Next Generation Higher National Educator Guide

Higher National Diploma Networking and Cloud Infrastructure

Qualification code: GV21 48

This qualification is available in a restricted delivery model from academic session 2025

This guide provides information about the Higher National Diploma (HND) to ensure consistent and transparent assessment year on year. It is for lecturers and assessors, and contains all the mandatory information you need to deliver and assess the HND.

You must read it alongside the Grading Pack.

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Contents

Purpose of the qualification

Networking and cloud infrastructure are critical components of modern computing and are increasingly in demand by employers across a wide range of organisations and industries. The demand for networking and cloud infrastructure professionals is projected to grow in the coming years. Networking and cloud infrastructure are rapidly evolving fields, with new technologies and techniques emerging.

This qualification includes current technologies and applications of networking in modern computing. The larger units provide an opportunity for more integrated teaching and assessment in the qualification.

Learners gain skills in configuring and maintaining a network infrastructure, working with a variety of networking technologies, including routers, switches, and wireless access points. They gain experience in designing, implementing, and maintaining network and cloud infrastructure for an organisation, working with a variety of networking technologies and cloud-based platforms. They understand the importance of security and integrity in a network and cloud infrastructure and implement intrusion detection and prevention systems.

Many of the skills and concepts in the qualification can be transferred to other areas of computing and technology. The qualification also offers opportunities for learners to develop the meta-skills and professional attitudes required in this vital industry sector, along with awareness of legal and ethical obligations, including those relating to diversity, inclusion and sustainability.

Structure

Higher National Diplomas (HNDs) are at SCQF level 8 and are made up of 120 SCQF credit points (15 SQA credits). HNDs must incorporate at least 80 credit points (10 SQA credits) at SCQF level 8.

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HND Networking and Cloud Infrastructure satisfies the design requirements for Next Generation Higher National (NextGen: HN) Qualifications. It incorporates a mandatory project unit (Professional Practice in Networking and Cloud Infrastructure) at SCQF level 8 with an SQA credit value of 4 credits. In comparison with HND Computing: Networking (GG7C 16), it has a reduced number of distinct units (from 12 to 6), with a corresponding reduction in assessment load for learners.

Framework

The HND is made up of mandatory and optional units. Learners must complete all the mandatory units and 8 SQA credits from the optional units.

Mandatory units

Unit code	Unit title	SQA credits	SCQF credit points	SCQF level
J68T 48	Network Infrastructure	3	24	8
J7EA 48	Professional Practice in Networking and Cloud Infrastructure	4	32	8

Optional units

Unit code	Unit title	SQA credits	SCQF credit points	SCQF level
J7E2 48	Advanced Network Technology	3	24	8
J6C9 48	Agile Project Management	2	16	8
J7E3 48	Cloud Virtualisation Infrastructure	3	24	8
J897 48	DevOps Principles and Practice	2	16	8
J7E4 48	Digital Forensics	2	16	8
J7E5 48	Firewall Technology	2	16	8
J7E6 48	Infrastructure Maintenance and Support	3	24	8
J7E7 48	Managing a Web Server	2	16	8
J7E9 48	Network Server Operating Systems	2	16	8

There are no restrictions on the choice of optional units in this qualification.

Aims of the qualification

General aims

1. Develop a range of academic competencies at SCQF level 8, including study and research skills.
2. Develop vocational skills to prepare learners for employment in current and future roles.
3. Develop capacity for learners to apply knowledge and skills to solve real-world problems.
4. Develop professionalism to support lifelong professional learning and development.
5. Enable progression within the Scottish Credit and Qualification Framework.
6. Develop meta-skills that complement technical and professional knowledge and skills.
7. Develop Learning for Sustainability skills, knowledge, understanding and values.

Specific aims

1. Develop an understanding of the principles and concepts that underpin computer networking and associated technologies.
2. Develop a range of specialist knowledge and skills in computer networking and infrastructure technologies, including security.
3. Develop competence in the design, building and testing of network systems and subsystems to meet specified requirements.
4. Develop competence in the use of specialist digital, wireless and network laboratory equipment, safely and effectively.
5. Develop understanding of current trends in computer networking and infrastructure, such as distributed cloud, and their application for the benefit of society and the economy.
6. Provide practical experience in the application of theory to a range of real-world contexts.

7. Prepare for employment in the design, implementation and testing of computer networking and infrastructure design solutions.
8. Develop the underpinning knowledge and skills required for carrying out vendor networking certifications and exams.
9. Develop computational thinking, problem recognition, deconstruction, and logical thinking skills.
10. Gain understanding of the ethical, social and legal issues associated with the use of computer network systems, including those relating to diversity, inclusion and sustainability.
11. Prepare for progression to further studies in networking, or related disciplines, at SCQF level 9.

Who is this qualification for?

This qualification is suitable for learners who wish to develop knowledge and understanding of the underlying concepts and principles that are fundamental to the development of computer networks and their related infrastructure. It is particularly advantageous to learners with a background in a computing-related subject or those who wish to pursue a career in science, technology or engineering. See the 'Mapping National Occupational Standards (NOS) to units' table for more details.

Entry to this qualification is at your centre's discretion. However, we recommend that learners have one or more of the following:

- HNC Computing (NextGen: HN) GT6G 47
- HNC Computing GF3E 15
- HNC Cyber Security GP10 15

Recognising prior learning

SQA recognises that learners gain knowledge and skills through formal, non-formal and informal learning contexts. Formal learning is learning certificated by a recognised awarding or professional body. Non-formal learning includes learning such as employers' in-house training courses. Informal learning is learning based on experience from a variety of environments that is not formally assessed.

It is unlikely that a learner would have the appropriate prior learning and experience to meet all the requirements of a full HND.

You can find more information and guidance about the recognition of prior learning on SQA's website.

Articulation and progression

Learners who complete this qualification could go on to:

- other qualifications in networking and infrastructure or related areas
- further study, employment and/or training
- degree-level study in networking and infrastructure

Professional recognition

HND Networking and Cloud Infrastructure does not lead to professional recognition. However, there are units in the framework that provide the knowledge and skills relevant to some vendor certifications in computer networking and cloud infrastructure.

Credit transfer arrangements

Centres can make decisions about transferring credit. They can transfer credit if the subject-related content of the units is broadly equivalent. Centres should consider the currency of a learner's achievement before transferring credit.

Recommended Core Skills entry profile

Learners should have the following Core Skills at the stated SCQF levels before starting this qualification. This information can help identify learners who may need additional support.

Core Skill	Recommended SCQF entry profile
Communication	Level 6
Numeracy	Level 6
Information and Communication Technology (ICT)	Level 6
Problem Solving	Level 6
Working with Others	Level 6

How the qualification meets employer and higher education institution needs

This qualification is designed in collaboration with employers, higher education institutions (HEIs), practitioners and professional bodies to meet the sector need.

The following tables show how the qualification can benefit employers and HEIs by equipping learners with the necessary skill set:

- Table 1 shows how units map to the aims of the qualification.
- Table 2 shows how the units map to National Occupational Standards (NOS).
- Table 3 shows the assessment strategy for the qualification.

Table 1: mapping qualification aims to units

General aims

Key: aim is directly relevant to unit (X), aim is optional in this unit (O), aim is not applicable to this unit (N/A)

Unit code	Unit title	Aim 1	Aim 2	Aim 3	Aim 4	Aim 5	Aim 6	Aim 7
J68T 35	Network Infrastructure	X	X	X	N/A	X	X	X
J7EA 48	Professional Practice in Networking and Cloud Infrastructure	X	X	X	X	X	X	X
J7E2 48	Advanced Network Technology	X	X	X	N/A	X	X	X
J6C9 48	Agile Project Management	X	X	X	X	X	X	N/A
J7E3 48	Cloud Virtualisation Infrastructure	X	X	X	N/A	X	X	X
J7E4 48	Digital Forensics	X	X	X	X	X	X	N/A
J897 48	DevOps Principles and Practice	X	N/A	X	N/A	X	X	X
J7E5 48	Firewall Technology	X	X	X	N/A	X	X	N/A

Unit code	Unit title	Aim 1	Aim 2	Aim 3	Aim 4	Aim 5	Aim 6	Aim 7
J7E6 48	Infrastructure Maintenance and Support	X	X	X	X	X	X	X
J7E7 48	Managing a Web Server	X	X	X	N/A	X	X	X
J7E9 48	Network Server Operating Systems	X	X	X	N/A	X	X	N/A

Specific aims

Key: aim is directly relevant to unit (X), aim is optional in this unit (O), aim is not applicable to this unit (N/A)

Unit code	Unit title	Aim 1	Aim 2	Aim 3	Aim 4	Aim 5	Aim 6	Aim 7	Aim 8	Aim 9	Aim 10	Aim 11
J68T 35	Network Infrastructure	X	X	X	X	X	X	X	X	X	X	X
J7EA 48	Professional Practice in Networking and Cloud Infrastructure	X	X	X	X	X	X	X	X	X	X	X
J7E2 48	Advanced Network Technology	X	X	X	X	X	X	X	X	X	X	X
J6C9 48	Agile Project Management	N/A	N/A	N/A	N/A	N/A	X	X	N/A	X	X	X

Unit code	Unit title	Aim 1	Aim 2	Aim 3	Aim 4	Aim 5	Aim 6	Aim 7	Aim 8	Aim 9	Aim 10	Aim 11
J7E3 48	Cloud Virtualisation Infrastructure	N/A	X	X	X	X	X	X	X	X	X	X
J7E4 48	Digital Forensics	X	X	X	X	N/A	N/A	X	X	X	X	X
J897 48	DevOps Principles and Practice	X	N/A	X	N/A	N/A	N/A	X	N/A	X	X	X
J7E5 48	Firewall Technology	X	X	X	X	N/A	X	X	X	X	X	X
J7E6 48	Infrastructure Maintenance and Support	X	X	X	X	X	X	X	X	X	X	X
J7E7 48	Managing a Web Server	X	X	N/A	X	N/A	X	N/A	X	X	N/A	X
J7E9 48	Network Server Operating Systems	X	X	N/A	N/A	N/A	X	X	X	X	X	X

Table 2: mapping National Occupational Standards (NOS) to units

The NOS for IT professionals are organised into 11 IT NOS disciplines, each with multiple sub-disciplines.

The table below identifies the sub-disciplines that cover the key areas of computer networking and cloud infrastructure, such as:

- network design and implementation
- technical support and consultancy
- cybersecurity
- service management
- project management
- database development and management

Sub-discipline references 1.1 to 11.3

IT professional NOS discipline	Sub-discipline
1. Digital Leadership Personal Competencies	1.1. Business Competencies
2. Business Analysis and Change Management	2.6. Requirements Engineering
4. Architecture, Analysis and Design	4.1. Systems Architecture 4.8. IT Infrastructure Design and Planning
5. Solutions Development, Systems Development	5.1. Software Development 5.5. Software Process Improvement

IT professional NOS discipline	Sub-discipline
6. Cyber Security (IT Professional)	6.1. Information Security Management 6.3. Implementing Secure Systems 6.5. Operational Security Management 6.8. Digital Forensics
7. Service Management and Delivery	7.1. IT Service Operations and Event Management 7.2. IT Service Helpdesk and Incident Management 7.3. IT Problem Management 7.4. Application Management and Support 7.6. Availability Management 7.7. IT Capacity Management 7.8. Change and Release Management
9. IT Networks, Network Services Planning	9.1. Network Design 9.2. Network Implementation and Support
11. Telecommunications	11.1. Plan Telecommunications Services 11.2. Install Telecommunications Equipment 11.3. Maintain the Performance of Telecommunications Services and Equipment

Unit code	Unit title	NOS codes
J68T 35	Network Infrastructure	2.6, 4.1, 4.8, 6.3, 6.5, 7.1, 7.7, 9.1, 9.2, 11.1, 11.2, 11.3
J7EA 48	Professional Practice in Networking and Cloud Infrastructure	1.1, 2.6, 6.1, 6.3, 6.5, 7.8, 9.1, 9.2, 11.2
J7E2 48	Advanced Network Technology	4.8, 7.1, 9.1, 9.2, 11.1, 11.2, 11.3
J6C9 48	Agile Project Management	1.1, 6.1, 7.1, 7.2, 7.3, 7.4, 7.6, 7.7, 7.8
J7E3 48	Cloud Virtualisation Infrastructure	4.1, 4.8, 7.1, 7.2, 7.3, 9.1, 9.2
J7E4 48	Digital Forensics	6.8
J897 48	DevOps Principles and Practice	1.1, 4.1, 4.8, 6.3, 7.1, 7.4, 7.7, 7.8, 9.2
J7E5 48	Firewall Technology	6.1, 6.3, 6.5, 9.1, 9.2
J7E6 48	Infrastructure Maintenance and Support	4.8, 7.1, 7.2, 7.3, 7.4, 7.6, 7.7, 7.8
J7E7 48	Managing a Web Server	4.8, 7.1, 7.2, 7.3, 9.2
J7E9 48	Network Server Operating Systems	4.8, 7.1, 7.4, 9.2

Table 3: assessment strategy for the qualification

Unit code	Unit title	Assessment method
J68T 48	Network Infrastructure	Knowledge evidence: This requires a theoretical assessment. You can use a closed-book test. Product evidence: From a given scenario, learners design and build a network, including cabling and configuration of network services. They demonstrate practical skills in network troubleshooting and testing.
J7EA 48	Professional Practice in Networking and Cloud Infrastructure	Product evidence (team): This is an extended team project of sufficient size and complexity to require a team solution to a network infrastructure problem. The project team produces a report on: • how they planned and managed the project • analysed the requirements • designed and implemented a network solution • conclusions and recommendations Product evidence (individual): Learners produce a reflective report on their individual contribution to the project. Performance evidence: This is a team presentation of the conduct of the project, the outcomes and solution. Meta-skills: Learners produce a reflective report showing that they have self-assessed their meta-skills, created a plan for development and carried out activities that improved and developed their meta-skills. Learning for sustainability: Leaners produce a report on how a networking process or product could be more sustainable and meet the aims of at least two selected UN SDGs.

Unit code	Unit title	Assessment method
J7E2 48	Advanced Network Technology	Knowledge evidence: A sampling frame is provided for knowledge tests. Alternatively, a portfolio can evidence knowledge through reports, diagrams and screenshots. Product evidence: From a brief or plan, learners build and test a network to demonstrate routing, network security and wide area network (WAN) technologies. Evidence is in the form of observation checklists, reports, presentations or demonstrations.
J6C9 48	Agile Project Management	Product evidence: Learners apply Agile techniques in the conduct of at least one project, with evaluation of outcomes.
J7E3 48	Cloud Virtualisation Infrastructure	Knowledge evidence: A sampling framework is provided for knowledge tests. Product evidence: From a given brief, learners: • create and build a cloud storage solution, implementing security and access control • automate a cloud infrastructure, and perform compute operations in the cloud
J897 48	DevOps Principles and Practice	Knowledge evidence: In any form of media, learners demonstrate knowledge relating to each outcome. Product evidence: A portfolio incorporating screenshots, operational logs, code files and repository links.
J7E4 48	Digital Forensics	Knowledge evidence: A sampling frame is provided for the knowledge test. Alternatively, learners can describe and explain methods used in digital forensics. Product evidence: Learners acquire and analyse forensic evidence and produce formal digital forensic reports and documentation.

Unit code	Unit title	Assessment method
J7E5 48	Firewall Technology	Knowledge evidence: A sampling frame is provided for the knowledge test. Product evidence: Learners apply practical configurations of network firewalls to facilitate traffic flow and internet connectivity. Evidence is in the form of checklists and reports.
J7E6 48	Infrastructure Maintenance and Support	Knowledge evidence: A sampling frame is provided for the knowledge test. Product evidence: From a given scenario or brief relating to a network, learners secure, analyse and support the network. Evidence is in the form of checklists for practical skills and a report on network performance.
J7E7 48	Managing a Web Server	Knowledge evidence: Learners produce a report that analyses operating system requirements and security issues (500 words), plus two topic reports (100 words each). Product evidence: Learners: • install and configure a web server • incorporate a web database and server-side scripting • maintain web directory structures • implement name-based virtual hosting • apply permissions • back up server and websites

Unit code	Unit title	Assessment method
J7E9 48	Network Server Operating Systems	Knowledge evidence: A sampling frame is provided for the knowledge test. Product evidence: This should be a case study or project of sufficient complexity to produce evidence for all the skills statements. This involves learners: • installing, upgrading and patching a NOS both locally and remotely • managing physical and logical disks • creating network permissions and authentication for users and groups • backing up and restoring data

Meta-skills

Every NextGen: HN Qualification gives learners the opportunity to develop meta-skills.

Meta-skills are transferable behaviours and abilities that help people to adapt and succeed in life, study and work. There are three categories of meta-skills: self-management, social intelligence and innovation. Each of these is made up of four meta-skills and a number of sub-skills.

- Self-management — focusing, integrity, adapting, initiative
- Social intelligence — communicating, feeling, collaborating, leading
- Innovation — curiosity, creativity, sense-making, critical thinking

From early in the qualification, we want learners to identify and understand the meta-skills they can develop, and to appreciate the personal and professional value of these skills. We want to support learners to continue to articulate, use and build on them long after they have achieved their qualification. In this way, we help learners to develop broad skills profiles, enabling them to thrive in a changing world.

Every NextGen: HN unit signposts opportunities for learners to develop meta-skills, and there is an assessed outcome in one of the mandatory units. When you make your whole-qualification grade decisions, you consider learners' commitment to engaging with meta-skills development.

You do not assess learners on their competence or progress in individual meta-skills. Instead, you assess them on evidence that they have engaged with a personal process of development. Meta-skills development is founded on a clear process of self-assessment, goal setting, action planning and reflective practice.

You can find meta-skills teaching, learning and assessment resources on SQA's meta-skills web page.

Meta-skills in HND Networking and Cloud Infrastructure

You can introduce meta-skills to learners as tools they can use in response to real-world challenges and opportunities. At SCQF level 8, you should use terminology from the Skills 4.0 model, but it is important that you develop a shared understanding with learners about meta-skills and what they mean to them, both individually and in the context of coursework, projects and the networking and infrastructure sectors.

You should embed meta-skills in learning and project tasks as a context for planning, practice, and reflection. You should encourage learners to be self-aware, set active goals and monitor their progress.

The process of developing meta-skills is not linear and you should make learners active participants in their learning. At the start of the process, you should introduce meta-skills to learners and explore the concept of self-assessment with them. You should set goals and make development and evaluation plans together. The process should become cyclical, with reflective practice informing new self-awareness, goal setting and review.

Many traditional learning and teaching activities used to develop industry- or sector-specific skills, knowledge and understanding also support the development of meta-skills. You can map these in course materials and resources and during learning.

Meta-skills are central to successfully engaging with and completing assignments and projects. You should encourage learners to plan how they will use and develop meta-skills in their coursework and to reflect on their success and future goals.

The role of the coach, mentor or facilitator is key to help learners understand, develop and reflect on their own meta-skills and those central to course activities, assessment projects and their target industry or sector. You and any employer partners or guest speakers could guide learners by taking on a coaching and mentoring role.

In this role, you should introduce learners to the fundamentals of reflective practice. You could use several models of reflective practice. You do not need to use a theoretical perspective. Any reference to these models should support learners' understanding of the nature and value of reflective practice in self-understanding and making change.

Introducing reflective practice can support your learners' personal development and goal setting. Frequent formative peer-to-peer, assessor, client (if appropriate) and group reflection activity can support learners through reflective practice.

Learners can focus on any meta-skills appropriate to them and their context. However, learning and teaching should also facilitate individual development. Learners have individual strengths and areas for development, and they do not have to reach a particular level in relation to meta-skills. Coursework and projects provide the context for development appropriate to the SCQF level. Within these contexts, the process of development is important. You should create a clear learning plan with each learner to provide evidence of their development.

You can create descriptions of abilities and skills that relate to meta-skills with learners. These can come from self-profiling, exploring the industry and sector, and discussion with peers and employers. You should consider the meta-skills needed to complete coursework and meet personal goals to set a context for reflection.

Exploring learning and working styles, personality traits and preferences, personal profiling and self-assessment tools can help learners to develop an understanding of their strengths and areas for development.

You can use case studies and scenario-based activities to demonstrate the value of meta-skills and how they can be applied. You can provide opportunities for peer reflection. A group of learners could share experiences and reflections about how to apply meta-skills in the context of their coursework. You could adopt the role of facilitator to draw learners' attention to situations where meta-skills were or could have been applied.

Reflective discussions can focus on how and where meta-skills are being developed. Your discussions with learners could include positive recognition and guidance on

future development based on previous performance. As learners progress, you could introduce industry content that requires skills like problem recognition and problem solving, both of which combine multiple meta-skills.

You can deliver the knowledge and skills for practical aspects of projects in sequence. However, learners benefit from learning and teaching that integrates meta-skills with project planning and development. This approach supports learners to engage in reflective practice throughout the project and develops their self-awareness and an appreciation for continuous learning. It also maximises your opportunities to support, coach and mentor learners through their projects.

Learning for Sustainability

Context

The United Nations (UN) 2030 Agenda for Sustainable Development, adopted by the UK in 2015, has shaped the development of Scottish, national and international sustainability policy. It sets out the UN Sustainable Development Goals (SDGs), which are central to the Scottish Government's National Performance Framework. Learning for Sustainability (LfS) is a commitment to embedding the SDGs in Scottish education.

LfS embraces global citizenship, sustainable development, social justice, human rights, climate change, biodiversity loss, equality and inclusion. Learners develop their capacity to deal with the unpredictable social, economic and environmental challenges facing our rapidly changing world.

LfS combines:

- education for sustainable development (ESD)
- global citizenship
- outdoor learning

ESD is the internationally used term for sustainability education. Although LfS has a broader remit, the terms are largely interchangeable. Colleges and universities tend to use ESD, while schools usually use LfS. Both focus on a broad range of social, economic and environmental themes and approaches across all levels of education. SQA uses LfS as an umbrella term.

Learning for Sustainability in Next Generation Higher National Qualifications

Sustainability is a core component in this qualification.

Learners who complete this qualification should have:

- a general understanding of social, economic and environmental sustainability
- a general understanding of the SDGs
- a deeper understanding of subject-specific sustainability
- the confidence to apply the skills, knowledge, understanding and values they develop in the next stage of their life

Sustainability is embedded as an outcome in the Professional Practice in Networking and Cloud Infrastructure unit.

Learners who complete this outcome can:

- assess their own knowledge and understanding of sustainability and the SDGs
- review unit content against the SDGs to identify a sustainability-related issue
- apply knowledge and understanding of sustainability and the SDGs to propose improvements

There are several ways in which you can introduce concepts relating to sustainability to learners. These include:

- energy efficiency: understanding the power consumption of network devices and optimising data centre infrastructure for energy efficiency contributes to UN SDG 7: affordable and clean energy
- green computing: green computing principles help learners understand how to reduce e-waste, leading to less harmful impact on the environment, and directly supports SDG 12: responsible consumption and production
- remote working: the ability to create and manage remote networks reduces the need for commuting, thereby decreasing carbon emissions, contributing to SDG 13: climate action

- digital divide: building networks that are accessible and affordable in underserved areas can help bridge the digital divide, supporting SDG 10: reduced inequalities, and SDG 9: industry, innovation and infrastructure
- sustainable hardware: selecting networking equipment manufactured in an eco-friendly manner and designed for easy end-of-life disposal or recycling can contribute to SDGs 9 and 12
- resource optimisation: learning to optimise network resources can reduce unnecessary energy use and hardware requirements, aligning with SDGs 7, 9, and 12
- security and privacy: implementing robust security measures can protect users' rights and privacy, upholding SDG 16: peace, justice, and strong institutions
- disaster recovery planning: planning for disasters ensures business continuity while reducing potential harm to communities and environments, addressing elements of SDG 11: sustainable cities and communities, and SDG 13: climate action
- educational technology for sustainability: using networking knowledge to create sustainable educational technology solutions can democratise education, directly supporting SDG 4: quality education

By incorporating these themes and concepts into your curriculum, you help learners to contribute to a more sustainable future.

You can cover any of the SDGs that are relevant to the subject area.

Find out more about SQA's approach on the NextGen: HN Learning for Sustainability web page. There is an LfS reflective template available in the resources section. You may find it helpful as a starting point for considering how the SDGs are, or could be, embedded in a qualification, unit or assessment.

Grading

Please see the Grading Pack for this qualification for more information on making grade judgements.

Grading in NextGen: HN Qualifications produces a valid and reliable record of a learner's level of achievement across the breadth of the qualification content.

As well as grading the whole qualification, you assess individual units on a pass or fail basis. Each unit has evidence requirements that learners must achieve before you can consider them for whole-qualification grading.

Whole-qualification grade outcomes

Learners who pass NextGen: HN Qualifications receive one of the following grade outcomes for the qualification as a whole:

- Achieved with Distinction
- Achieved with Merit
- Achieved

To determine a learner's whole-qualification grade, you use the grading matrix provided in the Grading Pack to assess and judge their performance across the key aspects of the HND. You must align your judgements with the following whole-qualification grade descriptors.

Whole-qualification grade descriptors

Achieved with Distinction

The learner has achieved an excellent standard across the course content, going significantly beyond meeting the qualification requirements. They showed a comprehensive knowledge and understanding of course concepts and principles, and consistently used them to apply skills to complete high-quality work. They engaged significantly with the process of developing their meta-skills in the context of their HN Qualification.

Achieved with Merit

The learner has achieved a very good standard across the course content, going beyond meeting the qualification requirements. They showed a very good knowledge and understanding of course concepts and principles, and consistently used them to apply skills to complete work of a standard above that expected for an Achieved grade. They actively engaged with the process of developing their meta-skills in the context of their HN Qualification.

Achieved

The learner has achieved a good standard across the course content, credibly meeting the qualification requirements. They showed a good knowledge and understanding of course concepts and principles, and used them to apply skills to complete work of the required standard. They engaged with the process of developing their meta-skills in the context of their HN Qualification.

Approaches to delivery and assessment

You should prioritise the Networking Infrastructure mandatory unit for delivery as early as possible, as it provides the underpinning knowledge and skills for many optional topics, such as Advanced Network Technology and Infrastructure Maintenance and Support. You should start the mandatory project unit (Professional Practice in Network and Cloud Infrastructure) when learners have sufficient breadth of knowledge in their optional topics to apply the concepts, principles and skills to the solution of a significantly large and complex networking and cloud infrastructure project.

You should consider when you might deliver units in tandem to enhance learning, or where sequential delivery might provide the best learning opportunity. In all the units in this qualification, you should realise the networking concepts through practical experiences with real-world networks and infrastructures. The more realistic these are, the more powerful the learning experience is. The increasing availability of virtual cloud infrastructures from technology vendors offers scope to challenge learners to apply their knowledge and skills to unfamiliar contexts.

Many of the units are suited to assessment in the form of assignments and/or projects. In such cases the product evidence is clearly specified, and you should use this information to plan work that enables learners to meet the evidence requirements. The case studies and assignments used for the purpose of generating assessment evidence should be as real-world as possible, while considering the SCQF level of the unit. Where program code is required, centres should ensure that learners have sufficient access to programming resources such as integrated development environments (IDEs) or notebook-style environments.

Sequencing or integrating units

Some units benefit from co-delivery to enhance the learning experience. Typical examples of these could be:

- Firewall Technology and Infrastructure Maintenance and Support
- Advanced Network Technology and Cloud Virtualisation Infrastructure
- Agile Project Management and Managing a Web Server

Alternatively, the units could follow the process of designing, creating and securing a network, followed by its maintenance and support.

Additional guidance on integrated or holistic assessment

Holistic or integrated assessment focuses on assessing a number of outcomes in a unit together, or in some cases, assessing the unit as a whole, rather than by outcome. When assessing a unit of competence holistically, the assessment activities integrate a number of aspects of the competence. Holistic or integrated assessment can reduce the time spent on assessment and can promote greater equity in the assessment process.

When developing or revising a NextGen: HN Qualification, SQA works with a development team to devise an appropriate assessment strategy that accommodates holistic or integrated assessment. However, the practice of integrating units for the purposes of learning and teaching is a centre-led activity.

Units are designed to facilitate holistic or integrated assessment approaches that prevent large, unwieldy assessments.

Sometimes more than one piece of evidence is needed for a unit. For example, if a unit is about building a wall, a learner would need to produce evidence of performance (following the correct procedures and processes when building the wall) and product (a completed wall).

Evidence requirements must do what they say: specify requirements for evidence of learner competence in the unit. The evidence must be of sufficient quality for an assessor or verifier to judge that the learner has achieved the unit.

Assessing project units

The Professional Practice in Networking and Cloud Infrastructure unit comprises a networking and infrastructure project that is sufficiently large or complex to require analysis by a project team. You should organise your group into teams of three-to-five learners, considering their preferences in relation to the available projects and your judgement of an appropriate composition for each team, which should vary in terms of age, gender, ability, and other relevant characteristics.

You should have a range of networking and infrastructure projects that are suitable to enable learners to demonstrate the outcomes of the project unit. You should select these to be as authentic (real-world) as possible and aligned to the level of study required. The project should allow learners to draw on the range of outcomes in the qualification and make it possible for them to develop their meta-skills while engaging in the project. To standardise the learner experience and level of demand, you should use a template to describe the objectives and required outcomes for each project offered to the groups of learners.

Your role in the conduct of the projects is to:

- approve projects
- assign learners to teams
- ensure each team allocates roles at the commencement of the project
- receive briefings from each team on progress against milestones
- observe and record the contributions of individual learners to teamwork and solution
- arrange for the presentation of the project outcomes and solution
- intervene to guide and support learners when circumstances require it

This role should be light touch, leaving each team to make their own decisions about a project methodology, as well as roles, timelines, resource allocations and

meetings. We recommend that each learner leads a specific part of the project (such as lead data analyst or lead tester).

The product evidence is a network infrastructure whose requirements must be sufficiently complex to require formal project management and development approaches. Each project team must collectively produce the following items, 1 to 5. Each learner must individually produce item 6.

Learners' product evidence must include:

1. the project plan, based on requirements-gathering and analysis
2. the network solution to the problem
3. a project report (including project evaluation)
4. documentation of the product (technical and user)
5. a presentation of the project outcomes and demonstration of solution
6. a personal statement

Learners' network solution must meet the requirements set out in the project plan. Their personal statements must:

- describe their specific role in the project team
- include a self-evaluation of their contribution to the development of the digital product

The performance evidence is in two parts:

- a record of the learner's professional behaviours and contributions to the project; this may be in the form of a checklist
- a recording of the project team's performance in delivering the presentation

Each learner must make an identifiable contribution to the final presentation of the project outcomes and the demonstration of the solution; the contribution can be in any form that is appropriate and agreed with the tutor.

Remediation and re-assessment in Next Generation Higher National Qualifications

Remediation

Remediation allows an assessor to clarify learners' responses, either by requiring a written amendment or by oral questioning, where there is a minor shortfall or omission in evidence requirements. In either case, the assessor must formally note such instances, in writing or as a recording, and make them available to the internal and external verifier.

Remediation is not permitted for closed-book assessments.

The size and structure of the larger NextGen: HN units should mean that the assessor or lecturer is close enough to ongoing assessment activity in project-based units to identify the requirement for remediation as it occurs.

Re-assessment

We must give learners who fail the unit a re-assessment opportunity or, in exceptional circumstances, two re-assessment opportunities. Where we have introduced larger units to the framework, we expect instances of re-assessment to be minimal, due to the approach to assessment and remediation. Where re-assessment is required in a project-based unit, a substantially different project must be used.

Resource requirements

The resource requirements for the qualification are dependent to some extent on the optional units chosen. For example, the optional unit Cloud Virtualisation Infrastructure requires access to cloud infrastructure and user accounts with a cloud service provider. These resource requirements are listed in each unit specification.

The mandatory units require access to networking resources to enable them to build networks, secure them and maintain them. This usually requires a networking lab that is disconnected from the main centre networks to avoid any contamination of centre business systems.

Where program code is developed, learners should have access to appropriate integrated development environments (IDEs) and code libraries. We also recommend that they have access to a notebook-style environment.

Delivering this qualification requires a mix of physical and digital resources to provide hands-on, real-world experiences for learners. Suggestions include:

1. Physical infrastructure

- a networking laboratory: a variety of networking devices such as switches, routers, and servers. You can create a sandbox environment where learners can physically interact with these devices to better understand their functionality and configuration
- computer workstations: each learner should have access to a computer workstation with high-speed internet. These should have modern processors, sufficient RAM (at least 16 GB recommended), and SSD drives for optimal performance

2. Software and digital resources

- operating systems: you need access to at least one network operating system and an appropriate single user operating system
- virtualisation software: this should be sufficient to enable learners to set up and experiment with different operating system (OS) configurations and network settings on the same physical machine
- networking software: software tools for network protocol analysis, network simulation, and security vulnerability scanning
- digital forensics tools: you need software for digital forensics investigations
- firewall and security tools: tools for firewall simulations, and security suites for demonstrations on detecting and mitigating threats

3. Cloud services

- cloud providers: access to services from one or more major cloud providers. Many of these providers offer educational programs or grants that can make their services more affordable for educational institutions
- cloud management tools: tools for infrastructure, such as code and cloud management
- containerisation and orchestration tools: tools for teaching about containerisation and orchestration in cloud environments

4. Online resources

- online resources: you should provide links to blogs, video tutorials, and forums that deal with new and emerging topics, along with any e-textbooks

5. Other

- industry partnerships: partnerships with IT businesses can provide learners with real-world problems to solve, and offer potential internship opportunities
- certification programs: aligning your delivery with professional certifications from vendors can help learners gain valuable, employable skills

Information for centres

Equality and inclusion

The units in this HND are designed to be as fair and as accessible as possible with no unnecessary barriers to learning or assessment.

You should consider the needs of individual learners when planning learning experiences, selecting assessment methods or considering alternative evidence.

Guidance on assessment arrangements for disabled learners and those with additional support needs is available on the assessment arrangements web page.

Internal and external verification

You must make sure all instruments of assessment you use in this qualification are internally verified according to your centre's policies and SQA's guidelines.

SQA carries out external verification to ensure that internal assessment meets the national guidelines for this qualification.

More information on internal and external verification is available in SQA's Guide to Assessment and in Next Generation: Higher National Quality Assurance — Guidance for Centres.

Glossary

SQA credits: 1 SQA credit equals 8 SCQF credit points.

SQA credit value indicates the contribution the unit makes to an SQA qualification. An SQA credit value of 1 represents approximately 40 hours of learning, teaching and assessment.

SCQF: the Scottish Credit and Qualifications Framework (SCQF) is Scotland's national framework for describing qualifications. We use SCQF terminology in this guide to refer to credits and levels. For more information on the SCQF, visit the SCQF website.

SCQF credit points indicate the amount of learning required to complete a qualification. NextGen HNCs and HNDs are worth 120 SCQF credit points.

SCQF levels indicate how hard the qualification is to achieve. The SCQF covers 12 levels of learning. NextGen HNCs are at SCQF level 7 and NextGen HNDs are at SCQF level 8.

Information for learners

HND Networking and Cloud Infrastructure

This information explains:

- what the qualification is about
- what you should know or be able to do before you start
- what you need to do during the qualification
- opportunities for further learning and employment

Qualification information

Higher National Diploma (HND) Networking and Cloud Infrastructure provides you with the opportunity to gain the knowledge, understanding and skills that you need to pursue a career in computer networking and cloud infrastructure and progress to higher levels of qualifications.

Networking and cloud infrastructure are critical components of modern computing which are increasingly in demand by employers across a wide range of organisations and industries. The demand for networking and cloud infrastructure professionals is projected to grow in the coming years. Networking and cloud infrastructure are rapidly evolving fields, with new technologies and techniques emerging.

In your course of study, you gain skills in configuring and maintaining a network infrastructure, working with a variety of networking technologies, including routers, switches, and wireless access points. You gain experience in designing, implementing, and maintaining network and cloud infrastructure, working with a variety of networking technologies and cloud-based platforms. You recognise the importance of security and integrity in a network and cloud infrastructure and implement intrusion detection and prevention systems.

Many of the skills and concepts in this qualification are transferable to other areas of computing and technology. The qualification also offers you opportunities to develop

the meta-skills and professional attitudes required in the industry sector, along with awareness of legal and ethical obligations, including those relating to diversity, inclusion and sustainability.

HND Networking and Cloud Infrastructure provides you with a solid foundation in the design, implementation, management and maintenance of secure network and cloud infrastructures. It helps you achieve the following specific aims:

1. Develop an understanding of the principles and concepts that underpin computer networking and associated technologies.
2. Develop a range of specialist knowledge and skills in computer networking and infrastructure technologies, including security.
3. Develop competence in the design, building and testing of network systems and subsystems to meet specified requirements.
4. Develop competence in the use of specialist digital, wireless and network laboratory equipment, safely and effectively.
5. Develop understanding of current trends in computer networking and infrastructure, such as distributed cloud, and their application for the benefit of society and the economy.
6. Provide practical experience in the application of theory to a range of real-world contexts.
7. Prepare for employment in the design, implementation and testing of computer networking and infrastructure design solutions.
8. Develop the underpinning knowledge and skills required for carrying out vendor networking certifications and exams.
9. Develop computational thinking, problem recognition, deconstruction, and logical thinking skills.
10. Gain understanding of the ethical, social and legal issues associated with the use of computer network systems, including those relating to diversity, inclusion and sustainability.
11. Prepare for progression to further studies in networking, or related disciplines, at SCQF level 9.

You study two mandatory units: the project unit (Professional Practice in Networking and Cloud Infrastructure, worth 4 SQA credits), and a unit that covers the concepts

that are essential to the practice of networking and cloud infrastructure (Network Infrastructure, worth 3 SQA credits). To achieve HND Networking and Cloud Infrastructure, you must pass the two mandatory units and additionally achieve at least 64 SCQF credit points from a group of optional units that enable you to develop an area of specialism, such as network security or cloud virtualisation.

Before starting the qualification, you would benefit from having attained the skills, knowledge, and understanding required by one or more of the following, or equivalent qualifications and/or experience:

- HNC Computing (NextGen: HN) GT6G 47
- HNC Computing GF3E 15
- HNC Cybersecurity GP10 15

You are assessed through a variety of approaches that reflect modern practice in assessment, including the use of projects, assignments and investigations, as well as question papers. You are encouraged to use a range of media to present evidence, such as video, audio, web pages and social media platforms. There is an emphasis on practical work in many of the units, using the tools and methods used in current industry practice.

Your grade reflects the quality of your work over the qualification. Project work that you have completed is graded according to a set of criteria that relate to the competencies expected of a networking and cloud infrastructure practitioner. The overall grade you receive is ‘achieved’, ‘achieved with merit’, or ‘achieved with distinction’.

You develop your personal meta-skills while studying industry- and sector-specific content. Meta-skills are higher-order skills that support the development of other skills and promote success in any context. They enable you to respond to professional challenges and opportunities by reflecting on, developing, applying and adapting industry skills and sector knowledge. Meta-skills are grouped into three categories: self-management, social intelligence, and innovation.

You also consider the value of the natural world and how the principles of social justice, human rights, global citizenship, and democratic participation help us live

within the ecological limits of the planet. During your studies, you develop your knowledge, skills and values related to the challenges of sustainability so that you can interact with the world in a socially responsible way.

Successful completion of the HND Networking and Cloud Infrastructure opens career opportunities for you in computer networking. You can study units that provide the knowledge and skills relevant to some vendor certifications in computer networking and infrastructure. You then have a sound basis for progression to degree programmes or other qualifications at SCQF level 9 in networking and infrastructure as well as other topics in computing, such as cyber security.

Administrative information

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History of changes

Version	Description of change	Date

Please check SQA's website to ensure you are using the most up-to-date version of this unit.

If a unit is revised:

- no new centres can be approved to offer the previous version of the unit
- centres should only enter learners for the previous version of the unit if they can complete it before its finish date

For more information on NextGen: HN Qualifications please visit the NextGen: HN web page.