

MINI PROJECT: COMPUTER NETWORK DESIGN FOR BUILDING OF THE BANK

INTRODUCTION

CCC (Computer & Construction Concept) was asked to design a computer network used in the **headquarters** and **two branches** of a BBB (BB Bank) under construction. The key characteristics of IT usage in this Bank are as follows.

- The building consists of **7 floors**, the **first floor** is equipped with **one IT room** and **Cabling Central Local** (for the gathering of wires and patch panels)
- **Small-scale BBB: 100 workstations, 5 servers, 12 (or maybe more with security-specific devices) networking devices**
- Using new technologies for network infrastructure including **100/1000 Mbps wired and wireless** connection
- The network is organized according to the **VLAN** structure
- The network connects to outside by **2 leased line** (for **WAN** connection) and **1 ADSL** (for **Internet** access) with a **load-balancing** mechanism
- Using a combination of **licensed** and **open-source** software, **office applications, client-server applications, multimedia, and database**
- Requirements for **high security, robustness** when problems occur, easy to **upgrade** the system

The bank needs to connect to **2 branches** in 2 big cities like Nha Trang and Danang. Each branch is also **designed similarly** to the **headquarters but** with a **smaller scale**:

- The building is about **2 floors** high, the **first floor** is equipped with **1 IT room** and **Cabling Central Local**.
- **BBB Branch: 50 workstations, 3 servers, 5 or more networking devices**

Implementing the **connection between** the **headquarters** and the **branch** through the **WAN** links, we can choose **one** of the **technologies used for this link** according to the **economy** of the solution.

- Analyze the **advantages** and **disadvantages** of the selected solution.

The **flows** and **load** parameters of the system (about **80% at peak** hours **9g-11g** and **15g-16g**) can be **shared** for **Head Office** and **Branch** as follows:

- Servers for updates, web access, database access, The total upload and download capacity is about 500 MB/day.
- Each workstation is used for Web browsing, document downloads, customer transactions, ... The total upload and download capacity is about 100 MB/day.
- WiFi-connected laptop for customers to access about 50 MB/day.
- VPN configuration for site-to-site and for a teleworker to connect to LAN

BB Bank's Computer Network is estimated for a growth rate of 20% in 5 years (in terms of the number of users, network load, branch extensions, ..).

REQUIREMENTS

Step 1 (1 points): Find out suitable network structures for buildings

- Analyze the network system requirements of Headquarters and Branches
- Make a checklist to be surveyed at the installation locations
- Define areas with high load (network load) to specially select the appropriate device configuration (load balancers are placed in necessary locations)
- Choose a network structure that matches the building's architecture with convenience and aesthetics
- Design the network usage in a wireless environment, applying network security standards and setting up partitions for network servers and devices (e.g., DMZ, Firewall, ...)

Step 2 (1 points): List of minimum equipment, IP diagram, and wiring diagram (cabling)

- List of recommended equipment and typical specifications
- Schematic physical setup of the system
- WAN connection diagram between Headquarters and Branches (using OSPF protocol)

Step 3 (2 points): Calculate throughput, bandwidth, and safety parameters for computer networks

Step 4 (2 points): Design the network map using Packet Tracer or GNS3 simulation software

Step 5 (2 points): Test the system with popular tools such as ping, traceroute, ... on the simulated system.

Step 6 (2 points): Re-evaluate the designed network system through the following features: reliability, easy to upgrade, diverse support software, safety, the security of data, ...

- The remaining problems for the project
- Development orientation in the future



Step 7: upload the simulation file (using Packet Tracer or GNS-3) and the project report to BkeL before deadline.

In the report and results demo of Assignment 2, we recommend students to test connectivity:

- Connect between PCs in the same VLAN
- Connect PCs between VLANs
- Connect PCs between Headquarters and branches
- Connect to servers in the DMZ
- No connections from Customers devices to PCs on the LAN
- Connect to the Internet to a Web server.

For **major student program**, you need to implement and test a security solution for the Bank: add a firewall and configure ACLs.

REFERENCES

-  Information selectively comes from the Internet
-  The references for the subject of Computer Networking

TIMING

Deadline for reporting: **14/11/2021**.

Softcopy (to be submitted to BkeL before deadline) and hard copy (needed for presentation and demo time).

NUMBER OF STUDENTS

Get into group of 2 or 3 or 4 students as indicated by the Instructor.