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Computer Network's Project

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Titile: "Design and Implementation of a Secure Telecommunication Company Network System"

Steps:

1. Network Design and Beautification:
   - This section covers the overall design of the network and emphasizes the importance of a clean and organized network structure.
2. Basic Settings to All Devices:
   - This part focuses on the initial basic configuration of network devices, including setting hostnames, passwords, and domain names.
3. VLANs (for WIRED, WIRELESS & VOICE) Assignment:
   - This part discusses the assignment of Virtual LANs (VLANs) to categorize different types of network traffic, such as wired, wireless, and voice.
4. EtherChannel, STP Portfast, and BPDUguard Configurations:
   - This section covers configuring features like EtherChannel, spanning tree protocol (STP) Portfast, and BPDUguard to optimize network performance and security. (Loops doesn't formed)
5. Subnetting and IP Addressing:
   - This part explains the process of subnetting and assigning IP addresses to different network segments within the enterprise network.
6. Inter-VLAN Routing on Switches:
   - This section discusses the setup of inter-VLAN routing on multiple switches and the use of DHCP helper addresses for proper IP assignment.
7. Static IP Address to DMZ/Server Farm Devices:
   - It covers configuring static IP addresses for devices in the DMZ (Demilitarized Zone) and server farm for added security.
8. DHCP Server Device Configurations:
   - This part explains how to configure DHCP servers for dynamic IP address allocation.
9. OSPF on Firewall, Routers, and Switch:
   - It covers the implementation of the OSPF routing protocol on various network devices, including firewalls, routers, and switches.
10. Firewall Interface Security Zones and Levels:

o This section focuses on setting up firewall security zones and levels to control traffic and enhance network security.

11. Wireless Network Configurations:
   o It discusses the configuration of a wireless LAN controller, including creating wireless LANs for employees and guests and implementing WPA-2 security.

12. Telephony Service Configuration:
   o This part explains the configuration of telephony services, including assigning IP addresses and line numbers to IP phones.

13. Verifying and Testing Configurations:
   o The final part emphasizes the importance of verifying and testing all configurations to ensure they work correctly and meet network requirements.

IP address table:

NETWORK CONFIGURATIONS

	Network & Subnet Mask	Valid Host Addresses	Default Gateway	Broadcast Address
WLAN	10.20.0.0/16	10.20.0.1 to 10.20.255.254	10.20.0.1	10.20.255.254
LAN	192.168.10.0/24	192.168.10.1 to 192.168.10.254	192.168.10.1	192.168.10.255
VoIP	172.16.10.0/24	172.16.10.1 to 172.16.10.254	172.16.10.1	172.16.10.255
DMZ	10.10.10.0/28	10.10.10.1 to 10.10.10.14	10.10.10.1	10.10.10.15

Between the Firewall, Routers and Layer-3 Switch

	Network Address
FW-Multi Layer Switch	10.30.30.0/30
FW-ISP	197.200.100.0/30
ISP-CLOUD	20.20.20.0/30
CLOUD	30.30.30.0/8

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Commands:

1] Basic Settings Command on Switches and Firewalls

```
en
conf t
hostname NAME
enable password cisco
banner motd *NO AUTHORISED ACCESS*
username cisco password cisco
ip domain-name cisco.net
line console 0
password cisco
login
exit
no ip domain-lookup
service password-encryption
do wr
```

2] VLAN Configuration on SWITCHES   50 -wired, 60- wireless, 101- voice

```
vlan 50
name LAN
vlan 60
name WLAN
vlan 101
name VoIP

int range fa0/3-11
switchport mode access
switchport access vlan 50
switchport voice vlan 101
ex

int range fa0/12
switchport mode access
switchport access vlan 60
ex

int range fa0/13-23
switchport mode access
switchport access vlan 50
```

switchport voice vlan 101
ex

int range fa0/24
switchport mode access
switchport access vlan 60
ex

do wr

3] Etherchannel, STP, BPDU protocol on Switches

int range fa0/1-2
channel-group 2 mode active
ex

int port-channel 2
switchport mode trunk
ex

int range fa0/3-24
spanning-tree portfast
spanning-tree bpduguard enable
ex

do wr
4] Firewall inspection policy – Allow traffic to pass

object network INSIDE-OUT
subnet 192.168.10.0 255.255.255.0 //WIRED
nat (INSIDE,OUTSIDE) dynamic interface
ex

object network INSIDE-OUT
subnet 10.20.0.0 255.255.0.0   //WIRELESS
nat (INSIDE,OUTSIDE) dynamic interface
ex

object network INSIDE-OUT3
subnet 10.10.10.0 255.255.255.240
nat (DMZ,OUTSIDE) dynamic interface
ex

wr mem

//STATIC ROUTING
route OUTSIDE 0.0.0.0 0.0.0.0 197.200.100.1

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access-list INSIDE-DMZ extended permit icmp any any
access-list INSIDE-DMZ extended permit udp any any eq 67
access-list INSIDE-DMZ extended permit udp any any eq 68   ---FOR DHCP

access-list INSIDE-DMZ extended permit udp any any eq 53
access-list INSIDE-DMZ extended permit tcp any any eq 53   -----FOR DNS

access-list INSIDE-DMZ extended permit tcp any any eq 80
access-list INSIDE-DMZ extended permit tcp any any eq 8080   -----FOR HTTP
access-list INSIDE-DMZ extended permit tcp any any eq 443
access-list INSIDE-DMZ extended permit tcp any any eq 8443   -----FOR HTTP

access-group INSIDE-DMZ in interface DMZ

PING -t 30.30.30.10 in Network Engineer CMD

5] Cisco Voice Gateway
ephone-dn 1
number 1001
ex

ephone-dn 2
number 1001
ex

ephone-dn 3
number 1001
ex   …………………………………….. Many more phones

Summary of Project

In this project we have done the implementation of a network system for a telecommunications company. The project aims to ensure the confidentiality, integrity, and availability of data and communication through secure and reliable means. The network will grant access to both wired and wireless users to various cloud resources via the Cloud platform.

Showed the use of hardware and software tools like Cisco firewalls, Catalyst switches, and Windows Server for network security and management. VLAN categorization is based on the type of connection (wired or wireless), and key settings such as VLAN routing and STP portfast are configured. Additionally, we showed the integration of various network components, including VoIP routers and DMZ for added security measures.

The practical implementation of the network design. This includes connecting end devices to the topology using access points and laptops, as well as further configuration steps such as setting up IP addresses, DMZ switches, and basic device settings.
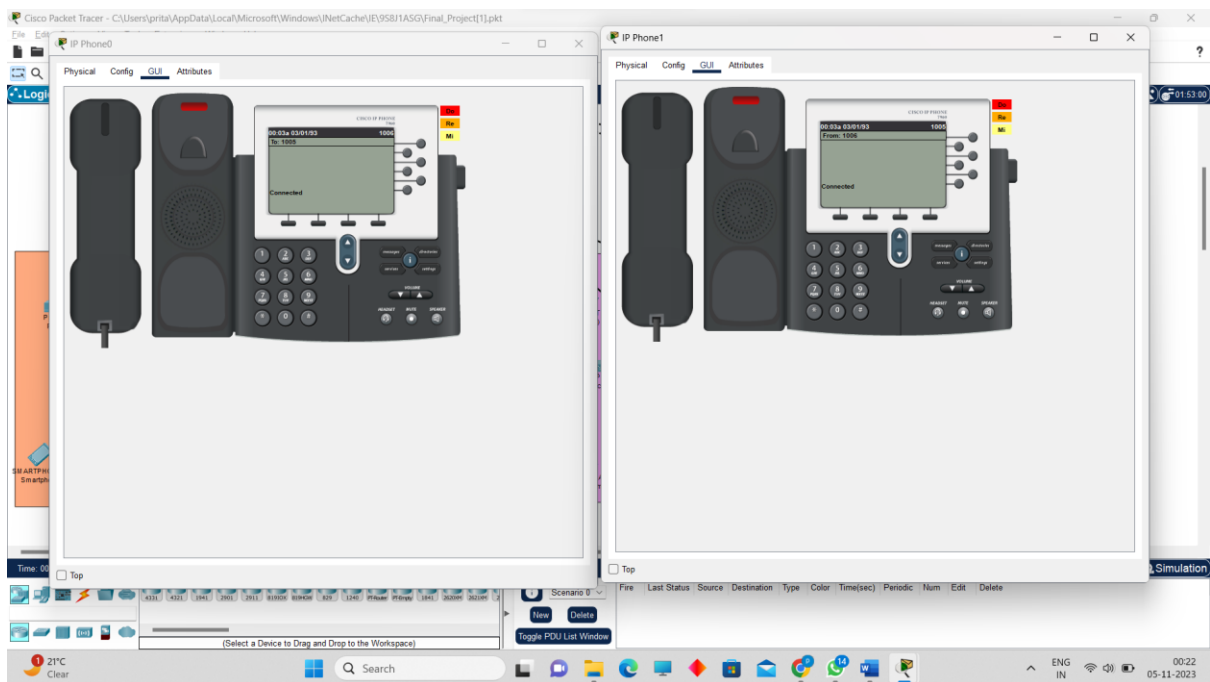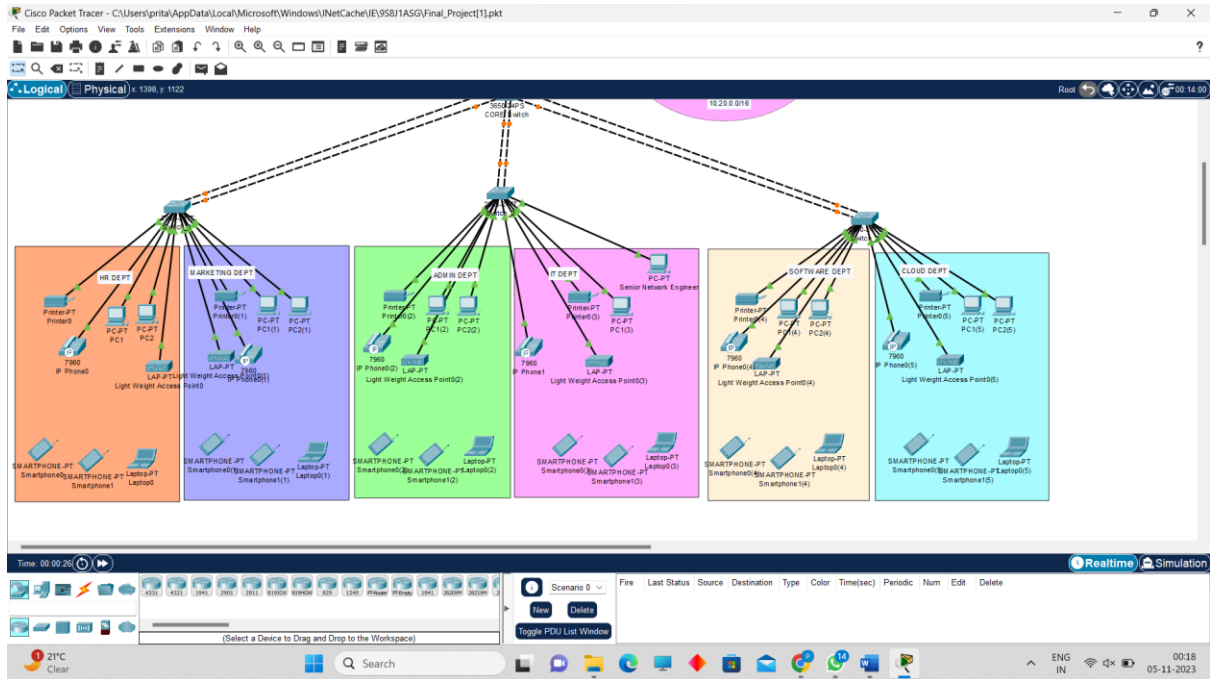
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Overall, it's a detailed and structured guide for designing, configuring, and implementing a robust network system tailored to the needs of a telecommunications company, with a focus on security, reliability, and scalability.

OUTPUT:
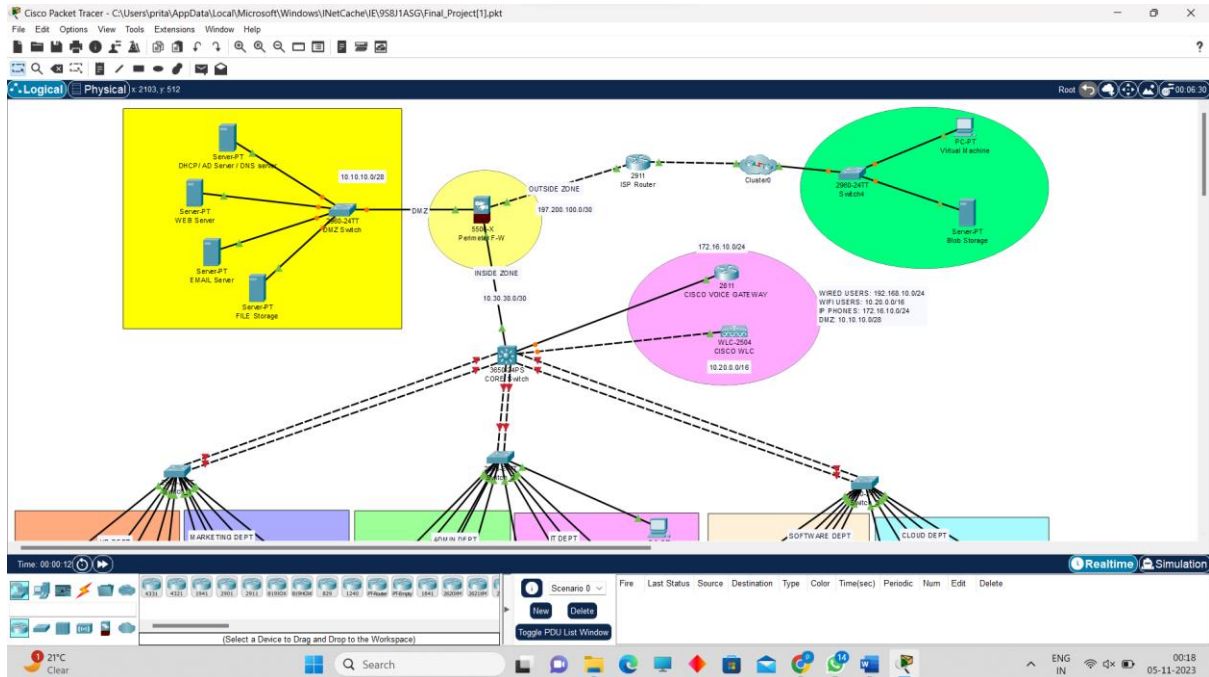
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