

Topic: 04
Unknown Organization

Group: 404

Course: CSE421
Section-04

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Given Population and distances:

	Headquarter s	Lobby	Mercenary	Intelligence	Undertaking
H (1432)	0				
L (3200)	59	0			
M (20)	68	58	0		
I (520)	96	56	66	0	
U (20)	58	58	68	98	0

Find shortest path:

Headquarters-H, Lobby-L Mercenary-M, Intelligence-I, Undertaking-U

	Headquarter	Lobby	Mercenary	Intelligence	Undertaking
H (1432)	0	∞	∞	∞	∞
L (3200)		68, H	98, H	96, H	59, H
M (20)		68, H		96, H	59, H
I (520)		68, H		96, H	
U (20)				96, H	

Assumption:

Considering the conditions of routing for this project, the routing or, any possible communication should take place:

1. Through the shortest path if the Headquarter is shut down (Using dynamic routing)
2. Otherwise, by visiting the Headquarter first (Using static routing)
3. As all the sectors are connected, total number of WAN connections should be 10

Applying VLSM:

The topology has 10 WAN connections. So total required host after sorting:

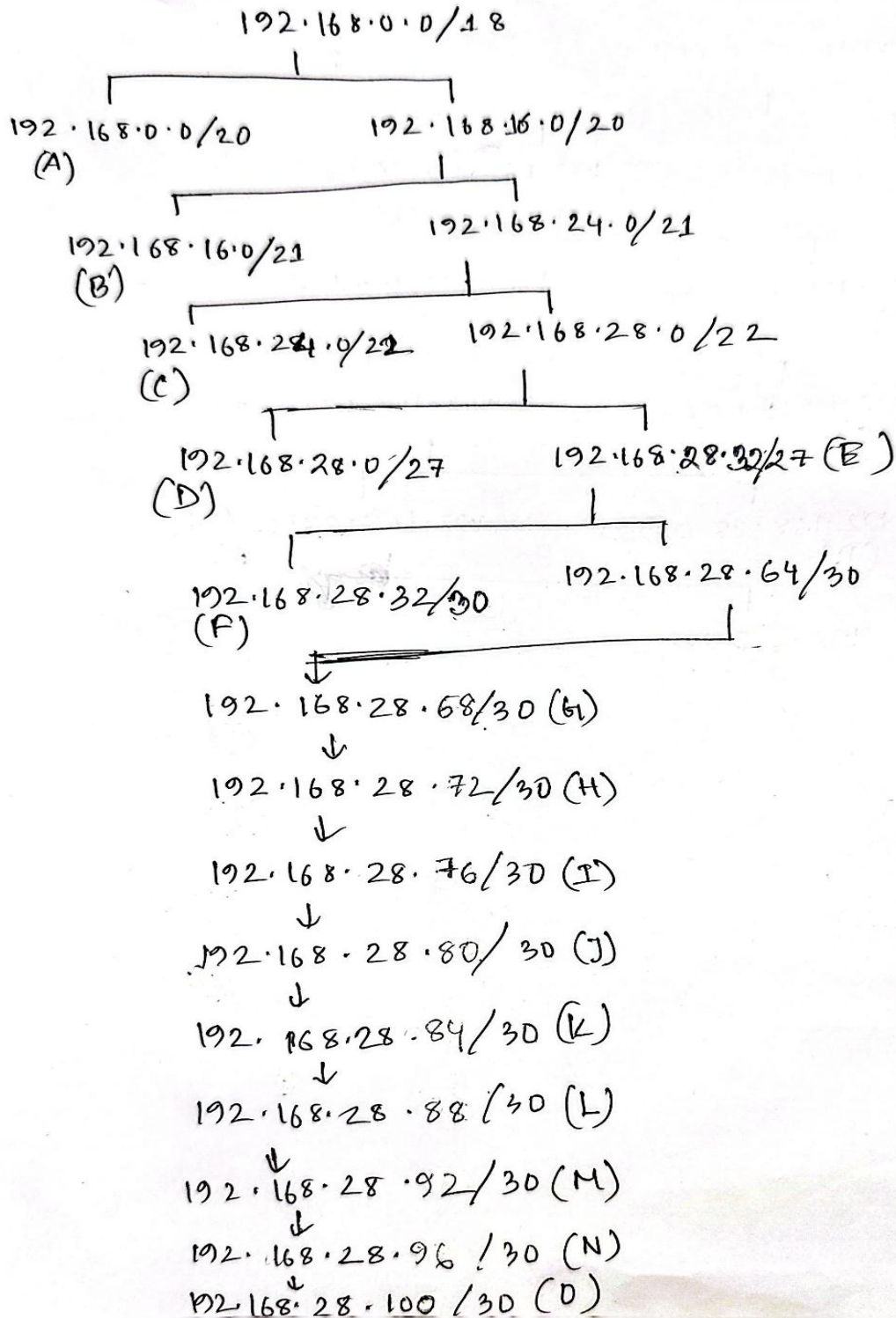
NAME	HOST
Lobby (L)	3200
Headquarters (H)	1432
Intelligence (I)	520
Undertaking (U)	20
Mercenary (M)	20
WAN-1	2
WAN-2	2
WAN-3	2
WAN-4	2
WAN-5	2
WAN-6	2
WAN-7	2
WAN-8	2
WAN-9	2
WAN-10	2

Let, Major IP:192.168.0.0/18
 Root, Host Bit = 14, Network Bit = 18

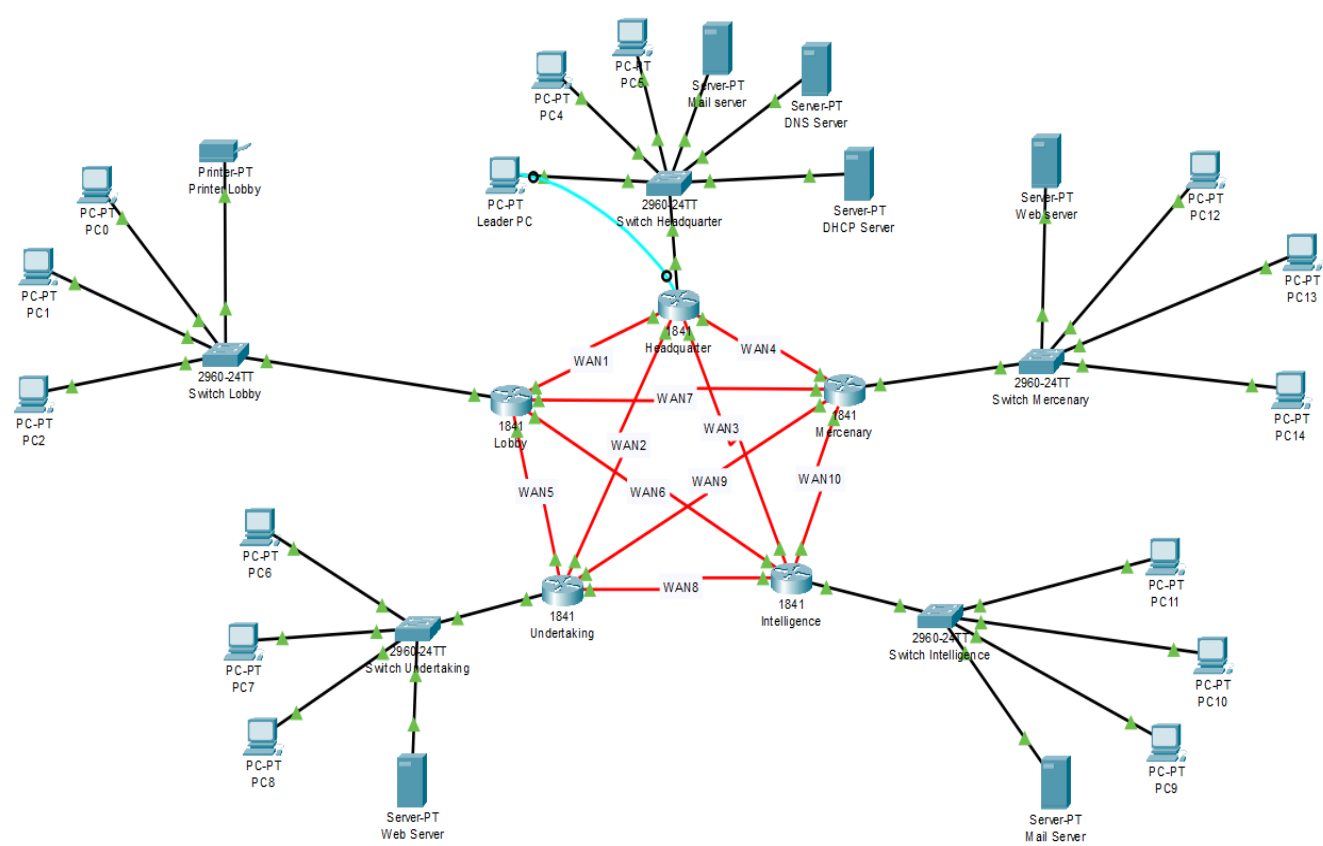
NAME	#	HOST	+2	RANGE	Mask	Network Address	Subnet Mask	Range
L	A	3200	3202	4096	/20	192.168.0.0	255.255.240.0	192.168.0.1-192.168.15.254
H	B	1432	1434	2048	/21	192.168.16.0	255.255.248.0	192.168.16.1-192.168.23.254
I	C	520	522	1024	/22	192.168.24.0	255.255.252.0	192.168.24.1-192.168.27.254
U	D	20	22	32	/27	192.168.28.0	255.255.255.224	192.168.28.1-192.168.28.30
M	E	20	22	32	/27	192.168.28.32	255.255.255.224	192.168.28.33-192.168.28.62
WAN-1	F	2	4	4	/30	192.168.28.64	255.255.255.252	192.168.28.65-192.168.28.66
WAN-2	G	2	4	4	/30	192.168.28.68	255.255.255.252	192.168.28.69-192.168.28.70
WAN-3	H	2	4	4	/30	192.168.28.72	255.255.255.252	192.168.28.73-192.168.28.74
WAN-4	I	2	4	4	/30	192.168.28.76	255.255.255.252	192.168.28.77-192.168.28.78
WAN-5	J	2	4	4	/30	192.168.28.80	255.255.255.252	192.168.28.81-192.168.28.82
WAN-6	K	2	4	4	/30	192.168.28.84	255.255.255.252	192.168.28.85-192.168.28.86
WAN-7	L	2	4	4	/30	192.168.28.88	255.255.255.252	192.168.28.89-192.168.28.90
WAN-8	M	2	4	4	/30	192.168.28.92	255.255.255.252	192.168.28.93-192.168.28.94
WAN-9	N	2	4	4	/30	192.168.28.96	255.255.255.252	192.168.28.97-192.168.28.98
WAN-10	O	2	4	4	/30	192.168.28.100	255.255.255.252	192.168.28.101-192.168.28.102

VLSM Tree:

Network Address - 192.168.0.0/18



Topology:



IP Address Table:

Device	Interface	IP	Subnet mask	Default Gateway
Headquarter	fa0/0	192.168.16.1	255.255.248.0	N/A
	s0/0/0	192.168.28.65	255.255.255.252	N/A
	s0/0/1	192.168.28.69	255.255.255.252	N/A
	s0/1/0	192.168.28.73	255.255.255.252	N/A
	s0/1/1	192.168.28.77	255.255.255.252	N/A
Lobby	fa0/0	192.168.0.1	255.255.240.0	N/A
	s0/0/0	192.168.28.66	255.255.255.252	N/A
	s0/0/1	192.168.28.81	255.255.255.252	N/A
	s0/1/0	192.168.28.85	255.255.255.252	N/A
	s0/1/1	192.168.28.89	255.255.255.252	N/A
Undertaking	fa0/0	192.168.28.1	255.255.255.224	N/A
	s0/0/0	192.168.28.70	255.255.255.252	N/A
	s0/0/1	192.168.28.82	255.255.255.252	N/A
	s0/1/0	192.168.28.93	255.255.255.252	N/A
	s0/1/1	192.168.28.97	255.255.255.252	N/A
Intelligence	fa0/0	192.168.24.1	255.255.252.0	N/A
	s0/0/0	192.168.28.74	255.255.255.252	N/A
	s0/0/1	192.168.28.86	255.255.255.252	N/A
	s0/1/0	192.168.28.94	255.255.255.252	N/A
	s0/1/1	192.168.28.101	255.255.255.252	N/A
Mercenary	fa0/0	192.168.28.33	255.255.255.224	N/A
	s0/0/0	192.168.28.78	255.255.255.252	N/A
	s0/0/1	192.168.28.90	255.255.255.252	N/A

	s0/1/0	192.168.28.98	255.255.255.252	N/A
	s0/1/1	192.168.28.102	255.255.255.252	N/A
Headquarter PC	NIC	192.168.16.2	255.255.248.0	192.168.16.1
Headquarter Mail Server	NIC	192.168.16.3	255.255.248.0	192.168.16.1
Headquarter DNS Server	NIC	192.168.16.4	255.255.248.0	192.168.16.1
Headquarter DHCP Server	NIC	192.168.16.5	255.255.248.0	192.168.16.1
Lobby Printer	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
Undertaking Web Server	NIC	192.168.28.2	255.255.255.224	192.168.28.1
Intelligence Mail Server	NIC	192.168.24.2	255.255.252.0	192.168.24.1
Mercenary Web Server	NIC	192.168.24.34	255.255.255.224	192.168.24.33
PC 0 PC 1 PC 2 PC (4-14)	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned

Commands to Configure Interfaces

Headquarter

Router>en

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#hostname Headquarter

Headquarter(config)#no ip domain-lookup

Headquarter(config)#interface fa0/0

Headquarter(config-if)#ip address 192.168.16.1 255.255.248.0

Headquarter(config-if)#no shut

Headquarter(config-if)#interface s0/0/0

Headquarter(config-if)#ip address 192.168.28.65 255.255.255.252

Headquarter(config-if)#no shut

Headquarter(config-if)#interface s0/0/1

Headquarter(config-if)#ip address 192.168.28.69 255.255.255.252

Headquarter(config-if)#no shut

Headquarter(config-if)#interface s0/1/0

Headquarter(config-if)#ip address 192.168.28.73 255.255.255.252

Headquarter(config-if)#no shut

Headquarter(config-if)#interface s0/1/1

Headquarter(config-if)#ip address 192.168.28.77 255.255.255.252

Headquarter(config-if)#no shut

Headquarter(config-if)#end

Headquarter#copy run start

Lobby

Router>en

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#hostname Lobby

Lobby(config)#no ip domain-lookup

Lobby(config)#interface fa0/0

Lobby(config-if)#ip address 192.168.0.1 255.255.240.0

Lobby(config-if)#no shut

Lobby(config-if)#interface s0/0/0

Lobby(config-if)#ip address 192.168.28.66 255.255.255.252

Lobby(config-if)#no shut

Lobby(config-if)#interface s0/0/1

Lobby(config-if)#ip address 192.168.28.81 255.255.255.252

Lobby(config-if)#no shut

Lobby(config-if)#interface s0/1/0

Lobby(config-if)#ip address 192.168.28.85 255.255.255.252

```
Lobby(config-if)#no shut
Lobby(config-if)#interface s0/1/1
Lobby(config-if)#ip address 192.168.28.89 255.255.255.252
Lobby(config-if)#no shut
Lobby(config-if)#end
Lobby#copy run start
```

Undertaking

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Undertaking
Undertaking(config)#no ip domain-lookup
Undertaking(config)#interface fa0/0
Undertaking(config-if)#ip address 192.168.28.1 255.255.255.224
Undertaking(config-if)#no shut
Undertaking(config-if)#interface s0/0/0
Undertaking(config-if)#ip address 192.168.28.70 255.255.255.252
Undertaking(config-if)#no shut
Undertaking(config-if)#interface s0/0/1
Undertaking(config-if)#ip address 192.168.28.82 255.255.255.252
Undertaking(config-if)#no shut
Undertaking(config-if)#interface s0/1/0
Undertaking(config-if)#ip address 192.168.28.93 255.255.255.252
Undertaking(config-if)#no shut
Undertaking(config-if)#interface s0/1/1
Undertaking(config-if)#ip address 192.168.28.97 255.255.255.252
Undertaking(config-if)#no shut
Undertaking(config-if)#end
Undertaking#copy run start
```

Intelligence

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Intelligence
Intelligence(config)#no ip domain-lookup
Intelligence(config)#interface fa0/0
Intelligence(config-if)#ip address 192.168.24.1 255.255.252.0
Intelligence(config-if)#no shut
```

```
Intelligence(config-if)#interface s0/0/0
Intelligence(config-if)#ip address 192.168.28.74 255.255.255.252
Intelligence(config-if)#no shut
Intelligence(config-if)#interface s0/0/1
Intelligence(config-if)#ip address 192.168.28.86 255.255.255.252
Intelligence(config-if)#no shut
Intelligence(config-if)#interface s0/1/0
Intelligence(config-if)#ip address 192.168.28.94 255.255.255.252
Intelligence(config-if)#no shut
Intelligence(config-if)#interface s0/1/1
Intelligence(config-if)#ip address 192.168.28.101 255.255.255.252
Intelligence(config-if)#no shut
Intelligence(config-if)#end
Intelligence#copy run start
```

Mercenary

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Mercenary
Mercenary(config)#no ip domain-lookup
Mercenary(config)#interface fa0/0
Mercenary(config-if)#ip address 192.168.28.33 255.255.255.224
Mercenary(config-if)#no shut
Mercenary(config-if)#interface s0/0/0
Mercenary(config-if)#ip address 192.168.28.78 255.255.255.252
Mercenary(config-if)#no shut
Mercenary(config-if)#interface s0/0/1
Mercenary(config-if)#ip address 192.168.28.90 255.255.255.252
Mercenary(config-if)#no shut
Mercenary(config-if)#interface s0/1/0
Mercenary(config-if)#ip address 192.168.28.98 255.255.255.252
Mercenary(config-if)#no shut
Mercenary(config-if)#interface s0/1/1
Mercenary(config-if)#ip address 192.168.28.102 255.255.255.252
Mercenary(config-if)#no shut
Mercenary(config-if)#end
Mercenary#copy run start
```

Commands to Configure Routes (Static)

Headquarter

Headquarter>en

Headquarter#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Headquarter(config)#ip route 192.168.0.0 255.255.240.0 s0/0/0

Headquarter(config)#ip route 192.168.28.0 255.255.255.224 s0/0/1

Headquarter(config)#ip route 192.168.24.0 255.255.252.0 s0/1/0

Headquarter(config)#ip route 192.168.28.32 255.255.255.224 s0/1/1

Headquarter(config)#end

Headquarter#show ip route

Lobby

Lobby>en

Lobby#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Lobby(config)#ip route 192.168.16.0 255.255.248.0 s0/0/0

Lobby(config)#ip route 192.168.28.0 255.255.255.224 s0/0/0

Lobby(config)#ip route 192.168.24.0 255.255.252.0 s0/0/0

Lobby(config)#ip route 192.168.28.32 255.255.255.224 s0/0/0

Lobby(config)#end

Lobby#show ip route

Undertaking

Undertaking>en

Undertaking#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Undertaking(config)#ip route 192.168.16.0 255.255.248.0 s0/0/0

Undertaking(config)#ip route 192.168.0.0 255.255.240.0 s0/0/0

Undertaking(config)#ip route 192.168.24.0 255.255.252.0 s0/0/0

Undertaking(config)#ip route 192.168.28.32 255.255.255.224 s0/0/0

Undertaking(config)#end

Undertaking#show ip route

Intelligence

Intelligence>en

Intelligence#conf t

Enter configuration commands, one per line. End with CNTL/Z.

```
Intelligence(config)#ip route 192.168.16.0 255.255.248.0 s0/0/0
Intelligence(config)#ip route 192.168.0.0 255.255.240.0 s0/0/0
Intelligence(config)#ip route 192.168.28.0 255.255.255.224 s0/0/0
Intelligence(config)#ip route 192.168.28.32 255.255.255.224 s0/0/0
Intelligence(config)#end
Intelligence#show ip route
```

Mercenary

```
Mercenary>en
Mercenary#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Mercenary(config)#ip route 192.168.16.0 255.255.248.0 s0/0/0
Mercenary(config)#ip route 192.168.0.0 255.255.240.0 s0/0/0
Mercenary(config)#ip route 192.168.28.0 255.255.255.224 s0/0/0
Mercenary(config)#ip route 192.168.24.0 255.255.252.0 s0/0/0
Mercenary(config)#end
Mercenary#show ip route
```

Commands to Configure Routes (Dynamic)

Headquarter

```
Headquarter>en
Headquarter#conf t
Headquarter(config)#router rip
Headquarter(config-router)#version 2
Headquarter(config-router)#no auto-summary
Headquarter(config-router)# network 192.168.16.0
Headquarter(config-router)# network 192.168.28.64
Headquarter(config-router)# network 192.168.28.68
Headquarter(config-router)# network 192.168.28.72
Headquarter(config-router)# network 192.168.28.76
Headquarter(config-router)#passive-interface fa0/0
Headquarter(config-router)#end
Headquarter#show ip route
```

Lobby

```
Lobby>en
Lobby#conf t
Lobby(config)#router rip
Lobby(config-router)#version 2
Lobby(config-router)#no auto-summary
Lobby(config-router)# network 192.168.0.0
Lobby(config-router)# network 192.168.28.64
Lobby(config-router)# network 192.168.28.80
Lobby(config-router)# network 192.168.28.84
Lobby(config-router)# network 192.168.28.88
Lobby(config-router)#passive-interface fa0/0
Lobby(config-router)#end
Lobby#show ip route
```

Undertaking

```
Undertaking>en
Undertaking#conf t
Undertaking(config)#router rip
Undertaking(config-router)#version 2
Undertaking(config-router)#no auto-summary
Undertaking(config-router)# network 192.168.28.0
Undertaking(config-router)# network 192.168.28.68
```

```
Undertaking(config-router)# network 192.168.28.80
Undertaking(config-router)# network 192.168.28.92
Undertaking(config-router)# network 192.168.28.96
Undertaking(config-router)#passive-interface fa0/0
Undertaking(config-router)#end
Undertaking#show ip route
```

Intelligence

```
Intelligence>en
Intelligence#conf t
Intelligence(config)#router rip
Intelligence(config-router)#version 2
Intelligence(config-router)#no auto-summary
Intelligence(config-router)# network 192.168.24.0
Intelligence(config-router)# network 192.168.28.72
Intelligence(config-router)# network 192.168.28.84
Intelligence(config-router)# network 192.168.28.92
Intelligence(config-router)# network 192.168.28.100
Intelligence(config-router)#passive-interface fa0/0
Intelligence(config-router)#end
Intelligence#show ip route
```

Mercenary

```
Mercenary>en
Mercenary#conf t
Mercenary(config)#router rip
Mercenary(config)#version 2
Mercenary(config)#no auto-summary
Mercenary(config-router)# network 192.168.28.32
Mercenary(config-router)# network 192.168.28.76
Mercenary(config-router)# network 192.168.28.88
Mercenary(config-router)# network 192.168.28.96
Mercenary(config-router)# network 192.168.28.100
Mercenary(config-router)#passive-interface fa0/0
Mercenary(config-router)#end
Mercenary#show ip route
```

Configure DHCP Relay Agent

Lobby

```
Lobby#conf t
Lobby(config)#interface fa0/0
Lobby(config-if)#ip helper-address 192.168.16.5
Lobby(config-if)#exit
Lobby(config)#exit
```

Undertaking

```
Undertaking#conf t
Undertaking(config)#interface fa0/0
Undertaking(config-if)#ip helper-address 192.168.16.5
Undertaking(config-if)#exit
Undertaking(config)#exit
```

Intelligence

```
Intelligence#conf t
Intelligence(config)#interface fa0/0
Intelligence(config-if)#ip helper-address 192.168.16.5
Intelligence(config-if)#exit
Intelligence(config)#exit
```

Mercenary

```
Mercenary#conf t
Mercenary(config)#interface fa0/0
Mercenary(config-if)#ip helper-address 192.168.16.5
Mercenary(config-if)#exit
Mercenary(config)#exit
```