

TCP/IP Protocol Stack (1/7)

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The layer model forming the basis for communication in the Internet is the TCP/IP layer model, also known as the **TCP/IP protocol stack** or **TCP/IP stack**. It consists of the following layers:

- Application layer
- Transport layer
- Internet layer
- Link layer
- (Hardware layer)¹

Each of the involved layers is responsible for solving specific tasks. It adds its own flow and management information to the payload itself
→ Overhead...

¹ The hardware layer is mostly not considered a layer of the TCP/IP stack

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Hardware Layer

- Lowest layer, located below the TCP/IP stack
- The data transport takes place here via the physical transmission medium
- Determination of the necessary electrical, mechanical, functional... parameters for transmission is the responsibility of the next higher layer

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Link Layer (1/2)

... also called **network interface** or **physical layer** provides

- Connection establishment and determines the convention for the logical interpretation of transmitted physical signals
- Grouping of bit streams into larger logical units (data packets)
- Data packets can contain mechanisms for error detection/correction

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Link Layer (2/2)

Functional separation into the areas of responsibility:

- **Media Access Control – MAC**

- Control of access at the transmission medium
- Well-known MAC protocols: Ethernet, Token Ring, FDDI, ...

- **Logical Link Control – LLC**

- Management of the logical connection, including error analysis and flow control

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Internet Layer

Provides transportation services for data packets

- The path through the network from sender to receiver is determined here, based on the addressing scheme established at this layer

→ Routing

- Routing is carried out according to various criteria, e.g. maximum throughput, low cost, uniform load distribution, best possible security, ...

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Transport Layer

Provides a universal transport service with

- Explicitly switched connections with modalities for setup and dismantling
- Guaranteed quality criteria
 - Error correction methods
 - Correct arrangement of the transmitted data packets
- Data flow control
 - For uniform utilization of the network infrastructure
 - Throttling of the transmission volume in case of overload

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Application Layer

Provides functions for application programs, e.g. for the following protocols

- FTP – File Transfer Protocol
- HTTP – Hypertext Transfer Protocol
- SMTP – Simple Mail Transfer Protocol
- ...

The applications themselves (file transfer, e-mail, WWW browser, ...) do not belong to the application layer but are outside of the layer model