BACHELOR OF TECHNOLOGY IN CT / IT / CCN

IBL1 2301: NETWORK DESIGN AND INSTALLATION INDIVIDUAL ASSESSMENT

SUBMISSION DATE 18TH DECEMBER 2021

INSTRUCTIONS

i) **Attempt** all the questions

DESIGN SCENARIO 1 (25 Marks)

4You is a scientific research project at a large university in Kenya. **4You** has recently started a large-scale project to sequence the genomes of 100,000 volunteers with a goal of creating a set of publicly accessible databases with human genomic, trait, and medical data. The project's founder, a brilliant man with many talents and interests, tells you that the public databases will provide information to the scientific community in general, not just those interested in medical research.

4You is planning how this data will be accessed and shared. But there is a major problem the employees have been complaining the network is too slow, they are also experiencing problems sending email, accessing web-based applications, and printing. In the past, when the company was small, they didn't have these problems. The IT manager outsourced ICT services to a local company called Network Rogues, who installed new workstations and servers as needed, provided desktop support, and managed the network devices such as switches, router, and firewall. **4You** is now considering bringing ICT services in-house and is wondering how to restore the performance of this network.

4You has hired you as their network consultant to help in redesign the network to address scalability needs. In a meeting with the project's founder a few issues came up such as redesign to use a layered approach, address loops and broadcast storms. For a start you agreed to implement 3 VLANs for the Employees, scientific community and the medical researchers respectively.

TASK 1

a) Using an IP address class of your choice design the above network on eNSP or packet tracer with all the necessary configurations and test connectivity between the VLANs

DESIGN SCENARIO 2 (30 Marks)

The city of KP, Oregon, which owns and operates its own power utility, built a fiber-optic network to monitor power meters at residents' homes. The network is called KP Fiber Network (KFN). Because KFN had more capacity than was needed to monitor meters, the city expanded its services to offer access to the network for city businesses. The businesses use the network to communicate with each other and to access the Internet. At the KFN headend, which is located with the city government offices, three routers and WAN links connect to the Internet for use by the city. The businesses on KFN also use these routers to reach the Internet.

In addition to the business service, KFN also offers cable modem service to homes. A cable modem router at the KFN headend connects to the fiber-optic network. In the city neighborhoods, hybrid fiber-coax nodes bring coax cabling to each street and into the homes for cable modem Internet access.

The KFN backbone consists of a fiber-optic Gigabit Ethernet network that runs through the city in a ring topology. The fiber-optic ring connects the hybrid fiber-coax nodes that bring coax cabling to each neighborhood. Also connected to the ring are six data routers.

Each router links one or more KP businesses to KFN via simple point-to-point connections. At the business, the fiber-optic network enters the building and connects to a media converter. A UTP cable connects to the media converter and typically to a 100-Mbps Ethernet switch. The switch links the business's computers and servers in a star topology via UTP cabling.

TASK 2

1. Based on the design requirements what specifications for network devices and transmission media can you recommend for this network
2. As a network consultant draw the network diagram / model for this network showing all the interconnections
2. What recommendations can you give to improve on the overall performance of this network?
3. With the help of an example explain the remote access configurations you can do for both routers and switches for this network

TASK 3

i)   Save your configurations and models
ii)   Add a text file to the configuration folder with your Registration Number and Name
iii)   Compress the configuration folder and send to s.i.c.t.tuk@gmail.com