

# Redes de Computadores II

**Universidade do Algarve**

**Aula Teórica 2**  
**Semana I**

[https://github.com/ncatanoc/redes\\_algarve](https://github.com/ncatanoc/redes_algarve)

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# Introduction to Networking

## Goal:

- I. To understand the basic underpinnings of computer networks.

# Roadmap

1. the 4-layers model
2. Basics on security (next week)

# Recap: the 4-layers model

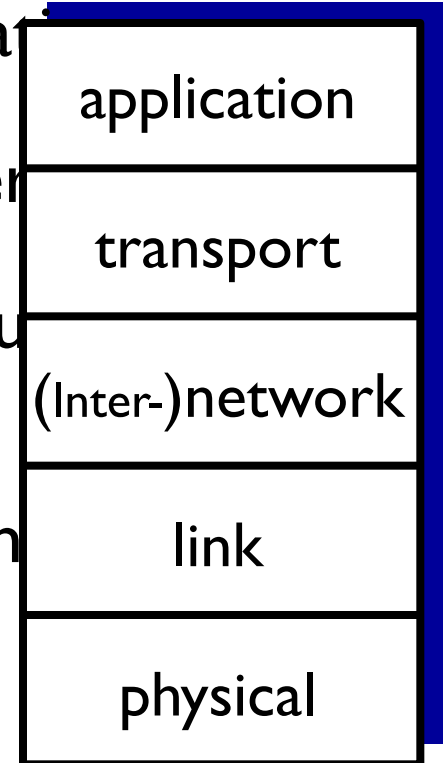
*application:* supporting network applications  
FTP, SMTP, HTTP, DNS

*transport:* process-process data transfer  
TCP, UDP

*network:* routing of datagrams from source to destination  
IP, routing protocols

*link:* data transfer between neighbouring elements  
Ethernet, 802.11 (WiFi), PPP

*physical:* bits “on the wire”



# Quiz - <https://www.menti.com/> - 36390773

1. A message from your friend arrives and your chat application displays a pop up notification

Select Network Layer... ▼

2. A message arrives which states that your friend has closed the chat connection.

Select Network Layer... ▼

3. A message gets sent from your computer to your router.

Select Network Layer... ▼

4. A message gets sent from your computer to your router to Google's server.

Select Network Layer... ▼

# Answer

1. A message from your friend arrives and your chat application displays a pop up notification

Application 

2. A message arrives which states that your friend has closed the chat connection.

Transport 

3. A message gets sent from your computer to your router.

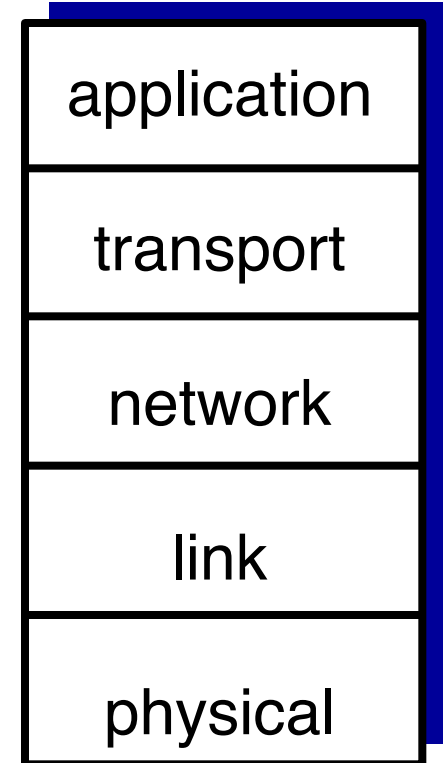
Link Layer 

4. A message gets sent from your computer to your router to Google's server.

Internetwork 

# How are packets sent and delivered?

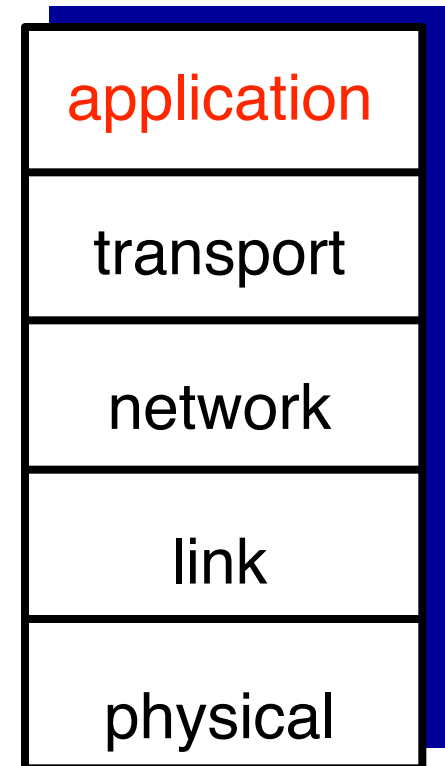
- delivering a message is like sending a **postcard**
  - the message is split into multiple **packets**
  - to deliver a message you need to send many **postcards/packets**
  - messages are just **packets**: an array of bytes of data



# Postcard example - application layer

- putting a postcard into a bag and bringing it to the post office.
- we want to send a “hello” message to a friend
  - The application layer builds a “hello” packet, which is subsequently sent to
    - transport ... network ... link layers

“hello!”

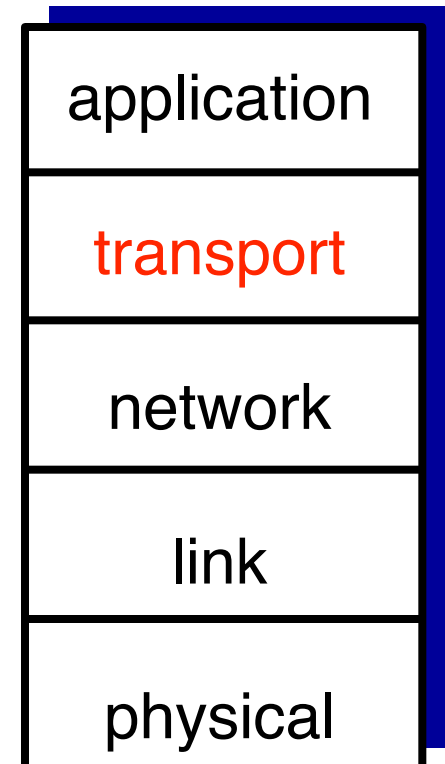
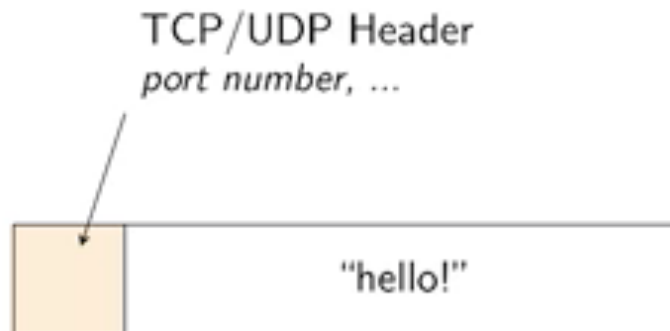




# Postcard example - transport layer

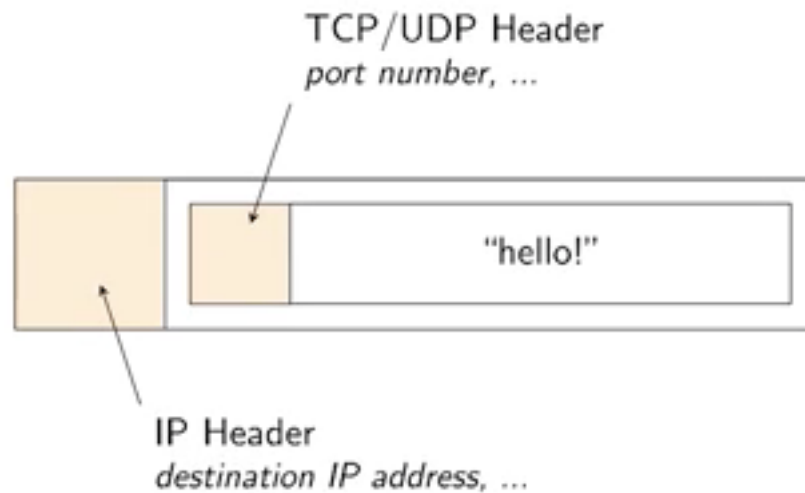
- the **transport** layer ensures the message is sent to the right application in the destination machine application
  - transport** layer adds a **TCP** or **UDP header** to the message
  - websites usually listen on **port 443**
  - the **recipient's name** on the **postcard**.

Application HTTP, DNS, ...
Transport TCP, UDP
Internetwork IP
Link Ethernet

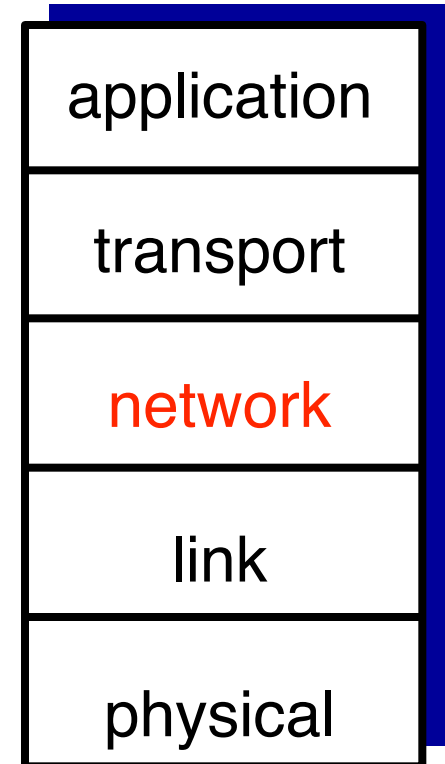


# Postcard example - network layer

- the **network layer** adds an **IP header**
  - street address where the **postcard** will be sent

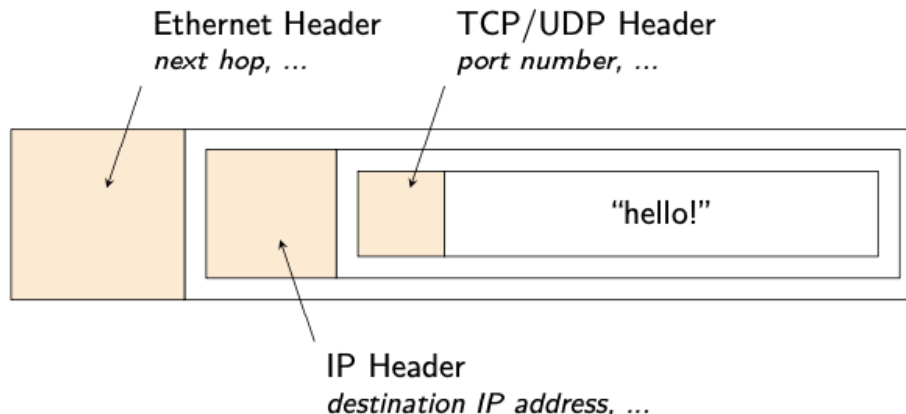


Application HTTP, DNS, ...
Transport TCP, UDP
Internetwork IP
Link Ethernet

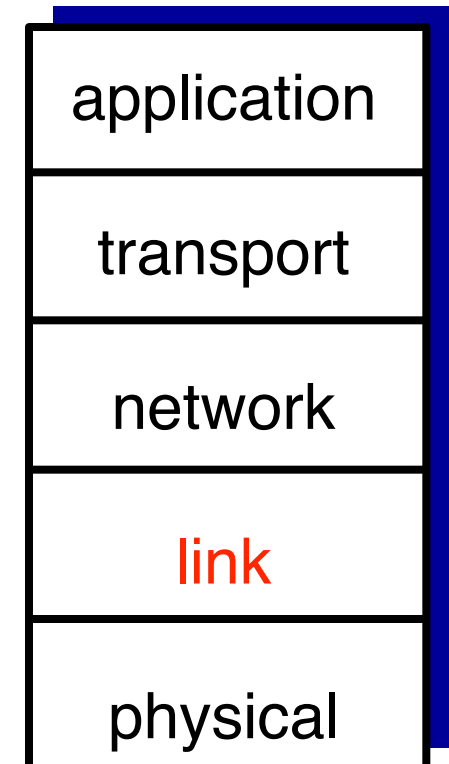


# Postcard example - link layer

- the link layer adds an ethernet header
- information on the next hop (router/machine) to which the packet will be sent
- Andar 6, fracção Z



Application
HTTP, DNS, ...
Transport
TCP, UDP
Internetwork
IP
Link
Ethernet



# Quiz - <http://menti.com> - code 3639 0773

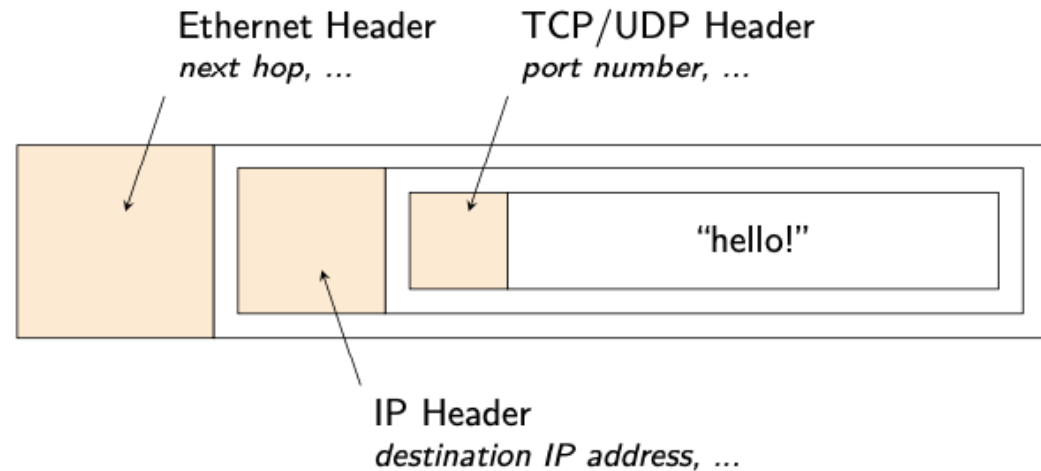
## Question

Which of the following statements are true?

- ☐ The router will replace/modify the existing Ethernet header before forwarding a packet.
- ☐ The TCP header contains the packet's destination IP address.
- ☐ To forward a packet, the router needs to parse and understand the packet's TCP header.
- ☐ Your internet service provider can read the contents of your packets when they pass through their network.

# answers

## Question



Which of the following statements are true?

- ☒ The router will replace/modify the existing Ethernet header before forwarding a packet.
- ☒ The TCP header contains the packet's destination IP address.
- ☒ To forward a packet, the router needs to parse and understand the packet's TCP header.
- ☒ Your internet service provider can read the contents of your packets when they pass through their network.

# some rational behind the answers

1. **True**: the **ethernet header** will include information on the next **hop** (router) where the packet will be sent
2. **False**: the **transport header** contains information about the **port** on which the packet will be sent.
  - The **network** layer adds the **IP**.
3. **False**: the router is only concerned with delivering the packet to the right destination.
  - The destination IP info is already present in the network layer.
4. **True**: packets are like postcards, they can be read or modified by anyone.

# Summary

- The 4-layer model
- The Dolev-Yao model (next week)