



T Level Technical Qualification in Digital Support Services

Occupational specialism assessment (OSA)

Network Cabling

Assignment 2 - Distinction

Guide standard exemplification materials

T Level Technical Qualification in Digital Support Services Occupational specialism assessment

Guide standard exemplification materials

Network Cabling

Assignment 2

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Introduction

The material within this document relates to the Network Cabling occupational specialism sample assessment. These exemplification materials are designed to give providers and students an indication of what would be expected for the lowest level of attainment required to achieve a pass or distinction grade.

The examiner commentary is provided to detail the judgements examiners will undertake when examining the student work. This is not intended to replace the information within the qualification specification and providers must refer to this for the content.

In assignment 2, the student must install part of the cabling system for the doctors' surgery, devise a test plan and test the cabling system.

After each live assessment series, authentic student evidence will be published with examiner commentary across the range of achievement.

Assignment 2

Scenario

You are required to provide the network data installation for a doctors' surgery based in a small, single-storey building.

The building will comprise of a reception area and 3 surgery rooms.

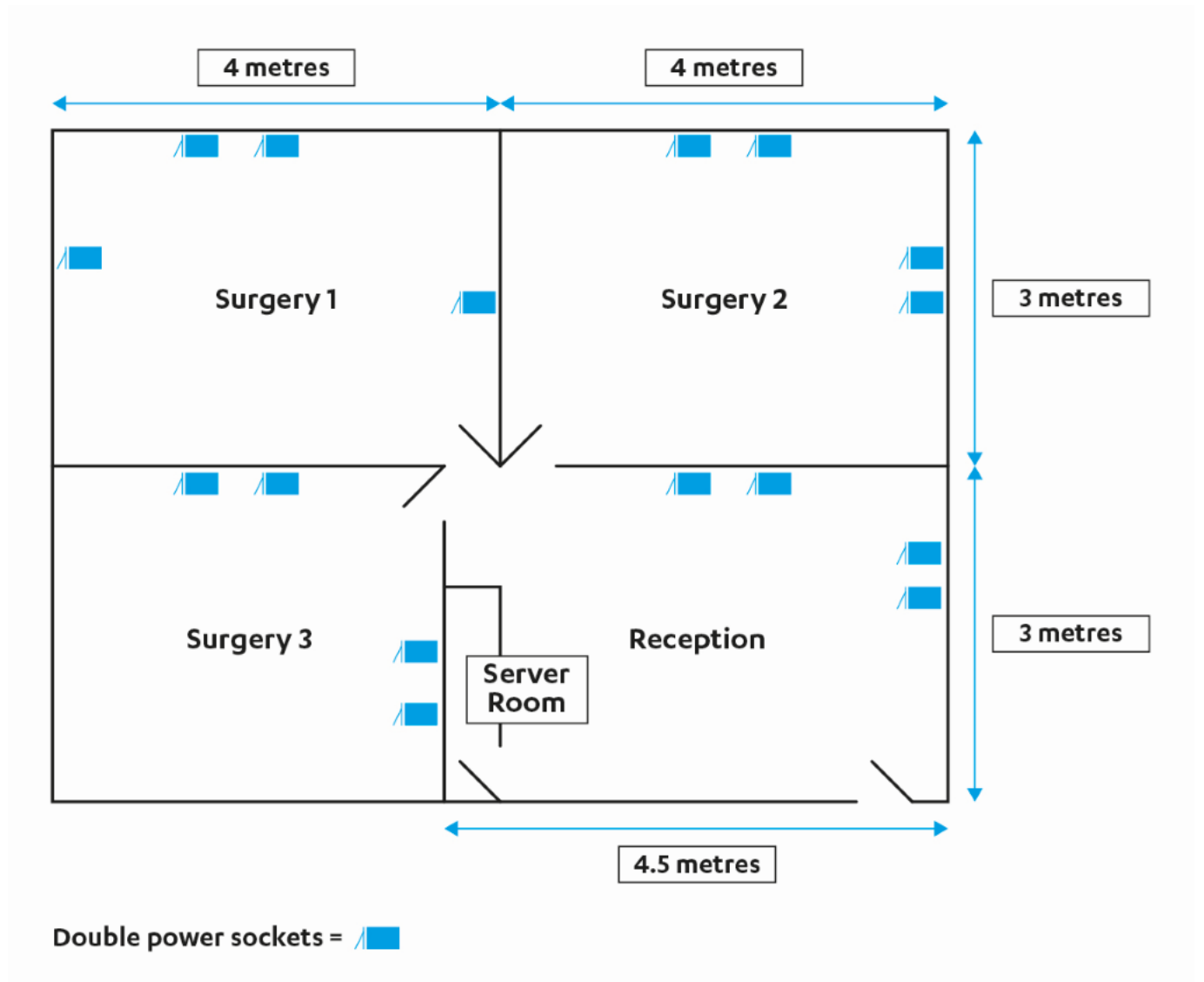
There is an ample supply of power sockets in each surgery room and the reception area.

The needs of the various users are:

- there are 6 doctors working in the practice and all will require access to the network at any time of the day
- doctors will need to be able to access digital medical records which will be stored separately from all other data
- doctors will need to be able to access the digital appointments system
- the 3 reception staff only require access to the booking system and must **not** have access to digital medical records
- the data server room will be located in the reception area
- all doctors and reception staff need access to a network printer

An outline plan of the surgery (image A) is provided on the next page.

Image A



Task 1: install the cabling system

Time limit

12 hours 30 minutes to complete task 1 and task 2

(32 marks)

You need to install part of the cabling system for the doctors' surgery, in line with the details given in the bulleted list below.

Using the components that you have been provided with, you need to create working cables and install hardware to a standard that will ensure a safe working environment for the end users:

- install 4 wall sockets fitted within trunking; this should be correctly cabled to allow successful data transmission
- the cabling system you installed in the previous point should be terminated at the patch panel and be connected to a switch
- appropriately configure DHCP
- there should also be all the necessary components to allow WiFi access with relevant security controls configured to end user devices
- appropriate application of principles of network security and implementation of a range of security controls when installing the network
- all installed equipment and ports should be labelled
- you are required to adhere to relevant health and safety standards whilst completing the installation, use the correct tools and have the correct PPE (personal protective equipment)
- end user devices capable of wired and wireless connectivity, for example, laptops

For task 1 and task 2 you will have access to the following equipment:

- word processing software
- digital camera
- network cabling
- a supply of RJ45 connectors
- trunking
- wall outlet sockets
- crimper tools
- cable tester
- patch panel
- network switch
- router
- wireless access points (WAPs)

- labelling machine
- appropriate end user devices for testing

Evidence required for submission to NCFE

Photographic evidence of the following, in .pdf format:

- raw materials
- completed cables meeting standard T-568B
- completed wall outlet sockets, including correct labelling
- wall outlet sockets successfully housed in trunking and fixed securely to work area
- cables terminated at the patch panel, meeting standard T-568B
- WiFi access configuration settings showing encryption standards used
- safe working environment and PPE to be utilised
- accurate labelling for all components in the installation

Student evidence

PPE:



While installing the cables I will need PPE (personal protective equipment) including eye protectors, gloves and a bump hat for when I am working under desks.

Tools:

These are the tools I will need including a cable tester, crimping tool and 'push down' tool.



I will also need a label printer and a saw.



Hardware:



I will be using UTP cable.



This is the trunking that will be used.



Patch panels

Wall plates



Networking equipment:



Network switch



Wireless access point



I install the trunking to protect the cable and ensure it is not a hazard.



Here I am installing the wall plates into the trunking, to reduce the chance of wear and tear.



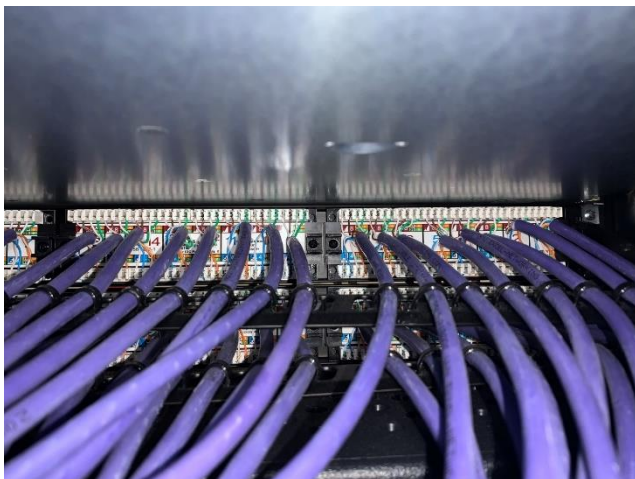
Cables (purple) are now in the trunking.

Installing the equipment:

Patch panel:



I install the patch panels into the server rack – this will make it easier in the future should a cable fail, and reduce wear and tear when cables are plugged and unplugged.



All ports are correctly terminated at a T-568B standard at the port end and the patch panel end.



Cables are now tested; all 8 lights show and flash in sequence to show that they are in the correct order.

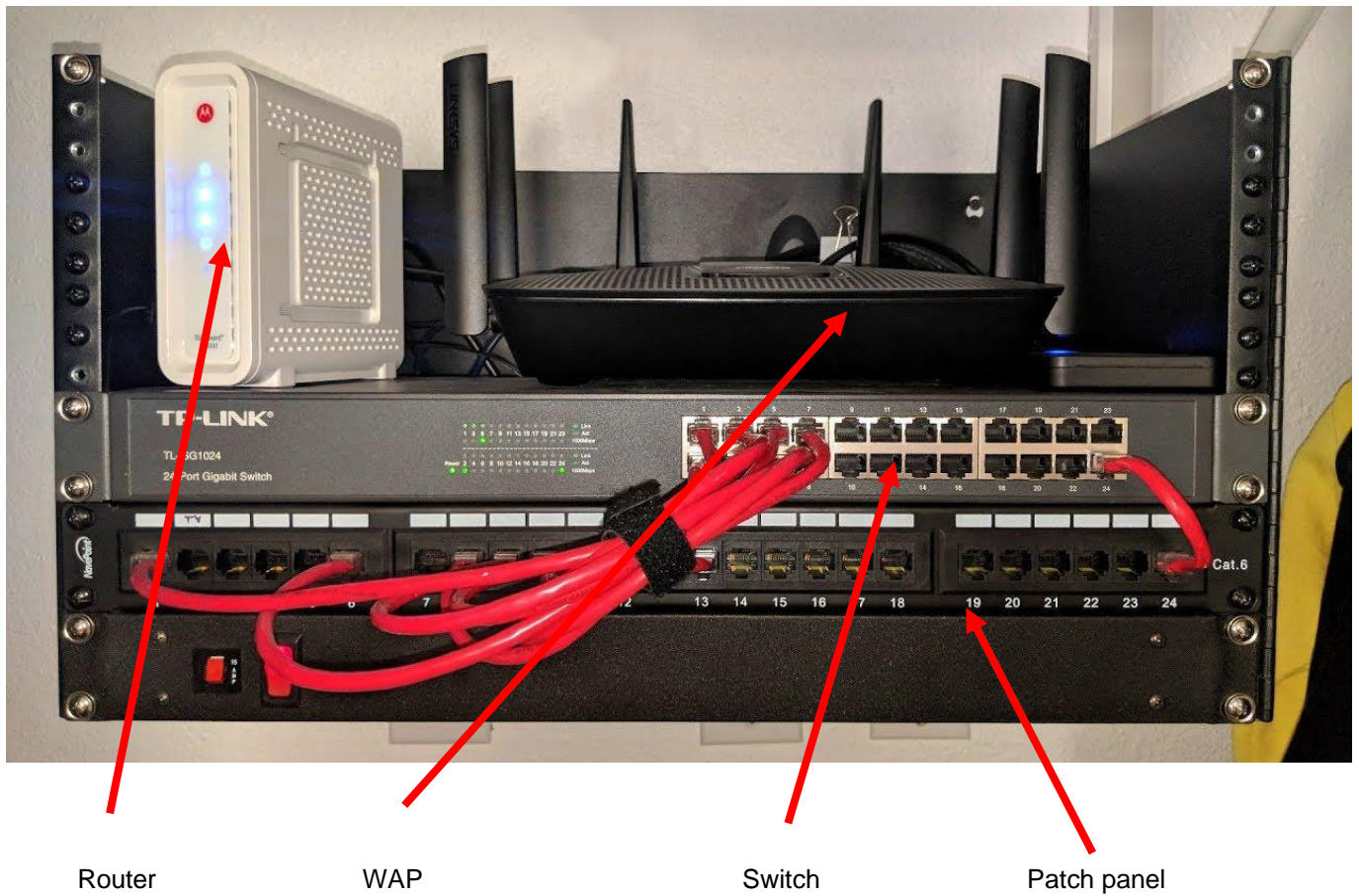
I have labelled both the cables and the ports to ensure that there are no misunderstandings in the future:



And then labelled at both ends.

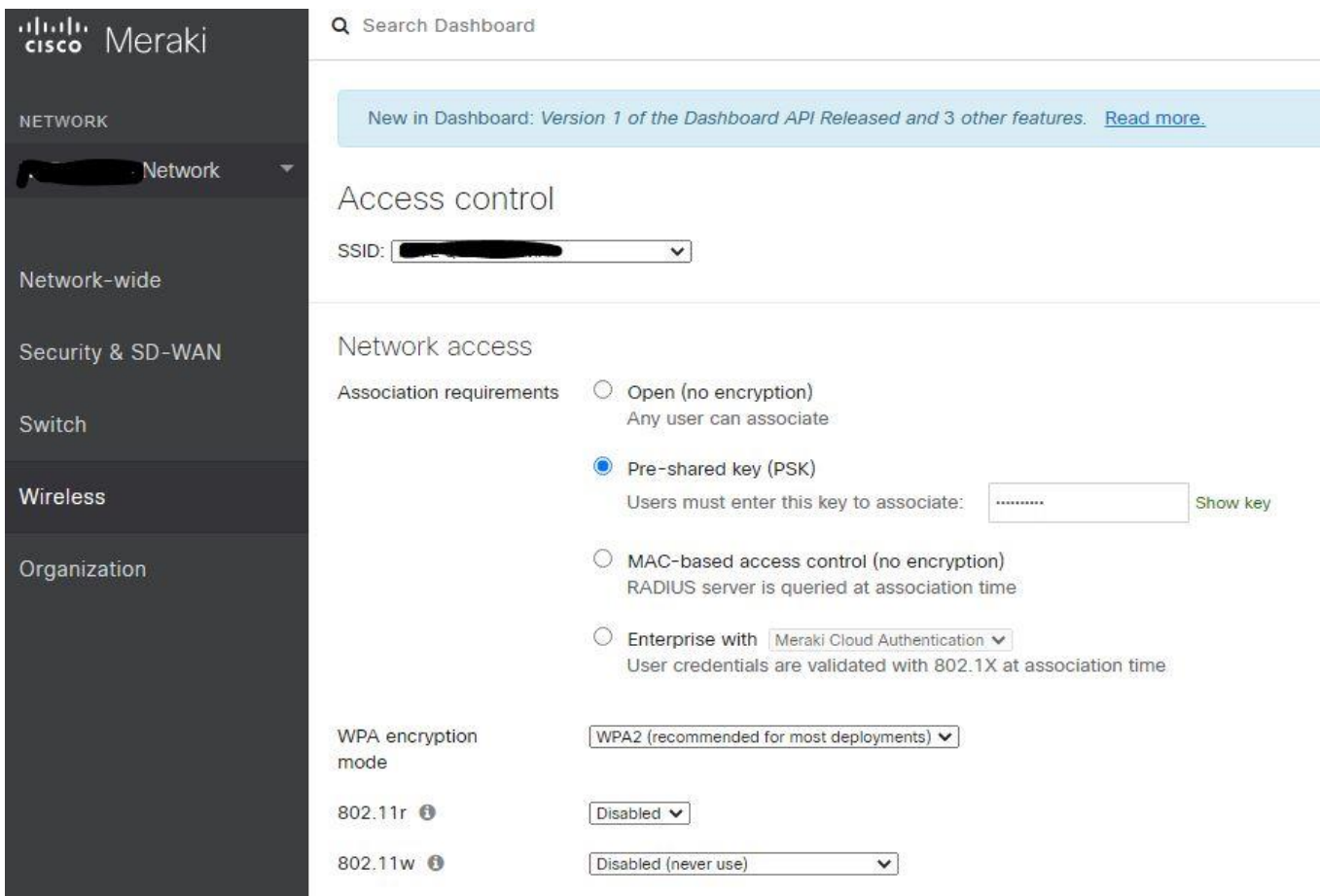
Everything has correct labelling at both ends.



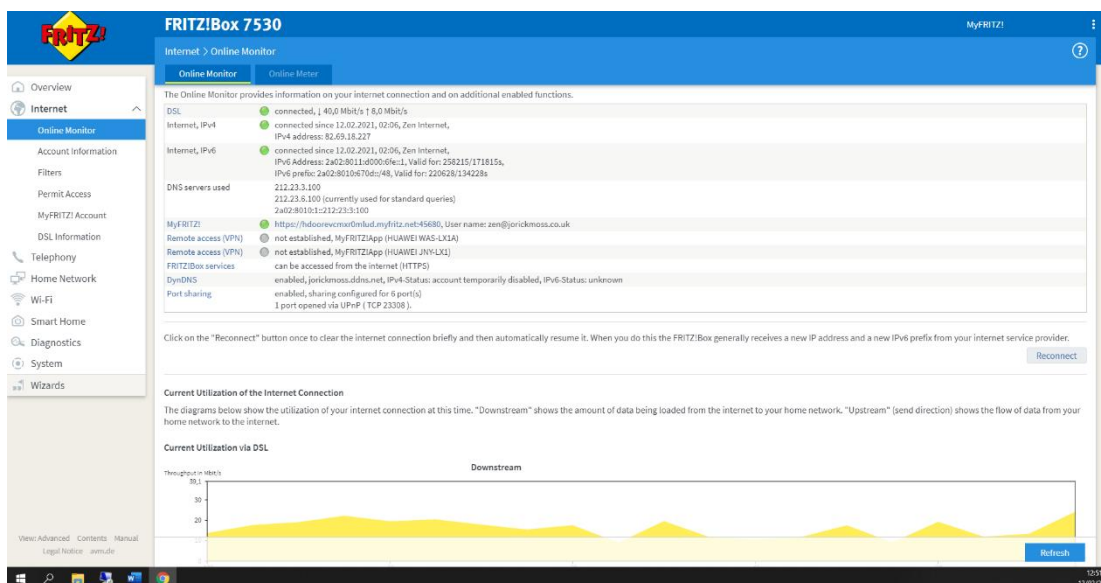


Here you can see the patch panel, switch, router and wireless access point all installed and patched together.

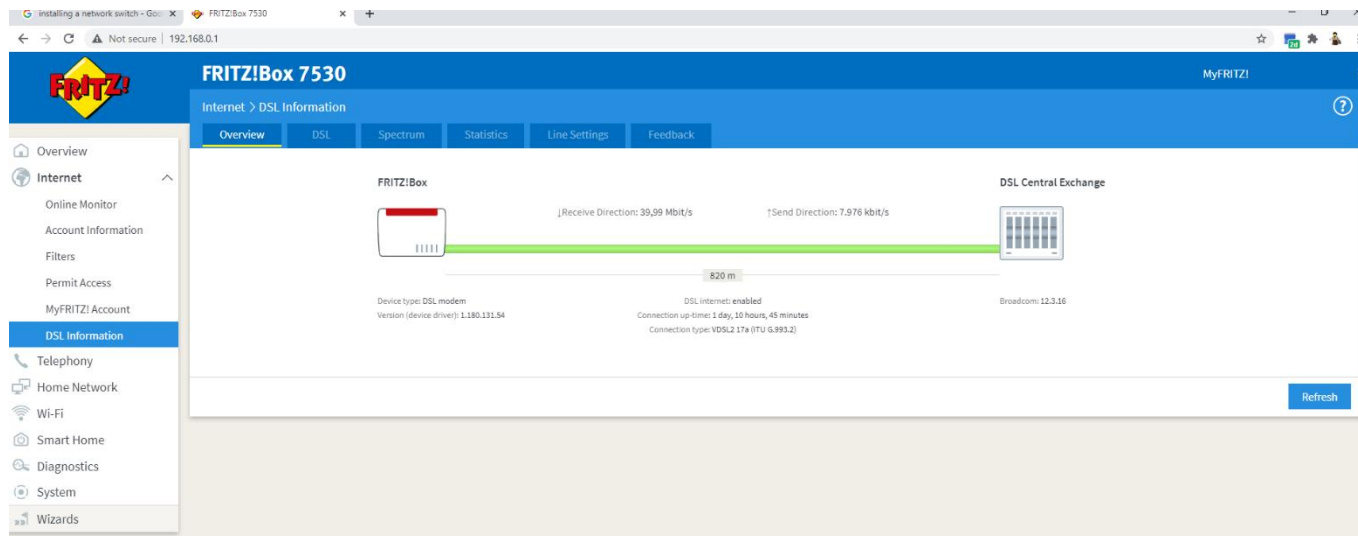
WiFi strong configuration:



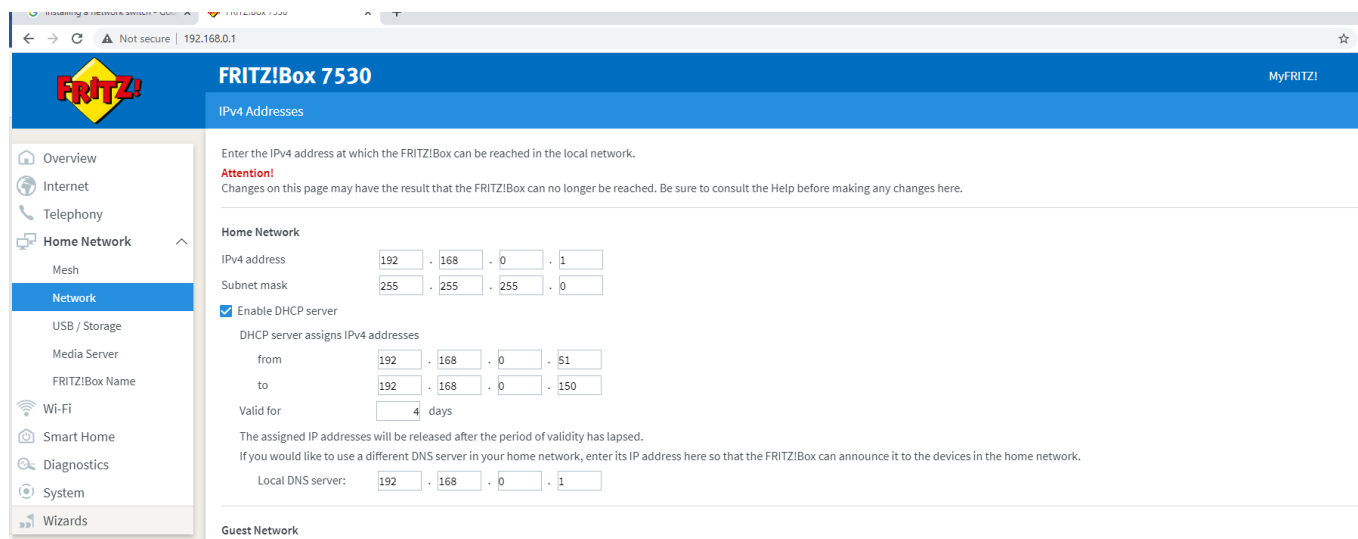
Screenshot of the WiFi configuration: showing the use of WPA2-PSK and a complex network key. This means that the network will be more secure.



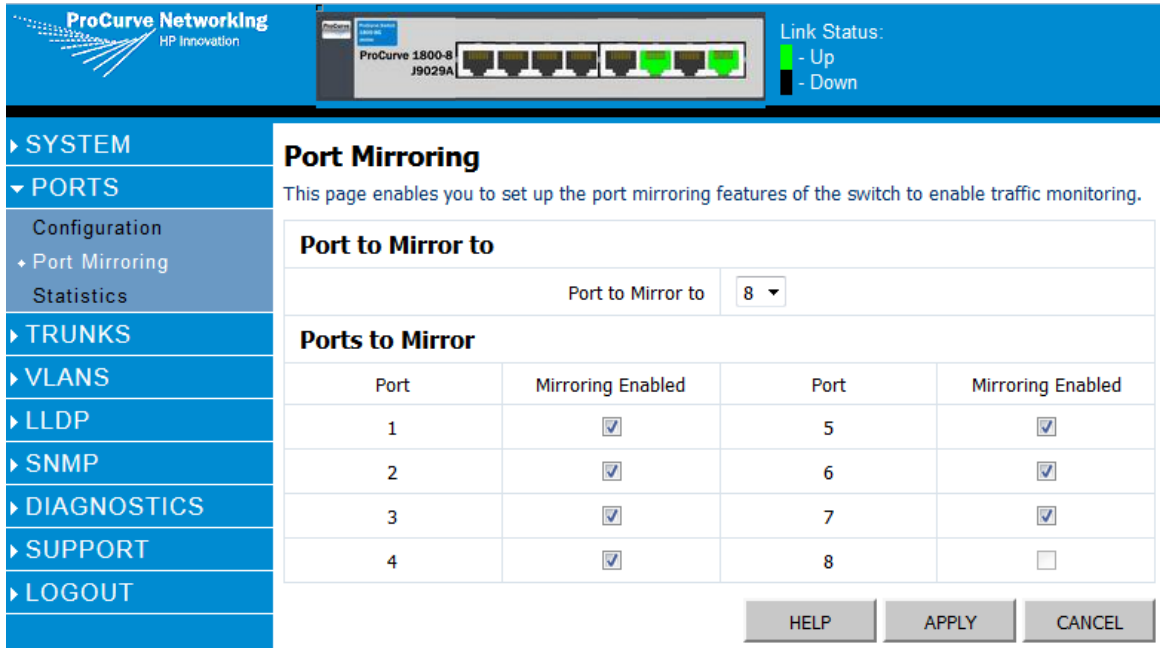
Here you can see the router is now connected to the internet:



Details of the DSL information shown in the router.



Here you can see that I have configured the DHCP server to use a 192.168.0.0/24 network with a host range of 192.168.0.51/24 to 192.168.0.150/24.



The screenshot shows the ProCurve Network configuration interface. At the top, there is a header with the ProCurve logo and a link status indicator showing 'Up' (green) and 'Down' (black). Below the header is a navigation menu on the left with options like SYSTEM, PORTS, TRUNKS, etc. The main content area is titled 'Port Mirroring' and includes a description: 'This page enables you to set up the port mirroring features of the switch to enable traffic monitoring.' Below this, there is a 'Port to Mirror to' dropdown menu set to '8'. A table titled 'Ports to Mirror' lists ports 1 through 8, with checkboxes for 'Mirroring Enabled'. Ports 1-7 have checked boxes, while port 8 has an unchecked box. At the bottom right, there are buttons for 'HELP', 'APPLY', and 'CANCEL'.

ProCurve Network
HP Innovation

ProCurve 1800-8 J9029A

Link Status:
- Up
- Down

▶ SYSTEM
▼ PORTS
Configuration
▶ Port Mirroring
Statistics
▶ TRUNKS
▶ VLANS
▶ LLDP
▶ SNMP
▶ DIAGNOSTICS
▶ SUPPORT
▶ LOGOUT

Port Mirroring

This page enables you to set up the port mirroring features of the switch to enable traffic monitoring.

Port to Mirror to

Port to Mirror to: 8 ▼

Ports to Mirror

Port	Mirroring Enabled	Port	Mirroring Enabled
1	<input checked="" type="checkbox"/>	5	<input checked="" type="checkbox"/>
2	<input checked="" type="checkbox"/>	6	<input checked="" type="checkbox"/>
3	<input checked="" type="checkbox"/>	7	<input checked="" type="checkbox"/>
4	<input checked="" type="checkbox"/>	8	<input type="checkbox"/>

HELP APPLY CANCEL

Here is the configuration page for the switch.

Task 2: devise a test plan and test the cabling system

Time limit

12 hours 30 minutes to complete task 1 and task 2

(12 marks)

To provide confidence that the cabling you have installed gives the data transmission capability desired by users, you are required to:

- use a cable tester to check for the successful connectivity and connection speed in all cables and infrastructure you have installed, in accordance with TIA/EIA 568B standards
- ensure successful communication between end devices through wired and wireless connectivity
- troubleshoot any issues encountered, such as latency, jitter, cross talk, media standard compatibility (for example 1000BASE-T) and any other connection issues. If no issues are found this should still be documented in your test plan
- appropriately test all implemented network security controls
- document the results - connection results should be cross-referenced to devices and media given in the scenario with information relating to the security controls that have been configured
- suggest any appropriate recommendations you feel would improve network security
- use the test plan template provided

Evidence required for submission to NCFE

Completed test results (using provided test plan template) which cover the complete installation and have fully relevant solutions or recommendations to any issues identified, in .pdf format.

Screenshots or photographs of all tests carried out, in .pdf format, these must be cross-referenced to a test in the test plan template.

Student evidence

Test Number	What is being tested?	How is it to be tested?	Expected outcome	Actual outcome	Solution	Remarks
1	Connectivity between patch port 1 to wall port 1	Network tester	Network tester to report all pairs match up	Successful reading from network tester	N/A	N/A
2	Connectivity between patch port 2 to wall port 2	Network tester	Network tester to report all pairs match up	Failed - network tester reported 1 faulty termination	Reusing the punch down tool on all terminations on port 2 at the port end and patch panel end	N/A
3	Connectivity between patch port 3 to wall port 3	Network tester	Network tester to report all pairs match up	Successful reading from network tester	N/A	N/A
4	Connectivity between patch port 4 to wall port 4	Network tester	Network tester to report all pairs match up	Successful reading from network tester	N/A	N/A

Test Number	What is being tested?	How is it to be tested?	Expected outcome	Actual outcome	Solution	Remarks
5	Connectivity from wired device to wired port 1 to 2	Transferring a large video file and checking the average transfer speed	Speeds averaging close to 1Gbps	Speeds averaged 0.8–0.9Gbps	N/A	This speed was to be expected
6	Connectivity from wired device to wired port 1 to 3	Transferring a large video file and checking the average transfer speed	Speeds averaging close to 1Gbps	Speeds averaged 0.8–0.9Gbps	N/A	This speed was to be expected
7	Connectivity from wired device to wired port 1 to 4	Transferring a large video file and checking the average transfer speed	Speeds averaging close to 1Gbps	Speeds averaged 0.8–0.9Gbps	N/A	This speed was to be expected
8	Latency test between wired devices	Ping between devices	1ms average. No more than 3ms.	Consistent 1ms ping	N/A	N/A
9	Latency test between wireless devices	Ping between devices	1ms average. No more than 3ms.	Consistent 1ms ping	N/A	N/A

Test Number	What is being tested?	How is it to be tested?	Expected outcome	Actual outcome	Solution	Remarks
10	Latency test between wired and wireless devices	Ping between devices	1ms average. No more than 3ms.	Consistent 1ms ping	N/A	N/A
11	Test wireless security	Enter incorrect password	Denied access to wireless	Connection was denied	N/A	N/A
12	Test wireless security	Enter correct password	Connection granted	Connection was granted	N/A	<p>Password complexity could be even further improved with the use of more symbols</p> <p>MAC address filtering could be applied on the wireless to only allow approved devices</p>
13	Test switch login	Enter the correct username and password for the switch	Authentication allowed to the server	Authentication was allowed to the switch	N/A	More complex passwords could be used to further increase the security

Test Number	What is being tested?	How is it to be tested?	Expected outcome	Actual outcome	Solution	Remarks
14	Ensuring the trunking is secure	Apply pressure to the trunking in different areas and around the ports	The trunking to remain intact with only a small amount of flex	One faceplate moved more than expected	Tightened the screws on both sides	As a precaution the screws of all ports were tightened further
15	Test DHCP	Connect a device using DHCP and check the configuration	Receive a 192.168.1.0/24 configuration	Device received the expected outcome	N/A	N/A

Below are a series of photographs and screen shots showing the above tests being completed:

Test 1: Connectivity between patch port 1 to wall port 1



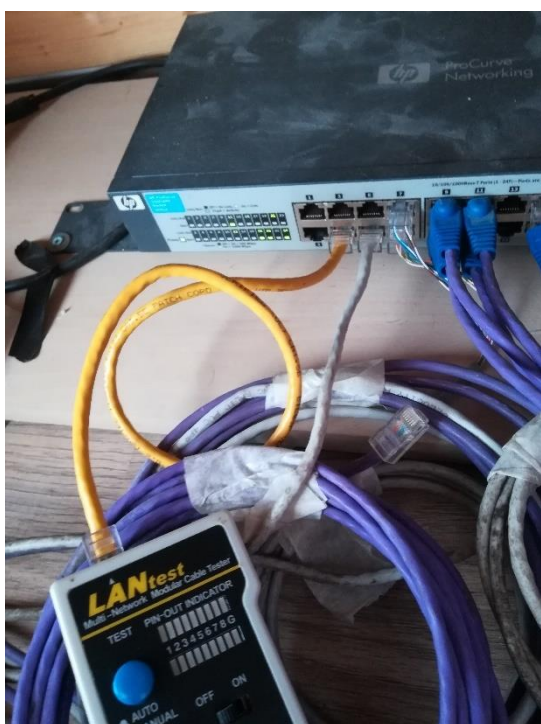
en patch port 3 to wall port 3



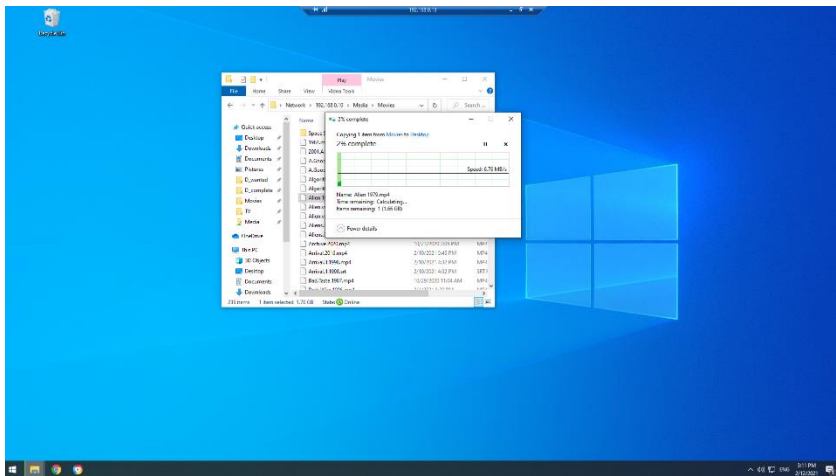
Test 2: Connectivity between patch port 2 to wall port 2

Test 3: Connectivity between patch port 3 to wall port 3

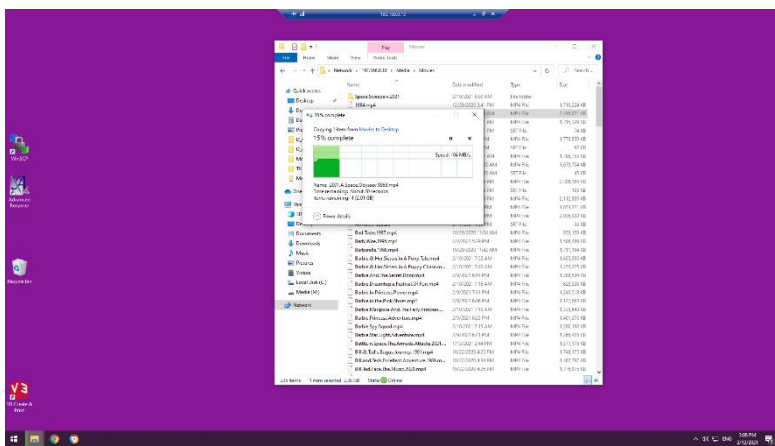
Test 4: Connectivity between patch port 4 to wall port 4



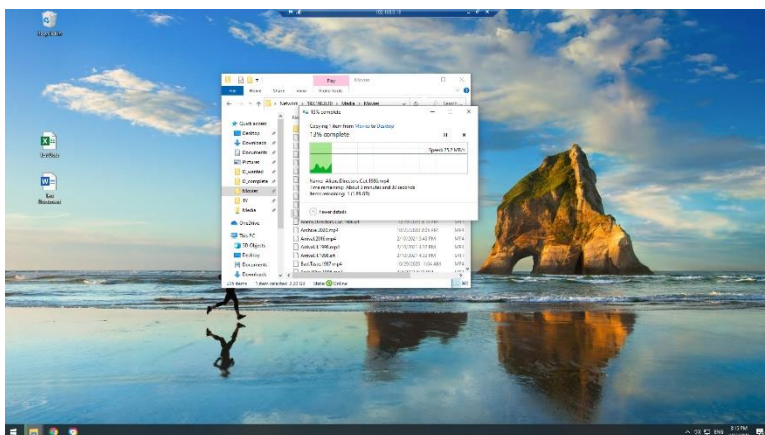
Test 5: Connectivity from wired device to wired port 1 to 2



Test 6: Connectivity from wired device to wired port 1 to 3



Test 7: Connectivity from wired device to wired port 1 to 4

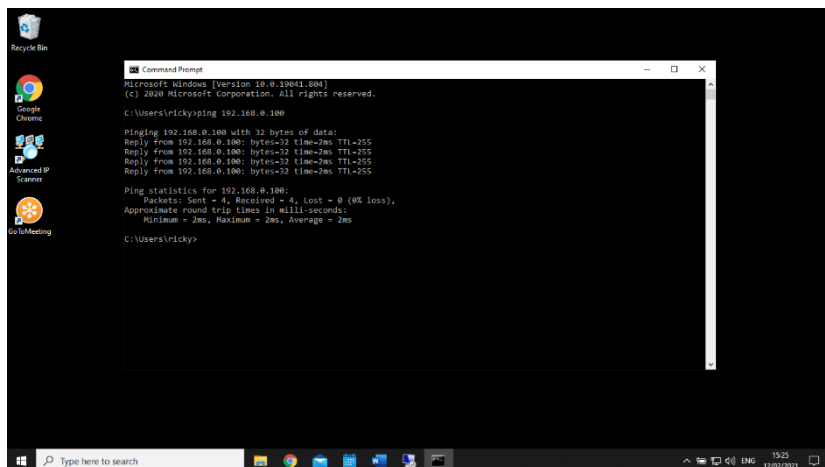


Test 8: Latency test between wired devices



Ping test results between a wired desktop and a wired server

Test 9: Latency test between wireless devices



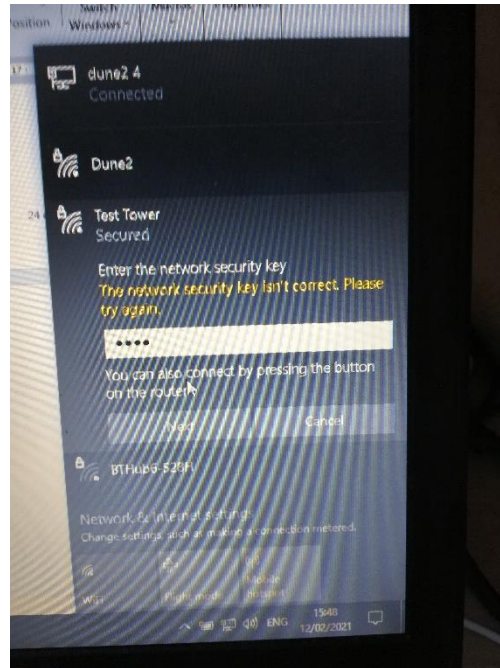
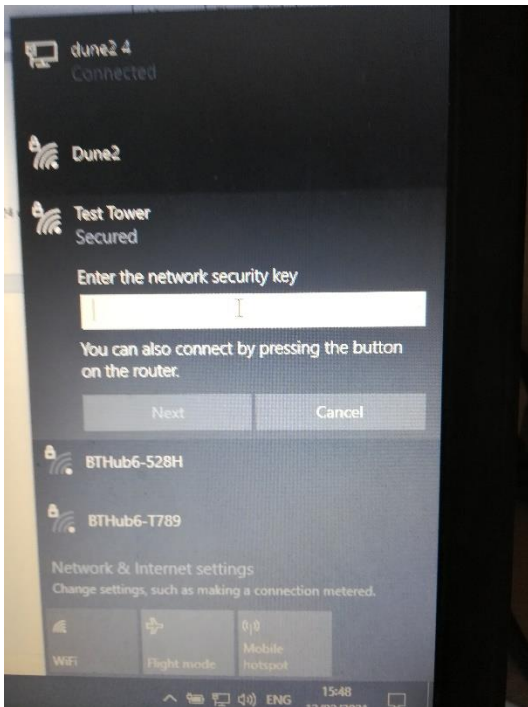
Ping test between laptop and printer both wireless

Test 10: Latency test between wired and wireless devices



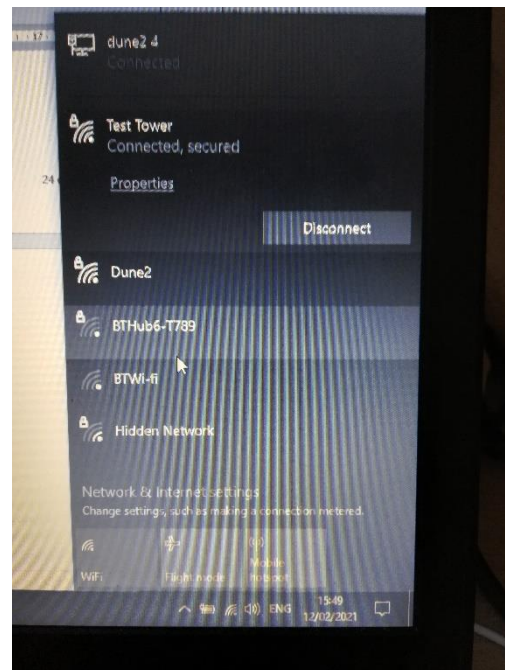
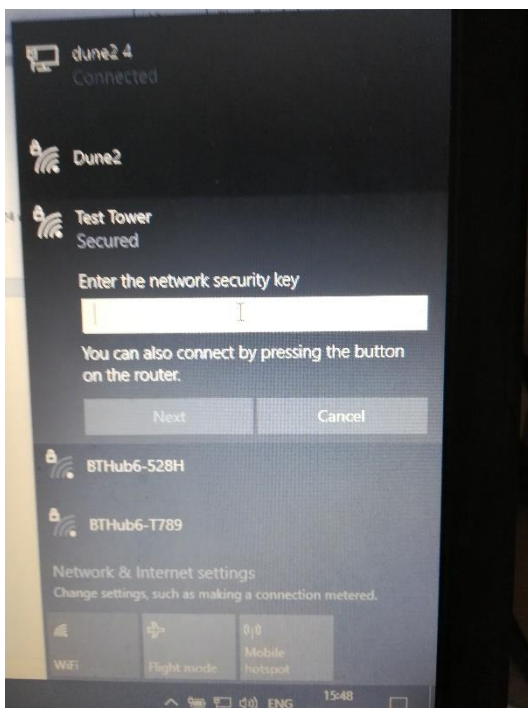
Ping between desktop (wired) and printer (wireless)

Test 11: Test wireless security

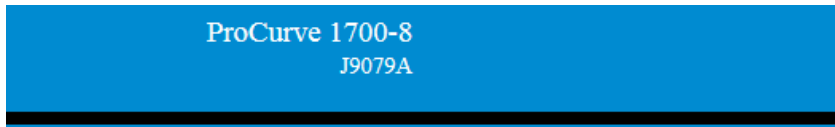


Incorrect password used

Test 12: Test wireless security



Test 13: Test switch login



Login

Password
(default password is blank)

Caution: If you have forgotten your password, click [here](#).

ProCurve Networking HP Innovation

ProCurve 1800-8 J9029A

Link Status:
- Up
- Down

- SYSTEM
- PORTS
 - Configuration
 - Port Mirroring
 - Statistics
- TRUNKS
- VLANS
- LLDP
- SNMP
- DIAGNOSTICS
- SUPPORT
- LOGOUT

Port Mirroring

This page enables you to set up the port mirroring features of the switch to enable traffic monitoring.

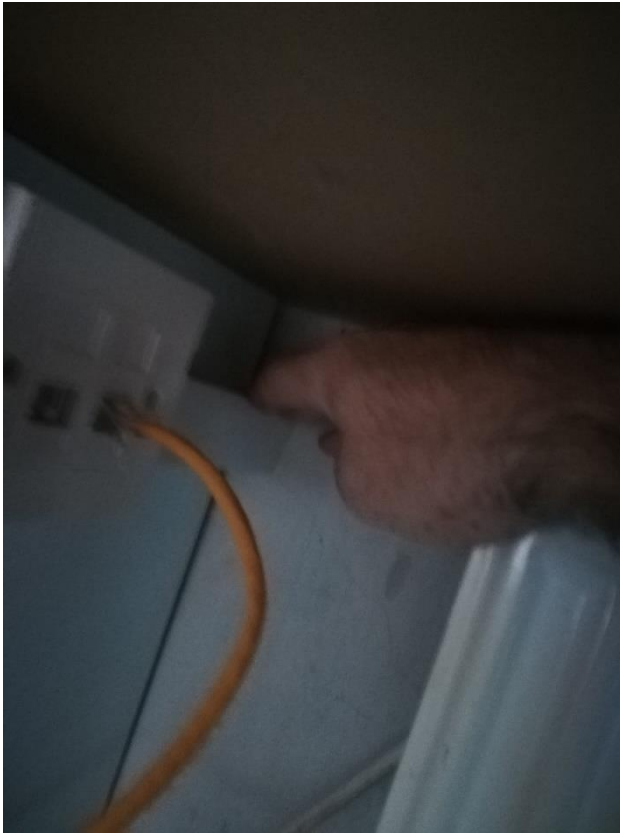
Port to Mirror to

Port to Mirror to: 8

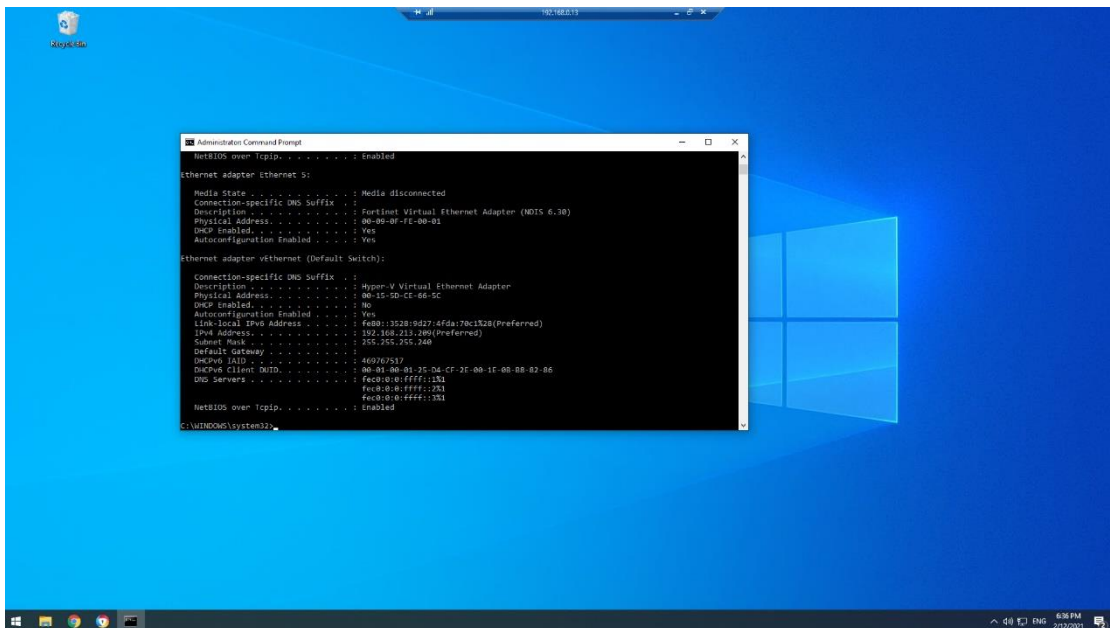
Ports to Mirror

Port	Mirroring Enabled	Port	Mirroring Enabled
1	<input checked="" type="checkbox"/>	5	<input checked="" type="checkbox"/>
2	<input checked="" type="checkbox"/>	6	<input checked="" type="checkbox"/>
3	<input checked="" type="checkbox"/>	7	<input checked="" type="checkbox"/>
4	<input checked="" type="checkbox"/>	8	<input type="checkbox"/>

Test 14: Ensuring the trunking is secure



15: Test DHCP



IPCONFIG /ALL shows IP address obtained via DHCP

Examiner commentary

The student has provided clear evidence and all required pieces of evidence are present. The physical network also works and is of a good standard. This has been configured well and labelled to a high standard.

The testing table is detailed, showing tests of all devices and using test methods that were appropriate for the situation. Where issues were present, they were resolved with a solution fit for the issue. Remarks were utilised to recommend improvements. The student could include more specific information on how the tests were performed as one area of improvement.

Overall grade descriptors

The performance outcomes form the basis of the overall grading descriptors for pass and distinction grades.

These grading descriptors have been developed to reflect the appropriate level of demand for students of other level 3 qualifications, the threshold competence requirements of the role and have been validated with employers within the sector to describe achievement appropriate to the role.

Occupational specialism overall grade descriptors:

Grade	Demonstration of attainment
Pass	The network diagrams are logical and display sufficient knowledge in response to the demands of the brief
	The student makes some use of relevant knowledge and understanding of network cabling theories and practices but demonstrates adequate understanding of perspectives or approaches associated with industry best practice.
	The student makes adequate use of facts/theories/approaches/concepts and attempts to demonstrate breadth and depth of knowledge and understanding in their designs and implementation, as well as in their testing and documentation.
	The student is able to identify some information from appropriate sources and makes use of appropriate information/appraise relevancy of information and can combine information to support decision making.
	The student makes sufficient judgements/takes some appropriate action/seek clarification with guidance and is able to make adequate progress towards solving faults with network cables or resolving faults found in testing.
	The student attempts to demonstrate skills and knowledge of the relevant concepts and techniques reflected in network cabling, design and implementation and generally applies this across different contexts.
	The student shows adequate understanding of unstructured problems that have not been seen before, using sufficient knowledge to find solutions to problems and make some justification for strategies for solving problems.

Distinction	The network designed and developed is precise, logical and provides a detailed and informative resolution to the demands of the brief.
	The student makes extensive use of relevant knowledge and has extensive understanding of the network cabling practices and demonstrates an understanding of the different perspectives/approaches associated with designing, installing and testing networks.
	The student makes decisive use of facts/theories/approaches/concepts in their designs, demonstrating extensive breadth and depth of knowledge and understands and selects highly appropriate skills/techniques/methods to build and test their networks.
	The student is able to comprehensively identify information from a range of suitable sources and makes exceptional use of appropriate information/appraises relevancy of information and can combine information to make coherent decisions.
	The student makes well-founded judgements/takes appropriate action/seek clarification and guidance and is able to use that to reflect on real life situations in resolving network cabling faults and network configuration.
	The student demonstrates extensive knowledge of relevant concepts and techniques reflected in network cabling, design and implementation and precisely applies this across a variety of contexts and tackles unstructured problems that have not been seen before, using their knowledge to analyse and find suitable solutions to the problems.
	The student can thoroughly examine network requirements in context and apply appropriate analysis in confirming or refuting conclusions and carrying out further work to justify strategies for solving problems, giving concise explanations for their reasoning.

* “Threshold competence” refers to a level of competence that:

- signifies that a student is well placed to develop full occupational competence, with further support and development, once in employment
- is as close to full occupational competence as can be reasonably expected of a student studying the TQ in a classroom-based setting (for example, in the classroom, workshops, simulated working and (where appropriate) supervised working environments)
- signifies that a student has achieved the level for a distinction in relation to the relevant occupational specialism component

U grades

- if a student is not successful in reaching the minimum threshold for the core and/or occupational specialism component, they will be issued with a U grade

Document information

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Owner: Head of Assessment Design

Change History Record

Version	Description of change	Approval	Date of Issue
v1.0	Published final version.		May 2021
v1.1	NCFE rebrand		September 2021
v2.0	Annual review 2023: Amends to grade descriptors to ensure clarity	June 2023	19 June 2023