Digital Industries Apprenticeship: Occupational Brief

Network Engineer

June 2016

Digital Industries Apprenticeships: Occupational Brief

Level 4 Network Engineer Apprenticeship

Minimum Standards and Grading Criteria

This paper defines the minimum requirements for the knowledge, skills and behaviours defined in the standard, which are required for a pass.   It also defines the criteria to be used for awarding the grade for merit or distinction. This paper should be read in conjunction with the Standard and Assessment Plan for the Level 4 Software Developer Apprenticeship

Overview of Grading

There are three sets of criteria on which the assessment and grading is made. The three criteria are

> The What: what the apprentice has shown they can do,

> The How: the way in which the work has been done

> The With Whom: The personal and interpersonal qualities the apprentice has brought to all their work relationships

Each of these three criteria has minimum (expected) requirements, which must be satisfied for a pass.

Each of these criteria has a number of dimensions which should be considered to determine if the apprentice is significantly above the minimum (expected) level of quality

The purpose of grading is to differentiate between those apprentices whose work is at the expected level of quality against the totality of the skills, knowledge and behaviours specified in the standard and those whose work is significantly above this expected level

> For a pass, <u>each</u> of the three sets of criteria must demonstrate at least <u>the expected (minimum requirement) level</u> of quality

> For a merit, t<u>he What has to be significantly above</u> the level of quality and <u>one of</u> <u>either the How or the With Whom has to be significantly above</u> the level of quality expected

> For a distinction, <u>each of the three sets of criteria must be significantly above the expected</u> level of quality

The assessor takes a holistic judgement of whether or not their assessments demonstrate that the apprentice is "significantly above the expected level of quality" in each of these three areas and can then determine which grade should be awarded

The what – what the apprentice has shown they can do

Minimum Requirements

The following table shows what the minimum, expected requirements are for a pass on this criteria

Competency Standard	Minimum, expected, requirements for a pass
Can design simple networks from a well-defined specification and apply appropriate security products and processes	Apprentices can show a solid understanding of networks and are able to use the required techniques, tools, documentation and devices when designing secure networks. The OSI and TCP/IP Models Types of networks Topologies Network devices Media Network Services Network addressing schemes Network planning documentation Typically this will have a minimum of two servers, at least 30 end point devices, a switch and with protection from known and standard threats.
Can install and configure network components, including switches, routers and firewalls	Apprentices can install and configure the elements required to implement a secure network, including Media Hardware devices Software
Can optimise the performance of network systems and services	Apprentices can demonstrate how network performance can be optimised and be able to implement techniques to optimise performance as directed.
Can monitor, test and adjust network systems and performance to meet accepted standards using diagnostic tools, analysers and other equipment	Apprentices can demonstrate a minimum of three diagnostic techniques and tools that can be used to interrogate and gather information regarding network performance and evaluate this information to allow network performance to be optimised.

	Can maintain security and performance of the network against known and standard threats.
Can apply diagnostic tools and techniques to identify the causes of network performance issues	Apprentices can show a solid understanding of the techniques and can apply a minimum of three tools to identify network performance issues and apply these to identify performance issues.
Can apply structured approaches to troubleshooting network issues and repair faults in hardware, software products and the network	Apprentices can show a minimum of three techniques to gather information and use a minimum of two tools to troubleshoot issues and be able to isolate, repair or escalate faults. They can communicate solutions and record in line with organisational procedures.
Can undertake system upgrades to network hardware, software and operating systems	Apprentices can use a minimum of 3 techniques to upgrade, apply and test hardware and software to at least three different network configurations ensuring that the network meets the organisation's requirements and minimises downtime.
Can integrate network related software into an existing network environment	Apprentices can demonstrate how to implement the integration of end users software solutions into an existing network environment. They can develop, implement and communicate these end user plans.
Can interpret written requirements and technical specifications for network activities and maintain accurate records of network maintenance activities	Apprentices can receive information from a manager, customer or technical specialist and interpret the information to accurately implement the defined requirements. They can monitor and identify maintenance requirements and implement required maintenance procedures. They can record accurate data and outcomes of work undertaken.
Can log and respond to network service calls and provide technical network support to end users as required	Apprentices can demonstrate high levels of communication, organisational and prioritisation skills when dealing with clients and be able record details relating to an issue, whether face-to-face, remote or in writing.
Can document work done in accordance with agreed procedures	Apprentices can show a solid understanding of the organisational procedures dealing with recording of information relating to IT systems and apply them effectively for internal and external customers. Can record information as specified in organisational polices and SLA

Can operate within the parameters of service level agreements, standards and/or agreed response times.	Apprentices can show a sound understanding of the Service Level Agreements (SLA) and how they impact their role as a network engineer. They can respond appropriately and in line with agreed timescales.
Can operate effectively in the business environment and responds to business issues related to network engineering	Apprentices can show a sound understanding of the factors that impact on a business environment to enable them to carry out their role as a network engineer effectively. They can work independently and demonstrate how they work securely within the business and recognise when there are factors effecting the network performance, including business needs, downtime, security of data and access controls.

The What – what the apprentice has shown they can do

Criteria for a Merit or Distinction

The following table shows what the apprentices would need to demonstrate to be assessed as significantly above the expected level for what they have done

Dimensions	Description of what significantly above the expected level of quality looks like
Breadth – the range of tools and methods understand and applied	Understands and applies a wide range of tools and methods Accurately and appropriately applies and effectively implements the right tools and methods in a variety of different situations
Depth – the level to which these tools and methods are understood and applied	A sophisticated user - fully exploits the functionality/capability of the tools and methods Extensive and deep understanding of different tools and methods and how and why they can be applied in different contexts

Complexity – the extent and prevalence of inter-related and inter-dependant factors in the work and how well the apprentice has dealt with these	Deals confidently and capably with a high level of interrelated and interdependent factors in their work

The how: the way in which the work has been done

The following table shows what the minimum, expected requirements are for a pass on this criteria

Competency Standard	Minimum expected requirements for a pass
Apprentices can demonstrate the full range of skills, knowledge and behaviours required to fulfil their job role	Knows what skills, knowledge and behaviours are needed to do the job well Are aware of their own strengths in the job role, and any areas for improvement Appreciate who else is important, for them to do their job and fulfil the role effectively (e.g. colleagues, managers, other stakeholders) Are aware of potential risks in the job role (e.g. security, privacy, regulatory) Use personal attributes effectively in the role, e.g. entrepreneurship Understand how the job fits into the organisation as a whole
Apprentices can demonstrate how they contribute to the wider business objectives and show an understanding of the wider business environments	Understands the goals, vision and values of the organisation Aware of the commercial objectives of the tasks/ projects they are working on Understands the importance of meeting or exceeding customers' requirements and expectations Is in tune with the organisation's culture Aware of the position and contribution of the organisation in the economy Understands the key external factors that shape the way the organisation function, e.g. regulation Knows how the organisation can gain advantage in the industry, e.g. through innovation, technology, customer service etc.
Apprentices can demonstrate the ability to use both logical and creative thinking skills when undertaking work tasks, recognising and applying techniques from both.	Logical thinking: • Understands initial premise(s) and preconditions • Recognises the conclusion to be reached • Proceeds by rational steps • Evaluates information, judging its relevance and value • Supports conclusions, using reasoned arguments and evidence

	Creative thinking:
	- Explores ideas and possibilities
	- Makes connections between different aspects
	- Adapts ideas and approaches as conditions or circumstances change
Apprentices can show that they recognise problems inherent in, or emerging during, work tasks, and can tackle them effectively	Problem-solving:
	- Analyses situations
	- Defines goals
	- Develops solutions
	- Prioritises actions
	- Deals with unexpected occurrences

The How: the way in which the work has been done

Criteria for a Merit or Distinction

The following table shows what the apprentices would need to demonstrate to be assessed as significantly above the expected level for the way in which the work has been done

Dimensions	Description of what significantly above the expected level of quality looks like
Responsibility – the scope of responsibility and level of accountability demonstrated in the apprentices work	Undertakes work that is more complex, more critical or more difficult Works independently and takes high level of responsibility
Initiative	Independently demonstrates an ability to extend or enhance their approach to work and the quality of outcomes Doesn't just solve the problem but explores creative or innovative options to do it better, more efficiently, more elegantly or to better meet customer needs

Delivery focus – the extent to which the apprentice has shown they can grasp the problems, identify solutions and make them happen to meet client needs	Shows strong project management skills, in defining problem, identifying solutions and making them happen
	Demonstrates a disciplined approach to execution, harnessing resources effectively
	Drives solutions – with a strong goal focused and appropriate level of urgency

The with whom: the personal and interpersonal qualities the apprentice has brought to internal and external relationships

Minimum Requirements

The following table shows what the minimum, expected requirements are for a pass on this criteria

	Minimum expected requirements for a pass
Apprentices can manage relationships with work colleagues, including those in more senior roles, customers/clients and other stakeholders, internal or external and as appropriate to their roles, so as to gain their confidence, keep them involved and maintain their support for the task/project in hand Apprentices can establish and maintain productive working relationships, and can use a range of different techniques for doing so.	Managing relationships: • Understands the value and importance of good relationships • Influences others by listening to and incorporating their ideas and views • Acknowledges other people's accomplishments and strengths • Manages conflict constructively • Promotes teamwork by encouraging others to participate Customer/client relationships: • Understands their requirements, including constraints and limiting factors • Sets reasonable expectations • Involves them in decisions and actions • Interacts positively with them • Provides a complete answer in response to queries ('transparency', 'full disclosure') Stakeholders: • Understands who they are and what their 'stake' is • Prioritises stakeholders in terms of their importance, power to affect the task and interest in it • Uses stakeholders' views to shape projects early on • Gains support from stakeholders, e.g. to win resources • Agrees objectives
Apprentices can communicate effectively with a range of people at work, one-to-one and in groups, in different situations and using a variety of methods.	Intention/purpose: • Understands the purpose of communicating in a particular situation or circumstance (e.g. inform, instruct, suggest, discuss, negotiate etc.) • Checks that the person/people with whom one is communicating also understand the purpose

Apprentices can demonstrate various methods of communication, with an understanding of the strengths, weaknesses and limitations of these, the factors that may disrupt it, and the importance of checking other people's understanding.	• Is sensitive to the dynamics of the situation
	• Is aware of anything that might disrupt the effectiveness of the communication (e.g. status, past history)
	a. Method:
	  • Chooses a good, appropriate method for the situation
	  • Aware of the limitations of the chosen method, and the possible risks of miscommunication (e.g. ambiguity)
	  • Takes account of the affective dimensions of the method (e.g. body language, tone of voice, eye contact, facial expression etc.)
	b. Execution:
	  • Expresses self clearly and succinctly, but not over-simplifying
	  • Checks that the other person/people understand what is being expressed
	  • Takes account of the potential barriers to understanding (e.g. filtering, selective perception, information overload)
	  • Modifies the purpose and methods of communication during a situation in response to cues from the other person/people

The With Whom: the personal and interpersonal qualities the apprentice has brought to internal and external relationships

Criteria for Merit or Distinction

The following table shows what the apprentices would need to demonstrate to be assessed as significantly above the expected level for the personal and interpersonal qualities the apprentice has brought to internal and external relationships

Dimensions	Description of what significantly above the expected level of quality looks like
Scope and appropriateness – the range of internal and external people and situations that the apprentice has engaged appropriately and effectively with	Internally – works alone, 1:1, in a team and across the company with colleagues at all levels Externally – works with customers, suppliers and partners in a variety of situations Reads situations, adapts behaviours, and communicates appropriately for the situation and the audience

Reliability – the extent to which they perform and behave professionally	Can be trusted to deliver, perform and behave professionally, manages and delivers against expectations, proactively updates colleagues and behaves in line with the highest values and business ethics
A role model and exemplar to others	Actively inspires and leads others, takes others with them, leads by example

Annex: Network Engineer: Knowledge and Understanding

Knowledge and Understanding is assessed on programme through Knowledge Modules and Vendor or Professional Qualifications

Knowledge Module 1: Network Principles (for Level 4 Network Engineer Apprenticeships)

The Knowledge Standards	Definition of the Minimum Requirements
Understands and applies the principles of networking, protocols and associated technologies	a) Apprentices should develop a solid understanding of network protocols and how they are used to implement data communications. b) This should include the differences between the latest published versions of OSI layer model, IP, TCP/IP, routing and switching, WANs, LANs i.e the differences between IP v4 and IP v6
Understands and applies the applied maths required to be a network engineer	a) Apprentices should develop a solid understanding of numbering systems to enable them to calculate and convert values, including algorithms, data, binary, probability and statistics

The following Vendor Certifications exempt apprentices from this knowledge module (see later for professional certificates)

CCNA 1+2

Network +

Juniper JNCIA – Junus

Knowledge Module 2: Network Systems and Architecture (for Level 4 Network Engineer Apprenticeships)

The Knowledge Standards	Definition of the Minimum Requirements
Understands the causes and consequences of system failure including load balance and storage protocols and responds appropriately	a) Apprentices should develop a solid understanding of the types of systems failures and their consequences and be able to respond appropriately.

The Knowledge Standards	Definition of the Minimum Requirements
Understands the architecture of a typical business IT system, including hardware, OS, server, virtualisation, middleware and applications	a) Apprentices should develop a solid understanding of the architecture required to implement IT systems to meet a business needs.

The following Vendor certifications exempt apprentices from this knowledge module (see later for Professional Certificates)

MCP Server Virtualization -Windows Server Hyper V

MCP MS Exchange Server

MCP Server 2012

MCP Windows Administrator

Server +

Juniper JNCIS – Ent

Knowledge Module 3: Network Security (for Level 4 Network Engineer Apprenticeships)

The Knowledge Standards	Definition of the Minimum Requirements
Understands and responds to security threats, firewalls and vulnerabilities	a) Apprentices should develop a sound understanding of known security threats and how they can be mitigated.

The following Vendor Certifications exempt apprentices from this knowledge module (see later for Professional Certificates)

Security +

CCNA Security

MTA Cloud and Mobility

Juniper JNCIS – Sec