

Data Communication



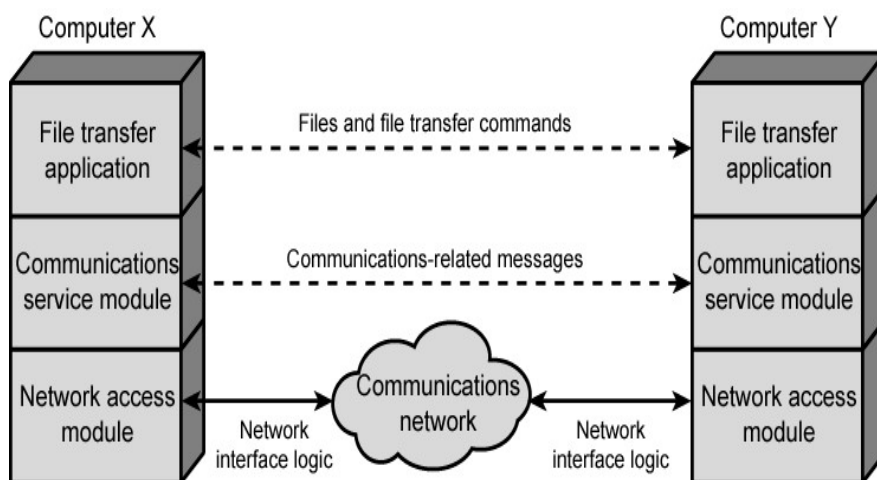
LAYER ARCHITECTURE

OSI

TCP/IP

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Simplified Network Architecture



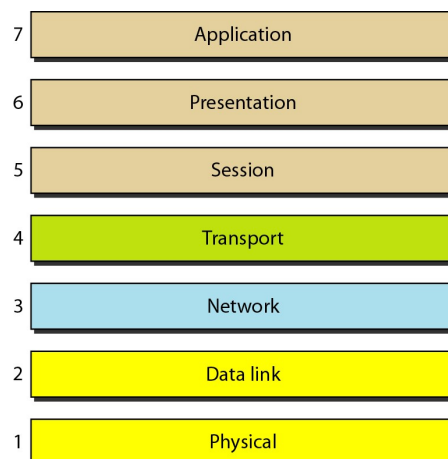
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OSI

- Open Systems Interconnection
- developed by the International Organization for Standardization (ISO)
- has seven layers
- is a theoretical system delivered too late!
- TCP/IP is the de facto standard

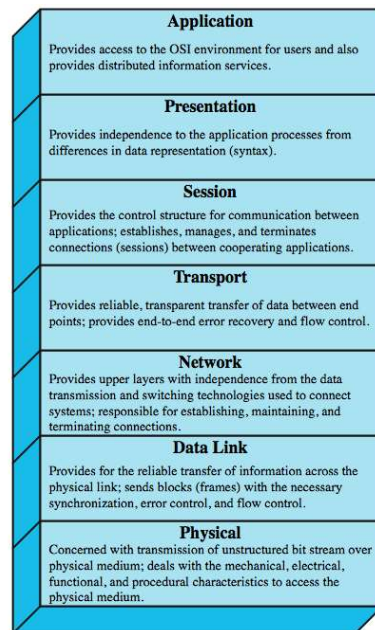
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Seven layers of the OSI model



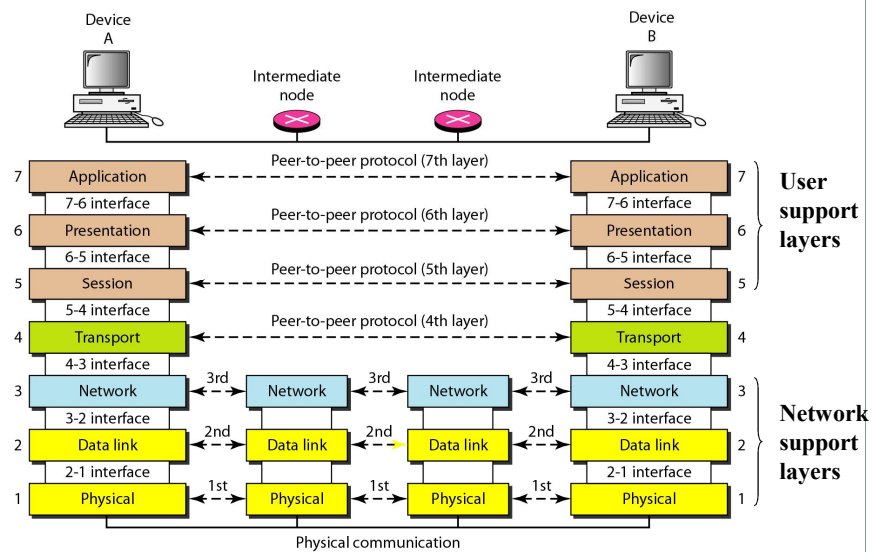
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OSI Layers



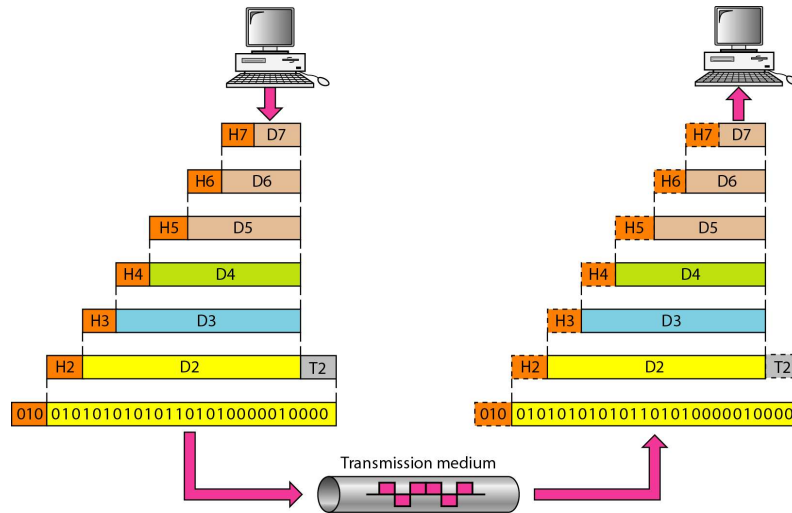
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The interaction between layers in the OSI model



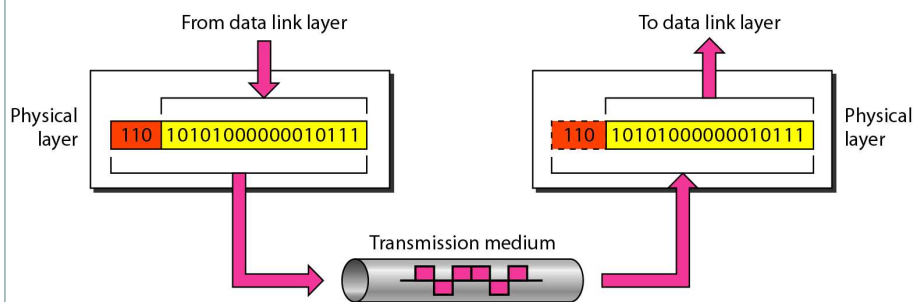
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An exchange using the OSI model



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LAYERS IN THE OSI MODEL

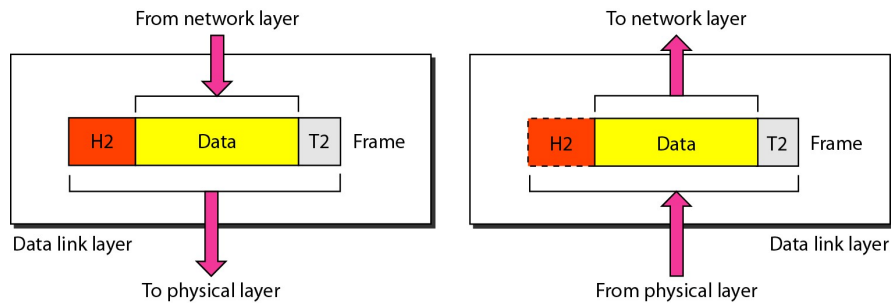


Physical layer

The physical layer is responsible for movements of individual bits from one hop (node) to the next.

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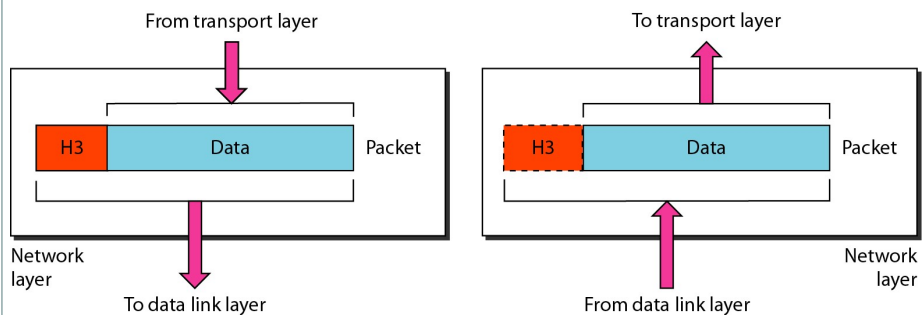
Data link layer



The data link layer is responsible for moving frames from one hop (node) to the next.
 Provides for error detection, “framing,” and flow control
 It divides the stream of bits into frames (data units)
 Detect and retransmit damaged or lost frames.
 Recognize duplicate frames. Using trailer
 Determine which device has control over the link at any given time

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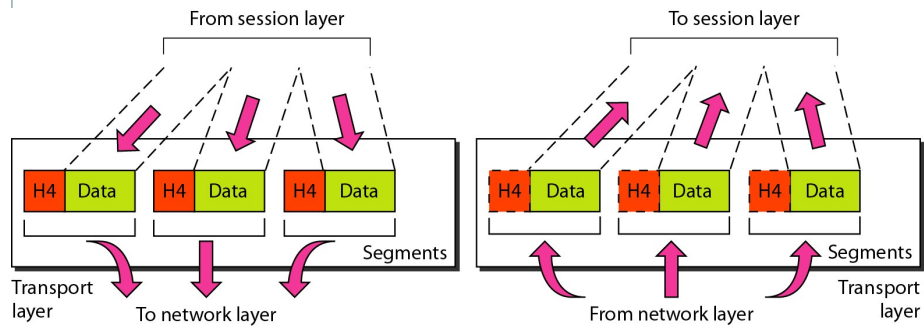
Network layer



The network layer is responsible for the delivery of individual packets from the source host to the destination host.
 Network layer adds logical addresses of the sender and receiver
 Routing: routers/switchers route or switch the packets to their final destination.

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Transport layer



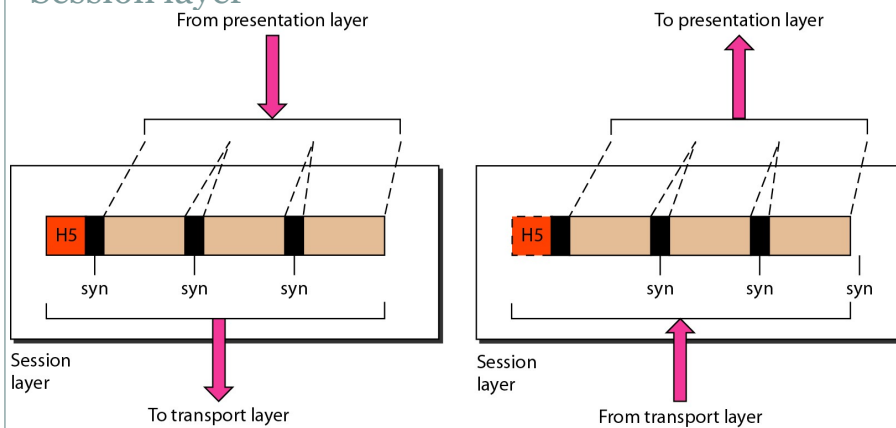
The transport layer is responsible for the delivery of a message from one process to another.

Adds service-point address (port address), gets the message to the correct process on the computer

Flow control, error control and correcting,

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Session layer

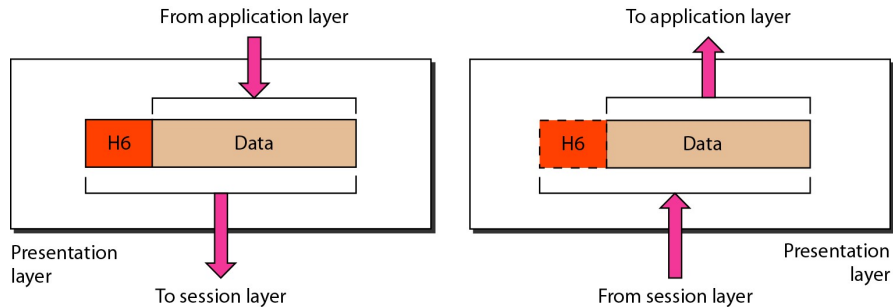


The session layer is responsible for dialog control and synchronization.

Provides for coordination between communicating processes between nodes

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Presentation layer



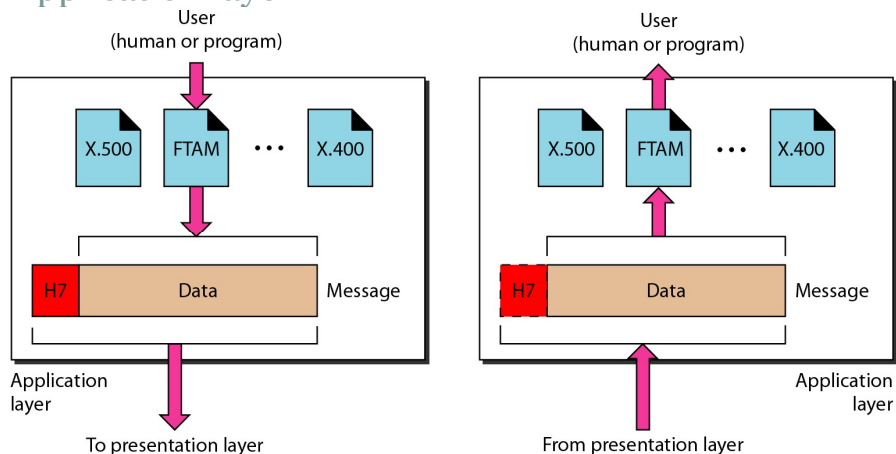
The presentation layer is responsible for translation, compression, and encryption. Concerned with the syntax and semantics of the information exchanged between two systems.

Compression: reduces the number of bits contained (text, audio, video)

Receives message from application layer, formats it, and passes it to the session layer.

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Application layer



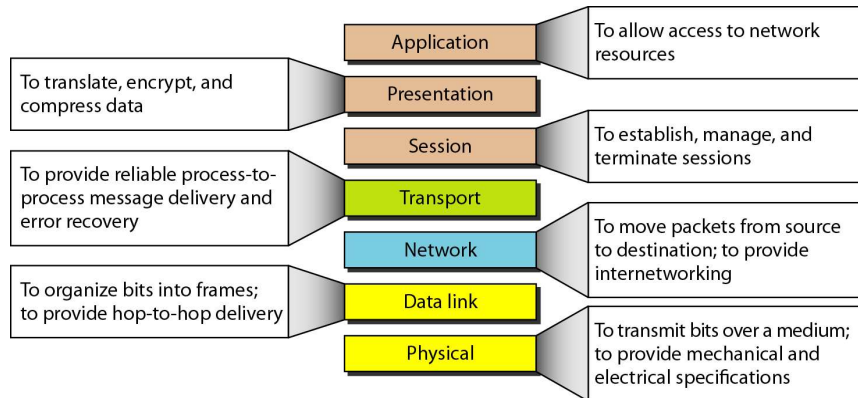
The application layer is responsible for providing services to the user.

Provides user interfaces and support for services such as email

Network virtual terminal: software version of a physical terminal. Allows users to log on to a remote host

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Summary of layers



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TCP/IP Protocol Architecture

- developed by US Defense Advanced Research Project Agency (DARPA)
- for ARPANET packet switched network
- used by the global Internet
- protocol suite comprises a large collection of standardized protocols

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TCP/IP PROTOCOL SUITE

- The layers in the TCP/IP protocol suite do not exactly match those in the OSI model. The original TCP/IP protocol suite was defined as having four layers: host-to-network, internet, transport, and application.
- However, when TCP/IP is compared to OSI, we can say that the TCP/IP protocol suite is made of five layers: physical, data link, network, transport, and application.
- Topics covered:
 - Physical and Data Link Layers
 - Network Layer
 - Transport Layer
 - Application Layer

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TCP/IP Layers

- no official model but a working one
 - Application layer
 - Host-to-host, or transport layer
 - Internet layer
 - Network access layer
 - Physical layer

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Physical Layer

- concerned with physical interface between computer and network
- concerned with issues like:
 - characteristics of transmission medium
 - signal levels
 - data rates
 - other related matters

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Network Access Layer

- exchange of data between an end system and attached network
- concerned with issues like :
 - destination address provision
 - invoking specific services like priority
 - access to & routing data across a network link between two attached systems
- allows layers above to ignore link specifics

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Internet Layer (IP)

- routing functions across multiple networks
- for systems attached to different networks
- using IP protocol
- implemented in end systems and routers
- routers connect two networks and relays data between them

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Transport Layer (TCP)

- common layer shared by all applications
- provides reliable delivery of data
- in same order as sent
- commonly uses TCP

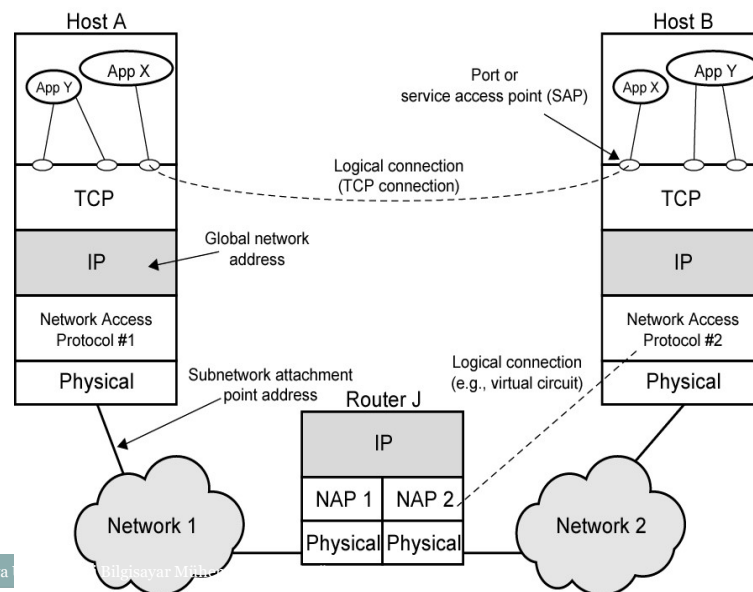
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Application Layer

- provide support for user applications
- need a separate module for each type of application

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Operation of TCP and IP



Sakarya

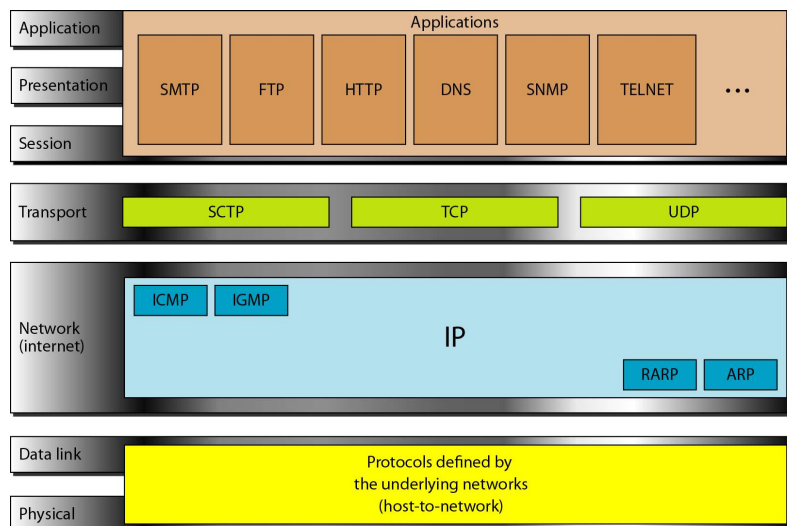
Bilgisayar Mühendisliği

Addressing Requirements

- two levels of addressing required
- each host on a subnet needs a unique global network address
 - its IP address
- each application on a (multi-tasking) host needs a unique address within the host
 - known as a port

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TCP/IP and OSI model



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