WM162-15 Network Protocols and Infrastructure

24/25

Department
> WMG

Level
> Undergraduate Level 1

Module leader
> Alaa Al Sebae

Credit value
> 15

Module duration
> 14 weeks

Assessment
> 60% coursework, 40% exam

Study locations
> University of Warwick main campus, Coventry Primary
> Distance or Online Delivery

Description

Introductory description

The advent of computer networks has revolutionised industries across all sectors. Computer networking allows businesses to grow by providing cost-effective resource sharing, improving storage efficiency, access and flexibility in securing valuable information. Skills acquired in this module will enable students to identify, plan, build and maintain networked PC systems, as well as troubleshoot common hardware and software problems in an industrial environment. Moreover, apprentices will be involved in group tasks that enabled them to demonstrate British and core society values.

[Module web page](#)

Module aims

This module aims to equip apprentices with fundamental knowledge of computer architecture and networked computer systems. The main components of a personal computer and network elements required to build a small-networked computer will be discussed in detail. A focus will be on switching basics and small-scale routing. This includes topics such as IP addressing

techniques, command-line interface (CLI) configuration of Ethernet switches, routers and Virtual Local Area Networks (VLANs). Basic cloud infrastructure will be introduced. At the end of this module, apprentices will be able to have a meaningful discussion with workplace technical managers to discuss how employer leverages networking infrastructure to meet the business need. Apprentices can then write a reflective piece on how employer can imporve their current provision to gain more business advantages. The reflective narrative can be discussesd with the DA tutor.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Technical topics:

Basics of internetworking.

- Background of data communication (wired, wireless).
- Network topologies (Star, Mesh, Hybrid).
- Cabling technology, Troubleshoot interface and cable issues.
- NIC: Network Interface Card
  The OSI Reference Model, TCP/IP reference model.
- Physical, Data Link, Network, Transport and Application layers.
- Error-detection and correction techniques.
- Principles of Reliable Data Transfer.
  Network Devices
- NIC, Hub, Switch, Router, Firewalls, Access points, Wireless controllers.
  Ethernet technology.
- Multiple Access Links and Protocols (static and dynamic channel allocation).
- MAC addressing.
- Frame format Broadcast & collusion domain.
- Switching concepts (MAC learning, Frame switching, fame flooding, MAC address table).
  IP addressing and routing
- Network Protocols, IPv4 address types (Unicast, Multicast, and Broadcast).
- Private and Public networks. intro to routing protocols such as RIP, OSPF and EIGRP
- Troubleshoot IPv4 addressing and sub-netting.

Non-technical topics:
Apprentices will engage in individual seminars and group Labs. This enables the apprentice to exhibit strong work ethics and commitment in order to meet the standards required. The apprentices will also engage in a coursework that involve a group work which enables apprentices to demonstrate behavioural aspects such as being reliable, objective and capable of both independent and team working.

Learning outcomes

By the end of the module, students should be able to:

- Recognise the role and function of various computer networking components. [BCS:CITP - 2.1.1]
- Explain the Open System Interconnection (OSI) and TCP/IP modeles and their addressing schemes. [BCS:CITP -2.1.2]
- Describe the main network protocols, their purpose, features and relationship to each other. [BCS:CITP -2.1.1]
- Work in a group to design simple computer networks and implement appropriate addressing schemes. [AHEP:4 -C8, C16, C17]], [BCS:CITP -2.1.13, 2.1.6, 2.1.10,2.1.11]]
- Work in group to configure and troubleshoot network connectivity. [BCS:CITP -2.1.13]

Indicative reading list

A.S. Tanenbaum, D.J. Wetherall, "Computer Networks", 5/E, Pearson, ISBN: 9781292024226, (2013).

W. Stallings, "Computer Organization and Architecture", 10/E, Pearson, ISBN: 9781292096858, (2016).

S. Tanenbaum, T. Austin, "Structured Computer Organization", 6/E, Pearson, ISBN: 9780273769248, (2013).

J. Kurose, K. Ross, "Computer Networking: A Top-Down Approach", 7/E, Pearson, ISBN: 9781292153599, (2017).

W. Odom, "CCENT/CCNA ICND1 100-105 Official Cert Guide, Academic Edition", Cisco Press, ISBN: 978-1-58720-597-2 (2016)

W. Odom, "CCNA Routing and Switching ICND2 200-105 Official Cert Guide, Academic Edition", Cisco Press, ISBN: 978-1-58720-579-8 (2016)

View reading list on Talis Aspire

Subject specific skills

The module aims to cover the following subject-specific skills. Some skills will be enhanced further in the following years based on the chosen stream.

How teams work effectively to produce digital and technology solutions.
Fundamental computer networking concepts in relation to digital and technology solutions. For example, structure, cloud architecture, components, quality of service.
The role and function of virtual or physical network components and functions and typical topologies and service architectures.
The main network protocols in use, their purpose, features and relationship to each other. For example, Ethernet, IP (Internet Protocol), TCP (Transmission Control Protocol), OSPF (Open Shortest Path First).
Plan, design and manage simple computer networks with an overall focus on the services and capabilities that network infrastructure solutions enable in an organisational context.
Monitor performance and ensure networks are configured correctly and perform as expected by designers or architects. Undertake capacity management and audit of IP addressing and hosted

devices.
Implement computer networks from a design including testing and validation. This includes populating variables in configurations, for example, IP addresses and subsequent application of configuration to equipment such as routers, switches, firewalls.

Apprentices will also exhibit
a strong work ethic and commitment in order to meet the standards required.
Reliable, objective and capable of both independent and team working.

Transferable skills

Students should be able to demonstrate:

- How teams work effectively to produce technology solutions.
- Applies analytical and critical thinking skills to systematically develop, analyse and apply structured problem solving techniques to complex systems and situations.

Study

Study time

Type	Required
Lectures	15 sessions of 1 hour (10%)
Tutorials	15 sessions of 1 hour (10%)
Work-based learning	15 sessions of 1 hour (10%)
Online learning (independent)	37 sessions of 1 hour (25%)
Other activity	8 hours (5%)
Assessment	60 hours (40%)
Total	150 hours

Private study description

No private study requirements defined for this module.

Other activity description

Other activity (8 hrs): 3hrs live and asynchronous support sessions to answer questions related to the module and its assessment and 5 hrs of self-directed learning during teaching days.
Online learning independent (37): Apprentices use their working hours to revise the contents taught during the module, interact with their peers, and carry out independent research on the taught subjects.
WBL (15 hrs): Apprentices to discuss with their employers their current practices in leveraging computer networks in light of the relevant KSBs.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group D2

	Weighting	Study time	Eligible for self-certification
Group coursework	60%	36 hours	No

A group report of up to 2400 words on network plan, design, and implementation using an industry-standard software.

	Weighting	Study time	Eligible for self-certification
Exam	40%	24 hours	No

Individual exam that assesses the fundamentals of Computer networks.

Feedback on assessment

Feedback given as appropriate to the assessment type:

- verbal feedback given during lectures and/or seminar sessions,
- verbal formative feedback on lab activities,
- written cohort-level feedback on the examination,
- written summative feedback on post module assessment.

[Past exam papers for WM162](#)

Availability

Courses

This module is Core for:

- Year 1 of DWMS-H655 Undergraduate Digital and Technology Solutions (Cyber) (Degree Apprenticeship)
- Year 1 of DWMS-H652 Undergraduate Digital and Technology Solutions (Data Analytics) (Degree Apprenticeship)
- Year 1 of DWMS-H653 Undergraduate Digital and Technology Solutions (Network Engineering) (Degree Apprenticeship)
- Year 1 of DWMS-H654 Undergraduate Digital and Technology Solutions (Software

Engineering) (Degree Apprenticeship)