Group Award Specification for:

HND Computing: Networking

Group Award Code: GG7C 16

Validation date: December 2012

Date of original publication: May 2013

Version: 19 (June 2023)

Contents

1   Introduction

This document was previously known as the Arrangements document. The purpose of this document is to:

♦   assist centres to implement, deliver and manage the qualification.
♦   provide a guide for new staff involved in offering the qualification.
♦   inform course managers, teaching staff, assessors, learners, employers and HEIs of the aims and purpose of the qualification.
♦   provide details of the range of learners the qualification is suitable for and progression opportunities.

1.1   Background

This award marks a significant departure to its predecessor, HND *Computer Networking and Internet Technology*, in that it no longer stands as a separate framework from the HNC *Computing* and associated HND awards (HND *Computer Science*, HND *Computing: Technical Support* and HND *Computing: Software Development*).

As such the HND *Computing: Networking* award will share a common generic HNC award with the revised versions of the HNDs (Software Development & Technical Support) and the new HND *Computer Science* award.

The decision to merge the two frameworks was proposed and agreed at the initial SQA consultation with the FE sector in June 2010.

The rationale for this approach is as follows:

♦   A generic HNC will serve the purpose of both pathways.
♦   Specialisation takes place, in general, at the HND level.
♦   Given that the majority of successful HNC students' progress to an HND award, delaying specialisation will give the students more time and a greater selection of HND awards to choose from.

In addition, the proposed HND *Computing: Networking* award will remove structural inconsistencies both within and between the existing frameworks in relation to the number of mandatory credits and the minimum number of SCQF level 8 and SCQF credit points.

As previously stated, the current development began in June 2010 with a public consultation meeting attended by 58 representatives, spanning 32 colleges.

One major finding during this phase was the sector's preference for a single development that encompassed Computing and Networking. HN *Computing* has previously been a family of awards consisting of: HNC *Computing*, HND *Computing: Software Development*, and HND *Computing: Technical Support*. The QDT, supported by Heads of Computing, wanted the review of these awards to embrace the review of HN *Computer Networking*, which was also due to commence as a separate development.

As a result, the 'HN Review', as it was known, encompassed five awards:

1   HNC *Computing*
2   HND *Computing: Technical Support*
3   HND *Computing: Software Development*
4   HNC *Computer Networking*
5   HND *Computer Networking & Internetworking Technology*

At this stage, it was agreed to combine the HNCs into a single award, and introduce a new HND award (HND *Computer Science*). The HN Review, therefore, sought to develop the following awards:

1   HNC *Computing* (based on HNC *Computing* and HNC *Computer Networking*)
2   HND *Computer Science* (new award)
3   HND *Computing: Technical Support* (based on existing award)
4   HND *Computing: Software Development* (based on existing award)
5   HND *Computing: Networking* (based on HND Computer Internetworking)

This document will concentrate on defining the rationale, content and delivery of the HND *Computing: Networking* award.

1.2   Rationale and Title of the Group Award

The title of the Group Award is HND *Computing: Networking*. The naming of the award was given due consideration by the Qualification Design Team (QDT) during the initial review phase and concluded that it more succinctly represented the essential content of the award than its predecessor and clearly identifies it as one of a range of related HND *Computing* awards articulating from a common generic HNC Computing award.
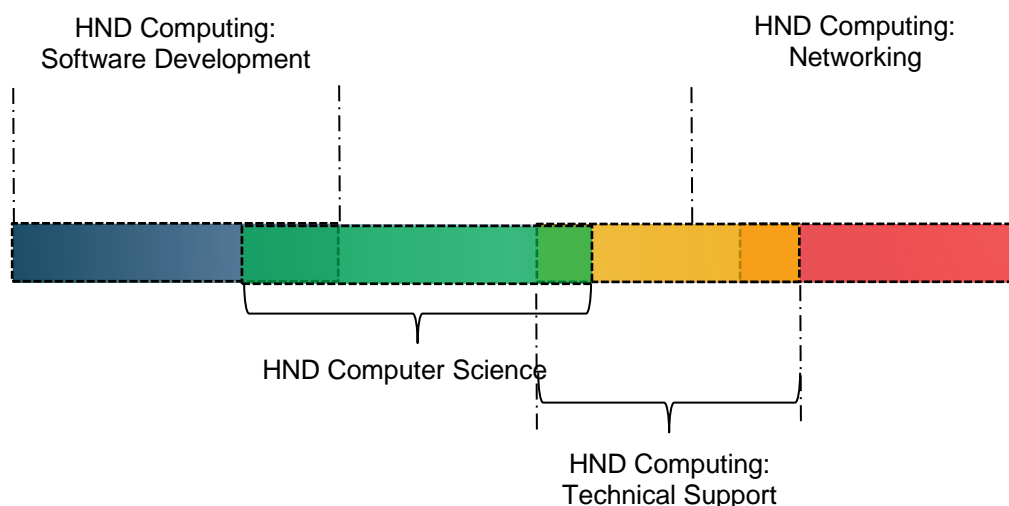
Proposed position of new awards within the spectrum of SQA portfolio. Diagram illustrates possible overlaps of frameworks

The HND awards have been designed to cover a spectrum of computing provision within FE in Scotland; from the more specialist streams of Software Development and Networking to the broader streams of Computer Science and Technical Support.

The e-Skills UK report 'Technology Insights 2012' highlights that employment of IT professionals within the IT industry in Scotland to 2020 is forecast to grow at 1.91% per annum — nearly four times faster than the Scottish average[1].

Despite this, and the fact that the sector is highly paid with excellent working conditions, ScotlandIS, the trade body for Scotland's ICT industry, has stated that there are not enough skilled staff to fill the vacancies[2].

Compounding these factors are the rapid and significant developments in ICT that are impacting business so strongly, namely: analytics, mobility, social, cloud and cyber security[3] (see Deloitte Tech Trends report 2012).

The Qualitative and Quantitative surveys carried out by the SQA as part of the review process have identified clear support for the development of the HND *Computing: Networking* award with 68.6% of respondents citing Networking as a 'Very Important' subject specific skill/competency, the highest score of all the listed competencies, and 63% supporting the development of the award (HN Review — College Survey (Quantitative)[4].

Support for an award with a networking focus scored the highest score of all awards within the employer survey with 92.3% approval (HN Review — College Survey (Quantitative)[5].

The HND *Computing: Networking* award has been revised to reflect this changing ICT landscape and introduces a number of newly devised Units such as Cloud Computing, Convergence Technologies and Intrusion Prevention systems, to address some of these technology trends.

In the existing award a significant number of Units are designed to prepare candidates for vendor certification exams such as Cisco CCNA, CompTIA A+ and Security+ and a variety of Microsoft client and server operating systems.

This was implemented due to the importance placed on vendor certifications by employers. Support for this approach is still evident as can be seen from the quantitative survey of employers with approximately 69% of employers stating that inclusion of vendor qualifications is an important feature of the award.

The revised award has refreshed and broadened these Units to include current technology trends such as convergence technologies.

In terms of identifying current skills gaps specific skills shortages in the area of cyber security have been identified by the UK's National Audit Office in their report 'The UK cyber security strategy: Landscape Review'. These are addressed in the next section of this document.

In addition to the NAO report CompTIA conducted a survey (Jan 2012) of CIOs with regard to IT skills shortages and their impact on their respective business functions.

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[1] Technology Insights 2012 – e-Skills UK
[2] ScotlandIS, September 2012
[3] Deloitte, Tech Trends 2012
[4] HN Review: College Survey (Quantitative)
[5] HN Review – Employer Survey (Quantitative)

93 per cent reported some gap between the technical skills their IT staffs possessed and the skills their companies needed. Eight-out-of-ten (83 per cent) said that gap was small to moderate. Nine per cent said their IT staffs' skills were not close to where they needed to be.

The skills that ranked as the most important were core IT skills. The following IT skills received rankings greater than 70 per cent:

♦   networking/infrastructure
♦   servers/data center management
♦   storage/back-up
♦   cybersecurity
♦   database/information management
♦   help desk/IT support
♦   telecom/unified communications
♦   printers/copiers/faxes
♦   data analytics/business intelligence

Anecdotal evidence to support the demand for these current skillsets is identified in Section 1.4 Employment Opportunities.

1.3 Target groups for the award

This qualification is suitable for the following range of learners:

♦ Learners articulating from the generic HNC *Computing* award wishing to specialise in networking related technologies in the second year of the award.
♦ School leavers or apprentices who possess the necessary entrance requirements and wish to pursue a course which will lead to employment in the ICT sector or further study within a related HE course.
♦ Further education students who have completed their National Certificate in Technical Support at SCQF level 6.
♦ Unemployed adults who wish to retrain in this vocational field with a view to finding employment in the ICT sector or further study within a related HE course.
♦ Any other suitable candidate wishing to achieve this award with a view to further articulation to an appropriate HE award or to pursue employment in the relevant ICT sector.

1.4 Employment Opportunities

Learners who gain this qualification will be equipped with the necessary skillset to pursue employment in the general category of IT&T engineer/ IT&T technician[1].

As has already been indicated, employment opportunities should be enhanced with the range of potential vendor certifications incorporated within the award allowing the candidates to focus on technology clusters such as infrastructure, security and client/server operating systems.

A number of important reports from significant bodies such as e-Skills UK and Gartner have highlighted a growing demand for the aforementioned skillsets and the award will be well placed to address these needs with the inclusion of new Units particularly in the area of security.

Within the HE sector there is strong evidence to suggest that the majority of students achieving the current HND Computing: Networking award articulate to an HE institute to pursue further specialisation within an SCQF level 9 award. Given the current preference for graduate entry to the sector[6] it is envisioned that this trend will continue with the new award.

In terms of identifying specific current employment opportunities there is significant anecdotal evidence to show that there is a demand from employers for candidates who possess the skillset contained within the Group Award.

Listed below is a small selection of current job listings taken from online UK jobsites.

All the jobs listed are entry/near entry level for this IT sector, do not explicitly state a minimum academic qualification and, essentially, list key skills which are delivered by the Group Award.

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[6] HN Review – Employer Survey (Qualitative)

Title: Firewall/Network Security Support Analyst

Skillset:

- CCNA qualified
- Experience of supporting firewalls
- Knowledge of IP networking in a Cisco environment
- Experience of supporting IT customers

Title: IT and Network Security Analyst

Skillset:

- Knowledge of securing Windows environments
- Some knowledge of security solutions for infrastructure such as VPN's and firewalls
- A good understanding of best practice security controls

Title: Network Technician

Skillset:

- Experience of supporting, administering and deploying enterprise level routers and switches
- Firewall platforms — Cisco/Checkpoint
- Routing protocols — OSPF/BGP
- LAN and WAN troubleshooting
- Experience/awareness of voice and virtualisation technologies
- Cisco CCNA/CCNP or equivalent.

Title: IT Field Services Technician

Skillset:

- Computer repair,
- Network set up & troubleshooting
- Router and data switch configuration

Title: Network Technician

Skillset:

- Configuring cisco nexus
- Network Support Technician
- CCNA, SAN support, PC hardware/software, LAN/WAN and VoIP, Windows

Title: Systems Technician

Skillset:

- LAN
- MS Windows knowledge
- Field Service/Technical Support

Title: Network Technician

Skillset:

♦ LAN/WAN troubleshooting
♦ Cisco Firewall platform
♦ Routing protocols OSPF/BGP
♦ CCNA qualified

1.5   Articulation Opportunities

The HND Computing: Networking course has been revised to reflect some of the ongoing technological changes in the ICT sector in relation to support services. This timely update should allow the new qualification to align with a wide range of related degrees offered by Scottish universities many of which are revising their programmes to reflect these newer technologies.

In addition to these specialist Units, the new qualification framework includes Units specifically identified as essential by most universities, namely a mandatory introduction to programming Unit and a range of optional mathematics Units.

Some consultation has been undertaken with a number of universities with regard to articulation paths to a variety of degree programmes. These are summarised in Section 6.2.1.

1.6   Relationship with other awards

This award is part of a suite of new or revised HNDs awards, as explained in Section 1.2. The relationship between the awards is illustrated in the diagram below.
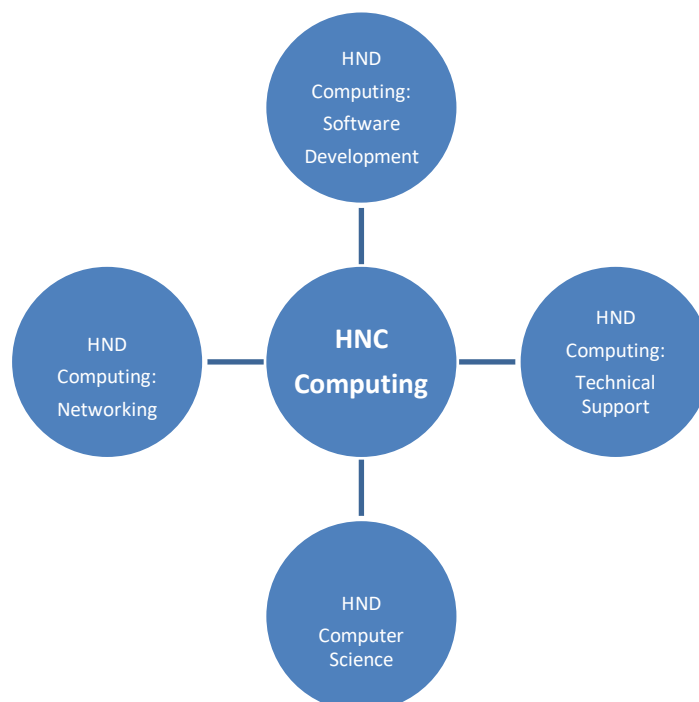
The HNC award is embedded within all of the HNDs, and (largely) constitutes the first year of each programme. Each HND offers a particular specialism that reflects recognized vocational or academic progression paths (see Sections 1.5 and 6.2 for further information on vocational or academic progression). The awards have similar structures and equivalent demands (in terms of practical or cognitive competencies) but each seeks to provide different skills sets and underpinning knowledge.

2 Qualification structure

This Group Award is made up of 30 SQA Unit credits. It comprises of 240 SCQF credit points of which 64 are at SCQF level 8 in the mandatory section including a HNC *Computing: Graded Unit* 1 of 8 SCQF credit points at SCQF level 7 and a HND *Computing: Networking* Graded Unit 2 of 16 SCQF credit points at SCQF level 8. A mapping of Core Skills development opportunities is available in Section 5.3.

2.1 Structure

In order to achieve the HND *Computing: Networking* Group Award the candidate must achieve 14 mandatory credits and 16 optional credits from Groups 1, 2 and 3.

Please note if choosing Units from Group 2 only a maximum of 9 credits can be taken. If choosing from Group 3 only a maximum of 7 credits can be taken.

The mandatory section of this Group Award incorporates 64 SCQF credit points at SCQF level 8 which satisfies the design principles.

Mandatory Units — Total of 14 credits

Candidates must pass all of the following Units.

Unit title	Code	SCQF credit points	SCQF level	SQA credit value
Developing Software: Introduction	H173 34	8	7	1
Professionalism and Ethics in Computing	H1F7 34	8	7	1
Computer Systems Fundamentals	H175 34	8	7	1
Troubleshooting Computer Problems	H177 34	8	7	1
Team Working in Computing	H178 34	8	7	1
Computing: Graded Unit 1 (Exam)	H1J8 34	8	7	1
Routing Technology	FR22 35	16	8	2
Networking Technology	FR24 35	16	8	2
Server Administration	H16X 35	16	8	2
Computing: Networking Graded Unit 2 (Project)	H48V 35	16	8	2

Optional Units — Total of 16 credits

Learners must select at least 16 credits selected from one or more of the following groups of optional Units.

Group 1:   Specialist options (up to 16 credits)
Group 2:   General options (up to 9 credits)
Group 3:   Vendor Units (up to 7 credits)
Group 4:   Local Options (up to 4 credits)

These rules of combination ensure that the aims and objectives of the award are achieved, irrespective of the route through the award. For example, by limiting the general options to 9 credits, all candidates are required to complete at least 21 credits directly related to the subject area.

Group 1 specialist options should be seen as the non-mandatory credits which are fundamental to giving the Group Award its distinctive emphasis on software development. Group 2 general options give centres a degree of flexibility in course design, eg options to include mathematics, networking and hardware. Group 3 Units are dedicated vendor qualifications. See the following section for further information on vendor provision.

Note that a local option is included in Group 2 (general options). Up to four credits can be selected from any area, subject to the design rules and rules of combination defined above. This is consistent with the current awards and reflects the preferences of centres so that they can customize the awards to their local circumstances.

There are a number of important clusters of Units which develop breadth and depth of technical expertise in specific areas.

Particularly significant in contemporary networks are the four Cisco related Units (Networking Technology, Routing Technology, Switching Technology and Internetworking Technology), the Windows 7 client related Units (Configuring a Desktop Operating System and Troubleshooting a Desktop Operating System) and the network security cluster of Security Concepts and Intrusion Prevention Systems.

Unit title	Code	SCQF credit points	SCQF level	SQA credit value
Group 1 — Specialist Options (Up to 16 credits)				
Big Data*	H8W8 34	8	7	1
Data Science*	H8W9 35	16	8	2
Private Cloud Virtualisation*	H8N5 35	8	8	1
Cloud Computing	H179 34	8	7	1
Computer Networks: Building Local Area Networks	H17C 34	16	7	2
Configuring a Desktop Operating System	FK89 34	16	7	2
Convergence Technologies	H17G 35	16	8	2
Internetworking Technology	FR25 35	16	8	2
Intrusion Prevention Systems	H17M 34	8	7	1
Mail Server Management	H17N 34	8	7	1
Managing a Web Server	H17P 34	8	7	1
Managing a Web Server	H16S 35	16	8	2
Network Concepts	H17S 34	16	7	2
Client Operating Systems	H1EM 34	16	7	2
Computer Networking: Fundamentals	H17A 34	8	7	1
Computer Networking: Practical	H17B 34	8	7	1
Digital Forensics	J0HL 34*	8	7	1
Ethical Hacking	J0HK 34*	8	7	1
Troubleshooting a Desktop Operating System	FK8A 34	16	7	2

Unit title	Code	SCQF credit points	SCQF level	SQA credit value
Network Security Concepts	HT9G 34*	16	7	2
Switching Technology	FR23 35	16	8	2
Professional Career Development in the IT Industry	HG1K 34	8	7	1
Data Security	J0H9 34*	8	7	1
Data Flow	J27L 34*	8	7	1
Cryptography: Practical Applications	J4BF 34*	8	7	1

Unit title	Code	SCQF credit points	SCQF level	SQA credit value
Group 2 — General Options (Up to 9 credits)				
Using Software Applications Packages*	D85F 34	8	7	1
Information Technology: Applications Software 1*	D75X 34	8	7	1
Computing: Planning*	DH35 34	8	7	1
Building an e-Business	F6JJ 34	8	7	1
Computer Hardware: Hardware Installation and Maintenance	H1FY 34	16	7	2
SQL: Introduction	DH3J 34	8	7	1
Computing: Introduction to Project Management	H17D 34	8	7	1
Computing: PC Hardware and Operating System Essentials	H17E 34	8	7	1
Computing: PC Hardware and Operating System Support	H17F 34	8	7	1
Database Design Fundamentals	DV6E 34	8	7	1
Databases: Introduction	H17H 34	8	7	1
Developing Mobile Web Based Applications: An Introduction	HF4Y 34*	16	7	2
Digital Culture: Online Collaboration	F86V 35	8	8	1
Digital Culture: Online Communications	F86P 34	8	7	1
Digital Culture: Web 2.0 Applications	F86T 33	8	6	1
E-Commerce: Publishing Web Sites	DV6G 34	16	7	2
Entrepreneurship in the Creative Industries	DR0T 35	8	8	1
*Preparing to Start a Business	H7V4 34	8	7	1
Handling Information as a Resource	H17K 34	8	7	1
Human Computer Interaction	H17L 34	8	7	1
Information Technology: Information Systems and Services	H1G0 34	8	7	1
Mathematics for Computing	A5P0 35	8	8	1
Mathematics for Computing 1	D76E 34	8	7	1
Mathematics for Computing 2	D76F 35	8	8	1
Mathematics for Interactive Computing: Essential Techniques	F20B 34	8	8	1
Mathematics: Calculus and Matrices for Computing	DP8F 34	8	7	1
Mobile Technology	H17R 35	8	8	1
Multi User Operating Systems	DH3A 34	8	7	1

Multimedia: Developing Multimedia Applications	DH2R 34	16	7	2
Personal Development Planning	DE3R 34	8	7	1
Project Management for IT	F1W0 34	8	7	1
Providing Support to Users	H17T 34	8	7	1
Software Development: Developing Small Scale Standalone Applications	H17W 34	16	7	2
Digital Skills	H9DE 34	8	7	1

*Refer to History of Changes for revision changes.

Unit title	Code	SCQF credit points	SCQF level	SQA credit value
Group 2 (cont)				
Software Development: Programming Foundations	H17X 34	8	7	1
Software Development: Systems Foundations	H17Y 34	16	7	2
Systems Development: Introduction	H180 34	8	7	1
Systems Development: Testing Software	H181 34	8	7	1
Systems Development: User Centred Design	H182 34	8	7	1
Technical Support: Supporting Users – Hardware	H183 34	8	7	1
Technical Support: Supporting Users – Software	H184 34	8	7	1
User Interface Design	HF55 34*	8	7	1
Work Role Effectiveness	DG6E 34	24	7	3
Work Role Effectiveness	DG6G 35	24	8	3
Working in IT	H185 35	16	8	2
Workplace Communication in English	H8T2 33*	8	6	1
Bring Your Own Device (BYOD): Introduction	H6D0 34*	8	7	1
Communication: Practical Skills	H7MB 34*	8	7	1
Open Source Operating Systems: Introduction to Command Line Administration	HT6W 35*	16	2	2
Computer Operating Systems	J11W 35*	16	8	2
Network Security Monitoring	J27N 35*	8	8	1
Working in Cyber Security	J27S 34*	8	7	1
Cryptography: Practical Applications	J4BF 34*	8	7	1

*Refer to History of Changes for revision changes.

Unit title	Code	SCQF credit points	SCQF level	SQA credit value
Group 3 — 'Vendor' Options (Up to 7 credits)				
Technical Specialist: Windows 7: Configuring	H1HR 35	8	24	3
Technical Specialist: Microsoft SharePoint 2010, Application Development	H1HW 36	9	15	1.5
Technical Specialist: Windows Server 2008: Network Infrastructure, Configuring	H1HF 34	7	30	3.5
Technical Specialist: Windows Server 2008: Applications Infrastructure, Configuring	H1HG 34	7	24	3

Unit title	Code	SCQF credit points	SCQF level	SQA credit value
Technical Specialist: Windows Server 2008: Active Directory Configuring	H1HH 35	8	35	4
IT Professional: Windows Server 2008: Server Administrator	H1HL 36	9	15	1.5
IT Professional: Windows Server 2008: Enterprise Administrator	H1HM 36	9	40	5
Unit title	**Code**	**SCQF credit points**	**SCQF level**	**SQA credit value**
Group 4 - Local Option (Up to 4 credits)				
Open Source Operating Systems: Basic Server Administration	H18E 35	16	8	2
Software Development: Object Oriented Programming	H171 35	16	8	2
Computer Networks: Administering Network Systems	D75S 35	8	7	1
Web Development Fundamentals	F203 34	8	7	1
Compositing and Motion Graphics	H4JN 34	8	7	1
Web Technologies 1: HTML and CSS	HF3K 34	8	7	1
Firewall Essentials	J2JW 34	16	7	2
Data Flow	J27L 34	8	7	1

*Refer to History of Changes for revision changes.

SQA HN awards adhere to a defined set of design principles[7] which can be summarised as follows:

♦ HNCs shall be designed to be at SCQF level 7 and shall comprise 96 SCQF credit points.
♦ HNDs shall be designed to be at SCQF level 8 and shall comprise 240 SCQF credit points.
♦ HNCs should incorporate 48 SCQF credit points at SCQF level 7.
♦ HNDs should incorporate 64 SCQF credit points at SCQF level 8.

The Scottish Credit and Qualifications Framework[8] are used when designing qualifications to allocate a level and a number of credits to a qualification, to decide on entry requirements and to map progression routes.

The SCQF level provides an indication of the complexity of the qualification. SCQF Levels are based on a single set of level descriptors that are the common reference points with each having five characteristics determining, for example, the level of a Unit.

The characteristics are as follows:

♦ Knowledge and understanding — mainly subject-based
♦ Practice (applied knowledge and understanding)
♦ Generic cognitive skills — eg evaluation, critical analysis
♦ Communication, numeracy and IT skills
♦ Autonomy, accountability and working with others

The generic HNC *Computing* award was validated in December 2011. This award provides the foundation of the first year of the HND *Computing: Networking* award and satisfies the Core Skills requirements for the award.

A number of SCQF level 7 Units have been developed as introductory Units which form the basis on which the more complex SCQF level 8 Units can develop and deepen knowledge and understanding of critical technologies such as security and client/server operating systems. These Units include:

Unit title	Code	SCQF credit points	SCQF level	SQA credit value
Network Security Concepts	HT9G 34*	16	7	1
Intrusion Prevention Systems	H17M 34	8	7	1
Configuring a Desktop Operating System	FK89 34	16	7	2
Cloud Computing	H179 34	8	7	1
Ethical Hacking	J0HK 34*	8	7	1
Managing a Web Server	H17P 34	8	7	1
Mathematics for Computing 1	D76E 34	8	7	1

[7]Design principles for Developing HNC's and HND's (www.sqa.org.uk)
[8] An Introduction to the SCQF SQA Publication code AE1243/2

2.2 Inclusion of vendor qualifications within HND Computing: Networking

SQA has agreed to participate in a pilot project to evaluate the feasibility of directly accrediting vendor qualifications within this award. This pilot has the approval of SQA's Qualification Committee, chaired by the Director for Qualifications.

Previously, vendor qualifications were accredited through credit transfer, whereby shadow Units were created, based on vendor curricula, and candidates were awarded these [SQA] Units on the basis of their vendor achievements. However, this system placed the onus on SQA to revise these shadow Units whenever vendors changed their certifications.

The pilot programme places the responsibility for recognition on to the vendors. Vendors are required to credit and level their qualifications using SCQF, and then propose these awards for inclusion in this framework. Their inclusion, or otherwise, will be decided by the appropriate Qualifications Support Team.[9] Figure 2 illustrates the process of vendor accreditation.
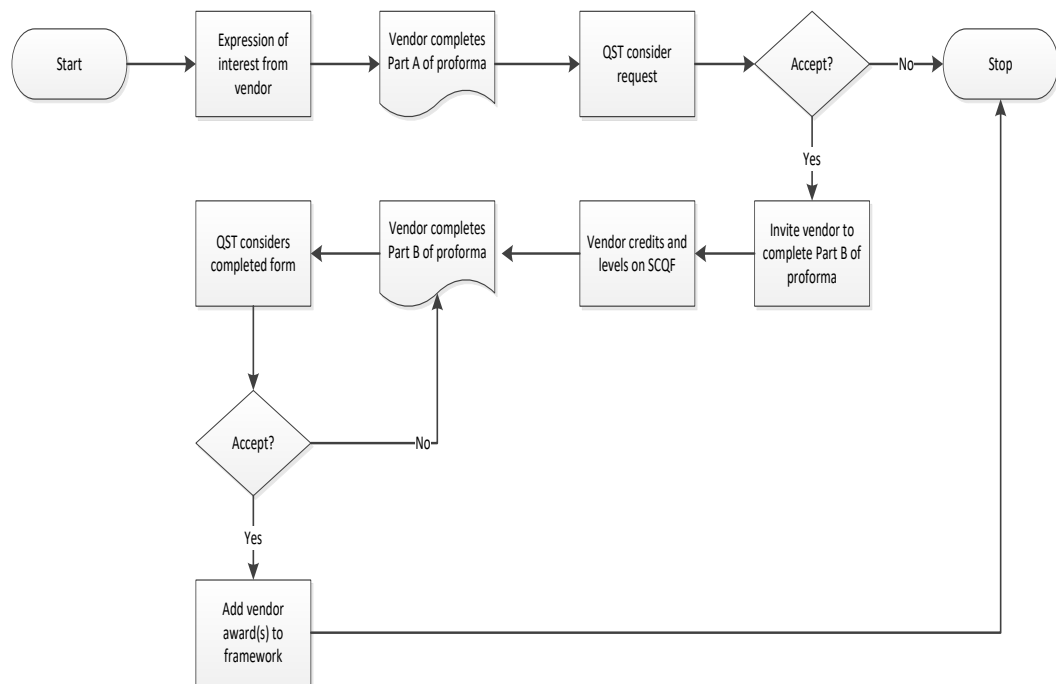
Figure 1: Vendor accreditation process

The Qualifications Committee imposed a cap on the contribution of vendor awards to national qualifications. The cap is 25% (7 credits for an HND). This limit applies to all vocational qualifications with direct recognition of third party awards, based on SCQF. This rule will be reviewed when the pilot is evaluated.

It is the responsibility of each vendor to accredit their awards on SCQF. This may be done by any one of the SCQF-accreditation bodies in Scotland.

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[9] During the development phase, the QDT will decide on the inclusion of specific vendor qualifications. This task will be taken over by the QST once the award is operationalised.

Grouping 3 within the qualification structure shows the accredited vendor qualifications at the time of writing this document. It is anticipated that more vendor awards will be added as and when they are accredited through this process. When a specific vendor award is accredited but found to be similar to an existing (generic) HN Unit, these Units (the vendor Unit and the HN Unit) will be grouped into an excluded combination to ensure that candidates cannot double count their knowledge or skills.

All decisions regarding the accreditation of vendor Units (for inclusion in this framework) and excluded combinations will be made by the Qualifications Support Team for HN awards.

This pilot programme will be evaluated in summer 2013, when final decisions will be made regarding its continuation.

3   Aims of the qualification

The principal aims of this award are to equip candidates with knowledge and skills of contemporary networking technologies to enable them to seek employment in the category of IT&T engineer and to provide an award which will enable candidates to progress to a wide range of degree courses primarily in Scottish universities.

In recent years there have been significant technology developments in the field of ICT which are having a major impact on businesses and business processes. Cloud computing is an example of a technology trend emerging from the congruence of developments such as real-time infrastructure (RTI), virtualisation, browsers and Web 2.0[10].

More than half of employers indicate that issues such as security, cloud computing, convergence of communications & IT and the real world web will have a major impact on business in the next three years[11].

The HND *Computing: Networking* award has been revised to reflect these changes with the introduction of a number of new Units designed to equip the learner with some of the fundamental knowledge and understanding of these technologies.

Support for the development of a revised HND *Computing: Networking* award with a focus on networking is evidenced by the Employers Quantitative survey showing 91.7% of employers indicating support for the award.

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[10] Gartner Report, The top 10 Technology trends for 2012
[11] Technology Insights 2012 e-Skills UK

3.1 General aims of the qualification

The general aims of this award are:

1 To develop the candidate's knowledge and skills such as planning, analysing and evaluating.
2 To develop employment skills and enhance candidates' employment prospects.
3 To enable progression within the SCQF.
4 To develop study and research skills.
5 To develop transferable skills including Core Skills.
6 To provide academic stimulus and challenge, and foster an enjoyment of the subject.
7 To support learners' continuing professional development.

3.2 Specific aims of the qualification

The specific aims of this award are:

8 To develop a range of specialist knowledge and skills in networking technologies.
9 Where applicable, to provide learners with the underpinning knowledge and skills that may allow them to sit vendor certification examinations.
10 To prepare candidates for progression to further studies in a related discipline at SCQF level 9.
11 To prepare candidates for employment in the general category of IT&T engineer/ IT&T technician.

3.3 Graded Unit

The QDT opted to remain with the existing arrangements in relation to Graded Units whereby the HNC SCQF level 7 Graded Unit will be examination based and the HND SCQF level 8 Graded Unit will be project based for each of the HND awards.

This mix of exam and project based Graded Units continues to be strongly supported by both HE and employers as is evidenced in surveys undertaken by the SQA for this development.

The SCQF level 8 Graded Unit is project based around a network related scenario. It is designed to evidence a candidate's ability to plan, develop, implement and evaluate a project utilizing the spectrum of skills acquired throughout their course.

The Graded Units for this award are designed to provide evidence that the candidate has achieved the following aims of HND *Computing: Networking:*

♦ To develop candidates' knowledge and skills in planning, developing and evaluating.
♦ To develop study and research skills.
♦ To prepare students for progression to further study in computer networking or a related discipline.
♦ To provide the learner with the opportunity to develop the identified Core Skills within the context a real project.

4   Recommended entry to the qualification

Entry to this qualification is at the discretion of the centre. The following information on prior knowledge, skills, experience or qualifications that provide suitable preparation for this qualification has been provided by the Qualification Design Team as guidance only.

Learners would benefit from having attained the skills, knowledge and understanding required by one or more of the following qualifications and/or experience:

♦ Passes in two relevant National Courses at SCQF level 6 (Higher) together with three relevant subjects at National 5.
♦ A related National Certificate at SCQF level 6.
♦ A relevant combination of vocational awards at appropriate levels.
♦ A mix of the above.

For example, a school leaver may be expected to possess two Higher level passes, (such as Computer Science and English) together with three passes at National 5 (such as Mathematics, Business Administration and History).

A college entrant would be expected to have completed a relevant National Certificate programme such as *Digital Media Computing* at SCQF level 6 or *Computer Games Development* at SCQF level 6. A combination of level 6 and level 5 National Units would also be appropriate. For example, a college entrant may possess a National Certificate in Mobile Technology at SCQF level 5 together with individual Unit passes at SCQF level 6.

Given the range of vocational awards available to learners, applicants who possess a range of smaller vocational qualifications should also be considered. For example, possession of relevant National Progression Awards (such as PC Passport and *Computer Games Development* at SCQF level 6) may be considered appropriate for entry to this award.

Applicants with a mixture of the above should also be considered for entry. For example, a candidate who possessed a pass in *Computer Science* at SCQF level 6 (Higher) together with one or more relevant NPA awards at SCQF levels 5 or 6 would, most likely, have the necessary knowledge and skills to benefit from undertaking this award.

Equivalent qualifications from other awarding bodies may also be acceptable as would suitable vendor certifications.

Mature candidates with suitable work experience should also be considered subject to the Core Skill entry profile detailed in Section 4.1.

Entry onto the second year of this award is at the discretion of the centre.

For direct entry into Year 2 of the HND *Computing: Networking* award candidates should have successfully passed the revised HNC *Computing* award (GF3E 15) or qualify for credit transfer using the recognised SQA quality procedures to ensure that the learner is credited with the appropriate SCQF Units. As the HNC *Computing* is a 12 credit award it is recommended that candidates top up their qualifications with an additional relevant 3 SQA credits prior to articulating to the second year of the award.

4.1   Core Skills entry profile

The Core Skill entry profile provides a summary of the associated assessment activities that exemplify why a particular level has been recommended for this qualification. The information should be used to identify if additional learning support needs to be put in place for learners whose Core Skills profile is below the recommended entry level or whether learners should be encouraged to do an alternative level or learning programme.

Core Skill	Recommended SCQF entry level	Associated assessment activities	SCQF exit level
Communication	Intermediate 2 (SCQF 5)	The Core Skill of 'Communications' at SCQF level 6 can be developed comfortably and naturally within the mandatory Units Team Working in Computing and Professionalism and Ethics in Computing but have been signposted rather than embedded.	Higher (SCQF 6)
Numeracy	Intermediate 2 (SCQF 5)	The Qualification Design Team have embedded the Core Skill of 'Numeracy' at SCQF level 5 within the mandatory Unit Computer Systems Fundamentals. A selection of 'Mathematics' Units which have Numeracy embedded at SCQF level 6 are also included in the framework as optional Units for centres wishing to offer a higher Core Skill exit level (refer to end of Section 4.1 for more information).	Intermediate 2 (SCQF 5)

Core Skill	Recommended SCQF entry level	Associated assessment activities	SCQF exit level
Information and Communication Technology (ICT)	Intermediate 2 (SCQF 5)	The Core Skill of 'ICT' at SCQF level 6 is embedded in the mandatory Unit Team Working in Computing.	Higher (SCQF 6)
Problem Solving	Intermediate 2 (SCQF 5)	The Core Skill component of 'Critical Thinking' which is part of the Problem Solving Core Skill is embedded within the mandatory Unit of Developing Software: Introduction. The Core Skill of 'Problem Solving' at SCQF level 6 is embedded in the mandatory Unit Troubleshooting Computing Problems.	Higher (SCQF 6)
Working with Others	Intermediate 2 (SCQF 5)	The Core Skill of 'Working with Others' at SCQF level 6 is embedded in the mandatory Unit Team Working in Computing.	Higher (SCQF 6)

The recommended Core Skill profile for entry to this award is the same as for HNC *Computing* which has already been validated.

It is recognised that some candidates, particularly adult returners, may not possess a specific Core Skills profile on entry, hence entry level is only recommended. In this case, it is recommended that centres carry out an appropriate evaluation of the learner's basic skills to ensure that they have the necessary prerequisites to benefit from undertaking this award.

Core Skills can be embedded or signposted within Units. Embedded skills occur where the development of a Core Skill is incorporated into the Unit and where the Unit assessment also covers the requirements of Core Skill assessment at a particular level. Units that have embedded Core Skill(s) will be automatically certificated upon successful completion of the Unit assessments.

Signposted means identifying opportunities within the Unit for developing Core Skills other than those that can be summatively assessed and certificated. This allows the development of the Core Skills through teaching and learning to be utilised and these opportunities are highlighted within the Unit support notes to those delivering and managing the Units.

Additional opportunities to attain the Core Skill of *Numeracy* at a higher SCQF level exist in the following Units:

DP8F 34   *Mathematics: Calculus and Matrices for Computing*
            (embedded — SCQF level 6)
D76E 34   *Mathematics for Computing 1* (Using Number embedded — SCQF level
            6, Using Graphical Information embedded — SCQF level 5)
F20B 34   *Mathematics for Interactive Computing: Essential Techniques*
            (signposted — SCQF level 6)

4.2   Relationship with Curriculum for Excellence

The award was developed during the *Curriculum for Excellence (CfE)* programme, which is on-going at the time of writing. The development was able to encompass the principles of CfE, particularly the principles relating to breadth, progression, choice and relevance.

The award naturally encompasses the technology curriculum responsibilities and some of the language, mathematics and science curriculum responsibilities outlined in the CfE factfile. The underlying development of programming skills also helps to develop an understanding of the syntax and semantics of languages. The development of problem solving skills alongside the programming skills also helps to tackle some of the issues raised in the STEM initiative.

The award also meets some of the major aims of CfE for responsibilities across all practitioners as detailed below.

♦   To develop health and well-being — specifically social well-being in the team working activities and in the study of computer ethics.
♦   To develop literacy skills (listening and talking, reading and writing) — the development of academic study skills and Core Skills are embodied in the general aims of the award.
♦   To develop numeracy across learning — The award embeds the level 5 *Numeracy* Core Skill and encourages the uptake of a range of Mathematics Units which would allow learners to obtain the level 6 *Numeracy* Core Skill.

A member of the QDT was given special responsibility for ensuring the QDT's work was compatible with CfE. The SQA manager with special responsibility for the new Computing Science arrangements was consulted throughout this development.

5   Additional benefits of the qualification in meeting employer needs

This qualification was designed to meet a specific purpose and what follows are details on how that purpose has been met through mapping of the Units to the aims of the qualification. Through meeting the aims, additional value has been achieved by linking the Unit standards with those defined in National Occupational Standards and/or trade/professional body requirements. In addition, significant opportunities exist for learners to develop the more generic skills, known as Core Skills through doing this qualification.

A major feature and benefit of the award and one which is strongly reflected in the employer survey is the embedding of vendor curricula within the learning and teaching process. This allows candidates to be presented for vendor certification exams if they choose and significantly enhances their employment prospects while assuring employers of their skills profile.

5 Mapping of qualification aims to Units

The following table maps the general and specific aims of the qualification, listed below, to the mandatory Units contained within the award:

1 To develop the candidate's knowledge and skills such as planning, analysing and evaluating.
2 To develop employment skills and enhance candidates' employment prospects.
3 To enable progression within the SCQF.
4 To develop study and research skills.
5 To develop transferable skills including Core Skills.
6 To provide academic stimulus and challenge, and foster an enjoyment of the subject.
7 To support learners' continuing professional development.
8 To develop a range of specialist knowledge and skills in networking technologies.
9 Where applicable, to provide learners with the underpinning knowledge and skills that may allow them to sit vendor certification examinations.
10 To prepare candidates for progression to further studies in a related discipline at SCQF level 9.
11 To prepare candidates for employment in the general category of IT&T engineer/IT&T technician.

Unit title and code	Aims										
	1	2	3	4	5	6	7	8	9	10	11
Developing Software: Introduction (H173 34)	✓	✓	✓	✓	✓	✓	✓				
Professionalism and Ethics in Computing (H1F7 34)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Computer Systems Fundamentals (H175 34)	✓	✓	✓	✓	✓	✓	✓		✓		
Troubleshooting Computer Problems (H177 34)	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Team Working in Computing (H178 34)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Computing: Graded Unit 1: Exam (H1J8 34)			✓	✓		✓			✓		
Routing Technology (FR22 35)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Networking Technology (FR24 35)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Server Administration (H16X 35)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Computing: Networking Graded Unit 2: Project (H48V 35)	✓	✓	✓	✓	✓	✓	✓		✓		✓

5.1 Mapping of National Occupational Standards (NOS) and/or trade body standards

IT and Telecoms Professional National Occupational Standards (NOS) have been developed in parallel with and as part of the IT Professional Competency Model — e-skills Procom. E-skills Procom is being established as the industry recognised, internationally relevant training framework for organising courses and qualifications. It defines knowledge, understanding, and competencies for seven broad disciplines.

The disciplines are:

1   Sales and marketing
2   Business change
3   Programme and project management
4   Solutions architecture
5   Solution development and implementation
6   Information management and security
7   IT service management and delivery

The content of disciplines 1–3, while important to the IT&T sectors, do not fall within the scope of e-skills UK for NOS. Consequently these will not formally be recognised as NOS as is the case for disciplines 4–7. To maintain the relationship these NOS have been numbered to reflect the relationship to e-skills Procom. Within each discipline there exist a number of sub-disciplines. Within each sub-discipline the competences relating to a particular role have been defined.

This is an example of a structure and as there are many more optional Units available then this is not an exhaustive list.

4.1	Systems Architecture	5.1	Systems Development
4.2	Data Analysis	5.2	Software Development
4.3	Human Needs Analysis	5.3	IT/Technology Solution testing
4.4	Systems Analysis	5.4	Systems Integration
4.5	Data Design	5.5	IT/Technology systems installation, implementation and handover
4.6	Human Computer Interaction/ Interface design	6.1	Information management
4.7	Systems Design	6.2	IT Security management
4.8	IT/Technology Infrastructure Design and Planning	6.3	IT Disaster Recovery

The mandatory Units from the HNC *Computing* award have already been mapped and are included within the 14 mandatory credits for the HND *Computing: Networking* award.

Unit title and code	National Occupational Standard															
	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3
Developing Software: Introduction (H173 34)		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	
Professionalism and Ethics in Computing (H1F7 34)														✓	✓	
Computer Systems Fundamentals (H175 34)	✓					✓			✓		✓		✓			
Troubleshooting Computer Problems (H177 34)	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Team Working in Computing (H178 34)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Computing: Graded Unit 1 (H1J8 34)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Computing: Networking Graded Unit 2 (H48V 35)				✓				✓			✓	✓	✓	✓	✓	
Routing Technology (FR22 35)								✓			✓			✓	✓	
Networking Technology (FR24 35)								✓			✓			✓	✓	
Server Administration (H16X 35)								✓			✓	✓	✓	✓	✓	✓

5.2 Mapping of Core Skills development opportunities across the qualification

Unit code	Unit title	Communication		Numeracy		ICT		Problem Solving			Working with Others	
		Written	Oral	Using Number	Using Graphical Information	Accessing Information	Providing/ Creating information	Critical Thinking	Planning and Organising	Reviewing and Evaluating	Working Co-operatively with Others	Reviewing Co-operative Contribution
H173 34	Developing Software: Introduction							Embedded (SCQF 6)				
H178 34	Team Working in Computing	Signposted (SCQF 6)	Signposted (SCQF 6)			Embedded (SCQF 6)	Embedded (SCQF 6)				Embedded (SCQF 6)	Embedded (SCQF 6)
H177 34	Troubleshooting Computing Problems							Embedded (SCQF 6)	Embedded (SCQF 6)	Embedded (SCQF 6)		
H175 34	Computer Systems Fundamentals			Embedded (SCQF 5)	Embedded (SCQF 5)							
H1F7 34	Professionalism and Ethics in Computing	Signposted (SCQF 6)	Signposted (SCQF 6)			Signposted (SCQF 6)	Signposted (SCQF 6)					
FR22 35	Routing Technology			Signposted (SCQF 6)								
FR24 35	Networking Technology							Signposted (SCQF 6)				
H16X 35	Server Administration	Signposted (SCQF 6)										
H48V 35	HND Computing: Networking: Graded Unit 2: Project							Embedded (SCQF 6)	Embedded (SCQF 6)	Embedded (SCQF 6)		

5.3   Assessment strategy for the qualification

The Units listed below are the mandatory Units which when added to the mandatory HNC Computing Units form the 14 mandatory credits for the HND Computing: Networking award.

Unit	Assessment				
	Outcome 1	**Outcome 2**	**Outcome 3**	**Outcome 4**	**Outcome 5**
Networking Technology (FR24 35)	Evidence for the Knowledge and Understanding component of the Unit must be produced using a set of 50 multiple-choice/multiple-response questions to assess candidates' capabilities. This should be administered as a single end-of-Unit test covering all Outcomes. Candidates must answer at least 60% of the questions correctly in order to obtain a pass.				
Routing Technology (FR22 35)	Evidence for the Knowledge and Understanding component of the Unit must be produced using a set of 50 multiple-choice/multiple-response questions to assess candidates' capabilities. This should be administered as a single end-of-Unit test covering all Outcomes. Candidates must answer at least 60% of the questions correctly in order to obtain a pass				
Server Administration (H16X 35)	Assessment for all Outcomes must be undertaken at the end of the Unit. Candidate capabilities will be examined by 60 multiple-choice/multiple-response questions with appropriate sampling of the complete Unit content. Candidates must score at least 60% in order to pass the Unit.				
HND Computing: Networking: Graded Unit 2 (H48V 35)	The candidate will be required to provide documentation which supports evidence of the candidate's ability to plan, develop, implement and evaluate technical skills gained throughout there course.				

6　　Guidance on approaches to delivery and assessment

One of the main aims of the new HND *Computing: Networking* award has been to reflect in its framework the significant technology developments that are taking place in the field of ICT in areas such as security, cloud computing, convergence of communications & IT and the real world web.

These developments are changing the skill requirements for IT staff[12], even in small organisations, and this is being reflected in the posts being advertised in IT sector employment agencies and in the portfolios of HE institutes offering related degree programmes.

An overarching aim of the revised HNC *Computing* and associated HND awards is to maximize the learning and teaching component of Unit delivery and correspondingly reduce the amount of time spent on assessment.

One possible approach to delivery would be to cluster associated technologies or Units and deliver these within a common teaching block/semester. This would afford the opportunity to sequence or integrate teaching of complementary or related Units creating building blocks of learning. In addition this would also allow for possible cross-assessment and integration of assessment between Units hence reducing overall assessment burden.

Where appropriate and practical this approach is to be encouraged. In addition to impacting significantly on business processes and practices, these same developments in ICT are impacting on pedagogy. Use of social networking tools and delivery of learning resources to personal internet technologies such as tablet computers and smartphones should be employed in addition to traditional classroom based teaching in order to allow for more flexibility and fluidity in learning activities[13].

A feature of the new HND *Computing: Networking* award is the significant additional theoretical content introduced within new Units such as Cloud Computing, Convergence Technologies, Intrusion Prevention Systems and Mobile Technology. Additionally a significant number of the existing and new Units are assessed by MCSA/MCMA methods. These assessment methods offer significant opportunities for e-assessment in both formative and summative assessment as well as opportunities to expose candidates to assessment methods undertaken in vendor related certification examinations.

Needless to say, delivery of these Units poses challenges to centres in relation to tutor skillsets and potential resources required. Significant planning for CPD and IT resourcing should be undertaken prior to the adoption of this award.

A further aim of the new HNC *Computing* and related HND awards is to allow centres a high degree of flexibility in the options available to them in order that they could tailor delivery to their own specialisms, HE articulation options and potential needs of local employers. This will be expanded upon in the following section.

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[12] IDC Cloud Computing's role in job creation
[13] Open University Innovation Report 1 – Innovating Pedagogy 2012

6.1   Sequencing/integration of Units

The new awards have been structured to allow a significant degree of flexibility to centres in their choice and sequencing of Units while retaining the core theme of the individual awards.

Given that the HNC Computing is a 12 credit award and that, anecdotally, a significant percentage of HNC students progress to the second year of an associated HND award it would be advisable to schedule Year 1 delivery to at least offer the option of a relevant additional three credits to accommodate this scenario.

Consequentially this raises the potential for a number of possible approaches to delivery, namely:

♦   Generic HNC which articulates to two or more of the HND *Computing* awards
♦   Networking oriented HNC leading to Year 2 of the award

In practice the various permutations of the above will be dictated by numerous factors including the size of the Year 1 cohort and the availability of resources.

Where possible, learners should complete a SCQF level 7 Unit before undertaking an associated SCQF level 8 Unit. It is recommended that where possible assessments should be integrated to reduce the assessment load.

The following table shows a sample HND *Computing: Networking* schedule of delivery: The schedule suggested below, is based upon a 2 Year course with each year comprising of 3 semesters. Note that centres are free to devise their own alternative course plans:

Note that Year 1 is predominantly populated with SCQF level 7 Units and Year 2 with SCQF level 8 Units.

Year 1			Year 2		
Trimester 1	**SCQF level**	**Credit Rating**	**Trimester 1**	**SCQF level**	**Credit Rating**
Developing Software Introduction (H173 34)	7	1	Switching Technology (FR23 35)	8	2
Computer Systems Fundamentals (H175 34)	7	1	Server Administration (H16X 35)	8	2
Configuring a Desktop Operating System (FK89 34)	7	2	Mobile Technology (H17R 35)	8	1
Networking Technology (FR24 35)	8	2			
Team Working in Computing (H178 34)	7	1			
Trimester 2	**SCQF level**	**Credit Rating**	**Trimester 2**	**SCQF level**	**Credit Rating**
Database Design Fundamentals (DV6E 34)	7	1	Internetworking Technology (FR25 35)	8	2
Troubleshooting Computer Problems (H177 34)	7	1	Network Security Concepts (HT9G 34)	7	2
Configuring a Desktop Operating System (FK89 34)	7	2	Intrusion Prevention Systems (H17M 34)	7	1
Professionalism and Ethics in Computing (H1F7 34)	7	1			
Networking Technology (FR24 35)	8	2			

Trimester 3	SCQF level	Credit Rating	Trimester 3	SCQF level	Credit Rating
Troubleshooting a Desktop Operating System (FK8A 34)	7	2	HND Computing: Networking: Graded Unit 2 (H48V 35)	8	2
HNC Computing: Graded Unit 1 (H1J8 34)	7	1	Convergence Technologies (H17G 35)	8	2
Routing Technology (FR22 35)	8	2	Cloud Computing (H179 34)	7	1

6.2 Recognition of Prior Learning

SQA recognized that learners gain knowledge and skills acquired through formal, non-formal and informal learning contexts.

In some instances, a full Group Award may be achieved through the recognition of prior learning. However, it is unlikely that a learner would have the appropriate prior learning and experience to meet all the requirements of a full Group Award.

The recognition of prior learning may **not** be used as a method of assessing in the following types of Units and assessments:

♦ HN Graded Units
♦ Course and/or external assessments
♦ Other integrative assessment Units (which may or not be graded)
♦ Certain types of assessment instruments where the standard may be compromised by not using the same assessment method outlined in the Unit
♦ Where there is an existing requirement for a licence to practice
♦ Where there are specific Health and Safety requirements
♦ Where there are regulatory, professional or other statutory requirements
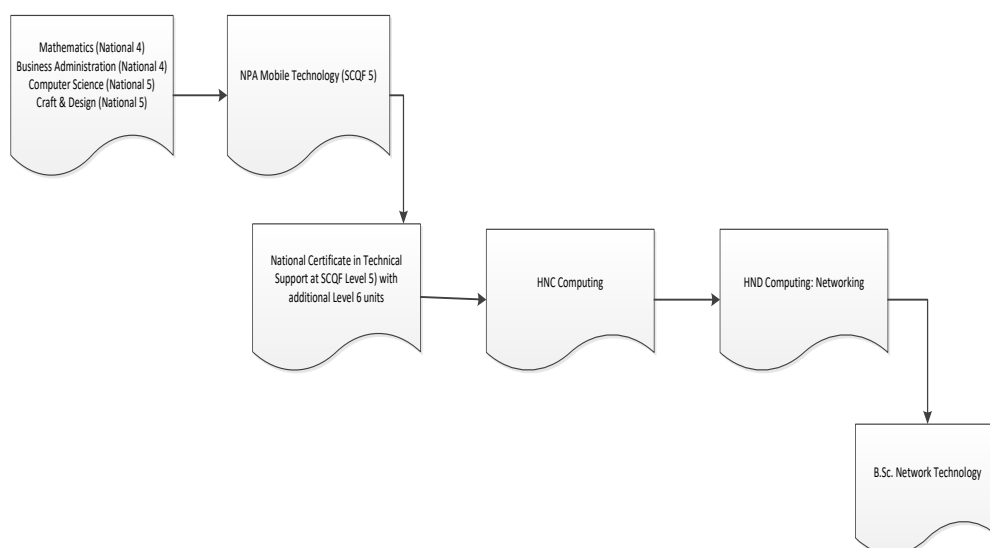♦ Where otherwise specified in an assessment strategy.

More information and guidance on the *Recognition of Prior Learning* (RPL) may be found on our website **www.sqa.org.uk**

The following sub-sections outline how existing SQA Unit(s) may contribute to this Group Award. Additionally, they also outline how this Group Award may be recognized for professional and articulation purposes.

6.2.1 Articulation and/or progression

This award has been designed to allow centres to forge a range of articulation routes to a wide range of degree courses at universities throughout Scotland. Some articulation routes are likely to require centres to select specific Units from the optional lists. For example, articulation to the 2nd year of the more traditional Universities such as the University of Strathclyde and the University of Glasgow might well require candidates to have achieved a certain level of Mathematics. In a similar vein direct entry to some third year courses might require some exposure to database development which could be achieved by adopting the Relational Database Management Systems Unit.

The following diagram illustrates one particular progression path for this award.

```
Mathematics (National 4)
Business Administration (National 4)        NPA Mobile Technology (SCQF 5)
Computer Science (National 5)
Craft & Design (National 5)

National Certificate in Technical
Support at SCQF Level 5) with  →  HNC Computing  →  HND Computing: Networking
additional Level 6 units

                                                    B.Sc. Network Technology
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The existing HND *Computer Networking and Internet Technology* award articulates to a range of degree courses at a variety of universities. In some instances individual colleges have specific articulation arrangements with particular universities.

Although at this stage no formal articulation agreements can be agreed for the proposed award, informal consultations between the lead developer and a small range of universities have indicated that similar articulation pathways are likely to be agreed with regard to the new award.

A list of potential articulation routes are shown below:

Institute	Degree Programme	Entry Point	Conditions
UWS	BSc Business Technology	Year 3	HND in related IT area
	BSc Computer Networking	Year 3	HND in Computing (including CCNA)
	BSc Information Technology	Year 3	HND in related IT area
GCU[14]	BEng Networked Systems Engineering	Year 3	HND in related area with A pass in Graded Unit 2
	BEng Digital Security, Forensics and Ethical Hacking	Year 2	HND in related area with A pass in Graded Unit 2
	BSc Cyber Security & Networks	Year 3	HND in related area with A pass in Graded Unit 2
Napier	BEng Computer Systems and Networks	Stage 3	Direct entry into Stage 3 with a sufficient pass mark in the Graded Unit
	BEng Computer Security and Forensics	Stage 3	Direct entry into Stage 3 with a sufficient pass mark in the Graded Unit and having undertaken relevant Units related to digital forensics during the course

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[14] GGAP funded activity mapping new award to relevant GCU awards

6.2.2   HN Enhancement Project

The most popular destination for graduates from this award is university.

SQA has recently received money from the *Scottish Funding Council* to improve articulation from college to university. It was agreed that a new project 'HN Enhancement' would commence where the primary aim would be to identify whether and what enhancements might be necessary to improve articulation between college HN programmes and university degree courses.

The project will explore four subject areas, one of which is Computing, to see how the existing awards can be improved to make the transition from college to university easier for students.

As part of the project, a Qualification Review Team (QRT) for the area of Computing has been formed consisting of college and university representation (including the Open University). Their role is to look at the structure, contents, assessment and supporting guidance to see if some or all of these can be improved to support articulation.

The project has six defined objectives. These are:

1   Undertake initial scoping work to:

  ♦   identify good practice and barriers to articulation in SQA HN qualifications.
  ♦   identify and consider the broader implications of enhancements across the sectors.
  ♦   identify and consider policy and guidance activity required to support the above.

2   Establish Qualification Review Teams to explore the above in the context of each subject pilot area.
3   Develop supporting guidance for any new approaches to HN development and/or assessment where required.
4   Consider alignment in relation to degree-level assessment structures.
5   Undertake restricted pilot activity over an agreed period of time.
6   Evaluate the impact of the changes and decide on roll-out to more or all SQA HN Qualifications.

This project is on-going. A QRT for Computing has been formed and the first meeting has taken place. At the time of writing, it is likely that additional assessments and guidance will be produced for this award to aid articulation between college and university.

Whatever enhancements are approved and developed, these will be piloted from August 2013.

6.2.3 Professional recognition

There are two professional bodies associated with this development:

1 E-Skills UK
2 British Computer Society.

E-Skills UK is the Sector Skills Council with special responsibility for the IT sector. The Director of Qualifications (Chris Morrow) is a member of the Sector Panel for Computing & IT.[15] This development has been discussed at Sector Panel on several occasions. Separately from this, E-Skills has been kept abreast of developments on an on-going basis. The current draft proposals are with E-Skills for their comment.[16]

The validation panel includes an ex-member of E-Skills UK, who maintains links with that organisation.

The *British Computer Society* (also known as *The Chartered Institute for IT*) is the main professional body for the subject area. BCS also has representation on the Sector Panel. No formal accreditation between this award and BCS is proposed. However, an indication of that organisation's broad support for the award is currently being sought.

The Sector Panel for Computing & IT includes a wide range of professional representation (in additional to E-Skills and BCS), including:

♦ Scotland IS
♦ Skills Development Scotland
♦ Cisco
♦ Microsoft
♦ Oracle

This award has been considered by the Panel on several occasions during its inception and development, and the Panel has expressed its support for it on each occasion.

6.2.4 Transitional Arrangements

HN awards in Computing have a long tradition of providing detailed guidance on credit transfer between existing and new awards.[17] This is done, at the request of centres and External Verifiers, to ensure consistency between centres. Credit transfer tables have been provided in this subject area since 1995. However, final decisions relating to credit transfer lies with centres.

Section 6.2.5 has been populated with equivalent Units which have been approved by an External Verifier. The External Verifier uses specific criteria to determine when two Units are equivalent and one can provide credit for another. Many of the 'new' (2011/12) Units in this table are revisions of the 'old' (2004/5) Units, making credit transfer more credible and easier to identify.

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[15] The Sector Panel is a long-standing SQA committee, which aims to capture external stakeholder input for planning and development purposes.

[16] E-Skills does not guarantee to provide feedback on qualification proposals to awarding bodies. This may or may not be provided based on available capacity.

[17] Standard SQA policy is to permit centres to decide on credit transfer.

Units within computing related frameworks prior to 2004 are not eligible for credit transfer into the new framework due to the importance of contemporary skills in this sector.

6.2.5   Credit transfer

HNC *Computing* was validated by SQA in December 2011 and HND *Computing* awards are due for validation in December 2012. These courses will replace a number of older Group Awards including:

G7GL 15   HNC *Computing*
G7DX 15   HNC *Computer Networking*
G7DY 16   HND *Computer Networking and Internet Technology*
G7TT 16   HND *Computing: Software Development*
G7TR 16   HND *Computing: Technical Support*

These Group Awards have been available since 2004/5 and themselves replaced older Group Awards, dating back to 2001. This section covers **full** credit transfer from Units in the 2004/5 Group Awards to Units in the 2012 Group Awards.

When new Group Awards are introduced, students often wish to transfer between the old and the new frameworks. For example, they may have started on an HNC under an older framework and wish to complete their HND on the new framework, or they may have completed Units some time ago and wish to use these as part of an HNC or HND under the new framework.

To assist in this process, SQA normally provides centres with guidance on Credit Transfer between the old and the new frameworks. SQA have clear criteria for deciding if two syllabuses are equivalent. All the following criteria must be satisfied if full credit transfer is to be recognised between both syllabuses:

1   *The syllabuses have the same SCQF levels.*
2   The syllabuses have the similar credit values (or equivalent).
3   The syllabuses are equivalent in terms of Core Skill coverage.
4   The syllabuses relate to the same subject area and the main topics are common to both.
5   The syllabuses present a similar level of cognitive demand.
6   The syllabuses encompass similar skill-sets.
7   The syllabuses are contemporary in terms of terminology, techniques and technology.
8   Employers, admission officers and other users would perceive both syllabuses as broadly equivalent.
9   The assessment demands are similar in terms of candidate activity and Performance Criteria, or candidates would be equally likely to pass both assessments.
10   Special conditions (where they exist) are applicable to both syllabuses.

This guidance is of an advisory nature. **The final decision on whether or not to grant credit transfer must be made by the centre and is subject to external moderation.** However, external moderators are unlikely to raise objections to any credit transfer based on the advice given here.

2004/5 GROUP AWARD UNITS		2012 GROUP AWARD UNITS	
Unit No	Unit title	Unit No	Unit title
DF9M 34	Client Operating System	H1EM 34	Client Operating Systems
DH2Y 34	Computer Hardware: Hardware Installation and Maintenance	H1FY 34	Computer Hardware: Hardware Installation and Maintenance
F1XA 34	Computing: PC Hardware and Operating System Essentials	H17E 34	Computing: PC Hardware and Operating Systems Essentials
F1X9 34	Computing: PC Hardware and Operating System Support	H17F 34	Computing: PC Hardware and Operating Systems Support
DH36 34	Computing: Graded Unit 1 (Exam)	H1J8 34	Computing: Graded Unit 1 (Exam)
DH37 34	Information Technology: Information Systems and Services	H1G0 34	IT: Information Systems & Services
DM30 35	Project Management 1	H17D 34	Computing: Introduction to Project Management
DH31 34	Computer Networks: Building Local Area Networks	H17C 34	Computer Networks: Building Local Area Networks
D75V 35	Computer Networks: Network Technology and Data Communications	H16V 35	Network Technology and Data Communications
DH32 35	Software Development: Developing for the World Wide Web	H1J9 35	Software Development: Developing Websites for Multiplatform Use
DH2X 34	Providing Support to Users	H17T 34	Providing Support to Users
DH3D 35/ FE77 35	Software Development Relational Database Systems	H16W 35	Relational Database Management Systems
D76V 35	Software Development Object Oriented Programming	H171 35	Software Development: Object Oriented Programming
DH3F 34	Systems Development: Introduction	H180 34	Systems Development: Introduction
DN4N 35	Computing: Software Development: Graded Unit 2 (Project)	H48W 35	Computing: Software Development: Graded Unit 2 (Project)
DN4P 35	Computing: Technical Support: Graded Unit 2 (Project)	H48X 35	Computing: Technical Support: Graded Unit 2 (Project)
DG0H 35	Computer Networking and Internet Technology: Graded Unit 2 (Project)	H48V 35	HND Computing: Networking Graded Unit 2 (Project)
F0N0 35	Professional Issues in Computing	H1F7 34	Professionalism and Ethics in Computing
DH21 34 D75X 34	Working Within a Project Team **AND** Information Technology: Applications Software 1	H178 34	Team Working in Computing
DH2T 34 DH33 34	Computer Architecture 1 **AND** Computer Operating Systems 1	H175 34	Computer Systems Fundamentals
F6BV 35	Human Computer Interface	H17L 34	Human Computer Interaction

2004/5 GROUP AWARD UNITS		2012 GROUP AWARD UNITS	
Unit No	**Unit title**	**Unit No**	**Unit title**
D59P 34	Network Concepts	H17S 34	Network Concepts
DG02 34	Security Concepts	HT9G 34*	Network Security Concepts
DM3H 35	Systems Development: Object Oriented Design	H172 35	Systems Development: Object Oriented Analysis and Design
DG07 34	Mail Server Administration	H17N 34	Mail Server Management
D75V 35	Computer Networks: Network Technology and Data Communications	H17A 34	Computer Networking Fundamentals

6.3   Opportunities for e-assessment

The Units in this award offer numerous opportunities for e-assessment ranging from the more obvious objective question based closed-book assessments to the use of e-portfolios and video for some of the open-book assessments. It is also possible to use social media software to record and facilitate group work where appropriate. Each Unit specification includes suggestions of how e-assessments might be used effectively.

Some SQA Units already have assessment banks developed SOLAR (**www.sqasolar.org.uk**) and centres are encouraged to use these where appropriate.

As part of an assessment strategy, centres are encouraged to investigate the option of e-assessment to support the programme. E-assessment may take a number of forms, and while it may be feasible in the future to conduct all assessment in an on-line format, currently some formats are more amenable to e-assessment than others.

The most obvious format is that of objective tests, eg multiple-choice or short-response tests, and some SQA Units already have an Evidence Requirement mandating the use of this type of test.

There is considerable scope for the use of e-assessment within and between the Units in the new framework. Many of the existing Units inherited from the previous framework have historically been mapped to vendor curricula and their assessment methodologies have emulated their vendor counterparts.

Consequently there already exists considerable resources and experience in deploying tools such as SQA SOLAR in assessing Unit Outcomes.

Given the wealth of published research on e-assessment there are undoubtedly further opportunities to broaden the use of e-assessment within the new award.

Below is a sample of Units within the Group Award where e-assessment may readily be adopted:

Multiple-choice/Short-response e-assessment opportunities	
Unit title	**Code**
Convergence Technologies	H17G 35
Routing Technology	FR22 35
Server Administration	H16X 35
Networking Technology	FR 24 35
Internetworking Technology	FR 25 35
Switching Technology	FR 23 35
Configuring a Desktop Operating System	FK89 34
Troubleshooting a Desktop Operating System	H177 34
Network Security Concepts	HT9G 34*

e-portfolio opportunities	
Unit title	**Type**
HND Computing Technical Support: Graded Unit (Project)	Project proposal Project Documentation

6.4   Support materials

A range of Assessment Support Packs (ASPs) have been produced for a number of mandatory and optional Units in this Group Award. These packs are available on the SQA secure website and access can be sought through the SQA coordinator in each centre.

6.5   Resource requirements

The requirement for ongoing staff CPD in relation to developments in ICT should be independent of new course development.

Centres who already deliver the existing HND *Computer Networking* and Internet Technology award will have invested significantly in staff CPD and hardware/software resources in relation to the Cisco CCNA curriculum and Microsoft Academy programmes.

The new award will build upon this and require further CPD in relation to the new Units introduced. The following table identifies some potential areas for CPD and *suggested* CPD routes:

Technology Area	Related Units	Suggested CPD
Network Infrastructure	Networking Technology, Routing Technology, Switching Technology, Internetworking Technology	Cisco Network Academy Programme
Client Side Operating Systems	Configuring a Desktop Operating System, Troubleshooting a Desktop Operating System	Microsoft Windows 7 Windows 8 vendor courses OR Open Source
Server Side Operating Systems	Server Administration, Administering Network Systems	Microsoft Windows Server 2008, Server 2012 OR Open Source
Convergence Technology, Cloud Computing	Convergence Technologies, Cloud Computing	CompTIA CTP+, CompTIA Cloud Essentials
Security	Security Concepts, Intrusion Prevention Systems	CompTIA Security+ Cisco CCNA Security

7　General information for centres

Equality and inclusion

The Unit Specifications making up this Group Award have been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners will be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**

Internal and external verification

All instruments of assessment used within this/these qualification(s) should be internally verified, using the appropriate policy within the centre and the guidelines set by SQA.

External verification will be carried out by SQA to ensure that internal assessment is within the national guidelines for these qualifications.

Further information on internal and external verification can be found in *SQA's Guide to Assessment* (**www.sqa.org.uk/GuideToAssessment**).

8　Glossary of terms

Embedded Core Skills: is where the assessment evidence for the Unit also includes full evidence for complete Core Skill or Core Skill components. A learner successfully completing the Unit will be automatically certificated for the Core Skill. (This depends on the Unit having been successfully audited and validated for Core Skills certification.)

Finish date: The end of a Group Award's lapsing period is known as the finish date. After the finish date, the Group Award will no longer be live and the following applies:

♦	Candidates may not be entered for the Group Award.
♦	The Group Award will continue to exist only as an archive record on the Awards Processing System (APS).

Graded Unit: Graded Units assess learners' ability to integrate what they have learned while working towards the Units of the Group Award. Their purpose is to add value to the Group Award, making it more than the sum of its parts, and to encourage learners to retain and adapt their skills and knowledge. (**Note to writer:** delete if not applicable to product type)

Lapsing date: When a Group Award is entered into its lapsing period, the following will apply:

♦	The Group Award will be deleted from the relevant catalogue.
♦	The Group Award specification will remain until the qualification reaches its finish date at which point it will be removed from SQA's website and archived.
♦	No new centres may be approved to offer the Group Award.
♦	Centres should only enter candidates whom they expect to complete the Group Award during the defined lapsing period.

SQA Credit Value: The credit value allocated to a Unit gives an indication of the contribution the Unit makes to an SQA Group Award. An SQA credit value of 1 given to an SQA Unit represents approximately 40 hours of programmed learning, teaching and assessment.

SCQF: The Scottish Credit and Qualification Framework (SCQF) provides the national common framework for describing all relevant programmes of learning and qualifications in Scotland. SCQF terminology is used throughout this guide to refer to credits and levels. For further information on the SCQF visit the SCQF website at **www.scqf.org.uk**

SCQF credit points: SCQF credit points provide a means of describing and comparing the amount of learning that is required to complete a qualification at a given level of the Framework. One National Unit credit is equivalent to 6 SCQF credit points. One National Unit credit at Advanced Higher and one Higher National Unit credit (irrespective of level) is equivalent to 8 SCQF credit points.

SCQF levels: The level a qualification is assigned within the framework is an indication of how hard it is to achieve. The SCQF covers 12 levels of learning. HNCs and HNDs are available at SCQF levels 7 and 8 respectively. Higher National Units will normally be at levels 6–9 and Graded Units will be at level 7 and 8. National Qualification Group Awards are available at SCQF levels 2–6 and will normally be made up of National Units which are available from SCQF levels 2–7.

Subject Unit: Subject Units contain vocational/subject content and are designed to test a specific set of knowledge and skills.

Signposted Core Skills: refers to opportunities to develop Core Skills arise in learning and teaching but are not automatically certificated.

History of changes

It is anticipated that changes will take place during the life of the qualification and this section will record these changes. This document is the latest version and incorporates the changes summarised below. Centres are advised to check SQA's APS Navigator to confirm they are using the up to date qualification structure.

NOTE: Where a Unit is revised by another Unit:

♦ No new centres may be approved to offer the Unit which has been revised.
♦ Centres should only enter candidates for the Unit which has been revised where they are expected to complete the Unit before its finish date.

Version Number	Description	Date
19	**Addition of Optional Units:** J27S 34 Working in Cyber Security and J4BF 34 Cryptography: Practical Applications (added as Group 2 optional units)	23/06/23
18	**Addition of Optional Units:** J11W 35 Computer Operating Systems and J27N 35 Network Security Monitoring have been added as Group 2 Optional units.	11/10/22
17	**Addition of Optional Unit:** J4BF 34 Cryptography: Practical Applications has been added as an optional unit	11/12/20
16	**Addition of Optional Unit:** J27L 34 Data Flow added as an Optional unit.	24/03/20
15	**Addition of Optional Unit:** J0H9 34 Data Security added as an Optional unit.	17/12/19
14	**Additional of optional units:** J2JW 34 Firewall Essentials and J27L 34 Data flow has been added to the local options	01/11/19
13	**Revision of Units:** H17V 34 Security Concepts (finish date 31/07/2020) has been replaced by HT9G 34 Network Security Concepts.	24/09/19
12	Addition of Optional Unit: HF3K 34 Web Technologies 1: HTML and CSS added as Optional unit. (APS only)	11/09/18
11	**Revision of Units:** H1EP 34 Ethical Hacking: Fundamentals (finish date 31/07/2021) has been replaced by J0HK 34 Ethical Hacking (start date 01/08/2018). H1EN 34 Computer Forensics: Fundamentals (finish date 31/07/2021) has been replaced by J0HL 34 Digital Forensics (start date 01/08/2018)	21/06/18
10	**Revision of Unit:** H18C 35 Open Source Operating Systems: Introduction to Command Line Administration (Finish date 31/07/2020) has been replaced by HT6W 35 Open Source Operating Systems: Introduction to Command Line Administration (Start date 01/08/2017)	15/08/17
09	**Revision of Unit:** HG1K 34 Professional Career Development in the IT Industry into Options Group 1	31/08/16
08	**Revision of Units:** H17J 34 Developing Mobile Web Based Applications: An Introduction has been replaced with HF4Y 34. F1VV 34 User Interface Design has been replaced by HF55 34. All of the of units will finish 31/07/2019	12/07/16
07	**Additional of Optional Units:** H9DE 34 Digital Skills (Group 2)	27/08/15
06	**Revision of Unit:**	13/07/15

	D77G 34 Communication Practical Skills has been revised by H7MB 34 Communication Practical Skills and finishes on 31/07/2016.	
05	**Revision of Unit:** DE1K 33 Workplace Communication in English has been revised by H8T2 33 and finishes on 31/07/2016.	19/05/15
04	**Addition of Optional Units:** D85F 34 Using Software Applications Packages (Group 2), D75X 34 Information Technology: Applications Software 1 (Group 2), DH35 34 Computing: Planning (Group 2), H8W8 34 Big Data (Group 1), H8W9 35 Data Science (Group 1), H8N5 35 Private Cloud Virtualisation (Group 1)	10/04/15
03	**Revision of Unit**: DK2K 34 Getting Started in Business *has been revised by* H7V4 34 Preparing to Start a Business *and will finish on* 31/07/2016.	20/01/15
02	*Bring Your Own Device (BYOD): Introduction* (H6D0 34) added as an optional Unit to framework (Group 2). Napier University articulation routes added.	09/06/14

Acknowledgement

9   General information for learners

This section will help you decide whether this is the qualification for you by explaining what the qualification is about, what you should know or be able to do before you start, what you will need to do during the qualification and opportunities for further learning and employment.

The aim of this qualification is to equip you with the necessary skillset to pursue employment in the general category of IT&T engineer/IT&T technician. In addition the award encompasses the necessary training required for a range of commercially recognised certifications such CompTIA, Microsoft and Cisco and allows you to focus on technology clusters such as network infrastructure, security and client/server operating systems.

This qualification is suitable for the following range of learners:

♦   Learners articulating from the generic HNC *Computing* award wishing to specialise in networking related technologies.
♦   Any other suitable candidate wishing to achieve this award with a view to further articulation to an appropriate HE award or to pursue employment in the relevant ICT sector.

At the discretion of a centre, you may be permitted to enter the award by waiving some of the entry requirements — based on your previous experience.

It is anticipated that the award will allow you to progress to a wide variety of university degree programmes at Year two and Year three respectively.

To achieve the award you will need to pass a minimum of 30 credits from the Group Award framework including all 14 of the mandatory Units.

In the first year of the award you will learn a range of introductory computing topics relating to computer systems and how to troubleshoot faults on them. You will also learn about team working and some of the legislation that governs securing the electronic data that is stored on systems. In addition you will study two Microsoft Windows 7 courses and two semesters of the Cisco Certified Network Associate (CCNA) programme covering local area networks (LAN's) and routers.

In second year you will specialise in server operating systems and complete the remaining two CCNA semesters relating to local area network switches and wide area network (WAN) technology. In addition you will learn about system and network security and voice over IP (VoIP) technology.