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1.Introduction

GlobalTech Solutions, a renowned player in the semiconductor industry, specializes in advanced wireless technologies such as Wi-Fi and Bluetooth, catering to a wide range of modern devices. The company's headquarters, located in Melbourne, are distributed across two buildings. This project shows the IP network addressing plan for Global Tech solutions. It shows the information about network addressing, subnetting, and IP assignment. Our network design has 76 pcs connected to 8 switches, and 3 routers which are connecting these switches. Our design is using star topology. In this we have divided the networks into 4 sectors that is research and development, Sales and marketing, Administration and Customer services. IP addressing plan is organised for each subnet and the router details.

Protocols are the rules that are used by routers and switches to communicate and forward packets to their destination efficiently. Routing protocol ensures that the data packet are directed between the sub networks with the help of routing table which guide the forwarding decisions. Switching protocol optimize the flow of data within departmental networks. It also ensures that data packets are correctly forwarded to intended receipt.

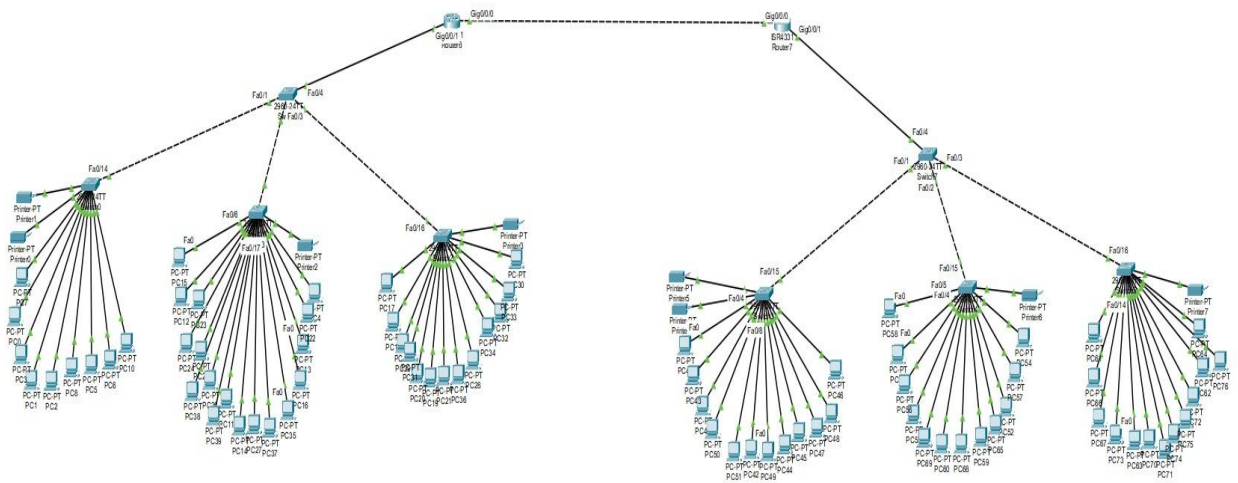
Routers and switches play vital role in data communication and network performance. Routers are responsible for data package transfer between different networks while switches are operated within single network and manage traffic at data link layer to forward data at correct destination. Proper configuration shows that data is transmitted efficiently and enhance security by controlling data paths.

IP subnetting is playing critical role in optimizing the network . It allows better allocation of IP address minimizing wastage and facilitating the organisation of devices with logical grouping. For Global tech solutions which operates multiple departments implementation of subnetting is important .It allows separation of network traffic between Adminstrative group ,Customer service, Sales and marketing ,Research and development and reduces traffic between them.

To enhance security within the computer network, it is necessary to implement static routing between sub network departments. Static routing will direct traffic and maintain robust security. This determines the necessary steps to configure static routes and subnetworks in two buildings

2.Network Diagram (if different from the phase 2)

The diagram uses a star tology in which one building has its own switch which is connected to the router of the company



3. Reason for changes

There are several reasons for changing the network diagram

Firstly the switch configuration-

Each subnet has variety of switches , managing multiple PCs and devices It has varied atmosphere where different departments have customised setups.It may leads to complicate management due to number of different devices. Each subnetwork has uniform configuration with switches managing consistent number of switches and PCs.This uniform configurations helps to simplify network management which can lead to better performance and easier scalability.

Performance optimization-The connection of devices and switches impacted the network performance . A well designed topology determines the effective flow of data ensures the data security and enhances performance. It supports company wireless technologies and modern devices.

Scalability- A redesigned diagram can accommodate future growth and additional departments. Uniform network design like in the second diagram are easy to scale. The more varied number of devices leads to more complications in the scaling the design especially if different segments have unique configuration and requirements.

Manageability- Managing a network is easy when there is consistency in design. In the second image it is easy to manage and maintain whereas in the first image it is quite complicated and difficult to many because of different devices.

4. Routing and switching protocols

Protocols are the rules that are used by routers and switches to communicate and forward packets to their destination efficiently. Routing protocol ensures that the data packet are directed between the sub networks with the help of routing table which guide the forwarding decisions.

Here static routing is used to configure routes between the networks. It requires manual configuration by network administrator. It is easier to configure and don't generate additional traffic. It provide measure of security. In this we need to find the destination network and subnet mask then the IP address. It is straightforward method used to determine the traffic between the routes for small and stable environments. As it is done manually so the chances of network predictability are more.

5.Router and Switch Configuration

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: no

Press RETURN to get started!

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname r1
r1(config)#interface gigabitethernet0/0/1
r1(config-if)#ip address 189.31.13.33 255.255.255.240
r1(config-if)#no shutdown

r1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up
end
r1#
%SYS-5-CONFIG_I: Configured from console by console
write memory
Building configuration...
[OK]
r1#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up

r1 con0 is now available
```

```

r2>enable
r2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
r2(config)#ip route 189.31.13.33 255.255.255.240 189.31.13.129
%Inconsistent address and mask
r2(config)#end
r2#
%SYS-5-CONFIG_I: Configured from console by console
write memory
Building configuration...
[OK]
r2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
r2(config)#ip route 189.31.13.32 255.255.255.240 189.31.13.129
r2(config)#end
r2#write memory
Building configuration...
[OK]
r2#
%SYS-5-CONFIG_I: Configured from console by console

r2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
r2(config)#ip route 189.31.13.0 255.255.255.224 189.31.13.129
r2(config)#end
r2#
%SYS-5-CONFIG_I: Configured from console by console
write memory
Building configuration...
[OK]
r2#
r2#
r2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
r2(config)#ip route 189.31.13.0 255.255.255.224 189.31.13.129
r2(config)#end
r2#
%SYS-5-CONFIG_I: Configured from console by console
write memory
Building configuration...
[OK]
r2#

```

6.IP Subnetting implementation

Subnet the 189.31.13.0/24 Network

1. **Building 1: 189.31.13.0/26**
2. **Building 2: 189.31.13.64/26**
3. **Router:189.31.13.128**

Step 2: Further Subnetting for Each Department Building

1:

1. **Administration (30 PCs): 189.31.13.0/27** ○
 Network Address: 189.31.13.0 ○
 Usable IP range: 189.31.13.1 - 189.31.13.30
 ○ Broadcast Address: 189.31.13.31
2. **Customer Service (9 PCs): 189.31.13.32/28** ○
 Network Address: 189.31.13.32 ○
 Usable IP range: 189.31.13.33 -
 189.31.13.46 ○ Broadcast Address: 189.31.13.47

Building 2:

1. **Sales and Marketing (25 PCs): 189.31.13.64/27** ○
Network Address: 189.31.13.64 ○
Usable IP range: 189.31.13.65- 189.31.13.94
○ Broadcast Address: 189.31.13.95
2. **Research and Development (12 PCs):**
189.31.13.96/28 ○ Network Address:
189.31.13.96 ○ Usable IP range: 189.31.13.96 -
189.31.13.111 ○ Broadcast Address:
189.31.13.112

Router: 189.31.13.128/30

○ Network address: 189.31.13.128 ○ Usable
range: 189.31.13.129-189.31.13.130 ○
Broadcast address: 189.31.13.131

Router addressing:

Router 1:

main switch of building 1 – 189.31.13.33/28

connected to router 2- 189.31.13.129/30 **Router**

2 :

main switch of building 2 – 189.31.13.97/28 connected

to router 1 – 189.31.13.130/30

7.Screen shots from packet tracker (ping connectivity – one from each network)

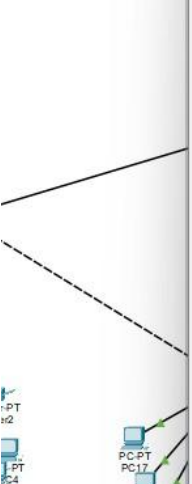
```
C:\>ping 189.31.13.108

Pinging 189.31.13.108 with 32 bytes of data:

Reply from 189.31.13.108: bytes=32 time<1ms TTL=126
Reply from 189.31.13.108: bytes=32 time<1ms TTL=126
Reply from 189.31.13.108: bytes=32 time=1ms TTL=126
Reply from 189.31.13.108: bytes=32 time<1ms TTL=126

Ping statistics for 189.31.13.108:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>|
```



```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 189.31.13.37

Pinging 189.31.13.37 with 32 bytes of data:

Reply from 189.31.13.37: bytes=32 time<1ms TTL=126
Reply from 189.31.13.37: bytes=32 time<1ms TTL=126
Reply from 189.31.13.37: bytes=32 time<1ms TTL=126
Reply from 189.31.13.37: bytes=32 time=32ms TTL=126

Ping statistics for 189.31.13.37:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 32ms, Average = 8ms

C:\>|
```

Conclusion

In conclusion, the updated network design for GlobalTech Solutions, which specializes in advanced wireless technologies, addresses key aspects of network management, performance, scalability, and security. The company's headquarters in Melbourne, distributed across two buildings, now benefit from a uniform switch configuration in each subnet, enhancing simplicity in network management and improving overall performance. This design optimizes data flow, supports modern wireless technologies, and ensures easier scalability to accommodate future growth.

The network is organized into four sectors: Research and Development, Sales and Marketing, Administration, and Customer Services, with an IP addressing plan tailored for each subnet and specific router details. Using a star topology with 76 PCs, 8 switches, and 3 routers, the network design minimizes traffic and enhances security through proper IP subnetting and static routing.

Protocols play a vital role in ensuring efficient communication and forwarding of packets between and within networks. Static routing, chosen for this design, offers a straightforward and secure method for directing traffic and maintaining network predictability, suitable for the stable environment of GlobalTech Solutions.

The changes in the network diagram were necessary to simplify management, improve performance, support scalability, and ensure consistent and manageable network infrastructure. By implementing these changes, GlobalTech Solutions enhances the efficiency and security of its network, ensuring it is well-prepared for current and future demands.

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