Faculty of Science and Technology
Department of Computing & Informatics

Submission Coursework Brief
Undergraduate

Unit: COMMUNICATIONS AND NETWORKING (COMP5071)		
Unit Contact: Marios Angelopoulos	**Credits:** 20	**Level:** 5

Assessment Title: Network Design & Evaluation	
Assessment Number: 1 **of** 1	
Assessment Type: Individual	**Weighting:** 100%
Deadline: 17/01/2025 at 12:00 PM	**Submission Method:** Turnitin (+ large file submission box)

Quality Assessor (QA): Huseyin Dogan	Other Marker(s): N/A

Can I use Generative AI tools?

Basic spelling and grammar correction tools are permitted.

The following originality requirements will apply to this assignment:

You are not allowed to use any Generative AI or other AI powered tools, such as ChatGPT, for this assessment. Any use of these tools for any part of this assessment would be considered an academic offence.

Task:

You have been contracted to design, evaluate and document a network for the company described in the following scenario, incorporating your selected network devices, giving detailed design, configuration, management, fault prevention and security arrangements. Network design and evaluation of the developed design by means of appropriate simulations will be conducted using Cisco Packet Tracer (CPT). Your design and evaluation study will be accompanied by a concise report documenting your design decisions and evaluation findings.

Develop network simulations and write a design & evaluation report that documents and critically analyses your network design and configuration decisions. In particular, based on the scenario found further below, you are asked to do the following:

a. Use CPT to develop a computer network simulation for the described use case scenario.
b. The CPT simulation will need to include the described services, end-user and networking devices, network topology and locations.
c. You will need to develop and include efficient IPv4 schemes, allocation of IP addresses to all relevant devices, appropriate and efficient bandwidth allocation to different links and segments of the network, as well as routing protocols.
d. Allocate, document and critically evaluate at least one LOGICAL IPv4 IP scheme, optionally using VLANs for appropriate network segments, including in your analysis and justifications;

e. Produce LOGICAL (with the IP design scheme made clear) and PHYSICAL diagrams (showing location of all network devices with some end devices included as examples) for your network design. You can use CPT to produce the diagrams;

f. Develop two simulation scenarios each one using a different routing protocol (e.g. static vs dynamic routing) highlighting their impact on the performance of the network. Include your analysis and findings in your report.

g. Justify carefully any necessary assumptions including giving justifications and clarifications of the network's business requirements described in the scenario;

h. Evaluate design issues for management of the network that link the organisation's sites using WAN technologies;

i. Make suggestions for innovative features such as fault prevention and security that enhance the network's capabilities.

SCENARIO

The IT Management Team at 'Bay Resort Hotels', a prestige, nationally known hotelier with a 5* hotel at their hotel site on the West Cliff in Bournechurch has to upgrade the network and network management facilities at its hotels, including the local Bournechurch hotel. The expectation is that the network should support the following minimum business requirements and activities at each hotel site including Bournechurch.

In a building measuring roughly 200m x 100m over two floors, there are 'Front Desk' facilities with a minimum of 6 manned check-in/out stations using wired or wireless connections internally within the building. Located close to each of two customer entrances and exits there are also a minimum of four unmanned "Rapid check-in/out" stations. Provision is needed of Wi-Fi in all public rooms – lobby, lounge, restaurant, café and bar. Retail items such as clothing, suits, jackets and dresses, watches, cosmetics, medical items and a range of similar accessories are available in the hotel boutique with a minimum of 2 manned card/cash pay-stations using wired or wireless connections. Facilities are needed to allow customers to pick up and pay for purchases reserved online.

You should suggest other related advanced application solutions requiring extra network features and management facilities such as electronic key entry to rooms, or optional Wi-Fi in guest rooms available at extra cost and other advanced features. The network must have security measures for confidentiality and integrity, such as access control, port security, wireless security, virus scanners and firewalls.

There should be a WAN network connection to the nearest regional HQ located at a regional hotel site 30 miles away near Southampton, as well as a connection to the company Head Office (HO) situated in London. HO is the centre of a hub-and-spoke WAN network to all regional HQs and hotel sites nationwide. There is a web server managed by HO with features such as the hotel directory with details of hotel sites and rates, special offers, goods that can be ordered via the e-commerce facility availability enquiries and making bookings.

Intended Learning Outcomes (ILOs)

This unit assesses your ability to:

1. Design, setup and configure networks based on specific networking and data communication requirements

2. Evaluate and choose between different data communication mechanisms and protocols

3. Implement best practice when evaluating and documenting design choices in enterprise LAN and WAN.

4. Make effective ethical and security choices in the development of professional network and infrastructure applications.

Submission Format:

The report will be in a single document in **PDF (.pdf)** format. The word count limit for this document is **1,500 words, excluding references, figures and diagrams**. Submitted via Turnitin on Brightspace. You are encouraged to use as many diagrams as necessary to support your proposal.

You **must** also submit all relevant Cisco Packet Tracer simulation files at Large/Additional Files submission box on Brightspace to support your report.

How will this be assessed?

1. Presentation and clarity of the report including references - 10%

To pass: Report exhibits good structure and layout of text, figures, diagrams and tables with a proper standard of labelling; English should be without spelling or grammatical errors. Simulation files are provided.

To achieve higher marks: Report should include excellent use of figures, diagrams and tables that integrate well with the written text to illustrate ideas and concept well with rationales explored and design choices logically explained. Simulation files provided for all considered scenarios and fully support the report.

2. Clarification of network requirements, justification and quality of design decisions - 20%

To pass: The report should clarify the key requirements that give rise to the main design choices. These are reflected in the simulation files.

To achieve higher mark: The narrative critically appraises key alternative architecture paradigms and evaluates choices thoughtfully with accompanying simulations files.

3. Logical IPv4/VLAN and physical schemes using TCP/IPv4 protocol - 25%

To pass: Report should at least produce logical and physical IPv4/VLAN schemes supported by corresponding simulation files.

To achieve higher mark: Report should evaluate efficient and state of the art alternatives (e.g. CIDR, VLSM, IPv6) with accompanying simulations.

4. Evaluation of routing schemes and protocols – 25%

To pass: The performance of at least one routing protocol is evaluated by means of simulation; analysis and findings are clearly presented in the report.

To achieve higher mark: The performance of at least two routing protocols is evaluated by means of simulation considering multiple simulation scenarios highlighting the differences of the protocols (e.g. including failures / dynamics) using multiple performance metrics; analysis and findings are presented in detail in the report.

5. Research provision for additional fault management & security features - 20%

To pass: Report should at least identify the main network monitoring, fault management & security issues and identify basic counter-measures;

To achieve higher mark: Report should elaborate on advanced monitoring, fault management principles and tools for advanced practices that prevent a security breach.

Questions about the assessment:

Questions about the brief can be brough in person to the lecture and laboratory session, or emailed to the Unit Leader - Prof. Marios Angelopoulos mangelopoulos@bournemouth.ac.uk

Academic Integrity

The work you submit must be your own. Any attempt to gain an unfair advantage in your assessment by **cheating**, deception or fraud is considered an academic offence. The 'Assessment help and support' section of the unit (found under 'Assessment' in the content area) provides more guidance on avoiding academic offences, including **any guidance on what will or will not be considered an academic offence in this specific assessment**

Help and support

The 'Assessment help and support' section of the unit (found under 'Assessment' in the content area) provides information and guidance, including specific information on support for this assessment. It provides help with our policies on deadline extensions and information on support available in the university, including academic skills support and additional learning support for students with disabilities.

Disclaimer

The information provided in this assignment brief is correct at time of publication. In the unlikely event that any changes are deemed necessary, they will be communicated clearly via e-mail and via the VLE and a new version of this coursework brief will be circulated.

Date Issued: 30/09/2024