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Layers

Lec 6

OSI Reference Model

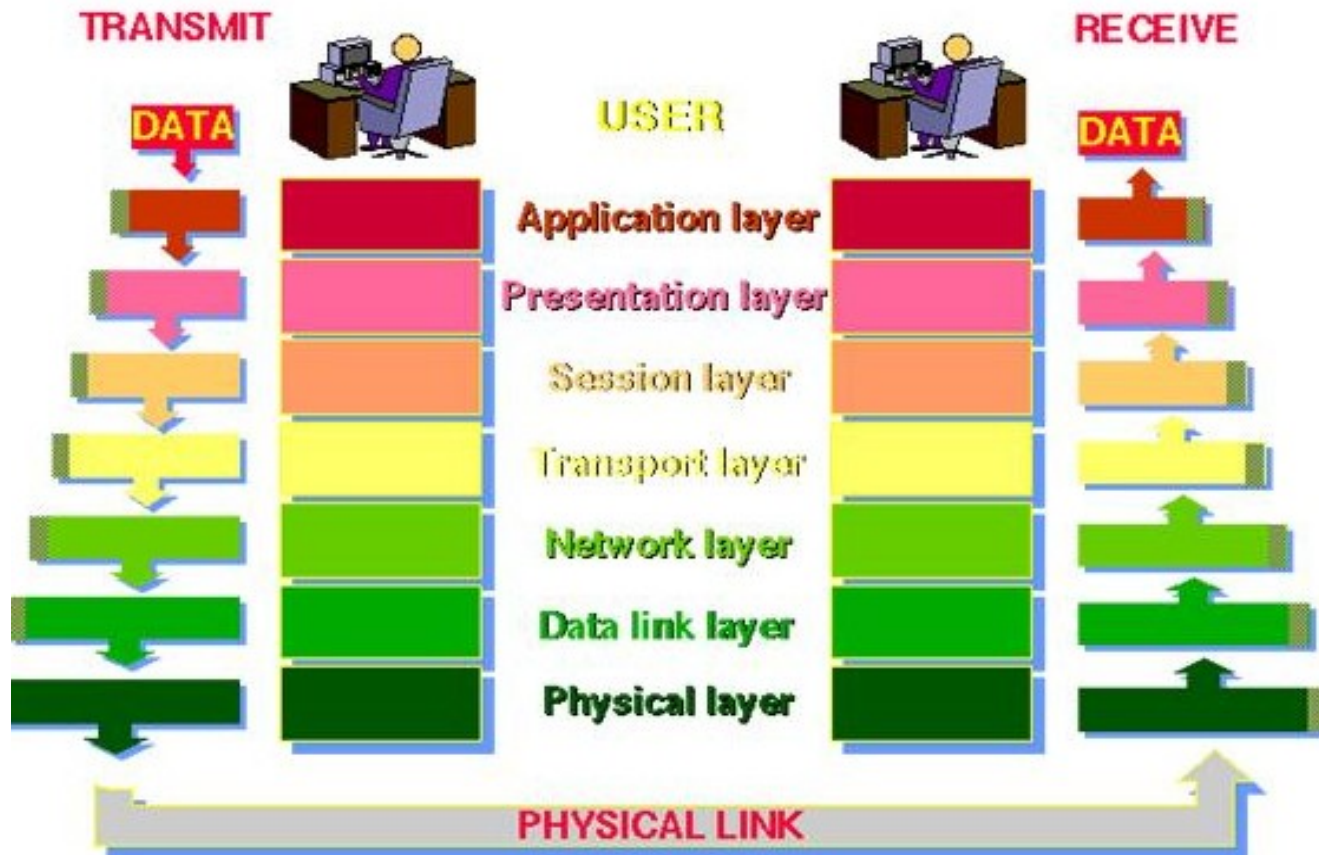**Layered model:**

7. Application
6. Presentation
5. Session
4. Transport
3. Network
2. Data Link
1. Physical

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OSI Reference Model

THE 7 LAYERS OF OSI

TRANSMIT

RECEIVE

DATA

USER

DATA

- Application layer
- Presentation layer
- Session layer
- Transport layer
- Network layer
- Data link layer
- Physical layer

PHYSICAL LINK

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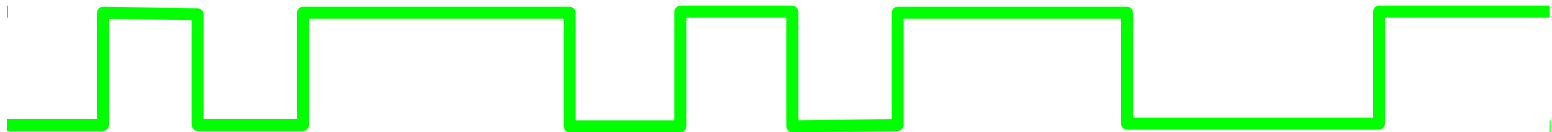
Physical Layer

Responsibility:
➢transmission of raw bits over a communication channel.

Issues:
➢mechanical and electrical interfaces
➢time per bit
➢distances

Data Link Layer -
Data Link Control

provide an error-free communication link

Issues:

➢ framing (dividing data into chunks)

➢ header & trailer bits

➢ addressing

```
10110110101  →  01100010011  →  10110000001  →
```
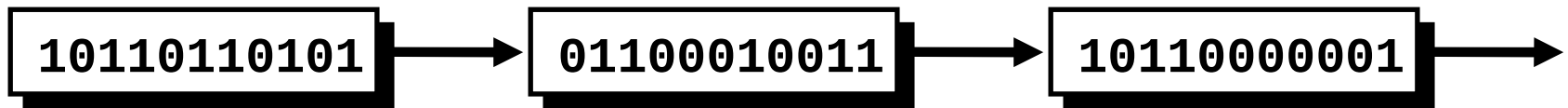
Data Link Layer -
The MAC sublayer

Medium Access Control - needed by mutiaccess networks.

MAC provides DLC with "virtual wires" on multiaccess networks.

Network Layer

Responsibilities:

➢path selection between end-systems (routing).

➢subnet flow control.

➢fragmentation & reassembly

➢translation between different network types.

Issues:

➢virtual circuits

Transport Layer

Responsibilities:
➤ provides virtual end-to-end links between peer processes.
➤ end-to-end flow control

Issues:
➤ error detection
➤ reliable communication

Session Layer

Responsibilities:

➢establishes, manages, and terminates sessions between applications.

Note: Many protocol suites do not include a session layer.

The Presentation Layer

Responsibilities:

data encryption

data compression

data conversion

Note :Many protocol suites do not include a Presentation Layer.

Application Layer

➢application level protocols
➢appropriate selection of "type of service"

"anything not provided by any of the other layers"
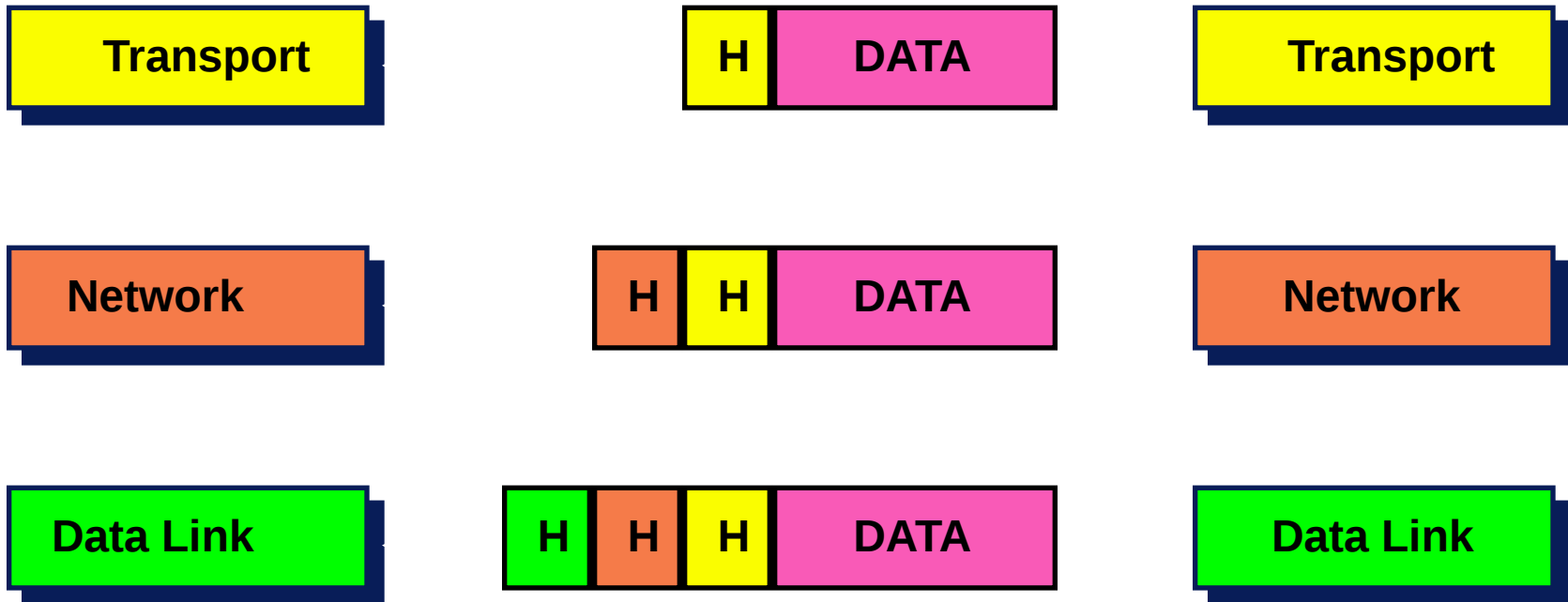Data

Layering & Headers

➢ Each layer needs to add some control information to the data in order to do it's job.

➢ This information is typically prepended to the data before being given to the lower layer.

➢ Once the lower layers deliver the the data and control information - the peer layer uses the control information.

To remember →

Away	Application Layer
Pizza	Presentation Layer
Sausage	Session Layer
Throw	Transport Layer
Not	Network Layer
Do	Data Link Layer
Please	Physical Layer

Layering & Headers

| Transport | | H | DATA | | Transport |

| Network | | H | H | DATA | | Network |

| Data Link | | H | H | H | DATA | | Data Link |

What are the headers?

Physical
➢ no header - just a bunch of bits.

Data Link
➢ address of the receiving endpoints
➢ address of the sending endpoint
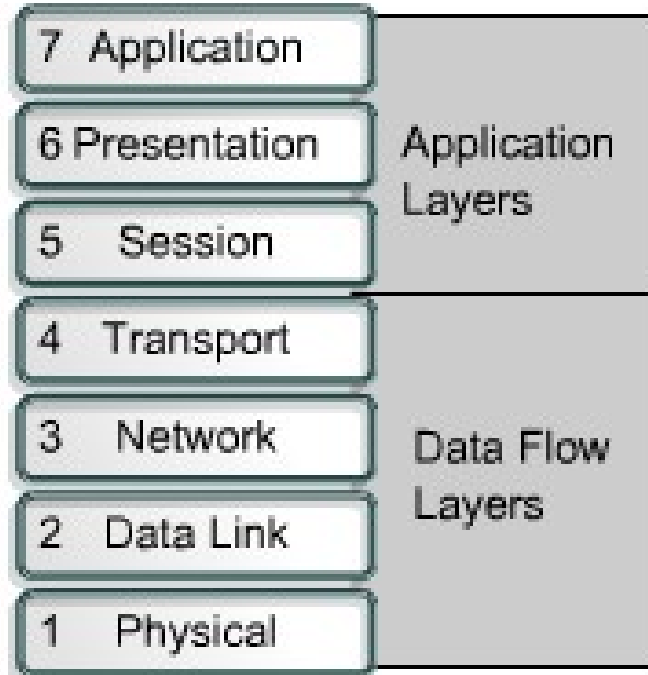➢ length of the data
➢ checksum.

Example: Network layer header

➢type of service
➢length of the data
➢packet identifier
➢fragment number
➢time to live
➢protocol
➢header checksum
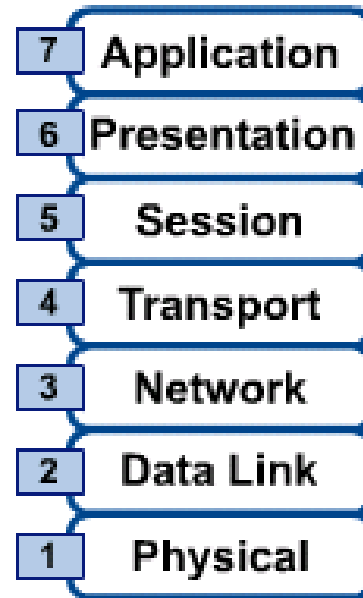➢source network address
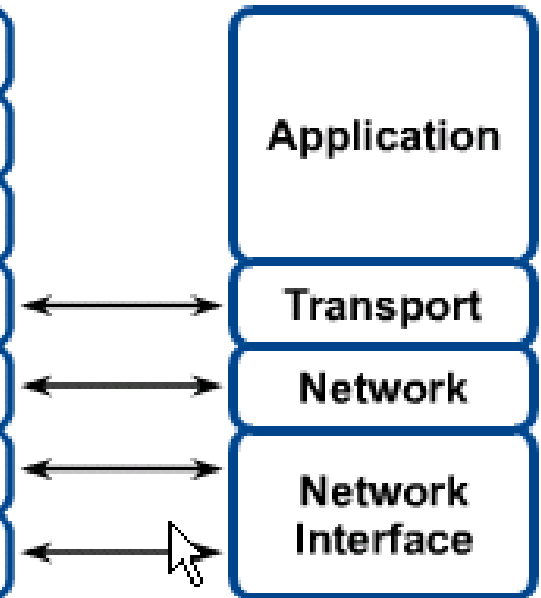➢destination network address

TCP/IP MODEL

OSI & TCP/IP Models

TCP/IP MODEL

Application Layer
Application programs using the network

Transport Layer (TCP/UDP)
Management of end-to-end message transmission, error detection and error correction

Network Layer (IP)
Handling of datagrams : routing and congestion

Data Link Layer
Management of cost effective and reliable data delivery, access to physical networks

Physical Layer
Physical Media