Part A – Theoretical Concepts

1) OSI Model

Layer	Description	Example Protocol/Device
7. Application	Interfaces with user software	HTTP, FTP, DNS
6. Presentation	Translates data (e.g., encryption)	SSL/TLS
5. Session	Manages sessions/connections	NetBIOS, PPTP
4. Transport	Reliable/unreliable transmission	TCP, UDP
3. Network	Routing and addressing	IP, ICMP; Router
2. Data Link	Frame creation and MAC addressing	Ethernet, Switch
1. Physical	Transmits raw bits	Cables, Hubs

2) TCP vs UDP

Feature	TCP	UDP
Reliability	Reliable (uses acknowledgments)	Unreliable (no guarantee)
Connection	Connection-oriented	Connectionless
Use Cases	Web (HTTP), Email (SMTP)	Streaming, DNS, VoIP

3) IP Addressing: Public vs Private

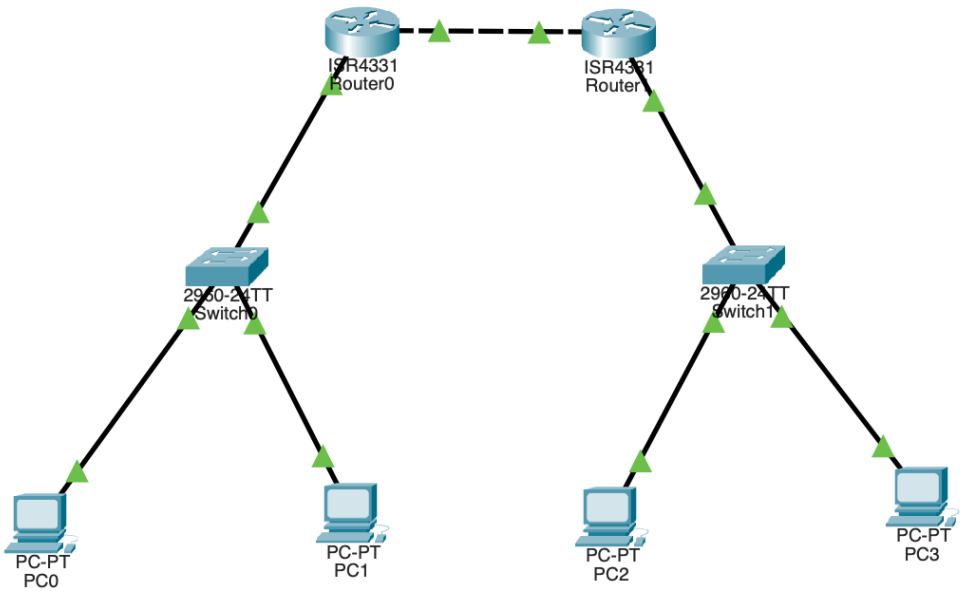
Class	Private IP Range Example	Public IP Example
A	10.0.0.0 – 10.255.255.255	11.0.0.1
B	172.16.0.0 – 172.31.255.255	172.40.0.1
C	192.168.0.0 – 192.168.255.255	192.0.2.1

Part B – Network Design & Configuration

1) Network Design

Topology Requirements:

1. Routers (R0, R1)
2. Switches (S0, S1)
3. PCs (PC0–PC3)



2) Configuration

1. IP addressing assigned manually to routers and PCs.
2. Routing: Static / RIP / OSPF
3. DHCP Server configured on one router for a subnet.

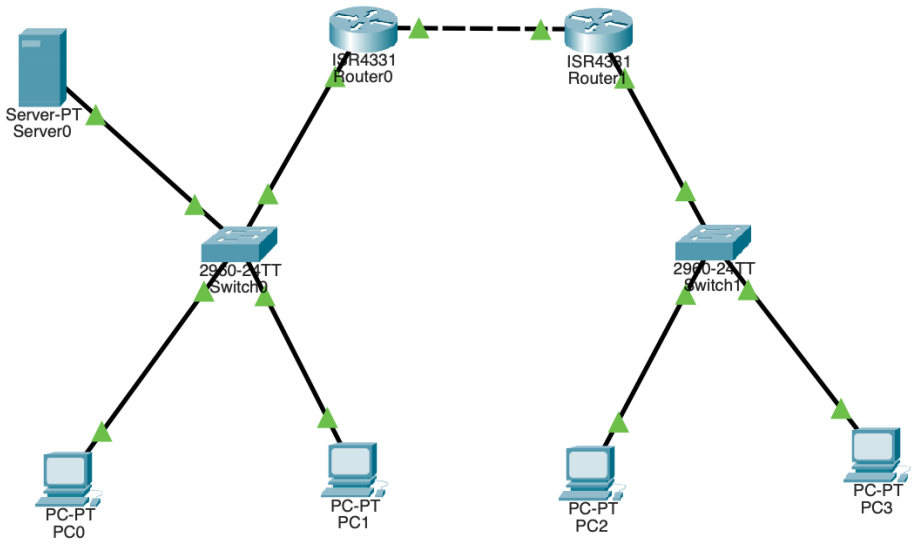
Device	Interface	IP Address	Subnet Mask	Notes
R0	G0/0/0	192.168.1.1	255.255.255.0	Connected to S0
R0	G0/0/1	10.0.0.1	255.255.255.252	Connected to R1
R1	G0/0/0	192.168.2.1	255.255.255.0	Connected to S1
R1	G0/0/1	10.0.0.2	255.255.255.252	Connected to R0
PC0	NIC	192.168.1.10	255.255.255.0	Static
PC1	NIC	192.168.1.11	255.255.255.0	Static
PC2	NIC	192.168.2.10	255.255.255.0	Static
PC3	NIC	192.168.2.11	255.255.255.0	Static

```
Router#ping 10.0.0.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.0.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

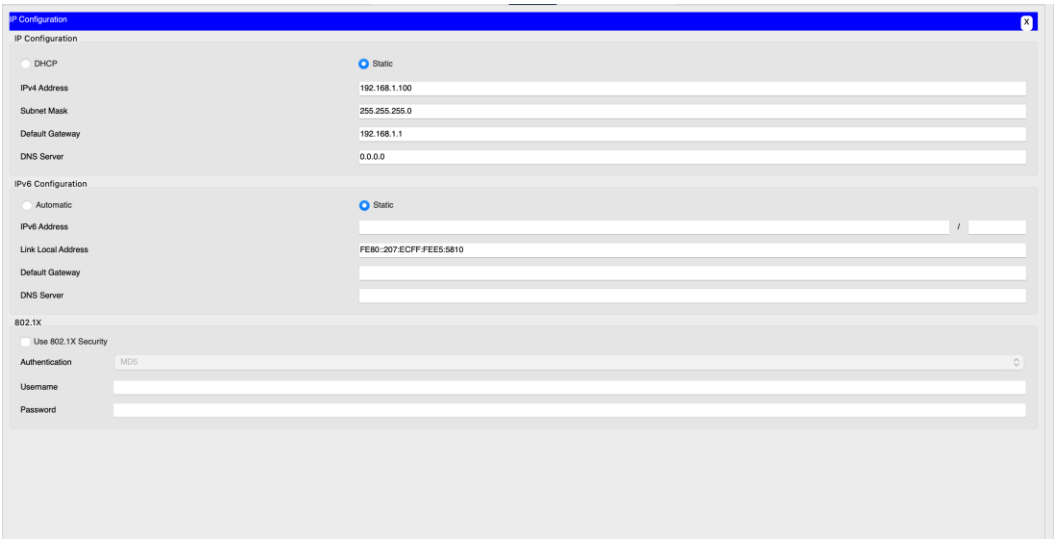
```
Router#ping 10.0.0.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.0.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 0/0/0 ms
```

Part C – Protocol Simulation Task

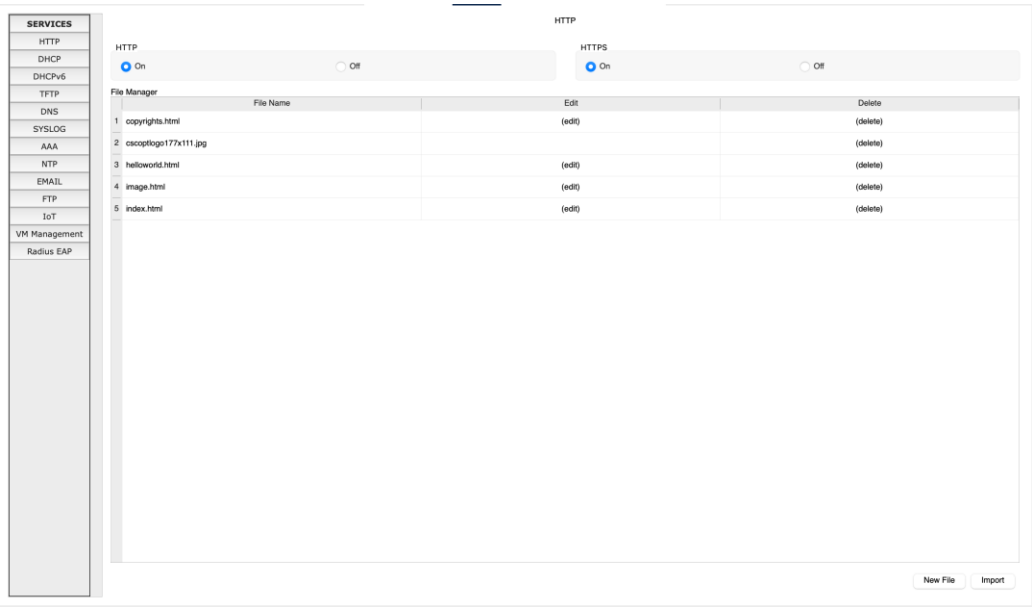
Network.



Server IP configuration.



HTTP/HTTPS service settings.



Web Browser displaying the page from PC0 and PC1.