TSN2201 - Computer Networks
Trimester 2 2019/2020

TC01/TT01

Question 4

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Question 4

Assume that Nantai is a chain of hospitals, which has branches in Malaysia. The headquarters of the hospital is located at KL Sentral and it is mainly used for the centralized administration, finance, and Information Technology needs. Hospital branches are located at Bangsar, Puchong, Cyberjaya and Putrajaya. Around 350 hosts are required in its headquarters and branches. The following table shows the divisions established in the branches.

Divisions	**Number of hosts**
Administration	130
Finance	15
Information Technology	37
Cardiology	40
General Surgery	45
Ophthalmology	18
Neurology	30
Gynaecology	35

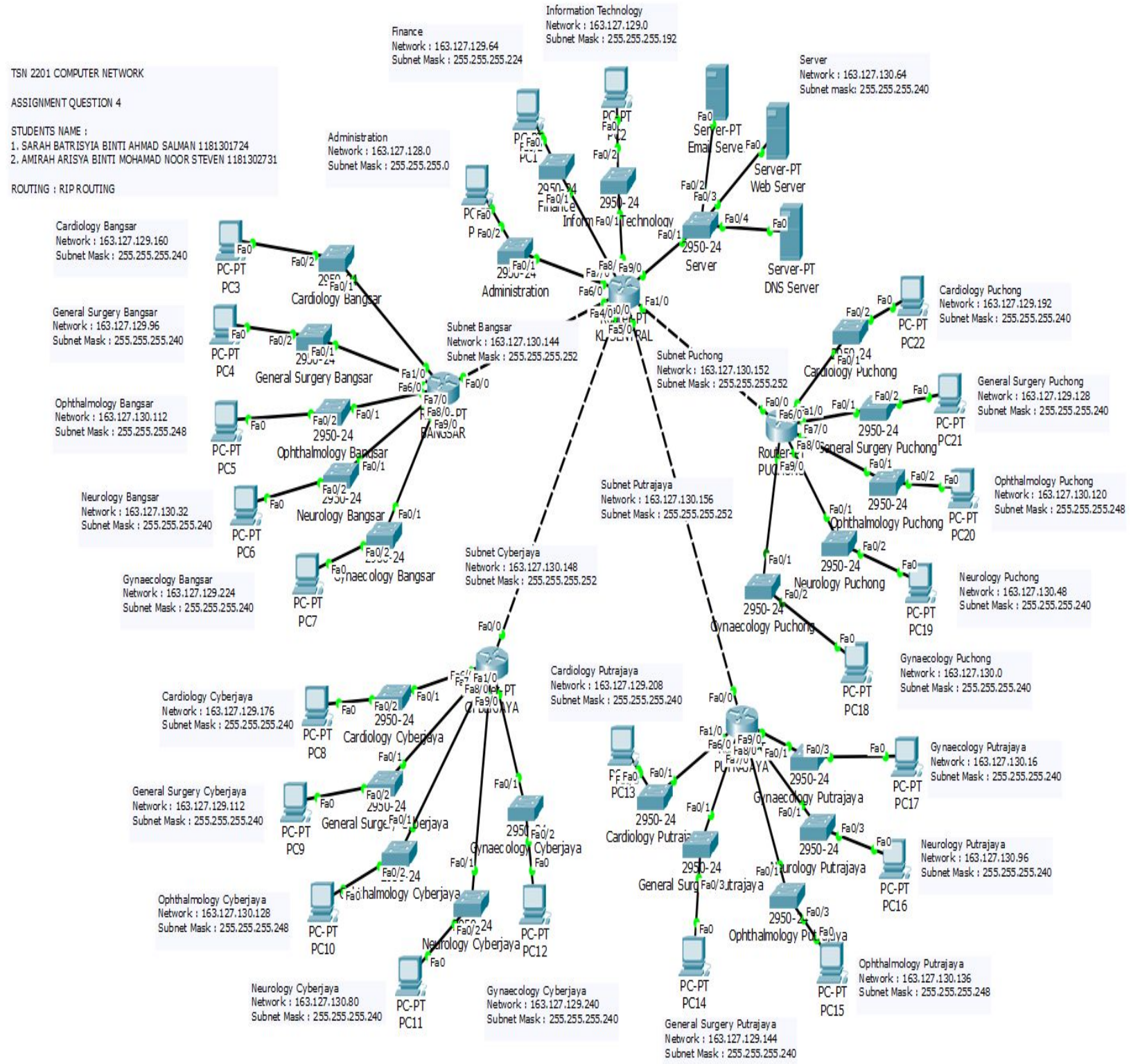
IP address block : 163.127.128.0/22

IP Address design (VLSM)

No	Subnet	Subnet Address	Subnet Mask	IP Addresses Range
1	Administration	163.127.128.0	255.255.255.0	163.127.128.1 - 163.127.128.254
2	Information Technology	163.127.129.0	255.255.255.192	163.127.129.1 - 163.127.129.62
3	Finance	163.127.129.64	255.255.255.224	163.127.129.65 - 163.127.129.94
4	General Surgery Bangsar	163.127.129.96	255.255.255.240	163.127.129.97 - 163.127.129.110
5	General Surgery Cyberjaya	163.127.129.112	255.255.255.240	163.127.129.113 - 163.127.129.126
6	General Surgery Puchong	163.127.129.128	255.255.255.240	163.127.129.129 - 163.127.129.142
7	General Surgery Putrajaya	163.127.129.144	255.255.255.240	163.127.129.145 - 163.12.129.158
8	Cardiology Bangsar	163.127.129.160	255.255.255.240	163.127.129.161 - 163.127.129.174
9	Cardiology Cyberjaya	163.127.129.176	255.255.255.240	163.127.129.177 - 163.127.129.190
10	Cardiology Puchong	163.127.129.192	255.255.255.240	163.127.129.193 - 163.127.129.206
11	Cardiology Putrajaya	163.127.129.208	255.255.255.240	163.127.129.209 - 163.127.129.222
12	Gynaecology Bangsar	163.127.129.224	255.255.255.240	163.127.129.225 - 163.127.129.238
13	Gynaecology Cyberjaya	163.127.129.240	255.255.255.240	163.127.129.241 - 163.127.129.254
14	Gynaecology Puchong	163.127.130.0	255.255.255.240	163.127.130.1 - 163.127.130.14

15	Gynaecology Putrajaya	163.127.130.16	255.255.255.240	163.127.130.17 - 163.127.130.30
16	Neurology Bangsar	163.127.130.32	255.255.255.240	163.127.130.33 - 163.127.130.46
17	Neurology Puchong	163.127.130.48	255.255.255.240	163.127.130.49 - 163.127.130.62
18	Server	163.127.130.64	255.255.255.240	163.127.130.65 - 163.127.130.78
19	Neurology Cyberjaya	163.127.130.80	255.255.255.240	163.127.130.81 - 163.127.130.94
20	Neurology Putrajaya	163.127.130.96	255.255.255.240	163.127.130.97 - 163.127.130.110
21	Ophthalmology Bangsar	163.127.130.112	255.255.255.248	163.127.130.113 - 163.127.130.118
22	Ophthalmology Puchong	163.127.130.120	255.255.255.248	163.127.130.121 - 163.127.130.126
23	Ophthalmology Cyberjaya	163.127.130.128	255.255.255.248	163.127.130.129 - 163.127.130.134
24	Ophthalmology Putrajaya	163.127.130.136	255.255.255.248	163.127.130.137 - 163.127.130.142
25	Bangsar	163.127.130.144	255.255.255.252	163.127.130.145 - 163.127.130.146
26	Cyberjaya	163.127.130.148	255.255.255.252	163.127.130.149 - 163.127.130.150
27	Puchong	163.127.130.152	255.255.255.252	163.127.130.153 - 163.127.130.154
28	Putrajaya	163.127.130.156	255.255.255.252	163.127.130.157 - 163.127.130.158

Design Justification



IP Address for PCs and Servers

No	Description	IPv4 Address	Default Gateway	Email Address
1	PC0	163.127.128.1	163.127.128.254	user0@nantai.com
2	PC1	163.127.129.65	163.127.129.94	user1@nantai.com
3	PC2	163.127.129.1	163.127.129.62	user2@nantai.com
4	PC3	163.127.129.161	163.127.129.174	user3@nantai.com
5	PC4	163.127.129.97	163.127.129.110	user4@nantai.com
6	PC5	163.127.130.113	163.127.130.118	user5@nantai.com
7	PC6	163.127.130.33	163.127.130.46	user6@nantai.com
8	PC7	163.127.129.225	163.127.129.238	user7@nantai.com
9	PC8	163.127.129.177	163.127.129.190	user8@nantai.com
10	PC9	163.127.129.113	163.127.129.126	user9@nantai.com
11	PC10	163.127.130.129	163.127.130.134	user10@nantai.com
12	PC11	163.129.130.81	163.127.130.94	user11@nantai.com
13	PC12	163.127.129.241	163.127.129.254	user12@nantai.com
14	PC13	163.127.129.209	163.127.129.222	user13@nantai.com
15	PC14	163.127.129.145	163.127.129.158	user14@nantai.com
16	PC15	163.127.130.137	163.127.130.142	user15@nantai.com
17	PC16	163.127.130.97	163.127.130.110	user16@nantai.com
18	PC17	163.127.130.17	163.127.130.30	user17@nantai.com
19	PC18	163.127.130.1	163.127.130.14	user18@nantai.com
20	PC19	163.127.130.49	163.127.130.62	user19@nantai.com
21	PC20	163.127.130.121	163.127.130.126	user20@nantai.com
22	PC21	163.127.129.129	163.127.129.142	user21@nantai.com
23	PC22	163.127.129.193	163.127.129.206	user22@nantai.com

IP Address for Routers

No	Description	FastEthernet	IPv4 Address	Cables type
1	KL Sentral	Fa0/0	163.127.130.146	Copper Cross-Over
		Fa1/0	163.127.130.154	
		Fa4/0	163.127.130.150	
		Fa5/0	163.127.130.158	
		Fa6/0	163.127.128.254	Copper Straight-Through
		Fa7/0	163.127.129.94	
		Fa8/0	163.127.129.62	
		Fa9/0	163.127.130.78	
2	Bangsar	Fa0/0	163.127.130.145	Copper Cross-Over
		Fa1/0	163.127.129.174	Copper Straight-Through
		Fa6/0	163.127.129.110	
		Fa7/0	163.127.130.118	
		Fa8/0	163.127.130.46	
		Fa9/0	163.127.129.238	
3	Cyberjaya	Fa0/0	163.127.130.149	Copper Cross-Over
		Fa1/0	163.127.129.190	Copper Straight-Through
		Fa6/0	163.127.129.126	
		Fa7/0	163.127.130.134	
		Fa8/0	163.127.130.94	
		Fa9/0	163.127.129.254	
4	Putrajaya	Fa0/0	163.127.130.157	Copper Cross-Over
		Fa1/0	163.127.129.222	Copper Straight-Through
		Fa6/0	163.127.129.158	
		Fa7/0	163.127.130.142	

		Fa8/0	163.127.130.110	
		Fa9/0	163.127.130.30	
5	Puchong	Fa0/0	163.127.130.153	Copper Cross-Over
		Fa1/0	163.127.129.206	Copper Straight-Through
		Fa6/0	163.127.129.142	
		Fa7/0	163.127.130.126	
		Fa8/0	163.127.130.62	
		Fa9/0	163.127.130.14	

Network Security

- ### Password

  On Cisco devices, there are a number of ways that you can protect resources with the use of passwords. Two common ways to achieve this is via the enable password command and enable secret password command. The main difference between enable and enable secret is encryption. With enable, the password that you give is stored in a plain text format and is not encrypted. With the enable secret password, the password is actually encrypted with MD5. In the simplest sense, enabling secret is the more secure way.

- ### Access Control

  Access control lists (ACLs) are used throughout many IT security policies, procedures, and technologies. An access control list is a list of objects; each entry describes the subjects that may access that object. Any access attempt by a subject to an object that does not have a matching entry on the ACL will be denied.

  Technologies like firewalls, routers, and any border technical access device are dependent upon access control lists in order to properly function. One thing to consider when implementing an access control list is to plan for and implement a routine update procedure for those access control lists. The Access Control also performs other tasks such as restricting telnet, filtering routing information and prioritizing WAN traffic with queuing. A wildcard mask allow to match the range of address in the Access Control statements.

Marking Scheme

No	Description	Marks(total 20)	
	Demo(functionality)		
1	All devices can ping.	4	
2	The traceroute output reflect the logical topology	2	
3	Routing is configured properly	1	
4	VLAN/ VTP is configured properly based on design	2	
5	DNS E.g. A number of Domains: @abc.com.my @xyz.com.my and etc	1	
6	Web server E.g. www.abc.com.my	1	
7	Email Server: E.g. user1@abc.com.my can send email to user2@abc.com.my	1	
	Report(Justification of design)		
8	Logical Network design Ensure proper labeling of network devices	2	
9	Network security (password, access control, NAT, etc.)	2	
10	IP address design (VLSM)	4	