



# OSI model

Module #1 - Basics networking

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# Agenda

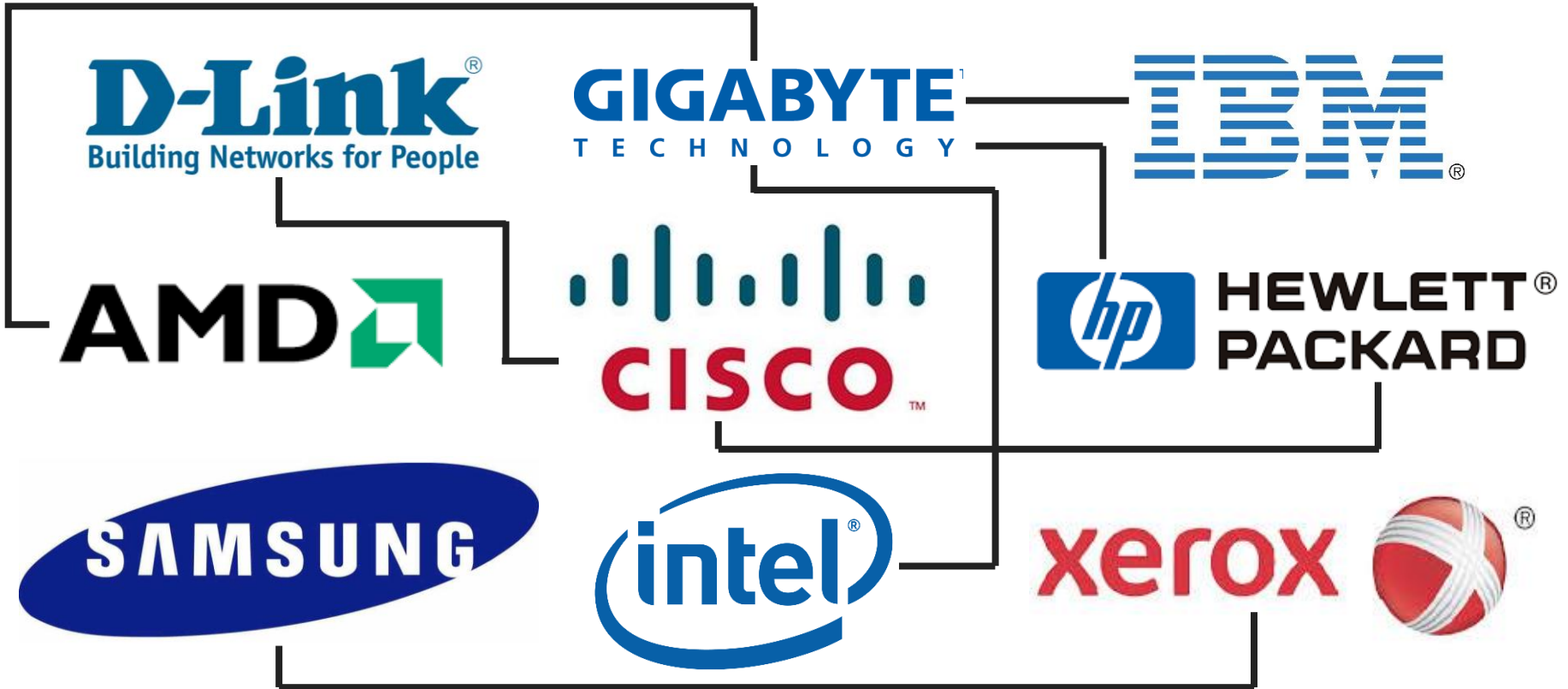
- Network complexity
- Protocol
- Encapsulation
- OSI model layers



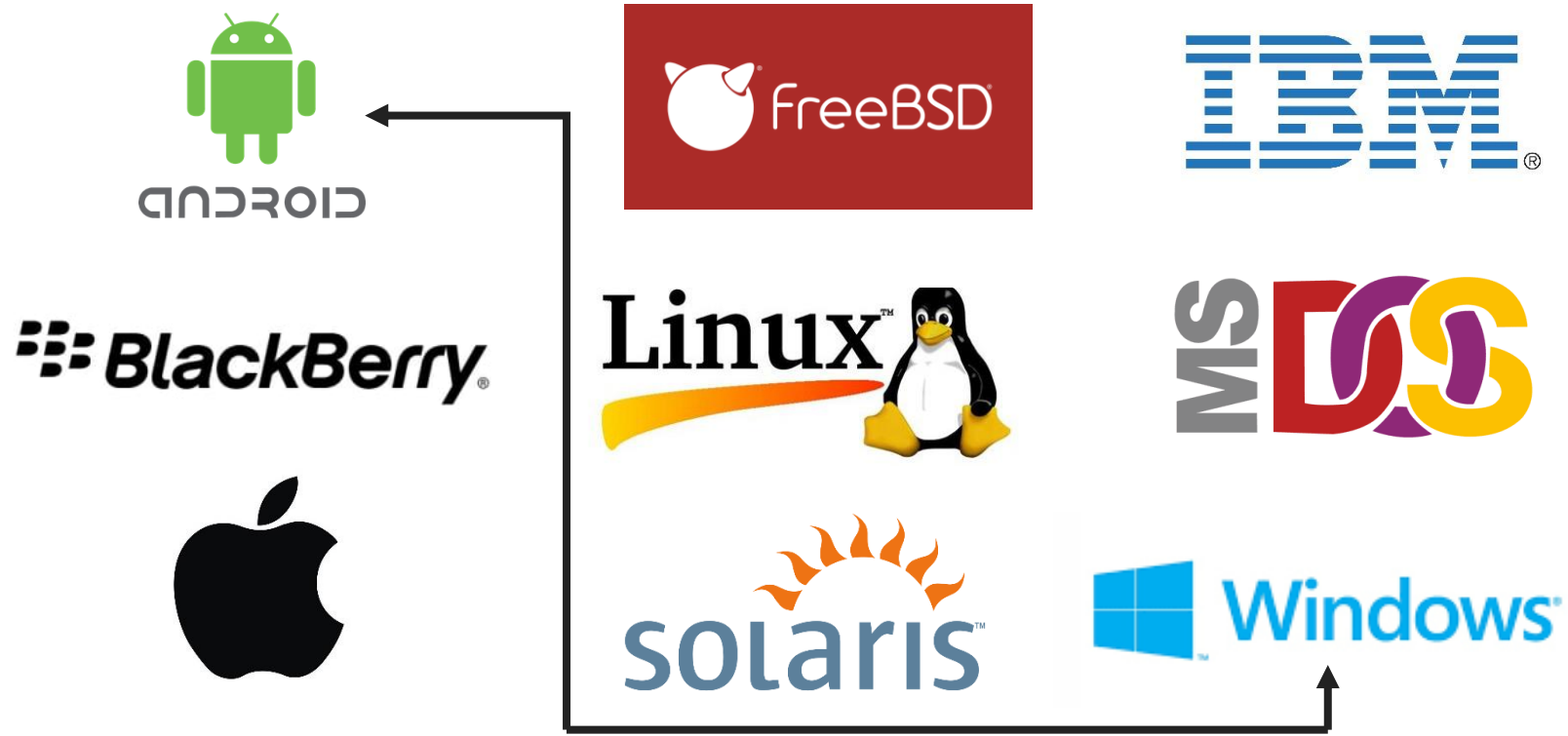
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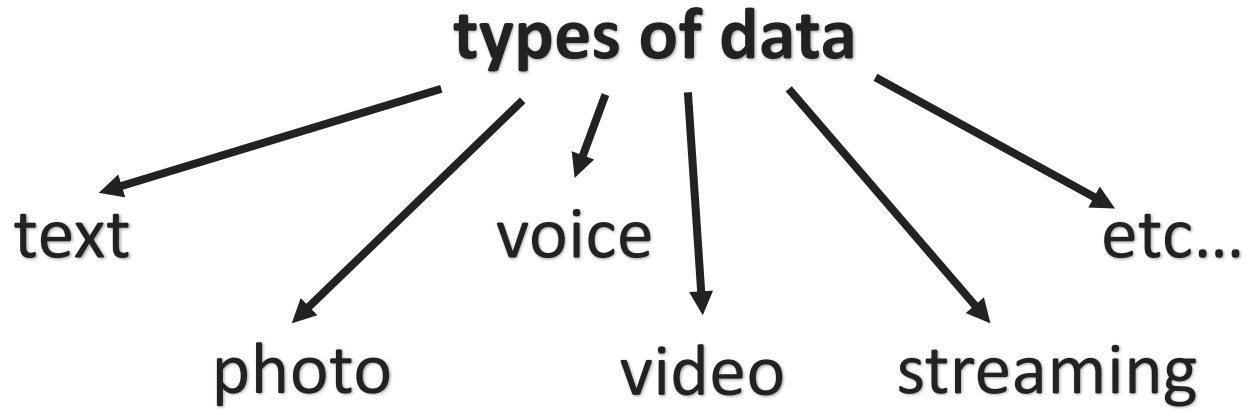
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# Network complexity

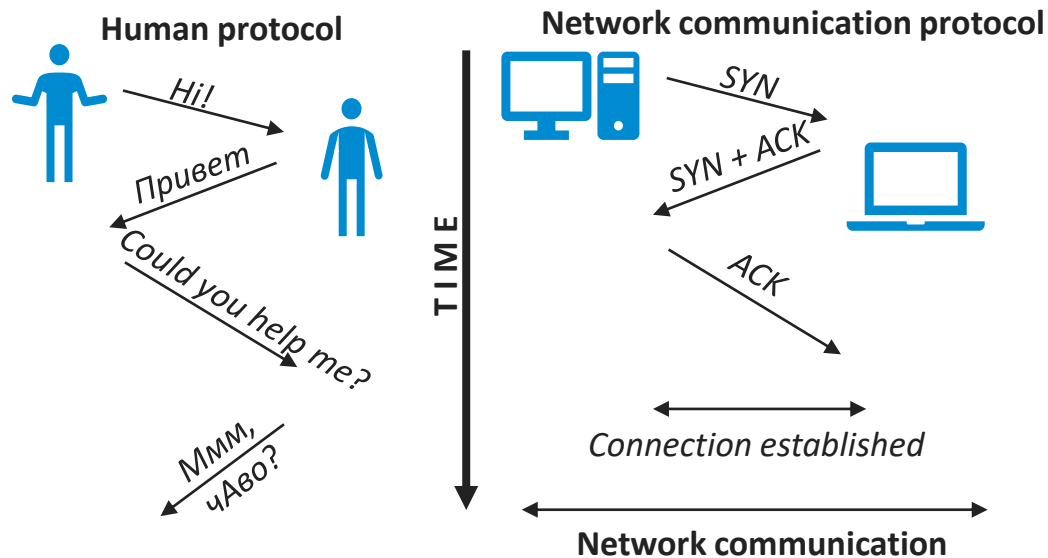


# Network complexity





# Protocol is a language



A **protocol** is a set of rules that governs the communications between computers on a network. In order for two computers to talk to each other, they must be speaking the same language.

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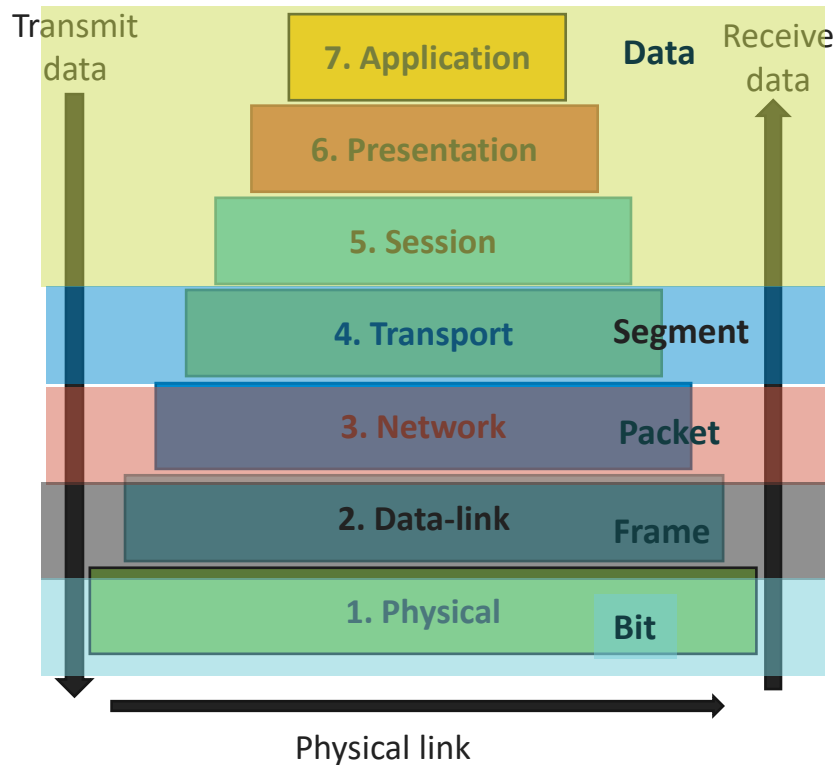
# OSI model



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# OSI model



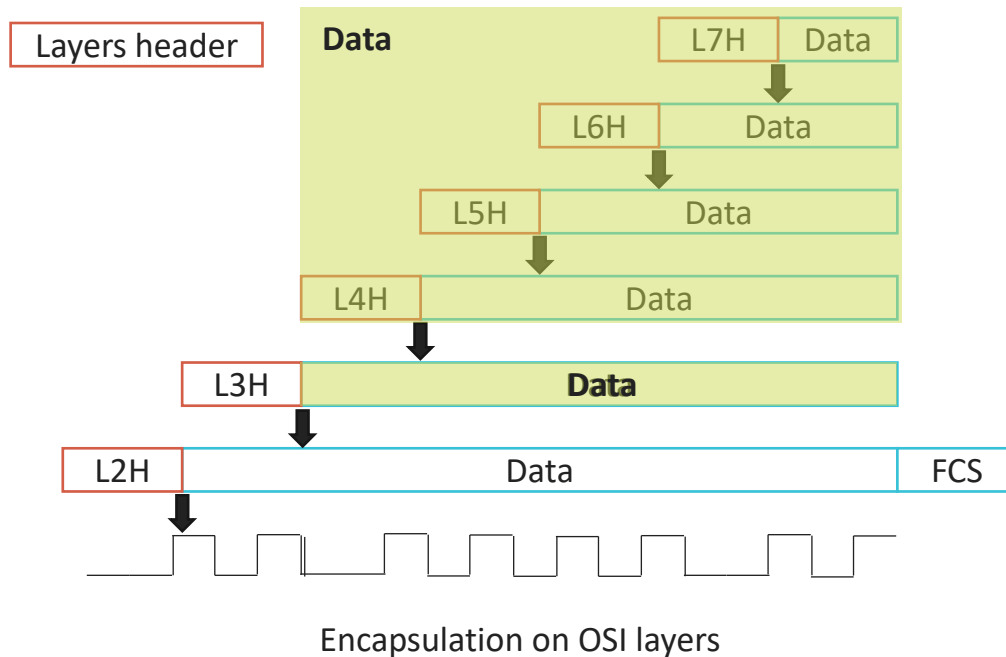
Designated ISO/IEC 7498-1 in the mid-1970s, the OSI model is a standard of the International Organization for Standardization (ISO). The **Open Systems Interconnection model (OSI model)** is a conceptual model that characterizes and standardizes the communication functions between two endpoints in a network.

The main concept of OSI is that the process of communication can be divided the communication procedure into smaller and simpler components.



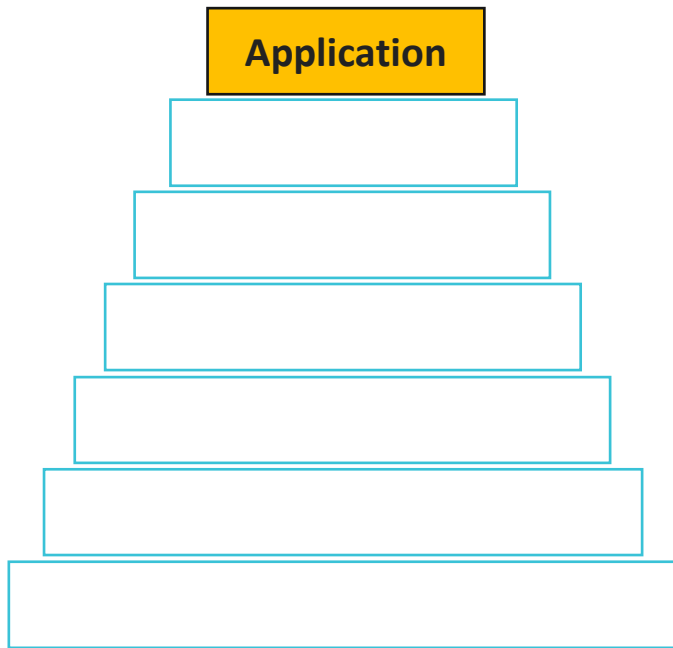
# Encapsulation

Data **Encapsulation** in computer networking is adding a bit of additional information to the data packet and preparing the information for being delivered in the network. The data is encapsulated by adding specific information to the main data at each OSI layer. Each layer adds its own information to data and passes the result to the next layer.



# OSI model: Application layer

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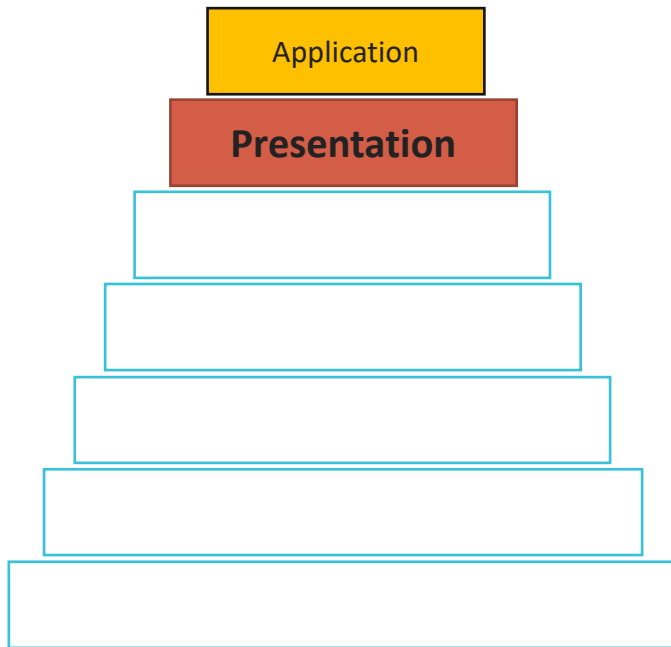
**Application layer** works with the application software to provide communications functions as required. It verifies the availability of a communications partner and the resources to support any data transfer.

**Protocols:**

HTTP, HTTPS, FTP, Telnet, SNMP, NTP, DNS, DHCP and etc

# OSI model: Presentation layer

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**Presentation layer** is also called the **Translation layer**. The data from the application layer is extracted here and manipulated as per the required format to transmit over the network.

**Main functions:**

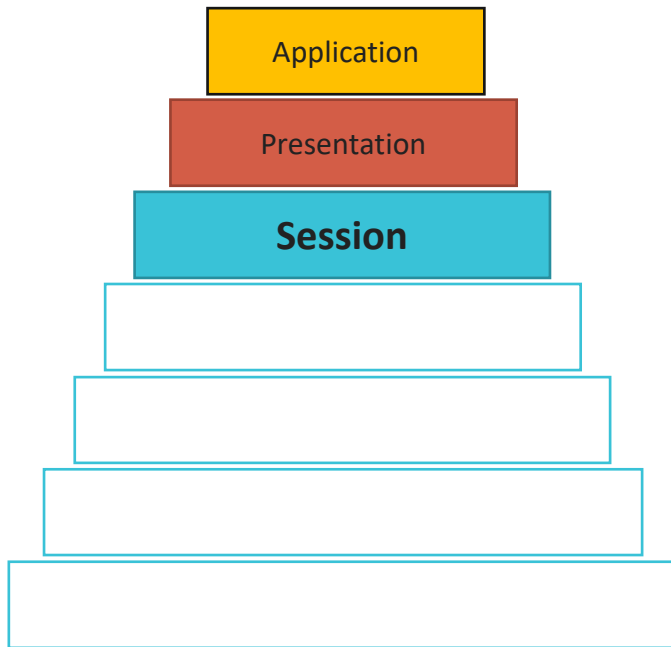
- Encryption / Decryption
- Compression

**Protocols:**

SSL, TLS, JPEG, MPEG, GIF and etc

# OSI model: Session layer

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**Session layer** manages the connection between the two communicating devices, establishing a connection, maintaining the connection, and ultimately terminating it.

**Main functions:**

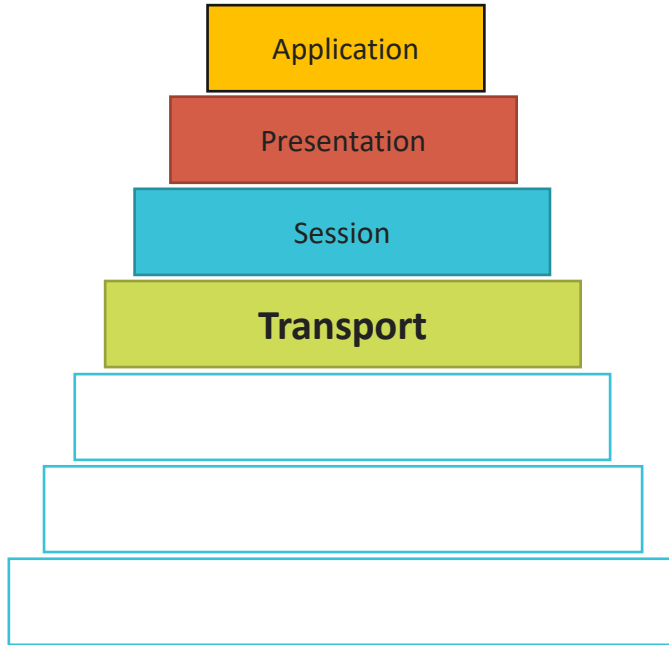
- Session establishment, maintenance and termination
- Synchronization

**Protocols:**

netBios, PAP, RPC, PPTP, L2TP and etc.

# OSI model: Transport layer

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**Transport layer** is responsible for the End to End Delivery of the complete message and provides the acknowledgement of the successful data transmission and re-transmits the data if an error is found.

**Main functions:**

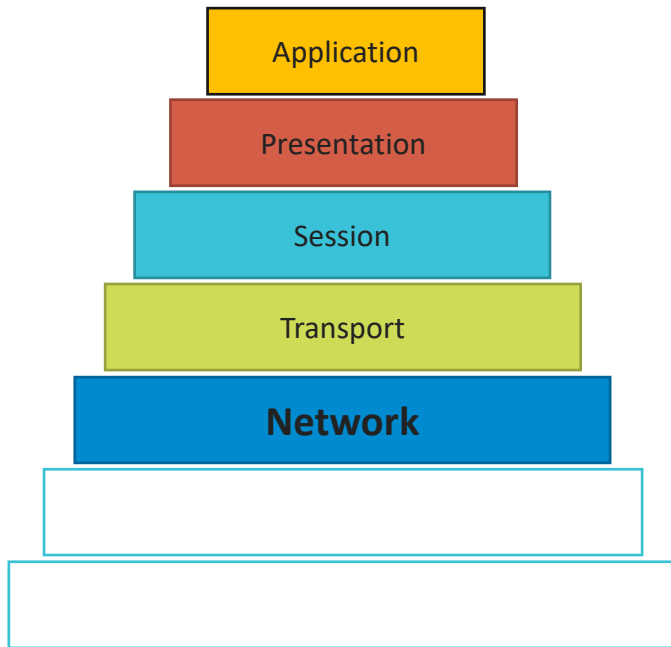
- Segmentation and Reassembly
- Service Point Addressing

*Data* in Transport layer is referred as **Segment**.

Protocols: TCP, UDP

# OSI model: Network layer

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**Network layer** works for the transmission of data from one host to the other located in different networks.

**Main functions:**

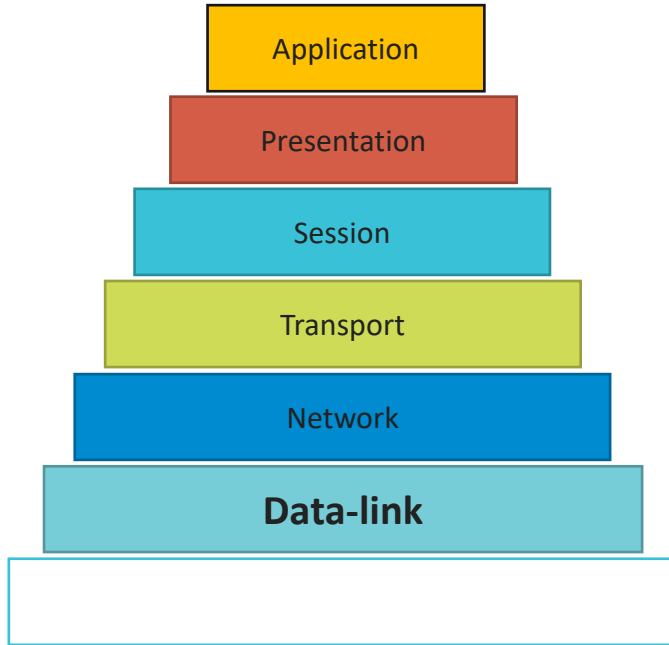
- Routing
- Logical Addressing

*Segment* in Network layer is referred as **Packet**.

Protocols: IP, IPX, IPSec, ICMP, IGMP and etc.

# OSI model: Data-link layer

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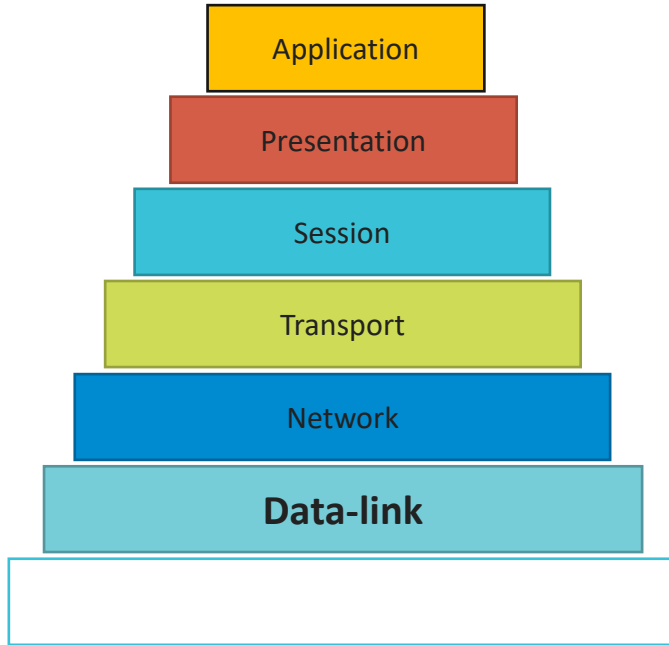
**Data-link layer** is responsible for the node to node delivery of the message. The main function of this layer is to make sure data transfer is error-free from one node to another, over the physical layer.

Data Link Layer is divided into two sub layers :

1. Media Access Control (MAC)
2. Logical Link Control (LLC)

## OSI model: Data-link layer: continue

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### Main functions:

- Framing
- Physical addressing
- Error control

*Packet in Data-link layer is referred as **Frame**.*

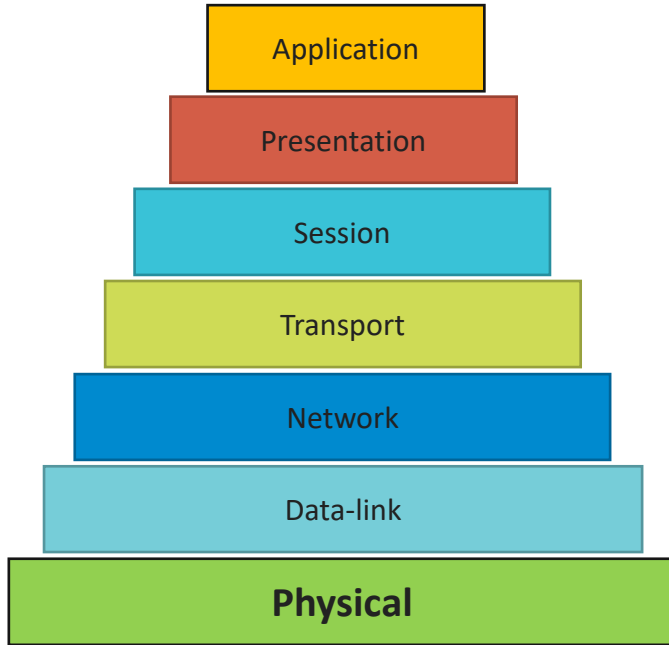
### Protocols:

Ethernet, PPPoE, ARP, MPLS, Frame Relay



# OSI model: Physical layer

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**Physical layer** is responsible for the actual physical connection between the devices. The physical layer contains information in the form of bits. It is responsible for transmitting individual bits from one node to the next.

**Main functions:**

Bit synchronization  
Bit rate control

*Frame in physical layer is referred as **Bit**.*

**Protocols:**

Bluetooth, PON, OTN, DSL, IEEE.802.11 (WiFi), IEEE.802.3, GSM

# OSI model: Data flow

