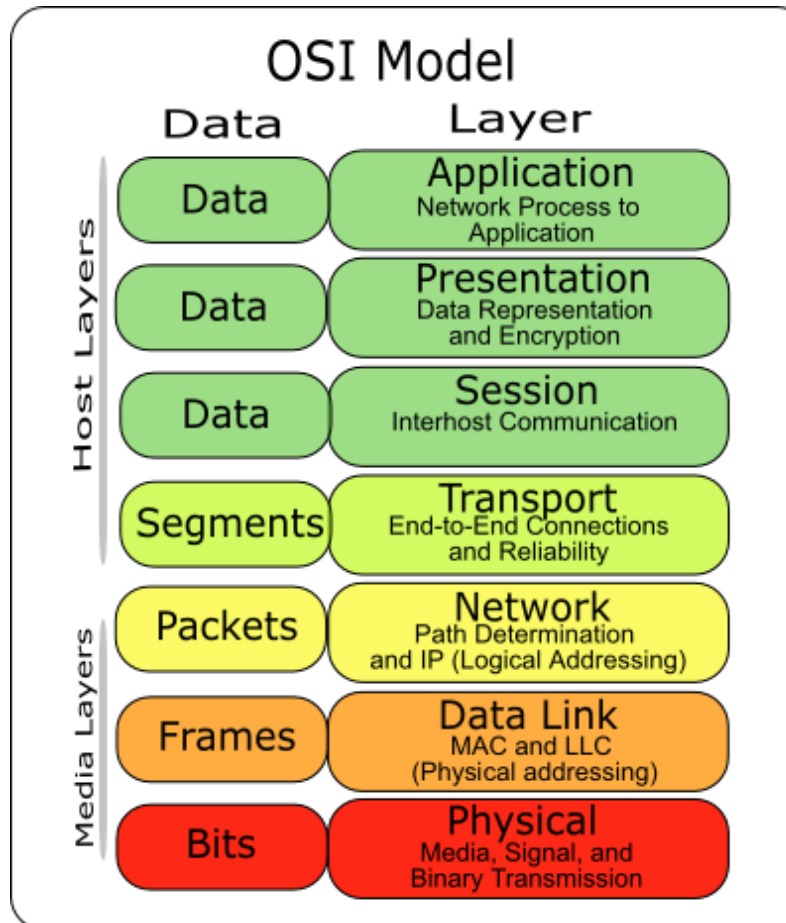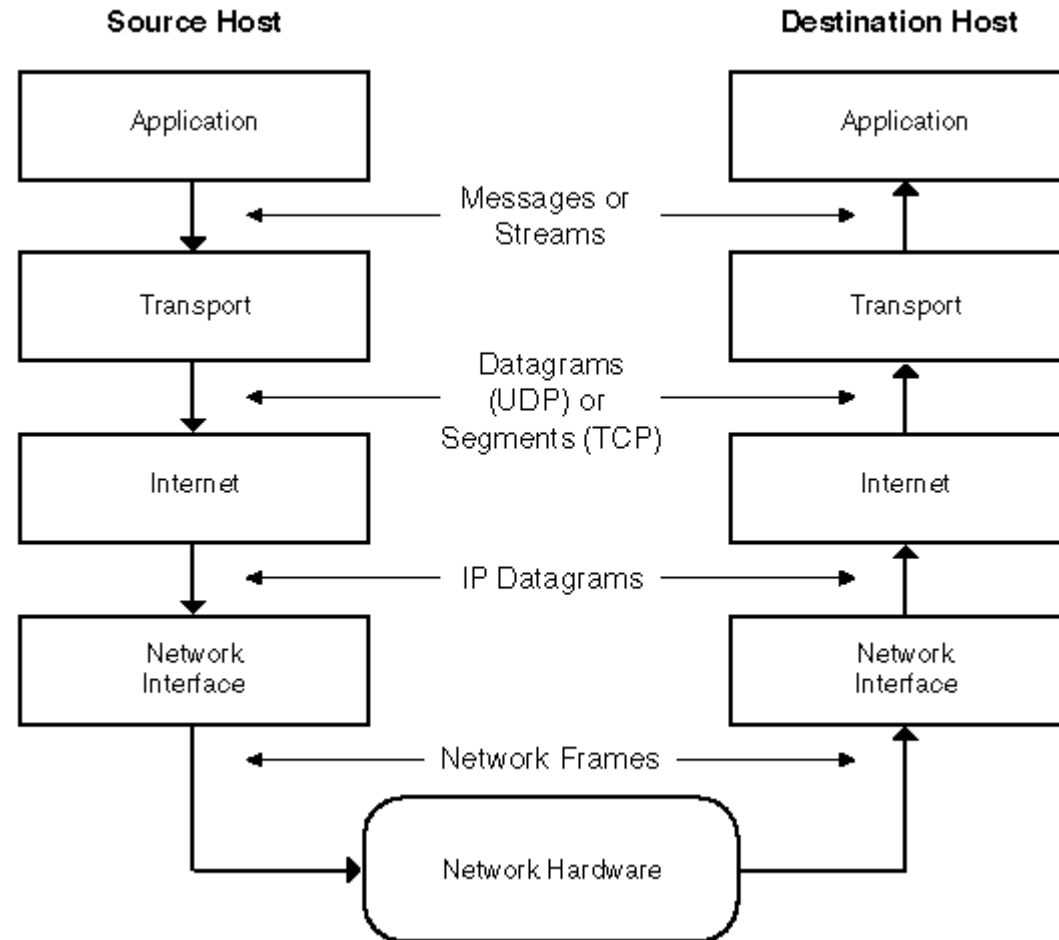# Bachelor Cycle

B5S - Network

PW #1

Summary

- OSI Model
- TCP/IP Model
- Encapsulation
- Network Equipment
- Physical link
- IP Protocol & IP Header Format
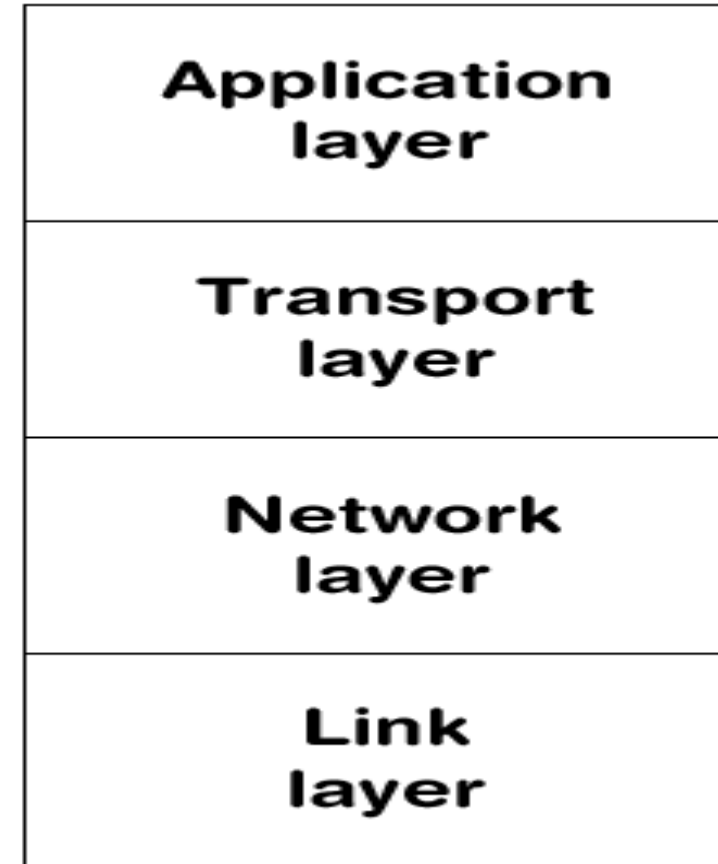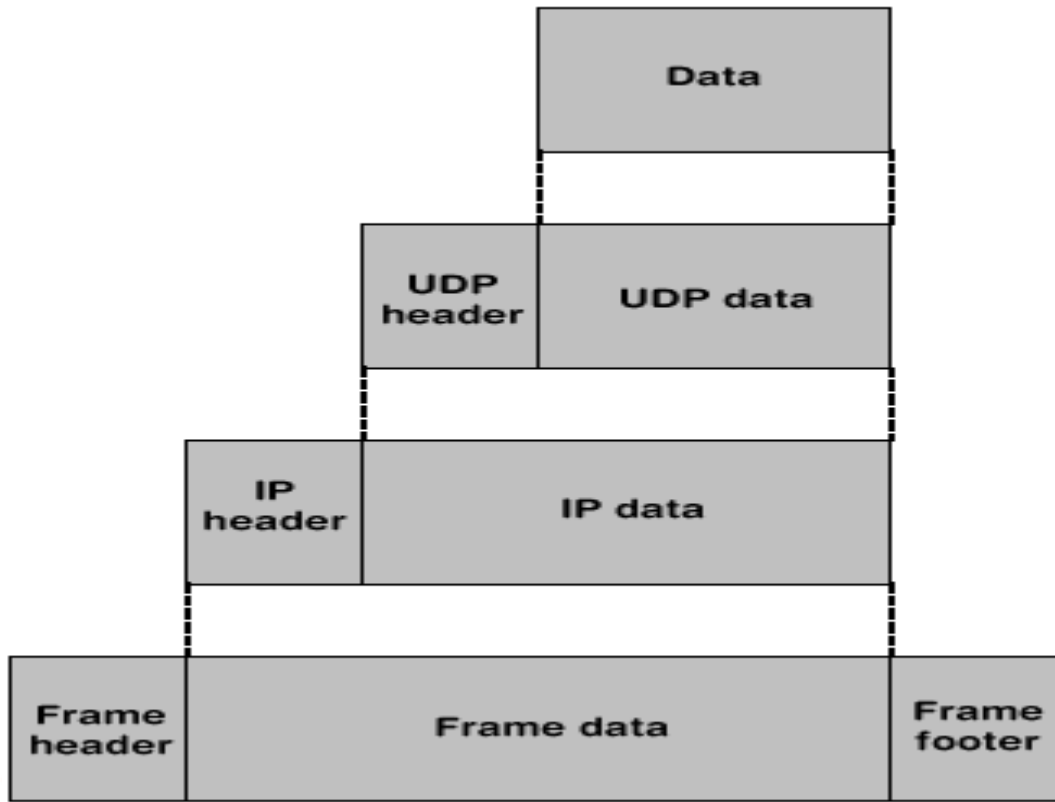- IP Address (anatomy, classes, exceptions)
- Subnet

OSI Model

TCP/IP Model

Encapsulation

Network Equipement

- **Repeater**: electronic device that receives a signal and retransmits it at a higher level or higher power so that the signal can cover longer distances.

- **Bridge**: link between two networks – based on the physical addresses.

- **Hub**: multiport repeater.

- **Switch**: multiport network brige.

- **Router** : device that forwards data packets between networks.

  based on logical addresses.

- **Gateway**: used to exit a network. It is based

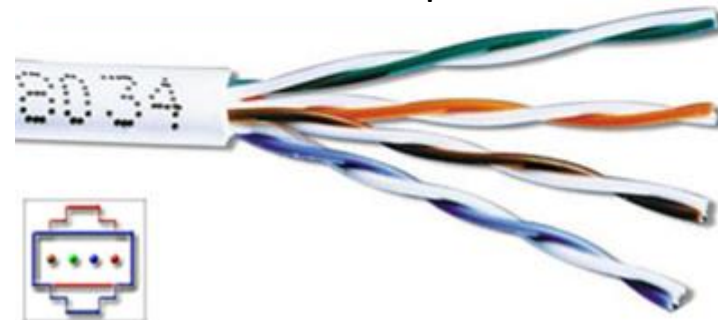 on application data.

Physical Link (1/2)

- **Coaxial cable**
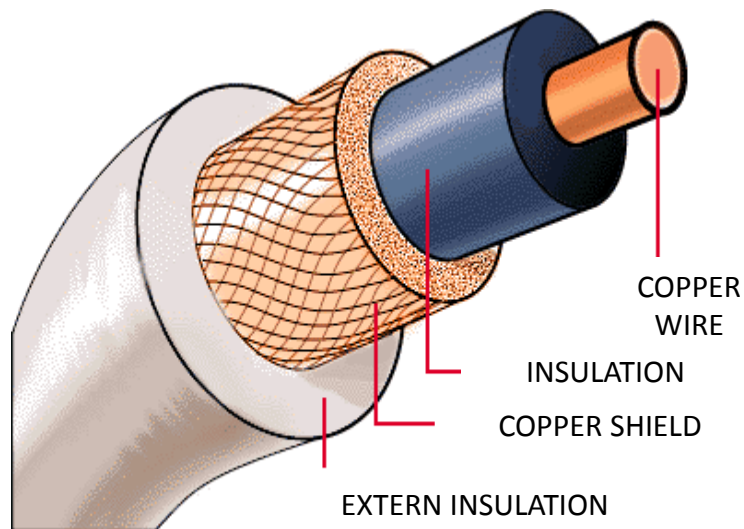
- **Twisted pair**

Shieleded twisted pair

Unshieleded twisted pair
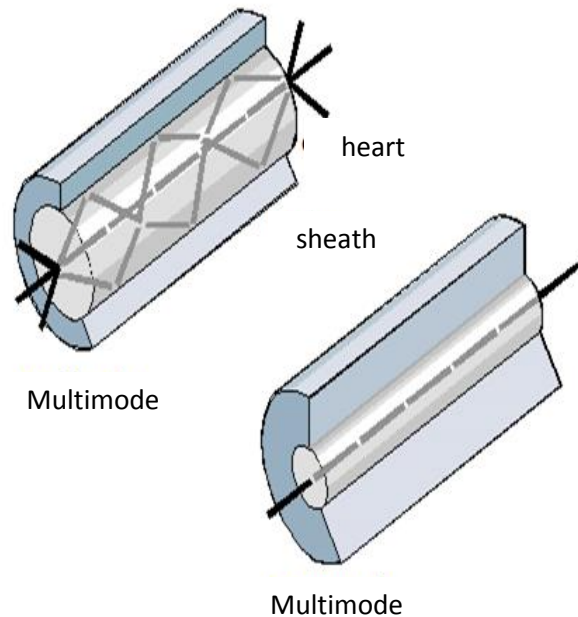
COPPER WIRE

INSULATION
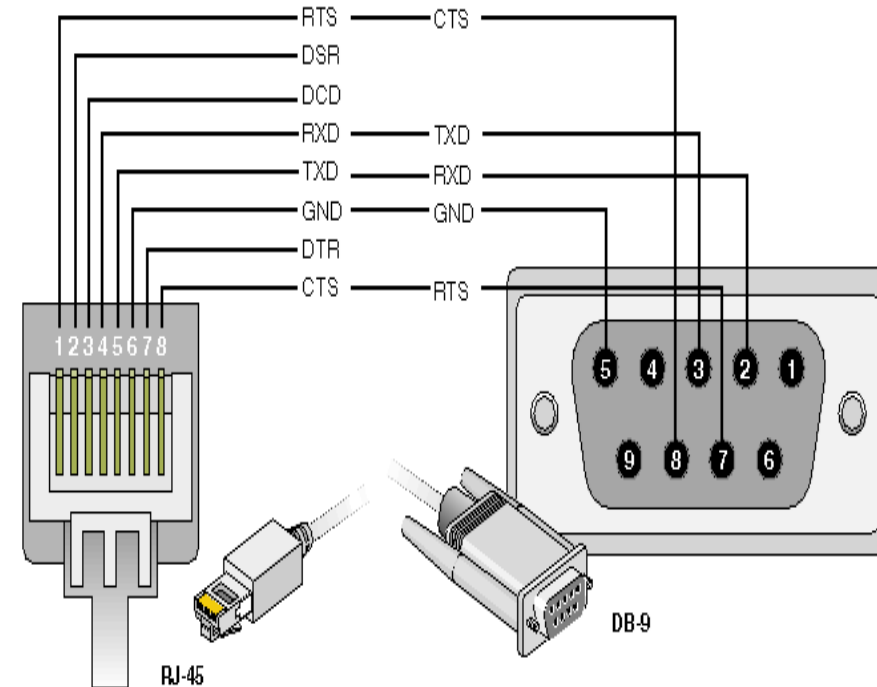
COPPER SHIELD

EXTERN INSULATION

Physical Link (2/2)

- **Optic fiber**

- **Serial cable**

The IP protocol

- It corresponds to the layer 3of the OSI model (Network)

- Unique identifier, like a phone number

- Used on all network card

- Logical address : allows router to find the reicipient with the IP address

IP Header
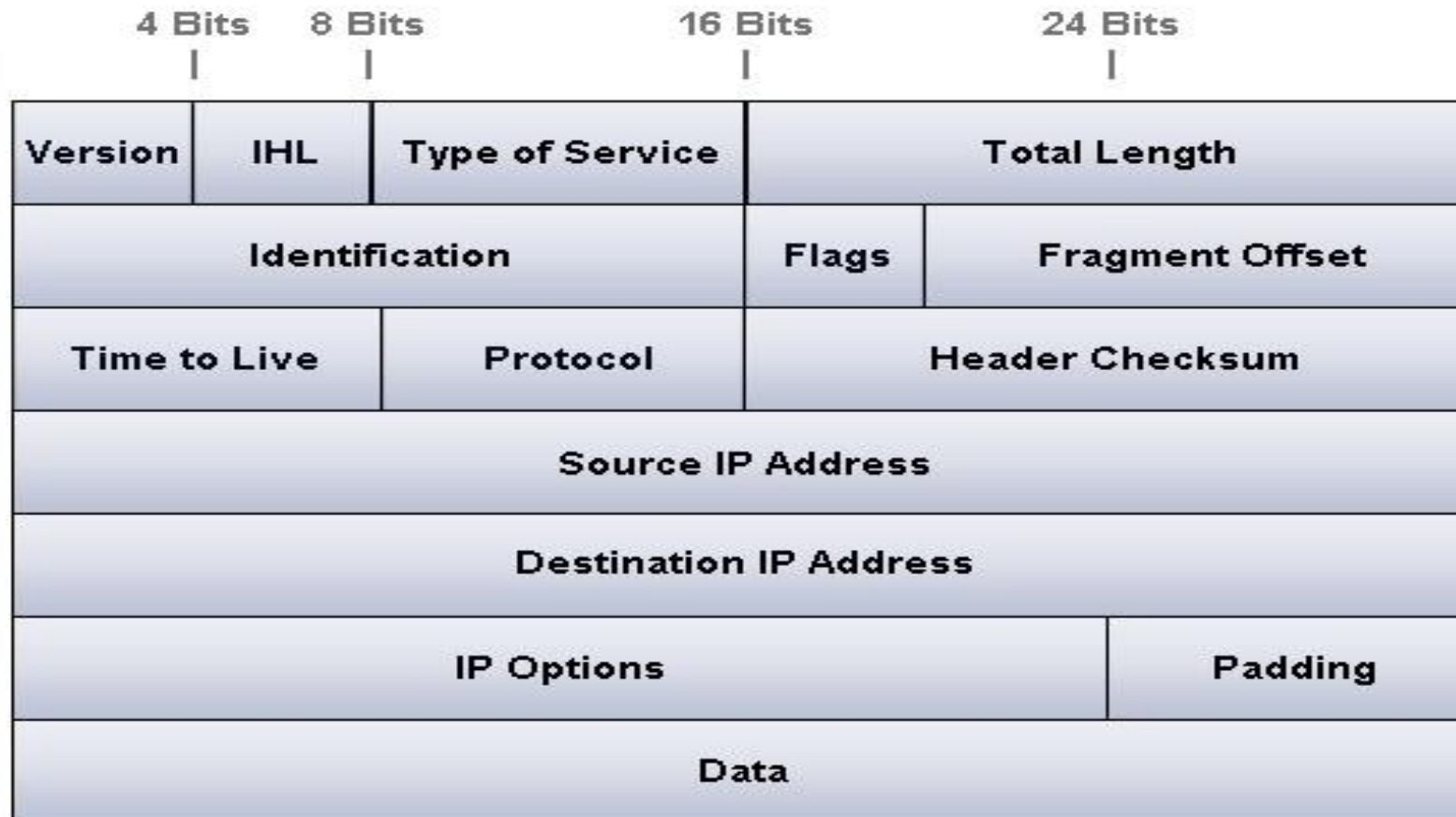
IP Address (1/2)

- It is 32 bits long :
  - Decimale notation : 192.168.0.1
  - Hexadecimale notation : 0xC0A80001

- Link to a network access point, not to a host

- An host can be on several networks

- Each access point must have a unique IP address on a network

IP Address (2/2)

- An IP address consists of two parts
  - Host id :
    - Assigned by the network administrator
    - Identifies a Host on a network
  - Network id :
    - Assigned by the authorities
    - Identifies the network
- The size of the network id depends on the class.

IP class (1/2)

Class A

0	net id (7 bit)	host id (24 bit)

Class B

10	net id (14 bit)	host id (16 bit)

Class C

110	net id (21 bit)	host id (8 bit)

Class D

1110	multicast (28 bit)

Class E

11110	future use (27 bit)

IP classes (2/2)

- **<u>A Class</u>**
  - o 8 bits for network id
  - o 24 bits for host id
  - o Range : 10.0.0.0 to 127.0.0.0
  - o 254^3 possible addresses

- **<u>B Class</u>**
  - o 16 bits for network id
  - o 16 bits for host id
  - o Range : 128.0.0.0 to 191.255.0.0
  - o 254^2 possible addresses

- **<u>C Class</u>**
  - o 24 bits for network id
  - o 8 bits for host id
  - o Range : 192.0.0.0 to 223.255.255.255
  - o 254 possible addresses

- **<u>D Class</u>**
  - o Multicast adresses used for the stream of audio-video data
  - o Range : 224.0.0.0 to 239.255.255.255

Private addresses

- **<u>A Class</u>**
  - 10.0.0.0 to 10.255.255.255 (10.X.X.X/8)

- **<u>B Class</u>**
  - 172.16.0.0 to 172.31.255.255 (172.16.X.X/16)

- **<u>C Class</u>**
  - 192.168.0.0 to 192.168.255.255 (192.168.X.X/24)

Special Address

- **Network address**
  - All of the host id bits are 0 ;
  - Example : 163.5.0.0 (For a B class).

- **Broadcast address**
  - Contact address for all the machines on the same network ;
  - All of the host id bits are 1 ;
 - Example : 163.5.255.255 (For a B class).

Subnet

- They are used to cut a network into several parts

- Thet reduce the broadcast domain

- Subnets addresses are created from bits of the host part

- The size of a subnet depends on the number of host that will be present on the network.

The subnet mask

- It is necessary to know the boundary between the host id and network id

- It has the same form as an IP address :
  - 1 bits for the network id
  - 0 bits for the host id

- Example :
  - C Class : 192.168.0.1
  - Subnet mask: 255.255.255.0

Practical work (1/2)

- **Straight cables** are used to connect PCs to a hub or network switch for example.

You look at the face without clip
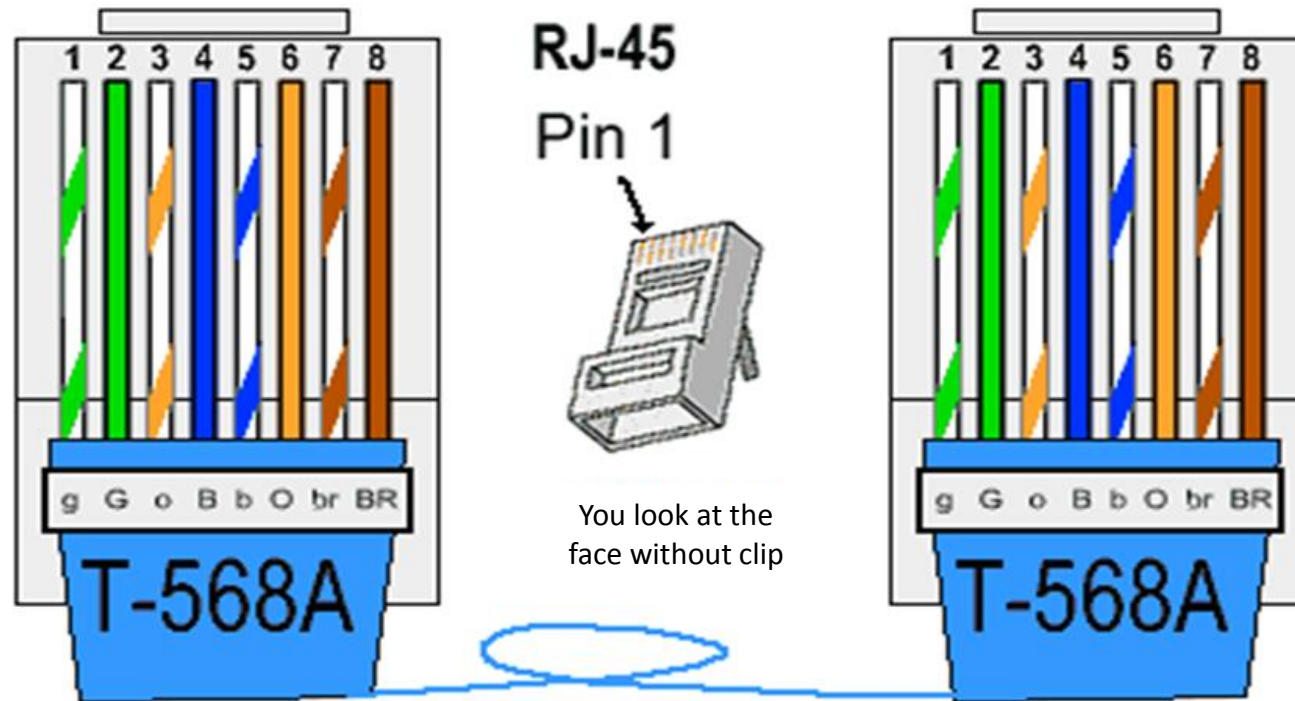
Practical work (2/2)

- **Crossover cables** are used to connect two PCs for example.

You look at the face without clip