Lesson plan

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| Topic 4 Choice of network |
| Learning Objectives:* Factors affecting the choice of network: user needs, specifications, security, cost, connectivity,
* Implementation, efficiency, compatibility, user experience, productivity
* How the features of a network and its component parts affect the performance of an IT system
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| Content |
| StarterPowerPoint Guide: Topic 4 Choice of networkThe starter asks students to consider the different factors that they personally value in their school or college network. Clearly there is no correct answer and many students will consider this from the point of view of improving their current network. Users may be most interested in accessibility if they have strong filters and find they cannot connect their own devices. Other users may say that minimum downtime is the most important feature as if a network is unavailable the other features are irrelevant. Alternative answers are given on the answers slide.MainUser experienceUser experience is a term also used in web development where it is known as UX. In this context the term is referring to the networks ease of use, performance, availability and accessibility. Take students through the slide and the answers on the following slide.Case study: Heal to ToeMany small businesses are now heavily reliant on the Internet to function. Ask students if any of them have ever experienced a problem with their Internet. What was the result? Typically, it may have been an inconvenience such as not having access to social media or having to do their homework at school or college.Now ask them what happens if a business doesn’t have their Internet connection. The results can clearly be more catastrophic. They usually result in losses of income, but they may also lose reputation. Watch the video about BT 4G Assure. This is a backup system for smaller businesses that reverts to a 4G connection if their main Internet connection has a problem. <https://www.youtube.com/watch?v=GC0S0-j0v6U>User needsAsk students the questions on the slide. The number of users will be a significant issue with Wi-Fi as each Access Point can only service a small number of users. As more users try to access the WAP the interference and congestion will increase, steadily making the service unusable. People working on video editing, for example, may need a high bandwidth connection – so Ethernet would be most suitable. Users who simply check their email and occasionally browse the web with a smartphone may only require Wi-Fi.SpecificationsBoth a network and individual devices have specifications. For instance, when buying a new computer for a network the end user may specify the speed of the processor and amount of RAM and disk space required. Network specifications have standards will dictate certain features. For instance, older Wi-Fi standards such as 802.11b and 802.11g are much slower than 802.11ac. To use the faster speed both the smartphone/table/TV and WAP must support the standard. Show students the video on Ethernet RJ45 speeds and cables: <https://www.youtube.com/watch?v=sbXe__EtGg4> Case study: DinolandThis case study shows a possible specification that may be created for the scenario given. Ask students if anything else would be required. Answers may include a router to connect to the Internet and a firewall to protect their network from attackers.Give out **Worksheet 4** and ask students to do **Task 1** and **Task 2**.Topic 4 Worksheet 4Topic 4 Worksheet 4 AnswersConnectivityConnectivity is how we connect networks together, particularly in order to access the Internet. The photo shows a coaxial router which is used to connect to cables used for cable TV. In the UK this is predominantly sold as Fibre by Virgin Media. The four yellow ports are Ethernet ports to set up a LAN. Ask students the questions and take them through the answers on the answer slide.CostThe cost slide shows the different specifications for the connection to an ISP. The full fibre optic connection (Fibre to The Premises/FTTP) has a synchronous connection meaning that the same upload and download bandwidth is available. There is also a far faster fault repair time. Faults will be repaired during the night or at weekends. By contrast, with a residential package, a fault reported on a Saturday will be unlikely to be investigated until Wednesday and may take weeks more to fix if it is significant. Hence, the business connection is far more expensive. Students should also be aware that a business package will require more capable hardware, such as a router that can take a fibre connection. This further adds to the cost.Efficiency and productivityOne of the obvious effects of a poor-quality network is that it will affect the efficiency and productivity of an organisation. In companies this will invariably lead to lost earnings. The calculation at the bottom of the slide allows the students to see the cost to a business of just a 10-minute delay per day due to an inefficient network. Ask students to try the calculation and then go through the answers slide to compare their results.Ask students to do **Task 3** on the worksheet.CompatibilityNetwork equipment must be compatible to operate correctly. For instance, 5G became available in 2019, but very few phones have the capability to access it. Some specifications are **backwards compatible** which allows older equipment to work with it. The slide shows a Network Interface Card (NIC) with an Ethernet socket. There is a coaxial cable on the left. These are clearly incompatible, and a network cannot be built with them.ImplementationStudents should be aware that the implementation of any network takes time. The slide shows the times required to install an Internet connection, however, in businesses there will also be a considerable time spent laying Ethernet cable and installing Wireless Access Points. Once the network is built, they will need to spend time testing it. Ask students the question about downtime and take them through the answers slide.SecurityStudents will by now understand that encryption helps to secure networks. It would be good to ask them for examples of protocols used such as WPA2 (Wireless Protection Access) for Wi-Fi, SSL/TLS (Secure Sockets Layer / Transport Layer Security) and HTTPS (Secure Hypertext Transfer Protocol) for web communications. Ask students for other security measures beyond encryption. Answers are given on the following slide.IT system performanceStudents will have been aware throughout this topic that the network features and hardware will affect the entire IT system. It would be good to discuss with students how the IT system performance in your school or college is affected by the features of your network and its component parts.Ask students to do **Task 3** and **Task 4** on the worksheet.PlenaryAsk students to complete the plenary task and discuss their answers as the give them. Encourage them to give more than one answer for each factor if they can. Hand out **Homework 4**. Topic 4 Homework 4Topic 4 Homework 4 Answers |