



F10.4 Network topologies

Name _____

Class _____

Date _____

What this lesson is about

Star, bus, ring and mesh, and routing around a failure in a mesh of robots.

- Four topologies
- Routes through a mesh

Questions

6 marks in all

1. In a star topology, what happens if the central switch fails? [1 mark]
☐ A No device can communicate
☐ B Only one device is affected
☐ C Data takes another route
☐ D Nothing, the devices connect directly
2. Why is a mesh network very reliable? [1 mark]
☐ A There are many routes, so data can go around a failed link
☐ B It has a single central switch
☐ C It uses less cable
☐ D Data travels in one direction
3. How many connections does a full mesh of 5 devices need? [1 mark]

4. In a bus topology, what happens if the backbone cable breaks? [1 mark]
☐ A The whole network fails
☐ B Only one device is affected
☐ C Data goes the other way round
☐ D The switch reroutes it
5. In a ring topology, how does data travel? [1 mark]
☐ A From device to device around the loop, in one direction
☐ B Through a central switch
☐ C Along one shared cable to every device at once
☐ D Directly between every pair of devices

6. What does this program print?

[1 mark]

```
links = {"A": ["B"], "B": ["A", "C"], "C": ["B"]}
seen = ["A"]
for robot in seen:
    for n in links[robot]:
        if n not in seen:
            seen.append(n)
print(seen)
```

The task: route around a failure

Write `route(links, start, end)` that returns the shortest route as a list of robots, using a breadth-first search. Print `route: A-B-D-F` style for the route from A to F, joining the names with `-`, and send the same text by radio. Then the link between D and F fails: remove it from both robots' lists, find the route again, and print `after D-F fails: <route>`.

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

links = {"A": ["B", "C"], "B": ["A", "D"], "C": ["A", "D", "E"], "D": ["B", "C", "F"], "E":
["C", "F"], "F": ["D", "E"]}
```

Plan your program here, then type it in and press Run.



Do it on the robot

www.bugbotlab.com/learn/f10-4-network-topologies/

The simulator checks it and tells you when it passes. Nothing to install, no account.

Challenges

1. How many links does a full mesh of 6 robots need? Check with a loop.
2. Make C fail completely. Is there still a route from A to F?
3. Change the network into a star with a switch in the middle. What happens to every route if the switch fails?