



F10.2 Network hardware and connections

Networks · GCSE · OCR J277 1.3.1, AQA 8525 3.5, Edexcel 1CP2 4.1.4 ·
about 15 min

What this lesson is about

NICs, switches, routers and access points; copper, fibre and wireless; Wi-Fi, Ethernet and Bluetooth.

- The hardware
- Transmission media
- Wired and wireless
- How a switch learns

Questions

6 marks in all

1. Which device connects different networks together, such as a LAN to the internet? [1 mark]

- ☐ A Router
- ☐ B Switch
- ☐ C NIC
- ☐ D Wireless access point

Answer: A. Routers forward packets between networks using IP addresses.

2. How does a switch decide where to send a frame? [1 mark]

- ☐ A It reads the destination MAC address
- ☐ B It reads the destination IP address
- ☐ C It sends it to every device
- ☐ D It asks the router

Answer: A. Switches work within a LAN, using MAC addresses.

3. What does a wireless access point do? [1 mark]

- ☐ A Lets devices connect to a wired network by radio
- ☐ B Connects a LAN to the internet
- ☐ C Gives each device a MAC address
- ☐ D Encrypts files on a server

Answer: A. A WAP provides Wi-Fi.

4. Which is an advantage of fibre optic cable over copper? [1 mark]

- ☐ A It carries data further without interference
- ☐ B It is cheaper
- ☐ C It is easier to bend
- ☐ D It carries electrical signals

Answer: A. Fibre carries light over many kilometres.

5. Why must Wi-Fi be encrypted?

[1 mark]

- ☐ A Its signals can be picked up by anyone in range
- ☐ B Encryption makes it faster
- ☐ C Wi-Fi cannot work without it
- ☐ D It stops interference

Answer: A. Radio waves travel beyond the building.

6. What does this program print?

[1 mark]

```
table = {}  
for port, src in [(1, "AA"), (3, "CC"), (2, "AA")]:  
    table[src] = port  
print(table)
```

Answer:

```
{'AA': 2, 'CC': 3}
```

AA is learned on port 1, then updated to port 2 when it appears there.

The task: a learning switch

Complete the switch. For each frame in `frames`, learn which port its source is on. Then print `frame` to `<destination>: port <n>` if the destination is known, or `frame` to `<destination>: every port` if not. At the end, print `learned <n> addresses`.

```
# the two lines every program starts with: the commands, then the robot
from bugbot import *
connect()

# (port it came in on, source MAC, destination MAC)
frames = [
    (1, "AA-01", "BB-02"),
    (2, "BB-02", "AA-01"),
    (3, "CC-03", "AA-01"),
    (1, "AA-01", "CC-03"),
    (4, "DD-04", "BB-02"),
]
table = {}
```

The hint students can ask for: For each frame, first note which port its sender came in on. Then look the destination up in the table: send it to that port if you know it, and to every port if you do not. The count at the end is how many addresses the table holds.

A solution

```
from bugbot import *
connect()
frames = [
    (1, "AA-01", "BB-02"),
    (2, "BB-02", "AA-01"),
    (3, "CC-03", "AA-01"),
    (1, "AA-01", "CC-03"),
    (4, "DD-04", "BB-02"),
]
table = {}
for port, source, destination in frames:
    table[source] = port
    if destination in table:
        print(f"frame to {destination}: port {table[destination]}")
    else:
        print(f"frame to {destination}: every port")
print("learned", len(table), "addresses")
```

Any program that meets the task's checks is marked correct in the simulator; this is one way, not the only way.