Build enterprise network (many site)

Project Proposal

Presented to you by :
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- Noor Alain Adel Mazroa
- Ahmed Mohamed Ragab
-Ebrahim Tala t Ebrahim

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Training company : Harvest company

Overview

- The **Build Enterprise Network (Multi-Site)** project is focused on designing and implementing a robust, scalable, and secure network infrastructure for an enterprise with multiple locations. The objective is to connect these 3 sites into a unified network that allows for seamless communication, efficient data transfer, and centralized management.

- This project will involve the configuration of routers, switches, and other necessary networking components to ensure secure inter-site connectivity. It also emphasizes redundancy, load balancing, and high availability to minimize downtime and ensure reliable access to critical enterprise applications and services across all locations. By leveraging advanced network design principles and industry best practices, this project aims to create an optimized, cost-effective network solution tailored to the enterprise's specific operational needs.

Stages of building the network

01

Building the internal network

02

Configuration for Acess and Distribution Switches

03

Configuration For Routers

04

Services configuration and Final Presentation


Week 01

Week one mainly focuses **on Installing internal network using cisco Switches & Router.**

The design used as shown in the figure, it represents a 3 branches enterprise in 3 different locations (Mansoura, Cairo, and Alexandria) inside the Arab republic of Egypt.

As a team we divided the required tasks to build the following figure as below:

1. Ahmed Elshahat :

- led the network design and installation, configuring the core infrastructure and guiding the team.

2. Noor Alain :

- assisted in setting up the network layout and ensuring scalability.

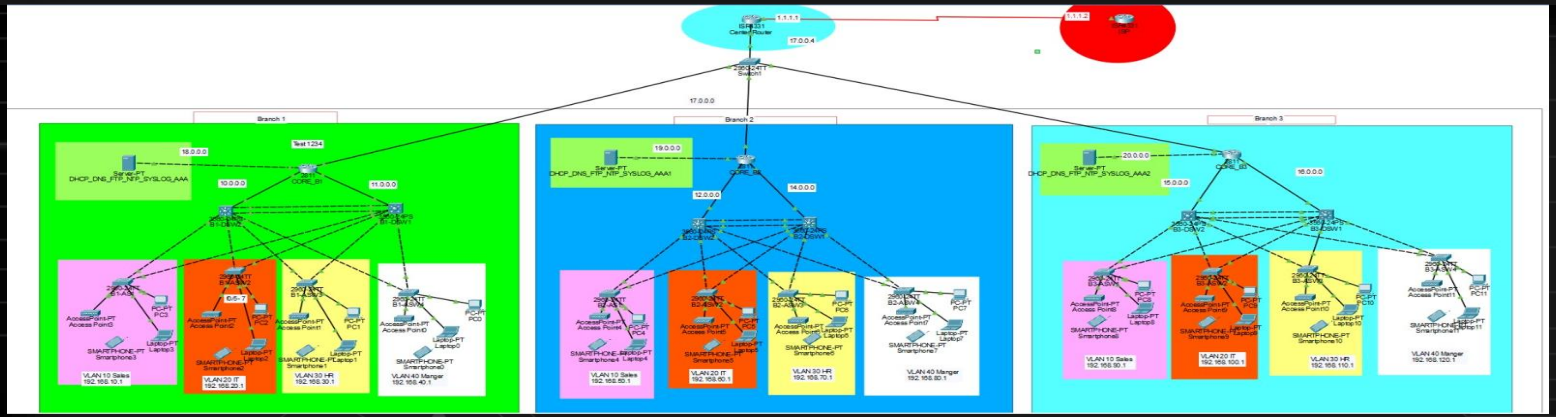
3. Ahmed Ragab:

- helped configure switches and validate connectivity.

4. Ebrahim Talat:

- supported the setup and testing of network components.

We Used Cisco packet tracer to simulate the case.




Week 02

In the second week we did the basic configration for the access and distribution switches and Using the following steps :

01 **VLAN Creation**

Segmenting Departments and enhancing security,stop domain broadcast

- VLAN 10 : SALES
- VLAN 20 : IT
- VLAN 30 :HR
- VLAN 40 : MANAGER

02 **Inter Vlan used MLS**

Connected different VLANS

- Ip routing
- Int VLAN 10,20,30,40
- Assign IP subnet

03 **HSRP**

host standby router protocol, provides router redundancy, ensuring failover and uninterrupted network connectivity

- Enter each VLAN
- Standby num_VLAN ip
- Example
- Int vlan 10
- Standby 10 ip 192.168.10.100

04 **Etherchannel**

Redundancy, Load balance

- LACP: Port Aggregation Protocol.
- A Cisco
- auto -Desirable

In the second week we did the basic configration for the access and distribution switches and Using the following steps :

05 **STP and Portfast**

STP Prevent loops and stability.used PVSPT forVLAN1,10,20 primary on DSw1 ,Vlan 30 Secondary on DSW2 Port Fast is an STP feature that immediately transitions ports to forwarding state, bypassing listening/learning, for end devices.

.spanning tree vlan 1,10.20 root primary DWS1
spanning tree vlan 30 root secondary DWS2

06 **SSH**

(Secure Shell) is a cryptographic protocol that provides secure remote access and management of devices over an encrypted connection

- Set a Hostname
- **Configure Domain Name**
- Generate RSA Keys
- Configure Local Username and Password
- enable SSH on VTY Lines

07 **Port Security**

limits the number of MAC addresses on a switch port, enhancing security by preventing unauthorized device access

Week 02 tasks were distributed as below:

1- Ahmed Elshahat

configuration of branch 1

VLAN
Inter-VLAN routing.
HSRP
EtherChannel
SSH and config Root bridge

2- Noor Alain

configuration of branch 2

VLAN
Inter-VLAN routing.
HSRP
EtherChannel
SSH and config Root bridge

3- Ebrahim Talat

configuration of branch 3

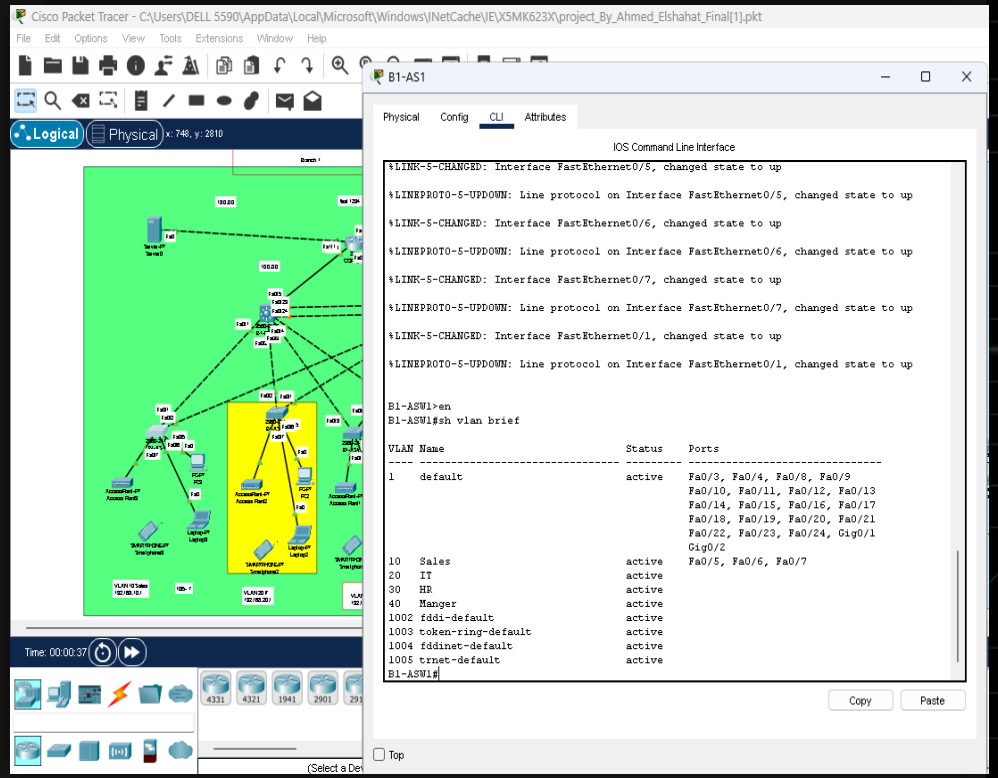
VLAN
Inter-VLAN routing.
HSRP
EtherChannel
SSH and config Root bridge

4- Ahmed Ragab

configuration of branch 1,2,3
Config access port as port fast at Access SW
Protect Access port from receive unexpected PBDU
Config port security at access SW
Save Config at NVRAM

The Used configuration at all access switches:

```
B1-ASW1(config-vlan)#name  Sales
B1-ASW1(config)#vlan 20
B1-ASW1(config-vlan)#name  IT
B1-ASW1(config)#vlan 30
B1-ASW1(config-vlan)#name  HR
B1-ASW1(config)#vlan 40
B1-ASW1(config-vlan)#name  Manger
B1-ASW1(config)#interface range f0/5-7
B1-ASW1(config-if-range)#switchport  mode  acces
B1-ASW1(config-if-range)#switchport access vlan 10
B1-ASW1(config)#interface range f0/5-7
B1-ASW1(config-if-range)# switchport mode access
B1-ASW1(config-if-range)# switchport port-security
B1-ASW1(config-if-range)#switchport port-security mac-address sticky
B1-ASW1(config-if-range)# switchport port-security violation restrict
B1-ASW1(config-if-range)# spanning-tree portfast
B1-ASW1(config-if-range)# spanning-tree guard root
B1-ASW1(config-if-range)# spanning-tree bpduguard enable
B1-ASW1(config)#interface range f0/1-2
B1-ASW1(config-if-range)#switchport  mode  trunk
```



The Used configuration at all Distribution Switches at each branch:

```
B1-DSW1(config)#ip routing **********
B1-DSW1(config)#vlan 10
B1-DSW1(config-vlan)#name Sales
B1-DSW1(config)#vlan 20
B1-DSW1(config-vlan)#name IT
B1-DSW1(config)#vlan 30
B1-DSW1(config-vlan)#name HR
B1-DSW1(config)#vlan 40
B1-DSW1(config-vlan)#name Manger
B1-DSW1(config)#interface range f0/1-4
B1-DSW1(config)#switchport trunk encasp dot1q
B1-DSW1(config)#switchport mode trunk
B1-DSW1(config)#interface vlan 10
B1-DSW1(config-if)# ip add 192.168.10.1 255.255.255.0
B1-DSW1(config-if)# no sh
B1-DSW1(config)#interface vlan 20
B1-DSW1(config-if)# ip add 192.168.20.1 255.255.255.0
B1-DSW1(config-if)# no sh
B1-DSW1(config)#interface vlan 30
B1-DSW1(config-if)# ip add 192.168.30.1 255.255.255.0
B1-DSW1(config-if)# no sh
B1-DSW1(config)#interface vlan 40
B1-DSW1(config-if)# ip add 192.168.40.1 255.255.255.0
B1-DSW1(config-if)# no sh
B1-DSW1(config)#interface range f0/23-24
B1-DSW1(config-if)# channel-protocol pagp
B1-DSW1(config-if)# channel-group 1 mode Desirable
B1-DSW1(config-if)#switchport trunk encasp dot1q
```

```
B1-DSW1(config)#interface vlan 10
B1-DSW1(config-if)#standby 10 ip 192.168.10.100
B1-DSW1(config)#interface vlan 20
B1-DSW1(config-if)#standby 20 ip 192.168.20.100
B1-DSW1(config)#interface vlan 30
B1-DSW1(config-if)#standby 30 ip 192.168.30.100
B1-DSW1(config)#interface vlan 40
B1-DSW1(config-if)#standby 40 ip 192.168.40.100
B1-DSW1(config)#ip domain-name branch1
B1-DSW1(config)#crypto key gen rsa
B1-DSW1(config)#line vty 0 4
B1-DSW1(config-line)#transport input ssh
B1-DSW1(config-line)#login local
B1-DSW1(config-line)#exit
B1-DSW1(config)username Admin privellage 15 password 1234
B1-DSW1(config)enable secret 1234
B1-DSW1(config)int g0/1
B1-DSW1(config-if)no switchport
B1-DSW1(config-if)ip add 11.0.0.2 255.0.0.0
B1-DSW1(config-if)no sh
B1-DSW1(config)#router eigrp1
B1-DSW1(config-router)# network 192.168.10.0 0.0.0.255
B1-DSW1(config-router)# network 192.168.20.0 0.0.0.255
B1-DSW1(config-router)# network 192.168.30.0 0.0.0.255
B1-DSW1(config-router)# network 192.168.40.0 0.0.0.255
B1-DSW1(config-router)# network 11.0.0.0 0.255.255.255
```


Week 03

In the Third week we applied the basic configurations and some important protocols to configure core routers in the network to link the 3 sites together

DHCP : Dynamic Host Configuration Protocol

1.Automatic IP assignment

2. Reducing admin Overhead

3. Efficient IP Usage

EIGRP: Enhanced Interior Gateway Routing Protocol

1.Fast Convergence

2.Reducing Bandwidth Usage

3.Load Balance

1.Simplified Routing

2.Efficient Traffic Management

3.Facilitates Internet Access

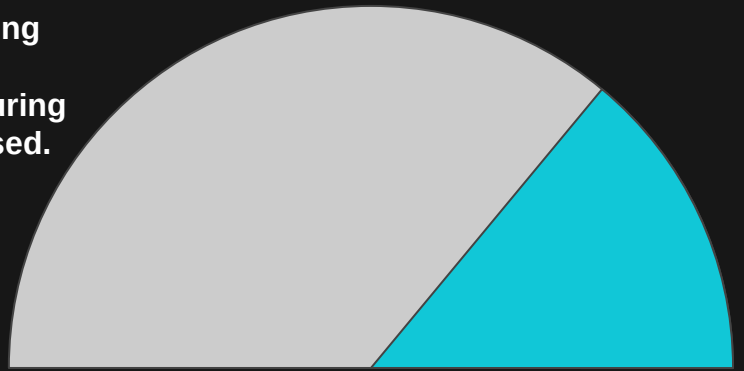
Default Route:

- **Basic configuration and subinterface**

Week 03 tasks were distributed as follow:

Ahmed Elshahat ,Noor Alain Adel, Ahmed Ragab, and Ebrahim Talat

contributed equally, configuring routers, setting up Eigrp , DHCP,Default route and ensuring routes were correctly advertised.



The Used configuration at all core router at each branch:

```
B1-core_R(config)#int f0/0
B1-core_R(config-if)#ip add  10.0.0.1 255.0.0.0
B1-core_R(config-if)#no sh
B1-core_R(config)#int f0/1
B1-core_R(config-if)#ip add  11.0.0.1 255.0.0.0
B1-core_R(config-if)#no sh
B1-core_R(config)#int f1/0
B1-core_R(config-if)#ip add  17.0.0.1 255.0.0.0
B1-core_R(config-if)#no sh
B1-core_R(config)#int f1/1
B1-core_R(config-if)#ip add  18.0.0.1 255.0.0.0
B1-core_R(config-if)#no sh
B1-core_R(config)#router eigrp  1
B1-core_R(config-router)#network 10.0.0.0 0.255.255.255
B1-core_R(config-router)#network 11.0.0.0 0.255.255.255
B1-core_R(config-router)#network 17.0.0.0 0.255.255.255
B1-core_R(config-router)#network 18.0.0.0 0.255.255.255 a
```

```
B1-DSW1,DSW2(config)#int vlan 10
B1-DSw1,DSW2(config-if)#ip  helper-address  18.0.0.10

 B1-DSW1,DSW2(config)#int vlan 20
B1-DSw1,DSW2(config-if)#ip  helper-address  18.0.0.10

B1-DSW1,DSW2(config)#int vlan 30
B1-DSw1,DSW2(config-if)#ip  helper-address  18.0.0.10

B1-DSW1,DSW2(config)#int vlan 40
B1-DSw1,DSW2(config-if)#ip  helper-address  18.0.0.10
```


Week 04

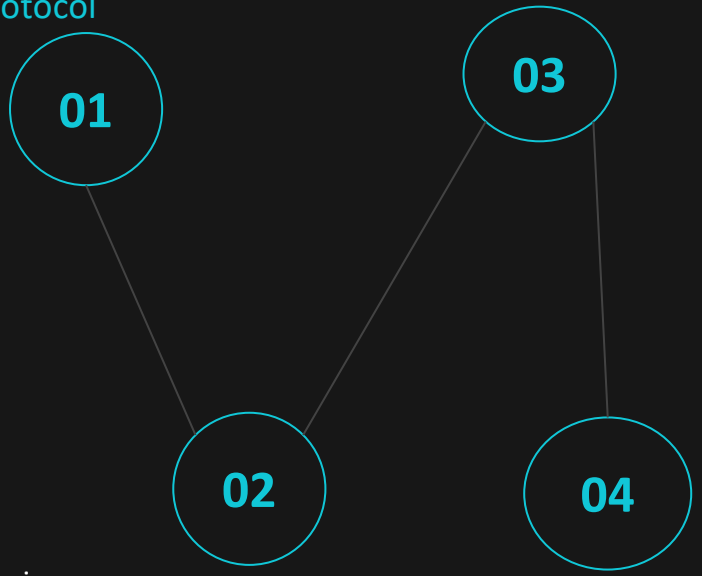
At week 04Configuration for Services such as NTP, Log server, PPP, and ACLs To monitor your traffic

NTP network time protocol

1.Time synchronization

2.Accurate Logging and Auditing

3.Improved Security



PPP Point to point Protocol

1.Data Link Layer Communication

2.Support Authentication

3.Error Detection

Log Server

1.Centralized Logging

2.Enhanced Security Monitoring

3.Improved Troubleshooting

ACL Access Control List

1.Traffic Filtering

2.Enhanced Security

3.Monitoring and Logging

At week 04Configuration for Services such as NTP, Log server, PPP, and ACLs To monitor your traffic

01

NTP network time protocol

B1-core-R(config)# ntp server 20.0.0.10

ntp authenticate

ntp trusted-key 1

ntp authentication-key 1 md5 cisco

ntp update-calendar

B1-core-R#show clock detail

02

Log Server

B1-core-R(config)#logging host 20.0.0.10

service timestamps log datetime mse

login on-success log

login on-failure log

At week 04Configuration for Services such as NTP, Log server, PPP, and ACLs To monitor your traffic

03

PPP Point to point Protocol

Between center router and isp

B1-core-R (config)#username isp password 123

B1-core-R (config)#int s0/1/0

encapsaultion pppp

ppp authencation chap

ISP1 (config)#username center_router password 123

isp21(config)#int s0/1/0

encapsaultion ppp

ppp authencation chap

04

ACL Access Control List

B1-DSW1,2

```
ip access-list exteand ACL1
    permit tcp 192.168.20.0 0.0.0.255 host 129.134.30.12 eq www
    permit tcp 192.168.20.0 0.0.0.255 host 129.134.30.12 eq 443
    permit tcp 192.168.20.0 0.0.0.255 host 129.134.31.12 eq www
    permit tcp 192.168.20.0 0.0.0.255 host 129.134.31.12 eq 443
    permit tcp 192.168.20.0 0.0.0.255 host 185.89.218.12 eq www
    permit tcp 192.168.20.0 0.0.0.255 host 185.89.218.12 eq 443
    permit tcp 192.168.20.0 0.0.0.255 host 185.89.219.12 eq www
    permit tcp 192.168.20.0 0.0.0.255 host 185.89.219.12 eq 443
    deny ip 192.168.20.0 0.0.0.255 192.168.10.0 0.0.0.255
    permit ip any  any



int vlan 20
ip access-group ACL1 in
```

Week 04 tasks were distributed as follow:

NTP Configuration

All routers were synchronized with the NTP server at the Cairo router, ensuring accurate timekeeping across the network

Ahmed Mohamed

ACL Configuration & AAA

Configured Access Control Lists (ACLs) to permit IT department traffic to Facebook while restricting access for the Sales department, adding a layer of security and traffic control.

Ahmed Elshahat

PPP Configuration

A PPP connection was established between the Cairo router and the ISP, ensuring reliable and secure communication.

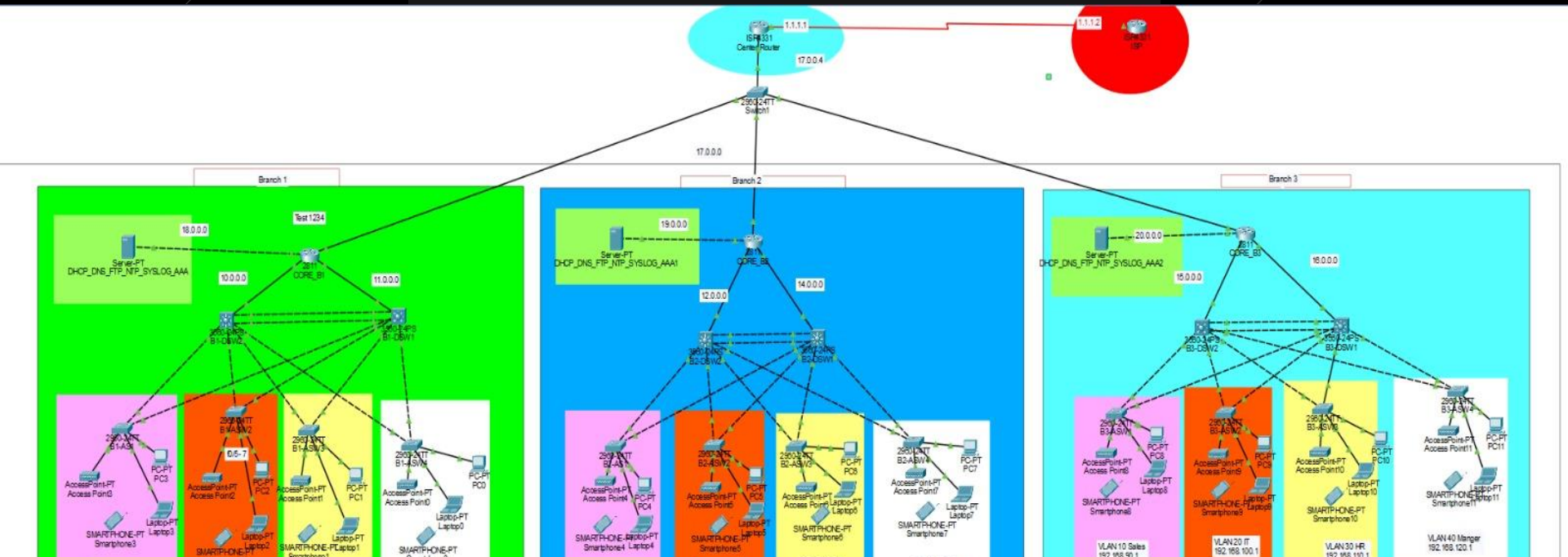
Noor Alain

Syslog Configuration

Configured all routers to send log messages to the log server, enabling effective traffic monitoring and troubleshooting through centralized logging

Ebrahim Talat

The final Result



Thank you for your time