***BSc Computing Technologies***

***Coursework – Network Design and Troubleshooting***

***Individual Written Report: Case Study Analysis***

***(Cisco packet tracer)***

**Assignment Task**:

This is an individual assignment based on the case study scenario presented below. This assignment will assess your understanding of the principles of network design and the ability to analyse, design and create a network infrastructure fully configured and tested which reflects understanding of network design and troubleshooting.

**Scenario:**

You are working as a network engineer in an IT company. You have been assigned to design, implement a network infrastructure for a small company. The company consist of 4 departments (**finance, engineers, sales and IT**). The network consists of three Servers: **web-dns, email- IoT, and common File Server** as described in the table below. All servers are shared between all users. The distribution of workstations, shown in table 1, describes the requirement of each department. The company has decided to allow members of staff to use the wireless network on their own wireless device such as smartphone to access the internet.

|  |  |  |
| --- | --- | --- |
| **Department** | **Devices** | **Requirements** |
| Finance | 8 Computers | cannot access any other department |
| Sales | 31 Computers & Printer | cannot access any other department |
| Engineers | 21 Computers & printer | cannot access any other department |
| IT | 3 computers | cannot access any other department |
| Wireless Devices | Should be sufficient for staff access | cannot access any department, need to be in a separate logical network but can access servers |
| dns-web  email  File server | 1-web-dns server  1 email-IoT server  1 common File Servers | Accessible by all computers |
| IoT devices | To monitor temperature / thermostat cooling, and server room door. |  |

Table 1: workstation and server distribution and requirements

The IT director emphasised on scalability and availability, hence you are being required to provide a complete network infrastructure design and implementation. The company will be using **private network IP address 192.168.44.0/24 within wired LAN**, and **10.20.44.0/24 for the wireless network.**

**Task**

Analyse the requirements given in above scenario evaluating suitable network models and components to design a network infrastructure featuring scalability, availability and security.

Based on your analysis and evaluation, you are to:

* Apply the required configuration for the selected components.
* Discuss, evaluate and apply Network monitoring tools/components.
* Produce network test and documentation suitable for network maintenance.

***All relevant network configuration, network diagram and device configuration tables, network simulation file must be included and attached as appendix.***

**Deliverables**

* Complete network diagram for the given scenario, including description and analysis
* Appropriate subnet showing all required elements, based on given network addresses, are fulfilled.
* Create VLAN for each department based on given requirements, including sample configuration.
* Justification of the use of network design model and components including any technologies/protocols used such as VTP, STP, DHCP etc..
* Provide complete security precaution and configuration where applicable including Access control list to isolate each department internally.
* Complete testing documentation of all relevant devices such as web, email, DNS servers, (note: use of screenshots without description is not acceptable as answers)

**Assessment Criteria**

1. **Introduction:**

* Introduction to the context and/or background to the topic, indicating the purpose of the report
* The introduction includes some definitions of complex terminology or acronyms and indicates ideas in view of the conclusion of the report.

1. **Knowledge and understanding**

* Demonstrate effective approach to study and research including explanation and discussion of subject concepts, exploring functional and non-functional requirements of the given assignment
* Use relevant information paraphrased / interpreted from academic sources, summarise and make sense of information

1. **Application and Analysis**

* Discussion, examination and analysis of different network components, exploring the relationship between different components
* Reasoning of device/components selection based on prior-knowledge, backed by evidence of research from sound sources
* Discussion and analysis of different network models

1. **Evaluation and judgement**

* The judgment in selecting components shows understanding of issues based on evaluating and comparing different network components supported by literature
* Evaluation of different technologies and/or protocols such as VLANs, Trunking, Access control, DHCP etc.

1. **Design and Implementation**

* A description of network diagram, summarising the network design, including implementation and configuration of all network components and protocol with evidence (sample network configuration scripts).
* The plan accommodates the necessary devices and accounts for the unforeseeable conditions.
* Evidence related to the work is carried out in designing. Implementation is apparent and demonstrates autonomy and independence.

1. **Testing and documentation**

* A well-defined document that reflects testing of given requirements, protocol, and selected components used.
* Demonstrate and present network testing using appropriate technical language evidently related to the work carried

1. **Presentation / reflection**

* The document is well styled using appropriate academic language, presenting information using many methods including graphs, text and diagrams where applicable
* The report reflects autonomous and creativity including an insight reflection of learning supported by theories

1. **Referencing**

* References are correctly presented to an appropriate academic style and relevant to the subject
* References are from different sources (Books, journals, periodicals and technical reports) to support the discussion within the report, properly cited to relevant source of information

***Standard and commonly used fonts such as Arial or Calibri should be used, font size must be within the range of 10 to 15 points including the headings, body text and any texts within diagrams.***

***Spacing should not be less than 1.5***