BCS Digital Industries Apprenticeship

Standard Specific Guidance for Training Providers

Level 4 Network Engineer Apprenticeship

Version 3.0
May 2018

Change History

Any changes made to the project shall be clearly documented with a change history log. This shall include the latest version number, date of the amendment and changes made. The purpose is to identify quickly what changes have been made.

Version Number and Date	Changes Made
November 2016 V1.0	Document created from three earlier documents: • Training Provider Reference and Guide • Summative Portfolio Guide • Employer Reference Guide
November 2016 V1.1	Summative portfolio declaration included within Template 5
February 2017 V1.2	Final checks and amendments
December 2017 V2.0	Update to technical competencies, knowledge standards and work activities
May 2018 V3.0	Removal of typical evidence and update to work activities.

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Contents

Purpose of this Document

The purpose of this document is to provide useful information and suggested supporting documentation specific to the Network Engineer Apprenticeship. It should be read in conjunction with the BCS General Guidance for Apprentices, Employers and Training Providers document and is designed to give training providers some tools to help them build their own programme from training plan through to end point assessment.

This guide will provide:

- supporting information around how help to the network engineer apprentice meet and go beyond the standard;
- a number of useful documents to support the training provider in meeting their responsibilities in managing the apprenticeship from training plan through to the end point assessment;
- evidence checklists to help the training provider support the apprentice in completing their summative portfolio;
- a template for completing the employer reference.

Introduction

The BCS Level 4 Network Engineer Apprenticeship is one of the suite of Digital Industries Apprenticeships that have been designed by the industry to address skills shortages and meet the ever changing needs of UK employers.

The General Guidance for Apprentices, Employers and Training Providers provides the broad view on how to run an apprenticeship programme to the BCS Digital Industries Standard. The collection of tables and templates contained within this document has been designed to give training providers the tools to build their programme and to assist them in helping apprentices and employers towards the successful completion of each element of the end point assessment.

The areas where a training provider should be involved in ensuring a successful outcome to the apprenticeship are:
- mapping and assessing work against the standard;
- advising the employer and the apprentice on which knowledge modules, vendor or professional certificates and other relevant training and activities are most appropriate for their requirements, and agree a suitable training plan;
- assisting the apprentice with applying knowledge in the workplace;
- acting as an advisor to the apprentice and the employer to ensure the programme remains on track and any concerns are addressed;
- helping the apprentice to select evidence for their summative portfolio;
- supporting the apprentice through the synoptic project;
- confirming the apprentice's readiness for the end point assessment.

The following series of checklists can be used by the training provider to help manage the process through to completion. Training providers may substitute their own processes and

documentation as they see fit in order to effectively manage their key areas of responsibility as set out above.

The Network Engineer Apprentice

The primary roles of a network engineer are to:

- design, install, maintain and support communication networks within an organisation or between organisations;
- maintain high levels of operation of communication networks in order to provide maximum performance and availability for their users, such as staff, clients, customers and suppliers;
- understand network configuration, cloud, network administration and monitoring tools;
- give technical advice and guidance.

Job titles may be different across different organisations so the role may also be referred to as network technician, network engineer, systems engineer, network administrator.

Business Proficiencies

The proficiencies that should be demonstrated by an apprentice in network engineering are listed below.

Business skills
- The apprentice can demonstrate an analytical and systematic approach to issue resolution.
- The apprentice can take the initiative in identifying and negotiating appropriate personal development opportunities.
- The apprentice can demonstrate effective communication skills.
- The apprentice can appreciate the wider business context, and how their role relates to other roles and to the business of the employer or client.

Complexity
- The apprentice can apply a methodical approach to issue definition and resolution.

Autonomy
- The apprentice can use discretion in identifying and responding to complex issues and assignments.

Influence
- The apprentice can interact with and influence colleagues.
- The apprentice has working level contact with customers, suppliers and partners.

Knowledge standards, technical competence and behaviour and relationship standards

Tables 1, 2 and 3 contain details of the topics that the training provider may decide to cover in their development plans and scheduled work activities in order to stretch the apprentice.

Table 1 – Network Engineer – Knowledge Standards

The knowledge standards define learning that must take place during the apprenticeship, **both through the activities and the apprentice's own independent learning**. The additional learning outcomes detailed in the table show how a training provider can stretch the apprentice's learning beyond the requirement as set out in the occupational brief. However, it is important to remember that stretching the apprentice in this way will only have a bearing on their final grading if the impact is demonstrated through their competence in the end point assessment. These knowledge standards, therefore, show the additional learning that may support the apprentice in improving their overall competence. Technical knowledge and understanding is assessed throughout the apprenticeship through a combination of Ofqual regulated knowledge modules and specified vendor and professional qualifications. These must be passed before the end point assessment can take place.

Knowledge standard	Expected requirement	Suggested learning outcomes to meet the standard and stretch the apprentice to exceed the minimum requirement

Understands and applies the principles of networking, protocols and associated technologies.	Apprentices should develop a solid understanding of network protocols and how they are used to implement data communications.
	
	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 IPv4 and IPv6.
		Describe the components of a network.
		
		Explain how rules are used to facilitate data communication.
		• encoding;
		• formatting and encapsulation;
		• size;
		• timing;
		• delivery options;
		  o unicast;
		  o multicast;
		  o broadcast.
		
		Explain the role of protocols in facilitating interoperability in network communications.
		• RIPv1;
		• RIPv2;
		• OSPF;
		• EIGRP;
		• RIPng;
		• OSPFV3;
		• EIGRP for IPv6.

			Describe LANs, WANs and MANs.
			
			Understanding of all seven layers and representative protocols at each layer within the OSI model.
			• the Physical layer;
			 ○ electrical;
			 ○ optical;
			 ○ wireless.
			• the Data Link layer;
			 ○ purpose of the Data Link layer;
			 ○ data format;
			 ○ description of an Ethernet frame;
			• the Network layer;
			 ○ purpose of the Network layer;
			 ○ Internet Protocol;
			• the Transport layer;
			 ○ purpose of the Transport layer;
			 ○ Transport layer protocols (TCP and UDP);
			• the Session layer;
			 ○ purpose of the Session layer;
			• the Presentation layer;
			 ○ purpose of the Presentation layer;
			• the Application layer;
			 ○ purpose of the Application layer.
			
			Explain the purpose and features of IP.
			• IP addressing - definition of network and host addresses;
			• classful addressing (class A, B, C, D, E);
			 ○ IP address allocation;
			 ○ IP address format
			  ▪ binary;
			  ▪ dotted decimal notation;
			 ○ network and broadcast addresses;
			• IP header format;

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- o type of service (TOS) field;
- o protocol field;
- o time to live (TTL) field;
- o checksum;
- mapping IP to the Datalink layer;
  - o Address Resolution Protocol (ARP);
    - ▪ ARP broadcast;
  - o Reverse Address Resolution Protocol (RARP);
- IP scaling problems;
  - o growth of Internet;
  - o subnet masks – the need for 3rd level of hierarchy;
    - ▪ subnet mask format;
    - ▪ logical AND operation;
    - ▪ public and private addresses;
    - ▪ default gateway;
  - o static and dynamic address allocation;
    - ▪ Dynamic Host Configuration Protocol (DHCP);
    - ▪ DHCP server requirements;
    - ▪ the DHCP process (DORA);
    - ▪ DHCP lease;
    - ▪ domain names;
    - ▪ domain name resolution;
    - ▪ requirements of DNS servers;
    - ▪ host name resolution (7 step sequence);
    - ▪ NetBIOS name resolution (6 step sequence);
    - ▪ subnetting (and supernetting) networks;
    - ▪ design considerations (the 4 key questions);
- purpose of IP v6
  - o benefits of IP v6;
  - o extended address space;
- IP v6 addressing (binary, hexadecimal);
  - o octet pair notation;
  - o abbreviated octet pair notation;

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		• IP v6 header format;
		  o version;
		  o priority, traffic class;
		  o flow label;
		  o payload length;
		  o next header;
		  o hop limit;
		• host address calculation;
		  o EU164 addresses;
		  o default gateway;
		• router advertisement;
		• extended features;
		  o path MTU discovery;
		  o mobility – destination options;
		  o IPSec authentication.

Understands and applies the applied maths required to be a network engineer (e.g. algorithms, data, binary, probability and statistics).	Apprentices should develop a solid understanding of numbering systems to enable them to calculate and convert values, including algorithms, data, binary, probability and statistics.	Explain different numbering systems • binary; • decimal; • hexadecimal. Demonstrate an ability to convert between binary and decimal. Demonstrate an ability to calculate the number of host addresses available when given a network and a subnet mask. Demonstrate an ability to calculate the necessary subnet mask when given a network diagram in order to accommodate the requirements of the network. Explain the benefits of variable length subnet masking (VLSM). Explain what an algorithm is and give examples of their use in computer networking. • DUAL. o Which routing protocol uses it.

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o How it determines the correct path.
- Dijkstra.
  o Which routing protocol uses it.
  o How it determines the correct path.

Explain how network monitoring systems enable the collection of data for statistical analysis and forecasting.
- hardware;
- bandwidth.

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Understands the causes and consequences of system failure including load balance and storage protocols, and responds appropriately.

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Apprentices should develop a solid understanding of the types of systems failures and their consequences and be able to respond appropriately.

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Describe the causes and impact of DNS round robin failures and summarise the appropriate response for each.
- misconfiguration - loss of connection to one/all nodes;
- single/multiple node failure(s) - intermittent connection;
- all nodes fail - complete outage.

Explain causes and consequences of network load balancer failures and summarise the appropriate response for each.
- misconfiguration - loss of connection to one / some nodes increasing load on remaining nodes;
- misconfiguration – loss of connection to all nodes;
- single node failure - intermittent connection;
- single/multiple node failures - intermittent loss of access;
- all nodes failure - complete outage.

Identify the reasons for and the impact of locally attached storage protocol failures (SATA, SCSI, SAS) and summarise the appropriate response for each.
- hardware failure - loss of access to local disk(s) and / or corruption of data.

Describe the causes and impact of failures of RAID (0,1,5,10) and summarise the appropriate response for each.
- loss of single / multiple disks - reduced throughput / loss of data depending on RAID level and number of disk failures;
- loss of RAID controller - permanent / temporary loss of access to data.

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Describe the causes and impact of failures of network shares and network-attached storage (NAS), and summarise the appropriate response for each.
- misconfigured firewall or protocols (NFS, SMB, TCP/IP, AFS) - complete loss of access to NAS;
- misconfigured NFS - loss of access for Linux / NAS network shares;
- misconfigured SMB - loss of access to Windows network shares;
- misconfigured AFS - loss of access for Apple systems shares;
- misconfigured authentication and/or authorisation - loss of access to some / all NAS / network shares.

Explain causes and consequences of storage area network (SAN) failures over the Fibre Channel protocol and summarise the appropriate response for each.
- single misconfigured or failed Fibre switch - increased load on remaining switches and possible reduced throughput and/or storage outage. The standard data network is unaffected;
- loss of all Fibre switches - complete loss of access to storage. The standard data network is unaffected;
- failure of a single host bus adapter (HBA) - increased load on remaining HBA on a single node and possible reduced throughput for this node or complete outage if this is the only onboard HBA.

Explain causes and consequences of SAN failures over Fibre Channel over Ethernet (FCoE) and summarise the appropriate response for each.
- single misconfiguration or failed standard switch - increased load on remaining switches and possible reduced throughput or storage outage. The standard data network may also be impacted;
- TCP/IP misconfiguration - inability for some / all nodes to access storage;
- failure of a single network interface controller (NIC) - increased load on remaining NIC on a single node and possible reduced throughput for this node or complete outage if this is the only onboard NIC;
- incorrect / invalid logical unit number (LUN) - inability to access logical storage device;
- loss of network - total outage.

		Explain causes and consequences of SAN failures over the iSCSI and summarise the appropriate response for each • single misconfiguration or failed standard switch - increased load on remaining switches and possible reduced throughput or storage outage. Standard data network may also be impacted; • TCP/IP misconfiguration - inability for some / all nodes to access storage; • failure of a single NIC - increased load on remaining NIC on a single node and possible; • reduced throughput for this node or complete outage if this is the only onboard NIC. • incorrect / invalid iSCSI qualified name (IQN) address - inability to access logical storage device. Describe the causes and consequences of cloud storage failures and summarise the appropriate response for each; with a focus on personal and enterprise storage: OneDrive, Dropbox, Google Drive, Amazon EC2 and Microsoft Azure. • router / ISP failure - complete loss of access; • TCP/IP misconfiguration - inability for some / all nodes to access storage; • misconfigured authentication / authorisation - loss of access to some / all cloud storage; • cloud service provider failure - loss of access to data and / or loss of data. Explain the causes and impact of computer system failures and summarise the appropriate response for each. • memory component failure - individual node crash; • SSD/HDD failure - system crash and possible loss of data; • CPU failure - intermittent system crash or failure to boot on a single node; • power supply - intermittent system crash or failure to boot on a single node; • cooling - intermittent crash or possibly permanent damage to components. Express the causes and impact of network failures and summarise the appropriate response for each. • NIC failure - loss of access from/to one network node;

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| | | • switch failure - loss of access to LAN or reduction in throughput depending on redundant configuration;
• router failure - loss of access to WAN or reduction in throughput depending on redundant configuration;
• firewall - loss of access to some/all network nodes / protocols;
• web proxy - loss of access to web traffic;
• cabling - incorrect cable type (straight through / cross over);
• cabling - exceeding recommended lengths and / or EMI;
• wireless - exceeding maximum distance and / or EMI or RFI.

Describe the causes and impact of incorrectly applied / faulty patches and summarise the appropriate response for each.
• intermittent problems / complete loss of function;
• failure to boot OS.

Explain causes and impact of IP Addressing configuration errors and summarise the appropriate response for each; with a focus on Invalid IP address, netmask, gateway and DNS Server.
• loss of access to some / all LAN / WAN / nodes.

Describe the causes and impact of VLAN configuration errors and summarise the appropriate response for each.
• invalid VLAN tagging - loss of access to nodes / lack of necessary network isolation.

Explain causes and impact of excessive heat and summarise the appropriate response.
• intermittent restarts / complete component failure.

Describe causes and impact of a lack of power and summarise the appropriate response.
• blackout / brownout;
   o intermittent problems;
   o system reboots;
   o complete loss of systems; |

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o   data loss.

Describe causes and impact of EMI / RFI and summarise the appropriate response.
- network interference - loss of some / all data.

Describe the causes and impact of backup failure and summarise the appropriate response.
- misconfigured backup / restore - loss of some / all data;
- corrupted missing / backup medium - loss of some / all data;
- fault backup / restore device - loss of some / all data.

Explain the causes and impact of malware infection and summarise the appropriate response.
- lack of user training - loss of some/all data and or reduction in work efficiency;
- insufficient anti-malware tools - loss of some / all data and / or reduction in work efficiency;
- poorly configured firewall - loss of some / all data and / or reduction in work efficiency.

Explain the causes and impact of poor wireless security and summarise the appropriate response.
- weak encryption / poor selection of passphrase - loss of some / all data and / or reduction in work efficiency.

Explain the causes and impact of a failure to implement physical security.
- unauthorised access and / or loss of data and / or reduction in work efficiency.

Describe the causes of network latency and summarise the appropriate response.
- jitter on time critical services - poor quality VOIP / video conferencing.

Describe the causes of lack of bandwidth and summarise the appropriate response.
- more traffic than network designed to accommodate - loss of some / all network traffic;
- misconfigured network device(s) - loss of some / all network traffic.

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		Explain the causes of lack of storage capacity and summarise the appropriate response. • lack of maintenance - storage filled resulting in system slowdown / crash; • neglecting to plan for future storage needs - storage filled resulting in system slowdown / crash; • system failure producing large files - storage filled resulting in system slowdown / crash. Explain the causes of lack of memory and summarise the appropriate response. • unexpected demand - system slow and / or crashes; • application memory leaks - system slow and / or crashes; • failure to plan - system slow and / or crashes. Describe the causes of lack of compute (CPU) capacity and summarise the appropriate response. • unexpected demand - system slow and / or crashes; • failure to plan - system slow and / or crashes.
Understands the architecture of a typical business IT system, including hardware, OS, server, virtualisation, middleware and applications.	Apprentices should develop a solid understanding of the architecture required to implement IT systems to meet business needs.	Explain the purpose of types of network switches. • layer 2; • layer 3; • three layered model (access, distribution, core); • VLANs. Describe the functions of routers. • static routing; • dynamic routing; • subnet access; • WAN access; • segmentation and broadcast traffic reduction. Describe the function of wireless systems. • wireless access points (WAP); • wireless routers.

Describe the functions of key network security devices.

- firewalls - stateful, stateless and deep packet inspection;
- intrusion prevention systems (IPS);
- intrusion detection systems (IDS);
- honeypot.

Explain the differences between server hardware formats.

- tower;
- rack mount;
- blade.

Describe the typical client operating system features.

- designed for end user;
- includes a GUI;
- accesses resources provided by a server;
- user applications are locally installed.

Explain the typical server operating system features.

- shares resources to client systems;
- stores resources centrally for easy management
- may have a GUI and / or CLI.

Describe the function of different types of server.

- Directory Active Directory / NIS
- DNS
- web proxy server;
- file and print;
- email;
- database;
- virtualisation.

Explain the key function of business application software.

- sales - customer relationship management;
- marketing - presentation and communication;

		- finance - accountancy packages; - HR - employee record management; - technical support – helpdesk; - general – communication; - email; - instant chat; - VOIP; - video conference. Describe the functions of basic components of virtualised systems. - host (type 1 and type 2); - guest; - hardware acceleration extensions (VT-x/AMD-V); - sharing of physical resources; - memory; - storage; - compute (CPU). Explain the key differences offered by levels of cloud service. - Infrastructure as a Service (IAAS); - Platform as a Service (PAAS); - Software as a Service (SAAS). Describe the function of virtual desktop infrastructure. Explain the key features of middleware. - distribute and coordinate processing across many hardware and application platforms; - provides a centralised location for 'business logic'; - provides a framework for the forwarding and queuing of transactions.
Understands and responds to security threats and vulnerabilities.	Apprentices should develop a sound understanding of known security threats and how they can be mitigated.	Describe security threats. - virus; - malware; - DDoS attacks;

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		- Trojan; - worm; - spyware; - social engineering; - phishing attacks; - man-in-the-middle; - DNS poisoning. Describe vulnerabilities. - ports; - services; - code. Describe security procedures. - security policy; - securing the perimeter; - physical security; - securing the network; - securing devices; - securing applications; - O/S updates. Describe common ways to protect data. - file and folder permissions; - encryption; - group policy. Describe protection against malicious software. - anti-virus; - anti-malware. Describe types of firewalls. - packet filter;

		- stateful; - application level; - intrusion detection systems; - intrusion prevention systems.

These expected requirements are met through the delivery of the BCS Ofqual regulated knowledge modules and vendor training courses, details of which are contained in the course syllabi.

Table 2 – Network Engineer – Technical Competency Standards

The competency standards have been defined to demonstrate that the knowledge learnt has been applied in real work tasks, activities and projects in a business environment.

Competencies are assessed throughout the apprenticeship through a combination of the employer reference, the synoptic project and a summative portfolio completed by apprentices from records of the work activities in which they have been involved.

The training provider should assist the employer to identify suitable work tasks, activities and projects within the scope of their normal business activities for the apprentice to practice what they have learnt and to demonstrate the competencies below.

The BCS Apprenticeship is mapped to an internationally recognised skills framework and to work activities in which a network engineer apprentice would be involved.

The following table sets out these competencies and the expected requirements against the work activities that might be demonstrated at and beyond the minimum expectation. The format is explained below:

Competency standard	Expected requirement	Work activities demonstrating the minimum expected level of competence
This column contains the competency as it is listed in the apprenticeship standard.	*This column shows the expected requirements listed in the occupational brief for a successful outcome.*	*This column shows recognised work activities that demonstrate that the apprentice is meeting the expected requirement.* *The apprentice should be able to demonstrate all of these activities.*

The network engineer competency standard, requirements and activities demonstrating competence follow:

Competency standard	Expected requirement	Work activities demonstrating expected level of competence
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, a number of end point devices, a switch and protection from known and standard threats.	Translates simple logical designs into physical designs, taking account of the target environment, performance requirements, existing systems, regulatory constraints, budgets, power supply requirements, fire protection and any potential safety-related aspects.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence
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.	Installs or removes network hardware and/or software, using supplied installation instructions and tools; follows agreed standards, including those for electrical work. Agrees the timing of the work with those affected, e.g. users, operations management, and including, where appropriate, handover to client. Follows agreed procedures, carries out routine configuration/installation and provides sufficient information for reconfiguration of network hardware and software. Implements network changes and maintenance routines, utilising the appropriate tools and test equipment. Facilitates and oversees installation, removal, upgrading and repair of network equipment. Carries out routine configuration/installation and reconfiguration of hardware and software. Using standard procedures and tools, carries out defined tasks associated with the planning, installation, upgrade, operation, control and maintenance of local and wide area networks for communication of any type of digital data, within one or more computer systems.

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Competency standard	Expected requirement	Work activities demonstrating expected level of competence
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.	Reviews network statistics, identifying trends in traffic flow and levels of service. Monitors activity over time to predict usage and comply with demand management SLAs. Carries out required network monitoring, logging and reporting tasks. Takes action on known errors and documented workarounds, logging such actions and advising supervisor or specialists when management or specialist attention is required. Uses network management systems tools to collect routine network load and model performance statistics. Uses network management systems software and appropriate analysis equipment to collect routine network load statistics and model performance, and creates reports as required. Conducts tests of the network hardware and/or software affected using supplied test procedures and diagnostic tools. Helps to resolve problems and faults, and corrects malfunctions, calling on help from more experienced colleagues if required. Documents results in accordance with agreed procedures.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence
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 enable network performance to be optimised. Can maintain security and performance of the network against known and standard threats.	Conducts tests of the network hardware and/or software affected using supplied test procedures and diagnostic tools. Helps to resolve problems and faults, and corrects malfunctions, calling on help from more experienced colleagues if required. Documents results in accordance with agreed procedures. Carries out required network monitoring, logging and reporting tasks. Takes action on known errors and documented workarounds, logging such actions and advising supervisor or specialists when management or specialist attention is required. Uses network management systems tools to collect routine network load and model performance statistics.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence
Can apply diagnostic tools and techniques to identify the causes of network performance incidents and problems.	Apprentices can show a solid understanding of the techniques and can apply a minimum of three tools to identify network performance incidents and problems.	Carries out required network monitoring, logging and reporting tasks. Takes action on known errors and documented workarounds, logging such actions and advising supervisor or specialists when management or specialist attention is required. Uses network management systems tools to collect routine network load and model performance statistics.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence
Can apply structured approaches to troubleshoot 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 incidents and problems, and be able to isolate, repair or escalate faults. They can communicate and record solutions and remedial actions in line with organisational procedures.	Investigates, diagnoses and resolves low impact network problems within service level agreement tolerances, referring to network users, other staff and suppliers, as necessary. Conducts tests of the network hardware and/or software affected using supplied test procedures and diagnostic tools. Helps to resolve problems and faults, and corrects malfunctions, calling on help from more experienced colleagues if required. Documents results in accordance with agreed procedures. Assists in resolving problems in network systems and services. Documents such incidents and problems within the configuration management defect/problem reporting system.

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Competency standard	Expected requirement	Work activities demonstrating expected level of competence
Can undertake system upgrades to network hardware, software and operating systems.	Apprentices can use a minimum of three 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.	Assists with the planning of network upgrades and modifications. Works with the change advisory boards on all planned changes.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence
Can integrate network related software into an existing network environment.	Apprentices can demonstrate how to implement the integration of end user's software solutions into an existing network environment. They can develop, implement and communicate these end user plans.	Installs or removes network hardware and/or software, using supplied installation instructions and tools; follows agreed standards, including those for electrical work. Agrees the timing of the work with those affected, e.g. users and operations management, including, where appropriate, handover to client.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence
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.	Carries out required collection of information and records, including using network management systems and appropriate performance analysis equipment to monitor installation performance against agreed service levels. Takes action on known or moderately complex network problems, escalating to superiors and specialists only when their involvement is required.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence
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 to record details relating to an incident or problem, whether face to face, remote or in writing.	Provides assistance to users in a professional manner following agreed procedures for further help or escalation of request. Maintains accurate records of user requests, contact details and outcomes. Provides feedback to users. Investigates, diagnoses and resolves low impact network problems within service level agreement tolerances, referring to network users, other staff and suppliers, as necessary.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence
Can document work done in accordance with agreed procedure.	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 policies and SLAs.	Documents all work using required standards, methods and tools, including prototyping tools where appropriate. Produces reports on network defect/problem reporting data (e.g. data extracted from the configuration management system/known error database).

Competency standard	Expected requirement	Work activities demonstrating expected level of competence
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.	Supports service level management in monitoring the impact of network problems on agreed service levels.

Competency standard	Expected requirement	Work activities demonstrating expected level of competence
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.	Undertakes all work in accordance with agreed safety, technical and quality standards, using appropriate methods and tools. Responds to service requests for support by providing information to fulfil requests or enable resolution. Applies client services standards to resolve or escalate clients' service problems within a specified area of responsibility.

Criteria for demonstrating **Significantly** higher competencies.
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.
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.
Deals confidently and capably with a high level of interrelated and interdependent factors in their work.

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Table 3 – Generic Behaviour and Relationship Standards

The behaviour and relationship standards have been defined to demonstrate that the apprentice applies the good behaviours and interpersonal skills that are needed in a business environment. Behaviours and business relationship skills are assessed throughout the apprenticeship through a combination of the employer reference, the synoptic project and a summative portfolio, which is completed by apprentices from records of the work activities in which they have been involved. The training provider could assist the apprentice by offering some additional soft skills training over and above their apprenticeship. The apprenticeship standard sets out the attributes required within the occupation brief, which can be accessed via the Apprenticeship section of www.bcs.org.

Behaviour and relationship standard	Expected requirement
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.

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Behaviour and relationship standard	Expected requirement
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.

These attributes are difficult to measure and are subjective in nature so cannot actually guarantee that any greater level of competence or proficiency is being demonstrated. The BCS Apprenticeship is mapped to the Skills Framework for the Information Age (SFIA), an internationally recognised skills framework and to observable activities that a network engineering apprentice working to the level of responsibility appropriate for the role should demonstrate. Accordingly, the proficiencies that should be demonstrated by an apprentice in network engineering are shown below.

Proficiency standard	Work activities demonstrating expected level of proficiency	Work activities demonstrating competence beyond the minimum expected
Business skills	Demonstrates an analytical and systematic approach to issue resolution. Takes the initiative in identifying and negotiating appropriate personal development opportunities. Demonstrates effective communication skills. Appreciates the wider business context, and how their role relates to other roles and to the business of the employer or client.	Independently demonstrates an ability to extend or enhance their approach to work and the quality of outcomes. Works independently and takes high level of responsibility. Demonstrates a disciplined approach to execution, harnessing resources effectively. Doesn't just solve problems but explores creative or innovative options to do better, more efficiently, more elegantly or to better meet customer's needs.
Complexity	Applies a methodical approach to issue definition and resolution.	Undertakes work that is more complex, more critical or more difficulty. Drive solutions – with strong goal focused and appropriate level of urgency. Shows strong project management skills, in defining problem, identifying solutions and making them happen.
Influence	Interacts with and influences colleagues. Has working level contact with customers, suppliers and partners.	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.
Autonomy	Uses discretion in identifying and responding to complex issues and assignments.	Reads situations, adapts behaviours and communicates appropriately for the situation and the audience. 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.

Proficiency standard	Work activities demonstrating expected level of proficiency	Work activities demonstrating competence beyond the minimum expected
		Actively inspires and leads others, takes others with them, leads by example.

Network Engineer Apprentice Templates

The following templates are designed to support the training provider, and will take them from training and development planning, through to the end point assessment readiness check. As with the tables above they can be used by the training provider to help them manage the process through to completion, although training providers may also substitute their own processes and documentation as they see fit in order to effectively manage their programme.

Network Engineer Template 1 – Training and Development Plan

Apprentice details

Name	
ULN	

Employer details

Company name	
Company address	
Contact name	

Training provider details

Company name	
Company address	
Contact name	

Role mapping against the network engineer standard

For each area of technical and behavioural competence an overall evaluation should be provided on a three-point scale to show how often this competence is required during the normal work carried out by the employer:

- **critical** – this competence is applied most of the time;
- **desirable** – this competence is applied some of the time;
- **occasional** – this competence is rarely required.

This evaluation could form the basis of an ongoing review with the apprentice on a regular basis.

Workplace competence map

The template shows the type of activities that are identified in the apprenticeship standard for network engineers as demonstrating the required competencies being applied in the workplace.

It is recognised that there are differences between the types of work carried out by different employers so this template provides the opportunity to include any other activity that demonstrates the apprentice's competence during their normal duties.

The tables below could be used to make an evaluation of the apprentice's work environment and detail the work activities that a competent apprentice should be able undertake. This activity should then lead to a discussion to identify any gaps with the employer and make a plan to redress the balance.

In the normal course of work, is the apprentice required to:	Critical	Desirable	Occasional
Design simple networks from a well-defined specification and apply appropriate security products and processes?	☐	☐	☐
Install and configure network components, including switches, routers and firewalls?	☐	☐	☐
Optimise the performance of network systems and services?	☐	☐	☐
Monitor, test and adjust network systems and performance to meet accepted standards using diagnostic tools, analysers and other equipment?	☐	☐	☐
Apply diagnostic tools and techniques to identify the causes of network performance issues?	☐	☐	☐
Apply structured approaches to troubleshoot network issues, and repair faults in hardware, software products and the network?	☐	☐	☐
Undertake system upgrades to network hardware, software and operating systems?	☐	☐	☐
Integrate network-related software into an existing network environment?	☐	☐	☐
Interpret written requirements and technical specifications for network activities and maintain accurate records of network maintenance activities?	☐	☐	☐
Log and respond to network service calls and provide technical network support to end users as required?	☐	☐	☐
Document work done in accordance with agreed procedures?	☐	☐	☐

Operate within the parameters of service level agreements, standards and/or agreed response times?	☐	☐	☐
Operate effectively in the business environment and respond to business issues related to network engineering?	☐	☐	☐
Please add any other activities you think demonstrates the apprentice's competence in this area.	☐	☐	☐

What is your overall evaluation of the apprentice's opportunity to demonstrate the technical competencies in the employer's normal workplace environment?

Please continue on a separate sheet if required.

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Knowledge module training plan

The knowledge standards define learning that should take place during the apprenticeship, **both through the training provider activities and the apprentice's independent learning**. The training provider should work with the employer to identify appropriate training for the apprentice to meet the requirements of the standard and the employer should identify opportunities within the scope of their normal business activities for the apprentice to demonstrate what they have learnt.

Knowledge and understanding will be delivered by a combination of BCS qualifications and vendor certifications in accordance with the network engineer standard.

One recognised vendor or professional certification must be passed, which may be used to exempt one of the knowledge modules. Details of these, and the knowledge module that can be exempted, are contained in the standard. The training provider and the employer should agree which is best suited to their requirements.

Training plan – knowledge

BCS qualification	Selected Y/N	Vendor certification alternative chosen
BCS Level 4 Certificate in Network Principles		CCNA 1+2 Network + Juniper JNCIA – Junus
BCS Level 4 Certificate in Network Systems and Architecture		MCP Server Virtualization -Windows Server Hyper V MCP MS Exchange Server MCP Server 2012 MCP Windows Administrator Server + Juniper JNCIS – Ent
BCS Level 4 Certificate in Network Security		Security + CCNA Security MTA Cloud and Mobility Juniper JNCIS – Sec

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Technical competence development plan

The following template may be used to describe how to ensure that the apprentice will be given the opportunity to demonstrate each of the required technical competencies stated in the network engineer standard.

Competency requirement to meet the standard	How will this be ensured?	Responsibility (employer or training provider)?
Can design simple networks from a well-defined specification and apply appropriate security products and processes.		
Can install and configure network components, including switches, routers and firewalls.		
Can optimise the performance of network systems and services.		
Can monitor, test and adjust network systems and performance to meet accepted standards using diagnostic tools, analysers and other equipment.		
Can apply diagnostic tools and techniques to identify the causes of network performance issues.		
Can apply structured approaches to troubleshoot network issues, and repair faults in hardware, software products and the network.		
Can undertake system upgrades to network hardware, software and operating systems.		
Can integrate network-related software into an existing network environment.		
Can interpret written requirements and technical specifications for network activities and maintain accurate records of network maintenance activities.		
Can log and respond to network service calls and provide technical network		

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support to end users as required.		
Can document work done in accordance with agreed procedures.		
Can operate within the parameters of service level agreements, standards and/or agreed response times.		
Can operate effectively in the business environment and respond to business issues related to network engineering.		

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Professional development activities plan

BCS has defined a number of professional development activities that support wider professional and career development. These activities have been associated with the various levels of responsibility, and the activities listed in the table below represent those that are appropriate for a network engineer apprentice.

Training providers may wish to engage in assisting the apprentice in some of these activities as they can contribute towards the portfolio of evidence. The recommended activities include those shown below.

Professional development activities	Appropriate to the role	Agreed with apprentice and employer
Participating in group activities inside or outside the working environment that can assist with the development of interpersonal skills.	☐	☐
Undertaking unpaid activities that can help to develop professional skills or offer additional insight into or understanding of their working role.	☐	☐
Undertaking learning in subjects relevant to but not directly related to their role (e.g. mentoring skills, cultural awareness and diversity training), perhaps through self-study or evening classes.	☐	☐
Gaining basic knowledge of the employing organisation, its business, structure, culture, products/services, operations and terminology.	☐	☐
Gaining knowledge of IT activities in the employing organisation external to their function.	☐	☐
Exploring a topic that is not part of their normal responsibilities, and presenting findings to colleagues and/or management.	☐	☐
Attending meetings, seminars and workshops organised by a professional body and reading published material such as journals and web content.	☐	☐
Undertaking learning and practice in the techniques of team and collaborative working. Gaining an understanding of the underlying concepts.	☐	☐
Undertaking learning and practice in oral and written communications, including report writing and presentations.	☐	☐

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Network Engineer Template 2 – Weekly Diary

Week number	Activities completed	Competencies displayed	Supporting evidence

Network Engineer Template 3 – Periodic Workplace Competence Assessment and Remedial Action Plan

This template can be used to track the competencies being applied in the workplace on a continual / periodic basis. The training provider can then discuss any gaps with the employer and make a plan to redress the balance.

Competence assessment

In the normal course of work, is the apprentice demonstrating these competencies:	Sufficiently applied to meet minimum competence standard	Start / stop / continue – what should the apprentice start, stop or continue doing in order to develop this competence?
Can design simple networks from a well-defined specification and apply appropriate security products and processes?	☐	
Can install and configure network components, including switches, routers and firewalls?	☐	
Can optimise the performance of network systems and services?	☐	
Can monitor, test and adjust network systems and performance to meet accepted standards using diagnostic tools, analysers and other equipment?	☐	
Can apply diagnostic tools and techniques to identify the causes of network performance issues?	☐	
Can apply structured approaches to troubleshoot network issues, and repair faults in hardware, software products and the network?	☐	
Can undertake system upgrades to network hardware, software and operating systems?	☐	
Can integrate network-related software into an existing network environment?	☐	
Can interpret written requirements and technical specifications for network activities and maintain accurate records of network maintenance activities?	☐	

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Can log and respond to network service calls and provide technical network support to end users as required?	☐	
Can document work done in accordance with agreed procedures?	☐	
Can operate within the parameters of service level agreements, standards and/or agreed response times?	☐	
Can operate effectively in the business environment and respond to business issues related to network engineering?	☐	
Please add any other activities you think demonstrates the apprentice's competence in this area.	☐	

Remedial action plan

An important function of the training provider is to act as an advisor to the apprentice and the employer to ensure that the programme remains on track and any concerns are addressed. The training provider should agree how best to provide ongoing assistance / advice throughout the apprenticeship, possibly as part of their contract / service agreement with the apprentice's employer.

If any remedial action is required, the table below could be used to record it.

Remedial action (if any) required to deliver the plan / SLA agreed with the employer and apprentice to demonstrate the technical competencies in the employer's normal workplace environment
Please continue on a separate sheet as required

Network Engineer Template 4 – The Employer Reference

Apprentice details

Name	
ULN	

Training provider details

Company name	
Company address	
Contact name	

Employer details

Company address	
Name	

Signed by:

Print name:

Job title:

Date:

Overview

This template and guidance will assist the training provider in supporting the employer when completing the employer reference, which forms a key part of the final end point assessment.

This employer reference template should be used to record the employer's comments against the grading minimum standards, criteria and dimensions, as set out in the network engineer standard.

For each area of technical competence and behavioural proficiency, the employer will be asked to provide an overall evaluation on a three-point scale:

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

They should perform an evaluation using the checkboxes, and then provide an overall evaluation of the apprentice's competence or proficiency.

The template shows the type of activities that could demonstrate the required competencies and behaviours being applied in the workplace. There are always differences between individual employers and their requirements so there is the opportunity for the employer to include any other activity that they think demonstrates the apprentice's competence. It should be completed by a senior member of the team, who is able to comment directly on work activities.

Section 1 - Technical competence evaluation

Please provide your evaluation of the technical competence of the apprentice using the tables below. Under each heading is a list of activities that a competent apprentice should be able to demonstrate.

Please indicate your assessment of each competence using the checkboxes, and then provide an overall evaluation of the apprentice's technical competence

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Competence – Design

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Can design simple networks from a well-defined specification and apply appropriate security products and processes?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in design?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area.

Please continue on a separate sheet if required.

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Competence – Installation and Commissioning

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Can install and configure network components, including switches, routers and firewalls?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in installation and commissioning?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area.

Please continue on a separate sheet if required.

Competence – Optimisation

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Can optimise the performance of network systems and services?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in optimisation?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area.

Please continue on a separate sheet if required.

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Competence – Monitoring and Testing

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Can monitor, test and adjust network systems and performance to meet accepted standards using diagnostic tools, analysers and other equipment?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in monitoring and testing?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area.

Please continue on a separate sheet if required.

Competence – Diagnostics

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Can apply diagnostic tools and techniques to identify the causes of network performance issues?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in diagnostics?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area.

Please continue on a separate sheet if required.

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Competence – Troubleshooting

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Can apply structured approaches to troubleshooting network issues and repair faults in hardware, software products and the network?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in troubleshooting?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area.
Please continue on a separate sheet if required.

Competence – System Upgrades

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Can undertake system upgrades to network hardware, software and operating systems?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in system upgrades?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area.

Please continue on a separate sheet if required.

Competence – Network Integration

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Can integrate network related software into an existing network environment?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in network integration?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area.

Please continue on a separate sheet if required.

Competence – Interpretation of Information

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Can interpret written requirements and technical specifications for network activities and maintain accurate records of network maintenance activities?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in interpretation of information?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area.

Please continue on a separate sheet if required.

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Competence – Technical Support

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Can log and respond to network service calls and provide technical network support to end users as required?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in technical support?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area.

Please continue on a separate sheet if required.

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Competence – Documentation

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Can document work done in accordance with agreed procedures?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in documentation?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area.

Please continue on a separate sheet if required.

Competence – Service Level Support

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Can operate within the parameters of service level agreements, standards and/or agreed response times?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in service level support?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area.

Please continue on a separate sheet if required.

Competence – Business Environment

In your view, is the apprentice competent to:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Can operate effectively in the business environment and respond to business issues related to network engineering?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's competence in business environment?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of competence in this area.

Please continue on a separate sheet if required.

Section 2 - Behaviours, business skills and level of responsibility evaluation

Please provide an evaluation as to the level of responsibility of the apprentice you are providing a reference for using the tables below. Under each heading is a list of proficiencies that a competent apprentice should display. Please indicate your assessment of the apprentice's proficiency using the checkboxes, and then provide an overall evaluation of the apprentice's proficiency.

Proficiency – Business Skills

In your view, is the apprentice proficient at:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Demonstrating an analytical and systematic approach to issue resolution?	☐	☐	☐
Takes the initiative in identifying and negotiating appropriate personal development opportunities?	☐	☐	☐
Demonstrating effective communication skills?	☐	☐	☐
Appreciating the wider business context, and how their role relates to other roles and to the business of the employer or client?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's business skills?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of proficiency in this area.

Please continue on a separate sheet if required.

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Proficiency – Complexity

In your view, is the apprentice proficient at:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Applying methodical approaches to issue definition and resolution?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's proficiency at handing complexity?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of proficiency in this area.

Please continue on a separate sheet if required.

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Proficiency – Autonomy

In your view, is the apprentice proficient at:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Uses discretion in identifying and responding to complex issues and assignments?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's proficiency to work autonomously?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of proficiency in this area.

Please continue on a separate sheet if required.

Proficiency – Influence

In your view, is the apprentice proficient at:	The apprentice has MET this requirement	The apprentice has EXCEEDED this requirement	The apprentice has NOT MET this requirement
Having working level contact with customers, suppliers and partners?	☐	☐	☐
Interacting with and influences colleagues?	☐	☐	☐

- **Met** – you have observed this behaviour in the apprentice most of the time.
- **Exceeded** – you have observed this behaviour in the apprentice all of the time.
- **Not Met** – you have not observed this behaviour in the apprentice.

What is your overall evaluation of the apprentice's ability to influence?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of proficiency in this area.

Please continue on a separate sheet if required.

Section 3 – professional development

A number of professional development activities have been identified as part of the SFIA*plus* framework to help career development. These activities have been associated with the various levels of responsibility, and the activities listed in the table below represent those that are appropriate for a network engineer apprentice.

In your view, is the apprentice undertaking any of the following professional development activities:	The apprentice is demonstrably undertaking this activity	The apprentice is NOT demonstrably undertaking this activity
Participating in group activities inside or outside the working environment that can assist with the development of interpersonal skills?	☐	☐
Undertaking pro bono (unpaid) activities that can help to develop professional skills or offer additional insight into or understanding of their working role?	☐	☐
Undertaking learning in subjects relevant to but not directly related to their role (e.g. foreign language courses, mentoring skills, cultural awareness and diversity training), perhaps through self-study or evening classes?	☐	☐
Gaining basic knowledge of the employing organisation, its business, structure, culture, products/services, operations and terminology?	☐	☐
Gaining knowledge of IT activities in the employing organisation external to their function?	☐	☐
Exploring a topic that is not part of their normal responsibilities, and presenting findings to colleagues and/or management?	☐	☐
Attending meetings, seminars and workshops organised by a professional body and reading published material such as journals and web content?	☐	☐
Undertaking learning and practice in the techniques of team and collaborative working. Gaining an understanding of the underlying concepts?	☐	☐
Undertaking learning and practice in oral and written communications, including report writing and presentations?	☐	☐

What is your overall evaluation of the apprentice's ability to undertake wider professional development?

Please give reasons, together with supporting examples, why you think the apprentice has demonstrated this level of proficiency in this area.

Please continue on a separate sheet if required.

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Section 4 - Overall impressions and constructive feedback

This section is an opportunity for you to provide written feedback outside the rigid competency structure.

It is a free text field to allow you to share general thoughts on the apprentice's performance in case you were unable to say everything you wanted to say using the structured template. For example, you may want to highlight some of the areas where you have not been able to give the apprentice the exposure they would have liked.

We would welcome any general constructive development advice you may wish to give.

Please continue on a separate sheet if required.

Network Engineer Template 5 – Declaration and Evidence Checklists for the Completion of the Summative Portfolio

These templates are provided to support the training provider in working with the apprentice and employer to ensure the successful completion of the summative portfolio.

The checklists can be used by training providers to help them manage the process through to completion, although training providers may also substitute their own processes and documentation as they see fit.

The key responsibilities of the apprentice in producing their summative portfolio can be found in the General Guidance for Apprentices, Employers and Training Providers, as can generic guidance on how to select evidence to compile the summative portfolio.

The apprentice should gather artefacts and record information that can evidence their activities undertaken in the workplace. The portfolio of evidence should demonstrate the full range of competencies, as shown in this template, which are required by the standard to show that the apprentice can fulfil the role of a network engineer.

Summative Portfolio Declaration

Apprentice declaration

Name	[first name] [surname]
ULN	[e.g.123456]
Declaration	[I confirm that all the evidence submitted is my own work and it has been completed as specified]
Signature	
Date	

Line manager declaration (employer)

Name	[line manager name]
Company	[employer name]
Declaration	I confirm that the work contained within this portfolio has, to the best of my knowledge, been completed solely by [apprentice's name]
Signature	
Date	

Training provider declaration (training provider)

Name	[observer name]
Company	[training provider name]
Declaration	I confirm that the work contained within this portfolio has, to the best of my knowledge, been completed solely by [apprentice's name]
Signature	
Date	

Network engineer technical competencies evidence checklist

The defined competence areas and associated typical evidence are listed in this table. Not all employer businesses are identical so there will always be variation in the types of activity that will be carried out in the course of each apprentice's daily work; however, each network engineer apprentice must be able to demonstrate evidence of every competence.

Competence		
Design Design simple networks from a well-defined specification and apply appropriate security products and processes.		
Minimum expected requirement	List the evidence in the portfolio that fulfils this requirement	Reflections on applying knowledge learnt
Evidence showing that you have a solid understanding of networks.		
Evidence demonstrating that you apply the required techniques, tools, documentation and devices when designing secure networks.		

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Competence		
Installation and configuration Install and configure network components, including switches, routers and firewalls.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence showing that you can install and configure the elements required to implement a secure network, for example: • media; • hardware devices; • software.		

Competence		
Optimisation Optimise the performance of network systems and services.		

Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence demonstrating that you know how network performance can be optimised and implementing techniques to optimise performance as directed.		

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Competence		
Monitoring and testing Monitor, test and adjust network systems and performance to meet accepted standards using diagnostic tools, analysers and other equipment.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence demonstrating you using a minimum of three diagnostic techniques and tools to interrogate and gather information regarding network performance.		
Evidence that you can evaluate information to enable network performance to be optimised.		
Evidence showing how you maintain security and performance of the network against known and standard threats.		

Competence		
Diagnostics Apply diagnostic tools and techniques to identify the causes of network performance issues.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence demonstrating you have a solid understanding of the techniques and of using a minimum of three tools to identify network performance incidents and problems.		

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Competence		
Troubleshooting Apply structured approaches to troubleshoot network issues, and repair faults in hardware, software products and the network.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence that you have used a minimum of three techniques to gather information relating to network incidents and problems.		
Evidence of using a minimum of two tools to troubleshoot incidents and problems, and isolate, repair or escalate faults.		
Evidence that you can communicate and record solutions and remedial actions in line with organisational procedures.		

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Competence		
System upgrades Undertake system upgrades to network hardware, software and operating systems.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence of you using a minimum of three 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.		

Competence		
Network integration Integrate network-related software into an existing network environment.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence demonstrating how you have integrated end users' software solutions into an existing network environment.		
Evidence that you can develop, implement and communicate end user plans.		

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Competence		
Interpretation of information Interpret written requirements and technical specifications for network activities and maintain accurate records of network maintenance activities.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence of you receiving information from a manager, customer or technical specialist and interpreting the information to accurately implement the defined requirements.		
Evidence of you monitoring and identifying maintenance requirements and implementing required maintenance procedures.		
Evidence of you recording accurate data and outcomes of work undertaken.		

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Competence		
Technical support Log and respond to network service calls and provide technical network support to end users as required.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence of you demonstrating high levels of communication, organisational and prioritisation skills when dealing with clients and recording details relating to an incident or problem, whether face to face, remote or in writing.		

Competence		
Documentation Document work done in accordance with agreed procedures.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence that you show a solid understanding of the organisational procedures dealing with recording of information relating to IT systems and apply them effectively for internal and/or external customers.		
Evidence that you record information as specified in organisational policies, SLAs, OLAs, contracts and KPIs.		

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Competence		
Service level support Operate within the parameters of service level agreements, standards and/or agreed response times.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence that you show a sound understanding of the SLAs, OLAs, contracts and KPIs, and how they impact your role as a network engineer.		
Evidence showing that you can respond appropriately and in line with agreed timescales.		

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Competence		
Business Environment Operate effectively in the business environment and responds to business issues related to network engineering.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence that you 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.		
Evidence that you show you 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.		

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Generic levels of responsibility evidence checklist

Areas of responsibility and associated typical evidence are shown below.

Proficiency		
Business skills Demonstrates an analytical and systematic approach to issue resolution. Takes the initiative in identifying and negotiating appropriate personal development opportunities. Demonstrates effective communication skills. Appreciates the wider business context, and how their role relates to other roles and to the business of the employer or client.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence that you can demonstrate an analytical and systematic approach to issue resolution.		
Evidence that you can take the initiative in identifying and negotiating appropriate personal development opportunities.		
Evidence that you can demonstrate effective communication skills.		
Evidence that you can appreciate the wider business context, and how your role relates to other roles and to the business of the employer or client.		

Proficiency		
Complexity Applies a methodical approach to issue definition and resolution.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence that you can apply a methodical approach to issue definition and resolution.		

Proficiency		
Autonomy Uses discretion in identifying and responding to complex issues and assignments.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence that you can use discretion in identifying and responding to complex issues and assignments.		

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Proficiency		
Influence Interacts with and influences colleagues. Has working level contact with customers, suppliers and partners.		
Minimum expected requirement	**List the evidence in the portfolio that fulfils this requirement**	**Reflections on applying knowledge learnt**
Evidence that you can interact with and influences colleagues.		
Evidence that you have working level contact with customers, suppliers and partners.		

Professional development activities evidence checklist

Areas of additional professional development activities that might be undertaken and associated typical evidence are shown below.

Professional development topic	Objectives	Typical evidence
Understanding organisation	Gaining basic knowledge of the employing organisation, its business, structure, culture, products/services, operations and terminology. Gaining knowledge of IT activities in the employing organisation external to their function.	• organisation charts; • company annual reports; • company website; • documents or reports from other areas of the business.
Additional business skills	Undertaking learning and practice in the techniques of team and collaborative working. Gaining an understanding of the underlying concepts. Undertaking learning and practice in oral and written communications, including report writing and presentations. Learning from experience and mistakes and applying the lessons as part of continuous improvement.	• presentations, reports or minutes of meetings that demonstrate communication skills, report writing abilities and collaborative activities; • evidence of reviewing their work and suggesting improvements or critically appraising what they did and what they learned from it.
External activities	Participating in group activities inside or outside the working environment that can assist with the development of interpersonal skills. Undertaking pro bono (unpaid) activities that can help to develop professional skills or offer additional insight into or understanding of their working role.	• evidence of meetings attended through continuous professional development records; • evidence of activities undertaken.
Additional learning	Undertaking learning in subjects relevant to but not directly related to their role (e.g. foreign language courses,	• evidence of learning undertaken from continuous professional development records;

	mentoring skills, cultural awareness and diversity training), perhaps through self-study or evening classes. Exploring a topic that is not part of their normal responsibilities, and presenting findings to colleagues and/or management.	• evidence of presentations given to colleagues and/or management.
Professional networking	Attending meetings, seminars and workshops organised by a professional body and reading published material such as journals and web content.	• evidence of meetings attended through continuous professional development records; • written evidence summarising learning gained from reading.

Network Engineer Template 6 – End Point Assessment Readiness Check

The training provider should assess whether the apprentice has met the criteria for the end point assessment as defined in the standard.

The template below is a simple checklist that may be used.

Competence	Ready	Not ready	Comments
Can design simple networks from a well-defined specification and apply appropriate security products and processes?	☐	☐	
Can install and configure network components, including switches, routers and firewalls?	☐	☐	
Can optimise the performance of network systems and services?	☐	☐	
Can monitor, test and adjust network systems and performance to meet accepted standards using diagnostic tools, analysers and other equipment?	☐	☐	
Can apply diagnostic tools and techniques to identify the causes of network performance issues?	☐	☐	
Can apply structured approaches to troubleshoot network issues, and repair faults in hardware, software products and the network?	☐	☐	
Can undertake system upgrades to network hardware, software and operating systems?	☐	☐	
Can integrate network-related software into an existing network environment?	☐	☐	
Can interpret written requirements and technical specifications for network activities and maintain	☐	☐	

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accurate records of network maintenance activities?			
Can log and respond to network service calls and provide technical network support to end users as required?	☐	☐	
Can document work done in accordance with agreed procedures?	☐	☐	
Can operate within the parameters of service level agreements, standards and/or agreed response times?	☐	☐	
Can operate effectively in the business environment and respond to business issues related to network engineering?	☐	☐	

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