

# Networking hardware

## Introduction

This lesson explores the functionality of key hardware components found in a network. The lesson covers network cables, hubs, servers and routers. Each is explained in turn, and students then use their knowledge of each component to build a series of increasingly complicated network diagrams. This lesson also includes a piece of homework in which a series of terms and statements need to be matched up.

## Learning intention

- List examples of the hardware necessary for connecting devices to networks

Students can:

- describe the function of the following components found in computer networks: network cable, hub, server, and router.
- describe how devices can be connected via network.

## Key vocabulary

Network cable, hub, server, router, ISP

### You will need:

- Slides ([Networks, routers, servers](#))
- Activities:
  - What am I?: [worksheet](#) and [answers](#)
  - Build a network: [worksheet](#)

## Outline plan

*\*Timings are rough guides*

<b>Starter activity</b> (Slide 2)  5 mins	<b>What am I?</b>  Four images and four names of hardware are displayed on the slide. Students should try to match the names with the images.  This can be completed verbally as a class, or individually via the activity worksheet provided.
<b>Activity 1</b> (Slide 5)  5 mins	<b>An explanation of network cables and hubs</b>  Display slide 5 and explain to students the purpose of network cables. You could also ask students if they can see network cables in use in the classroom.
<b>Activity 2</b> (Slides 6–8)  10 mins	<b>Build a network: scenario 1</b>  A small company has four people working for it with four computers. All computers now need to be networked together using cables so that they can communicate and access each other's files.  Students should use the 'Build a network' worksheet to complete this task. They should use slide 2 of the worksheet for this scenario.  Students can simply drag the icons on the slide to build the network — the line represents the cable. The students can duplicate the line using copy and paste, and then position and rotate it as required. You may have to demonstrate this to the students, depending on their skills.  Students should work in pairs for these scenario activities. There are four scenarios in total. One learner could solve the problem while the other learner builds the network, then they could swap roles for the next scenario.  Alternatively, this would make a great unplugged activity. Students could use sticky notes to represent the devices (e.g. a personal computer), and string to represent the cables.  <b>Discussion</b>  Display slide 7 of the lesson slide deck, which reveals the answer to scenario 1. It shows all four personal computers connected by cables. There are six cables in total. Ask students if there is a disadvantage to this setup. If students struggle to identify a disadvantage, ask them to imagine the same scenario but with 10 or 20 personal computers.  Display slide 8, which shows the disadvantage to the setup, i.e. the setup requires a lot of cabling, and the number of cables required would soon become unmanageable and

	<p>expensive.</p> <p>Ask, “How many cables would be needed for a room with 6 computers? What about 20 computers?”</p> <p>Students may be able to work out how many cables are required for six computers (fifteen cables). You should not expect students to work out the number of cables needed for 20 computers but could instead ask students to make educated guesses, and see which learner gets closest to the actual answer of 190 cables. This should emphasise the point that the number of cables required grows significantly, and quickly becomes very expensive and unmanageable.</p>
<p><b>Activity 3</b> (Slides 9–11)</p> <p>10 mins</p>	<p><b>The hub</b></p> <p>Display slide 9, and explain the functionality of a hub:</p> <ul style="list-style-type: none"> <li>• A hub connects a number of computers together within the same room or building.</li> <li>• The hub has ports that allow cables to be plugged into it from each connected computer.</li> <li>• When a hub receives a message from a computer, it passes the message on to all of the computers connected to it.</li> </ul> <p><b>Build a network: scenario 2</b></p> <p>Students should work in pairs and use slide 3 of the ‘Build a network’ worksheet. In this scenario, the company wishes to install a hub to reduce the overall number of cables used to network the four computers. Students need to place a hub in the centre of the network, then connect a network cable between each personal computer and the hub.</p> <p>Display slide 11 of the lesson slide deck to show the answer to scenario 2. A question is posed to the students: “How many fewer cables are used in scenario 2 compared to scenario 1?”. In scenario 1, six cables were used. In this scenario, four cables are used, so the answer is “two”.</p>
<p><b>Activity 4</b> (Slides 12–15)</p> <p>10–15 mins</p>	<p><b>The server</b></p> <p>Display slide 12 and explain the functionality of a server. A server is a powerful computer which provides services to other devices in a network, such as central storage of shared files. This would be defined as a ‘file server’. Users on the network can save files to the file server, and open files from the file server. This is a great way of sharing files across many computers and allowing users to work on files collaboratively.</p> <p><b>Learning opportunity:</b> If your school network has a shared network drive, you could ask students to explore it. Emphasise that the files are not on every individual computer, but on a file server.</p> <p>Display slide 13, which shows the current setup of the company network based on the answer to scenario 2. The network has four personal computers, all connected directly</p>

	<p>to a hub. Ask the students, “Imagine that computer A is turned off. Can computer C access files that are stored on computer A?”. Give the students time to discuss the answer.</p> <p>The answer is “no”. If computer A is turned off, all files held within it are inaccessible. This is not a good situation; there needs to be a way to share files amongst all computers, without the need for all computers to be turned on. This can be achieved by giving all computers access to a file server.</p> <p><b>Build a network: scenario 3</b></p> <p>Students should work in pairs and use slide 4 of the ‘Build a network’ worksheet. In this scenario, the company wishes to install a file server so that all four computers can store their files in a central location. Students need to connect a file server to the hub.</p> <p>Display slide 15 of the lesson slide deck to show the answer to scenario 3. It shows that a file server has been connected to the hub, and the personal computers are no longer reliant on each other; all files can be stored and accessed centrally on the file server.</p>
<p><b>Activity 5</b> (Slide 16)</p> <p>5 mins</p>	<p><b>Fill in the blanks</b></p> <p>The ‘Network hardware’ worksheet includes the ‘fill in the blanks’ activity. Ask the students to fill in the six missing words describing a network cable, hub, and server. The missing words are provided (cables, server, files, video, hub, both).</p> <p>You can find the solution for this activity in the ‘Network hardware’ answer sheet.</p>
<p><b>Activity 6</b> (Slides 17–19)</p> <p>10 mins</p>	<p><b>The router</b></p> <p>Display slide 17 and explain the functionality of a router:</p> <ul style="list-style-type: none"> <li>• A router is used to send messages between different networks that are not local (e.g. not in the same building).</li> <li>• It connects the two separate networks together so that they can communicate with one another. For example, if a company had an office in London and an office in Newcastle and it needed to share files between the two networks, it would use a router to link the two networks and allow the files to be forwarded.</li> <li>• A common use of a router is to connect a home or business network to the internet.</li> <li>• The router will typically have different ports. One port will be used to connect to the internet, and others will be used to connect to each of the devices within the network it resides on. The connection to the internet is provided by an ISP (internet service provider).</li> </ul> <p>Ask the students if they can give any examples of internet service providers. Give students time to discuss before providing suitable answers such as Telstra, Optusnet or Aussie broadband.</p> <p><b>Build a network: scenario 4</b></p> <p>Students should work in pairs and use slide 5 of the ‘Build a network’ worksheet. In</p>

	<p>this scenario, the company wants to connect its network to the internet so that the four users can carry out internet research on their computers via the web. Students need to connect a router to the hub and display the ‘internet cloud’ connected to the router.</p> <p>Display slide 19 of the lesson slide deck, which shows the answer to scenario 4. It shows that the router is connected to the hub, just as the file server was in the previous scenario, and all personal computers now have access to the router. It also shows that the router acts as a gateway to the internet, and all personal computers can now carry out research on the web via the internet.</p>
<p><b>Plenary</b> (Slides 20– 21)</p> <p>5 mins</p>	<p><b>True or false?</b></p> <p>Students need to identify whether six statements about networking hardware are true or false. This could be done through discussion, or as a ‘hands up’ activity, with students putting their hands up if the answer is “true” and keeping their hands down if the answer is “false”.</p>