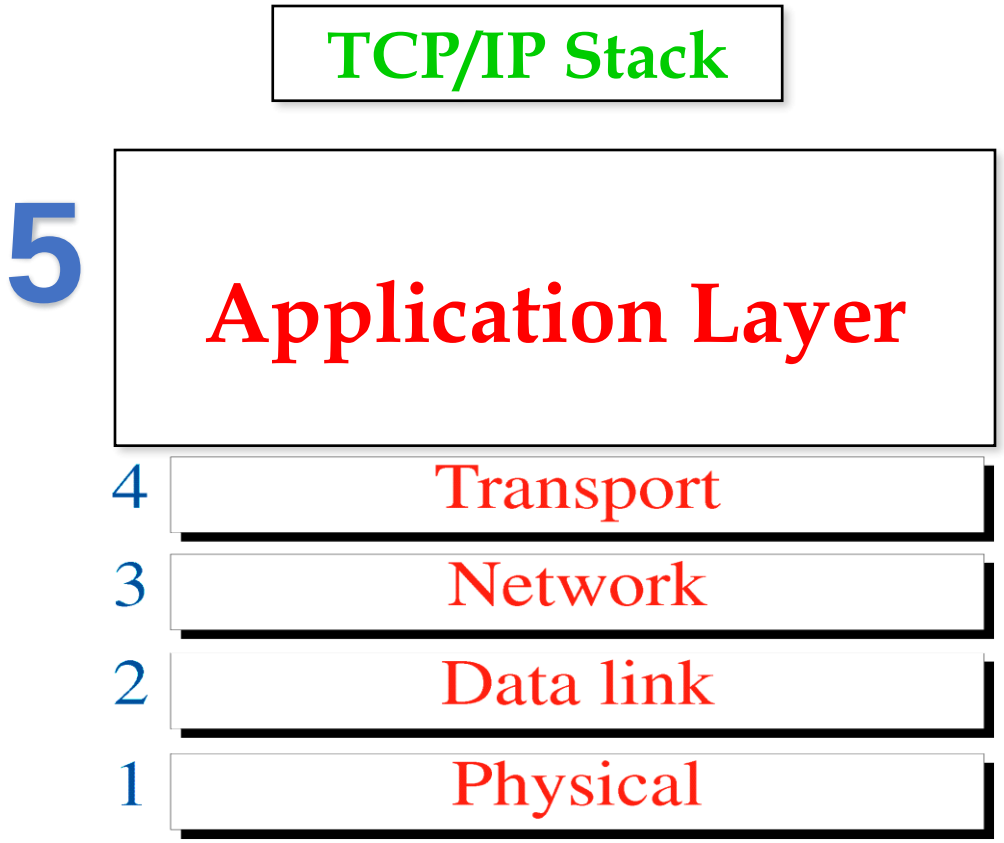
- **The TCP/IP reference model.**



OSI MODEL and TCP/IP Stack



Theoretical OSI Model



Practical OSI Model

OSI Layer Functions

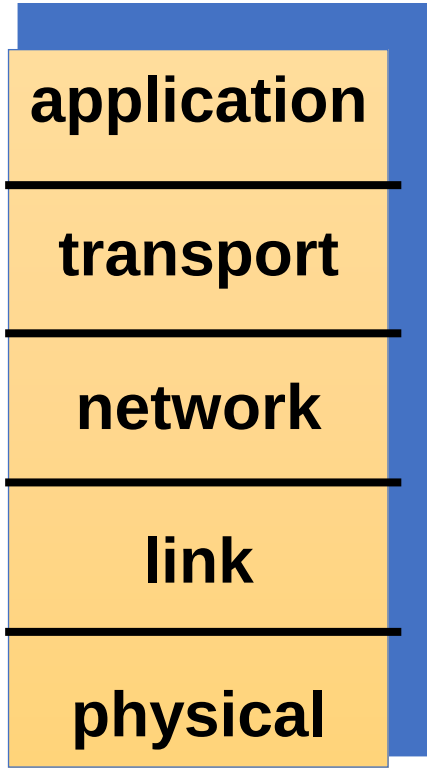
Application: supporting network applications
- FTP, SMTP, HTTP, Ping, Aarogya Setu

Transport: process-process data transfer
- TCP, UDP

Network: routing of datagrams from source to destination
- IP, routing protocols

Link: data transfer between neighboring network elements
- Ethernet, 802.11 (WiFi)

Physical: bits "on the wire"



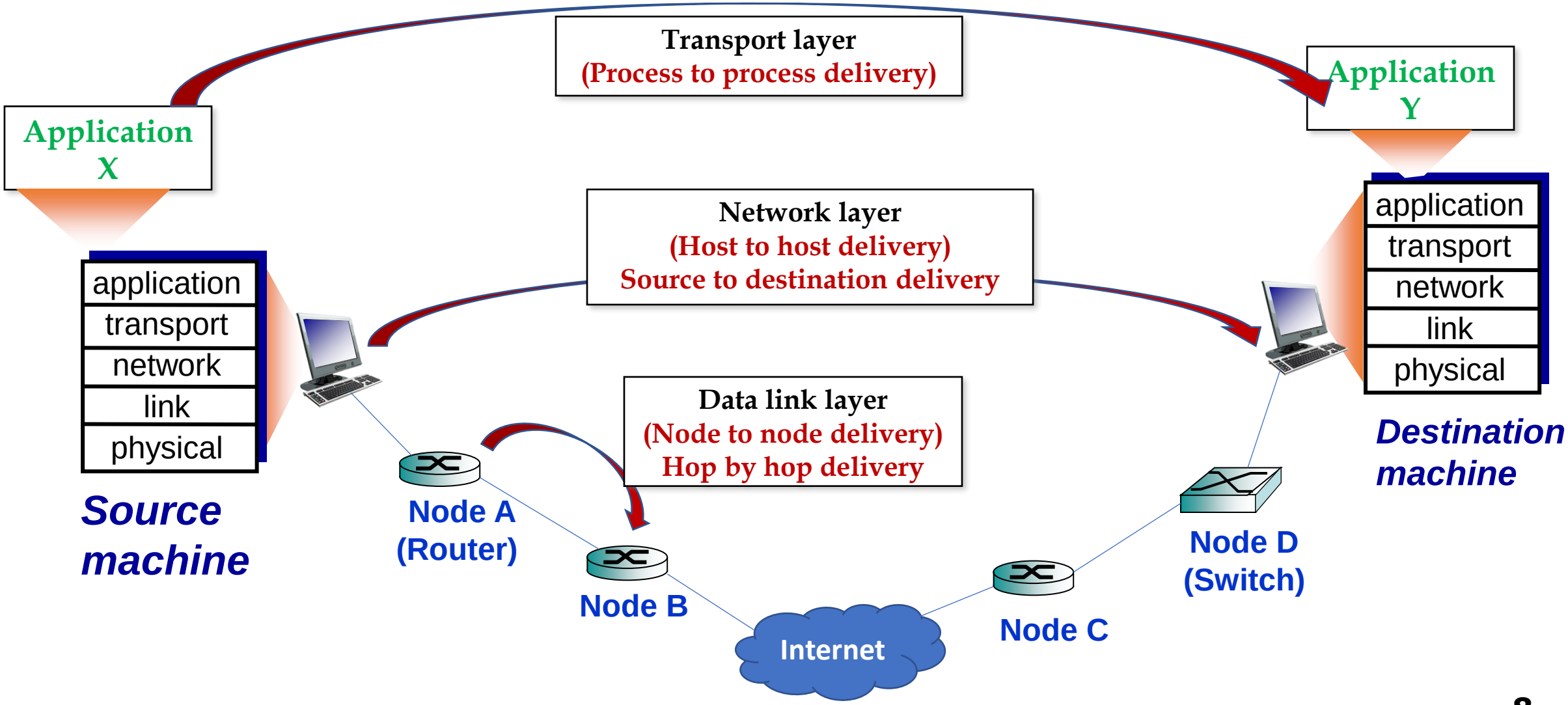
TCP/IP Stack

Key points:

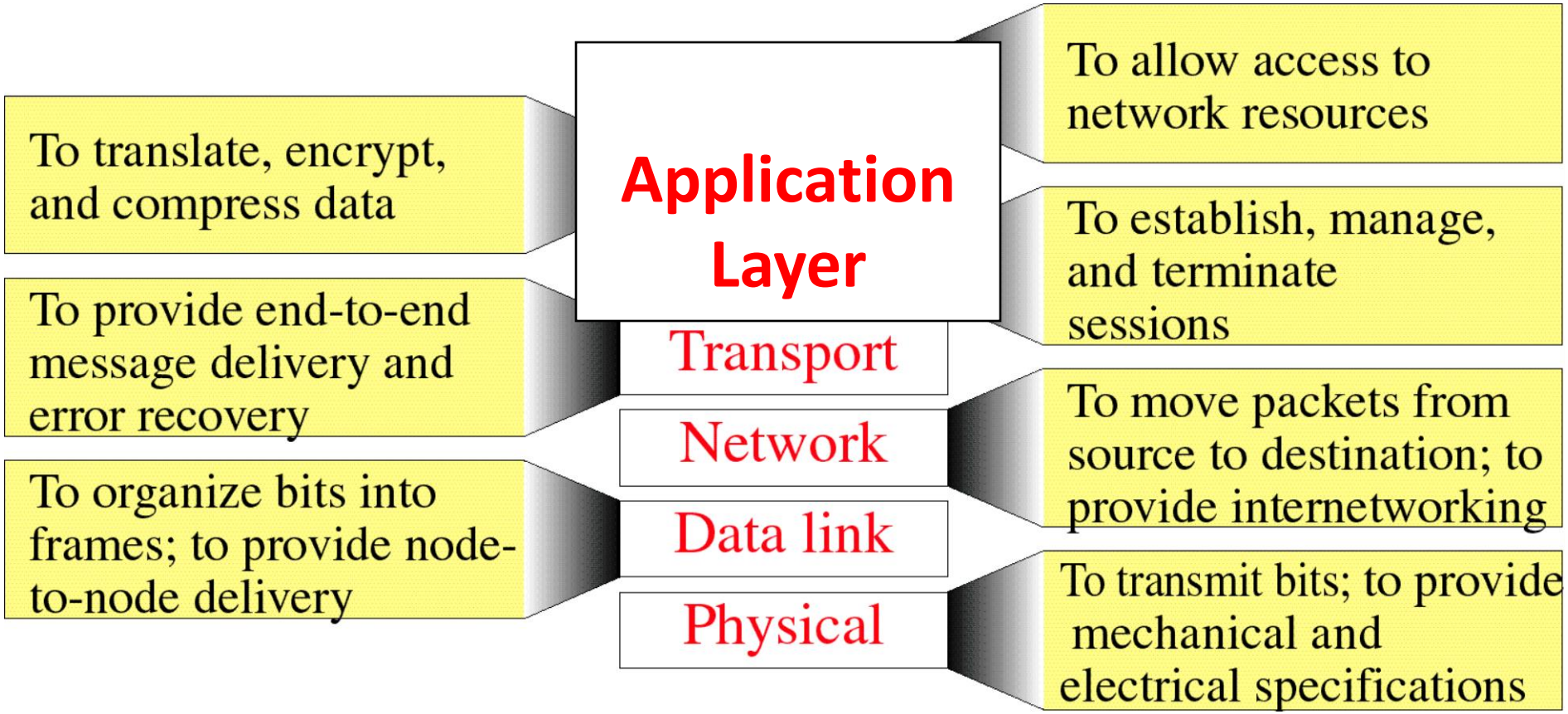
❑*No layer is aware of layer above it or below it*

❑*layers are isolated, with non-overlapping responsibilities.*

OSI Model Layer Functions: Layer to layer communication



Summary of Layer Functions



TCP/IP Stack real world analogy

Nodes:

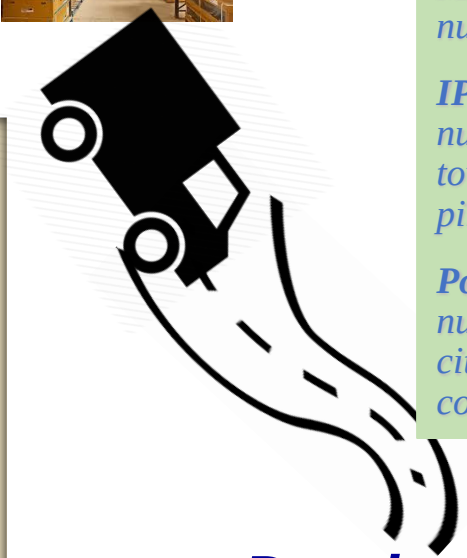
- Residences
- Railway station
- Airport
- Any local/ international station etc.

Application

Message

Source (current residence)

- **Application:** Application->Person, Message->luggage
- **Session and presentation:** package of luggage (encryption/decryption)
- **Transport layer:** Transport courier company
- **Network layer:** company regional office
- establish path from source to the destination (current residence->railway station/airport-> new residence)
- **Routers:** Railway station/airport/company godown.
- **Data link layer:** Residence to railway station or airport (hop by hop delivery)
- **Switches:** company local office/godown.
- **Physical layer:** Truck/Train/Plane are physical medium



Addresses:

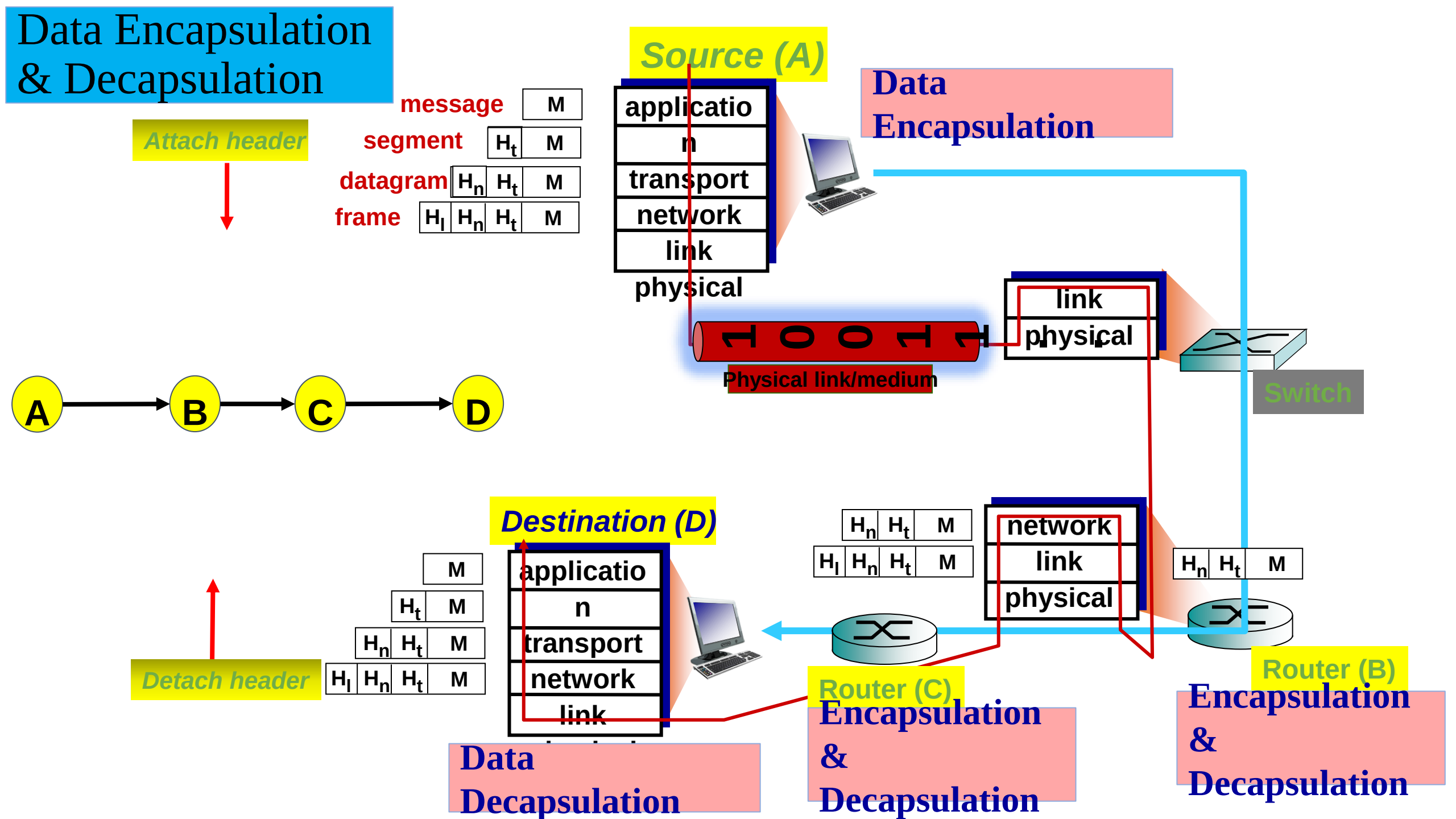
MAC Address: House number

IP Address: House number, street number, town, city, state, country, pin code.

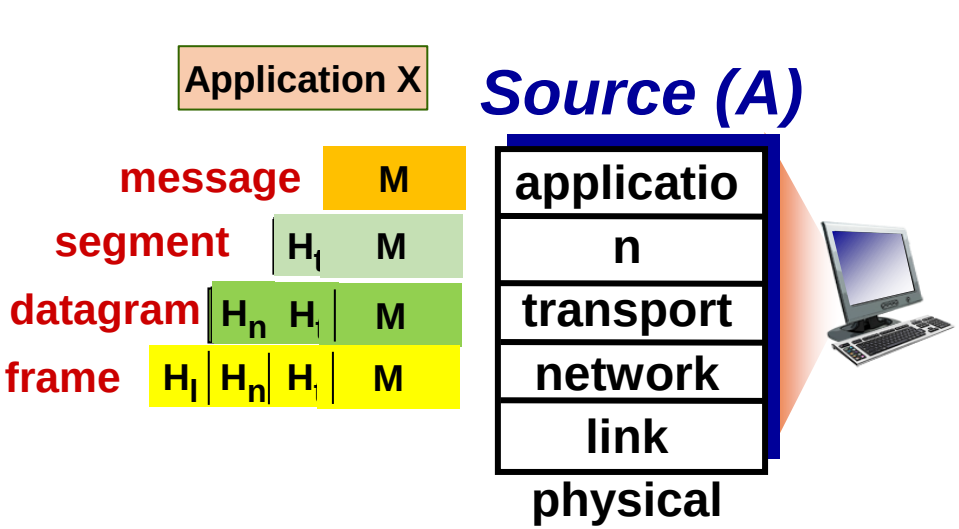
Port Address: Luggage number, House number, city, state, country, pin code.

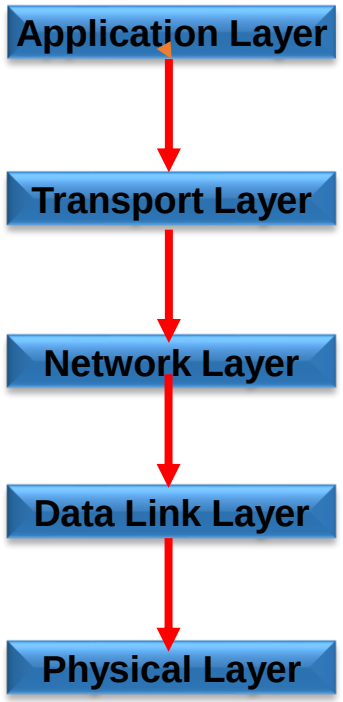
Destination (new residence)

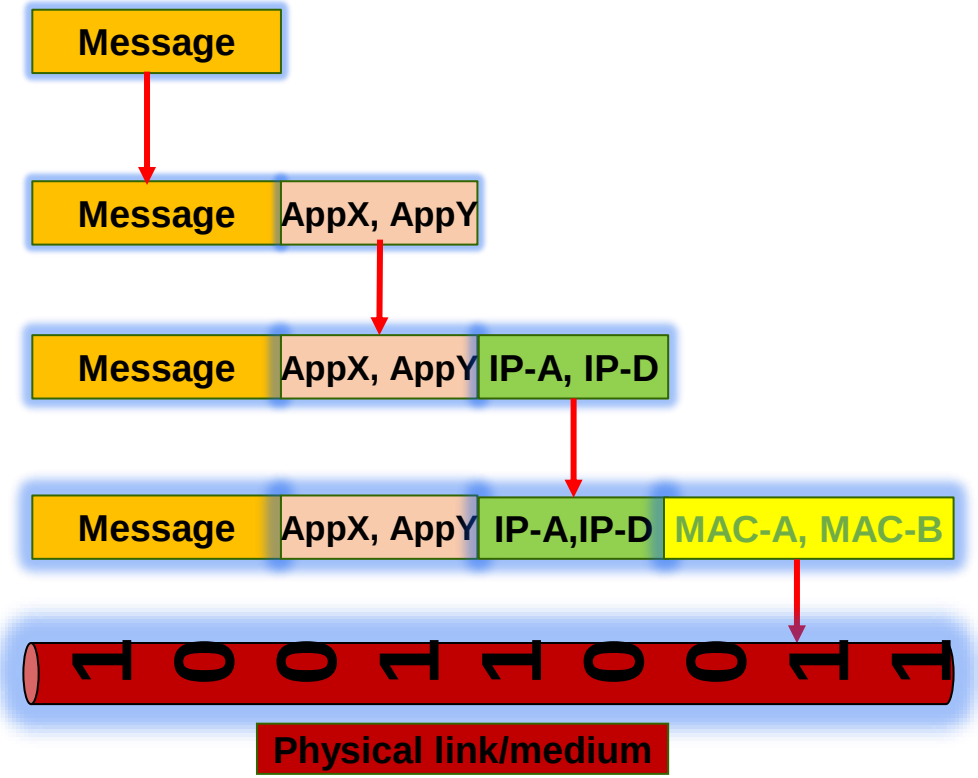
Data Encapsulation & Decapsulation

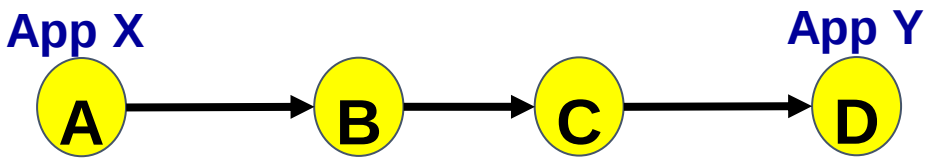


Data Encapsulation on Sending machine

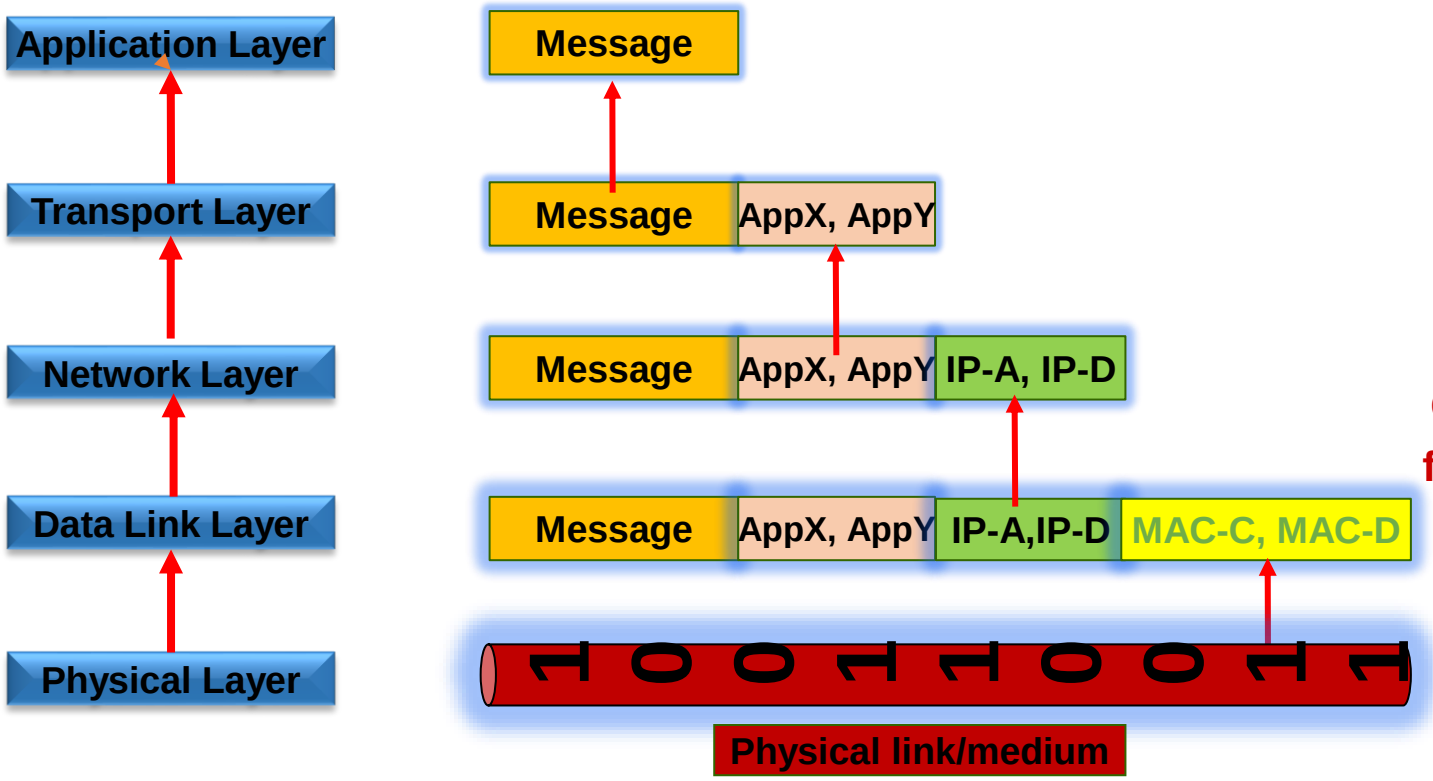


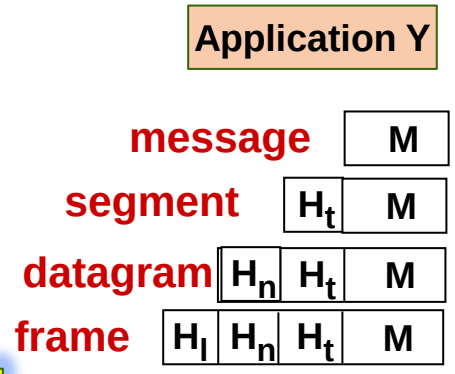


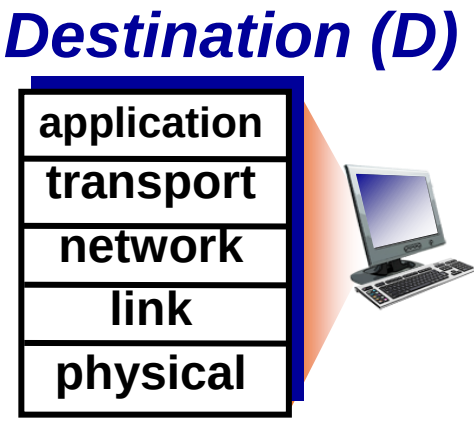


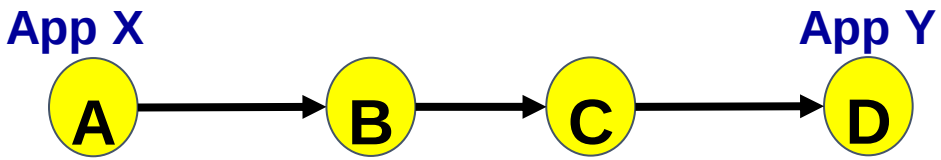


Data Decapsulation on Receiving machine

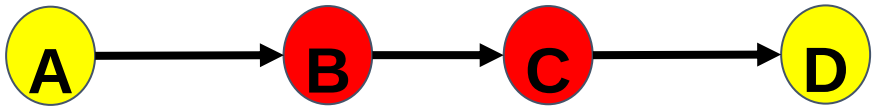


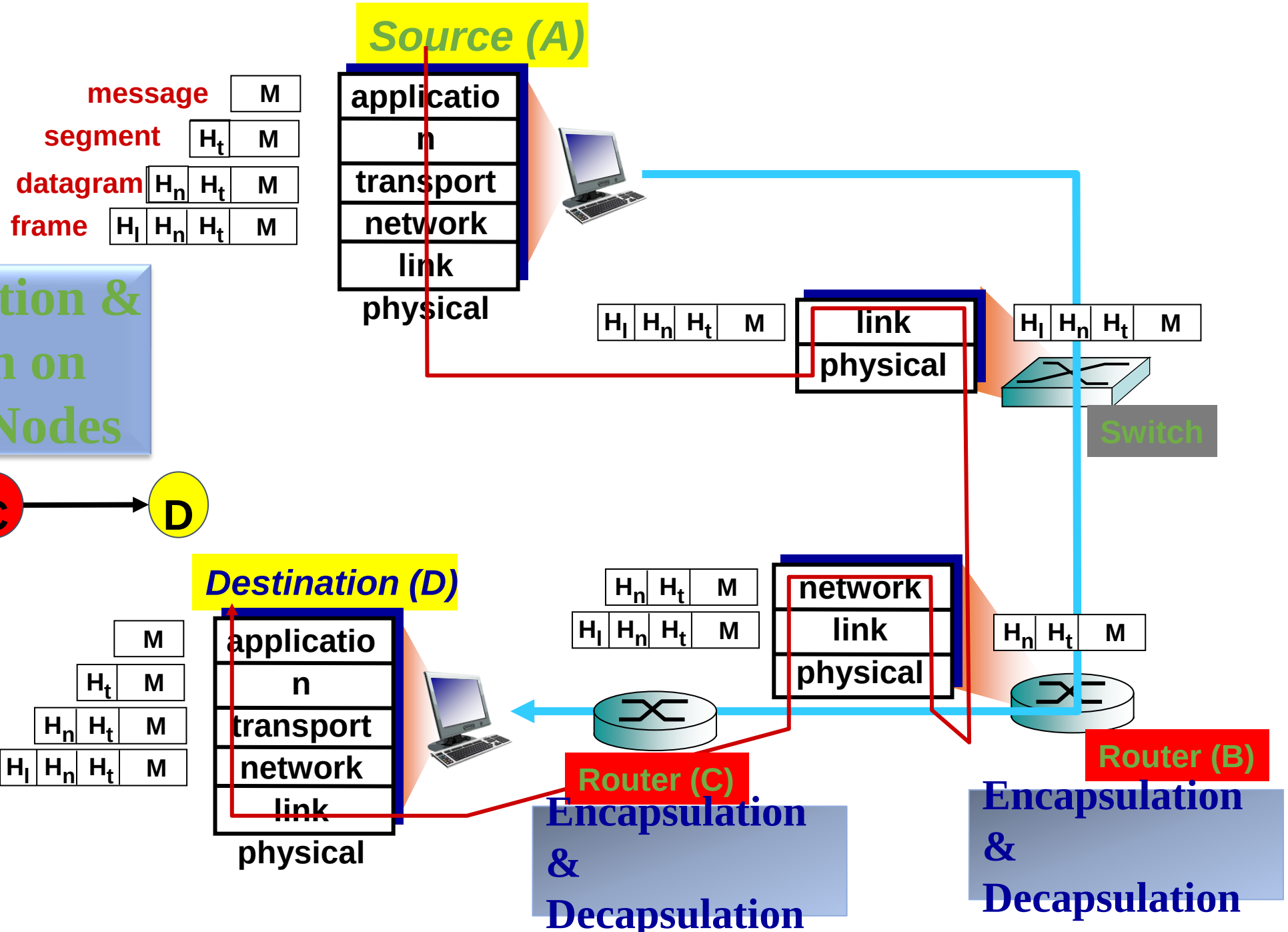




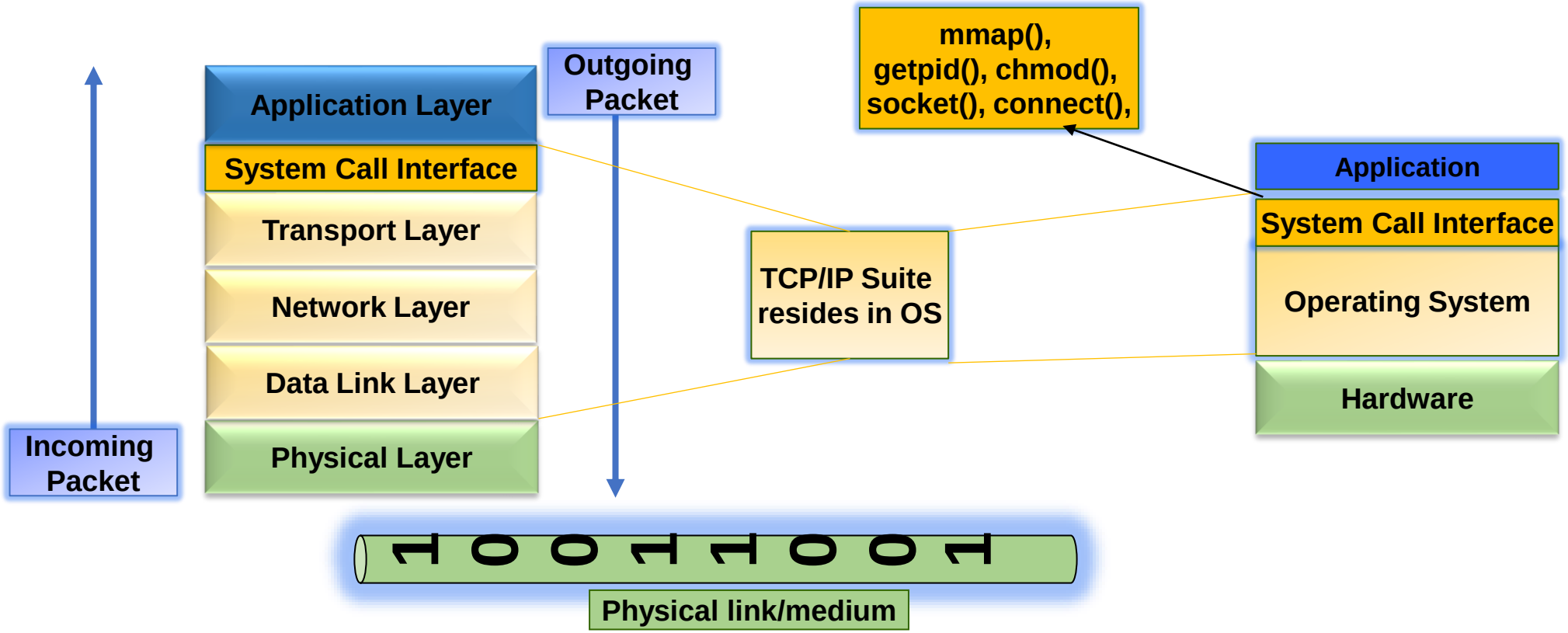


Data Encapsulation & Decapsulation on Intermediate Nodes





System Call Interface & Layer Function



Thank You