



**FAKULTI TEKNOLOGI DAN KEJURUTERAAN  
ELEKTRONIK DAN KOMPUTER**

**BERL 1222: NETWORK , SWITCHING AND ROUTING**

**ASSIGNMENT PROJECT**

**NETWORK PLANNING AND DESIGN WITH RIPv2**

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*Program:*

**BACHELOR OF TECHNOLOGY IN INDUSTRIAL ELECTRONICS  
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## **1.0 INTRODUCTION**

This assignment involves designing and implementing a network for the Faculty of Engineering Technology (FTK) at UTeM, connecting it to the UTeM library network. The main tasks include subnetting the given network address, assigning IP addresses, setting up RIPv2 routing, and simulating the network using Cisco Packet Tracer.

### **1.1 Subnetting**

Subnetting divides a large network into smaller sub-networks (subnets). Each subnet functions as a separate network, improving management and security. For this assignment, the FTK network (202.185.2.0/24) will be divided to accommodate the Data Communication Lab, Lecturer's Office, and Administration's Office.

### **1.2 IP Address Planning**

IP address planning assigns unique IP addresses to each device in the network, preventing conflicts and ensuring smooth operation. We will allocate IP addresses based on the number of hosts needed in each department:

1. **Data Communication Lab:** 45 hosts
2. **Lecturer's Office:** 60 hosts
3. **Administration's Office:** 15 hosts
4. **Library Network:** 5 hosts

### 1.3 Routing Information Protocol Version 2 (RIPv2)

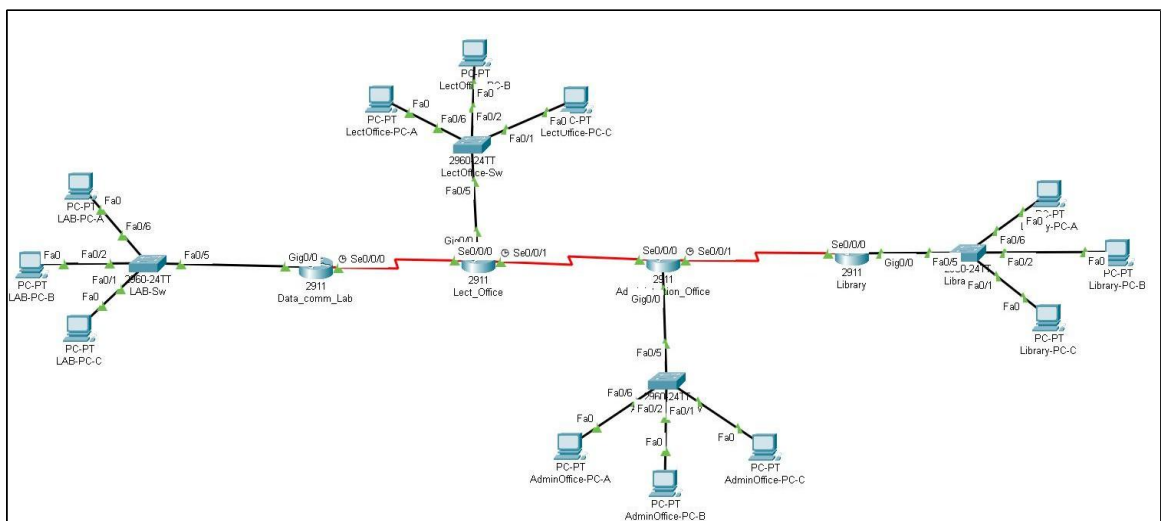
RIPv2 is a simple routing protocol used to exchange routing information between routers. It supports Classless Inter-Domain Routing (CIDR), which allows for efficient IP address usage. We will configure RIPv2 to enable communication between the FTK subnets and the library network.

## 2.0 OBJECTIVE






1. **Plan and assign IP addresses** for all hosts in the FTK subnets and library network.
2. **Implement RIPv2 routing** to enable communication between the FTK subnets and the library network.
3. **Simulate network connectivity** using Cisco Packet Tracer:

## 3.0 METHODOLOGY

### 3.1 Network Topology Design



### 3.2 Device Selection

DEVICE	FUNCTION
 End Device-PC	<b>Send and receive data in a network simulation</b>
 Switches-2960	<b>Use for connect computer to router within a network</b>
 Routers-2911	<b>Connect two different network</b>
 Connection- Cooper straight-through	<b>TO connect different types of devices.</b>
 Connection- Serial DCE	<b>Provides the clock signal for data synchronization.</b>

### 3.3 Subnetting Table

Network Address	First Host Address	Last Host Address	Broadcast Address	Subnet mask
202.185.2.0	202.185.2.1	202.185.2.62	202.185.2.63	255.255.255.192
202.185.2.64	202.185.2.65	202.185.2.126	202.185.2.127	255.255.255.192
202.185.2.128	202.185.2.129	202.185.2.142	202.185.2.143	255.255.255.240
202.185.0.0	202.185.0.1	202.185.0.6	202.185.2.7	255.255.255.248
10.0.1.0	10.0.1.1	10.0.1.2	10.0.1.3	255.255.255.252
10.0.2.0	10.0.2.1	10.0.2.2	10.0.2.3	255.255.255.252
10.0.3.0	10.0.3.1	10.0.3.2	10.0.3.3	255.255.255.252

### 3.4 Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
LAB-PC-A	NIC	202.185.2.3	255.255.255.192	202.185.2.1
LAB-PC-B	NIC	202.185.2.4	255.255.255.192	202.185.2.1
LAB-PC-C	NIC	202.185.2.62	255.255.255.192	202.185.2.1
LAB-Sw				N/A
Data_Communication_Lab	G0/0	202.185.2.1	255.255.255.192	N/A
	S0/0/0	10.0.1.1	255.255.255.252	N/A
LectOffice-PC-A	NIC	202.185.2.66	255.255.255.192	202.185.2.65
LectOffice-PC-B	NIC	202.185.2.67	255.255.255.192	202.185.2.65
LectOffice-PC-C	NIC	202.185.2.126	255.255.255.192	202.185.3.65
LectOffice-Sw				N/A
Lect_Office	G0/0	202.185.2.65	255.255.255.192	N/A
	S0/0/0	10.0.1.2	255.255.255.252	N/A
	S0/0/1	10.0.2.1	255.255.255.252	N/A
AdminOffice-PC-A	NIC	202.185.2.130	255.255.255.240	202.185.2.129
AdminOffice-PC-B	NIC	202.185.2.131	255.255.255.240	202.185.2.129
AdminOffice-PC-C	NIC	202.185.2.142	255.255.255.240	202.185.2.129
AdministrationOffice-Sw				N/A
Administration_Office	G0/0	202.185.2.129	255.255.255.240	N/A
	S0/0/0	10.0.2.2	255.255.255.252	N/A
	S0/0/1	10.0.3.1	255.255.255.252	N/A
Library-PC-A	NIC	202.185.0.2	255.255.255.248	202.185.0.1

Library-PC-B	NIC	202.185.0.3	255.255.255.248	202.185.0.1
Library-PC-C	NIC	202.185.0.4	255.255.255.248	202.185.0.1
Library-Sw				N/A
Library	G0/0	202.185.0.1	255.255.255.248	N/A
	S0/0/0	10.0.3.2	255.255.255.248	N/A

### 3.5 Basic Configuration

#### For Router:

```
Router> enable
```

```
Router# configure terminal
```

```
Router(config)#
```

```
Router(config)# hostname Library
```

```
Library(config)# no ip domain-lookup
```

```
Library(config)# Banner motd #
```

```
“Only Group 2 BERL can access this Device! #
```

```
Library(config)# enable secret class
```

```
Library(config)# lan con 0
```

```
Library(config-if)# pass cisco
```

```
Library(config-if)# login
```

```
Library(config-if)# lan vty 0 4
```

```
Library(config-if)# pass cisco
```

```
Library(config-if)# login
```

```
Library(config)# interface g0/0
```

```
Library(config-if)# ip address 202.185.2.1 255.255.255.192
```

```
Library(config-if)# no shutdown
```

### **For Switch:**

```
Switch> enable

Switch# configure terminal
Switch(config)#
Switch(config)# hostname Sw_Library
Sw_Library(config)# no ip domain-lookup
Sw_Library(config)# Banner motd #
"Only Group 2 BERL can access this Device! #
Sw_Library(config)# enable secret class
Sw_Library(config)# lan con 0
Sw_Library(config-if)# pass cisco
Sw_Library(config-if)# login
Sw_Library(config-if)# lan vty 0 4
Sw_Library(config-if)# pass cisco
Sw_Library(config-if)# login
```

## **3.6 Routing Protocol**

```
Router> enable

Router# configure terminal
Router(config)#
Router(config)# router rip
Router(config-router)# version 2
Router(config-router)# network 202.185.2.0

Router(config-router)# network 10.0.1.0
Router(config-router)# no auto summary
Router(config-router)# exit
```



## 4.0 RESULT AND DISCUSSION

```
Lab>enable
Lab#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

Gateway of last resort is not set

    10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C       10.0.1.0/30 is directly connected, Serial0/0/0
L       10.0.1.1/32 is directly connected, Serial0/0/0
R       10.0.2.0/30 [120/1] via 10.0.1.2, 00:00:00, Serial0/0/0
R       10.0.3.0/30 [120/2] via 10.0.1.2, 00:00:00, Serial0/0/0
    202.185.0.0/29 is subnetted, 1 subnets
R       202.185.0.0/29 [120/3] via 10.0.1.2, 00:00:00, Serial0/0/0
    202.185.2.0/24 is variably subnetted, 4 subnets, 3 masks
C       202.185.2.0/26 is directly connected, GigabitEthernet0/0
L       202.185.2.1/32 is directly connected, GigabitEthernet0/0
R       202.185.2.64/26 [120/1] via 10.0.1.2, 00:00:00, Serial0/0/0
R       202.185.2.128/28 [120/2] via 10.0.1.2, 00:00:00, Serial0/0/0
```

### Routing Table for Lab router

```
Lect_Office>enable
Lect_Office#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

Gateway of last resort is not set

    10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
C       10.0.1.0/30 is directly connected, Serial0/0/0
L       10.0.1.2/32 is directly connected, Serial0/0/0
C       10.0.2.0/30 is directly connected, Serial0/0/1
L       10.0.2.1/32 is directly connected, Serial0/0/1
R       10.0.3.0/30 [120/1] via 10.0.2.2, 00:00:12, Serial0/0/1
    202.185.0.0/29 is subnetted, 1 subnets
R       202.185.0.0/29 [120/2] via 10.0.2.2, 00:00:12, Serial0/0/1
    202.185.2.0/24 is variably subnetted, 4 subnets, 3 masks
R       202.185.2.0/26 [120/1] via 10.0.1.1, 00:00:16, Serial0/0/0
C       202.185.2.64/26 is directly connected, GigabitEthernet0/0
L       202.185.2.65/32 is directly connected, GigabitEthernet0/0
R       202.185.2.128/28 [120/1] via 10.0.2.2, 00:00:12, Serial0/0/1
```

### Routing Table for Lect\_office router

```

Administration_Office>enable
Administration_Office#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

Gateway of last resort is not set

    10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
R       10.0.1.0/30 [120/1] via 10.0.2.1, 00:00:17, Serial0/0/0
C       10.0.2.0/30 is directly connected, Serial0/0/0
L       10.0.2.2/32 is directly connected, Serial0/0/0
C       10.0.3.0/30 is directly connected, Serial0/0/1
L       10.0.3.1/32 is directly connected, Serial0/0/1
    202.185.0.0/29 is subnetted, 1 subnets
R       202.185.0.0/29 [120/1] via 10.0.3.2, 00:00:11, Serial0/0/1
    202.185.2.0/24 is variably subnetted, 4 subnets, 3 masks
R       202.185.2.0/26 [120/2] via 10.0.2.1, 00:00:17, Serial0/0/0
R       202.185.2.64/26 [120/1] via 10.0.2.1, 00:00:17, Serial0/0/0
C       202.185.2.128/28 is directly connected, GigabitEthernet0/0
L       202.185.2.129/32 is directly connected, GigabitEthernet0/0

```

### Routing Table for Administration\_office router

```

Library>enable
Library#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

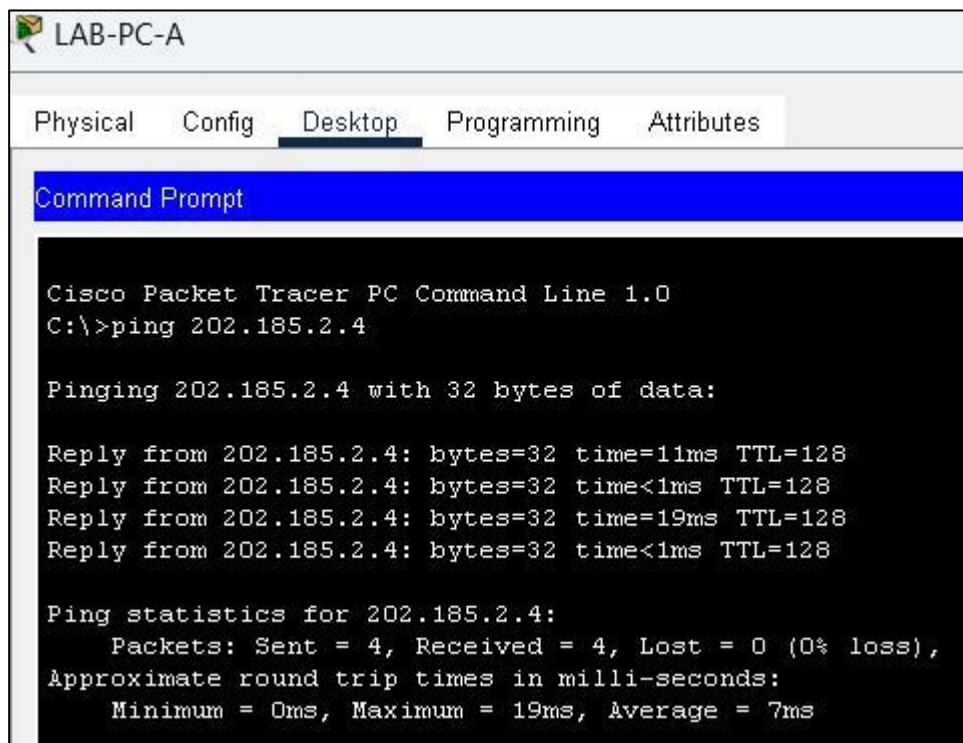
Gateway of last resort is not set

    10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
R       10.0.1.0/30 [120/2] via 10.0.3.1, 00:00:23, Serial0/0/0
R       10.0.2.0/30 [120/1] via 10.0.3.1, 00:00:23, Serial0/0/0
C       10.0.3.0/30 is directly connected, Serial0/0/0
L       10.0.3.2/32 is directly connected, Serial0/0/0
    202.185.0.0/24 is variably subnetted, 2 subnets, 2 masks
C       202.185.0.0/29 is directly connected, GigabitEthernet0/0
L       202.185.0.1/32 is directly connected, GigabitEthernet0/0
    202.185.2.0/24 is variably subnetted, 3 subnets, 2 masks
R       202.185.2.0/26 [120/3] via 10.0.3.1, 00:00:23, Serial0/0/0
R       202.185.2.64/26 [120/2] via 10.0.3.1, 00:00:23, Serial0/0/0
R       202.185.2.128/28 [120/1] via 10.0.3.1, 00:00:23, Serial0/0/0

```

### Routing Table for Library router

The output from show ip route on the each router reveals the current routing table entries. It shows that the router is directly connected to the some network address.



LAB-PC-A

Physical Config Desktop Programming Attributes

Command Prompt

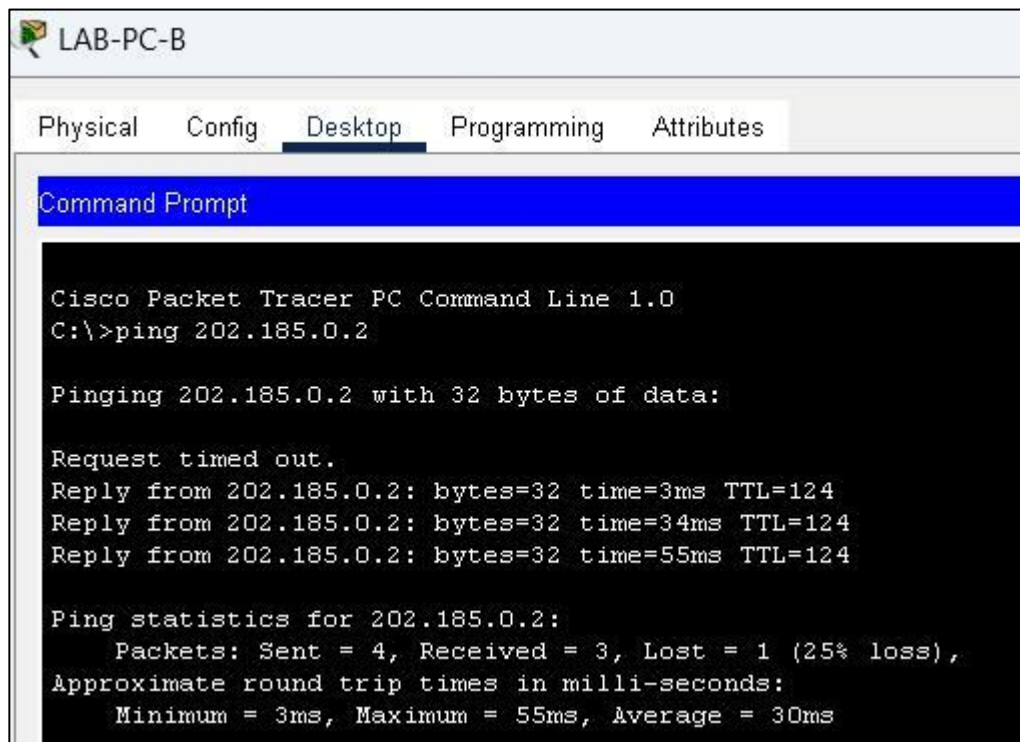
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 202.185.2.4

Pinging 202.185.2.4 with 32 bytes of data:

Reply from 202.185.2.4: bytes=32 time=11ms TTL=128
Reply from 202.185.2.4: bytes=32 time<1ms TTL=128
Reply from 202.185.2.4: bytes=32 time=19ms TTL=128
Reply from 202.185.2.4: bytes=32 time<1ms TTL=128

Ping statistics for 202.185.2.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 19ms, Average = 7ms
```

Lab PC-A ping to Lab-PC-B. Pinging in the same subnet



LAB-PC-B

Physical Config Desktop Programming Attributes

Command Prompt

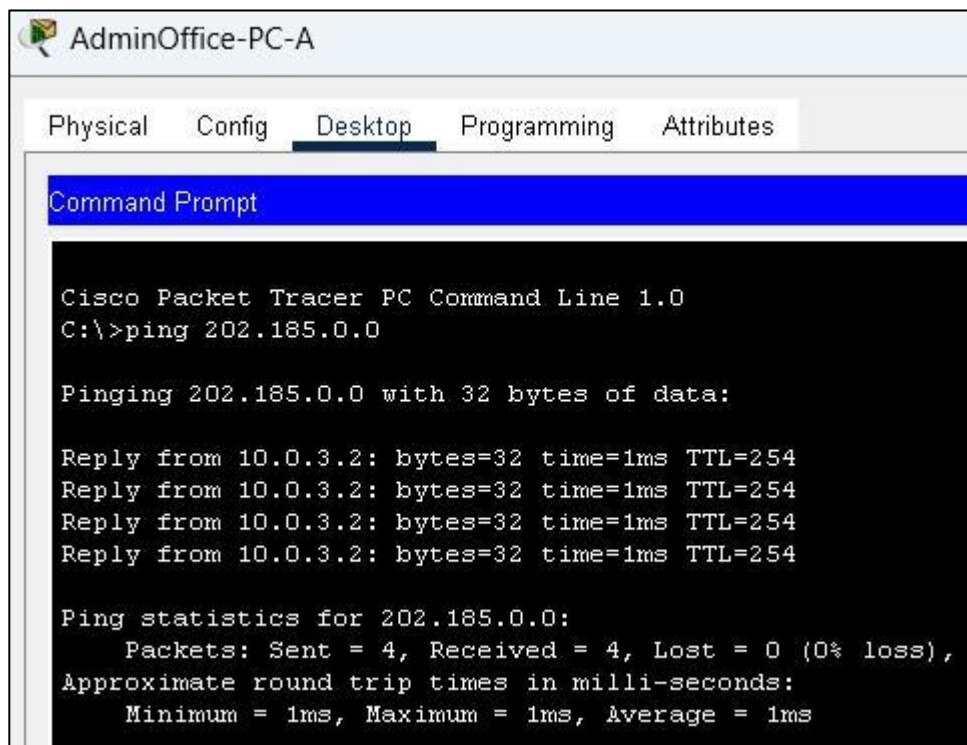
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 202.185.0.2

Pinging 202.185.0.2 with 32 bytes of data:

Request timed out.
Reply from 202.185.0.2: bytes=32 time=3ms TTL=124
Reply from 202.185.0.2: bytes=32 time=34ms TTL=124
Reply from 202.185.0.2: bytes=32 time=55ms TTL=124

Ping statistics for 202.185.0.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 55ms, Average = 30ms
```

LectOffice-PC-B ping to Library-PC-A



The screenshot shows a window titled "AdminOffice-PC-A" with tabs for Physical, Config, Desktop, Programming, and Attributes. The "Desktop" tab is active, displaying a "Command Prompt" window. The command prompt shows the output of a ping command to 202.185.0.0, indicating successful connectivity with 0% loss and 1ms round trip times.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 202.185.0.0

Pinging 202.185.0.0 with 32 bytes of data:

Reply from 10.0.3.2: bytes=32 time=1ms TTL=254
Reply from 10.0.3.2: bytes=32 time=1ms TTL=254
Reply from 10.0.3.2: bytes=32 time=1ms TTL=254
Reply from 10.0.3.2: bytes=32 time=1ms TTL=254

Ping statistics for 202.185.0.0:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 1ms, Average = 1ms
```

AdminOffice-PC-A ping to Library network (Library router)

## 5.0 CONCLUSION

In this guide, we covered the basics of configuring routers and interfaces, enabling routing protocols like RIPv2 and managing the routing table using Cisco Packet Tracer. We also explored methods to remove directly connected routes by shutting down interfaces or removing IP addresses and to delete dynamically learned routes by modifying the routing protocol configuration. This practical knowledge is crucial for network administrators to ensure efficient data flow, maintain network performance, and have control over the network topology, ultimately enhancing their ability to design, implement, and troubleshoot network infrastructures.