NMG316D PROJECT01 NETWORK TOPOLOGY AND SUBNETTING

INSTRUCTIONS:

You are hired as an IT Manager for company X (please provide the company base on your group name that you have agreed) that is currently based in head office (Gauteng), due to its growth you are informed by the CEO that the company will nee d to open new branches to the following provinces: - Gauteng (15 users), with the following Organizational units: 5 Employees in IT Department, 5 Employees in HR Department and 5 Employees in Procurement Department. - Cape Town (5 users) - Free State (5 users) - Eastern Cape (5 users) Please take a note that the head office does not have a network and server infrastructure for communication purpose and there are only 15 employees including the CEO. You are being asked by the CEO to do the following as part of your responsibilities.

Topology Drawing:

You should design/draw by illustrating a network diagram for the entire organization (All provinces) with all relevant components i.e. type of servers, databases, types of cabling with their associated links, type of internetworking devices (switches, routers, firewalls, etc), take a note of Private and Public IP addresses and label clearly with all addressees (whether is a sub - netted network or not, we want to see the IP addresses, subnet masks, default gateways for all machine on network site/ branch). NB You can use Microsoft Visio or other related software design for network diagram creation. In addition, you should explain and justify why y ou will need such component and how it is applicable to this task. For Fault Tolerance thus both system and network redundancy approach to avoid the downtime, this can be explained and demonstrated on the network diagram

IP Sub-netting task:

Due to the instruction given above in terms of number of users or clients per province, you are then requesting to create Subnets to accommodate the above instructions. Please take note: Group 1 to Group 5 (Using different network) should use CLASS C IP range, then Group 6 to Group 10 (Using different networks) should use CLASS A IP rage and Group 11 to Group 15 (Using different network) should use CLASS B IP range.

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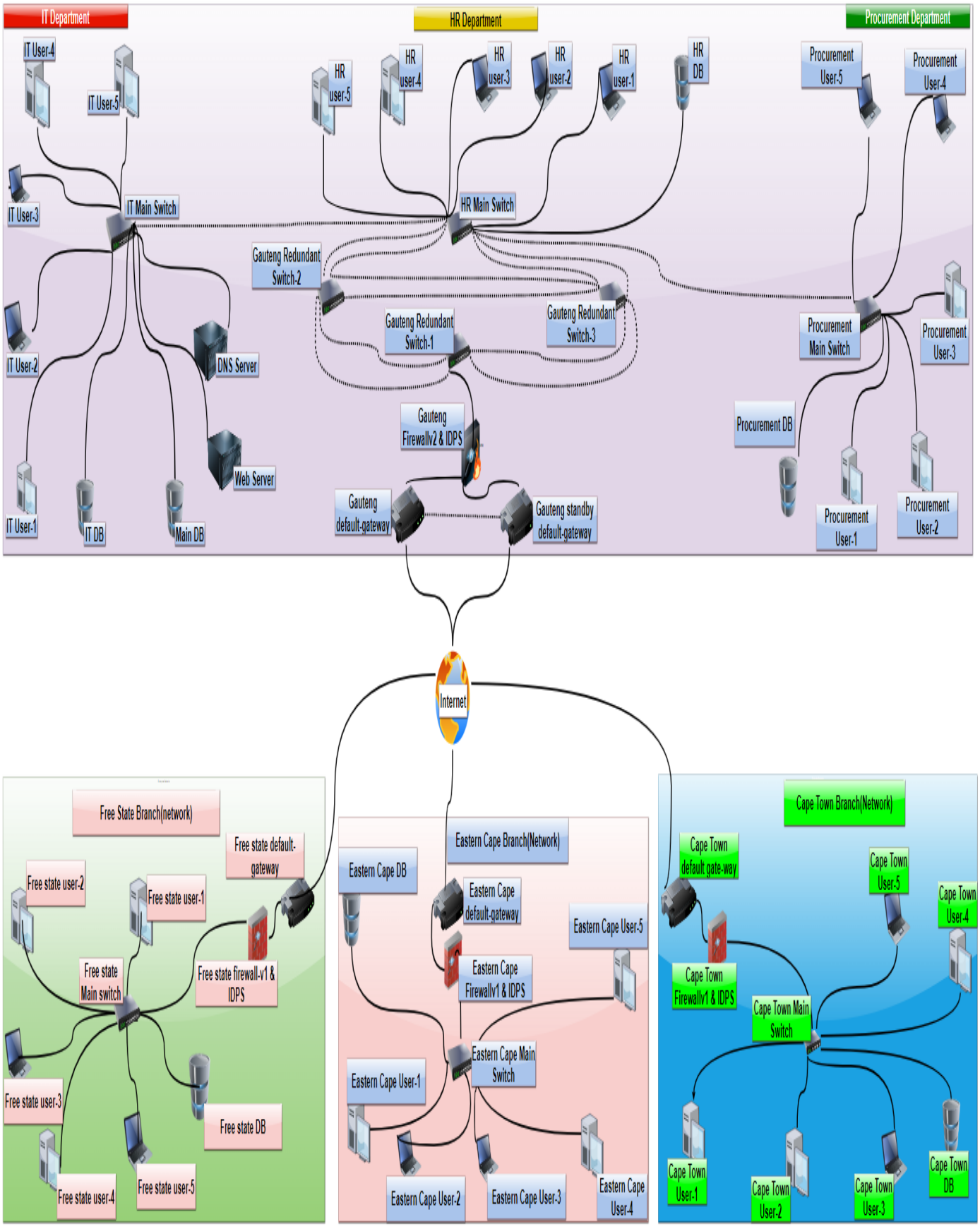

provinces	Network Address	First Usable Address	Last Usable Address	Broadcast ID	Subnet Mask
Gauteng (24host)	192.168.222.0	192.168.222.1	192.168.222.30	192.168.222.31	/27
Free state (7host)	192.168.222.32	192.168.222.33	192.168.222.46	192.168.222.47	/28
Eastern cape (7host)	192.168.222.48	192.168.222.49	192.168.222.62	192.168.222.63	/28
Cape Town (7host)	192.168.222.64	192.168.222.65	192.168.222.78	192.168.222.79	/28

-Given that IPv4 class C range is: 192.0.0.0 to 223.255.255.255/24

-therefor we are going to use the address 192.168.222.0/24 to perform VLSM(Variable Length Subnet Mask)

Device Name	Device Description	Device IP-Address	Device Default-gateway IP-address	Device Subnet Mask
Gauteng user-1	Laptop for IT user running Linux OS	192.168.222.4	192.168.222.1	255.255.255.224
Gauteng user-2	Laptop for IT user running Linux OS	192.168.222.6	192.168.222.1	255.255.255.224
Gauteng user-3	Desktop for IT user running Windows 11 OS	192.168.222.8	192.168.222.1	255.255.255.224
Gauteng user-4	Desktop for IT user running Windows 11 OS	192.168.222.5	192.168.222.1	255.255.255.224
Gauteng user-5	Desktop for IT user running Windows 11 OS	192.168.222.10	192.168.222.1	255.255.255.224
Device Name	Device Description	Device IP-Address	Device Default-gateway IP-address	Device Subnet Mask
Gauteng user-6	Laptop for HR user running Windows 11 OS	192.168.222.7	192.168.222.1	255.255.255.224
Gauteng user-7	Laptop for HR user running Windows 11 OS	192.168.222.3	192.168.222.1	255.255.255.224
Gauteng user-8	Laptop for HR user running Windows 11 OS	192.168.222.9	192.168.222.1	255.255.255.224

Gauteng user-9	Desktop for HR user running Windows 11 OS	192.168.222.12	192.168.222.1	255.255.255.224
Gauteng user-10	Desktop for HR user running Windows 11 OS	192.168.222.15	192.168.222.1	255.255.255.224
Device Name	Device Description	Device IP-Address	Device Default-gateway IP-address	Device Subnet Mask
Gauteng user-11	Laptop for Procurement user running Windows 11	192.168.222.11	192.168.222.1	255.255.255.224
Gauteng user-12	Laptop for Procurement user running Windows 11	192.168.222.17	192.168.222.1	255.255.255.224
Gauteng user-13	Desktop for Procurement user running Windows 11	192.168.222.13	192.168.222.1	255.255.255.224
Gauteng user-14	Desktop for Procurement user running Windows 11	192.168.222.16	192.168.222.1	255.255.255.224
Gauteng user-15	Desktop for Procurement user running Windows 11	192.168.222.14	192.168.222.1	255.255.255.224
Device Name	Device Description	Device IP-Address	Device Default-gateway IP-address	Device Subnet Mask
IT DB	MSSQL DB persisting IT records	192.168.222.18	192.168.222.1	255.255.255.224
DNS server	Server running DNS service for this company	192.168.222.19	192.168.222.1	255.255.255.224

Main DB	Database containing all records persisted in all databases in all branches	192.168.222.20	192.168.222.1	255.255.255.224
Device Name	Device Description	Device IP-Address	Device Default-gateway IP-address	Device Subnet Mask
HR DB	MSSQL DB persisting HR records	192.168.222.21	192.168.222.1	255.255.255.224
Procurement DB	MSSQL DB persisting Procurement records	192.168.222.15	192.168.222.1	255.255.255.224
Gauteng default-gateway	Cisco C887VAM Integrated Services Router	192.168.222.1		255.255.255.224
Gauteng standby default-gateway	Inactive Cisco C887VAM Integrated Services Router	192.168.222.2		255.255.255.224
Web Server	Apache HTTP server running web server services	192.168.222.27	192.168.222.1	255.255.255.224
IT main Switch	Cisco Catalyst 4500-X Series Interconnecting all IT devices			
Device Name	Device Description	Device IP-Address	Device Default-gateway IP-address	Device Subnet Mask

HR main Switch	Cisco Catalyst 4500-X Series Interconnecting all HR devices			
Device Name	Device Description	Device IP-Address	Device Default-gateway IP-address	Device Subnet Mask
Procurement main Switch	Cisco Catalyst 4500-X Series Interconnecting all Procurement devices			
Gauteng Redundant Switch-1	Backup Cisco Catalyst 4500-X Series running EtherChannel technology			
Gauteng Redundant Switch-2	Backup Cisco Catalyst 4500-X Series running EtherChannel technology			
Gauteng Redundant Switch-3	Backup Cisco Catalyst 4500-X Series running EtherChannel technology			

Device Name	Device Description	Device IP-Address	Device Default-gateway IP-address	Device Subnet Mask
Free Sate user-1	Laptop for Free State user running Linux OS	192.168.222.34	192.168.222.33	255.255.255.240
Free State user-2	Laptop for Free State user running Linux OS	192.168.222.37	192.168.222.33	255.255.255.240
Free State user-3	Desktop for Free State user running Windows 11 OS	192.168.222.39	192.168.222.33	255.255.255.240
Free State user-4	Desktop for Free State user running Windows 11 OS	192.168.222.35	192.168.222.33	255.255.255.240
Free State user-5	Desktop for Free State user running Windows 11 OS	192.168.222.38	192.168.222.33	255.255.255.240
Free State DB	MSSQL DB persisting Free State records	192.168.222.36	192.168.222.33	255.255.255.240
Free State default-gateway	Cisco C887VAM Integrated Services Router	192.168.222.33		255.255.255.240
Free State main Switch	Interconnecting all Free State devices Cisco Catalyst 4500-X Series			

Device Name	Device Description	Device IP-Address	Device Default-gateway IP-address	Device Subnet Mask
Eastern Cape user-1	Laptop for Eastern Cape user running Linux OS	192.168.222.50	192.168.222.49	255.255.255.240
Eastern Cape user-2	Laptop for Eastern Cape user running Linux OS	192.168.222.52	192.168.222.49	255.255.255.240
Eastern Cape user-3	Desktop for Eastern Cape user running Windows 11 OS	192.168.222.55	192.168.222.49	255.255.255.240
Eastern Cape user-4	Desktop for Eastern Cape user running Windows 11 OS	192.168.222.53	192.168.222.49	255.255.255.240
Eastern Cape user-5	Desktop for Eastern Cape user running Windows 11 OS	192.168.222.54	192.168.222.49	255.255.255.240
Eastern Cape DB	MSSQL DB persisting Eastern Cape records	192.168.222.59	192.168.222.49	255.255.255.240
Eastern Cape default-gateway	Cisco C887VAM Integrated Services Router	192.168.222.49		255.255.255.240
Eastern Cape main Switch	Interconnecting all Free State devices Cisco Catalyst 4500-X Series			

Device Name	Device Description	Device IP-Address	Device Default-gateway IP-address	Device Subnet Mask
Cape Town user-1	Laptop for Cape Town user running Linux OS	192.168.222.67	192.168.222.66	255.255.255.240
Cape Town user-2	Laptop for Cape Town user running Linux OS	192.168.222.71	192.168.222.66	255.255.255.240
Cape Town user-3	Desktop for Cape Town user running Windows 11 OS	192.168.222.68	192.168.222.66	255.255.255.240
Cape Town user-4	Desktop for Cape Town user running Windows 11 OS	192.168.222.72	192.168.222.66	255.255.255.240
Cape Town user-5	Desktop for Cape Town user running Windows 11 OS	192.168.222.69	192.168.222.66	255.255.255.240
Cape Town DB	MSSQL DB persisting Cape Town records	192.168.222.70	192.168.222.66	255.255.255.240
Cape Town default-gateway	Cisco C887VAM Integrated Services Router	192.168.222.66		255.255.255.240
Free State main Switch	Interconnecting all Free State devices Cisco Catalyst 4500-X Series			

Device Name	Device Description	Device IP-Address	Device Default-gateway IP-address	Device Subnet Mask
CAT7 Cross-over cable	Interconnecting switches			
CAT7 Straight Through cable	Interconnecting branch devices through a branch main switch and interconnecting Main Switches to default-gateways			
IDPS	Snort software			
Firewall v2	Check Point Next Generation Firewall			
Firewall v1	Azure Firewall for the 3 branches			