



# **T Level Technical Qualification in Digital Support Services**

Occupational specialism assessment (OSA)

## **Network Cabling**

Assignment 3 - Pass

Guide standard exemplification materials

## T Level Technical Qualification in Digital Support Services Occupational specialism assessment

# Guide standard exemplification materials

## Network Cabling

### Assignment 3

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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 3, the student must troubleshoot a set of faulty cables, troubleshoot a proposed cabling installation and carry out a risk assessment of the client's network.

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

## Assignment 3

### Scenario

You have just been hired as a junior network cabler to work at a large company. The roles and responsibilities of your new role include undertaking a range of implementation, monitoring and testing tasks, as well as ensuring that all work is documented appropriately to meet organisation quality standards and best working practice. Below are 3 tasks you have been given to complete.

### Task 1: troubleshooting faulty cables

#### Time limit

1 hour 30 minutes

You can use the time how you want but all parts of the task must be completed within the time limit.

(25 marks)

As your first task you have been asked to fix several cables that one of the apprentices has incorrectly constructed, so they can be reused. The cables have various problems that need troubleshooting before they can be used in a cabling installation. Issues you may encounter include latency, jitter, cross talk and poor connections in the cables.

You are required to:

- test the cables to find and fix the faults in accordance with TIA/EIA 568B standards
- document the faults in the test plan template provided and record suitable solutions
- fix the fault on each cable and document the test results in the test plan template
- take photographs of the corrected cables which clearly show the connections of the internal wiring to the RJ45 and the coloured outer cable

You will have access to the following equipment:

- a hand-held cable/network tester
- a network impairment simulator/network delay simulator
- a digital camera
- a supply of RJ45 connectors

### Evidence required for submission to NCFE

Completed test plan template in .pdf format.

For each cable you need to provide in .pdf format:

- a clear photograph showing a close up of the RJ45 connector and the corrected wires within it, with the coloured cable clearly visible
- a photograph of the read-out from the cable tester showing the full results of testing, with the coloured cable clearly visible

## Student evidence

The table below shows the physical tests on the 5 cables.

| What is being tested? | How is it to be tested?                                       | Expected outcome                  | Actual outcome | Solution                                             | Remarks                                                                              |
|-----------------------|---------------------------------------------------------------|-----------------------------------|----------------|------------------------------------------------------|--------------------------------------------------------------------------------------|
| Is the cable damaged  | Look at it from end to end                                    | Not damaged                       | Cable was ok   | N/A                                                  | N/A                                                                                  |
| Are the RJ45 ends ok  | Pull on the ends to make sure they stay on                    | Ends to stay on                   | They stayed on |                                                      |                                                                                      |
| T568B standard        | Visual check and network connectivity check with cable tester | Cables to be in the correct order | Wrong order    | Redo the termination on the incorrect end and retest | Blue and green were mixed up. Once fixed the cable worked fine on the network tester |

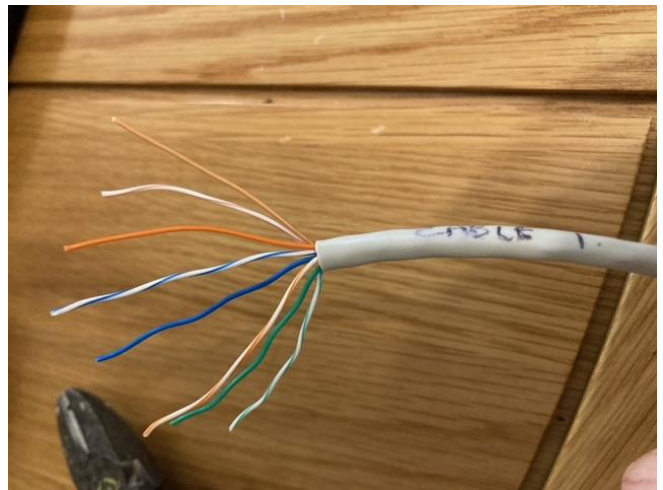
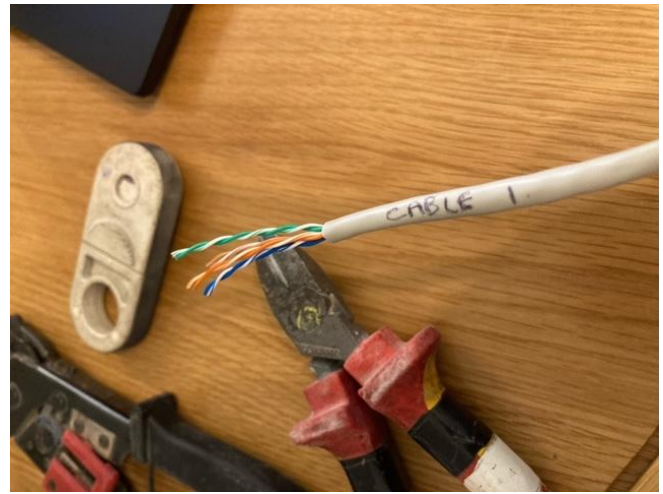
|                     |     |                                                         |                   |     |                                                                                                                        |
|---------------------|-----|---------------------------------------------------------|-------------------|-----|------------------------------------------------------------------------------------------------------------------------|
| Does the cable work | Yes | The cable to work according to the network cable tester | It was successful | N/A | Had I performed this test earlier it would have failed but as I corrected the cable order in a previous test it worked |
|---------------------|-----|---------------------------------------------------------|-------------------|-----|------------------------------------------------------------------------------------------------------------------------|

[Relevant photos supplied and annotated for which test they are for]

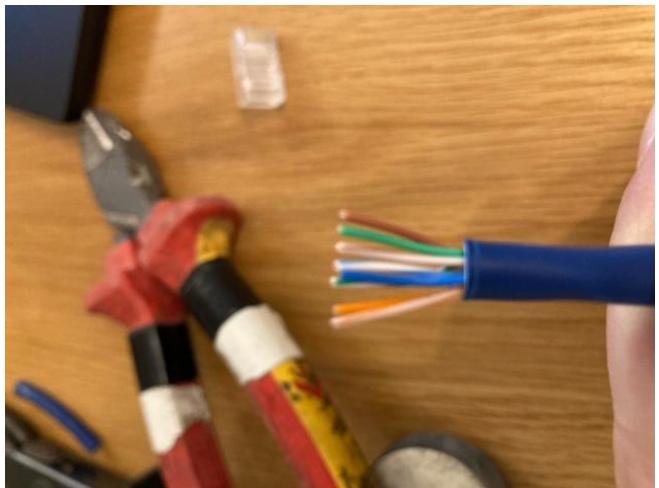
Equipment



Cable 1: one RJ45 configured as cross-over cable.  
Produced on grey cable and labelled '**Cable 1**'.



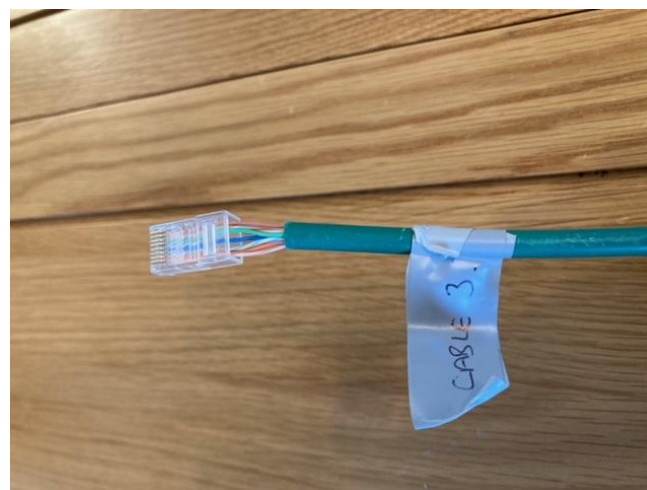
Cable 2: short across wires inside one RJ45.  
Produced on blue cable and labelled '**Cable 2**'.





Cable 3: outer sheath of cable not gripped by crimp within one RJ45.

Produced on green cable and labelled '**Cable 3**'.



Cable 4: one RJ45 has been wired 'upside down' but has not been crimped.

Produced on yellow cable and labelled '**Cable 4**'.





Cable 5: wires within one end of the cable do not reach the copper pins within the RJ45.  
Produced on purple cable and labelled 'Cable 5'.



## Task 2: troubleshooting the proposed cabling installation

### Time limit

2 hours

You can use the time how you want but all parts of the task must be completed within the time limit.

(20 marks)

Your predecessor was in the process of designing 2 separate, interconnected networks for a law firm that is a client of your organisation. Unfortunately, because they have left the company, they were unable to finish the project. You have been asked by your manager to complete this project by troubleshooting and resolving any issues within the design of the interconnected networks.

You are to perform thorough troubleshooting of all cabling on the interconnected network design to identify and fix any faults identified prior to the customer conducting their own testing (UAT). You will describe how you will approach the troubleshooting, including why you will approach it that way, and record the results in a test plan.

You will be using the Cisco Packet Tracer file to carry out troubleshooting to ensure that data can be transmitted across all devices on the interconnected networks.

You must:

- write a brief description of how you will analyse, interpret and solve any issues which arise from the troubleshooting process - 4 marks are available for this element of the task
- document your troubleshooting in a logical order, demonstrating that no aspect of troubleshooting and analysis has been omitted
- use the test plan template provided to record the results of the troubleshooting
- you will have access to the following equipment:
  - word processing software
  - Cisco Packet Tracer

### Evidence required for submission to NCFE

- screenshots of all issues identified and resolved within the Cisco Packet Tracer file, in .pdf format (this must be a before and after screenshot)
- completed test plan template in .pdf format
- written description of analysis and interpretation of issues, as well as solution of issues

### Student evidence

I will first be completing connectivity tests to each device to diagnose problem areas. I will then attempt to correct any issues found, first checking the basics such as the cabling then moving onto the configuration if the simpler solutions do not resolve the issue.

| What is being tested?                               | How is it to be tested? | Expected outcome | Actual outcome                                                | Solution                                                                                                                                                                         | Remarks                                                                                                                                                                                        |
|-----------------------------------------------------|-------------------------|------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connectivity between routers                        | Ping                    | Successful ping  | Success                                                       | N/A                                                                                                                                                                              | As this was successful any issues that occur when testing site to site communication will not be the link between the sites                                                                    |
| Connectivity from Newcastle server to Newcastle PCs | Ping                    | Successful ping  | PC 01 – Success<br><br>PC 02 – Success<br><br>PC 03 – Success | N/A                                                                                                                                                                              | N/A                                                                                                                                                                                            |
| Connectivity from Newcastle PCs to Newcastle server | Ping                    | Successful ping  | PC 01 – Success<br><br>PC 02 – Failed<br><br>PC 03 – Success  | The network port on PC02 was set to down, changed to up and repeated the test with success                                                                                       | With this issue I would have expected the server to not have been able to communicate but it could                                                                                             |
| Connectivity between London server and London PCs   | Ping                    | Successful ping  | PC 01 – Failed<br><br>PC 02 – Failed<br><br>PC 03 – Failed    | The Fa0/1 port on the switch was misconfigured. After being set to up from down connectivity was achieved, however PC 01 could still not communicate but 02 and 03 could. 01 had | First checking the server, I saw no obvious reason these tests failed so this moved the investigation to the switch where the problem was discovered. Another issue was discovered with 01 and |

|                                                   |      |                 |                                                                                                                       |                                                                                                                                                          |                                                                                                    |
|---------------------------------------------------|------|-----------------|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
|                                                   |      |                 |                                                                                                                       | statically assigned IP addressing which were not correct for this network configuration after setting the IP addressing to DHCP the problem was resolved | resolved                                                                                           |
| Connectivity between London PCs and London server | Ping | Successful ping | PC 01 – Success<br><br>PC 02 – Success<br><br>PC 03 – Success                                                         | N/A                                                                                                                                                      | Some of these tests would likely have failed if not for the corrective work from the previous test |
| Connectivity between London and Newcastle servers | Ping | Successful ping | Failed<br><br>Ping London server to London router – Success<br><br>Ping Newcastle Server to Newcastle router – Failed | Removed Gig01 configuration on Newcastle router and moved it to Gig02 as this is the port being used and then enabled the port                           | N/A                                                                                                |
| Connectivity between London and Newcastle PCs     | Ping | Successful ping | All successful                                                                                                        | N/A                                                                                                                                                      | Previous resolutions ensured this test was successful                                              |

|                                                                             |                                              |                                              |                                      |     |                                                                |
|-----------------------------------------------------------------------------|----------------------------------------------|----------------------------------------------|--------------------------------------|-----|----------------------------------------------------------------|
| Check IP addressing is correct and DHCP is working<br><br>Newcastle devices | Checking each device is configured correctly | All IP addressing to be configured correctly | All devices are configured correctly | N/A | Previous resolutions ensured addressing was correct on all PCs |
| Check IP addressing is correct and DHCP is working<br><br>London devices    | Checking each device is configured correctly | All IP addressing to be configured correctly | All devices are configured correctly | N/A | Previous resolutions ensured addressing was correct on all PCs |

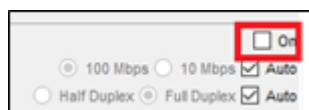
#### Fixing London server



#### Newcastle router fixed

| Fire | Last Status | Source          | Destination      |
|------|-------------|-----------------|------------------|
|      | Successful  | Newcastle PC-01 | Newcastle Router |

#### Newcastle PC-02 fixed



| Fire | Last Status | Source          | Destination      |
|------|-------------|-----------------|------------------|
|      | Successful  | Newcastle PC-02 | Newcastle Router |

### Fixing London PC-01

|                                       |                              |
|---------------------------------------|------------------------------|
| <input checked="" type="radio"/> DHCP | <input type="radio"/> Static |
| IPv4 Address                          | 192.168.20.5                 |
| Subnet Mask                           | 255.255.255.0                |
| Default Gateway                       | 192.168.20.1                 |
| DNS Server                            | 0.0.0.0                      |

| Fire                                                                              | Last Status | Source       | Destination   |
|-----------------------------------------------------------------------------------|-------------|--------------|---------------|
|  | Successful  | London PC-01 | London Router |

### Fixing IP addressing on London server

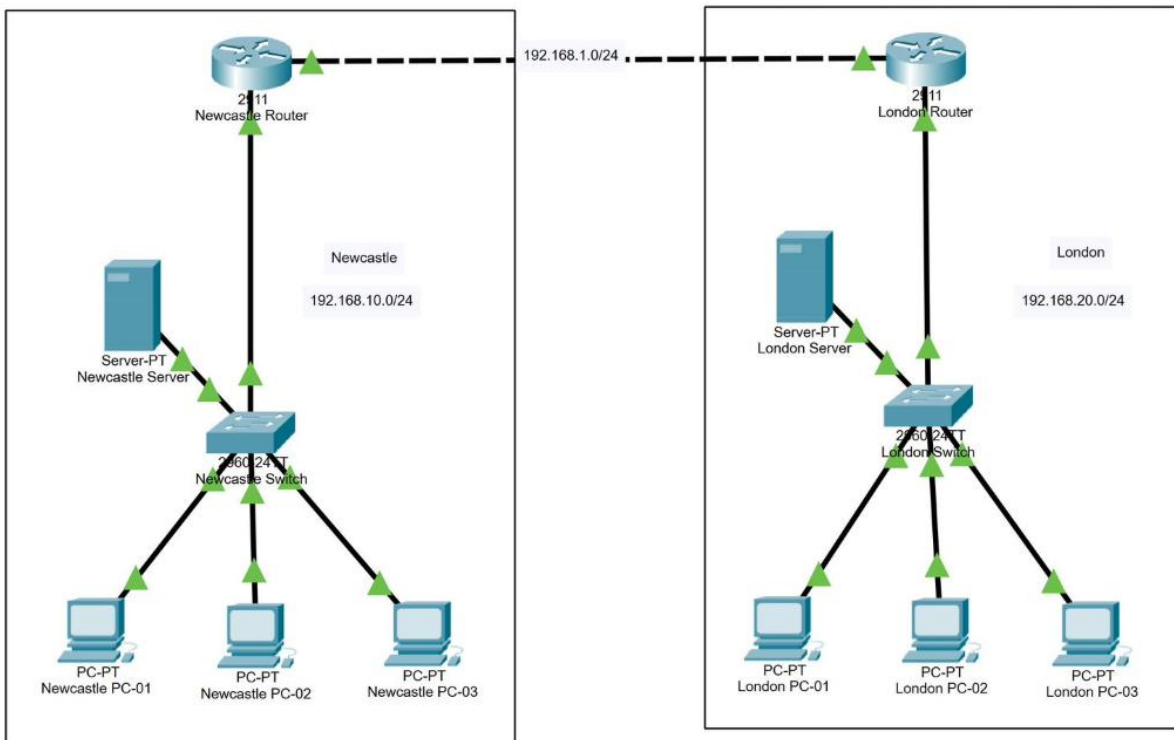
|                                         |               |
|-----------------------------------------|---------------|
| IP Configuration                        |               |
| <input type="radio"/> DHCP              |               |
| <input checked="" type="radio"/> Static |               |
| IPv4 Address                            | 192.168.20.1  |
| Subnet Mask                             | 255.255.255.0 |

## Task 3: carry out a risk assessment of the client's network

Time limit

2 hours

(16 marks)



The law firm in task 2 has now implemented your interconnected network design. You have been asked to perform a risk assessment on both the Newcastle and London sites. Your manager has given you the following details from an information gathering session that they attended.

Both sites are in industrial areas and have no record of flooding. They are in areas with a high level of reported crime. The 2 sites are linked through a site-to-site VPN configured on the routers and communication is vital between the 2 sites due to shared services. Both sites have high speed internet connections, so latency is rarely an issue. The London site also has a back-up mobile data (4G) connection.

Both sites have a single server. The London server is the law firm's domain controller and runs their DNS and DHCP. The Newcastle server is their file server and print server, however printing is rare and considered non-essential. Both servers have 4 network cards, however due to time constraints during the network setup only one was utilised.

Both sites have inert gas fire suppression systems for the server rooms to help prevent a fire from destroying the servers and switches. There are no other fire suppression systems installed in the rest of the building and fire safety relies on building evacuation. To prevent and detect intruders, the buildings are locked at night by the last member of staff to leave the building. All staff have a master key which can be used on any door in the building. There is currently no CCTV or burglar alarm system.

All infrastructure cabling is accessible due to easily opened trunking and floating ceilings. When your manager inspected this, they noted that Cat5e U/UTP cable is used for all machines and all infrastructure cabling. They also



noted that a large batch of the cabling was running parallel and near to the power cables. When inspecting the cabling, your manager noticed evidence of rodents possibly being above the floating ceiling.

The law firm has a large budget to pay for any changes that you recommend as a result of your risk assessment.

Your risk assessment should include:

- identification of possible threat to the interconnected networks
- vulnerability related to threat identified
- asset at risk
- impact if threat is exploited
- likelihood that threat is exploited
- overall risk to business
- recommended action
- type of control implemented as mitigation

You should consider:

- the information provided by your manager above
- both internal and external cabling
- security of the interconnected network on both sites
- all hardware network components
- documentation to support mitigation

You will have access to the following equipment:

- word processing software

## **Evidence required for submission to NCFE**

Completed risk assessment document.

## Student evidence

| Threat                                      | Vulnerability                                                                                                         | Asset                                      | Impact                                                                                                                                           | Likelihood                                                                                                           | Risk                                                                                                                                                                                          | Action                                                                                                                                                                     | Control type |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Rodents and wildlife damaging cables</b> | Unprotected and exposed external cabling                                                                              | Physical cables and data being transmitted | Medium<br><br>Loss of service to customer<br><br>Potential reputational damage for organisation<br><br>Additional cost for replacement of cables | Medium<br><br>Although the majority of cable is protected, some sections are exposed                                 | Medium<br><br>Cables are damaged by wildlife, leading to loss of service for client and damage to reputation for providing organisation                                                       | Ensure physical trunking protects cables in their entirety. Implement methods to deter wildlife where needed                                                               | Preventative |
| <b>Loss of servers</b>                      | Lack of redundancy with the networking to the servers<br><br>Single point of failure for most services on the network | Services                                   | Medium<br><br>As each of these services are important to the network and a loss of either server will lose several of these services             | Medium<br><br>As the servers have no network redundancy, a single point of failure will result in a loss of services | High<br><br>Users cannot log in<br><br>Users cannot access file resources<br><br>Users cannot navigate to webpages<br><br>Users cannot print<br><br>Devices cannot communicate on the network | Where possible implement power and network redundancy<br><br>The servers have 4 network cards, utilising the 3 unused cards will give a large amount of network redundancy | Preventative |
| <b>Loss of site to site link</b>            | Connection between sites                                                                                              | Connectivity<br><br>Routers                | Medium<br><br>As servers to                                                                                                                      | Medium<br><br>As there is                                                                                            | Medium<br><br>Loss of                                                                                                                                                                         | Consider installing secondary                                                                                                                                              | Preventative |

|                                      |                                  |                           |                                                                                                                                                      |                                                                                                                                                             |                                                                                                                         |                                                                                                                                                      |                                |
|--------------------------------------|----------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
|                                      | Each router                      | Cabling                   | each site offer specific services and neither server offers a backup service                                                                         | only one site to site link this can act as a single point of failure                                                                                        | services offered from each site to the other.<br><br>This will result in the same risks as the “loss of servers” threat | fibre connections for a permanent secondary VPN connection                                                                                           |                                |
| <b>Loss of internet at London</b>    | Main internet link<br><br>Router | Connectivity and hardware | Low<br><br>Potentially reduced productivity due to possibly slower 4G connection<br><br>Loss of some services due to lost connectivity between sites | Low<br><br>As there is a failover 4G connection the impact is minimum and may just result in slower connection speeds while the 4G connection is being used | Low<br><br>Main impact is the loss of services supplied from the Newcastle site                                         | A future consideration would be to upgrade this to a 5G connection once available or have it replaced with a secondary fibre or broadband connection | Acceptance<br><br>Preventative |
| <b>Loss of internet at Newcastle</b> | Main internet link<br><br>Router | Connectivity and hardware | Medium<br><br>Loss of services from London site<br><br>Productivity losses                                                                           | Medium<br><br>As there is no back up line here services are not only lost from the London site but there is a total loss of internet for the site           | Medium<br><br>Inability to complete work or use devices correctly on the network                                        | Install a secondary 4G line<br><br>Install a secondary fibre line at both sites to have a backup VPN connection                                      | Preventative                   |
| <b>Loss of a</b>                     | The only                         | Connectivity              | Medium                                                                                                                                               | Medium                                                                                                                                                      | Medium                                                                                                                  | Install a                                                                                                                                            | Preventative                   |

|                                      |                                                                    |                 |                                                                                                                              |                                                               |                                                                            |                                                                                                            |                               |
|--------------------------------------|--------------------------------------------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------|
| <b>network switch at either site</b> | switches at each site                                              | and hardware    | Loss of services to both sites<br><br>Financial loss dependant on down time<br><br>Productivity loss                         | The lack of redundancy could lead to a serious network outage | Switch failure at either site                                              | redundant switch at each site                                                                              |                               |
| <b>Theft/ malicious damage</b>       | Lack of security<br><br>Same key for all doors in use by all staff | Physical assets | Medium<br><br>Financial loss dependant on down time<br><br>Financial loss dependant on damage/theft<br><br>Productivity loss | High<br><br>The area has a known high crime rate              | Low<br><br>Theft of equipment or damage of equipment with malicious intent | Install an alarm system and CCTV system<br><br>Add signage about the security measures around the building | Deterrent<br><br>Preventative |

|                                                           |                                                                             |                                                                                                                                   |
|-----------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>Risk levels:</b><br><br>low   medium   high   critical | <b>Business control types:</b><br><br>physical   administrative   technical | <b>Mitigating control types:</b><br><br>preventative   detective   corrective   deterrent   directive   compensating   acceptance |
|-----------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|

## Assignment 3:

### Examiner commentary

The student has performed enough tests on each cable to find the issue. Although it appears not many tests are being performed on this cable, a single test actually looks at multiple possible issues. Tests are named but the names might not be clear. The descriptions in each column although correct, lack detail. Any issues found are resolved and documented.

All testing that is required to complete the network and have it working have been completed but tests are not detailed in the table as in depth as they could be. Screenshots provided show only the problems and their resolutions but not the testing process or evidencing the tests, which worked without issue, which are some of the ways this submission could be improved.

All threats are applicable although there may not be a great range of threats, a major improvement for this submission would be to include a wider range with more detail in some of the weaker areas. The corrective actions are sensible for the threat and the impact and likelihood are appropriate. More detail in the recommendations and how they would improve the situations would push this higher up the marking band.

### 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                                                                                                         |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Distinction | The evidence is logical and provides an excellent response to the demands of the brief                                              |
|             | Makes use of relevant knowledge and is well-informed by the practices of the sector                                                 |
|             | Demonstrates an understanding of the different perspectives/approaches associated within the sector                                 |
|             | Makes excellent use of facts/theories/approaches/concepts                                                                           |
|             | Demonstrates comprehensive use of breadth and depth of knowledge and understanding                                                  |
|             | Consistently selects appropriate skills/techniques/methods                                                                          |
|             | Identifies information from a range of suitable sources and makes use of appropriate information/appraises relevancy of information |
|             | Combines information to make accurate and appropriate decisions                                                                     |

|      |                                                                                                                                                                   |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      | Makes sound judgements/takes appropriate action/seek clarification and guidance                                                                                   |
|      | Successfully tackles both routine and non-routine problems that reflect real life situations in the sector                                                        |
|      | Effectively demonstrates skills and knowledge of the relevant concepts and techniques reflected in the sector and is applied across a variety of contexts         |
|      | Tackles unstructured problems that have not been seen before, using their knowledge to analyse and find suitable solutions to the problems                        |
|      | Analyses data/information in context and applies appropriate analysis in confirming or refuting conclusions and carrying out further work to evaluate conclusions |
|      | Justifies strategies for solving problems, giving clear explanations for their reasoning                                                                          |
| Pass | The evidence is logical and a good response to the demands of the brief                                                                                           |
|      | Makes use of relevant knowledge and is generally informed by the practices of the sector                                                                          |
|      | Demonstrates an understanding of some perspectives or approaches associated within the sector                                                                     |
|      | Makes good use of facts/theories/approaches/concepts                                                                                                              |
|      | Demonstrates breadth and depth of knowledge and understanding                                                                                                     |
|      | Generally selects appropriate skills/techniques/methods                                                                                                           |
|      | Identifies information from appropriate sources                                                                                                                   |
|      | Makes use of appropriate information/appraises relevancy of information                                                                                           |
|      | Combines information to make accurate decisions                                                                                                                   |
|      | Makes generally sound judgements/takes appropriate action/seek clarification and guidance                                                                         |
|      | Able to successfully tackle routine problems and make some progress on solving non-routine problems in real life situations                                       |
|      | Demonstrates most skills and knowledge of the relevant concepts and techniques reflected in the sector and is applied across different contexts                   |
|      | Able to make some progress on unstructured problems that have not been seen before, using their knowledge to find solutions to problems                           |
|      | Makes some justification for strategies for solving problems, giving 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 pass 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

The T Level Technical Qualification is a qualification approved and managed by the Institute for Apprenticeships and Technical Education.

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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 |