



Inspiring Excellence

CSE421: Computer Networks

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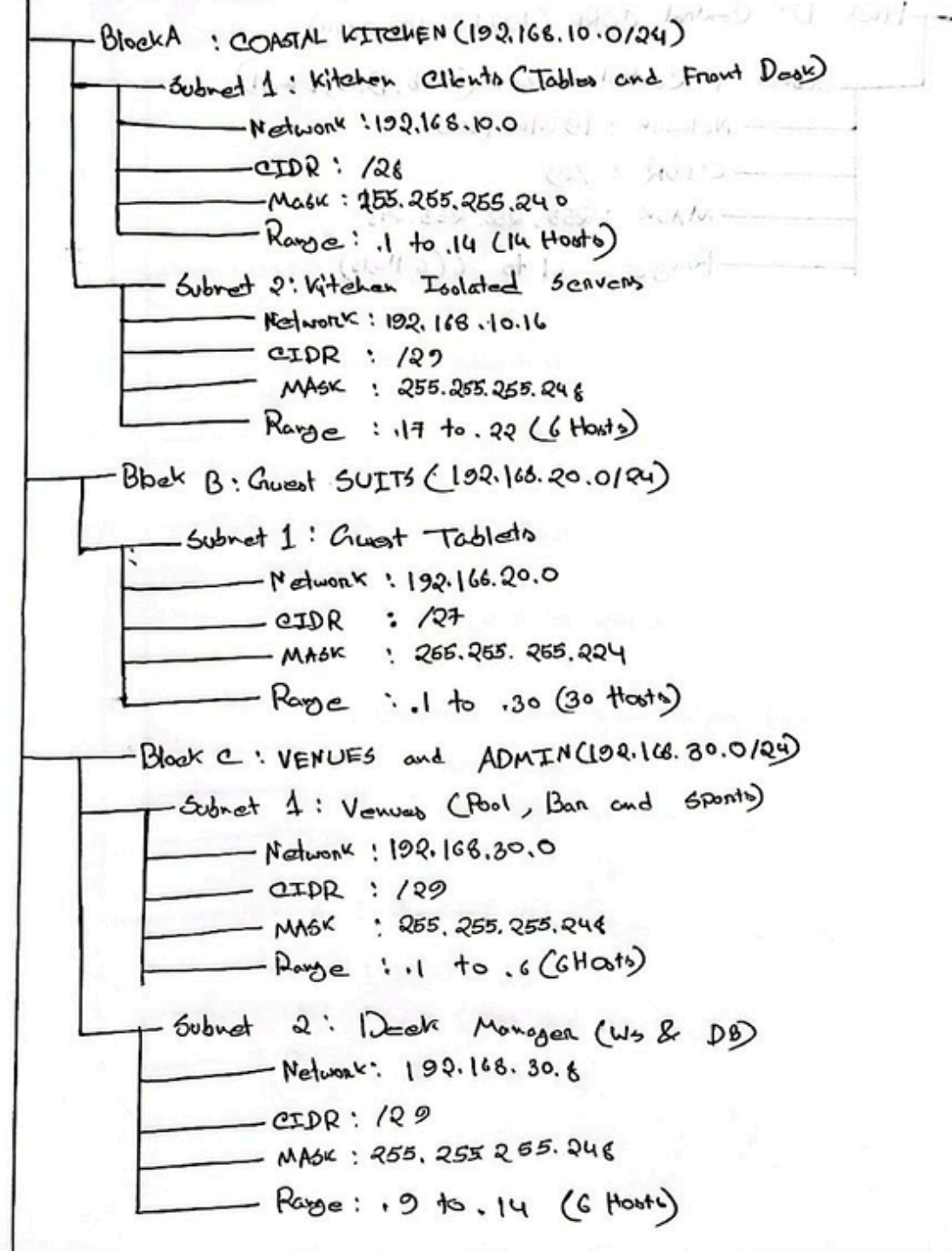
Section: 09

Group ID: 908

1. The LAN ISM Tree

We separated the LANs into 4 major blocks to make management easier

Root NETWORK: 192.168.0.0/16



Block D: Central CORE (192.168.100.0/24)

Subnet 1: Central Servers (Web, DNS, Email)

Network : 192.168.100.0

CIDR : /29

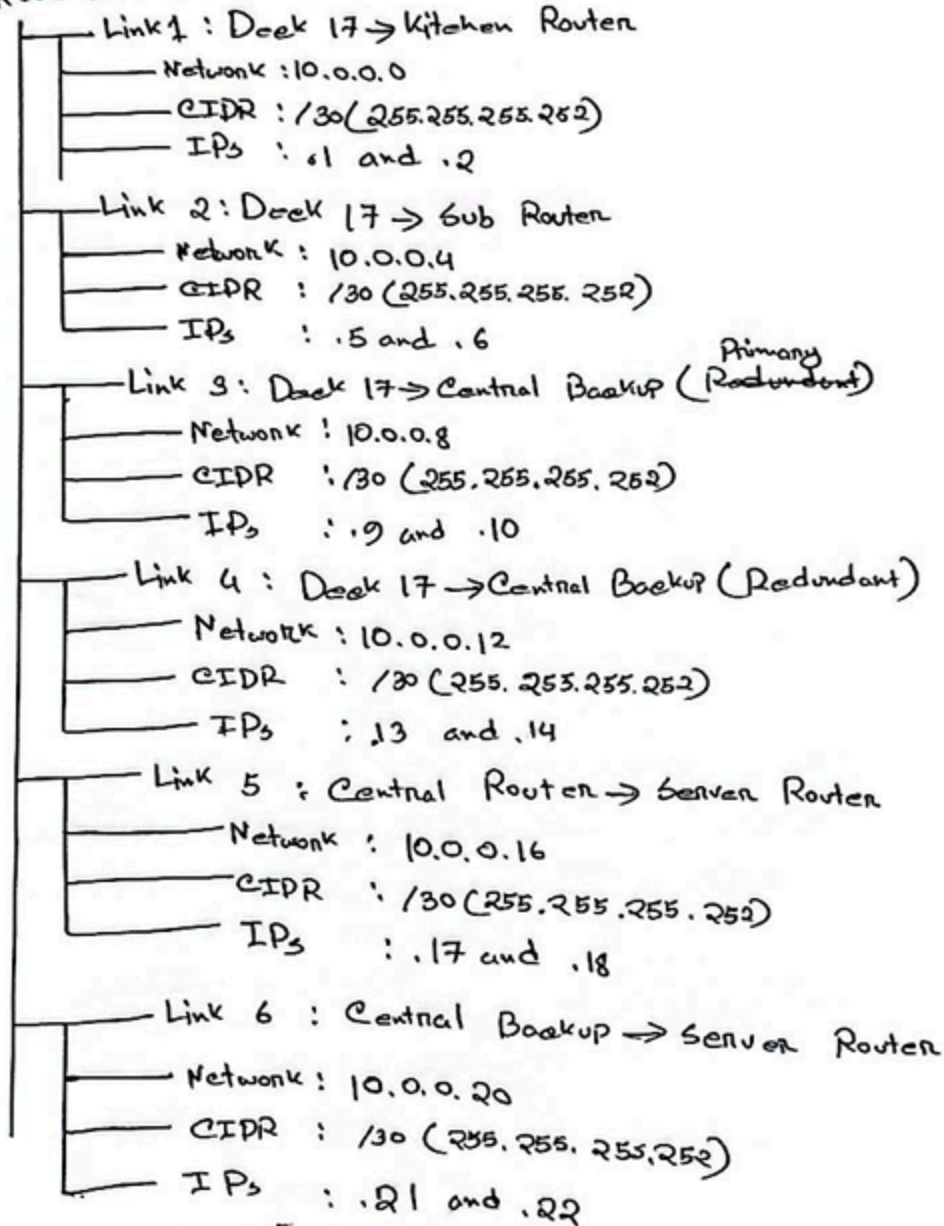
Mask : 255.255.255.248

Range : .1 to .6 (6 Hosts)

2. The WAN KLSM Tree (Backbone : 10.0.0.0)

We used a standard point-to-point /30 allocation for all connections

ROOT NETWORK



LAN VLSM TABLE(End Devices)

Subnet Description	Network Address	CID R	Subnet Mask	Hosts Needed	Usable Hosts	Host Address Range	Broadcast Address	Gateway IP
Coastal Kitchen Clients	192.168.10.0	/28	255.255.255.240	8 (6 Tables, 1 Desk, 1 RTR)	14	192.168.10.1 - 192.168.10.14	192.168.10.15	192.168.10.14
Kitchen Servers	192.168.10.16	/29	255.255.255.248	3 (2 Srv, 1 RTR)	6	192.168.10.17 - 192.168.10.22	192.168.10.23	192.168.10.17
Guest Suites	192.168.20.0	/27	255.255.255.224	23 (22 Tabs, 1 RTR)	30	192.168.20.1 - 192.168.20.30	192.168.20.31	192.168.20.1
Venues (Pool/Sports)	192.168.30.0	/29	255.255.255.248	4 (3 PCs, 1 RTR)	6	192.168.30.1 - 192.168.30.6	192.168.30.7	192.168.30.1

Deck Manager	192.168.30.8	/29	255.255.255.248	3 (1 PC, 1 DB, 1 RTR)	6	192.168.30.9 - 192.168.30.14	192.168.30.15	192.168.30.9
Central Servers	192.168.100.0	/29	255.255.255.248	4 (3 Srv, 1 RTR)	6	192.168.100.1 - 192.168.100.6	192.168.100.7	192.168.100.1

WAN VLSM TABLE(Router Links)

Link Description	Network Address	CIDR	Subnet Mask	Usable Range (Interface IPs)	Broadcast Address
Deck 17 <-> Kitchen	10.0.0.0	/30	255.255.255.252	10.0.0.1 - 10.0.0.2	10.0.0.3
Deck 17 <-> Sub Router	10.0.0.4	/30	255.255.255.252	10.0.0.5 - 10.0.0.6	10.0.0.7
Deck 17 <-> Central (Pri)	10.0.0.8	/30	255.255.255.252	10.0.0.9 - 10.0.0.10	10.0.0.11

Deck 17 <-> Backup (Sec)	10.0.0.12	/30	255.255.255.252	10.0.0.13 - 10.0.0.14	10.0.0.15
Central <-> Server Router	10.0.0.16	/30	255.255.255.252	10.0.0.17 - 10.0.0.18	10.0.0.19
Backup <-> Server Router	10.0.0.20	/30	255.255.255.252	10.0.0.21 - 10.0.0.22	10.0.0.23

IP Address Table

1.Routers

Device Name	Interface	IP Address	Subnet Mask	Default Gateway	Description/Connection
Server Router	G0/1	192.168.100.1	255.255.255.248	N/A	LAN Gateway for Core Servers
	S0/0/0	10.0.0.18	255.255.255.252	N/A	WAN to Central Router

	S0/0/1	10.0.0.22	255.255.255.252	N/A	WAN to Central Backup
Central Router	S0/0/0	10.0.0.17	255.255.255.252	N/A	WAN to Server Router
	S0/0/1	10.0.0.10	255.255.255.252	N/A	WAN to Deck 17
Central Backup	S0/0/0	10.0.0.14	255.255.255.252	N/A	WAN to Deck 17
	S0/0/1	10.0.0.21	255.255.255.252	N/A	WAN to Server Router
Deck 17 Router	S0/1/0	10.0.0.1	255.255.255.252	N/A	WAN to Kitchen
	S0/1/1	10.0.0.5	255.255.255.252	N/A	WAN to Sub Router
	S0/0/1	10.0.0.9	255.255.255.252	N/A	WAN to Central

	S0/0/0	10.0.0.13	255.255.255.252	N/A	WAN to Backup
Sub Router	G0/0	192.168.20.1	255.255.255.224	N/A	LAN Gateway for Guest Suites
	G0/1	192.168.30.1	255.255.255.248	N/A	LAN Gateway for Venues
	G0/2	192.168.30.9	255.255.255.248	N/A	LAN Gateway for Manager
	S0/0/0	10.0.0.6	255.255.255.252	N/A	WAN to Deck 17
Kitchen Router	G0/0	192.168.10.14	255.255.255.240	N/A	LAN Gateway for Tables
	G0/1	192.168.10.17	255.255.255.248	N/A	LAN Gateway for Isolated Servers

	S0/0/0	10.0.0.2	255.255.255.252	N/A	WAN to Deck 17
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2.Servers(Static IP)

Device Name	Interface	IP Address	Subnet Mask	Default Gateway	DNS Server
Central DNS	NIC	192.168.100.2	255.255.255.248	192.168.100.1	127.0.0.1
Central Web	NIC	192.168.100.3	255.255.255.248	192.168.100.1	192.168.100.2
Central Email	NIC	192.168.100.4	255.255.255.248	192.168.100.1	192.168.100.2
Kitchen DNS	NIC	192.168.10.18	255.255.255.248	192.168.10.17	127.0.0.1
Kitchen Web	NIC	192.168.10.19	255.255.255.248	192.168.10.17	192.168.10.18
Manager DB	NIC	192.168.30.10	255.255.255.248	192.168.30.9	192.168.100.2

3. End Devices:

Location	Device Name	IP Address	Subnet Mask	Default Gateway	Allocation Method
Coastal Kitchen	Table 1	192.168.10.1	255.255.255.240	192.168.10.14	Static (Req: Last Octet .1)
	Table 2	192.168.10.2	255.255.255.240	192.168.10.14	Static (Req: Last Octet .2)
	Table 3	192.168.10.3	255.255.255.240	192.168.10.14	Static (Req: Last Octet .3)
	Table 4	192.168.10.4	255.255.255.240	192.168.10.14	Static (Req: Last Octet .4)
	Table 5	192.168.10.5	255.255.255.240	192.168.10.14	Static (Req: Last Octet .5)
	Table 6	192.168.10.6	255.255.255.240	192.168.10.14	Static (Req: Last Octet .6)

	Front Desk	192.168.10. x	255.255.255.24 0	192.168.10.14	DHCP
Guest Suites	Tablet PCs	192.168.20. x	255.255.255.22 4	192.168.20.1	DHCP
Venues	Lime/Pool/Sports	192.168.30. x	255.255.255.24 8	192.168.30.1	DHCP
Deck Manager	Workstation	192.168.30. x	255.255.255.24 8	192.168.30.9	DHCP

Configuration Commands

1. Server Router

The Core Router holding the Main Servers.

```
enable
configure terminal
hostname ServerRouter
```

Interface Configuration

```
interface g0/1
ip address 192.168.100.1 255.255.255.248
no shutdown
exit
```

```
interface s0/0/0
ip address 10.0.0.18 255.255.255.252
no shutdown
exit
```

```
interface s0/0/1
ip address 10.0.0.22 255.255.255.252
no shutdown
exit
```

Routing Protocol (RIPv2 for Core)

```
router rip
version 2
no auto-summary
network 10.0.0.0
network 192.168.100.0
exit
```

Return Routes (To send traffic back to the ship)

Primary Path via Central Router

```
ip route 192.168.0.0 255.255.0.0 10.0.0.17
```

Backup Path via Central Backup (Administrative Distance 10)

```
ip route 192.168.0.0 255.255.0.0 10.0.0.21 10
```

```
end
copy running-config startup-config
```

2. Central Router (Primary)

The Main Gateway to the Ship.

```
enable
configure terminal
hostname CentralRouter
```

Interface Configuration

```
interface s0/0/0
ip address 10.0.0.17 255.255.255.252
no shutdown
exit
```

```
interface s0/0/1
ip address 10.0.0.10 255.255.255.252
no shutdown
exit
```

Routing Protocol (RIPv2)

```
router rip
version 2
no auto-summary
network 10.0.0.0
exit
```

!Static Route Down to Deck 17

```
ip route 192.168.0.0 255.255.0.0 10.0.0.9
```

```
end
copy running-config startup-config
```

3. Central Backup (Secondary)

The Redundant Gateway.

```
enable
configure terminal
hostname CentralBackup
```

Interface Configuration

```
interface s0/0/0
ip address 10.0.0.14 255.255.255.252
no shutdown
exit
```

```
interface s0/0/1
ip address 10.0.0.21 255.255.255.252
no shutdown
exit
```

Routing Protocol (RIPv2)

```
router rip
version 2
no auto-summary
network 10.0.0.0
exit
```

Static Route Down to Deck 17

```
ip route 192.168.0.0 255.255.0.0 10.0.0.13
```

```
end
copy running-config startup-config
```

4. Deck 17 Router

The Central Hub of the Deck.

```
enable
configure terminal
hostname Deck17Router
```

Interface Configuration

```
interface s0/1/0
ip address 10.0.0.1 255.255.255.252
no shutdown
exit
```

```
interface s0/1/1
ip address 10.0.0.5 255.255.255.252
no shutdown
exit
```

```
interface s0/0/1
ip address 10.0.0.9 255.255.255.252
no shutdown
exit
```

```
interface s0/0/0
ip address 10.0.0.13 255.255.255.252
no shutdown
exit
```

Routing Protocol (RIPv2 Internal)

```
router rip
version 2
no auto-summary
network 10.0.0.0
```

Prevent sending RIP updates to the Core Routers

```
passive-interface s0/0/0
passive-interface s0/0/1
exit
```

Redundant Static Routes

Primary Route

```
ip route 0.0.0.0 0.0.0.0 10.0.0.10
```

Backup Route (Floating Static - Administrative Distance 10)

```
ip route 0.0.0.0 0.0.0.0 10.0.0.14 10
```

```
end
copy running-config startup-config
```

5. Sub Router

Handles Guest Suites, Venues, and Managers.

```
enable
configure terminal
hostname SubRouter
```


Interface Configuration

```
interface g0/0
ip address 192.168.20.1 255.255.255.224
no shutdown
exit
```

```
interface g0/1
ip address 192.168.30.1 255.255.255.248
no shutdown
exit
```

```
interface g0/2
ip address 192.168.30.9 255.255.255.248
no shutdown
exit
```

```
interface s0/0/0
ip address 10.0.0.6 255.255.255.252
no shutdown
exit
```

DHCP Exclusions (Protect Static IPs)

```
ip dhcp excluded-address 192.168.30.9 192.168.30.10
```

DHCP Pools

```
ip dhcp pool SUITES
network 192.168.20.0 255.255.255.224
default-router 192.168.20.1
dns-server 192.168.100.2
exit
```

```
ip dhcp pool VENUES
network 192.168.30.0 255.255.255.248
default-router 192.168.30.1
dns-server 192.168.100.2
exit
```

```
ip dhcp pool MANAGER
network 192.168.30.8 255.255.255.248
default-router 192.168.30.9
dns-server 192.168.100.2
exit
```

Routing Protocol (RIPv2)

```
router rip
version 2
no auto-summary
network 10.0.0.0
network 192.168.20.0
network 192.168.30.0
exit

end

copy running-config startup-config
```

6. Kitchen Router

Handles Tables and Isolated Servers.

```
enable
configure terminal
hostname KitchenRouter
```

Interface Configuration

```
interface g0/0
ip address 192.168.10.14 255.255.255.240
no shutdown
exit
```

```
interface g0/1
ip address 192.168.10.17 255.255.255.248
no shutdown
exit
```

```
interface s0/0/0
ip address 10.0.0.2 255.255.255.252
no shutdown
exit
```

DHCP Exclusions (Protect Static Tables)

Exclude Table 1 to Table 6

```
ip dhcp excluded-address 192.168.10.1 192.168.10.6
```

Exclude Gateway

```
ip dhcp excluded-address 192.168.10.14
```

DHCP Pool (For Front Desk)

```
ip dhcp pool KITCHEN_DESK
network 192.168.10.0 255.255.255.240
default-router 192.168.10.14
dns-server 192.168.10.18
exit
```

Routing Protocol (RIPv2)

```
router rip
version 2
no auto-summary
network 10.0.0.0
network 192.168.10.0
exit
```

ACL for Kitchen Server Isolation

1. Permit Tables (192.168.10.0) to access Servers

```
access-list 100 permit ip 192.168.10.0 0.0.0.15 192.168.10.16 0.0.0.7
```

2. Deny Everyone Else from accessing Servers

```
access-list 100 deny ip any 192.168.10.16 0.0.0.7
```

3. Permit everything else

```
access-list 100 permit ip any any
```

Apply ACL to Interface G0/1 (Outbound)

```
interface g0/1
ip access-group 100 out
exit
```

```
end
copy running-config startup-config
```

Assumptions

1. IP Addressing Assumptions

Private Address Space: We assumed the use of the Class C private address block (192.168.0.0/16) for the internal ship network (Intranet), as no specific Public IP block was provided by the ISP/Satellite provider.

2. Security Assumptions

Kitchen Isolation: The requirement stated Coastal Kitchen servers should "not be accessible elsewhere." We assumed this implied Layer 3 filtering using Access Control Lists (ACLs) rather than physical air-gapping (completely disconnecting wires), as the tables still need to communicate with the kitchen servers.

Switch Management: We assumed that configuring Management IPs (VLAN 1) and remote access (SSH/Telnet) on the Layer 2 switches was out of scope, as the deliverables focused primarily on Router and Server configurations.

3. Service Assumptions

DNS Resolution: We assumed that the "Central DNS Server" is the authoritative source for all ship-wide domain names (like royalcaribbean.com) and that the local "Kitchen DNS Server" is only authoritative for the local restaurant menu URL.