Coursework – Network Design and Troubleshooting

Individual Written Report: Network Analysis (40%)

Academic year and term:	2018/19 – Semester-2, Year 2
Module title:	Network Design and Troubleshooting
Module code:	**QAC020N253A**
Module Convener:	**Dr M Hasan**
Module Learning Outcomes	Students who successfully complete this module will be able to: • Identify, analyse and communicate principles and processes of Network Design. • Critically analyse and evaluate business and technical Requirements. • Plan and design a Network Infrastructure (LAN/WAN/MAN). • Design and evaluate a management and implementation Strategy for a Network. • Collect and synthesise information to inform a choice of vendor solutions, with the module assignment providing a good opportunity to test this area. • Evaluate a range of information comparing alternative methods and techniques used in Network Design. • Be able to troubleshoot and maintain integrated, complex networks.
Learning outcomes assessed within this piece of work as agreed at the programme level meeting	This assignment will assess the following learning outcomes: • Plan and design a Network Infrastructure (LAN/WAN/MAN). • Collect and synthesise information to inform a choice of vendor solutions, with the module assignment providing a good opportunity to test this area. • Evaluate a range of information comparing alternative methods and techniques used in Network Design. • Be able to troubleshoot and maintain integrated, complex networks
Weighting	40% of the total module marks
Type of assessment:	Individual Written Report: recommended maximum words 3500 Including network simulation
Assessment deadline:	Individual Report to be submitted on 19/11/2018 (no later than 2pm). Microsoft Word file.

Assignment Task

This is an individual assignment based on the case study scenario presented below. This assignment will assess your understanding of the network design principles and the ability to research a common network problem. It will also assess your ability to evaluate the reliability of data and information especially in relation to free resources.

Scenario

You are working in a company as a network engineer and have been asked to design and implement a small network for a client company (Sysco UK). The network should connect four departments i.e. IT, Human Resources, Marketing and Finance. The details of user access and distribution of devices are shown in table 1 below.

The company uses Domain Name System (DNS), email and web (e.g. sysco.co.uk) servers by which all departments have access. The web and email servers should be accessible via the internet (external access) as well. You must consider use of active directory implementation for local area network users' authentication/authorisation of network resources.

Department Name	Devices	Access rules
Information Technology	37 Computers one printer and department dedicated server	Users cannot access any other department except the main servers
Human Resources	17 Computers one printer and department dedicated server	Users cannot access any other department except the main servers
Marketing	9 Computers one printer and department dedicated server	Users cannot access any other department except the main servers
Finance	67 Computers one printer and department dedicated server	Users cannot access any other department except the main servers

Table 1: Department Details and Access Rules

The IT director emphasised scalability and availability, hence you are required to provide a complete network infrastructure design and implementation. The company will be using private IP address 192.168.168.0/24, and public network address 130.140.150.160 / 28.

You are also required to include a working network simulation including testing of all relevant devices such as web, email, DNS servers, all relevant network configuration, router, switches, etc. Network diagram and devices configuration tables.

Assignment Tasks and Marking Guidance/Criteria

1. You are required to carry out research to evaluate a range of information comparing alternative methods and techniques used in LAN/WAN/MAN network design. You should use both subscription-only and free publications. Your solution should contain the following:

    - A complete network diagram to meet the requirements of your client given in the above scenario. You should clearly mention any assumptions you have made. **(15 marks)**
    - Virtual local area network (VLAN) for each department to avoid any collusion domains. **(10 marks)**
    - Subnetting based on given network address for efficient use of network addressing for both local and wide area network. **(15 marks)**

Marks will be given based on the correctness of the optimised design choices and are properly supported by related literature sources (both free and subscription-only). You must cite all sources properly within the text using the Harvard referencing system and include these in the list of references. You should also include the main network design diagram as evidence of your solution.

2. You are required to provide a network design rationale for the following :

    - Complete Network Diagram, supporting all LAN/WAN/MAN users. **(10 marks)**
    - Network components used to achieve performance and reliability. **(10 marks)**
    - Use of secure methods/protocols for authentication and appropriate use of subnetting for robust network access. **(20 marks)**
    - Access control lists to isolate each department internally and for demilitarised zone (DMZ) **(10 marks)**
    - Provide evidence of successful network connectivity and user authentication over the network. Evidence should be included in the form of snippets to support your rationale. **(10 marks)**

Marks will be given based on the evidence from background reading and research and the justification of the design choices made regarding network performance, scalability, availability and security. Material from external sources (both free and subscription-only) must be properly referenced and cited within the text using the Harvard referencing system.

Assignment Preparation Guidelines

1. All components of the assignment report must be word processed (hand written text are not acceptable), font size must be within the range of 12 point to 14 point including the headings, body text and any texts within diagrams.
2. Standard and commonly used fonts such as Times New Roman, Arial or Calibri should be used.
3. Your document must be aligned left or justified with line spacing of 1.5.
4. All figures, graphs and tables must be numbered and labelled.
5. Material from external sources (both free and subscription-only) must be properly refereed and cited within the text using the **Harvard** referencing system.
6. All components of the assignment (text, diagrams. Code etc.) must be submitted in one word file.