

BCS LEVEL 4 NETWORK ENGINEER

PROJECT GUIDE
FOR LEARNERS



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Unit Code: F/650/5337

This is a United Kingdom government regulated qualification which is administered and approved by one or more of the following: Ofqual Qualifications Wales, CCEA Regulation or SQA

Are you ready to showcase your skills?

Well done for all of your hard work so far on the Digital Modular Programme (DMP). It's now time to begin planning and preparing your synoptic project. This is your opportunity to apply everything you have learned so far, and we want to make sure that you are as prepared as possible.

Within this document, you will find information about the requirements and format for this part of the assessment for the BCS Level 4 Diploma Digital Modular Programme in Network Engineering.

NB: This synoptic project is part of the mandatory assessment strategy for all qualifications in the DMP suite of qualifications. This project **will not be required** by learners accessing any element of the DMP as part of an apprenticeship.



Overview of the project

In a project-based environment, network engineers work through the network engineering lifecycle to develop a network solution that meets the customer's and end-user's requirements.

This project will enable you to demonstrate your ability to design, build and test a network solution which fulfils the given requirements. It requires you to draw upon experience gained during your day-to-day work or training to design a project which addresses a network engineering task that is relevant to your role, or to a given scenario if you are not currently working in a network engineer role.



Top tip: Start with the end in mind! We encourage you to familiarise yourself with the project early on in your DMP journey and to think about areas or topics that you might like to explore further when undertaking the project.

What should I focus on within my project?

The project should address a specific problem, recurring issue or idea/opportunity. There are two options available for how you may undertake this project depending on whether you are currently employed in a network engineer role or not:

- 1. A real-world business solution.** Your choice of project will focus on a real work situation relevant to your current job, e.g. a network engineer. This may include either live client work (which can be anonymised) or work that forms part of a larger-scale or wider-focused business activity. The project should set out to solve a specific business problem, recurring issue or idea/opportunity (e.g. to improve the customer experience or to support a particular operational issue) where you have identified an opportunity to design and build a network that supports a particular aspect of the business. Your project should be based on a set of business requirements that you have gathered.

You should ensure that you are able to clearly define the problem you wish to solve, who this solution has been designed to support, the network technology, software and services you will use to develop your solution, and the process through which you will plan, design, build, test and deploy your network.

- 2. A solution to a given scenario.** You can undertake your project using a given scenario and set of requirements provided by BCS. You will be required to gather further requirements from other stakeholders, such as your tutor, to incorporate into the design of your solution.

You should ensure that you are able to clearly articulate the problem you are being tasked to solve, understanding who this solution has been designed to support, the technologies and services you will use to develop your solution, and the process through which you will plan, design, build, test and deploy your network.

Whichever option you choose, it should:

- Clearly state the business problem and requirements for network engineering development.
- Analyse the requirements of the intended stakeholders to inform them on the design of the solution.
- Allow others to understand how the solution will work by providing a clear design concept.
- Demonstrate your approach to network engineering development through the creation of a working network and appropriate evidence.
- Demonstrate your approach to testing the implementation to provide assurance of its suitability against the requirements.

You will need to produce:

- A clear requirements statement based on stakeholder discussions and a set of user stories.
- A technical specification and design concept for your solution.
- An instance of the built solution including appropriate evidence.
- Samples of your device configuration with explanations.
- A review or report capturing evidence of how you have tested the solution.
- A reflective account to review the outputs and own performance.

The project must map, in an appendix:

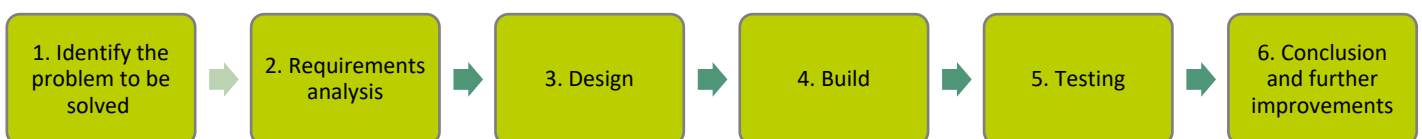
- How it evidences the relevant knowledge, skills and behaviours for this assessment method (as described on pages 11-12).
- Where you have provided justifications for any decisions made during the project.

To ensure your project is sufficient in scope and that your work fulfils all of the required criteria for this assessment, you should follow the guidance set out alongside the pass criteria and occupational standards (page 4 onwards).

We highly recommend that a mentor/tutor supports you throughout your project. When you meet with them, you will complete a log of your meetings to track the progress and feedback of your project. Each party signs and dates to allow the log to be submitted alongside your project. This will enable you to capture any feedback given to you by your mentor/tutor on your individual performance, how you have worked with others, and provide an opportunity for you to record how you have overcome any challenges during each stage of the project.

How should I structure my work?

The project will follow the same structure whether you choose to focus on a real-world solution or a given scenario. To ensure you meet the requirements of this assessment, the files you submit for your project should reference the Network Engineer Lifecycle throughout. You should set out your project as follows:



Top tip: These elements are not equally weighted – this means that you would not be expected to spend the same amount of time on or produce as much for each of the six sections.

The guidance provided on page 4 clearly identifies the scope of criteria you need to include within your work for each section of your project.

How long should my project be?

The project must represent a substantial piece of work; as such, the suggested time requirement for this part of the assessment is 30 hours. These hours are included in the Total Qualification Time (TQT) of 514 hours. You do not have to be supervised when you complete all the project work but you may wish to have your tutor available for any questions.

As a minimum all project outputs must include:

- An introduction
- The scope of the project (including key performance indicators)
- Project outcomes and how the outcomes were achieved
- A project plan
- Consideration of legislation, regulation, industry and organisational policies, procedures and requirements
- Analysis
- Research and findings
- Recommendations and conclusions

A word limit of **3500 words** applies to your project, with a 10% tolerance either way. Any additional information, research data, test logs, samples of work or supporting documentation can be included as an annex, which would not contribute to the overall word count. If the project exceeds the tolerance allowed, then the project will be returned unmarked and a restructure before the second submission would be requested.

How will I submit my work?

Your project must be submitted electronically and contain notes and guidance for the assessor so that they can easily identify where you have met the learning objectives and assessment criteria in your work. The final submission must be in a format that is straightforward to access, so that your work can be assessed against the stated criteria – these might include PowerPoint, Word, PDF or Excel.

What will I need to demonstrate to pass this assessment?

The following table outlines the tasks you will be required to undertake for each stage of your project, the pass and distinction criteria used for this assessment, with reference to the knowledge, skills and behaviours (KSBs) you will be able to demonstrate by undertaking this project. These KSBs are listed in full in the Occupational Standard section of this document. The syllabus criteria have been provided to show you how the learning undertaken through completion of the Digital Core module and your occupationally focussed module will support you to meet these criteria.

1. Identify the problem to be solved

You will describe the problem to be solved, the solution you intend to develop, and the approach you will take to develop it. You will be required to:

- a. Provide an overview of the project you will undertake:
 - i. Identifying the audience, users and outputs required. (B1, B3, B8)
 - ii. Identifying the scope for the work to be completed and controls to be used which may include security, testing and change management. (K5, S14, S15, S17)
 - iii. Identifying the stakeholders with whom you will be working e.g. mentor, colleagues, tutor. (B8)
- b. Develop a plan for each stage of the process you are going to undertake following the Network Engineer Lifecycle. This should also include the resources you will need to complete the task. (B2, B8)

Pass criteria	Distinction criteria	Reference to learning
<p>You can demonstrate that you are able to:</p>	<p>You can demonstrate that you are able to:</p>	<p>The learning towards these criteria can be supported within the following syllabus areas:</p>
<p>Identify and describe the problem to be solved and explain how networks can present a solution.</p> <p>Illustrate plans to undertake each of the stages of the network lifecycle.</p> <p>Show an understanding of your role within the project environment.</p>	<p>Evaluate the roles of others in the project lifecycle and the dependencies that exist to deliver the required solution.</p> <p>Analyse the cost and benefits of the solution.</p>	<p>BCS Level 4 Module in Digital Core: 7.1, 7.3, 7.5</p>

2. Requirements analysis

You will outline the requirements of the business and the intended users, illustrating how your solution will meet these requirements. You will be required to:

- a. Provide evidence of how you have gathered, analysed and interpreted additional stakeholder requirements to be used within the design of the proposed network. (S13, S15, S16, S17)
- b. Develop documents such as traffic categorisation, scalability and bandwidth estimation to articulate the requirements of the intended network. (B5, B7, S9, S10)

You should include copies of any user surveys or other information used in your requirements gathering within your annex.

Pass criteria	Distinction criteria	Reference to learning
Demonstrate an ability to gather, analyse and interpret stakeholder requirements to propose a network solution to address a specific business need. Apply suitable requirements elicitation and analysis approaches to create documents articulating the network requirements of the customer.	Categorise the gathered requirements based on priority level and with clear justification.	BCS Level 4 Module in Digital Core: 4.4, 7.1

3. Design

You will design your solution with consideration to any particular industry and organisational standards, as well as any technical, legal or regulatory requirements. You will demonstrate the design approach you have taken, using materials to provide visual evidence of your design, ensuring the design concept can be easily understood by both technical and non-technical audiences. You will be required to:

- a. Create a technical specification for your solution.
- b. Develop a design concept for your solution possibly including wireless heat maps, rack diagrams, IP addressing tables, servers, hardware and cabling specification, logical and physical network diagrams and VLAN tables. (K2, K6, K7, K8, K9, K10, K11, K12, K13, K14, K16, K19, S4, S10, S13, S16, S18)
- c. Outline how your design concept meets the relevant guidelines, standards, legalities and regulations. (B4, B5, S4, S19, S20)

Pass criteria	Distinction criteria	Reference to learning
<p>Demonstrate an understanding and creativity to design a fit for purpose solution using appropriate techniques.</p> <p>Communicate information and the solution in a suitable way.</p> <p>Demonstrate consideration and adhere to relevant guidelines, standards, legalities and regulations.</p>	<p>Propose and compare multiple design options, justifying the choice of design and costs, covering all aspects of the network.</p>	<p>BCS Level 4 Module in Digital Core: 1.4, 4.2, 4.3, 4.4, 4.5, 4.6, 4.9, 5.4</p> <p>BCS Level 4 Module in Network Engineering: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 3.1, 3.4, 3.9, 4.1, 5.1, 6.2, 6.4</p>

4. Build

You should provide evidence of how you have developed your network and your use of network devices, protocols and services. This should include samples of network device configuration with an explanation of how it has been used to deliver the intended solution and specific functionality.

- a. Provide an outline of the approach you are going to take. (S12, S19)
- b. Use the technical specification to build the network, including the required components. (K3, K7, K8, K9, K18, K20, K21, S2, S9, S12, S18, S20, B1)

Pass Criteria	Distinction criteria	Reference to learning
<p>Apply clear and valid reasoning in order to create a network which is logical, effective and uses appropriate techniques.</p> <p>Identify and apply a suitable project approach.</p> <p>Demonstrate an ability to configure network services and hardware.</p>	<p>Demonstrate a good understanding to build a network that can be scaled, resilient, fit for purpose and justified alongside detailing future expansion plans.</p>	<p>BCS Level 4 Module in Digital Core: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.9</p> <p>BCS Level 4 Module in Network Engineering: 1.1, 1.5, 2.1, 5.1</p>

5. Testing

You will provide evidence of how you have tested your network, the process you have followed and your observations when testing. This may take the form of a testing log. You should explain your approach to fixing or addressing any issues encountered whilst testing. You will be required to:

- a. Select and apply a suitable testing approach, following a stated strategy and plan. (K15, K17)
- b. Undertake the testing against identified test scenarios. (K4, K8, S1, S3, S4, S5)
- c. Provide evidence of how you have identified and resolved problems during testing. (K1, S2, S6, S7, S8, S11, B6, B8)

You should include a copy of your test log in your annex.

Pass criteria	Distinction criteria	Reference to learning
<p>Select and apply a suitable testing approach, following a stated methodology or framework.</p> <p>Proactively identify and resolve problems, using appropriate techniques where required.</p>	<p>Facilitate a pilot or group testing session in order to gather feedback from multiple test users.</p> <p>Apply appropriate key metrics to the tests such as bandwidth, throughput, latency, jitter, packet loss and error rate.</p>	<p>BCS Level 4 Module in Digital Core: 3.4, 7.5</p> <p>BCS Level 4 Module in Network Engineering: 4.2, 4.3, 4.4, 4.5, 4.6, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 5.14, 6.5, 6.6, 6.7, 6.8</p>

6. Conclusion and further improvements

You will provide a summary of your solution, evaluating whether it has met all the intended requirements and identifying potential improvements you have identified through testing.

You should include a reflective account, evaluating your performance and any lessons learnt from the process. You will be required to:

- a. Review the outputs of the work, identifying potential improvements. (B1, B3, B8, K5, K7, S7)
- b. Review own performance, identifying areas for personal development. (B1, B3, B8)

Pass criteria	Distinction criteria	Reference to learning
Review own performance and the output of the work, identifying potential improvements.	Analyse the feedback provided by multiple test users, incorporating their feedback into any modifications or plans for improvement.	N/A

Occupational standard

The following table lists each of the knowledge, skills and behaviours as defined within the Network Engineer occupational standard as referenced in the sections above.

Knowledge
K1: the causes and consequences of network and IT infrastructure failures
K2: the architecture of typical IT systems, including hardware, OS, server, virtualisation, voice, cloud and applications
K3: the techniques for systems performance and optimisation
K4: diagnostic techniques and tools to interrogate and gather information regarding systems performance
K5: organisational procedures to deal with recording information effectively and in line with protocols
K6: Service Level Agreements (SLAs) and their application to delivering network engineering activities in line with contractual obligations and customer service
K7: their role in Business Continuity and Disaster Recovery
K8: the purposes and uses of ports and protocols
K9: devices, applications, protocols and services at their appropriate OSI and, or, TCP or IP layers
K10: the concepts and characteristics of routing and switching
K11: the characteristics of network topologies, types and technologies
K12: wireless technologies and configurations
K13: cloud concepts and their purposes
K14: functions of network services
K15: the different types of network maintenance
K16: how current legislation relates to or impacts occupation
K17: troubleshooting methodologies for network and IT infrastructure
K18: how to integrate a server into a network
K19: the types of security threats to networks and IT infrastructure assets
K20: how to use tools to automate network tasks
K21: approaches to change management
Skills
S1: apply the appropriate tools and techniques when securely operating and testing networks
S2: install and configure the elements required to maintain and manage a secure network
S3: implement techniques to monitor and record systems performance in line with defined specifications
S4: maintain security and performance of the system against known and standard threats
S5: apply the appropriate tools and techniques to identify systems performance issues
S6: apply the appropriate tools and techniques to gather information to troubleshoot issues and isolate, repair or escalate faults
S7: communicate outcomes of tasks and record in line with organisational procedures and SLAs including adherence to customer service standards
S8: upgrade, apply and test components to systems configurations ensuring that the system meets the organisation's requirements and minimises downtime. This should include backup processes
S9: record task details whether face-to-face, remote or in writing in line with organisational requirements
S10: interpret information received from a manager, customer or technical specialist and accurately implement the defined requirements
S11: monitor, identify and implement required maintenance procedures
S12: implement techniques to optimise systems performance in line with defined specifications

S13: organise and prioritise clients or stakeholders' requests in line with SLAs and organisation processes
S14: explain their job role within the business context to stakeholders to enable a clear understanding on both sides of what their remit is and convey technical constraints in appropriate language considering accessibility and diversity implications
S15: operate securely and apply the appropriate process, policies and legislation within their business responsibilities
S16: communicate with a range of stakeholders taking into consideration the organisations cultural awareness and technical ability
S17: apply the appropriate level of responsibility when planning and prioritising work tasks
S18: apply the relevant numerical skills (Binary, dotted decimal notation) required to meet the defined specifications
S19: ensure compliance of network engineering outputs with change management processes
S20: select the appropriate tools and comply with organisation policies and processes when upgrading systems
Behaviours
B1: work independently and demonstrate initiative being resourceful when faced with a problem and taking responsibility for solving problems within their own remit
B2: work securely within the business
B3: work within the goals, vision and values of the organisation
B4: take a wider view of the strategic objectives of the tasks or projects they are working on including the implications for accessibility by users and diversity
B5: works to meet or exceed customers' requirements and expectations
B6: Identifies issues quickly, investigates and solves complex problems and applies appropriate solutions. Ensures the true root cause of any problem is found and a solution is identified which prevents recurrence
B7: Committed to continued professional development in order to ensure growth in professional skill and knowledge
B8: Work effectively under pressure showing resilience

Top tips you help you prepare

Finally, here are our key pieces of advice for preparing your project:



1. Plan your time wisely. You should approach this piece of work as if it were a real-life project.
2. Document what you do. Things will fail, but this does not mean that they are not worth writing about. For example, you might like to discuss why they failed, what you learned and how did this impact on your next steps.
3. Use tools that you are familiar with. Do not be tempted to use new or unfamiliar tools for the project as this could waste time.
4. Show your thought process. Think about how you have used logic or problem-solving techniques to approach and break down a problem. Make sure you document this!

You can find more information in the Network Engineer syllabus or the [DMP Qualification Guide](#).