TSN 2201

COMPUTER NETWORKS

ASSIGNMENT QUESTION 2(MK Malaysia SDN. BHD.)

PREPARED BY

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1. Introduction

MK Malaysia SDN. BHD. is a consumer drinking water company at Pasir Gudang. This company is based on three location which are at Pasir Gudang, Shah Alam and Perai. The company has three production plants and admin headquarter on each of the three locations. Shah Alam on the other hand also have seven departments which are Production, Human Resource, Purchasing, Contracts, Planning, IT and Finance & Accounting. The departments have 110, 70, 60, 50, 30, 20, 10 employees respectively. Totalling number of 350 employees. The company was permitted network IP 171.123.0.0/23 or 512 host addresses to design the network infrastructure in Pasir Gudang, Shah Alam and Perai.

171.123.0.0/23 address is divided into 3 section where Shah Alam gets a total number of 480 hosts, Pasir Gudang gets 12 hosts and Perai gets 12 hosts. 8 hosts were used to connect the three cities using RIPv2.

VLSM was done by Inter VLAN on each router of each city. Every VLAN number represents a department. Each department is connected through their respective city's router by their own switches. These switches are connected through bus topology. Every department shares their switch with Admin VLAN and their own department VLAN.

In Shah Alam, The IT department has the servers for various services like DHCP, DNS, EMAIL, FTP, HTTP and HTTPS. Each departments Admin server has their own HTTP and HTTPS server. The employees can connect the device and is automatically assigned by an IP address by DHCP server and the IP assigned will be based on their department.

2. Network Design

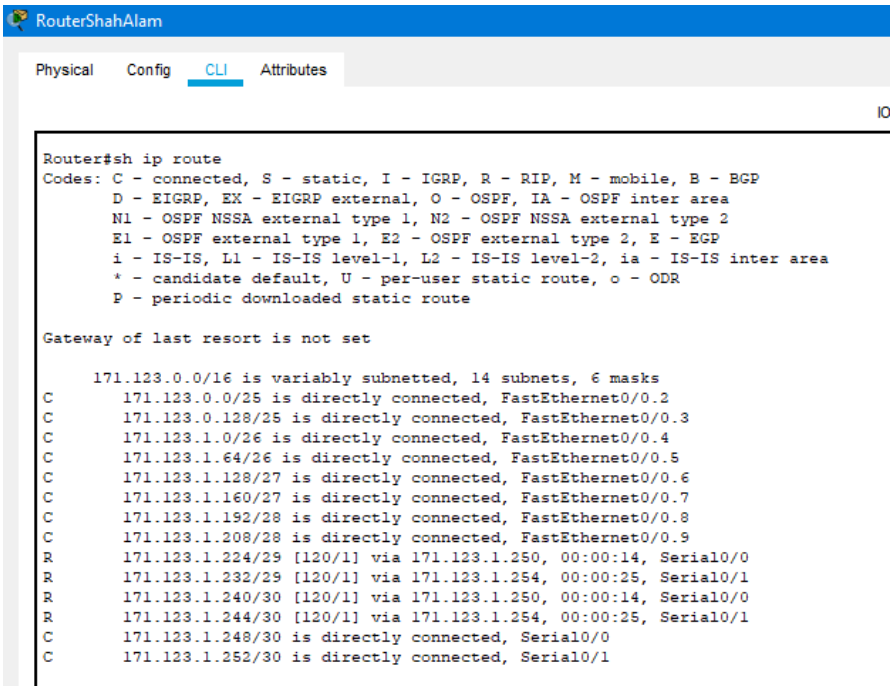
2.1. Logical Design

VLAN

```
Switch>en
Switch#sh vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active
2    Production                       active
3    HR                               active
4    Purchasing                       active
5    Contract                         active    Fa0/3, Fa0/4, Fa0/5, Fa0/6
                                                Fa0/7, Fa0/8, Fa0/9, Fa0/10
                                                Fa0/11, Fa0/12, Fa0/13, Fa0/14
                                                Fa0/15, Fa0/16, Fa0/17, Fa0/18
                                                Fa0/19, Fa0/20, Fa0/21, Fa0/22
                                                Fa0/23
6    Planning                         active
7    IT                               active
8    FnA                              active
9    Admin                            active    Fa0/1, Fa0/2
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
```

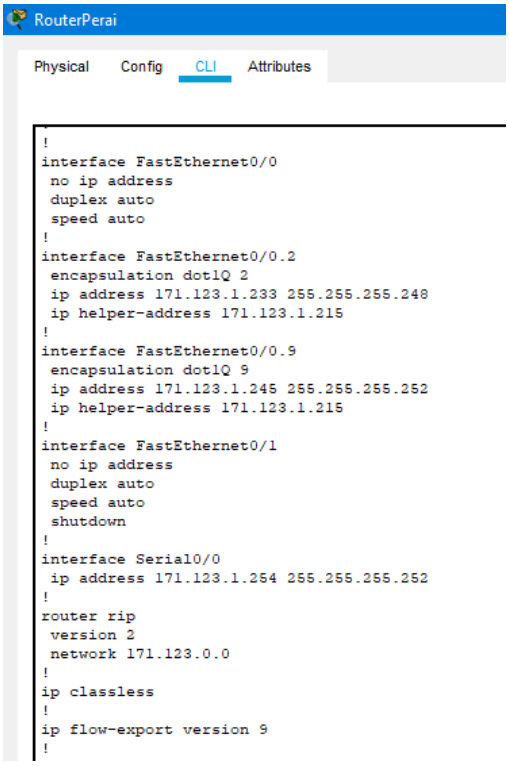
IP route (Shah Alam)



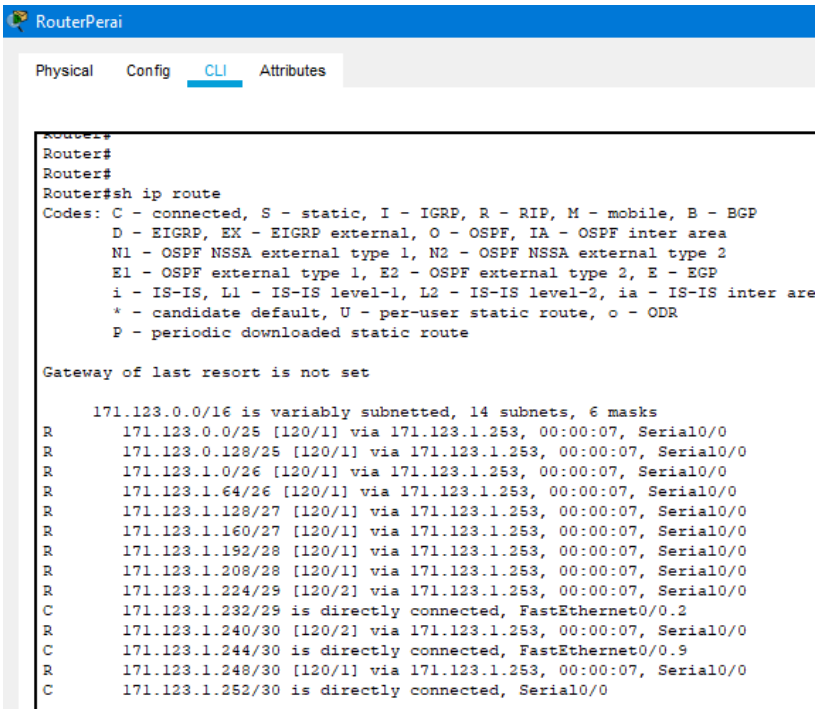
Running configuration (Shah Alam)

```
!
interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
!
interface FastEthernet0/0.2
 encapsulation dot1Q 2
 ip address 171.123.0.1 255.255.255.128
 ip helper-address 171.123.1.215
!
interface FastEthernet0/0.3
 encapsulation dot1Q 3
 ip address 171.123.0.129 255.255.255.128
 ip helper-address 171.123.1.215
!
interface FastEthernet0/0.4
 encapsulation dot1Q 4
 ip address 171.123.1.1 255.255.255.192
 ip helper-address 171.123.1.215
!
interface FastEthernet0/0.5
 encapsulation dot1Q 5
 ip address 171.123.1.65 255.255.255.192
 ip helper-address 171.123.1.215
!
interface FastEthernet0/0.6
 encapsulation dot1Q 6
 ip address 171.123.1.129 255.255.255.224
 ip helper-address 171.123.1.215
!
interface FastEthernet0/0.7
 encapsulation dot1Q 7
 ip address 171.123.1.161 255.255.255.224
 ip helper-address 171.123.1.215
!
interface FastEthernet0/0.8
 encapsulation dot1Q 8
 ip address 171.123.1.193 255.255.255.240
 ip helper-address 171.123.1.215
!
interface FastEthernet0/0.9
 encapsulation dot1Q 9
 ip address 171.123.1.209 255.255.255.240
 ip helper-address 171.123.1.215
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0
 ip address 171.123.1.249 255.255.255.252
 clock rate 2000000
!
interface Serial0/1
 ip address 171.123.1.253 255.255.255.252
 clock rate 2000000
!
router rip
 version 2
 network 171.123.0.0
!
ip classless
!
```

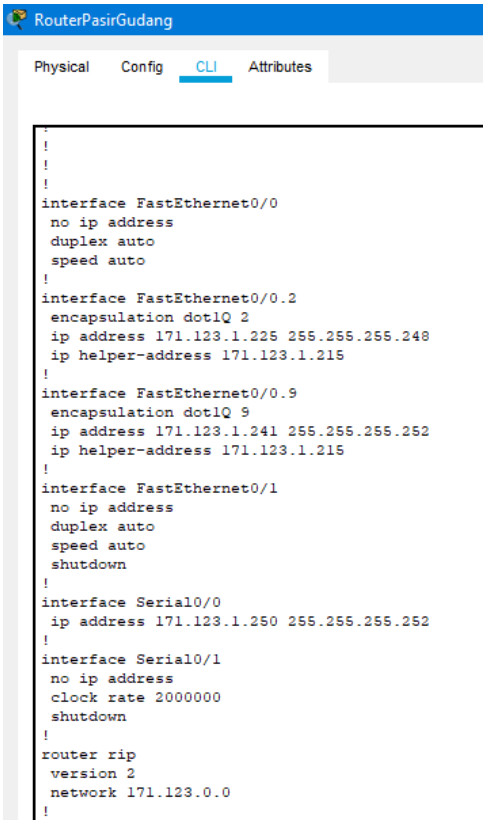
Running configuration (Perai)



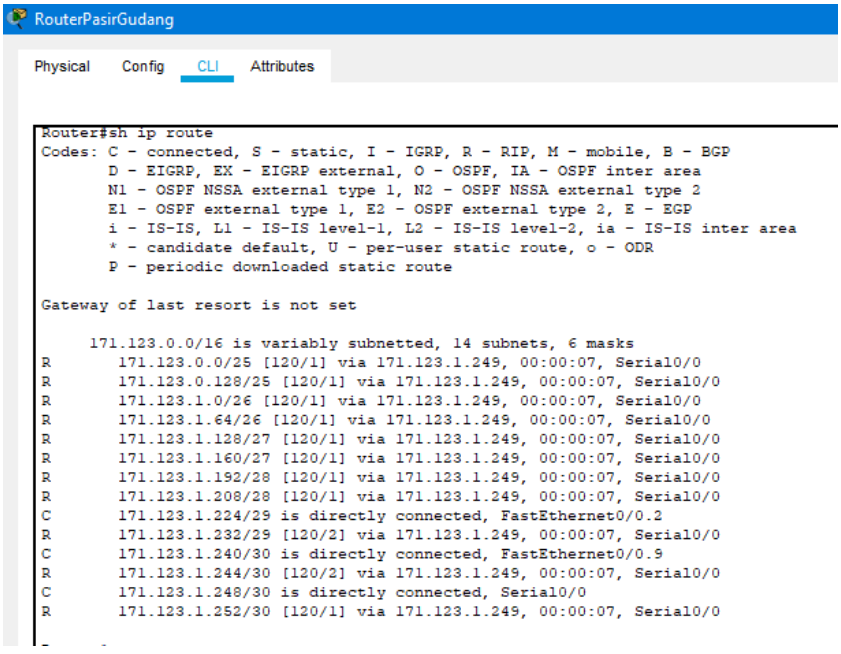
IP route (Perai)



Running configuration (Pasir Gudang)



IP route (Pasir Gudang)



2.2. Physical Design

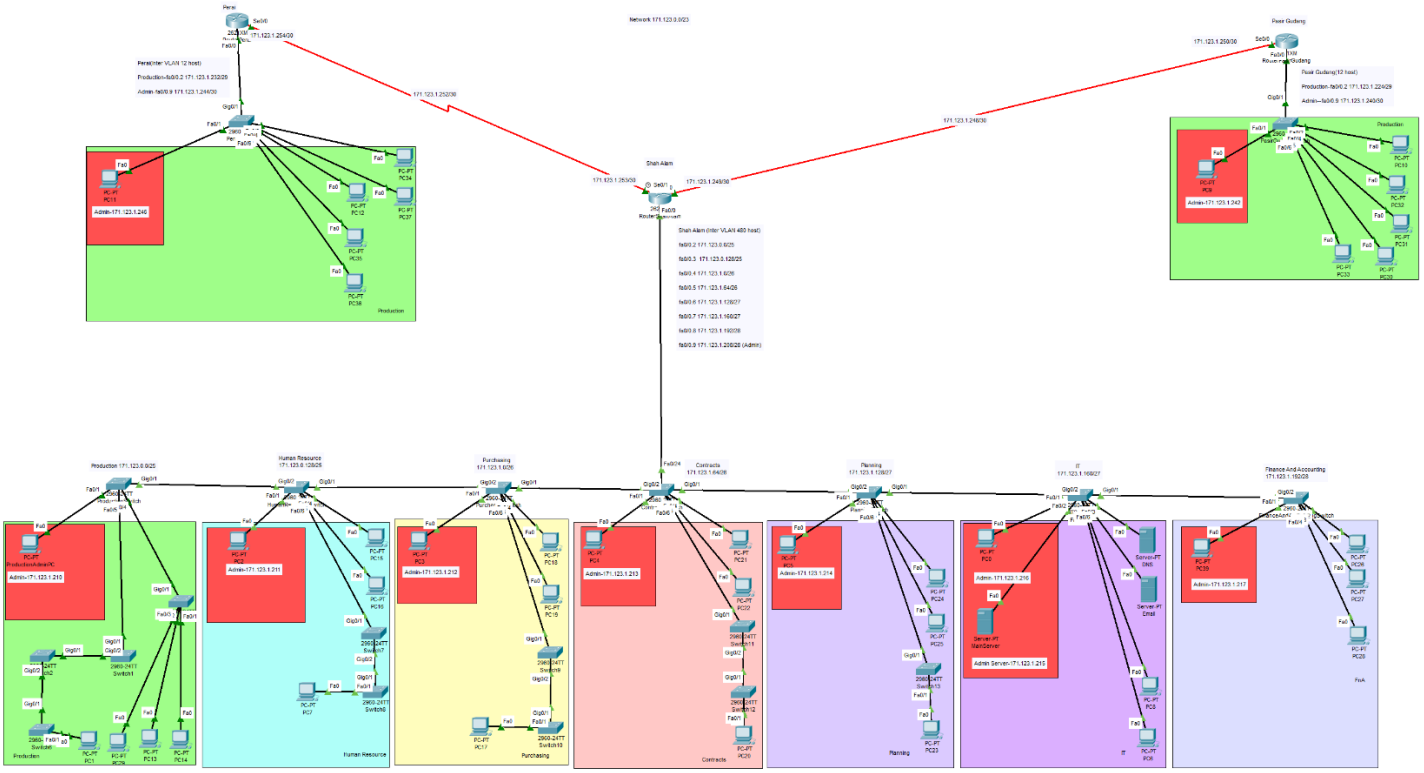


Figure 2.2.1: Physical Topology

3. Network Performance

3.1. Cost

Total Router used 3. Per router cost 170.

Total Router cost= 3x170 = 510

Total Switches used 19. Per Switch costs 250

Total Switch cost= 19x250 = 4750

Total Servers used 3. Per Server costs 2000

Total Server cost =3x2000 = 6000

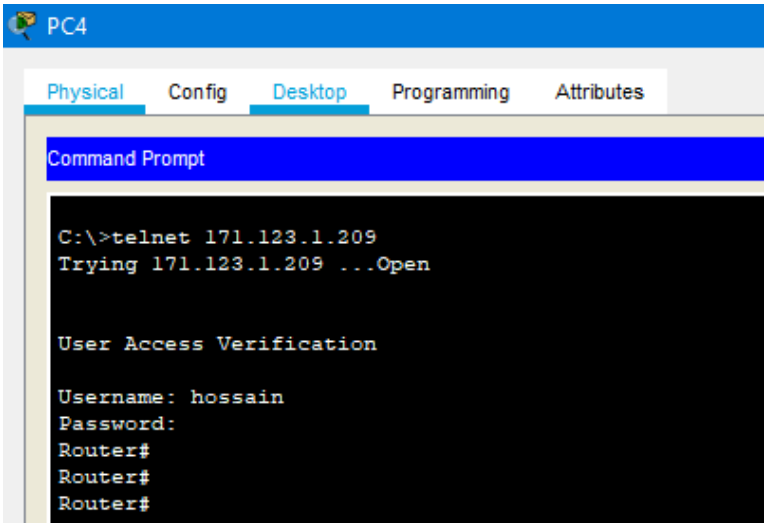
Total approximate cost ~11260

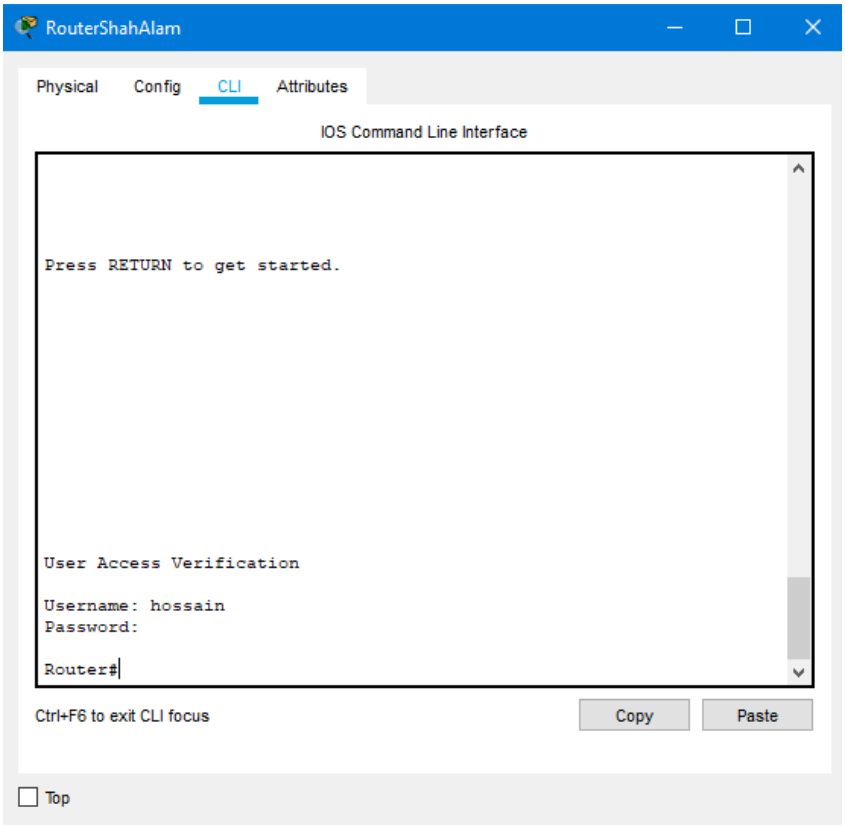
Considering the huge infrastructure cost is relatively low. Because this system uses minimal routers and switches to established connection depending on the company's need.

3.2. Security

Each department have their own VLAN. So, they cannot communicate directly through LAN although they are connected by switches. Communications have to be established by the router must. Even in Admin is separated from the rest of the employees which further increases security. The servers, especially EMAIL server uses client user name and password. Which means email service is secured. Main Server uses SSL for HTTP service.

To access the routers, username and password is required. That's why every router was set to access by the admins only. Shah Alam router can be access by production and IT admin only. The rest two routers can be accessed by their production admin. Example is shown below.




RouterShahAlam
Physical
Config
CLI
Attributes
IOS Command Line Interface
Press RETURN to get started.
User Access Verification
Username: hossain
Password:
Router#
Ctrl+F6 to exit CLI focus
Copy
Paste
Top

4. IP Address Design (VLSM)

City	Department	VLAN Number	Network ID	Range	Broadcast Address	Subnet Mask	CIDR
Shah Alam	Production	2	171.123.0.0	171.123.0.1 - 171.123.0.126	171.123.0.127	255.255.255.128	25
	Human Resource	3	171.123.0.128	171.123.0.129 - 171.123.0.254	171.123.0.255	255.255.255.128	25
	Purchasing	4	171.123.1.0	171.123.1.1 - 171.123.1.62	171.123.1.63	255.255.255.192	26
	Contracts	5	171.123.1.64	171.123.1.65 - 171.123.1.126	171.123.1.127	255.255.255.192	26
	Planning	6	171.123.1.128	171.123.1.129 - 171.123.1.158	171.123.1.159	255.255.255.224	27
	IT	7	171.123.1.160	171.123.1.161 - 171.123.1.190	171.123.1.191	255.255.255.224	27
	Finance & Accounting	8	171.123.1.192	171.123.1.193 - 171.123.1.206	171.123.1.207	255.255.255.240	28
	Admin	9	171.123.1.208	171.123.1.209 - 171.123.1.222	171.123.1.223	255.255.255.240	28
Pasir Gudang	Production	2	171.123.1.224	171.123.1.225 - 171.123.1.230	171.123.1.231	255.255.255.248	29
	Admin	9	171.123.1.240	171.123.1.241 - 171.123.1.242	171.123.1.243	255.255.255.252	30
Perai	Production	2	171.123.1.232	171.123.1.233 - 171.123.1.238	171.123.1.239	255.255.255.248	29
	Admin	9	171.123.1.244	171.123.1.245 - 171.123.1.246	171.123.1.247	255.255.255.252	30
Connection	Shah Alam to Pasir Gudang		171.123.1.248	171.123.1.249 - 171.123.1.250	171.123.1.251	255.255.255.252	30
	Shah Alam to Perai		171.123.1.252	171.123.1.253 - 171.123.1.254	171.123.1.255	255.255.255.252	30