FACULTY OF INFORMATION TECHNOLOGY
DEPARTMENT OF NETWORKS AND INFORMATION SYSTEMS

CHAPTER 3 – PRACTICE 02

Configuring Static Routing

OBJECTIVES

- Understand:
  - ✓ Connected network
  - ✓ Static route
  - ✓ Default route

- Practice some exercises about static routing on Router 2811:
  - ✓ Connected network
  - ✓ Static and Default routing

CONTENTS

- **Part 1**: Exercise 01 - Connected network

- **Part 2**: Exercise 02 - Static and Default routing

Exercise 01

Connected Network

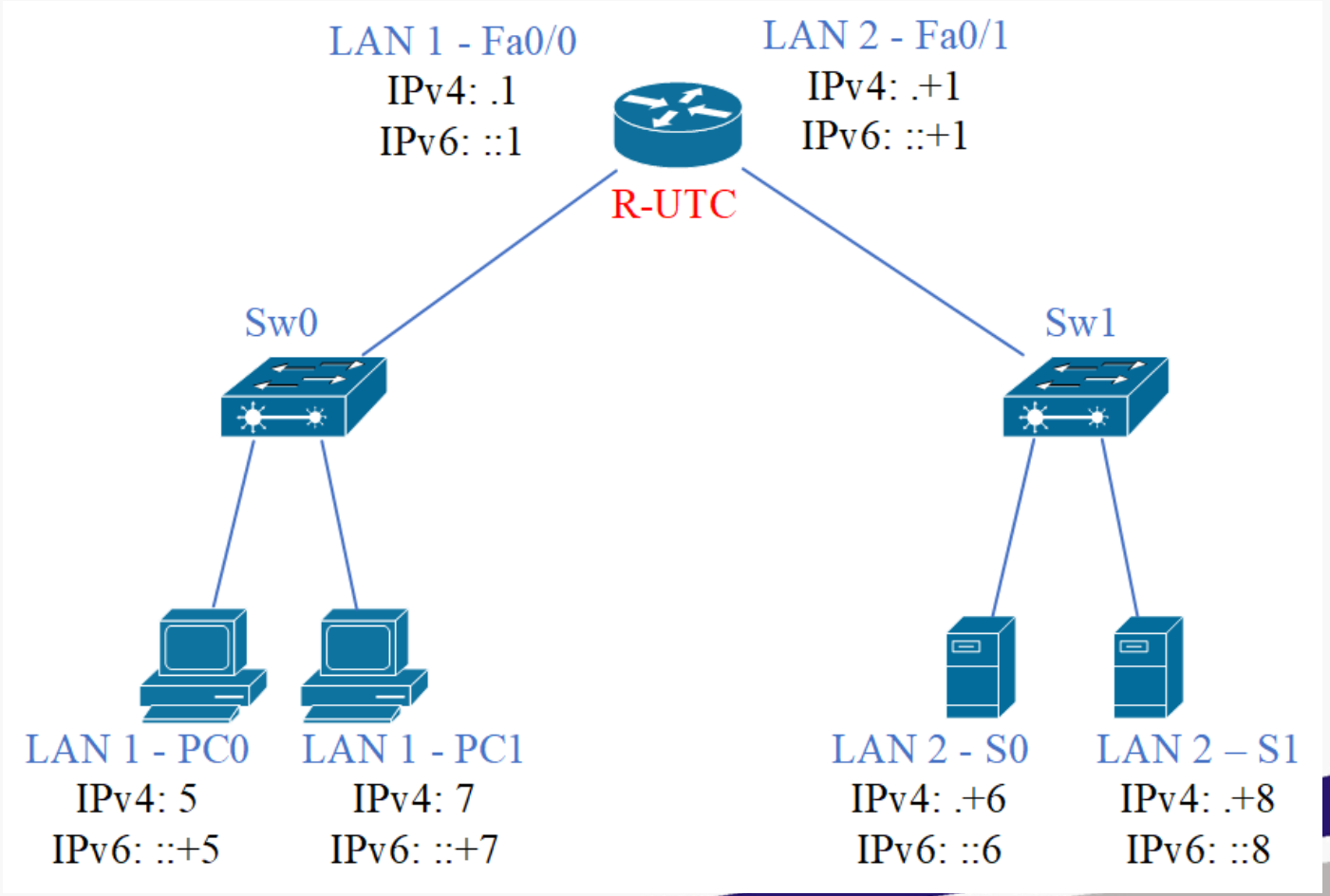
LAN 1:
- IPv4: 99.100.31.0/24
- IPv6: A1B3:4E1C::/64

LAN 2:
- IPv4: 32.154.23.128/25
- IPv6: 2DCF:A001::/64

Explanation of symbols in the figure:

LAN 1 - Fa0/0
- IPv4: .1 (= IPv4 of Fa0/0: 99.100.31.1/24)
- IPv6: ::1 (= IPv6 of Fa0/0: A1B3:4E1C::1/64)

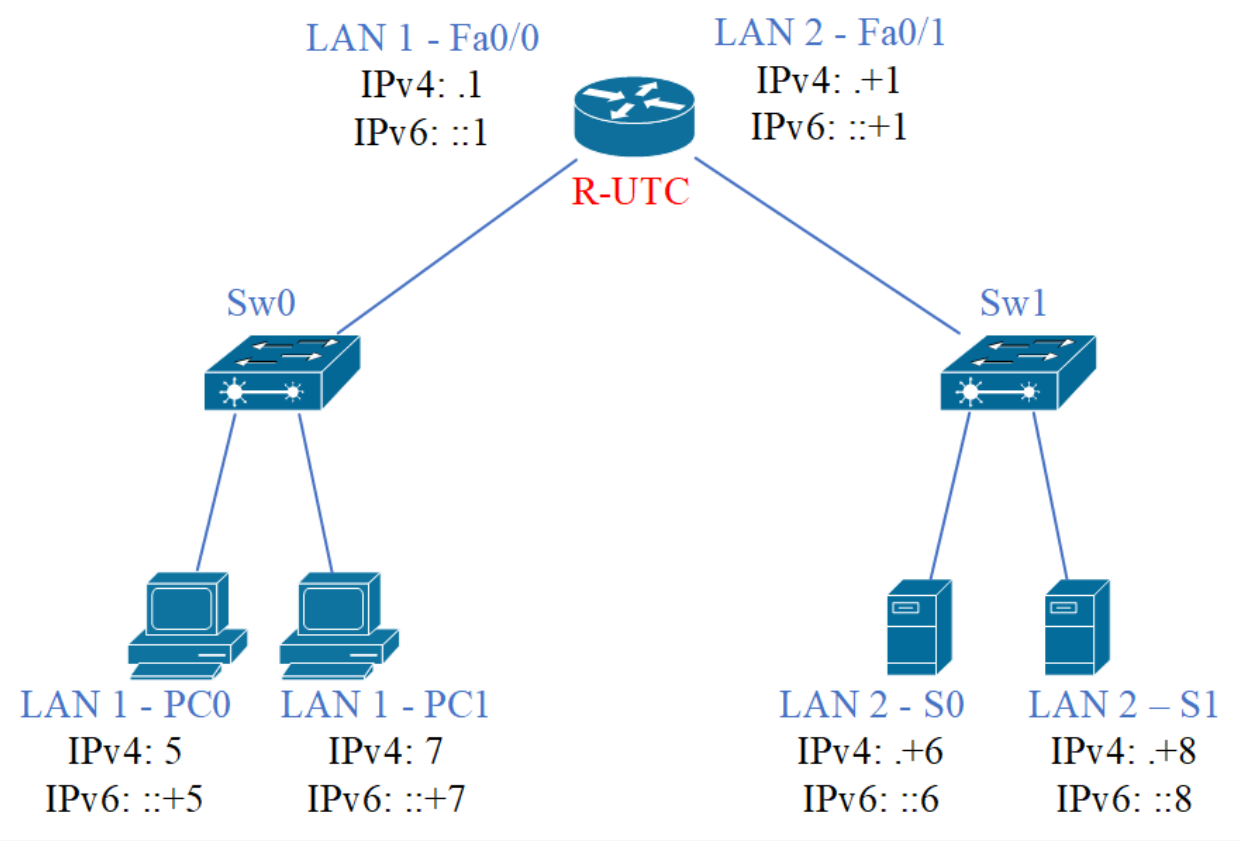
LAN 2 - Fa0/1
- IPv4: .+1 (= IPv4 of Fa0/1: 32.154.23.129/25)
- IPv6: ::+1 (= IPv6 of Fa0/1: 2DCF:A001::1/64)

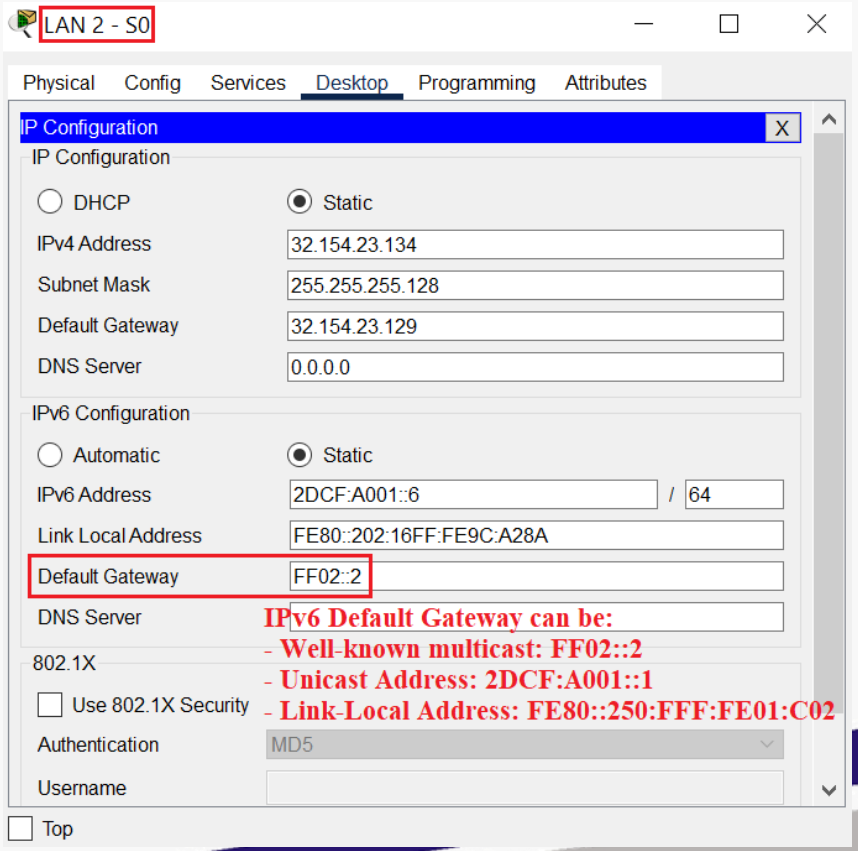


Exercise 01

Connected Network

Configure addresses on PCs and Servers:

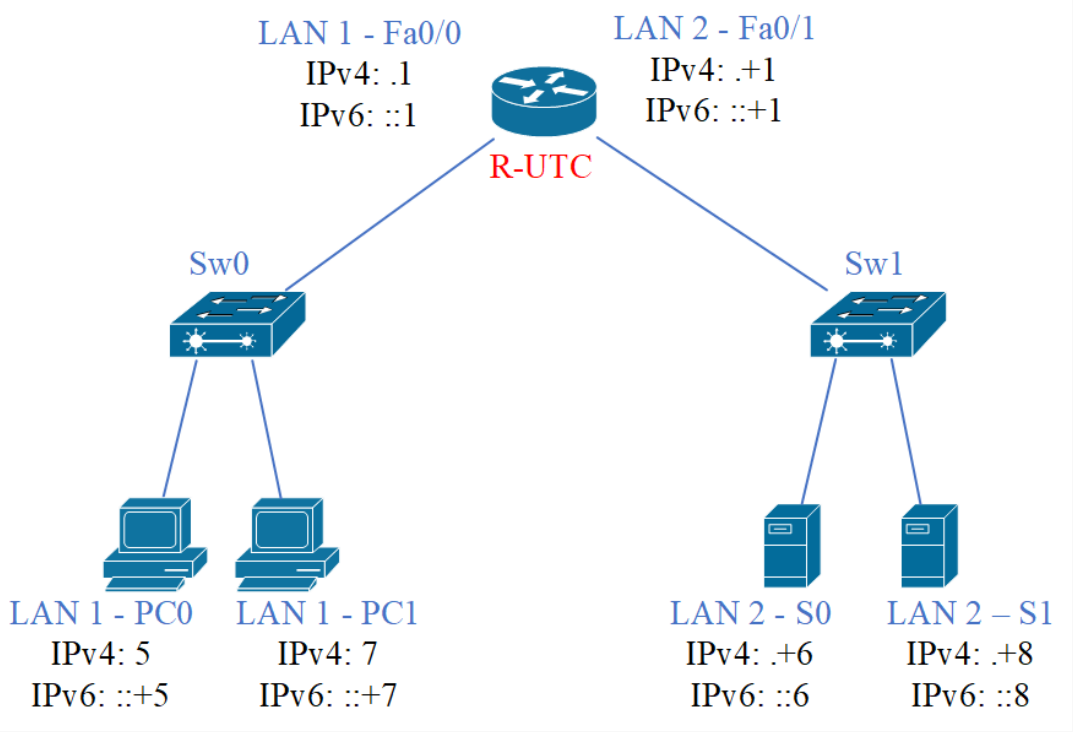




Exercise 01

Connected Network

Configure addresses on Router:

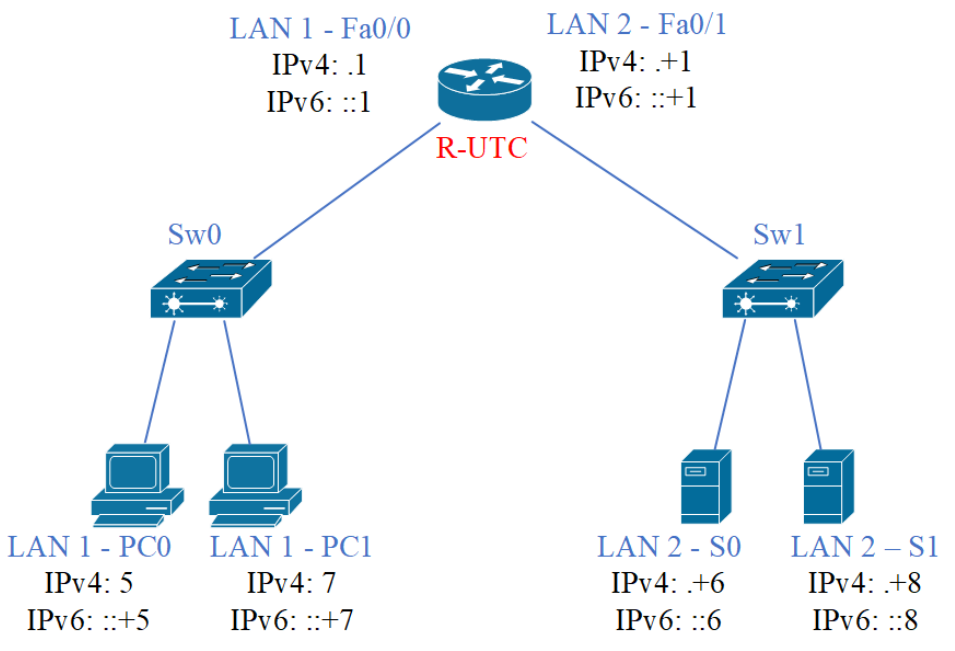



```
R-UTC#
R-UTC#show ip int brief
Interface                  IP-Address      OK? Method Status                Protocol
FastEthernet0/0            99.100.31.1     YES manual up                    up
FastEthernet0/1            32.154.23.129   YES manual up                    up
Vlan1                      unassigned      YES unset  administratively down down
R-UTC#
R-UTC#show ipv6 int brief
FastEthernet0/0            [up/up]
    FE80::250:FFF:FE01:C01
    A1B3:4E1C::1
FastEthernet0/1            [up/up]
    FE80::250:FFF:FE01:C02
    2DCF:A001::1
Vlan1                      [administratively down/down]
    unassigned
R-UTC#
```

Exercise 01

Connected Network

Show IPv4 routing information table on Router:

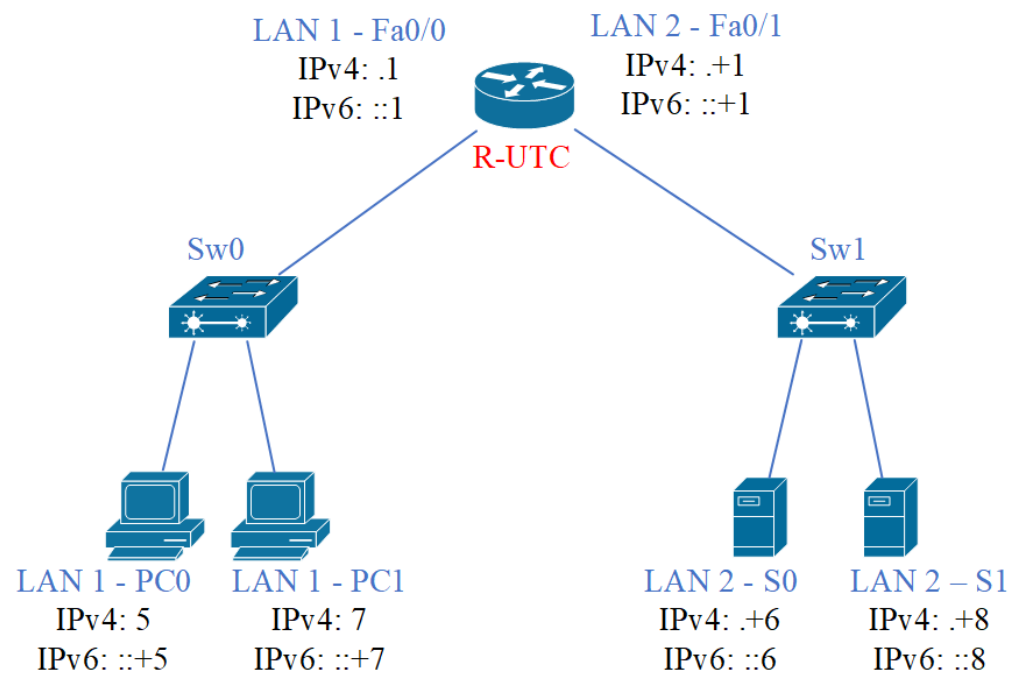



```
R-UTC#
R-UTC#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 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

      32.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        32.154.23.128/25 is directly connected, FastEthernet0/1
L        32.154.23.129/32 is directly connected, FastEthernet0/1
      99.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        99.100.31.0/24 is directly connected, FastEthernet0/0
L        99.100.31.1/32 is directly connected, FastEthernet0/0
```

Exercise 01

Connected Network

Show IPv6 routing information table on Router:

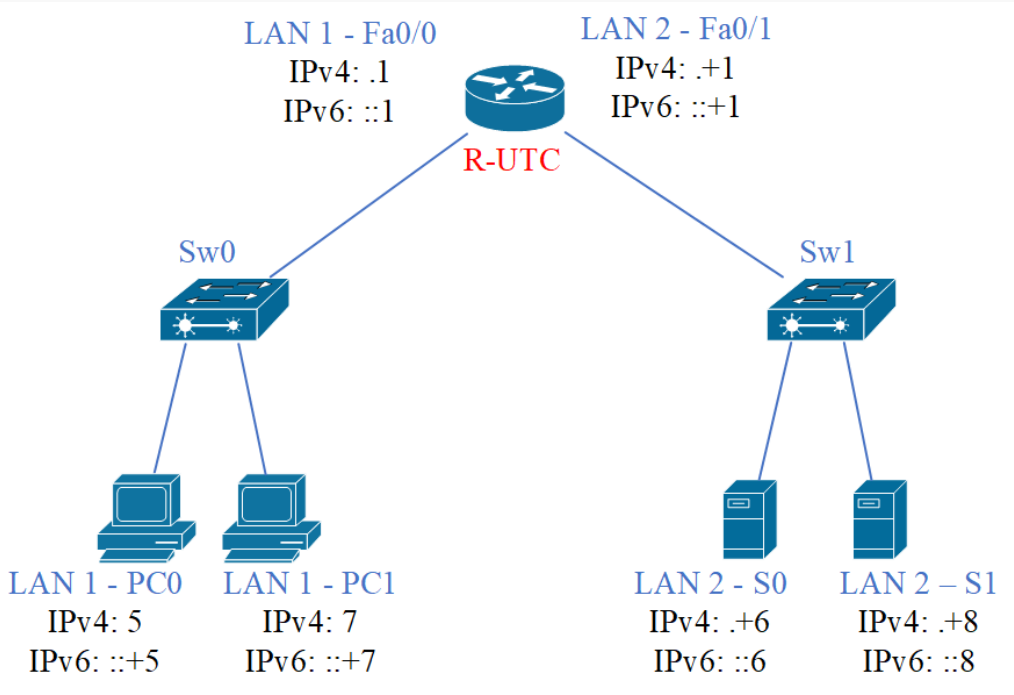



```
R-UTC#
R-UTC#show ipv6 route
IPv6 Routing Table - 5 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
C    2DCF:A001::/64 [0/0]
      via FastEthernet0/1, directly connected
L    2DCF:A001::1/128 [0/0]
      via FastEthernet0/1, receive
C    A1B3:4E1C::/64 [0/0]
      via FastEthernet0/0, directly connected
L    A1B3:4E1C::1/128 [0/0]
      via FastEthernet0/0, receive
L    FF00::/8 [0/0]
      via Null0, receive
```

Exercise 01

Connected Network

Show IPv4 forwarding information table on Router:

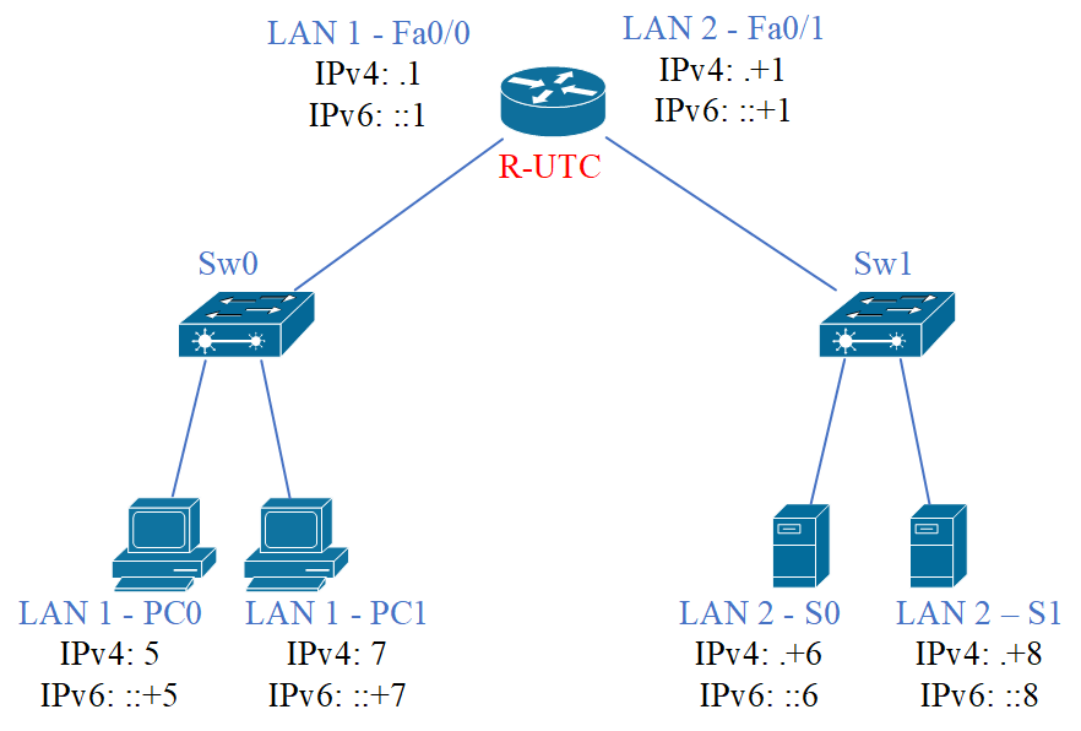



```
R-UTC#
R-UTC#show ip cef
Prefix              Next Hop            Interface
0.0.0.0/0           drop                Null0 (default route handler entry)
0.0.0.0/8           drop
0.0.0.0/32          receive
32.154.23.128/25    attached            FastEthernet0/1
32.154.23.128/32    receive
32.154.23.129/32    receive
32.154.23.255/32    receive
99.100.31.0/24      attached            FastEthernet0/0
99.100.31.0/32      receive
99.100.31.1/32      receive
99.100.31.255/32    receive
127.0.0.0/8         drop
224.0.0.0/4         drop
224.0.0.0/24        receive
240.0.0.0/4         drop
255.255.255.255/32  receive
R-UTC#
```

Exercise 01

Connected Network

Show IPv6 forwarding information table on Router:

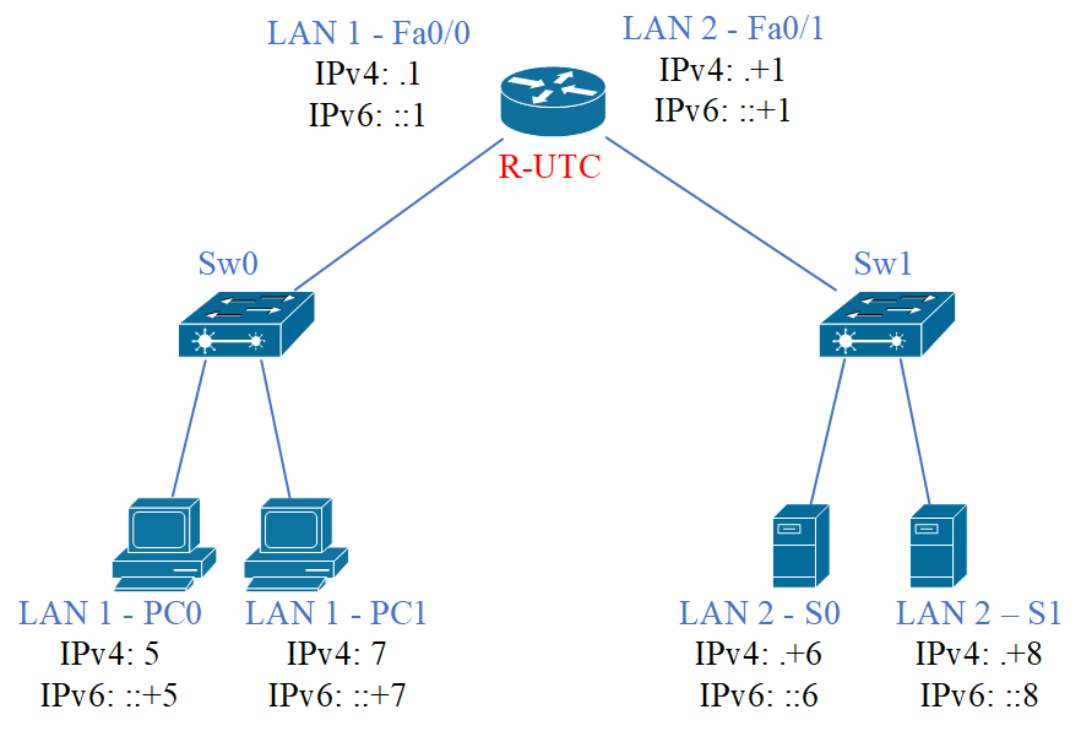



```
R-UTC#
R-UTC#show ipv6 cef
::/127
  discard
2DCF:A001::/64
  attached to FastEthernet0/1
2DCF:A001::1/128
  receive for FastEthernet0/1
A1B3:4E1C::/64
  attached to FastEthernet0/0
A1B3:4E1C::1/128
  receive for FastEthernet0/0
FE80::/10
  receive for Null0
FF00::/8
  Multicast
R-UTC#
```

Exercise 01

Connected Network

Show protocols on Router:

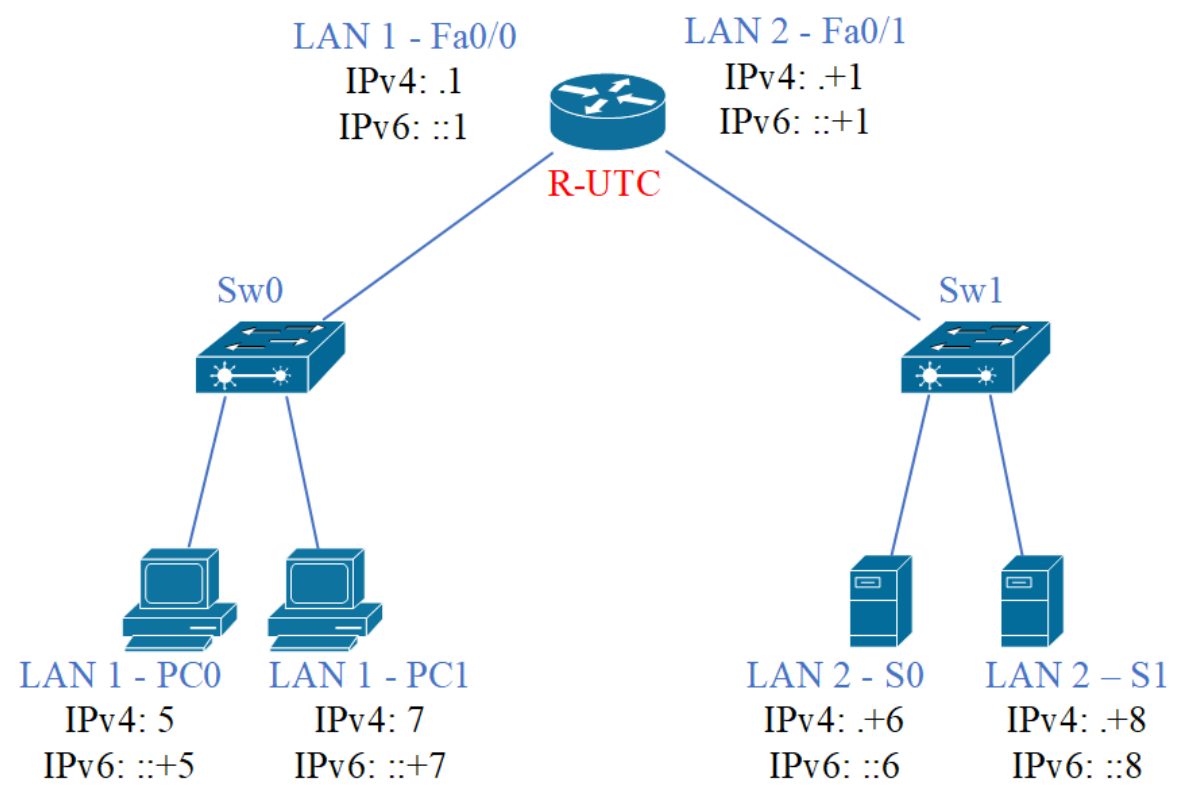



```
R-UTC#
R-UTC#
R-UTC#show protocols
Global values:
  Internet Protocol routing is enabled
FastEthernet0/0 is up, line protocol is up
  Internet address is 99.100.31.1/24
FastEthernet0/1 is up, line protocol is up
  Internet address is 32.154.23.129/25
Vlan1 is administratively down, line protocol is down
R-UTC#
R-UTC#
```

Exercise 01

Connected Network

Check the connection between the two LANs:



LAN 2 - S0

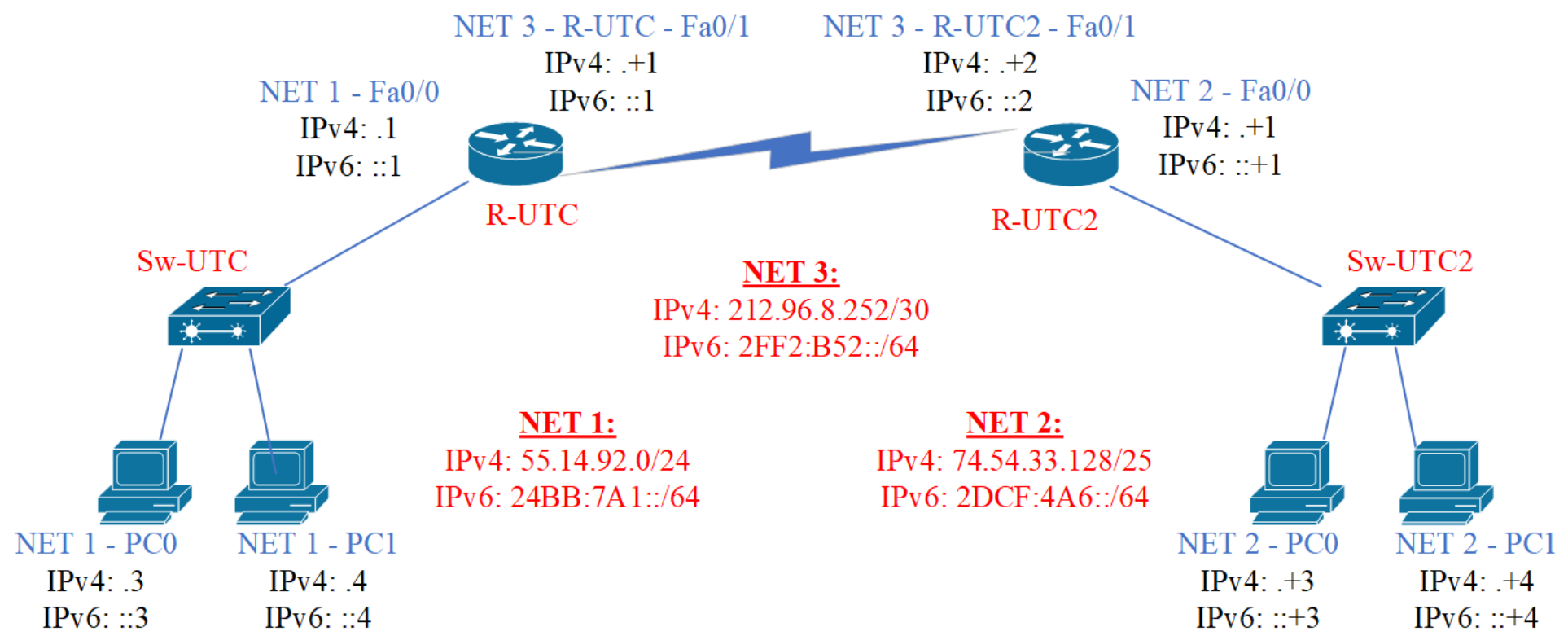
Physical | Config | Services | Desktop | Programming | Attributes

Command Prompt

```
C:\>
C:\>ping 99.100.31.5

Pinging 99.100.31.5 with 32 bytes of data:

Reply from 99.100.31.5: bytes=32 time<1ms TTL=127
Reply from 99.100.31.5: bytes=32 time=1ms TTL=127
Reply from 99.100.31.5: bytes=32 time<1ms TTL=127
Reply from 99.100.31.5: bytes=32 time<1ms TTL=127

Ping statistics for 99.100.31.5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
C:\>ping A1B3:4E1C::5

Pinging A1B3:4E1C::5 with 32 bytes of data:

Reply from A1B3:4E1C::5: bytes=32 time<1ms TTL=127
Reply from A1B3:4E1C::5: bytes=32 time=1ms TTL=127
Reply from A1B3:4E1C::5: bytes=32 time<1ms TTL=127
Reply from A1B3:4E1C::5: bytes=32 time<1ms TTL=127

Ping statistics for A1B3:4E1C::5:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

Exercise 02

Static and Default routing



Use one of below ways to connect two networks (NET 1, 2):

1. Use static routing on Routers
2. Use default route on Routers
3. Configure Static route (on R-UTC) and Default route (on R-UTC2)

Exercise 02

Static and Default routing

Routing commands for each method:

1. Method 1: Use static routing on Routers
   - ✓ R-UTC(config)#ip route 74.54.33.128 255.255.255.128 212.96.8.254
   - ✓ R-UTC(config)#ipv6 route 2DCF:4A6::/64 2FF2:B52::2

   - ✓ R-UTC2(config)#ip route 55.14.92.0 255.255.255.0 212.96.8.253
   - ✓ R-UTC2(config)#ipv6 route 24BB:7A1::/64 2FF2:B52::1

2. Method 2: Use default route on Routers
   - ✓ R-UTC(config)#ip route 0.0.0.0 0.0.0.0 212.96.8.254
   - ✓ R-UTC(config)#ipv6 route ::/0 2FF2:B52::2

   - ✓ R-UTC2(config)#ip route 0.0.0.0 0.0.0.0 212.96.8.253
   - ✓ R-UTC2(config)#ipv6 route ::/0 2FF2:B52::1

Note:

- Students themselves do method 1 and 2

Exercise 02

Static and Default routing

Routing commands for each method:

3. Method 3: Configure Static route (on R-UTC) and Default route (on R-UTC2)

On R-UTC

- ✓ R-UTC(config)#ip route 74.54.33.128 255.255.255.128 212.96.8.254
- ✓ R-UTC(config)#ipv6 route 2DCF:4A6::/64 2FF2:B52::2

On R-UTC2

- ✓ R-UTC2(config)#ip route 0.0.0.0 0.0.0.0 212.96.8.253
- ✓ R-UTC2(config)#ipv6 route ::/0 2FF2:B52::1

Exercise 02

Static and Default routing

Routing commands for each method:

3. Method 3: Configure Static route (on R-UTC) and Default route (on R-UTC2)

   ✓ R-UTC(config)#ip route 74.54.33.128 255.255.255.128 212.96.8.254

```
R-UTC#
R-UTC#show 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

     55.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       55.14.92.0/24 is directly connected, FastEthernet0/0
L       55.14.92.1/32 is directly connected, FastEthernet0/0
     74.0.0.0/25 is subnetted, 1 subnets
S       74.54.33.128/25 [1/0] via 212.96.8.254
     212.96.8.0/24 is variably subnetted, 2 subnets, 2 masks
C       212.96.8.252/30 is directly connected, FastEthernet0/1
L       212.96.8.253/32 is directly connected, FastEthernet0/1
```

Exercise 02

Static and Default routing

Routing commands for each method:

3. Method 3: Configure Static route (on R-UTC) and Default route (on R-UTC2)

   ✓ R-UTC(config)#ipv6 route 2DCF:4A6::/64 2FF2:B52::2

```
R-UTC#show ipv6 route
IPv6 Routing Table - 6 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
C   24BB:7A1::/64 [0/0]
     via FastEthernet0/0, directly connected
L   24BB:7A1::1/128 [0/0]
     via FastEthernet0/0, receive
S   2DCF:4A6::/64 [1/0]
     via 2FF2:B52::2
C   2FF2:B52::/64 [0/0]
     via FastEthernet0/1, directly connected
L   2FF2:B52::1/128 [0/0]
     via FastEthernet0/1, receive
L   FF00::/8 [0/0]
     via Null0, receive
```

Exercise 02

Static and Default routing

Routing commands for each method:

3. Method 3: Configure Static route (on R-UTC) and Default route (on R-UTC2)

   ✓ R-UTC2(config)#ip route 0.0.0.0 0.0.0.0 212.96.8.253

```
R-UTC2#
R-UTC2#show 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 212.96.8.253 to network 0.0.0.0

     74.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       74.54.33.128/25 is directly connected, FastEthernet0/0
L       74.54.33.129/32 is directly connected, FastEthernet0/0
     212.96.8.0/24 is variably subnetted, 2 subnets, 2 masks
C       212.96.8.252/30 is directly connected, FastEthernet0/1
L       212.96.8.254/32 is directly connected, FastEthernet0/1
S*   0.0.0.0/0 [1/0] via 212.96.8.253
```

Exercise 02

Static and Default routing

Routing commands for each method:

3. Method 3: Configure Static route (on R-UTC) and Default route (on R-UTC2)

   ✓ R-UTC2(config)#ipv6 route ::/0 2FF2:B52::1

```
R-UTC2#
R-UTC2#show ipv6 route
IPv6 Routing Table - 6 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
S   ::/0 [1/0]
     via 2FF2:B52::1
C   2DCF:4A6::/64 [0/0]
     via FastEthernet0/0, directly connected
L   2DCF:4A6::1/128 [0/0]
     via FastEthernet0/0, receive
C   2FF2:B52::/64 [0/0]
     via FastEthernet0/1, directly connected
L   2FF2:B52::2/128 [0/0]
     via FastEthernet0/1, receive
L   FF00::/8 [0/0]
     via Null0, receive
R-UTC2#
```

Exercise 02

Static and Default routing

Routing commands for each method:

3. Method 3: Configure Static route (on R-UTC) and Default route (on R-UTC2)

   ✓ Do "*show protocols*" command on both routers

```
R-UTC#
R-UTC#show protocols
Global values:
  Internet Protocol routing is enabled
FastEthernet0/0 is up, line protocol is up
  Internet address is 55.14.92.1/24
FastEthernet0/1 is up, line protocol is up
  Internet address is 212.96.8.253/30
Vlan1 is administratively down, line protocol is down
R-UTC#
```

```
R-UTC2#
R-UTC2#show protocols
Global values:
  Internet Protocol routing is enabled
FastEthernet0/0 is up, line protocol is up
  Internet address is 74.54.33.129/25
FastEthernet0/1 is up, line protocol is up
  Internet address is 212.96.8.254/30
Vlan1 is administratively down, line protocol is down
R-UTC2#
```

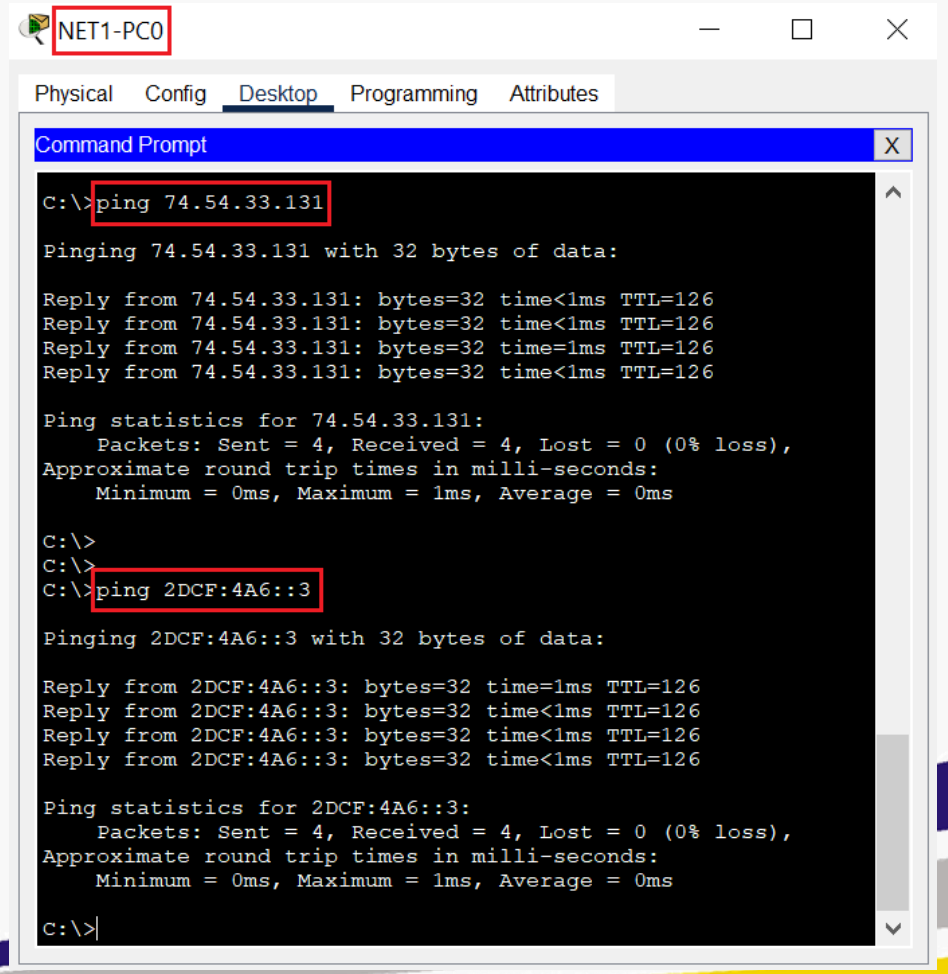
Exercise 02

Static and Default routing

Routing commands for each method:

3. Method 3: Configure Static route (on R-UTC) and Default route (on R-UTC2)

- Check the connection from “NET1 - PC0” to “NET2 - PC0”, by
  - ✓ ping 74.54.33.131
  - ✓ ping 2DCF:4A6::3



Questions and Answers