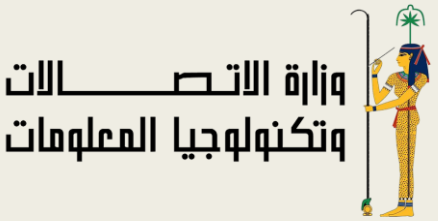




FINAL PROJECT

# FINANCIAL INSTITUTION NETWORK SYSTEM DESIGN AND IMPLEMENTATION

Ahmed, Malek, Mohammed, Rana, Wael, Yasmeen

# Agenda

- Introduction
- Project Goal
- Project Technical Tasks
- Project Architecture
- Task Responsibilities

# Introduction

- Jubilee Financial Services Ltd (**JFSL**) is a well-established finance service provider in Kenya,
  - which offers online finance solutions and services to its clients.
- The company operates in the country's capital city, Nairobi.
- It is hosted within an eleven-story building.
- The company primarily operates from the seventh to the eighth floors.

# Introduction

- The company has the following **five** departments
  - Human resource (**HR**).
  - Customer Service (**CS**).
  - Marketing (**MK**).
  - Legal Management (**LM**).
  - Information Technology (**IT**).

# Introduction

- Number of users and other devices per department
  - **Seventh** Floor: **HR**, **CS**, and **MK**, each department has at least
    - 40 user devices.
    - 40 IP phones.
    - one WIFI-AP.
  - **Eighth** Floor:  **LM** and **IT**, each department has at least
    - 20 user devices
    - 20 IP phones,
    - one WIFI-AP.
  - each user can have an associated VoIP phone (but not a must).

# Introduction

- The network infrastructure is currently run and managed by a third-party firm called **Infinitive IT Systems Kenya**.
- The senior management has decided to *own its network infrastructure* including
  - Local Area Network (LAN),
  - Wide Area Network (WAN).
  - An external Server-Side location
    - connected via appropriate WAN technology
    - prioritizing secure communication between the HQ network and the external site.

# Company Senior Management Requirement

- The server-side site will host **DHCP**, **DNS**, **WEB**, and **EMAIL** servers.
- Company is intending to subscribe to two ISPs (Safaricom and JTL ISPs)
  - provide redundancy and load-balancing in terms of internet provisions.
- The company has also purchased
  - **Two** Cisco Catalyst 2911 routers (**one** for **HQ** and **other** for **server-side**)
  - **One** gateway router Catalyst 2811 router (for HQ VoIP)
  - **Two** multilayer switches(both for HQ)
  - **Six** access switches for the departments

# Company Senior Management Requirement

- Due to security requirements
  - All five departments will be on a **separate** network segment within the same local area network
- None of the servers is located within the local area network
  - It will be hosted from an external site accessible via a WAN connection.
- The network security policy will comprehensively dictate the user access to the external site using Access Control LIST (ACL).

# Project Goal

- We have been **hired** as **Network Security Engineers**
  - Design the network for Jubilee Financial Services Ltd (JFSL)
  - Due to the requirements set by the senior management
- We will consult an appropriate robust network design model to meet the design requirements.
- The company will be using the following IP address:
  - **192.168.20.0/24** for *Data*.
  - **10.10.10.0/24** for *Voice*.
  - **190.200.100.0** for *public addresses*.

# Project Goal

- We will also implement Access Control Lists and Virtual Private Networks to enable secure communication
  - Considering security and network performance factors paramount to safeguard the Confidentiality, Integrity, and Availability of data and communication.
  - The company has emphasized
    - High performance
    - Redundancy
    - Scalability
    - Availability
  - Hence, we are required to provide a complete JFSL network infrastructure design and implementation.

# Project Technical Tasks & Technologies Implemented

1. Creating a network topology using Cisco Packet Tracer.
2. Hierarchical Network Design.
3. Connecting Networking devices with Correct cabling.
4. Configuring Basic device settings.
5. Creating VLANs and assigning ports VLAN numbers.
6. Creating both data and voice VLANs and assigning ports VLAN numbers.

# Project Technical Tasks & Technologies Implemented

7. Subnetting and IP Addressing.

8. Configuring Inter-VLAN Routing both on the Switches (SVI) and Routers (router-on-a-stick).

9. Configuring Dedicated DHCP Server device for Data to provide dynamic IP allocation.

10. Configuring Routers as DHCP server for Voice to provide IP Phones dynamic IP allocation.

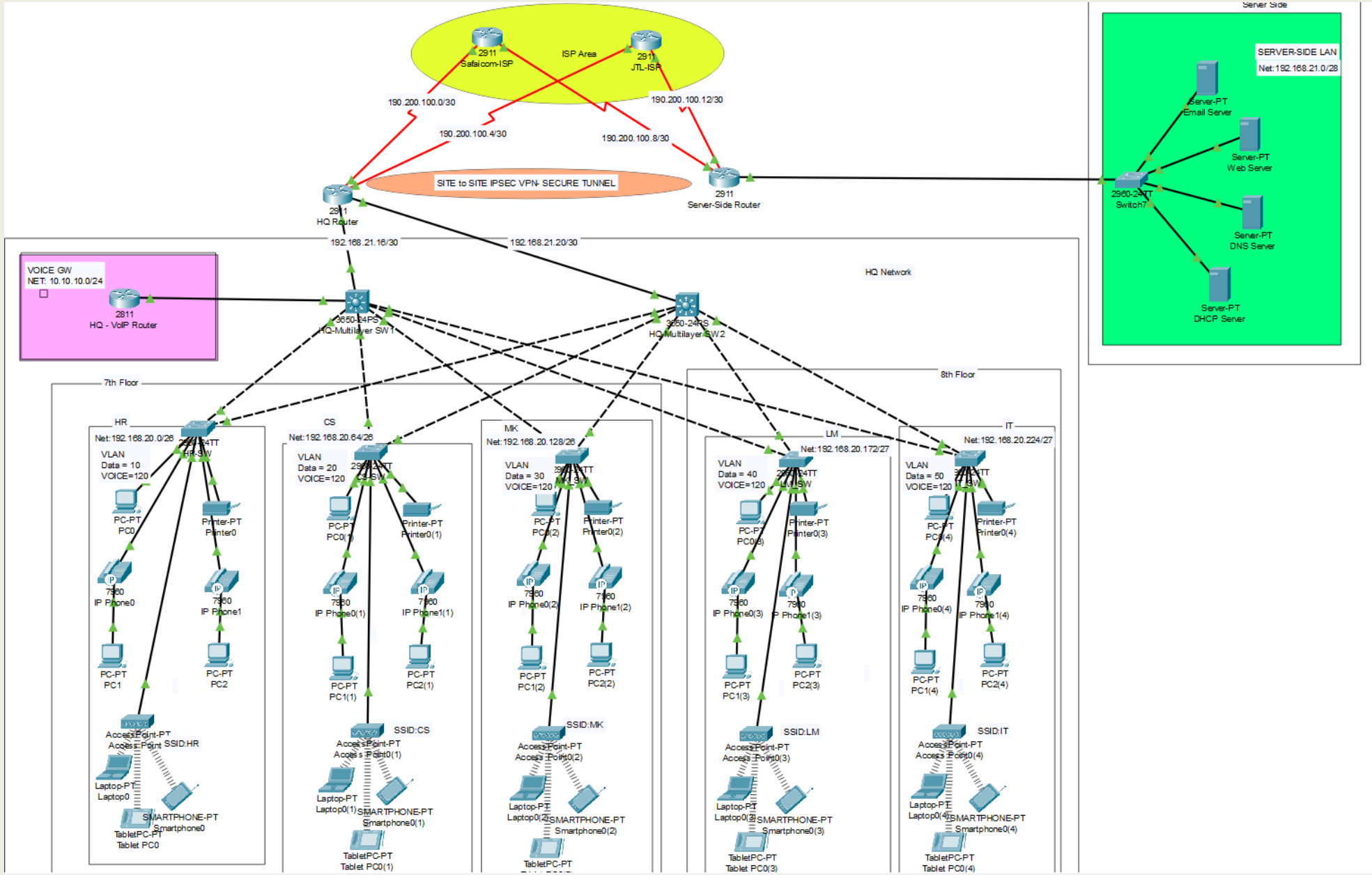
11. Configuring SSH for secure Remote access.

12. Configuring OSPF as the routing protocol.

# Project Technical Tasks & Technologies Implemented

13. Configuring Standard ACL for VTY interfaces to restrict remote Access using SSH.
14. Configuring Port Address Translations or PAT for NAT.
15. Configuring Standard ACL for PAT.
16. Configuring VoIP or Telephony service configuration in all routers.
17. Configuring site-to-site IPsec VPN on the gateway routers.
18. Configuring Standard ACL for site-to-site IPsec VPN.
19. Host Device Configurations.
20. Test and Verifying Network Communication.

# Topology Architecture




رواد مصر الرقمية

10/24/2024

# Task Responsibility

| | |
|---|---|
| Mohammed Adel | Network Design and beautification. |
| Mohammed Adel | Basic settings to all devices plus ssh on the routers and switches. |
| Mohammed Adel | VLANs(for DATA & VOICE) assignment plus all access and trunk ports on switches. |
| Wael | Switchport security to server-side site department. |
| Wael | Subnetting and IP addressing |
| Wael | OSPF on the routers and 13 switches. |
| Rana | Standard ACL for SSH |
| Rana | PAT + Access Control List |
| Malek | Inter-VLAN routing on the 13 switches plus ip dhcp helper addresses. |
| Malek | Wireless network configurations. |
| Malek | Telephony service configuration |
| Malek | Static IP address to Server-Room devices |
| Wael | DHCP server device configurations. |
| Mohammed Adel | Verifying and testing configurations. |

رواد مصر الرقمية

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# IP Scheme Plan [1]

**IP Addressing**

**Base Network: 192.168.20.0**

**HQ Network**

| Department | Network & Subnet Mask | Valid Host Addresses | Default Gateway | Broadcast Address |
|---|---|---|---|---|
| HR | 192.168.20.0/26 | 192.168.20.1 to 192.168.20.62 | 192.168.20.1 | 192.168.20.63 |
| CS | 192.168.20.64/26 | 192.168.20.65 to 192.168.20.126 | 192.168.20.65 | 192.168.20.127 |
| MK | 192.168.20.128/26 | 192.168.20.129 to 192.168.20.190 | 192.168.20.129 | 192.168.20.191 |
| LM | 192.168.20.192/27 | 192.168.20.193 to 192.168.20.222 | 192.168.20.193 | 192.168.20.223 |
| IT | 192.168.20.224/27 | 192.168.20.225 to 192.168.20.254 | 192.168.20.225 | 192.168.20.255 |

# IP Scheme Plan [2]

## Server-side Site

| No. | Branch | Network &Subnet Mask | Valid Host Addresses | Default Gateway | Broadcast Address |
|---|---|---|---|---|---|
| 1 | Server-Side LAN | 192.168.21.0/28 | 192.168.21.1 to 192.168.21.254 | 192.168.21.1 | 192.168.21.15 |

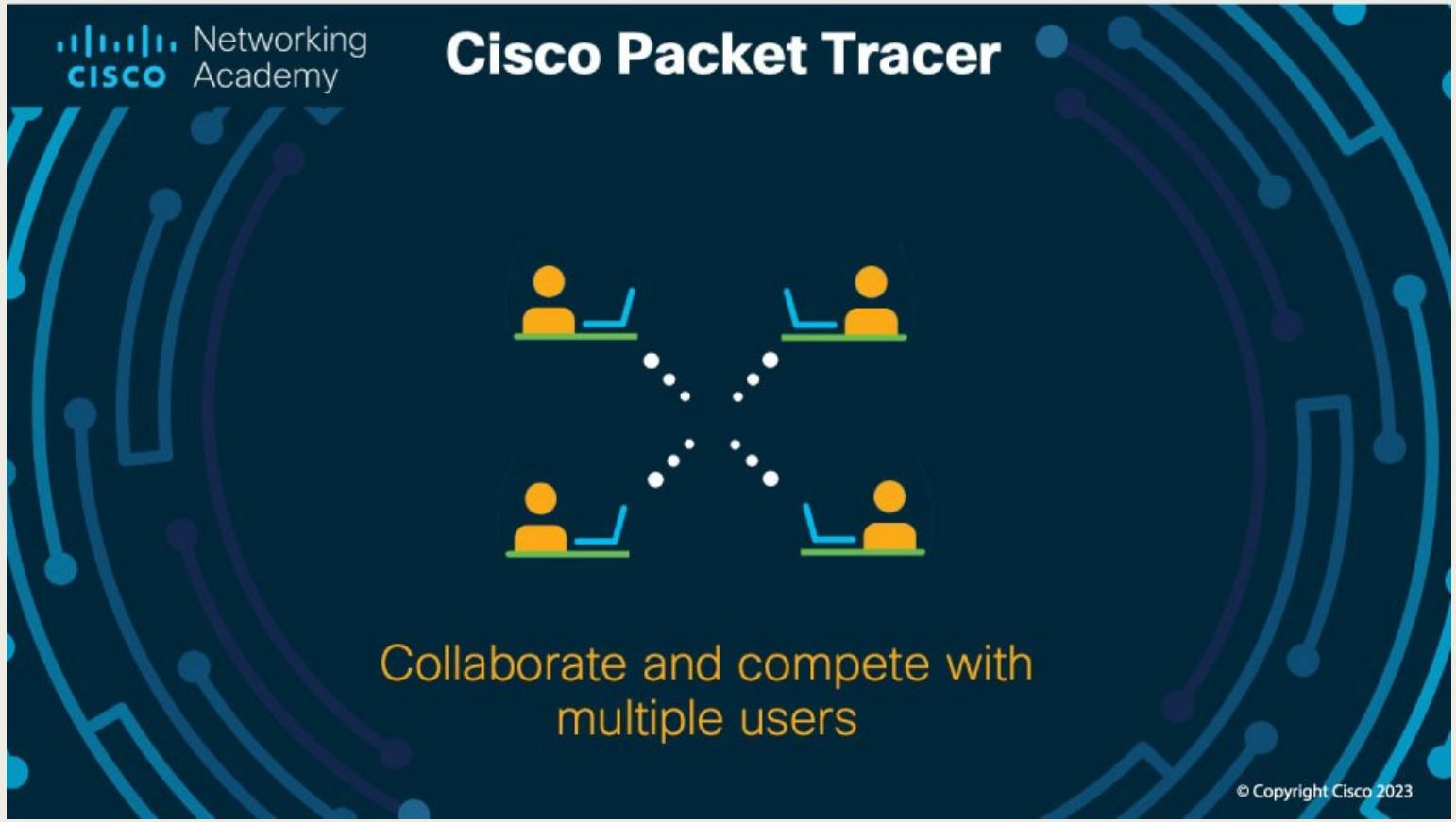
## Between the Routers and Layer-3 Switches

| No. | Network Address |
|---|---|
| HQR- HQMLSW1 | 192.168.21.16/30 |
| HQR- HQMLSW2 | 192.168.21.20/30 |

## Between the Routers and ISPs- 190.200.100.0

| No. | Network Address |
|---|---|
| HQR- ISP1 | 190.200.100.0/30 |
| HQR- ISP2 | 190.200.100.4/30 |
| SVR- ISP1 | 190.200.100.8/30 |
| SVR- ISP2 | 190.200.100.12/30 |

# Let’s Go


Networking Academy
Cisco Packet Tracer
Collaborate and compete with multiple users
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**Thanks for your listening ☺**

**Questions or Suggestions ?**


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