

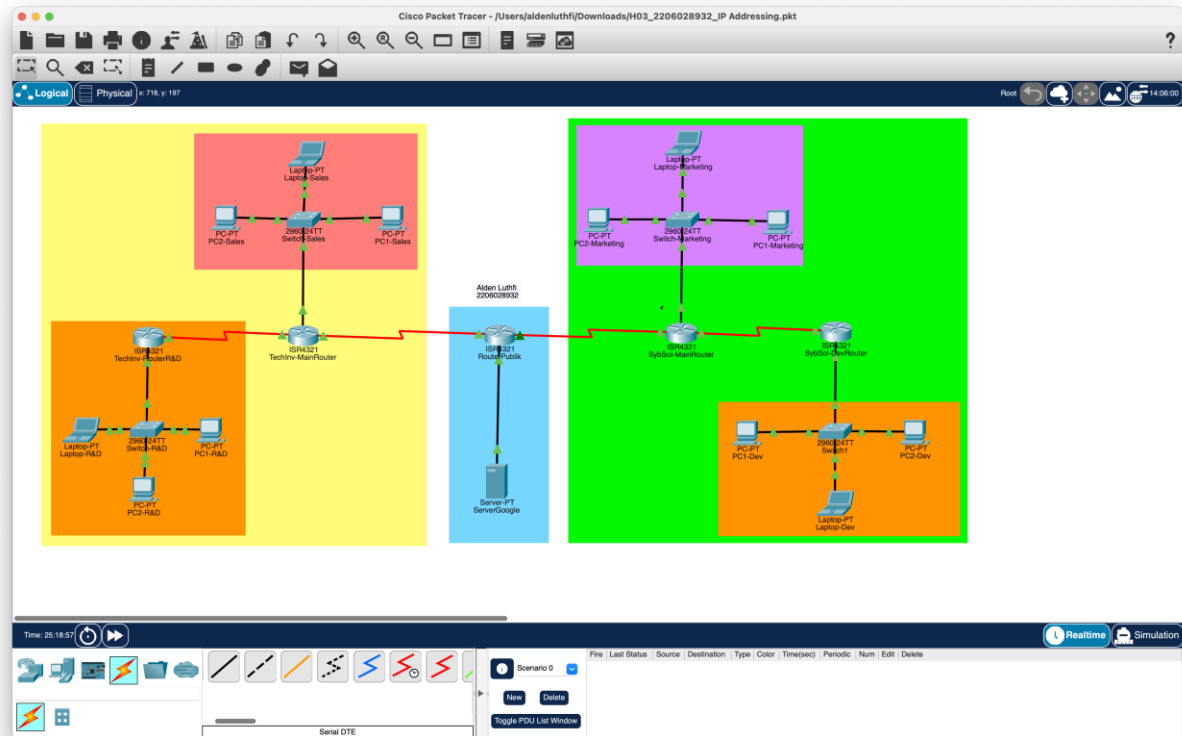


**Lembar Jawaban**  
**Hands On- H03**

# **NAT & OSPF**

**Nama : Alden Luthfi**  
**NPM : 2206028932**

## [8 Poin] Topologi

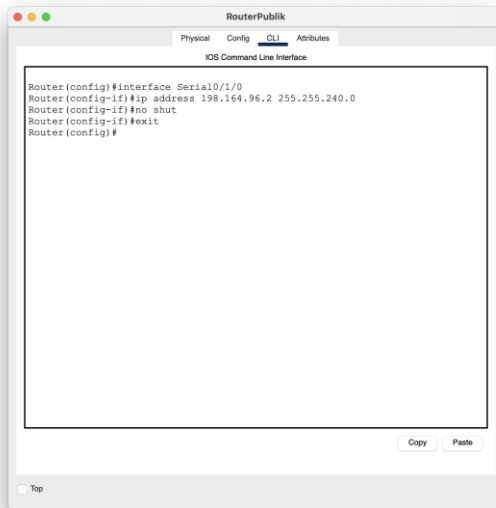


## [2 Poin] Nilai X

$$2206028932 \rightarrow 932 \pmod{256} = 164$$

## [10 Poin] Alokasi IP

Subnet	Network Address	Slash	Subnet Mask	First Device IP Address	Last Device IP Address	Default Gateway
Divisi Marketing	10.164.0.0	/22	255.255.252.0	10.164.0.2	10.164.3.254	10.164.0.1
Divisi Developer	10.164.4.0	/22	255.255.252.0	10.164.4.2	10.164.7.254	10.164.4.1



RouterPublik

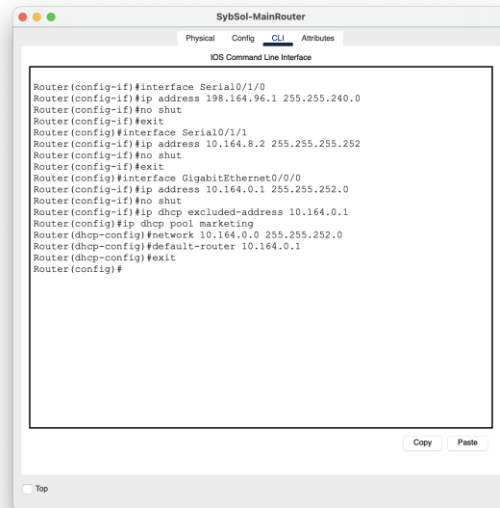
Physical Config CLI Attributes

IOS Command Line Interface

```
Router(config)#interface Serial0/1/0
Router(config-if)#ip address 198.164.96.2 255.255.240.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#
```

Copy Paste

☐ Top



SybSol-MainRouter

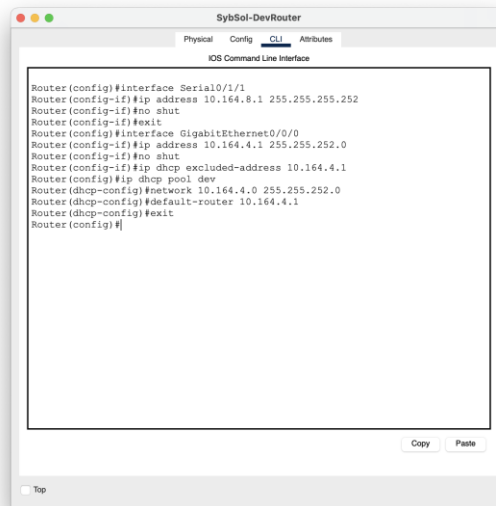
Physical Config CLI Attributes

IOS Command Line Interface

```
Router(config-if)#interface Serial0/1/0
Router(config-if)#ip address 198.164.96.1 255.255.240.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#interface Serial0/1/1
Router(config-if)#ip address 10.164.8.2 255.255.255.252
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#ip address 10.164.0.1 255.255.252.0
Router(config-if)#no shut
Router(config-if)#ip dhcp excluded-address 10.164.0.1
Router(config)#ip dhcp pool marketing
Router(dhcp-config)#network 10.164.0.0 255.255.252.0
Router(dhcp-config)#default-router 10.164.0.1
Router(dhcp-config)#exit
Router(config)#
```

Copy Paste

☐ Top



SybSol-DevRouter

Physical Config CLI Attributes

IOS Command Line Interface

```
Router(config)#interface Serial0/1/1
Router(config-if)#ip address 10.164.8.1 255.255.255.252
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#ip address 10.164.4.1 255.255.252.0
Router(config-if)#no shut
Router(config-if)#ip dhcp excluded-address 10.164.4.1
Router(config)#ip dhcp pool dev
Router(dhcp-config)#network 10.164.0.0 255.255.252.0
Router(dhcp-config)#default-router 10.164.4.1
Router(dhcp-config)#exit
Router(config)#
```

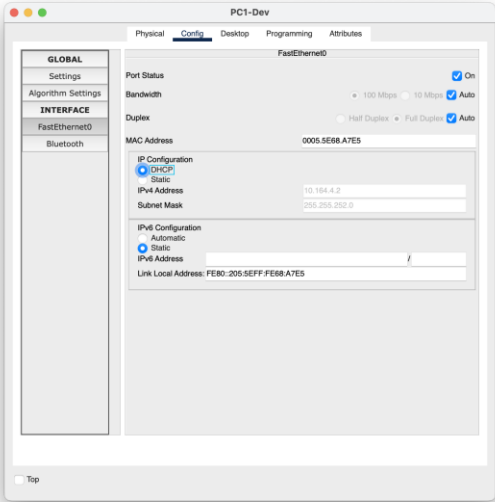
Copy Paste

☐ Top

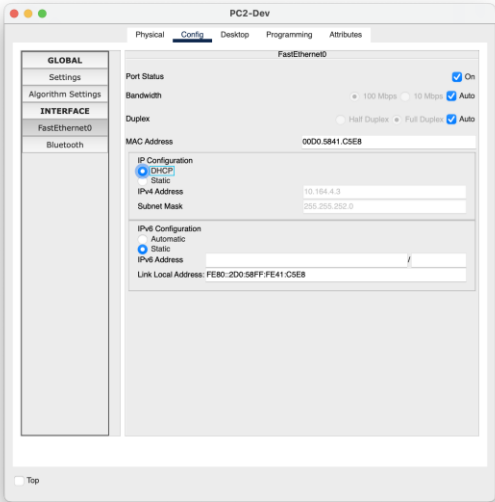
## Distribusi IPV4

Device Name	Tangkapan Layar
-------------	-----------------

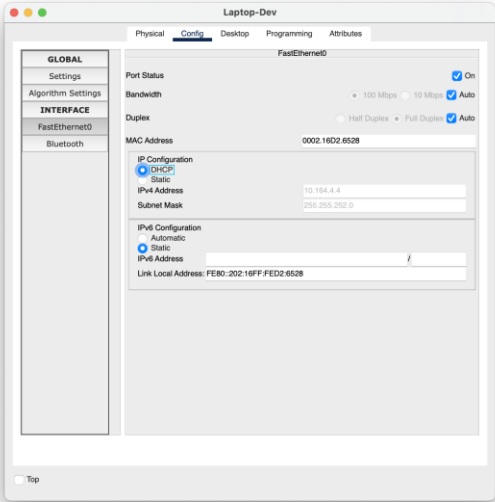
PC1-Dev



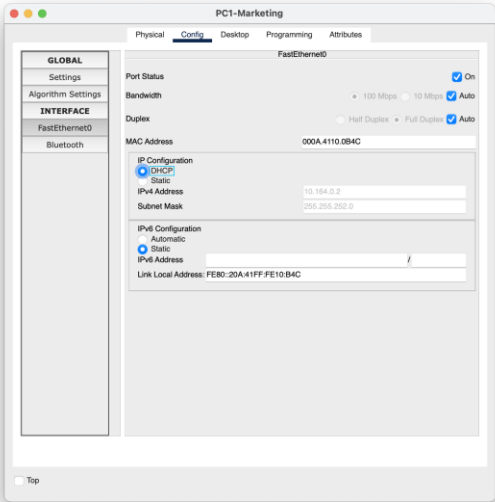
PC2-Dev



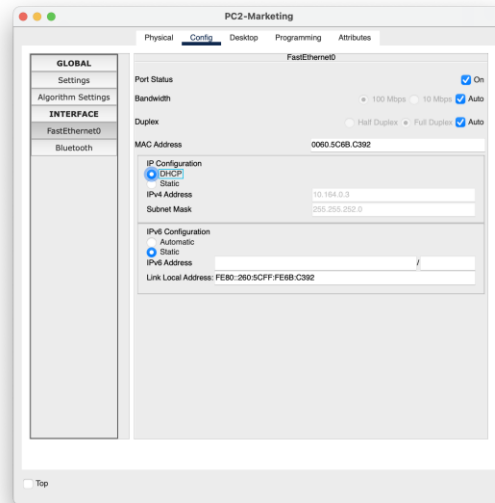
Laptop-Dev



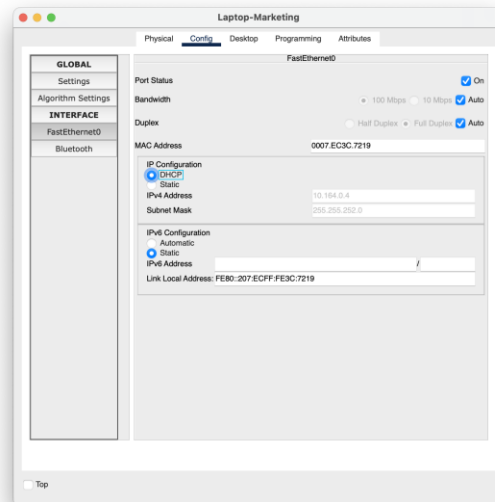
PC1-Marketing



PC2-Marketing



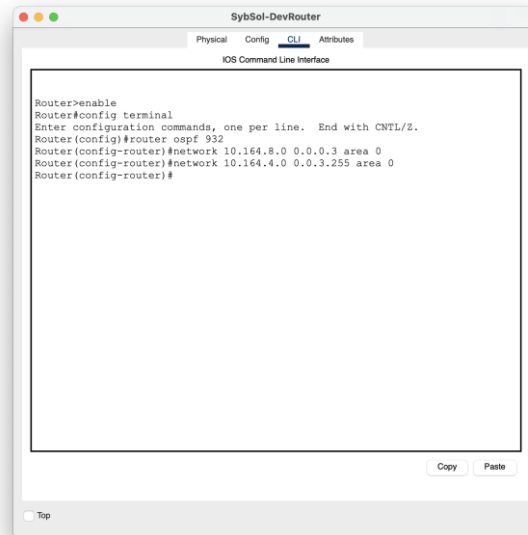
Laptop-Marketing



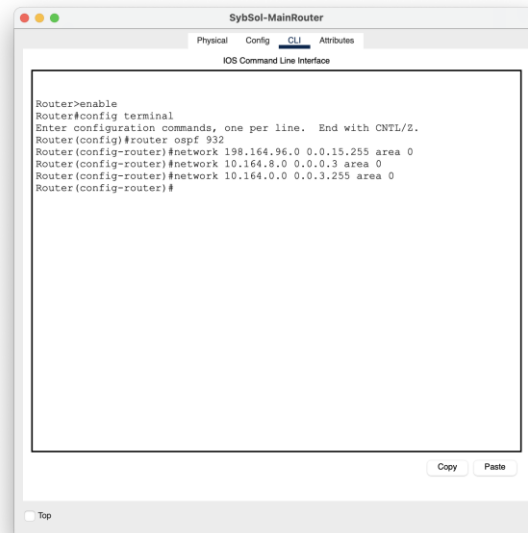
## [29 Poin] Konfigurasi OSPF

Cantumkan tangkapan layar yang berisikan konfigurasi OSPF pada antarmuka CLI tiap router.

CLI Router SybSol-Dev

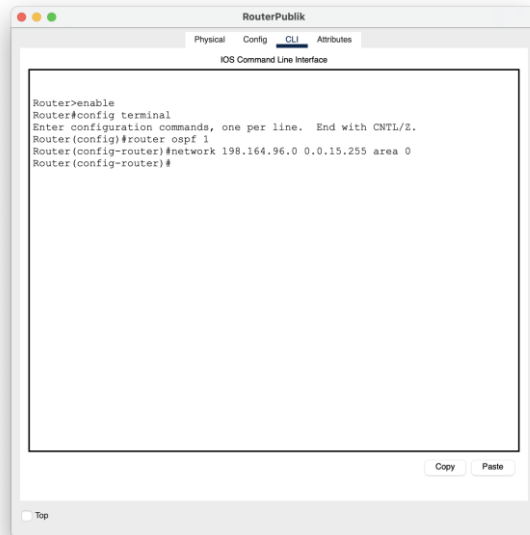


## CLI Router SybSol-Main



## CLI Router Publik





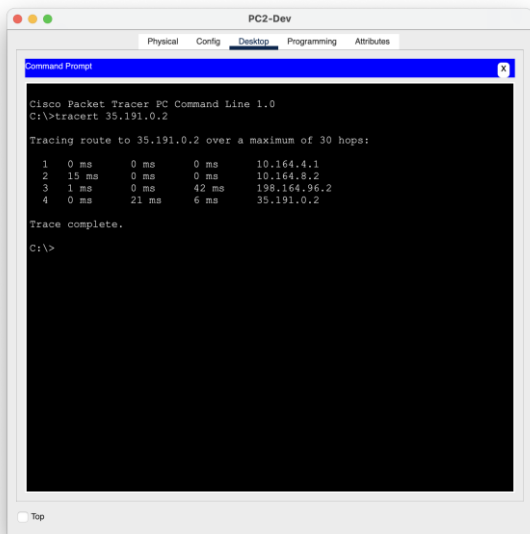
## Uji Konektivitas

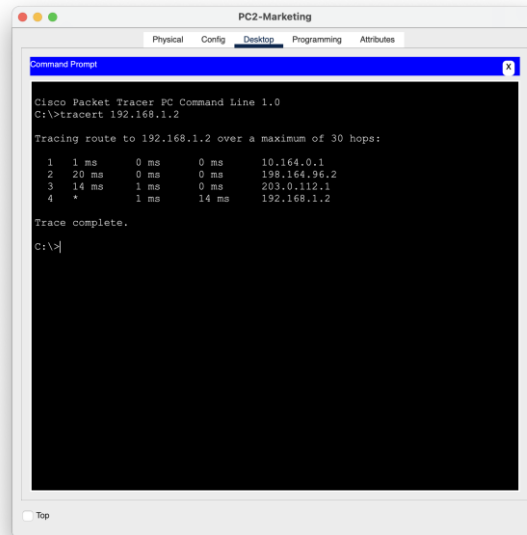
### Jawaban (Hapus yang bukan jawabannya):

- PC2-Dev ke Server Google: **Successful**
- PC1-Marketing ke PC1-Sales: **Successful**

### Bukti:

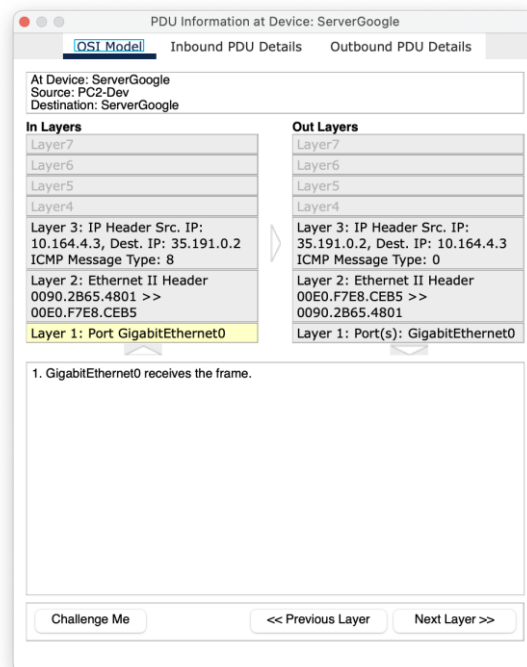
PDU List Window										
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC2-Dev	ServerGoogle	ICMP		0.000	N	0	(edit)	(delete)
	Successful	PC1-Ma...	PC1-Sales	ICMP		0.000	N	1	(edit)	(delete)





## OSI Model

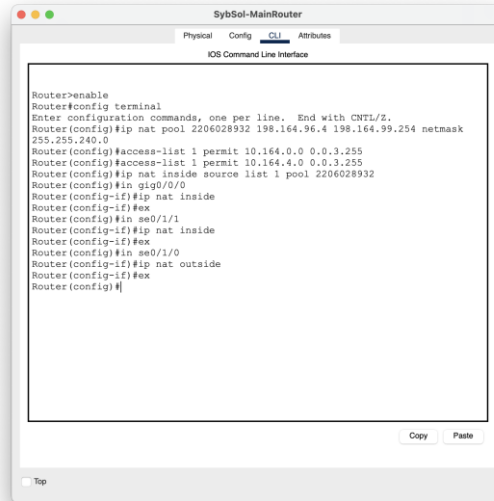
### OSI Model pada Server Google



## [29 Poin] Konfigurasi NAT

Cantumkan tangkapan layar yang berisikan konfigurasi NAT pada antarmuka CLI pada Router SybSol-Main.

### CLI Router SybSol-Main



```
Router>enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip nat pool 2206028932 198.164.96.4 198.164.99.254 netmask
255.255.240.0
Router(config)#access-list 1 permit 10.164.0.0 0.0.3.255
Router(config)#access-list 1 permit 10.164.4.0 0.0.3.255
Router(config)#ip nat inside source list 1 pool 2206028932
Router(config)#in gig0/0/0
Router(config-if)#ip nat inside
Router(config-if)#ex
Router(config)#in se0/1/1
Router(config-if)#ip nat inside
Router(config-if)#ex
Router(config)#in se0/1/0
Router(config-if)#ip nat outside
Router(config-if)#ex
Router(config)#
Router(config)#
```

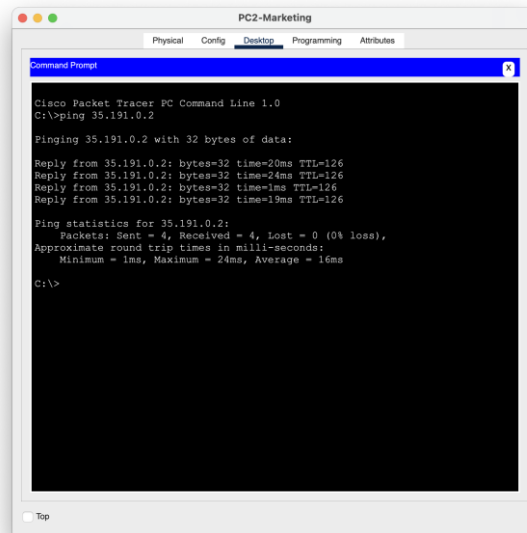
## Uji Konektivitas

**Jawaban (Hapus yang bukan jawabannya):**

- PC2-Marketing ke Server Google: **Successful**
- PC1-Dev ke PC1-R&D: **Failed**

**Bukti:**

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC2-Ma...	ServerGoogle	ICMP		0.000	N	0	(edit)	(delete)
	Failed	PC1-Dev	PC1-R&D	ICMP		0.000	N	1	(edit)	(delete)



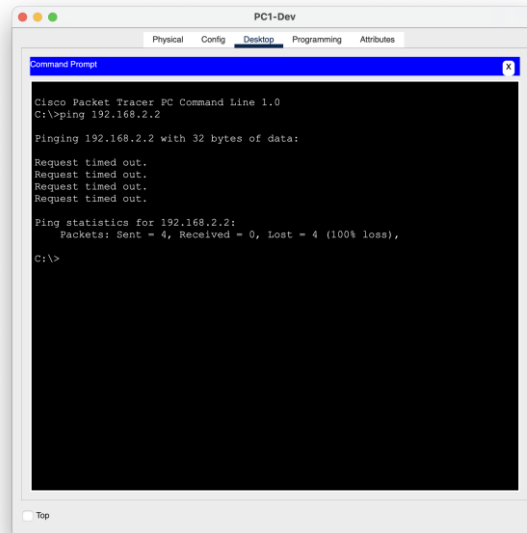
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 35.191.0.2

Pinging 35.191.0.2 with 32 bytes of data:

Reply from 35.191.0.2: bytes=32 time=20ms TTL=126
Reply from 35.191.0.2: bytes=32 time=24ms TTL=126
Reply from 35.191.0.2: bytes=32 time=1ms TTL=126
Reply from 35.191.0.2: bytes=32 time=19ms TTL=126

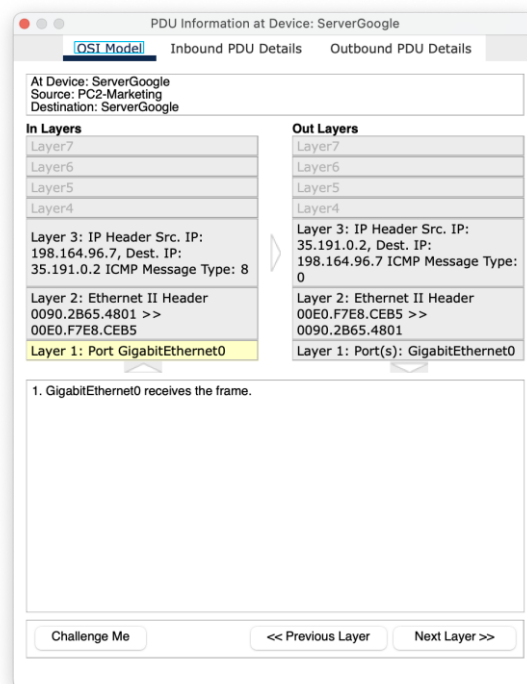
Ping statistics for 35.191.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 24ms, Average = 16ms

C:\>
```



## OSI Model

### OSI Model pada Server Google



## [10 Poin] Uji Konektivitas

Berikan tanda ✓ untuk hasil uji coba yang sukses dan tanda ✗ untuk hasil uji coba yang gagal. Anda juga dapat mewarnai kolom dengan warna hijau sebagai sukses dan merah sebagai gagal.

✓ / ✗	PC1-Marketing	PC2-Marketing	Laptop-Marketing	PC1-Dev	PC2-Dev	Laptop-Dev	Server Google
PC1-Marketing							
PC2-Marketing							
Laptop-Marketing							
PC1-Dev							
PC2-Dev							
Laptop-Dev							
Server Google							

Bukti Uji Konektivitas										
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
●	Successful	PC2-Ma...	PC1-Dev	ICMP		0.000	N	0	(edit)	(delete)
●	Successful	PC2-Ma...	PC2-Dev	ICMP		0.000	N	1	(edit)	(delete)
●	Successful	PC2-Ma...	Laptop-Dev	ICMP		0.000	N	2	(edit)	(delete)
●	Successful	PC2-Ma...	Laptop-Marketing	ICMP		0.000	N	3	(edit)	(delete)
●	Successful	PC2-Ma...	PC1-Marketing	ICMP		0.000	N	4	(edit)	(delete)
●	Successful	Laptop...	PC1-Dev	ICMP		0.000	N	5	(edit)	(delete)
●	Successful	Laptop...	Laptop-Dev	ICMP		0.000	N	6	(edit)	(delete)
●	Successful	Laptop...	PC2-Dev	ICMP		0.000	N	7	(edit)	(delete)
●	Successful	Laptop...	PC2-Marketing	ICMP		0.000	N	8	(edit)	(delete)
●	Successful	Laptop...	PC1-Marketing	ICMP		0.000	N	9	(edit)	(delete)
●	Successful	PC1-Ma...	PC1-Dev	ICMP		0.000	N	10	(edit)	(delete)
●	Successful	PC1-Ma...	Laptop-Dev	ICMP		0.000	N	11	(edit)	(delete)
●	Successful	PC1-Ma...	PC2-Dev	ICMP		0.000	N	12	(edit)	(delete)
●	Successful	PC1-Ma...	PC2-Marketing	ICMP		0.000	N	13	(edit)	(delete)
●	Successful	PC1-Ma...	Laptop-Marketing	ICMP		0.000	N	14	(edit)	(delete)
●	Successful	PC1-Dev	PC2-Marketing	ICMP		0.000	N	15	(edit)	(delete)
●	Successful	PC1-Dev	Laptop-Marketing	ICMP		0.000	N	16	(edit)	(delete)
●	Successful	PC1-Dev	PC1-Marketing	ICMP		0.000	N	17	(edit)	(delete)
●	Successful	PC1-Dev	Laptop-Dev	ICMP		0.000	N	18	(edit)	(delete)
●	Successful	PC1-Dev	PC2-Dev	ICMP		0.000	N	19	(edit)	(delete)
●	Successful	Laptop...	PC2-Marketing	ICMP		0.000	N	20	(edit)	(delete)
●	Successful	Laptop...	Laptop-Marketing	ICMP		0.000	N	21	(edit)	(delete)
●	Successful	Laptop...	PC1-Marketing	ICMP		0.000	N	22	(edit)	(delete)
●	Successful	Laptop...	PC1-Dev	ICMP		0.000	N	23	(edit)	(delete)
●	Successful	Laptop...	PC2-Dev	ICMP		0.000	N	24	(edit)	(delete)
●	Successful	PC2-Dev	PC2-Marketing	ICMP		0.000	N	25	(edit)	(delete)
●	Successful	PC2-Dev	Laptop-Marketing	ICMP		0.000	N	26	(edit)	(delete)
●	Successful	PC2-Dev	PC1-Marketing	ICMP		0.000	N	27	(edit)	(delete)
●	Successful	PC2-Dev	PC1-Dev	ICMP		0.000	N	28	(edit)	(delete)
●	Successful	PC2-Dev	Laptop-Dev	ICMP		0.000	N	29	(edit)	(delete)

## [12 Poin] Analisis

1. Pada CybSol-Router Main, interface mana yang berperan sebagai ip nat inside dan interface mana yang berperan sebagai ip nat outside? Apa yang terjadi jika keduanya ditukar?

### Jawaban

Tidak bisa, nat inside memetakan IP Adress yang ada di dalam jaringan lokal, sedangkan nat outside memberikan IP Address kepada jaringan lokal sehingga bisa dikenali dari luar. Jika

keduanya ditukar maka jaringan tidak akan bisa berjalan dengan semestinya. SybSol menggunakan satu interface sebagai nat outside dan dua interface sebagai nat inside.

2. Lihat OSI model pada uji coba menggunakan Simple PDU dari PC2-Dev ke Server google pada posisi At Device Router CybSol-Main dan posisi At Device Router Publik.
  - a. Apakah terdapat perbedaan? Jika ya, tunjukkan perbedaannya.
  - b. Jelaskan mengapa berbeda atau tidak berbeda.

### Jawaban

PDU Information at Device: SybSol-MainRouter

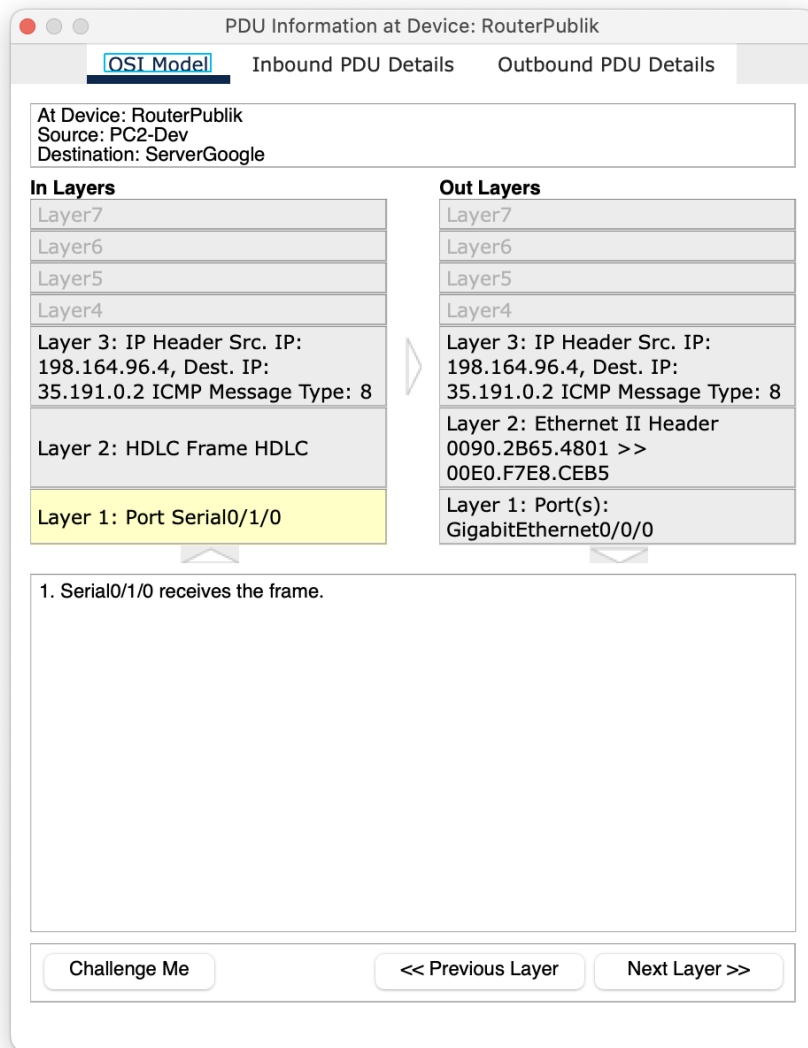
OSI Model   Inbound PDU Details   Outbound PDU Details

At Device: SybSol-MainRouter  
Source: PC2-Dev  
Destination: ServerGoogle

In Layers	Out Layers
Layer7	Layer7
Layer6	Layer6
Layer5	Layer5
Layer4	Layer4
Layer 3: IP Header Src. IP: 10.164.4.4, Dest. IP: 35.191.0.2 ICMP Message Type: 8	Layer 3: IP Header Src. IP: 198.164.96.4, Dest. IP: 35.191.0.2 ICMP Message Type: 8
Layer 2: HDLC Frame HDLC	Layer 2: HDLC Frame HDLC
Layer 1: Port Serial0/1/1	Layer 1: Port(s): Serial0/1/0

1. Serial0/1/1 receives the frame.

Challenge Me   << Previous Layer   Next Layer >>



- a. Ada, Terlihat pada gambar bahwa source IP dari in layer kedua paket berbeda
  - b. Kedua PDU memiliki perbedaan karena pada SybSol-MainRouter, router tersebut menggunakan NAT sehingga ip address internal 10.164.4.4 ditranslasikan agar bisa dikenali eksternal, menjadi 198.164.96.4.
3. Lakukan uji coba menggunakan Simple PDU dari PC1-R&D ke PC1-Dev.
- a. Apakah berhasil atau gagal? Tunjukkan hasilnya.
  - b. Jelaskan mengapa hal tersebut bisa terjadi. Sertakan juga buktinya.  
Hint: Lakukan analisis pada OSI Model.

**Jawaban**

Fire

Last Status

Source

Destination

Type

Color

Time(sec)

Periodic

Num

Edit

Delete

(delete)

Failed

PC1-R&D

PC1-Dev

ICMP

0.000

N

0

(edit)

PDU Information at Device: TechInv-MainRouter

OSI Model

Inbound PDU Details

Outbound PDU Details

At Device: TechInv-MainRouter

Source: PC1-R&D

Destination: PC1-Dev

In Layers

Layer7

Layer6

Layer5

Layer4

Layer 3: IP Header Src. IP: 192.168.2.3, Dest. IP: 10.164.4.2  
ICMP Message Type: 8

Layer 2: HDLC Frame HDLC

Layer 1: Port Serial0/1/0

Out Layers

Layer7

Layer6

Layer5

Layer4

Layer 3: IP Header Src. IP: 203.0.112.4, Dest. IP: 10.164.4.2  
ICMP Message Type: 8

Layer 2: HDLC Frame HDLC

Layer 1: Port(s): Serial0/1/1

1. The routing table finds a routing entry to the destination IP address.

2. The destination network can be reached via 203.0.112.2.

3. The device decrements the TTL on the packet.

4. The packet is going from an inside to an outside network. The device looks up its NAT table for necessary translations.

5. The packet matches an inside source list and creates a new entry for source local address.

6. The device translates the packet from local to global addresses with the matched entry.

Challenge Me

<< Previous Layer

Next Layer >>



PDU Information at Device: SybSol-MainRouter

OSI Model

Inbound PDU Details

Outbound PDU Details

At Device: SybSol-MainRouter  
Source: PC1-R&D  
Destination: PC1-Dev

In Layers

Layer7

Layer6

Layer5

Layer4

Layer 3: IP Header Src. IP: 203.0.112.4, Dest. IP: 10.164.4.2  
ICMP Message Type: 8

Layer 2: HDLC Frame HDLC

Layer 1: Port Serial0/1/0

Out Layers

Layer7

Layer6

Layer5

Layer4

Layer 3: IP Header Src. IP: 203.0.112.4, Dest. IP: 10.164.4.2  
ICMP Message Type: 8

Layer 2: HDLC Frame HDLC

Layer 1: Port(s): Serial0/1/1

1. The routing table finds a routing entry to the destination IP address.  
2. The destination network can be reached via 10.164.8.1.  
3. The device decrements the TTL on the packet.

Challenge Me

<< Previous Layer

Next Layer >>

PDU Information at Device: TechInv-MainRouter

**OSI Model**   Inbound PDU Details   Outbound PDU Details

At Device: TechInv-MainRouter  
Source: PC1-R&D  
Destination: PC1-Dev

In Layers	Out Layers
Layer7	Layer7
Layer6	Layer6
Layer5	Layer5
Layer4	Layer4
Layer 3: IP Header Src. IP: 198.164.96.5, Dest. IP: 203.0.112.4 ICMP Message Type: 0	Layer 3: IP Header Src. IP: 198.164.96.5, Dest. IP: 203.0.112.4 ICMP Message Type: 0
Layer 2: HDLC Frame HDLC	Layer 2: HDLC Frame HDLC
Layer 1: Port Serial0/1/1	Layer 1: Port(s): Serial0/1/1

1. The packet is coming from an outside network. The device looks up its NAT table for necessary translations.  
2. The NAT table does not have a matched entry for this packet. It passes the packet through without translations.  
3. The device looks up the destination IP address in the routing table.

Challenge Me   << Previous Layer   Next Layer >>

- Bisa dilihat pada tangkapan layar pertama bahwa paket gagal dikirimkan
- Paket gagal dikirimkan karena pada awalnya PC1-R&D (A) berhasil mengirim paket ke PC1-Dev (B). Main router di TechInv mentranslasikan IP Address dari A (192.168.2.3) menjadi IP Address yang bisa dikenali eksternal (203.0.112.4) dan berhasil diteruskan ke B. Namun ketika B ingin mengirimkan acknowledgement terhadap kiriman A, NAT yang dimiliki Router SybSol mentranslasikan IP Address B (10.164.4.2) menjadi (198.164.96.5) sehingga ketika ingin dikembalikan oleh router TechInv, router tersebut kebingungan karena tidak bisa memetakan paket acknowledgement tersebut ke paket manapun yang dikirim oleh device dalam jaringan. Alhasil paket akan dibolak-balikkan antara router TechInv dan router publik hingga timeout dan pengiriman paket gagal.