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BCS Level 4 Certificate in Network Services Syllabus 603/3256/6

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Change History

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

Version Number	Changes Made
V1.0 May 2018	Document created.

Introduction

This certificate is the third module of four knowledge modules that are applicable to the level 4 Unified Communications Trouble Shooter apprenticeship. It covers the range of concepts, approaches and techniques that are applicable to network services, for which apprentices are required to demonstrate their knowledge and understanding.

Objectives

Apprentices should be able to demonstrate an understanding of modern computer security principles. Key areas are:

1. Understand network protocols and how they are used to implement data communications.
2. Understand numbering systems to enable them to calculate and convert values, including algorithms, data, binary, probability and statistics.
3. Understands SIP and SIP logs.
4. Understand cloud services.
5. Understand data and hosted services.
6. Understands a wide range of Domain Services to administer a network including group policy.

Evidence of lessons learnt in these key areas should be collected and reflected upon when the apprentice is compiling the summative portfolio as the apprentice could identify how the task might be done better / differently with knowledge subsequently gained.

Target Audience

This certificate is relevant to anyone enrolled on the Level 4 Unified Communications Trouble Shooter Apprenticeship programme.

Course Format and Duration

Apprentices can study for this certificate by attending a training course provided by a BCS accredited Training Provider. The estimated total qualification time for this certificate is 137 hours.

Eligibility for the Examination

Individual employers will set the selection criteria, but this is likely to include 5 GCSEs (especially English, mathematics and a science or technology subject); other relevant qualifications and experience; or an aptitude test with a focus on IT skills.

Level 2 English and Maths will need to be achieved, if not already, prior to taking the endpoint assessment.

Duration and Format of the Examination

The format for the examination is a one-hour multiple-choice examination consisting of 40 questions. The examination is closed book (no materials can be taken into the examination room). The pass mark is 26/40 (65%).

Additional Time for Apprentices Requiring Reasonable Adjustments Due to a Disability

Apprentices may request additional time if they require reasonable adjustments. Please refer to the Access to Assessment policy for detailed information on how and when to apply.

Additional Time for Apprentices Whose Language Is Not the Language of the Exam

If the examination is taken in a language that is not the apprentice's native / official language, then they are entitled to 25% extra time.

If the examination is taken in a language that is not the apprentice's native / official language, then they are entitled to use their own **paper** language dictionary (whose purpose is translation between the examination language and another national language) during the examination. Electronic versions of dictionaries will **not** be allowed into the examination room.

Guidelines for Training Providers

Each major subject heading in this syllabus is assigned an allocated time. The purpose of this is two-fold: first, to give both guidance on the relative proportion of time to be allocated to each section of an accredited course and an approximate minimum time for the teaching of each section; second, to guide the proportion of questions in the exam. Training providers may spend more time than is indicated and apprentices may spend more time again in reading and research. Courses do not have to follow the same order as the syllabus. Courses may be run as a single module or broken down into two or three smaller modules.

This syllabus is structured into sections relating to major subject headings and numbered with a single digit section number. Each section is allocated a minimum contact time for presentation. Apprentices should be encouraged to consider their summative portfolio throughout the modules.

Calculators

Candidates taking on-line examinations will have access to an on-screen calculator. No other calculators or mobile technology will be allowed.

Syllabus

For each top-level area of the syllabus a percentage and K level is identified. The percentage is the exam coverage of that area, and the K level identifies the maximum level of knowledge that may be examined for that area.

1 Network Fundamentals (42.5%, K3)

In this topic area, the apprentice will understand network fundamentals including network components and internet protocols. The successful apprentice should be able to:

1.1 Describe the components of a network.

1.2 Describe all seven layers and representative protocols at each layer within the OSI model.

- the Physical layer;
  - electrical;
  - optical;
  - wireless.
- the Data Link layer;
  - purpose of the Data Link layer;
  - data format;
  - description of an Ethernet frame;
- the Network layer;
  - purpose of the Network layer;
  - Internet Protocol;
- the Transport layer;
  - purpose of the Transport layer;
  - Transport layer protocols (TCP and UDP);
- the Session layer;
  - purpose of the Session layer;
- the Presentation layer;
  - purpose of the Presentation layer;
- the Application layer;
  - purpose of the Application layer.

1.3 Explain the role of protocols in facilitating interoperability in network communications.
- RIPv1;
- RIPv2;
- OSPF;
- EIGRP;
- RIPng;
- OSPFV3;
- EIGRP for IPv6.

1.4 Explain different numbering systems.
- binary;
- decimal;
- hexadecimal.

1.5 Demonstrate an ability to convert between binary and decimal.

1.6 Demonstrate an ability to calculate the number of host addresses available when given a network and a subnet mask.

1.7 Demonstrate an ability to calculate the necessary subnet mask when given a network diagram in order to accommodate the requirements of the network.

1.8 Explain noise to signal ratios.

1.9 Recall the maximum rated segment lengths for a range of cable types, including legacy cables.
- 10Base2;
- 10Base5;
- 10BaseT;
- 100Base-TX;
- 1000Base-T;
- 10GBase-T;
- 100Base-FX;
- 1000Base-LX (single-mode);
- 1000Base-LX (multi-mode);
- 1000Base-SX;
- 10GBase-SR;
- 40GBase-SR4;
- 100GBase-SR10.

1.10 Recall the maximum rated indoor transmission distances for a range of wireless protocols.
- IEEE 802.11a;
- IEEE 802.11b;
- IEEE 802.11g;
- IEEE 802.11n;
- IEEE 802.11ac.

2 Network Service Solutions (30%, K3)

In this topic area, the apprentice will describe and explain network service solutions. The successful apprentice should be able to:

2.1 Explain the purpose of:
- operating system – software used to manage the basic functions of a computer;
- applications – software designed to provide a specific task normally for end users;
- databases – used to storage and rapid retrieval of information;
- servers – provide systems resources that other computers can access;
  - Active Directory;
  - DNS;
  - web proxy server;
  - file and print;
  - email;
  - database;
  - virtualisation;
    - scalability – the ability to add capacity for expansion;
    - scalability – fault tolerance by implementing clustering;
- networking - provide managed communication links between computers;
- security – maintaining the integrity of systems and data.

2.2 Explain the purpose of cloud-based services.
- Infrastructure as a Service (IaaS);
- Platform as a Service (PaaS);
- Software as a Service (SaaS).

2.3 Identify the purpose of types of data communication platforms used in networking.

- video;
  - typically requires more bandwidth than voice or data;
  - individual packets can be lost and communication still works but at reduced quality;
  - impacted by jitter;
- voice;
  - typically requires greater bandwidth than data less than video;
  - individual packets can be lost and communication still works but at reduced quality;
  - impacted by jitter;
- data;
  - typically requires less bandwidth than video or voice;
  - typically, a whole message must be received for the file to be uncorrupted.

2.4 Describe SIP user agents – the network elements that use SIP.

- user agent;
- proxy server;
- registrar;
- redirect server;
- session border controller;
- gateway.

2.5 Describe protocols related to SIP.

- SDP;
- UDP;
- TCP;
- SCTP;
- RTP;
- SRTP;
- TLS.

2.6 Demonstrate the ability to capture and record SIP traffic using a suitable packet analysis tool.

3 Domain Services (27.5%, K2)

In this topic area, the apprentice will describe and explain domain services including administration, user and service accounts, and group policy. The successful apprentice should be able to:

3.1 Describe tools used to administer domain services.

- Active Directory Domain Services (AD DS);
- Active Directory Lightweight Domain Services (AD LDS);
- Remote Server Administration Tools (RSAT) for locally managed domains;
- Remote Server Administration Tools (RSAT) for Azure Active Directory Domain Services (AAD DS) managed domain;
- Third party domain services management tools;
- HP CloudSystem Matrix;
- SolarWinds Server and Application Monitor;
- IBM Cloud tools;
- Amazon Web Services (AWS) cloud management tools.

3.2 Explain the purpose of a DNS server.

- name resolution;
- storage of network records;
  - A and AAAA;
  - CNAME;
  - PTR;
  - MX;
  - SOA.

3.3 Describe how to configure and support networks by editing key settings.

- IP address / netmask / default gateway;
- primary and secondary DNS;
- firewall;
  - enabling / disabling the entire firewall;
  - enabling / disabling ports;
    - dhcp;
    - dns;
    - ftp;
    - http;
    - https;
    - imap;
    - pop3;
    - RDP;
    - smtp;
    - ssh;
    - telnet;
  - restricting internet access to specific applications.

3.4 Describe the key purposes of domain controllers.

- centralise the management of directory services;
- centralise the management of security policies.

3.5 Explain the main configuration tools, what their functions are and how they are used to maintain security.

- personal firewall;
- perimeter firewall;
- directory services (Active Directory);
  - users;
  - groups;
- policies (group policy);
  - password policies;
  - hardware restrictions;
  - application and utility restrictions;
  - remediation.

3.6 Describe the purpose of creating and managing users and computer records within Active Directory.

- users – centralised management of user access to organisational network;
- computers – centralised management of which computer can access a domain and domain resources.

3.7 Describe how to create, update and delete within Active Directory.

- organisational unit (OU);
- users;
- computers.

Levels of Knowledge / SFIA Levels

This syllabus will provide apprentices with the levels of difficulty / knowledge skill highlighted within the following table, enabling them to develop the skills to operate at the levels of responsibility indicated. The levels of knowledge and SFIA levels are explained on the website www.bcs.org/levels. The levels of knowledge above will enable apprentices to develop the following levels of skill to be able to operate at the following levels of responsibility (as defined within the SFIA framework) within their workplace:

Level	Levels of Knowledge	Levels of Skill and Responsibility (SFIA)
K7		Set strategy, inspire and mobilise
K6	Evaluate	Initiate and influence
K5	Synthesise	Ensure and advise
K4	Analyse	Enable
K3	Apply	Apply
K2	Understand	Assist
K1	Remember	Follow

Question Weighting

Syllabus Area	Target Number of Questions
1. Network Fundamentals	17
2. Network Service Solutions	12
3. Domain Services	11
Total	**40 Questions**

Format of Examination

Type	40 Question Multiple Choice.
Duration	1 hour. An additional 15 minutes will be allowed for apprentices sitting the examination in a language that is not their native / mother tongue.
Pre-requisites	Training from a BCS accredited training provider is strongly recommended but is not a pre-requisite.
Supervised	Yes.
Open Book	No.
Pass Mark	26/40 (65%).
Calculators	Calculators may be used during this examination.
Total Qualification Time (TQT)	137 Hours, 75 GLH recommended.
Delivery	Online.

Trainer Criteria

Criteria	▪ Have 10 days' training experience or have a Train the Trainer qualification. ▪ Have a minimum of 3 years' practical experience in the subject area.

Classroom Size

Trainer to apprentice ratio	1:16