

<b>Module Code:</b>	COM551
---------------------	--------

<b>Module Title:</b>	Networking: Scaling Networks
----------------------	------------------------------

<b>Level:</b>	5	<b>Credit Value:</b>	20
---------------	---	----------------------	----

<b>Cost Centre(s):</b>	GACP	<b>JACS3 code:</b>	I120
		<b>HECoS code:</b>	100365

<b>Faculty:</b>	Arts, Science and Technology	<b>Module Leader:</b>	Dr Nigel Houlden
-----------------	------------------------------	-----------------------	------------------

Scheduled learning and teaching hours	30 hrs
Guided independent study	170 hrs
Placement	0 hrs
<b>Module duration (total hours)</b>	<b>200 hrs</b>

<b>Programme(s) in which to be offered (not including exit awards)</b>	Core	Option
BSc (Hons) Computer Networks and Security	✓	<input type="checkbox"/>
BSc (Hons) Computer Networks and Security (with Industrial Placement)	✓	<input type="checkbox"/>
BSc (Hons) Cyber Security	✓	<input type="checkbox"/>
BSc (Hons) Cyber Security (with Industrial Placement)	✓	<input type="checkbox"/>

<b>Pre-requisites</b>
None

**Office use only**

Initial approval: 28/11/2019

Version no:1

With effect from: 01/09/2019

Date and details of revision: 03/04/19 APSC approved modification

Version no:2

## Module Aims

This module, which aims to deal with selected, advanced topics in networking and data communications, is intended to:

- Develop, in depth, issues relating to network services provision
- Consider the modelling, simulation, planning and optimisation of communication networks
- Investigate various forms of networking algorithms
- Provide students with an insight into cutting-edge and emergent network technology

## Intended Learning Outcomes

Key skills for employability

KS1	Written, oral and media communication skills
KS2	Leadership, team working and networking skills
KS3	Opportunity, creativity and problem solving skills
KS4	Information technology skills and digital literacy
KS5	Information management skills
KS6	Research skills
KS7	Intercultural and sustainability skills
KS8	Career management skills
KS9	Learning to learn (managing personal and professional development, self-management)
KS10	Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Design and plan a network demonstrating the use of Routing Protocols used in multi-area operation	KS1-10	
2	Implement and build a network	KS2	KS5
		KS3	KS9
		KS4	
3	Evaluate the use of wireless networks and the associated technologies involved in modern networks	KS1-10	
4	Analyse the resilience of networking covering aspects of redundancy, link aggregation, VLANs, trunking, backup routes and routing protocols.	KS1, KS3, KS4,	KS5, KS6, KS9, KS10
5	Analyse different security threats in networking and potential solutions including, Access Control lists, VPNs and firewall configuration.	KS1, KS3, KS4,	KS5, KS6, KS9, KS10

6	Implement different security threats in networking and potential solutions including, Access Control lists, VPNs and firewall configuration.	KS2	KS5
		KS3	KS9
		KS4	
7	Compare and contrast the use of different WAN technologies.	KS1, KS3, KS4	KS5, KS6, KS9, KS10
8	Evaluate the use of tunnels to support ipv4, ipv6 and VPN networking.	KS1, KS3, KS4, KS5,	KS6, KS9, KS10
9	Research the use of various types wireless technologies involved in modern networks	KS1 – KS10	

**Transferable skills and other attributes**

--

**Derogations**

None

**Assessment:**

Indicative Assessment Tasks:

Assessment 1 is typically a design study of a network. A case study is used e.g. a network campus, that requires students to individually assess the requirements for a typical business network and produce a report covering the technical aspect of the infrastructure. It would be expected that elements of LAN and WAN technologies would be included. In addition to the networking technology other aspects that should be considered are network protocols, resilience and security.

Assessment 2 is an in-class test covering the theory and terminology used in a networking environment.

Assessment 3 is an in-class practical test covering the practical and troubleshooting skills used in a networking environment.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,4,8,9	Case Study	40		3000
2	2, 6	Practical	40	2 hours	
3	3,5, 7	In-class test	20	1.25 hours	

**Learning and Teaching Strategies:**

Students will receive instruction during workshops involving practical work, on-line reading material, and lectures. Students are tested at all stages by probing on-line exams and challenging practical case studies.

**Syllabus outline:**

- VLANs
- Routing Concepts
- Inter-VLAN Routing
- Access Control Lists
- DHCP
- Network Address Translation
- Introduction to Scaling Network
- LAN Redundancy
- Link Aggregation
- Wireless LANs
- Mobile telecommunications technology (3G/4G)
- OSPF
- EIGRP
- EIGRP Advanced Configurations and Troubleshooting
- Design build and Troubleshoot Multi-area networks
- Hierarchical Network Design
- Connecting to the WAN
- Point-to-Point Connections
- Broadband Solutions
- Securing Site-to-Site Connectivity
- Monitoring the Network
- Troubleshooting the Network

**Indicative Bibliography:****Essential reading**

William Stallings (2013). Data and Computer Communications. 10th ed. New York: Prentice Hall.

CCNA Routing and Switching 200-125 Official Cert Guide Library Hardcover –2016: Ciscopress

**Other indicative reading**

Rick Graziani (2012). IPv6 Fundamentals: Cisco press

Muhammad Afaq Khan (2013). Building Service-Aware Networks: The Next-generation WAN/MAN (Networking Technology): Cisco press