

appunti_verifica_inglese

Da studiare: pg. 204-210

Appunti libro

Communication Networks

Communicating is the process of sending information from one place to another.

When the transmission travels a long distance, it's called **telecommunications**.

The objective is to convert the messages into signals that can travel in wires, optical fibers and interplanetary space.

A telecommunication system consists of some basic blocks or *components*.

The message is transferred along a **channel**, between a **transmitter** (*the source*), and a **receiver** (*destination*).

The **transducer** converts the message into a suitable signal. The signal is then traduced to the old format by another transducer at the destination.

An **amplifier** is used to boost the strength of the signal.

Encoders and *Decoders* may be used to put the signal in the right form for transmission. It has to be converted into electrical energy either in *analogue* (continuous or pulse) or *digital* (or discrete) form, in order to be processed by electronic circuits.

We have got 5 types of telecommunication systems:

- **Simplex**, one-way systems where the message travels in only one direction. (ex. megaphone)
- **Duplex**, two-way system. We have got 2 sub-types:
 - **Half-Duplex**, when the two directions can be used only one at a time (walkie-talkie)
 - **Full-Duplex**, when both directions can be used at the same time (phone call)
- **Broadcast**, when one system has got a powerful transmitter, and the others have got many low-power, sensitive receivers, like *radio and television broadcasts*.
- **Multiplex**, when we have got multiple transmitters and receivers, like *videoconferencing*.

Pg.206 Methods of transmission

We have got 4 types of transmissions:

- **Point-To-Point**
 - **Synchronous transmission**, data travels in full-duplex mode in blocks or frames. There is no gap between the data. The system is synchronized via a clock embedded into the data stream. It's reliable and used for transferring large amounts of data.

- **Asynchronous transmission**, data is transmitted in bytes in half-duplex mode. Simpler, cheaper and used for transmitting small amounts of data, like emails and messages.
- **Circuit switching**
Connection-oriented. A constant path is used as session.
The data arrives in order, so It's faster due to not needing re-ordering.
Used by phone calls. Dial-up internet connections.
- **Packet switching**
Connectionless.
Data is broken into packets. They are independent from each other and can take multiple routes. Data may not arrive in order, so It must be re-ordered by the recipient.
Used by VoIP, Internet, LAN and WAN.

Pg.210 Networks

The network is a number of computers that are connected together.

There are 2 types of networks:

Peer-to-peer	Client-server
All the computers have equal status	A more powerful computer, the <i>server</i> , is in control of the network, and is used to store the data and programs needed by the whole network
The computers can share each other's resources	Software and data are stored on the server, they can be accessed by all the computers on the network
Only suitable for small networks	The network is dependant on the server. If it breaks, the whole network can't be used
They are easy to set-up	The most used for networks that need many computers
The whole networks slows down as the number of users increases	

The components of a network are:

- *NIC*, which allows the connection to the network.
- *Hub*, joins multiple cables into a single output.
- *Router*, a central point in the network, which chooses the best path for the transmission of data.
- *Switch*, works like a Hub but can divide the network in multiple segments which look at each packet of data, reducing travel times.
- *Bridge*, divides the network in 2 parts.
- *Repeater*, strengthens the signal.
- *Gateway*, a passage that connects 2 different networks.

The components of a network are: (appunti della prof)

- *NIC*, allows the connection to networks (es. SIM)
- *Hub*, unites multiple cables into one (es. ciabatta elettrica per cavi di rete)
- *Router*, selects the routes on which the data will travel (es. vigile del traffico)
- *Switch*, similar to the router, but is more efficient (es. vigile organizzato?)
- *Bridge*, divides the networks in 2 parts (es. muro con porta controllata)
- *Repeater*, strengthens the signal (es. Come un megafono che ripete la parola)
- *Gateway*, connects 2 different networks (es. è come un ponte tra due città)

Modal verbs

Category	Modal verb (invariable) + base form	Examples
Ability	• CAN (present ability) • COULD (general ability in the past)	• <i>The school technician can set up a new network.</i> • <i>When I was a child, I could only use a walkie-talkie.</i>
Advice	• SHOULD (personal advice) • OUGHT TO (what people are expected to do)	• <i>You should buy a new router.</i> • <i>You ought to ask an expert to install a new NIC.</i>
Request	• CAN/COULD	• <i>Can/Could you send me the message again?</i>
Permission	• MAY (formal) • CAN (informal) • COULD (tentative)	• <i>Excuse me, may I use your LAN?</i> • <i>Paul, can I use your LAN?</i> • <i>Could I use your LAN? This will be the last time I ask, I promise.</i>
Obligation	• MUST (order, strong necessity or recommendation)	• <i>I must choose the right topology, otherwise the school lab won't work properly.</i>
Prohibition	• MUSTN'T • CAN'T	• <i>Students mustn't/can't eat or drink in the computer lab.</i>
Deduction	• MUST (almost certain) • MAY/MIGHT/COULD (possibility) • CAN'T (impossibility)	• <i>It must be a star topology. There's just one server.</i> • <i>It might be an application protocol, but I'm not sure.</i> • <i>It can't be the ISO/OSI model. It only has 4 layers.</i>

Ricerca 5G

Advantages:

- **High speeds** than 4G and older.
We can stream movies at higher resolutions without buffering.
- **lower latency** than 4G and older.
Useful for multiplayer gaming, video calls, and especially for medical devices.
- **Allows for more devices to be connected.**
Very useful for small spaces with many users, like stadiums and big cities. More people can have the same high speeds.

5G is the latest wireless phone technology, deployed in 2019. The main difference from older versions is that it's extended into higher frequencies, around 3.5 GHz, up to 10. The higher frequencies are new to phone networks, but they are already used by point-to-point radio links, and security body-scanners.

Although 5G uses more base stations, the exposure at 3.5 GHz is similar to existing phone networks.

The **WHO** has already done much research, and currently, no adverse health effects have been linked with the exposure to wireless technologies.

The studies have only been done to the whole radio spectrum, but few to 5G.

The main issue is tissue heating, but the heat increase is negligible.

As the frequency increases, there is less penetration into body tissues and the absorption of the energy becomes more confined to the surface of the body.

Appunti prof:

Unit 5.1 - Communication networks

What is Telecommunications?

- *Telecommunications* is sending *information* from one place to another, *over long distances*.
- The message can travel by *wire*, *optical fibre* or *wireless signals*.
(started in the *19th century*, with the *electric telegraph*)

How does it work?

3 main parts:

- *Transmitter (source)*, which sends the message
 - *Receiver (destination)*, the one which gets the message
 - *Channel*, the path that carries the signal
- Other parts are:
- *Transducer*, that changes the voice or sound into an electric signal
 - *Amplifier*, makes the signal stronger
 - *Encoder/Decoder*, prepare the signal to be sent and understood correctly

Types of Communication Systems

Type	Description	Example
Simplex	One-way communications only	Megaphone, TV
Half-Duplex	Two-way, but only one speaks at a time	Walkie-talkie
Full-Duplex	Two-way, at the same time	Telephone
Broadcast	One sender, many receivers	Radio, TV
Multiplex	Many signals travel together on one channel	Internet cables

Short-Range Wireless Transmission

Short range communication without cables.

- Wi-Fi
 - Connects devices to local networks using *radio waves*
 - Needs a *router* or *access point*.
- Bluetooth
 - Connects devices directly over short distances (like watches or earbuds)
 - Replaces cables between devices

Mobile Transmission

Used for phones and mobile internet.

There are multiple generations:

Generation	Year	Features
2G	1991	Text messages, SMS
3G	1998	Internet access, pictures
4G/LTE	2008	Fast internet, streaming
5G	2020	Very high speed, slow delay, <i>Internet of Things</i>

HSDPA / HSPA+ / LTE

- **HSDPA** = High-Speed Downlink Packet Access
Used in 3G, **downloads faster**.
- **HSPA+**
Improved version, similar to **4G**.
- **LTE** = Long-Term Evolution, 4G standard
very fast for streaming, video calls...

5G - The New Generation

Fifth generation of mobile networks.

Much faster (up to 10gbs), with almost no delay (very low latency).

Advantages:

- Very fast download and upload speed
- Better connection for many devices (useful for smart cities, cars and hospitals)
- Allows the *Internet of Things* (IoT), for smart devices to be connected everywhere (Smart houses...)

Disadvantages/Concerns:

- Needs *many antennas*. Some people worry about radiation. (No scientific proof of danger)
- *Expensive* installation costs.
- *Old devices* might not support it.