

# LAPORAN PRAKTIKUM

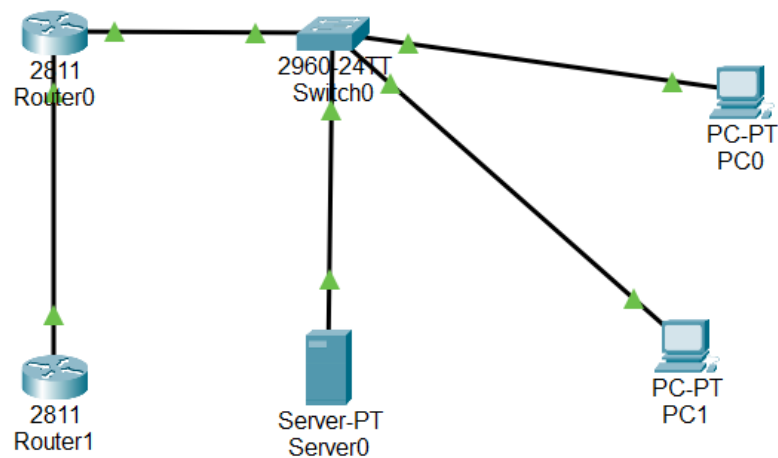
## TUGAS 6

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Link Repository: <https://github.com/verinaaard/TUGAS-DMJK>

### A. Membuat Topologi



Pengkabelan dasar:

- Router1 Fa0/0 → Switch Fa0/1: Gunakan kabel straight-through.
- Switch Fa0/2 → Server: Gunakan kabel straight-through.
- Switch Fa0/3 → PC0: Gunakan kabel straight-through.
- Switch Fa0/4 → PC1: Gunakan kabel straight-through.
- Router1 Fa0/1 → Router2 Fa0/0: Gunakan kabel straight-through untuk link WAN.

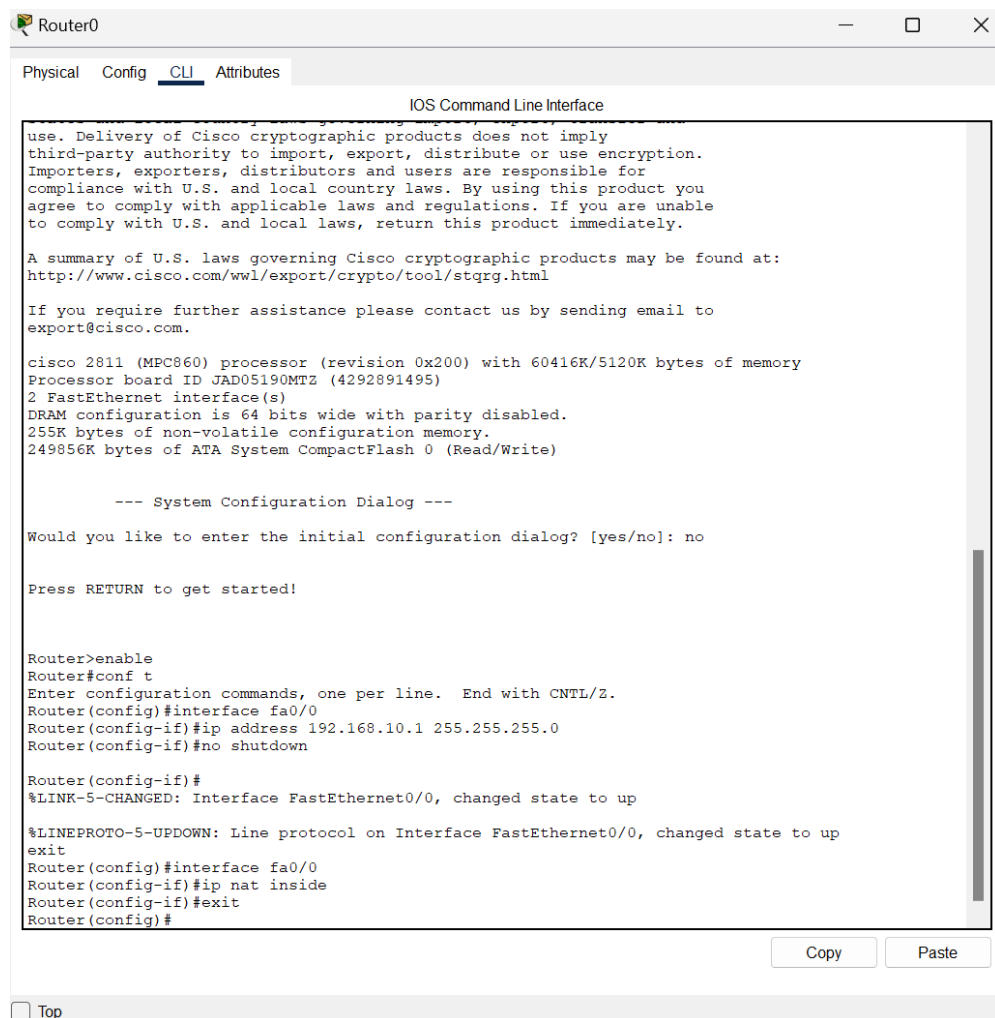
### B. Konfigurasi Router0

#### a. Interface LAN (Fa0/0)

Interface LAN (Local Area Network) adalah antarmuka pada router yang terhubung ke jaringan lokal, seperti komputer, server, atau perangkat lain dalam satu lokasi fisik. Interface ini biasanya digunakan untuk menghubungkan router

ke switch atau perangkat LAN lainnya. Berikut adalah langkah-langkah untuk mengkonfigurasi interface LAN (Fa0/0):

- Gunakan perintah enable untuk masuk ke mode Privileged EXEC.
- Ketik configure terminal untuk masuk ke mode konfigurasi global.
- Akses interface Fa0/0 dengan perintah interface fa0/0.
- Atur IP address dan subnet mask menggunakan ip address 192.168.10.1 255.255.255.0.
- Aktifkan interface dengan no shutdown.
- Tandai Fa0/0 sebagai inside untuk NAT dengan perintah ip nat inside.
- Gunakan exit untuk keluar dari mode konfigurasi interface.



The screenshot shows a Cisco Router CLI window titled "Router0". The window has tabs for "Physical", "Config", "CLI", and "Attributes", with "CLI" selected. The main area displays the "IOS Command Line Interface". The output shows the router's startup sequence, including a copyright notice, a summary of U.S. laws governing Cisco cryptographic products, and a system configuration dialog. The user enters "no" to skip the initial configuration dialog. The user then enters "enable" to enter privileged EXEC mode, followed by "configure terminal" to enter global configuration mode. The user then enters "interface fa0/0" to enter interface configuration mode. The user then enters "ip address 192.168.10.1 255.255.255.0" to configure the IP address and subnet mask. The user then enters "no shutdown" to activate the interface. The user then enters "exit" to exit interface configuration mode. The user then enters "ip nat inside" to configure the interface as the inside interface for NAT. The user then enters "exit" to exit global configuration mode. The user then enters "exit" to exit privileged EXEC mode. The output shows the interface status changing to "up" and the line protocol changing to "up".

```
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fa0/0
Router(config-if)#ip address 192.168.10.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#interface fa0/0
Router(config-if)#ip nat inside
Router(config-if)#exit
Router(config)#
```

## b. Interface WAN (Fa0/1)

Interface WAN (Wide Area Network) adalah antarmuka pada router yang terhubung ke jaringan luas, seperti internet atau jaringan lain di lokasi yang berbeda. Interface ini berfungsi sebagai pintu gerbang untuk menghubungkan jaringan lokal (LAN) ke jaringan luar. Berikut adalah langkah-langkah untuk mengkonfigurasi interface WAN (Fa0/1):

- Gunakan perintah enable untuk masuk ke mode Privileged EXEC.
- Ketik configure terminal untuk masuk ke mode konfigurasi global.
- Akses interface dengan perintah interface fa0/1.
- Atur IP address dan subnet mask: ip address 203.0.113.1 255.255.255.252.
- Aktifkan interface: no shutdown.
- Ketik ip nat outside untuk menandai Fa0/1 sebagai outside dalam NAT.
- Ketik ip route 0.0.0.0 0.0.0.0 203.0.113.2 untuk mengarahkan semua lalu lintas yang tidak dikenal ke Router2.
- Ketik end untuk keluar dari mode konfigurasi.
- Simpan konfigurasi dengan perintah write memory

```
Router(config)#interface fa0/1
Router(config-if)#ip address 203.0.113.1 255.255.255.252
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
exit
Router(config)#interface fa0/1
Router(config-if)#ip nat outside
Router(config-if)#exit
Router(config)#ip route 0.0.0.0 0.0.0.0 203.0.113.2
Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
Router#
```

☐ Top

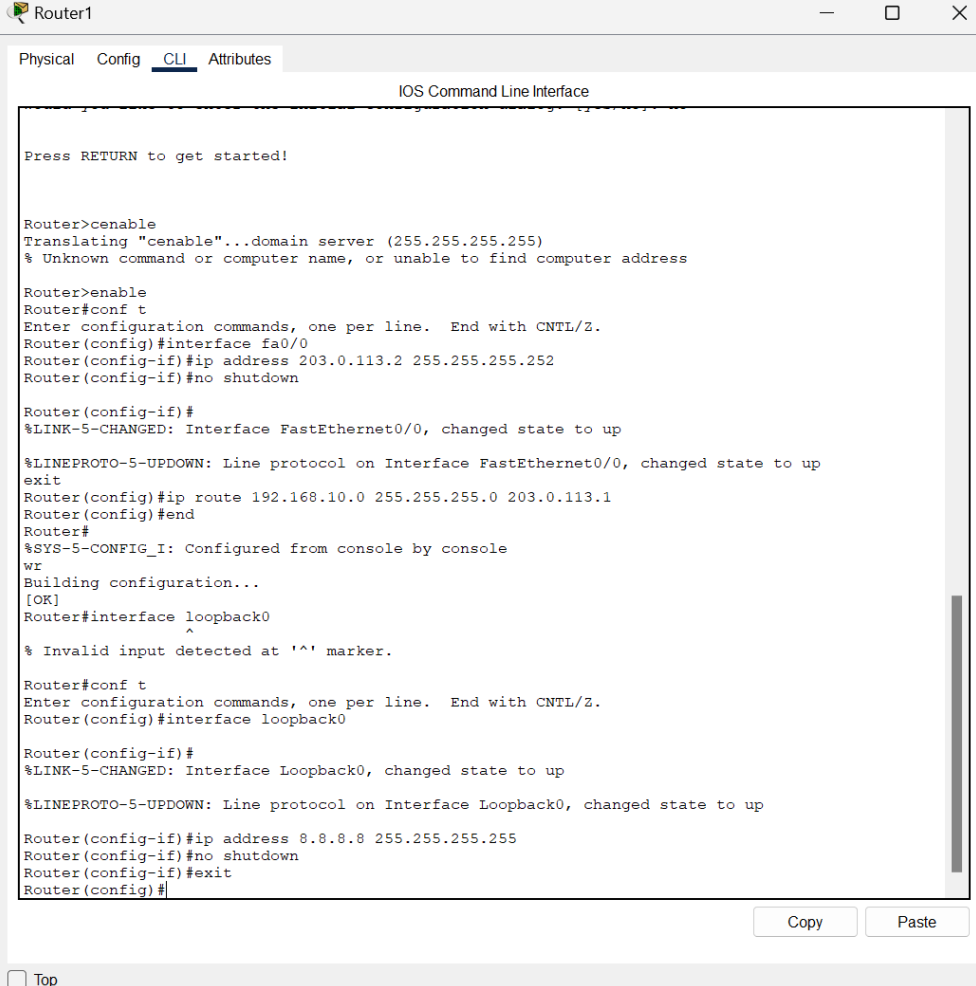
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### C. Konfigurasi Router1 Sebagai Internet

Konfigurasi Router1 sebagai "Internet" bertujuan untuk mensimulasikan jaringan luar (WAN) yang terhubung ke Router0.

- R1 berperan sebagai perangkat yang mewakili internet atau jaringan eksternal.
- Interface Fa0/0 pada R1 dihubungkan ke R0 dan dikonfigurasi dengan IP publik (203.0.113.2/30).

- Route balik ditambahkan agar R1 dapat mengirim paket kembali ke jaringan LAN R0.
- Loopback interface (8.8.8.8) digunakan untuk mensimulasikan alamat IP publik tambahan, seperti server di internet.



The screenshot shows the Router1 CLI interface with the following commands and output:

```

Router1
Physical Config CLI Attributes
IOS Command Line Interface

Press RETURN to get started!

Router>enable
Translating "enable"...domain server (255.255.255.255)
% Unknown command or computer name, or unable to find computer address

Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface fa0/0
Router(config-if)#ip address 203.0.113.2 255.255.255.252
Router(config-if)#no shutdown

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

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
Router(config)#ip route 192.168.10.0 255.255.255.0 203.0.113.1
Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console
wr
Building configuration...
[OK]
Router#interface loopback0
^
% Invalid input detected at '^' marker.

Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface loopback0

Router(config-if)#
%LINK-5-CHANGED: Interface Loopback0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up

Router(config-if)#ip address 8.8.8.8 255.255.255.255
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#

```

Buttons: Copy, Paste

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#### D. Konfigurasi DHCP & DNS pada Server (di LAN)

##### a. Mengatur IP Server (statik) dengan memasukkan:

- IP Address: 192.168.10.2
- Subnet Mask: 255.255.255.0
- Gateway: 192.168.10.1
- DNS: 192.168.10.2

Server0

Physical Config Services **Desktop** Programming Attributes

**IP Configuration** [X]

IP Configuration

☐ DHCP ☒ Static

IPv4 Address: 192.168.10.2

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.10.1

DNS Server: 192.168.10.2

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address: /

Link Local Address: FE80::2D0:97FF:FE77:5B49

Default Gateway:

DNS Server:

802.1X

☐ Use 802.1X Security

Authentication: MD5

Username:

Password:

☐ Top

**b. Menyiapkan DHCP pada server dengan mengatur:**

- Default Gateway: 192.168.10.1
- DNS Server: 192.168.10.2
- Start IP: 192.168.10.50
- Subnet Mask: 255.255.255.0
- Max User: 50

Server0

Physical Config **Services** Desktop Programming Attributes

**SERVICES**

- HTTP
- DHCP**
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

**DHCP**

Interface: FastEthernet0 Service: ☒ On ☐ Off

Pool Name: serverPool

Default Gateway: 192.168.10.1

DNS Server: 192.168.10.2

Start IP Address: 192 168 10 50

Subnet Mask: 255 255 255 0

Maximum Number of Users: 50

TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

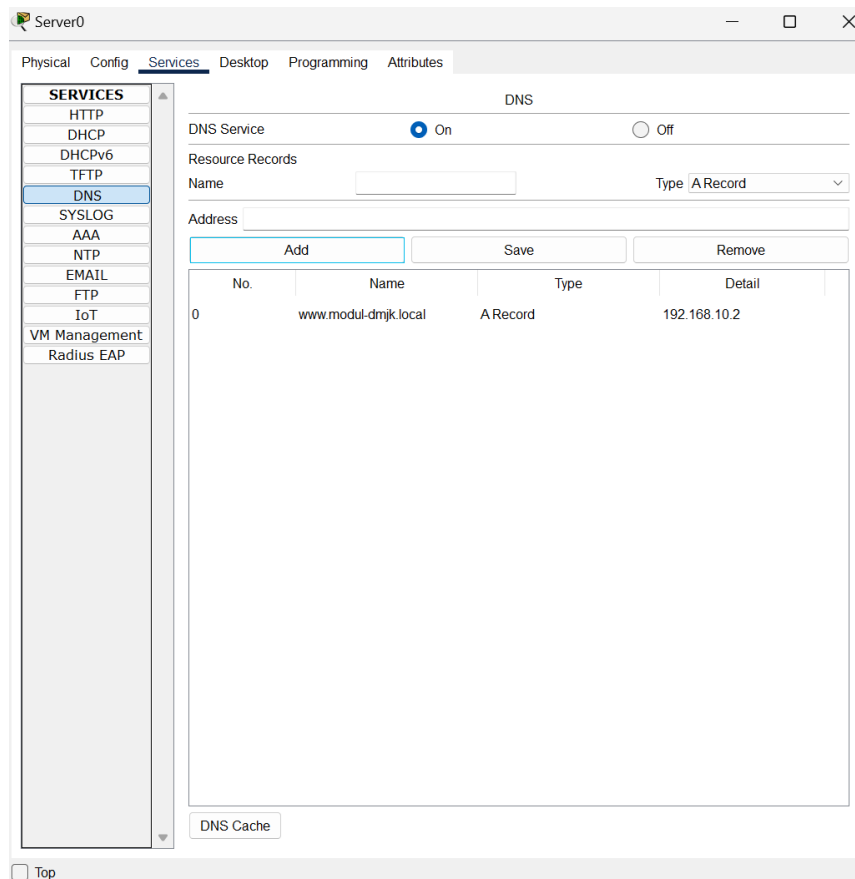
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Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool	192.168.10.1	192.168.10.2	192.168.10.50	255.255.255.0	50	0.0.0.0	0.0.0.0

☐ Top

c. Menyiapkan DNS pada server dengan mengatur:

- Name: www.modul-dmjk.local
- Address: 192.168.10.2



### E. Konfigurasi NAT Overload (PAT) di Router0

NAT Overload (PAT - Port Address Translation) memungkinkan banyak perangkat di jaringan lokal (LAN) menggunakan satu alamat IP publik (WAN) untuk mengakses internet. Dalam konfigurasi ini perangkat di LAN (192.168.10.0/24) akan menggunakan alamat IP publik Router1 (203.0.113.1) saat mengakses jaringan luar (WAN). Router1 akan menerjemahkan alamat IP lokal ke alamat IP publik dengan menggunakan port yang berbeda untuk membedakan sesi.

```
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#access-list 1 permit 192.168.10.0 0.0.0.255
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip nat inside source list 1 interface fa0/1 overload
Router(config)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console
wz
Building configuration...
[OK]
Router#
```

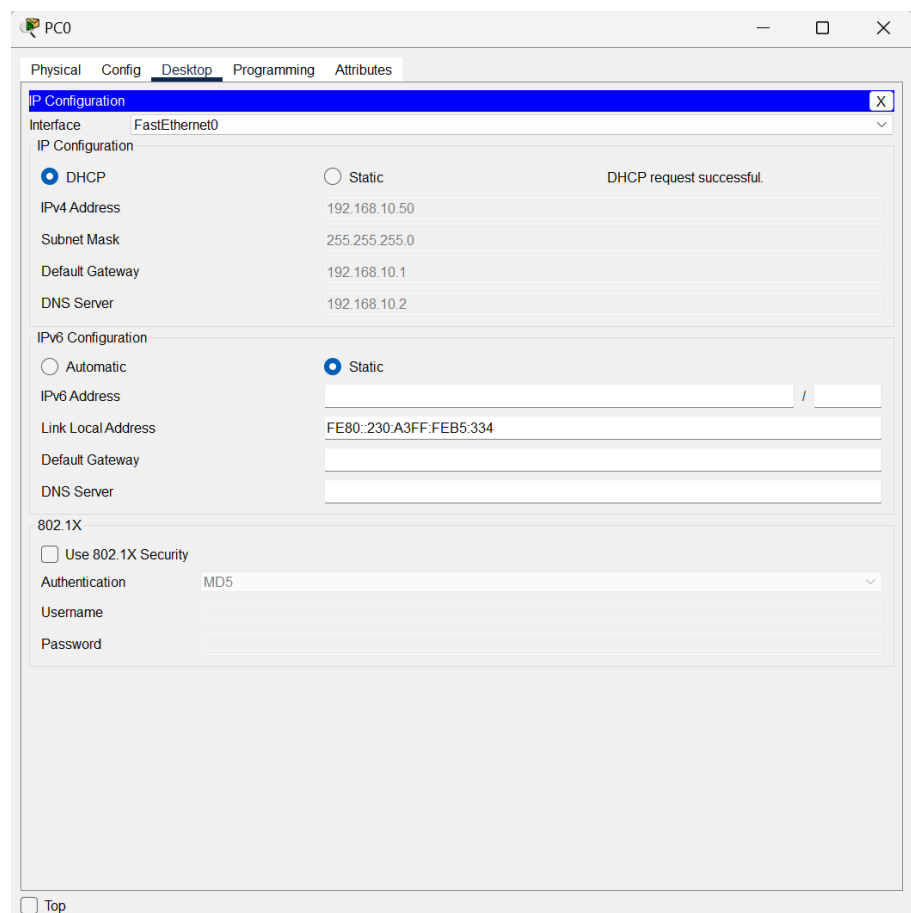
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## F. Verifikasi & Uji Konektivitas

### a. Verifikasi dari PC di LAN

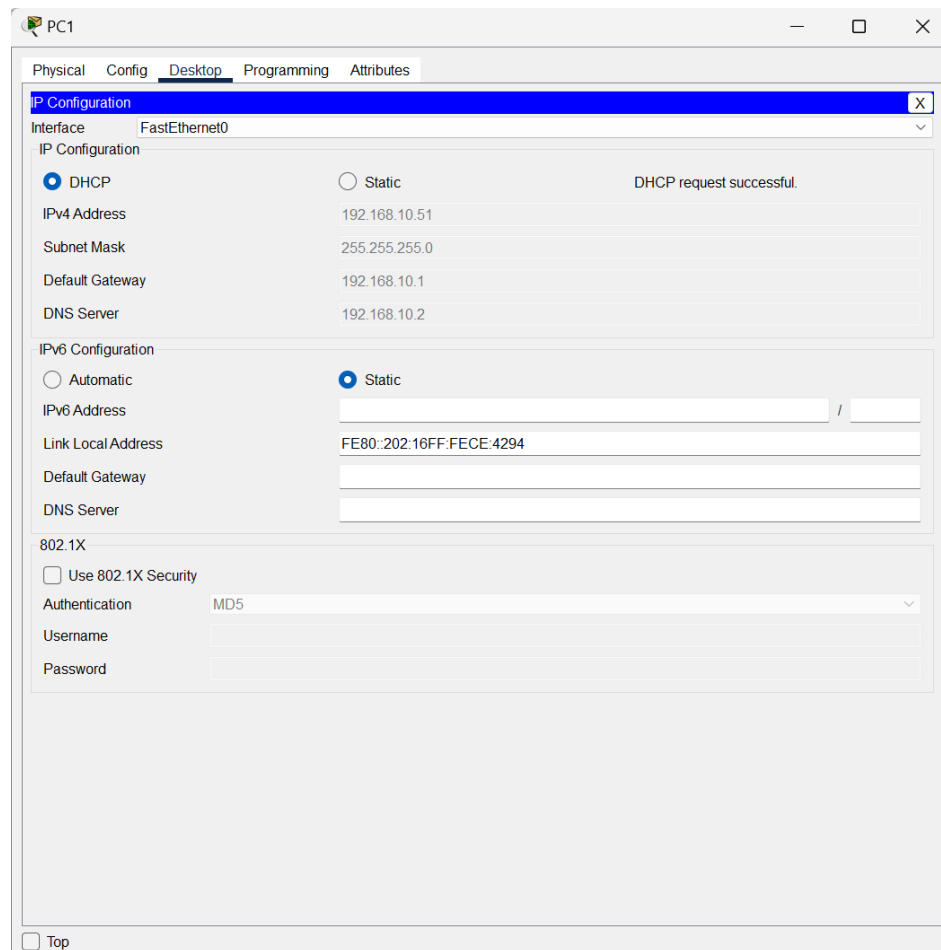
- Buka PC0, lalu buka Desktop → IP Configuration.
- Pilih DHCP untuk mendapatkan IP otomatis.
- Pastikan PC mendapatkan:
  - IP Address: 192.168.10.50 (atau rentang 192.168.10.x).
  - Gateway: 192.168.10.1.
  - DNS Server: 192.168.10.2
- Lakukan hal yang sama pada PC1

### • PC0



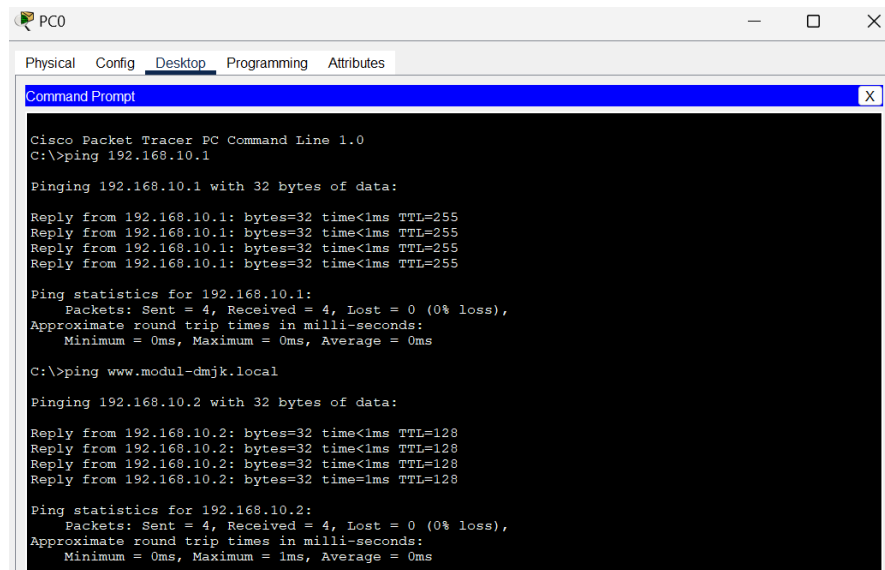


- **PC1**



Selanjutnya:

- Buka Command Prompt di PC0.
- Jalankan perintah: `ping 192.168.10.1` Jika konfigurasi benar, ping ke gateway (Router0) akan berhasil.
- Di Command Prompt, jalankan perintah: `ping www.modul-dmjk.local` Jika DNS server berfungsi, ping akan mengembalikan balasan dari alamat DNS server (192.168.10.2).



```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.10.1

Pinging 192.168.10.1 with 32 bytes of data:

Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255
Reply from 192.168.10.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.10.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping www.modul-dmjk.local

Pinging 192.168.10.2 with 32 bytes of data:

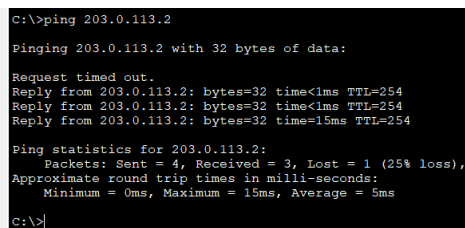
Reply from 192.168.10.2: bytes=32 time<1ms TTL=128
Reply from 192.168.10.2: bytes=32 time<1ms TTL=128
Reply from 192.168.10.2: bytes=32 time<1ms TTL=128
Reply from 192.168.10.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

b. Uji NAT (Jika R2 Berfungsi sebagai Internet)

➤ Ping ke R2 (203.0.113.2)

- Di PC0, jalankan: ping 203.0.113.2. Harus Reply: Jika NAT dan routing berfungsi dengan benar, ping akan berhasil.



```
C:\>ping 203.0.113.2

Pinging 203.0.113.2 with 32 bytes of data:

Request timed out.
Reply from 203.0.113.2: bytes=32 time<1ms TTL=254
Reply from 203.0.113.2: bytes=32 time<1ms TTL=254
Reply from 203.0.113.2: bytes=32 time=15ms TTL=254

Ping statistics for 203.0.113.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 15ms, Average = 5ms

C:\>|
```

➤ Lihat Translasi NAT di Router0

- Masuk ke CLI Router1.
- Jalankan perintah: show ip nat translations

```

*****
%SYS-5-CONFIG_I: Configured from console by console
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 203.0.113.2 to network 0.0.0.0

C      192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
L      192.168.10.0/24 is directly connected, FastEthernet0/0
L      192.168.10.1/32 is directly connected, FastEthernet0/0
C      203.0.113.0/24 is variably subnetted, 2 subnets, 2 masks
C      203.0.113.0/30 is directly connected, FastEthernet0/1
L      203.0.113.1/32 is directly connected, FastEthernet0/1
S*     0.0.0.0/0 [1/0] via 203.0.113.2

Router#show ip nat translations
Router#show ip nat translations
Pro Inside global      Inside local      Outside local      Outside global
icmp 203.0.113.1:5      192.168.10.50:5    8.8.8.8:5          8.8.8.8:5
icmp 203.0.113.1:6      192.168.10.50:6    8.8.8.8:6          8.8.8.8:6
icmp 203.0.113.1:7      192.168.10.50:7    8.8.8.8:7          8.8.8.8:7
icmp 203.0.113.1:8      192.168.10.50:8    8.8.8.8:8          8.8.8.8:8

Router#

```

Dari hasil show ip nat translations terlihat bahwa Inside local: 192.168.10.50 (IP PC di LAN) dan Inside global: 203.0.113.1 (IP publik Router1).

### ➤ Ping ke Loopback R1 (8.8.8.8)

```

C:\>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:

Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>|

```