INFT1205 – Data Communications and Networking II

Capstone Project - Winter 2024

You must collaborate in teams comprising a minimum of 3 and maximum 4 members

OBJECTIVES

In this Project activity, you will demonstrate your ability to:

- Design and implement an IPv4 VLSM addressing scheme that fulfills the requirements.
- Use VLAN segmentation and inter-vlan routing.
- Implement Ether-channel to increase the bandwidth.
- Configure and verify static route.
- Implement DHCPv4.
- Securing the LAN using switchport security.
- Design network infrastructure based on the requirements and document in detail.
- Implement an operational network based on your network design.
- Explain your implementation and demonstrate its operation.
- Produce documentation of your testing and network configuration for use by others to maintain and expand the network.

REQUIREMENTS

- In the suggested IP addresses replace *xxx* with the 2 last digits of a student ID of one of your teammates
- Utilize the physical equipment provided in rooms H-218 and H-166B. You may need to employ multiple pods to meet the requirements. **Do Not use Packet Tracer.**
- Make use of POD PC or your personal laptops connected via network cables to test and verify your implementation.
- Do not use packet tracer for creating topology instead use Visio or any equivalent

- Ensure appropriate icons/devices/media type is used in your topology diagram – **marks will be deducted for non-standard representation.**

DESIGN, ADDRESSING and IMPLEMENTATION

Teckky Inc., a company specializing in detecting and mitigating fraud in digital commerce, operates within a two-level building situated in Oshawa (Building 1). Due to their successful endeavors in assisting eCommerce stakeholders across Canada, the organization is now in the process of expansion. A notable expansion project involves the acquisition of an additional building (Building 2) adjacent to their primary site. Teckky Inc. heavily relies on the Internet for their product development, leading them to enter into a five-year contract with Rogers for their ISP connectivity solution. To enhance fault tolerance, they've opted for redundancy in their ISP connectivity solution. Securing contracts with both Rogers and Telus, they've established routes to the ISPs using static and floating static routes in their router.

In building 1, Teckky Inc. has a dedicated a router that connects to both ISP's. Also there, Teckky Inc. keeps a "router-on-a- stick" for inter-VLAN routing between company departments. Your task is to design and implement the rest of the topology ensuring an ether-channel to augment the bandwidth between the two buildings.

Teckky Inc. utilize the network address 201.*xxx*.1.0/30 as primary to connect to Rogers ISP router and use the network address 201.*xxx*.2.0/30 as back-up to connect to Telus ISP router.

The acquisition of the company has necessitated a redesign of IP addresses and the allocation of departments. Your task involves strategically assigning address space in a logical manner, taking into

consideration the company's best interests. Provide an explanation of why your design is advantageous and outline the implementation plan, aiming for minimal address wastage.

The organization has chosen to utilize the private IP address space of 172.30.xxx.0/23 for their IPv4 addressing, and this private IP assignment is to be distributed across all LAN segments. VLSM (Variable Length Subnet Masking) will be employed to allocate addresses to various departments based on their specific needs.

LOCATION	NO. OF HOSTS
BD1	
IT	122
Customer Support	55
Sales and Marketing	50
BD2	
Management	30
HR&Accounting	52
System Admins	60
Purchasing	50
Legal	20

The design ensures efficient use of address space, minimizing wastage by tailoring subnet sizes to match department requirements. DHCPv4 will be implemented to dynamically assign addresses to the IT department in Building 1 and the HR & Accounting department in Building 2. This dynamic addressing approach enhances flexibility and simplifies network management, particularly in environments with evolving device configurations.

Show one PCs to each subnetwork in your design topology.

IMPLEMENTATION

In the implementation phase, designate one switch to represent BD1 and another for BD2. Utilize three routers to symbolize Teckky Inc., ISP1, and ISP2. Employ two PCs on each switch, representing the IT department and customer support in Building 1, as well as the Management and HR & Accounting department in Building 2. VLAN segmentation will be applied to delineate each subnetwork, with the native VLAN identified as xxx (replace xxx with your group number) for managing VLAN segmentation. Distribute a few physical ports across all VLAN segments. Use possible switchport security to enhance security based on your experience configuring the labs.

Configure network security to the client requirements

a) Configure all passwords as encrypted.

b) Require a username and password for all login.

c) Restrict access to the console connection.

d) Restrict access to the VTY connections.

    a. Allow SSHv2 connections only. (Use the company domain Teckky Inc..com)

e) Disable AUX port access.

f) Configure a banner warning.

Verify the network

1) Validate connectivity between all networks and ISP.

2) Validate static routing functionality by provides the appropriate routing tables and ping outputs. Use at least 3 commands to verify routing configuration.

3) Document and verify VLAN Segmentation and Inter-VLAN routing.

4) Document and verify DHCPv4 configured.

5) Document and verify EtherChannel.

DOCUMENT REQUIREMENTS:

Submit the following files:

- A complete network topology for your network "as built. Submit one document- Filename: **Topology.vsdx**
- A fully explained and well documented network addressing scheme preferably in an excel table. The submission should list at a minimum the Network ID, subnet mask, first host, last host, and broadcast address (where appropriate) for each segment. **Filename: Addressing.xlsx**
- Use appropriate 'show' commands to demonstrate your implementation.
- For each router and switch, the final configuration of the device as a *DEVICENAME*.docx file where *DEVICENAME* is the name of the device. Submit one document per device; Filename: ***Devicename*.docx**
- Submit screenshots to verify connectivity between LAN networks and ISP. Filename: **Pings.docx**
- Submit screenshots to show routing table in all routers. Filename: **Routing.docx**
- Include screenshots to prove the implementation of DHCPv4. Filename: **DHCP.docx**
- Include appropriate screenshots to prove the implementation of Inter-vlan routing and VLAN segmentation. Filename: **VLAN.docx**
- Include appropriate screenshots to prove the implementation of port security. Filename: **portsec.docx**
- A word document to justify your final topology, and implementation. Your document should highlight all. Filename: **Overview.docx**
- A fully explained network addressing scheme
- Do **NOT** create subfolders for each device. Zip all files (do not use WinRAR) and submit via DC Connect. Please do **NOT** submit any .pdf documents.

- Ensure your documents are professional, clear and easy to understand. Treat it as an official exchange between an IT consulting firm and its client.

DOCUMENTATION OF THIS PROJECT MUST BE SUBMITTED TO THE APPROPRIATE FOLDER IN DC CONNECT BY Sunday, April 14TH, 2024 AT 11:59PM.

ALL EMAIL SUBMISSIONS WILL BE IGNORED AND WILL RESULT IN A GRADE OF ZERO FOR THE CAPSTONE PROJECT.

NO EXCEPTIONS AND NO EXTENSIONS.