

Laporan Praktikum

Desain dan Manajemen Jaringan
Komputer

TUGAS 2
Akademik ITK



Disusun Oleh :

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 **Kriteria Penilaian**

- **Perhitungan Subnet & CIDR (40%):**
 - Ketepatan menentukan network address, broadcast address, dan host range.
- **Implementasi IP Address (40%):**
 - Router & PC dikonfigurasi sesuai hasil perhitungan, tidak ada overlap.
 - Ping antar-subnet berhasil.
- **Dokumentasi & Pemahaman Konsep (20%):**
 - Tabel subnet, screenshot topologi, dan ringkasan konsep subnet/CIDR.

Jawaban

a. Menentukan Kebutuhan Subnet

Pada langkah ini, Anda diminta untuk menentukan kebutuhan subnet berdasarkan jumlah host yang dibutuhkan. Berikut rinciannya:

- **Subnet A:** Membutuhkan 10 host.
- **Subnet B:** Membutuhkan 14 host.
- **Subnet C:** Membutuhkan 30 host.

Setiap subnet harus memiliki cukup alamat IP untuk menampung host yang dibutuhkan. Selain itu, perlu diperhatikan bahwa dalam setiap subnet, ada 2 alamat yang tidak bisa digunakan untuk host:

Network Address: Alamat pertama dalam subnet (digunakan untuk identifikasi subnet).

Broadcast Address: Alamat terakhir dalam subnet (digunakan untuk broadcast ke semua host dalam subnet).

Alamat Dasar:

Alamat dasar yang digunakan adalah 192.168.100.0/24.

Ini adalah alamat jaringan Class C dengan subnet mask default 255.255.255.0.

Artinya, memiliki total 256 alamat IP (dari 192.168.100.0 hingga 192.168.100.255) yang dapat dibagi menjadi beberapa subnet.

b. Melakukan Perhitungan Subnet (CIDR)

Ringkasan konsep subnet/CIDR.

1. Apa Itu Subnetting?

Subnetting adalah proses membagi sebuah jaringan besar menjadi beberapa jaringan yang lebih kecil (subnet). Tujuannya adalah:

- Mengoptimalkan penggunaan alamat IP.
- Mengurangi lalu lintas jaringan dengan membatasi broadcast domain.
- Meningkatkan keamanan dengan memisahkan jaringan.

2. Apa Itu CIDR?

CIDR (Classless Inter-Domain Routing) adalah metode pengalokasian alamat IP yang lebih fleksibel dibandingkan sistem klasik (Class A, B, C). CIDR menggunakan notasi prefix length (contoh: /24) untuk menentukan berapa banyak bit yang digunakan sebagai network ID.

3. Komponen Penting dalam Subnetting

1. Network Address:

- Alamat pertama dalam subnet.
- Digunakan untuk mengidentifikasi subnet.
- Contoh: 192.168.100.0.

2. Broadcast Address:

- Alamat terakhir dalam subnet.
- Digunakan untuk mengirim pesan ke semua host dalam subnet.
- Contoh: 192.168.100.15.

3. Host Range:

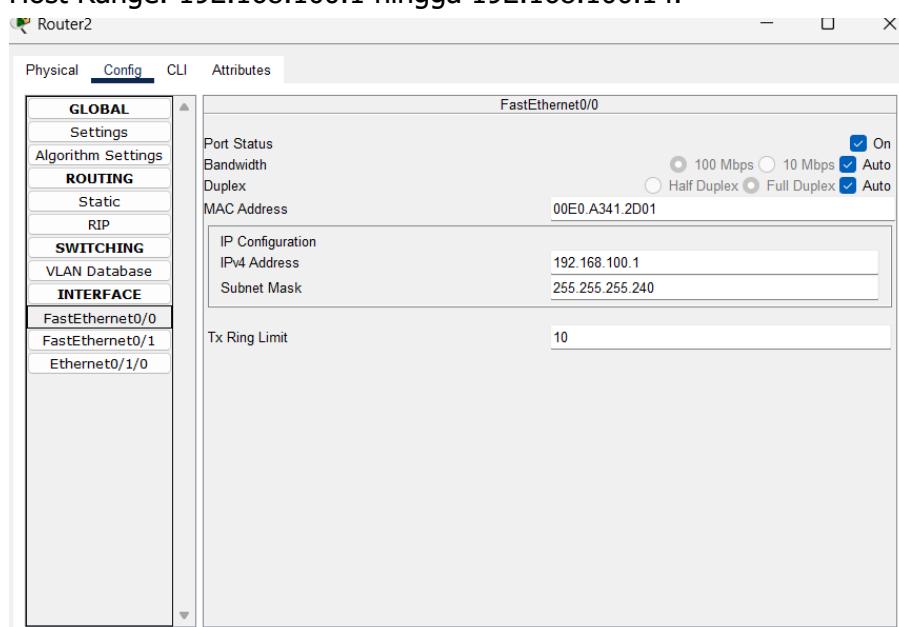
- Rentang alamat yang dapat digunakan untuk host.
- Contoh: 192.168.100.1 hingga 192.168.100.14.

4. Subnet Mask:

- Menentukan berapa banyak bit yang digunakan untuk network ID dan host ID.
- Contoh: /28 atau 255.255.255.240.

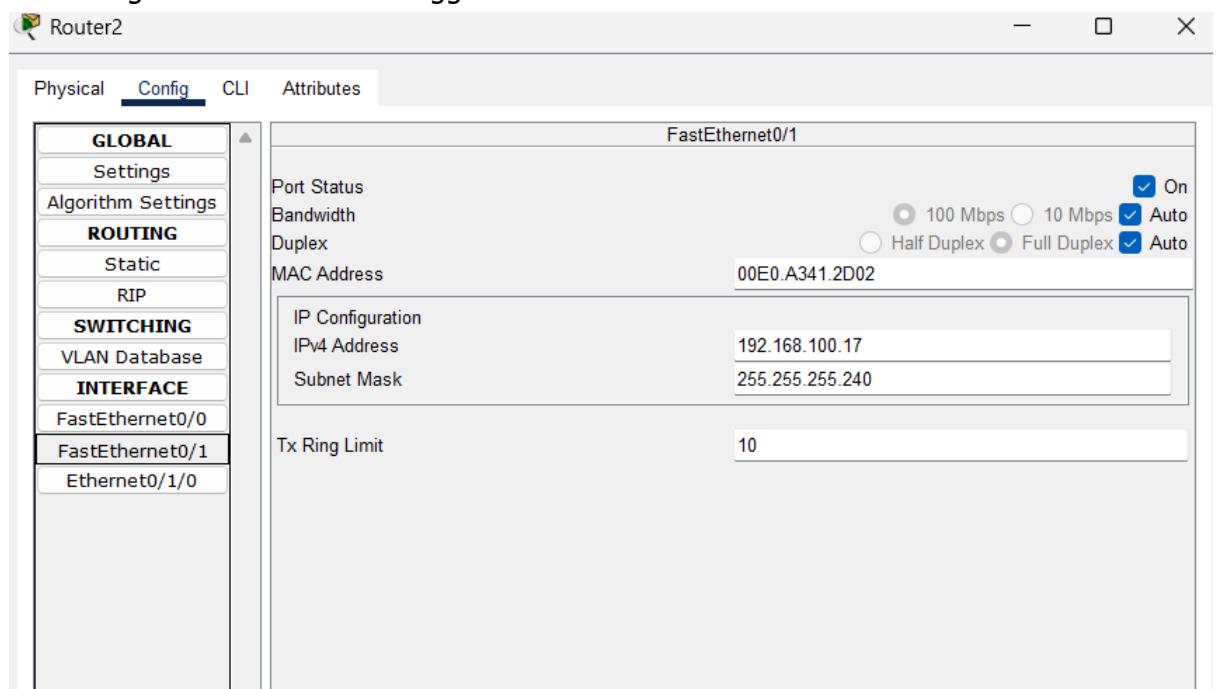
Perhitungan Detail

1. Subnet A (10 host)
- Jumlah host yang dibutuhkan: 10.
- Hitung jumlah bit host:
$$2^n - 2 \geq 10 \quad n - 2 \geq 10$$
$$2^n \geq 12$$
$$n=4 \text{ (karena } 2^4=16).$$
- Subnet mask:
 - Total bit: 32 (IPv4).
 - Bit network: $32-4=28$.
 - Subnet mask: /28 atau 255.255.255.240.
- Jumlah alamat per subnet: $2^4=16$.
- Network Address: 192.168.100.0.
- Broadcast Address: 192.168.100.15 (network address + 15).
- Host Range: 192.168.100.1 hingga 192.168.100.14.



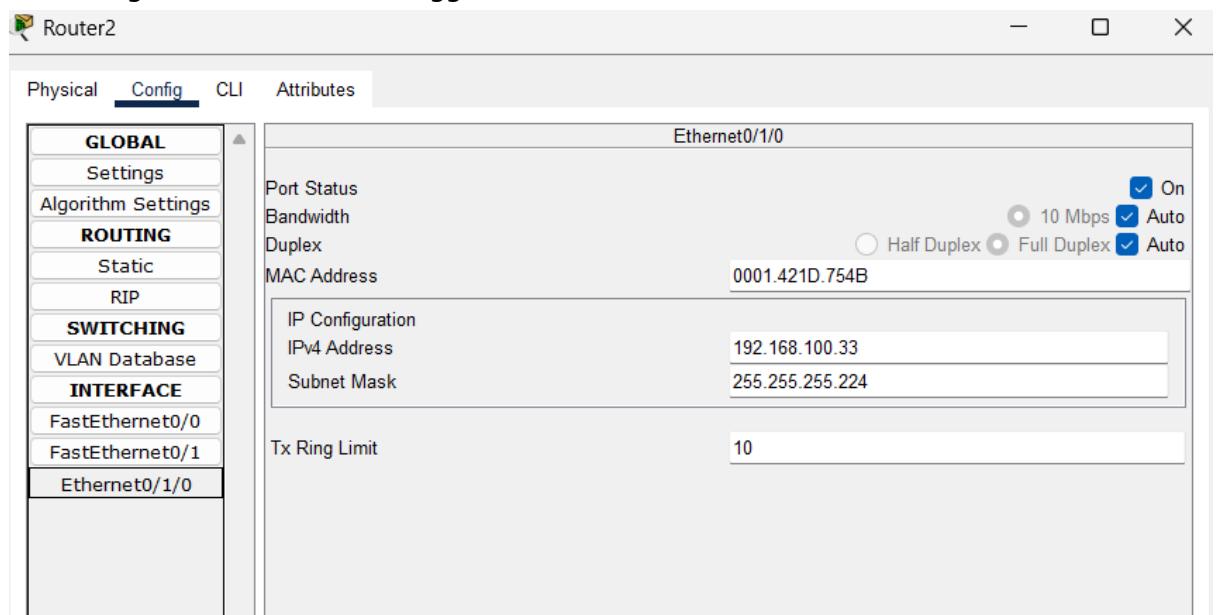
2. Subnet B (14 host)

- Jumlah host yang dibutuhkan: 14.
- Hitung jumlah bit host:
 $2^n - 2 \geq 14$
 $2^n \geq 16$
 $n=4$ (karena $2^4=16$).
- Subnet mask:
 - Total bit: 32 (IPv4).
 - Bit network: $32-4=28$.
 - Subnet mask: /28 atau 255.255.255.240.
- Jumlah alamat per subnet: $2^4=16$.
- Network Address: 192.168.100.16 (subnet sebelumnya berakhir di 192.168.100.15).
- Broadcast Address: 192.168.100.31 (network address + 15).
- Host Range: 192.168.100.17 hingga 192.168.100.30.



3. Subnet C (30 host)

- Jumlah host yang dibutuhkan: 30.
- Hitung jumlah bit host:
 $2^n - 2 \geq 30$
 $2^n \geq 32$
 $n=5$ (karena $2^5=32$).
- Subnet mask:
 - Total bit: 32 (IPv4).
 - Bit network: $32-5=27$.
 - Subnet mask: /27 atau 255.255.255.224.
- Jumlah alamat per subnet: $2^5=32$.
- Network Address: 192.168.100.32 (subnet sebelumnya berakhir di 192.168.100.31).
- Broadcast Address: 192.168.100.63 (network address + 31).
- Host Range: 192.168.100.33 hingga 192.168.100.62.



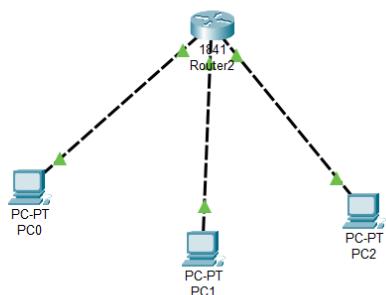
c. Membangun Topologi Dasar di Packet Tracer

Komponen:

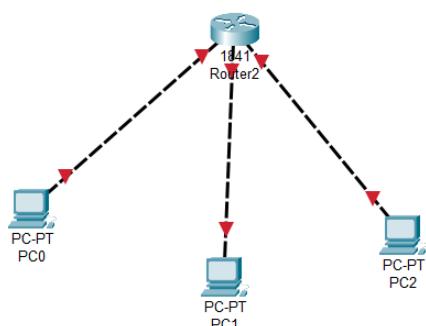
- 1 Router (Cisco Router 1841)
- 3 PC (PC0, PC1, PC2)
- 3 Kabel Cross-Over
- Topologi Star

Pengertian Topologi Star

Topologi **Star (Bintang)** adalah salah satu jenis topologi jaringan di mana semua perangkat dalam jaringan terhubung ke satu perangkat pusat, seperti **switch atau router**. Perangkat pusat ini berfungsi sebagai pengelola lalu lintas data antar perangkat dalam jaringan.

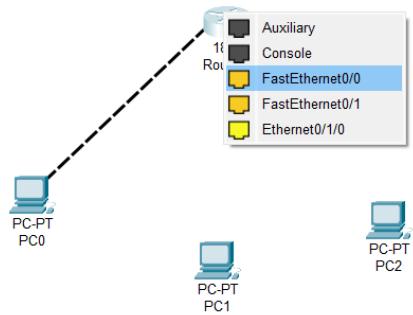


#Jika router pusat, hub, atau switch gagal, seluruh jaringan mati dan semua komputer terputus dari jaringan.

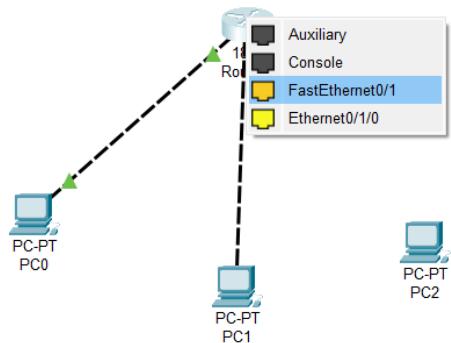


Hubungkan masing-masing PC langsung ke router:

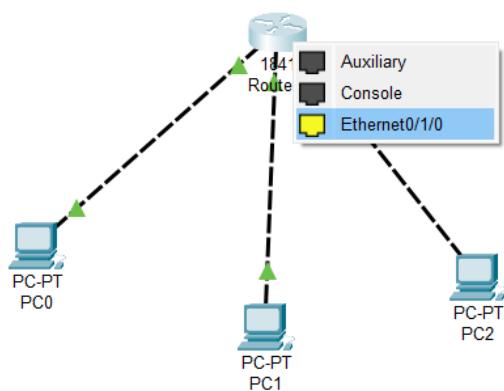
- **PC0 → Fa0/0**



- **PC1 → Fa0/1**



- **PC2 → Ethernet0/1/0** (port tambahan yaitu dari modul WIC-1ENET).

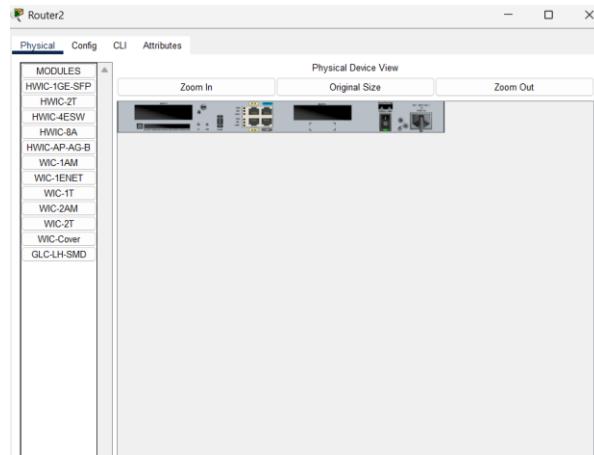


d. Konfigurasi IP Address

1. Penambahan Modul WIC-1ENET

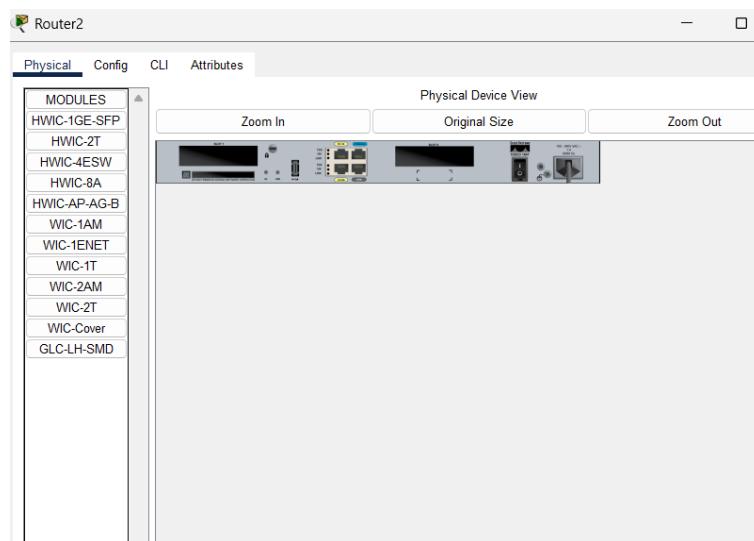
1. Masuk ke Mode Physical di Packet Tracer:

- Klik pada ke Router 1841.
- Lalu pilih tab Physical.

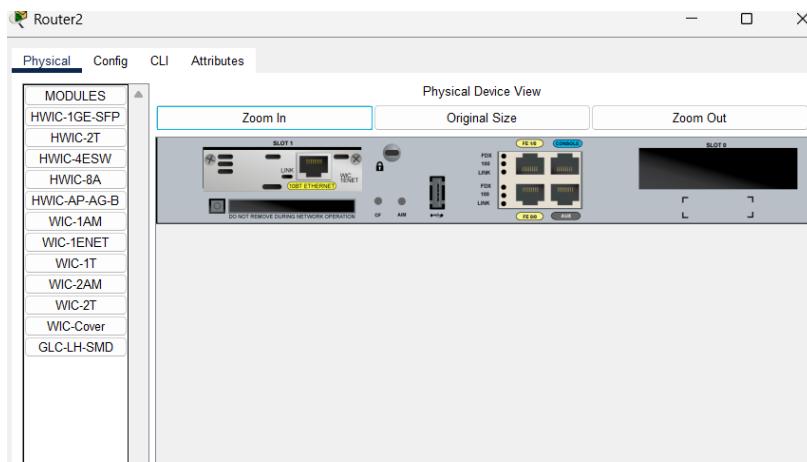


2. Tambahkan Modul WIC-1ENET:

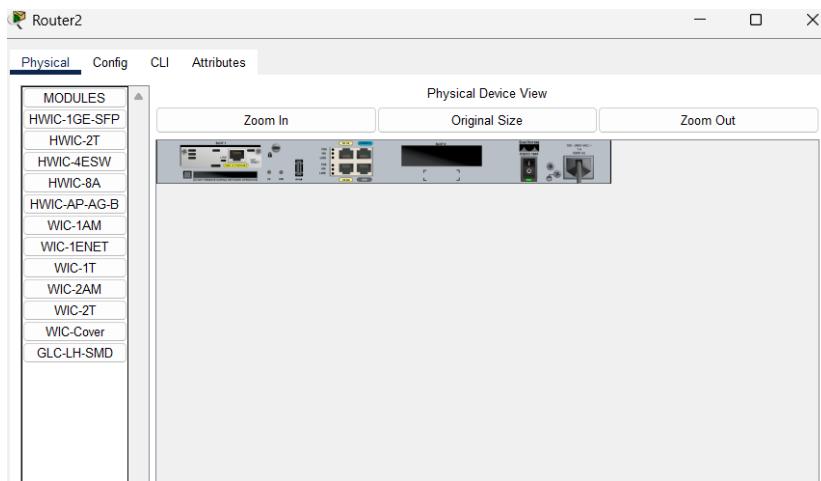
- Matikan router dengan klik tombol Power (Off).



- Seret modul WIC-1ENET ke slot kosong di router.

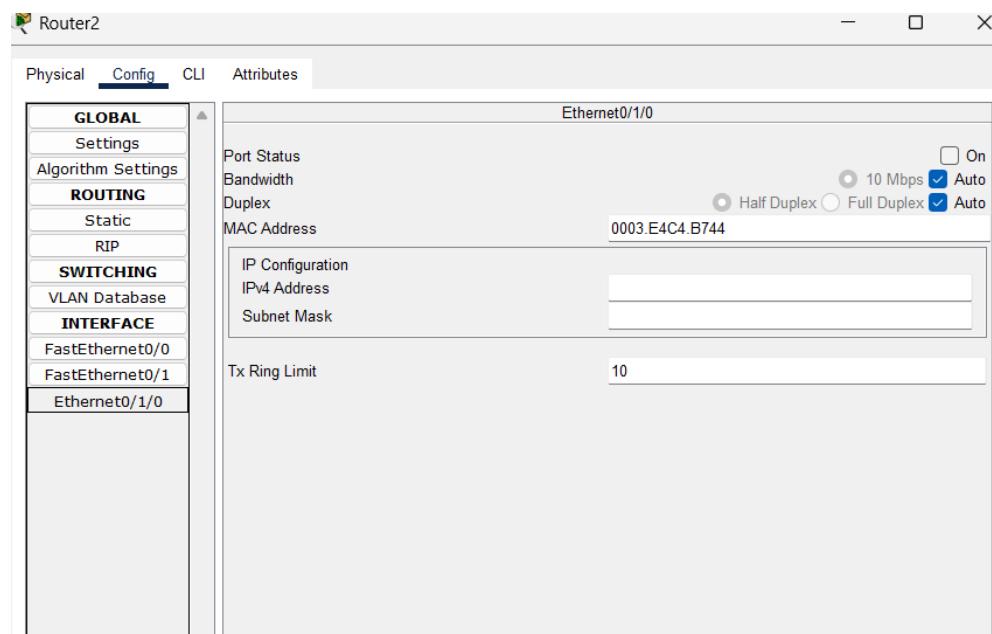


- Nyalakan kembali router dengan klik tombol Power (On).



3. Verifikasi Modul:

- Modul WIC-1ENET akan menambahkan port baru dengan nama Ethernet0/1/0.



2. Konfigurasi Router

Setelah modul ditambahkan, konfigurasikan port pada router:

Masuk ke mode konfigurasi:

```
Router(config-if)#enable
^
% Invalid input detected at '^' marker.

Router(config-if)#configure terminal
^
% Invalid input detected at '^' marker.

Router(config-if) #
```

Konfigurasikan interface router:

- **Fa0/0 (Subnet A):**

```
Router(config-if)#interface fa0/0
Router(config-if)#ip address 192.168.100.1 255.255.255.240
Router(config-if)#no shutdown

Router(config-if)#exit
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config)#+
```

- **Fa0/1 (Subnet B):**

```
Router(config)#interface fa0/1
Router(config-if)#ip address 192.168.100.17 255.255.255.240
Router(config-if)#no shutdown

Router(config-if)#exit
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Router(config)#+
```

- **Ethernet0/1/0 (Subnet C):**

```
Router(config)#interface ethernet0/1/0
Router(config-if)#ip address 192.168.100.33 255.255.255.224
Router(config-if)#no shutdown

Router(config-if)#exit
%LINK-5-CHANGED: Interface Ethernet0/1/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1/0, changed state to up

Router(config)#+
```

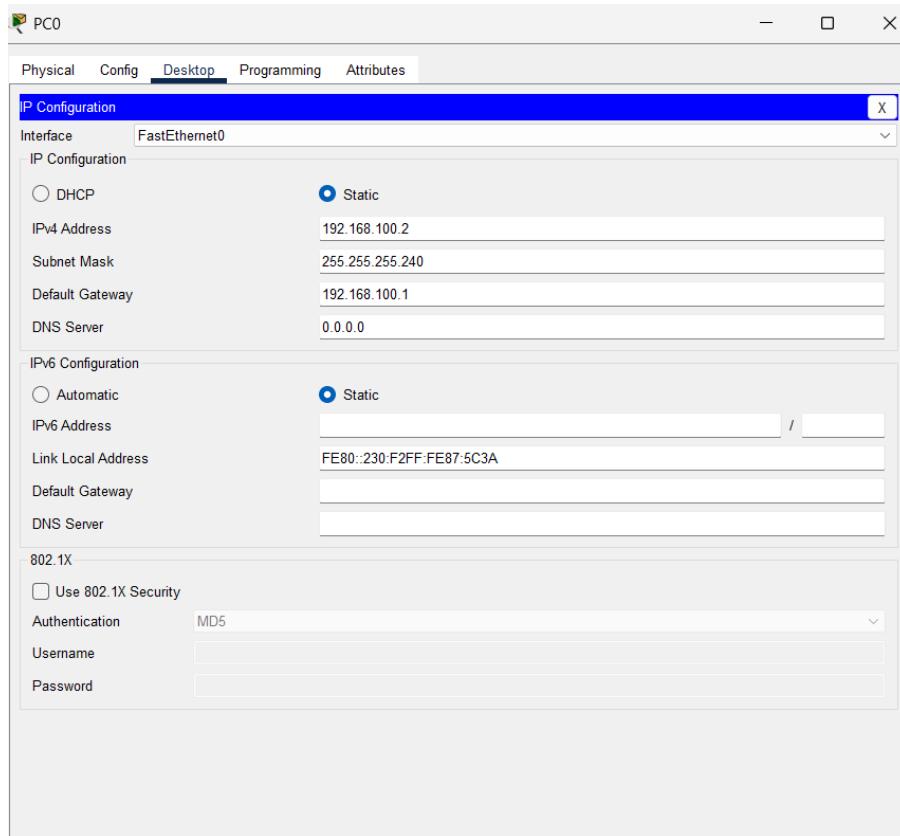
Simpan konfigurasi router:

```
Router(config)#write memory
^
% Invalid input detected at '^' marker.

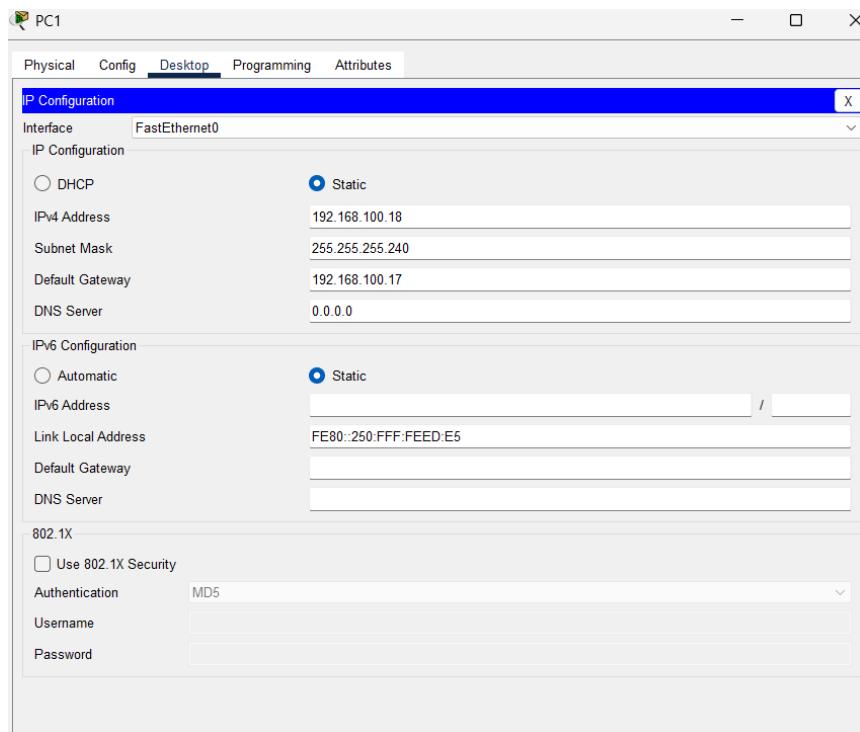
Router(config)#+
```

3. Konfigurasi PC

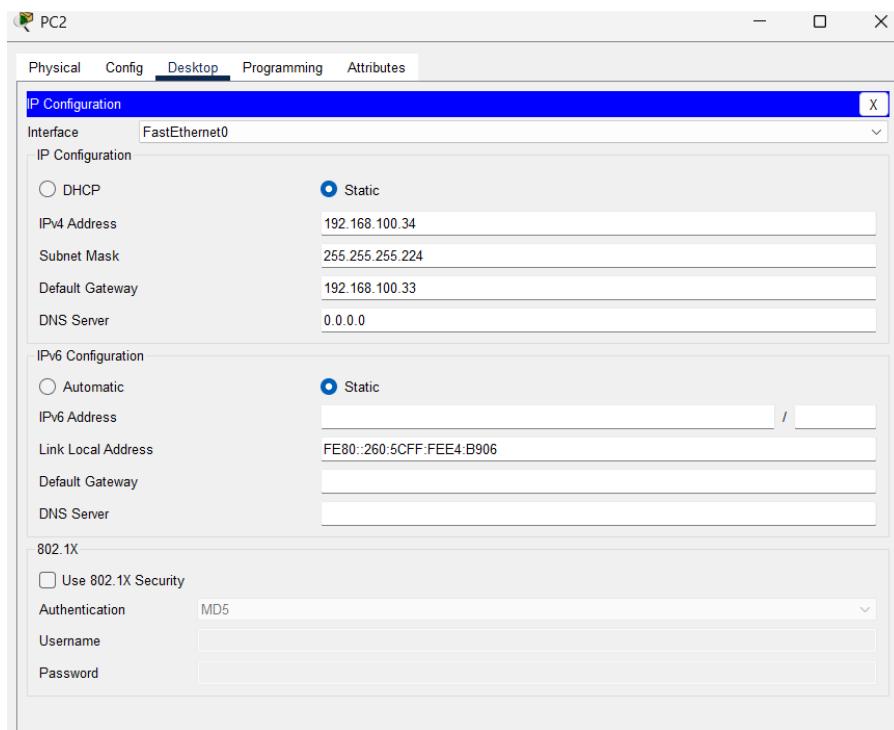
PC0 (Subnet A):



PC1 (Subnet B):



PC2 (Subnet C):



e. Uji Konektivitas (Ping)

Ping Gateway dari Setiap PC:

- Dari PC0, ping ke 192.168.100.1.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.100.1

Pinging 192.168.100.1 with 32 bytes of data:

Reply from 192.168.100.1: bytes=32 time<lms TTL=255

Ping statistics for 192.168.100.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

- Dari PC1, ping ke 192.168.100.17.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.100.17

Pinging 192.168.100.17 with 32 bytes of data:

Reply from 192.168.100.17: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.100.17:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

- Dari PC2, ping ke 192.168.100.33.

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.100.33

Pinging 192.168.100.33 with 32 bytes of data:

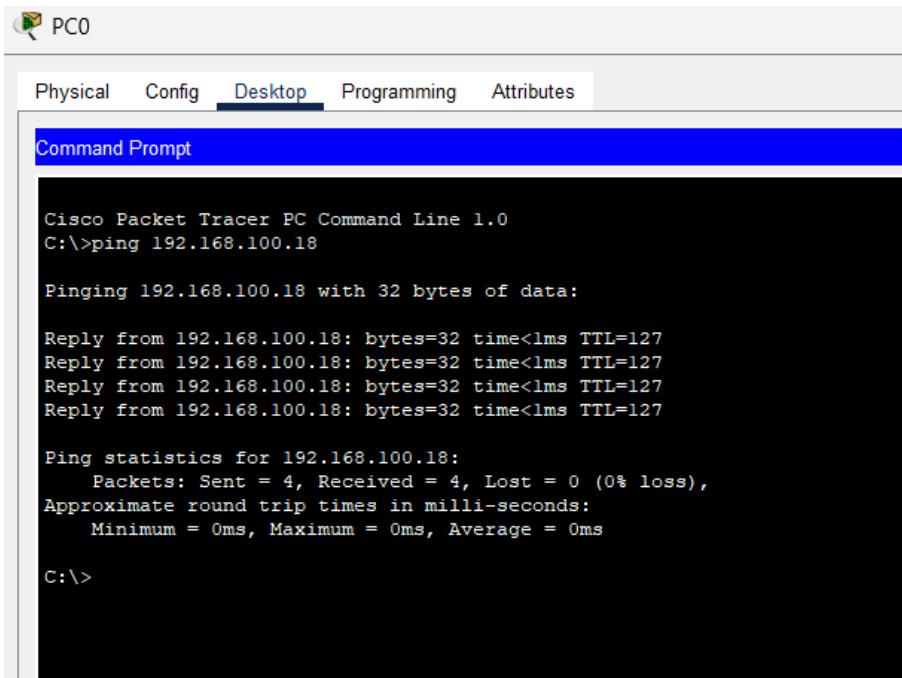
Reply from 192.168.100.33: bytes=32 time=8ms TTL=255
Reply from 192.168.100.33: bytes=32 time=5ms TTL=255
Reply from 192.168.100.33: bytes=32 time<1ms TTL=255
Reply from 192.168.100.33: bytes=32 time=4ms TTL=255

Ping statistics for 192.168.100.33:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 8ms, Average = 4ms

C:\>
```

Ping ke PC Lain:

- Dari PC0 (192.168.100.2), ping ke PC1 (192.168.100.18).



The screenshot shows the Cisco Packet Tracer interface with a window titled "PC0". The tab bar at the top has "Physical", "Config", "Desktop" (which is selected and highlighted in blue), "Programming", and "Attributes". Below the tab bar is a "Command Prompt" window with a blue header bar. The command prompt output is as follows:

```
Cisco Packet Tracer PC Command Line 1.0
C:>ping 192.168.100.18

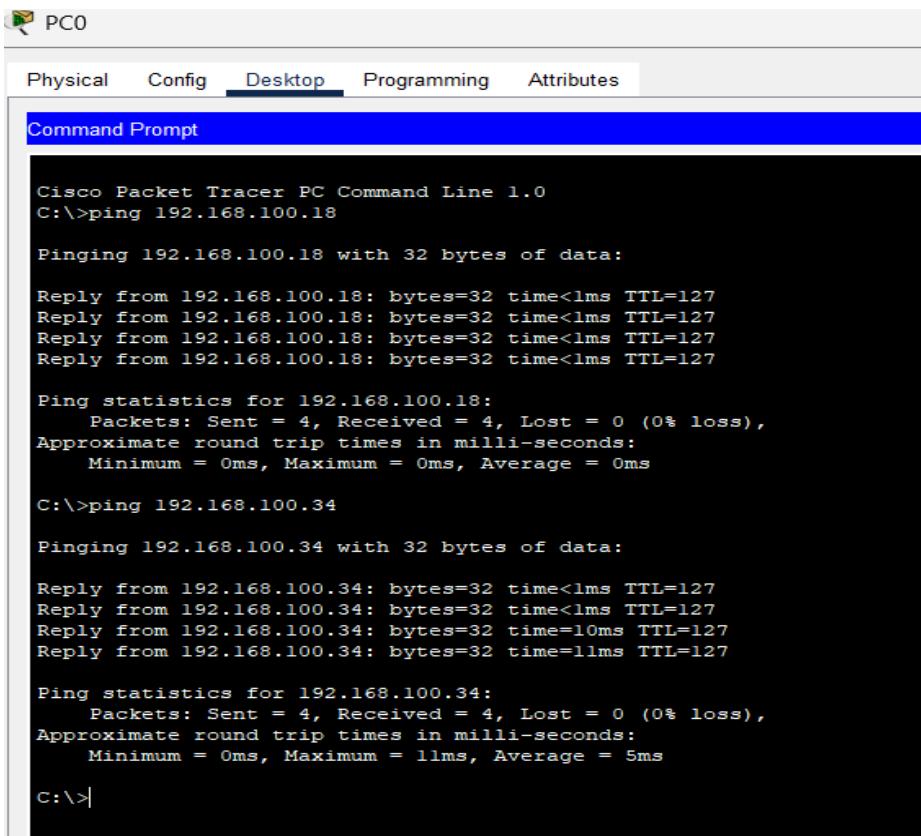
Pinging 192.168.100.18 with 32 bytes of data:

Reply from 192.168.100.18: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.100.18:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:>
```

- Dari PC0 (192.168.100.2), ping ke PC2 (192.168.100.34).



The screenshot shows the Cisco Packet Tracer interface with a window titled "PC0". The tab bar at the top has "Physical", "Config", "Desktop" (selected), "Programming", and "Attributes". Below the tab bar is a "Command Prompt" window with a blue header bar. The command prompt output is as follows:

```
Cisco Packet Tracer PC Command Line 1.0
C:>ping 192.168.100.18

Pinging 192.168.100.18 with 32 bytes of data:

Reply from 192.168.100.18: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.100.18:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:>ping 192.168.100.34

Pinging 192.168.100.34 with 32 bytes of data:

Reply from 192.168.100.34: bytes=32 time<1ms TTL=127
Reply from 192.168.100.34: bytes=32 time<1ms TTL=127
Reply from 192.168.100.34: bytes=32 time=10ms TTL=127
Reply from 192.168.100.34: bytes=32 time=11ms TTL=127

Ping statistics for 192.168.100.34:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 11ms, Average = 5ms

C:>
```

Jika Ping Gagal:

Cek konfigurasi IP Address, Subnet Mask, dan Default Gateway di setiap PC. Pastikan interface router up/up menggunakan:

Device Name: Router2
Device Model: 1841
Hostname: Router
Port Link VLAN IP Address IPv6 Address MAC Address
FastEthernet0/0 Up -- 192.168.100.1/28 <not set> 00E0.A341.2D01
FastEthernet0/1 Up -- 192.168.100.17/28 <not set> 00E0.A341.2D02
Ethernet0/1/0 Up -- 192.168.100.33/27 <not set> 0001.421D.754B
Vlan1 Down 1 <not set> <not set> 0001.4385.092A
Physical Location: Intercity > Home City > Corporate Office > Main Wiring Closet > Rack > Router2

```
Router>show ip interface brief
Interface          IP-Address      OK? Method Status        Protocol
FastEthernet0/0    192.168.100.1   YES manual up           up
FastEthernet0/1    192.168.100.17  YES manual up           up
Ethernet0/1/0      192.168.100.33  YES manual up           up
Vlan1             unassigned      YES unset administratively down down
Router>
```

- Periksa tabel routing di router:

```
Router>show ip route
Codes: C - connected, S - static, I - IGRP, 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

192.168.100.0/24 is variably subnetted, 3 subnets, 2 masks
C     192.168.100.0/28 is directly connected, FastEthernet0/0
C     192.168.100.16/28 is directly connected, FastEthernet0/1
C     192.168.100.32/27 is directly connected, Ethernet0/1/0

Router>
```

GITHUB :

<https://github.com/DeathMoonerg/DMJK-TUGAS-2-RAYHAN-IQBAL->