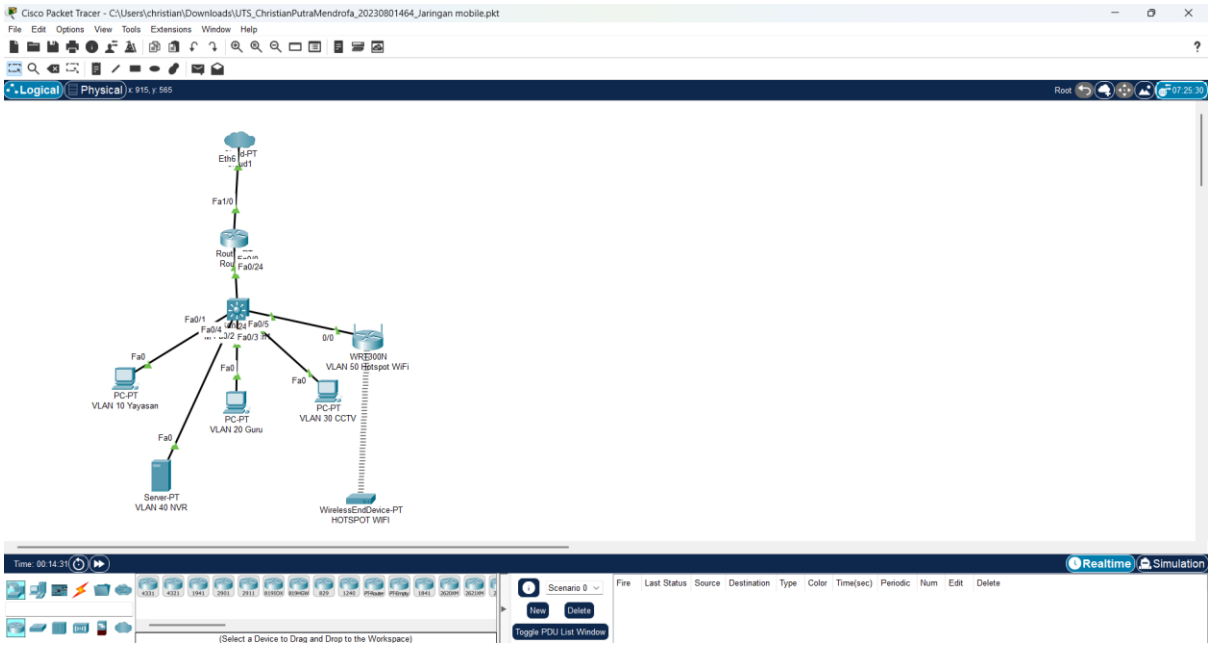
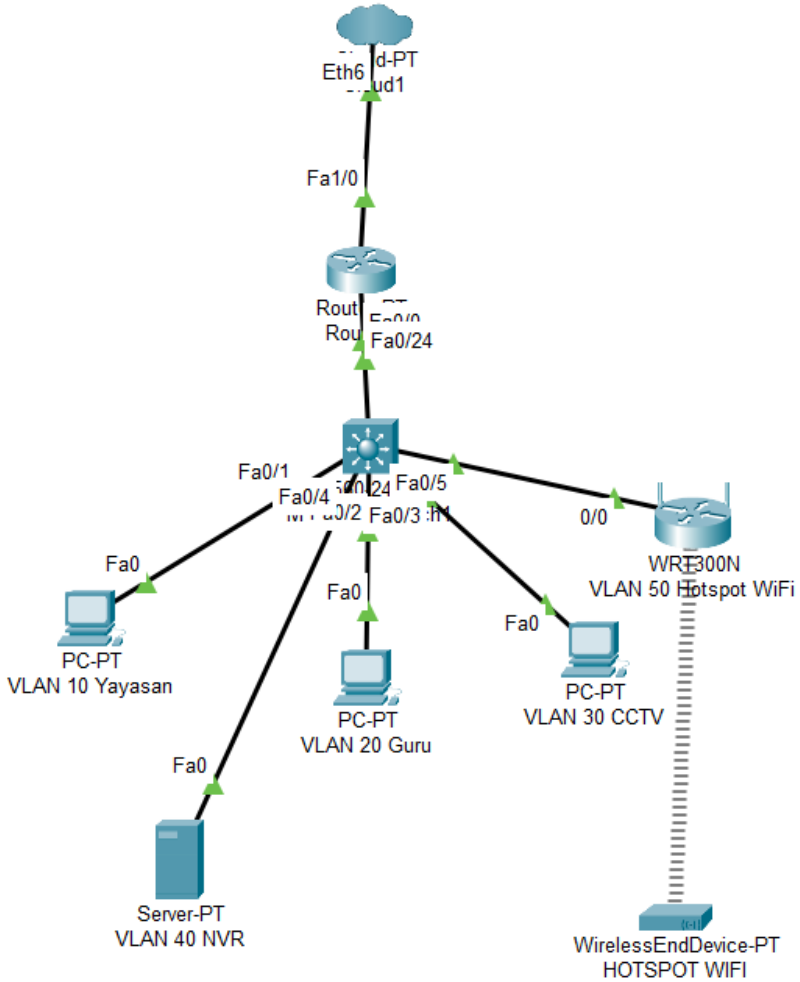

Cisco Packet Tracer - C:\Users\christian\Downloads\UTS_ChristianPutraMendrofa_20230801464_Jaringan mobile.pkt
File Edit Options View Tools Extensions Window Help
Logical
Physical
Fa1/0
Fa0/24
Fa0/1
Fa0/5
0/0
WRT300N
VLAN 50 Hotspot WiFi
Fa0
PC-PT
VLAN 10 Yayasan
PC-PT
VLAN 20 Guru
PC-PT
VLAN 30 CCTV
Server-PT
VLAN 40 NVR
WirelessEndDevice-PT
HOTSPOT WIFI
Realtime
Simulation
(Select a Device to Drag and Drop to the Workspace)


Fa1/0
Fa0/24
Fa0/1
Fa0/5
0/0
WRT300N
VLAN 50 Hotspot WiFi
Fa0
PC-PT
VLAN 10 Yayasan
PC-PT
VLAN 20 Guru
PC-PT
VLAN 30 CCTV
Server-PT
VLAN 40 NVR
WirelessEndDevice-PT
HOTSPOT WIFI

1. Ringkasan topologi & tujuan

Topologi yang diimplementasikan terdiri dari:

- 1 × Router (menghubungkan ke Cloud/ISP dan ke switch)
- 1 × Switch (Cisco 3560/2960 sebagai switch akses; port Fa0/3 sebagai trunk ke Router)
- PC/Server/Device di beberapa VLAN:
    - VLAN 10 — **Yayasan** (PC Yayasan)
    - VLAN 20 — **Guru** (PC Guru)
    - VLAN 30 — **CCTV** (PC CCTV / kamera)
    - VLAN 40 — **Server / NVR** (Server fisik)
    - VLAN 50 — **Hotspot WiFi** (WRT300N AP + wireless clients)
- Cloud (Internet) terhubung ke Router.

Tabel Perangkat

No	Perangkat	Model	Fungsi	Port yang Dipakai
1	Router	Cisco 2811/1941	Router-on-a-Stick, NAT, DHCP	Fa0/0, Fa1/0
2	Switch	Cisco 2960-24PS	Pengelompokan VLAN & trunk	Fa0/1–Fa0/6 (access), Fa0/3 (trunk)
3	PC Yayasan	PC-PT	Host VLAN 10	Fa0/1
4	PC Guru	PC-PT	Host VLAN 20	Fa0/2
5	PC CCTV	PC-PT	Host VLAN 30	Fa0/5
6	Server NVR	Server-PT	Host VLAN 40	Fa0/4
7	Access Point Hotspot	WRT300N	WiFi Hotspot VLAN 50	Fa0/6
8	Laptop Hotspot	WirelessEndDevice	Client VLAN 50 Hotspot	Wireless
9	Cloud/ISP	Cloud-PT	Simulasi Internet	Fa1/0 Router

Addressing Table

Perangkat	Interface	VLAN	IP Address	Subnet Mask	Gateway
PC Yayasan	FastEthernet0	10	192.168.10.10	255.255.255.0	192.168.10.254
PC Guru	FastEthernet0	20	192.168.20.10	255.255.255.0	192.168.20.254
PC CCTV	FastEthernet0	30	192.168.30.10	255.255.255.0	192.168.30.254
Server NVR	FastEthernet0	40	192.168.40.10	255.255.255.0	192.168.40.254
Hotspot AP	FastEthernet0	50	192.168.50.2	255.255.255.0	192.168.50.254
Router Subif	Fa0/0.10	10	192.168.10.254	255.255.255.0	—
Router Subif	Fa0/0.20	20	192.168.20.254	255.255.255.0	—
Router Subif	Fa0/0.30	30	192.168.30.254	255.255.255.0	—
Router Subif	Fa0/0.40	40	192.168.40.254	255.255.255.0	—
Router Subif	Fa0/0.50	50	192.168.50.254	255.255.255.0	—
Router → Cloud	Fa1/0	—	10.10.10.2	255.255.255.252	10.10.10.1

Tujuan:

1. Memisahkan jaringan ke VLAN sesuai fungsi.
2. Mengaktifkan inter-VLAN routing sehingga host di VLAN berbeda bisa saling berkomunikasi.
3. Router melakukan NAT ke Internet (Cloud).
4. Hotspot (VLAN50) berjalan lewat trunk dan laptop wireless bisa mendapatkan akses.
5. Menyusun dokumentasi langkah konfigurasi, verifikasi, dan troubleshooting.

2. Perencanaan alamat IP (Addressing plan)

Gunakan subnet /24 per VLAN:

VLAN	Nama	Subnet	Gateway (Router-on-a-Stick)
10	YAYASAN	192.168.10.0/24	192.168.10.254
20	GURU	192.168.20.0/24	192.168.20.254
30	CCTV	192.168.30.0/24	192.168.30.254
40	SERVER	192.168.40.0/24	192.168.40.254
50	HOTSPOT	192.168.50.0/24	192.168.50.254

Link Router↔Switch	—	192.168.100.0/30	Router: 192.168.100.1, Switch (tidak diperlukan jika trunk)

3. Langkah implementasi (step-by-step)

3.1. Persiapan perangkat di Packet Tracer

1. Tarik perangkat: 1 Router (mis. 2811/1941), 1 Switch (3560/2960), 1 Cloud, PC/Server/AP sesuai jumlah.
2. Sambungkan kabel:
    - Router Fa0/0 ↔ Switch Fa0/3 (menggunakan kabel Copper Straight-Through) — ini jadi trunk.
    - PC/Server/AP ke port access di Switch (fa0/1..fa0/6 sesuai layout).
    - Router ke Cloud (mis Fa0/1 atau Fa1/0) untuk Internet.

3.2. Konfigurasi VLAN & Access port di Switch (L2)

Masuk ke CLI switch:

```
enable
conf t
vlan 10
 name YAYASAN
vlan 20
 name GURU
vlan 30
 name CCTV
vlan 40
 name SERVER
vlan 50
 name HOTSPOT
!
interface fa0/1
 switchport mode access
 switchport access vlan 10
 no shutdown
```

```
interface fa0/2
 switchport mode access
 switchport access vlan 20
 no shutdown
interface fa0/3
 switchport mode trunk
 switchport trunk allowed vlan 1,10,20,30,40,50
 no shutdown
interface fa0/4
 switchport mode access
 switchport access vlan 40
 no shutdown
interface fa0/5
 switchport mode access
 switchport access vlan 30        ! (atau sesuai kabel CCTV)
 no shutdown
interface fa0/6
 switchport mode access
 switchport access vlan 50
 no shutdown
end
wr
```

3.3. Konfigurasi Router — Router-on-a-Stick (subinterfaces)

Di router, buat sub-interface pada interface yang terhubung ke switch (contoh Fa0/0):

```
enable
conf t
interface Fa0/0
 no ip address
!
interface Fa0/0.10
```

```
 encapsulation dot1Q 10
 ip address 192.168.10.254 255.255.255.0
!
interface Fa0/0.20
 encapsulation dot1Q 20
 ip address 192.168.20.254 255.255.255.0
!
interface Fa0/0.30
 encapsulation dot1Q 30
 ip address 192.168.30.254 255.255.255.0
!
interface Fa0/0.40
 encapsulation dot1Q 40
 ip address 192.168.40.254 255.255.255.0
!
interface Fa0/0.50
 encapsulation dot1Q 50
 ip address 192.168.50.254 255.255.255.0
!
no shutdown
end
wr
```

3.4. NAT di Router (agar host bisa akses Internet via Cloud)

Asumsi: Router punya interface ke Cloud Fa1/0 (atau interface lain). Lakukan NAT overload:

```
conf t
access-list 1 permit 192.168.0.0 0.0.255.255
interface Fa0/0.1    ! contoh interface ke Internet (sesuaikan)
 ip nat inside       ! interface yang mengarah ke internal? sesuaikan
interface Fa1/0
```

ip nat outside

exit

ip nat inside source list 1 interface Fa1/0 overload

end

wr

3.5. Set IP di PC/Server/AP (di Packet Tracer GUI)

Klik PC → Desktop → IP Configuration, isi:

- PC Yayasan: 192.168.10.10 /255.255.255.0 /GW 192.168.10.254
- PC Guru: 192.168.20.10 /GW 192.168.20.254
- PC CCTV: 192.168.30.10 /GW 192.168.30.254
- Server NVR: 192.168.40.10 /GW 192.168.40.254
- AP (WRT) LAN IP static: 192.168.50.2 /GW 192.168.50.254 (disable DHCP on AP if using router DHCP)

4. Verifikasi & pengujian

4.1. Perintah verifikasi penting (Switch)

- show vlan brief — memastikan VLAN ada dan port akses benar.
- show interfaces trunk — memastikan trunk aktif dan VLAN lewat.
- show running-config — cek konfigurasi port/VLAN.

Contoh output ideal show interfaces trunk:

Port Mode Encapsulation Status Native vlan

Fa0/3 on 802.1q trunking 1

Vlans allowed on trunk 1,10,20,30,40,50

Vlans in forwarding state 1,10,20,30,40,50

4.2. Perintah verifikasi (Router)

- show ip interface brief — memastikan subinterfaces muncul dan status up/up.
- show ip route — memastikan route ke internal networks ada (connected via subinterfaces).
- show ip nat translations — jika NAT aktif untuk koneksi Internet.

4.3. Pengujian konektivitas

Dari PC di VLAN 10:

- ping 192.168.10.254 → harus berhasil.
- ping 192.168.20.10 → harus berhasil (inter-VLAN via router).
- ping 192.168.40.10 → akses server.
- ping 8.8.8.8 → uji Internet (jika NAT & Cloud dikonfigurasi).

5. Troubleshooting umum & solusi

Masalah A — Trunk tidak forwarding VLAN (Fa0/3 status none)

Penyebab:

- Port trunk belum dikonfigurasi benar di switch / router parent interface masih ada IP.
  Perbaikan:
- Pastikan parent interface router **tidak** punya IP. Gunakan subinterfaces.
- Di switch: interface fa0/3 → switchport mode trunk & switchport trunk allowed vlan 1,10,....
- Cek STP: jika trunk masih blocking, aktifkan spanning-tree portfast trunk (dengan hati-hati) jika link ke router/AP pasti tidak menyebabkan loop.

Masalah B — Subinterface Fa0/0.10 tidak muncul / tidak up

Penyebab:

- Parent interface shutdown atau subinterface typo.
  Perbaikan:
- Pastikan no shutdown pada parent interface.
- Pastikan encapsulation dot1Q x pada tiap subinterface.

Masalah C — PC tidak bisa ping gateway lokal

Penyebab:

- Port PC belum diassign ke VLAN yang benar.
  Perbaikan:
- Di switch, interface fa0/X → switchport access vlan N → no shutdown.

Masalah D — NAT tidak bekerja / Internet tidak bisa

Penyebab:

- ip nat inside/outside belum diterapkan, atau default route di router ke Cloud belum ada.
  Perbaikan:

- Tandai interface inside/outside, buat ip nat inside source list ... interface <outside> overload, serta tambahkan ip route 0.0.0.0 0.0.0.0 <gateway ISP> pada router.

6. Keamanan & best practices singkat

- Aktifkan line vty password & SSH untuk remote management.
- Matikan VLAN1 manajemen atau pindahkan IP manajemen ke VLAN khusus.
- Tambahkan bpduguard di port access untuk mencegah loop (kecuali trunk ke router/AP).
- Batasi VLAN yang di-allow di trunk hanya yang diperlukan.
- Nonaktifkan layanan yang tidak perlu (service tcp-small servers, dll) di router/switch.

7. Konfigurasi Lengkap

Konfigurasi Switch :

```
enable
conf t
vlan 10
 name YAYASAN
vlan 20
 name GURU
vlan 30
 name CCTV
vlan 40
 name SERVER
vlan 50
 name HOTSPOT
!
interface fa0/1
 switchport mode access
 switchport access vlan 10
!
interface fa0/2
 switchport mode access
```

```
 switchport access vlan 20
!
interface fa0/4
 switchport mode access
 switchport access vlan 40
!
interface fa0/5
 switchport mode access
 switchport access vlan 30
!
interface fa0/6
 switchport mode access
 switchport access vlan 50
!
interface fa0/3
 switchport mode trunk
 switchport trunk allowed vlan 1,10,20,30,40,50
 no shutdown
end
wr
```

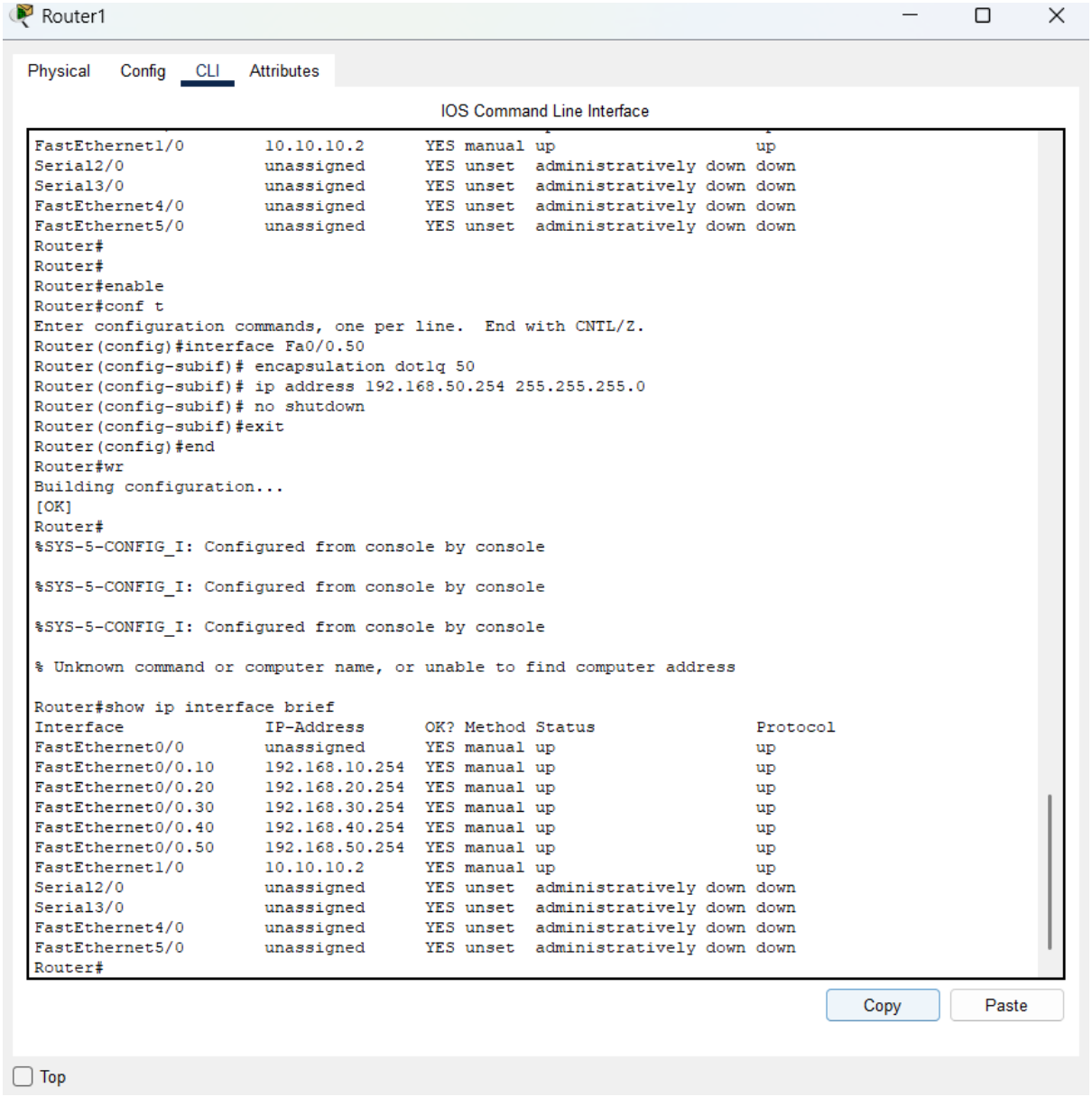
Konfigurasi Router :

```
enable
conf t
interface Fa0/0
 no ip address
!
interface Fa0/0.10
 encapsulation dot1Q 10
 ip address 192.168.10.254 255.255.255.0
```

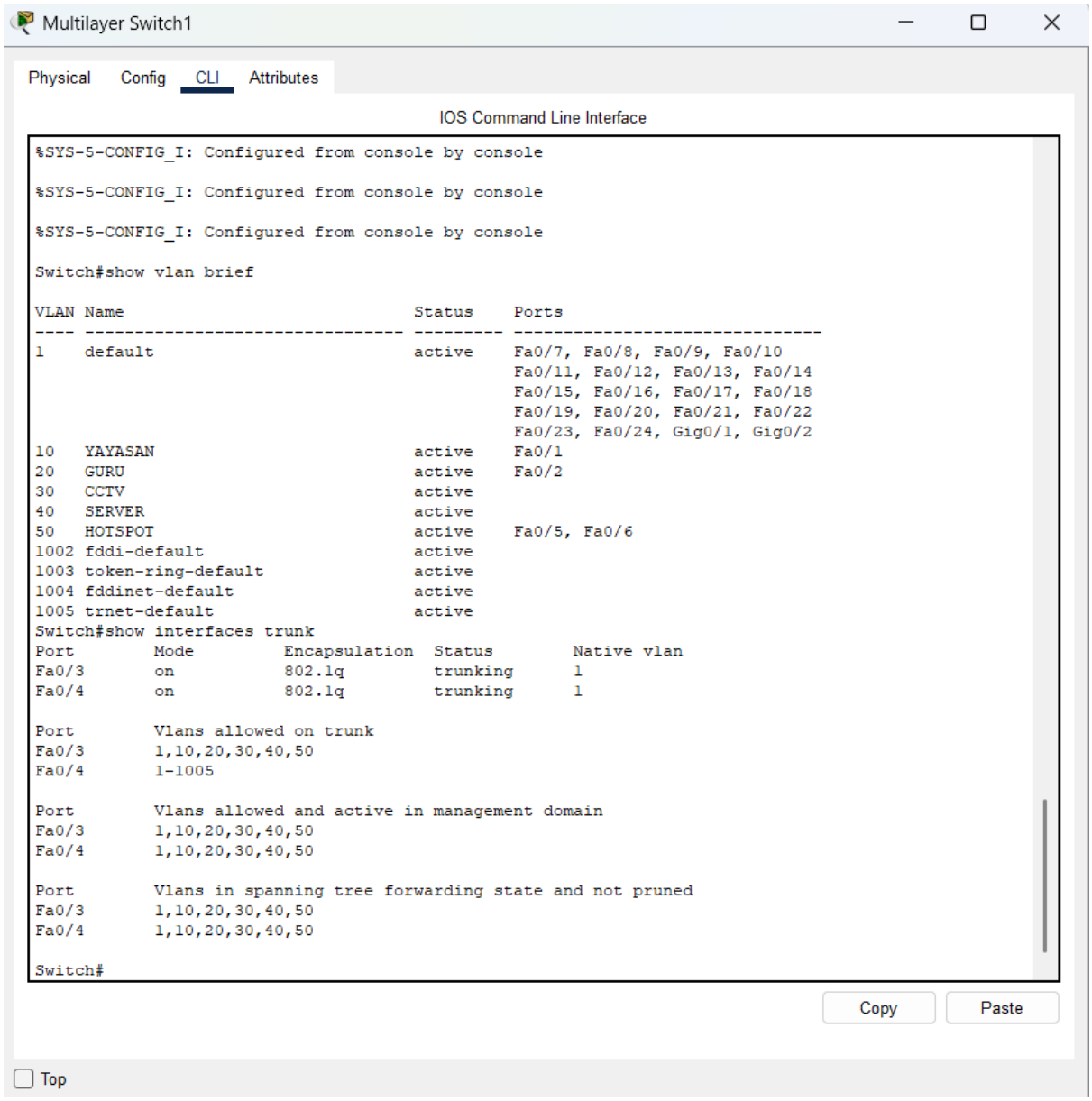
```
!
interface Fa0/0.20
 encapsulation dot1Q 20
 ip address 192.168.20.254 255.255.255.0
!
interface Fa0/0.30
 encapsulation dot1Q 30
 ip address 192.168.30.254 255.255.255.0
!
interface Fa0/0.40
 encapsulation dot1Q 40
 ip address 192.168.40.254 255.255.255.0
!
interface Fa0/0.50
 encapsulation dot1Q 50
 ip address 192.168.50.254 255.255.255.0
!
interface Fa1/0
 ip address 10.10.10.2 255.255.255.252
 ip nat outside
!
interface Fa0/0
 ip nat inside
!
access-list 1 permit 192.168.0.0 0.0.255.255
ip nat inside source list 1 interface Fa1/0 overload
end
wr
```

VERIFIKASI

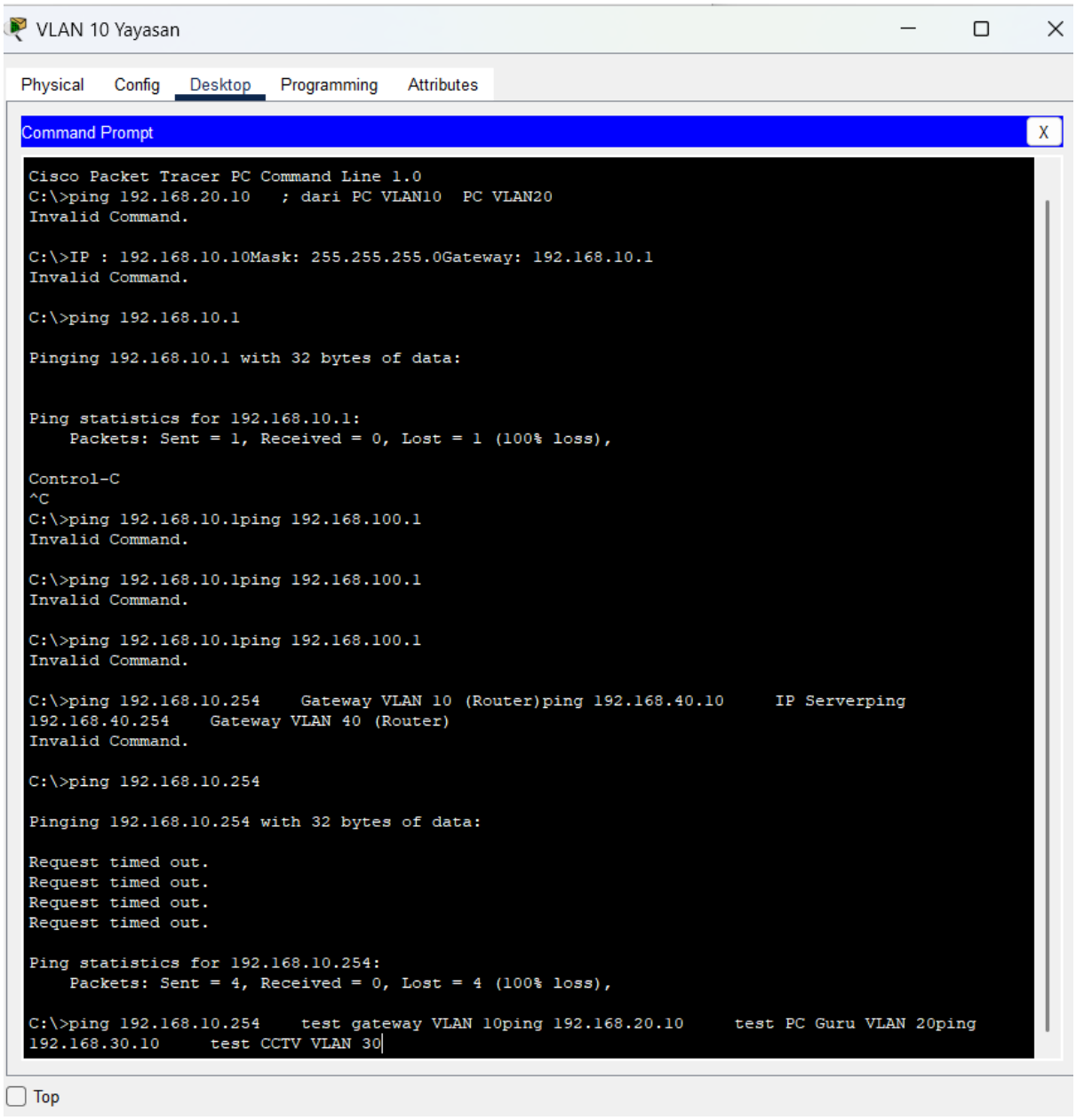
Cek Status Interface Router

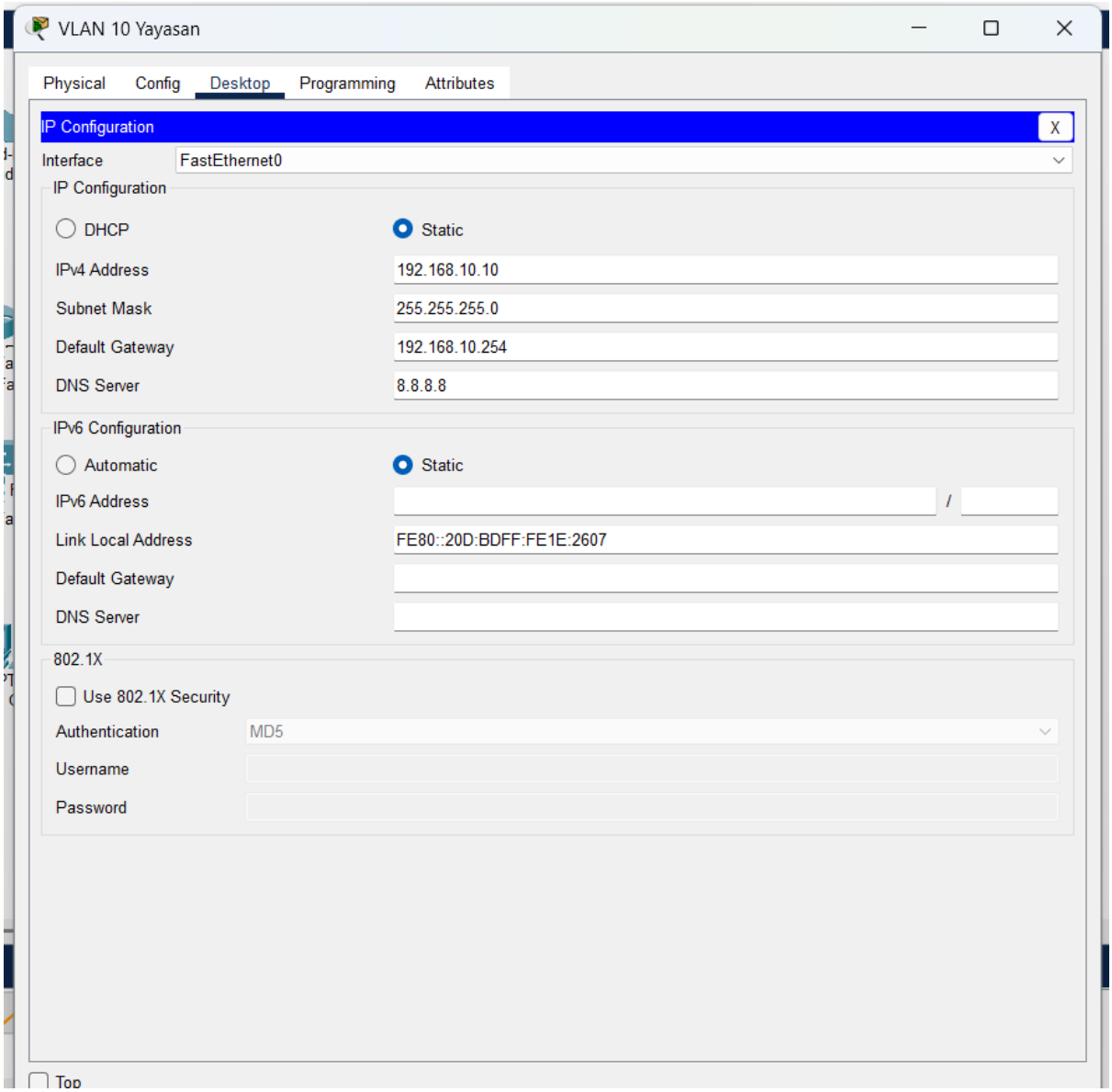


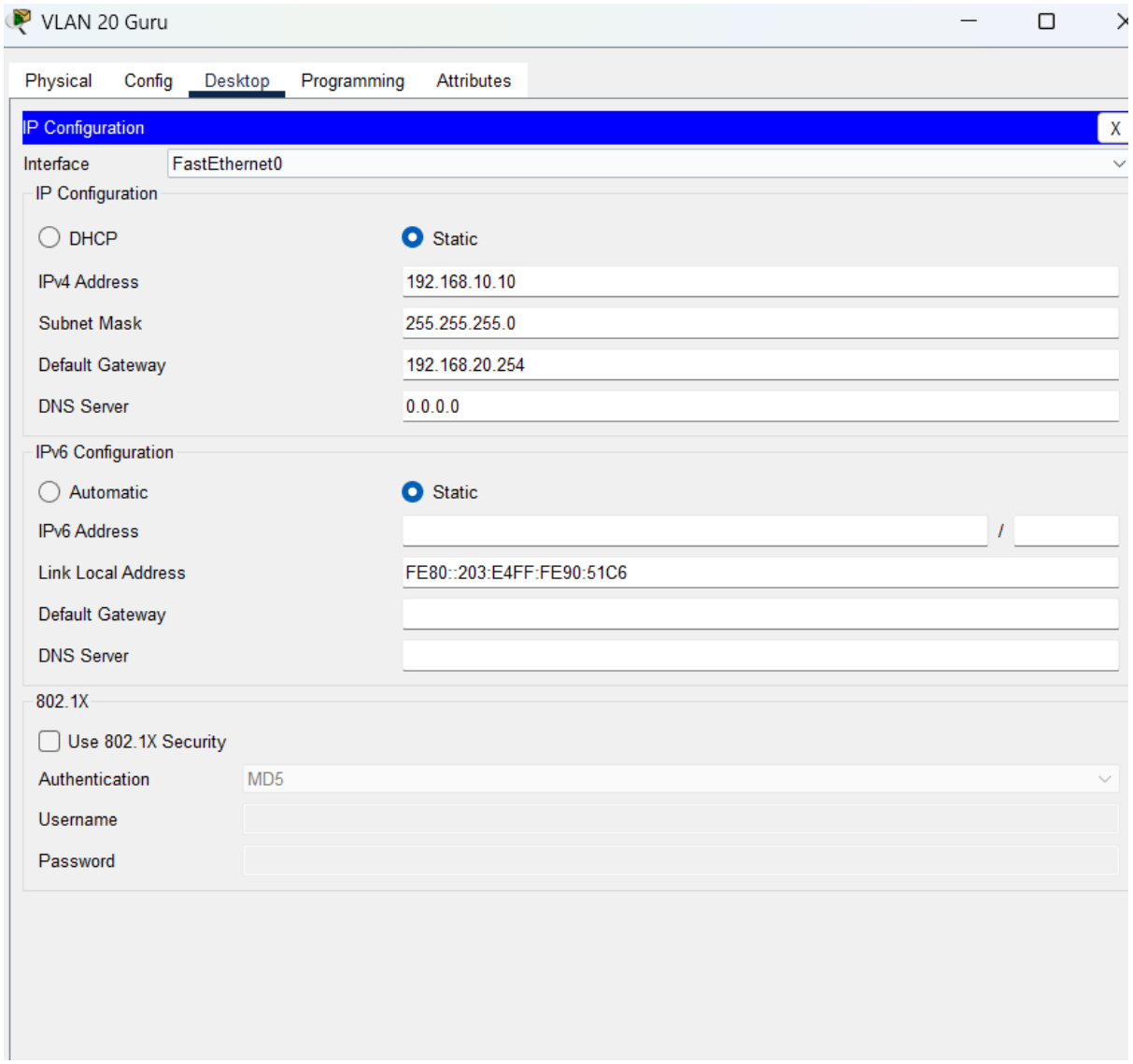
Cek VLAN & Trunk di Switch

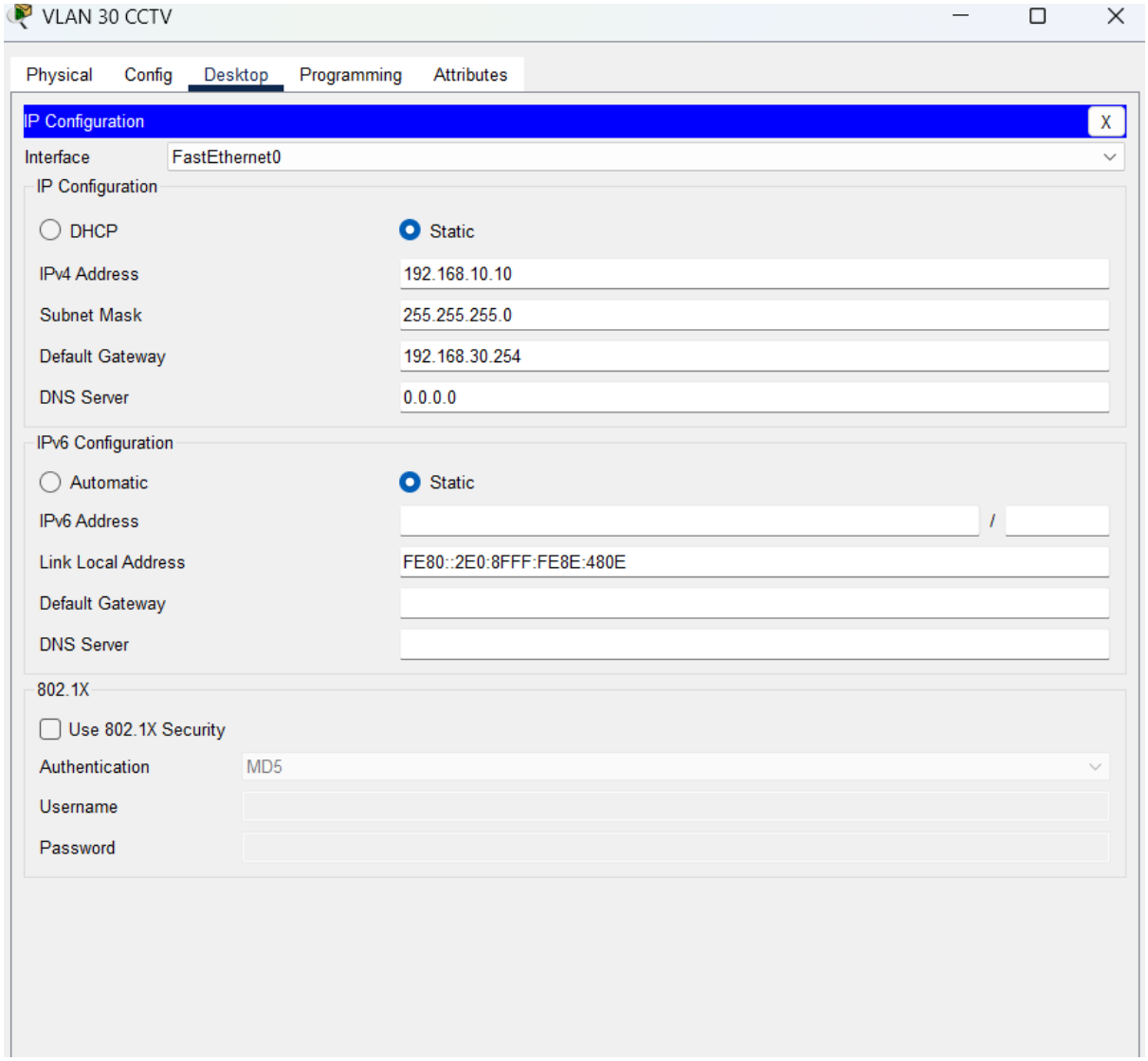


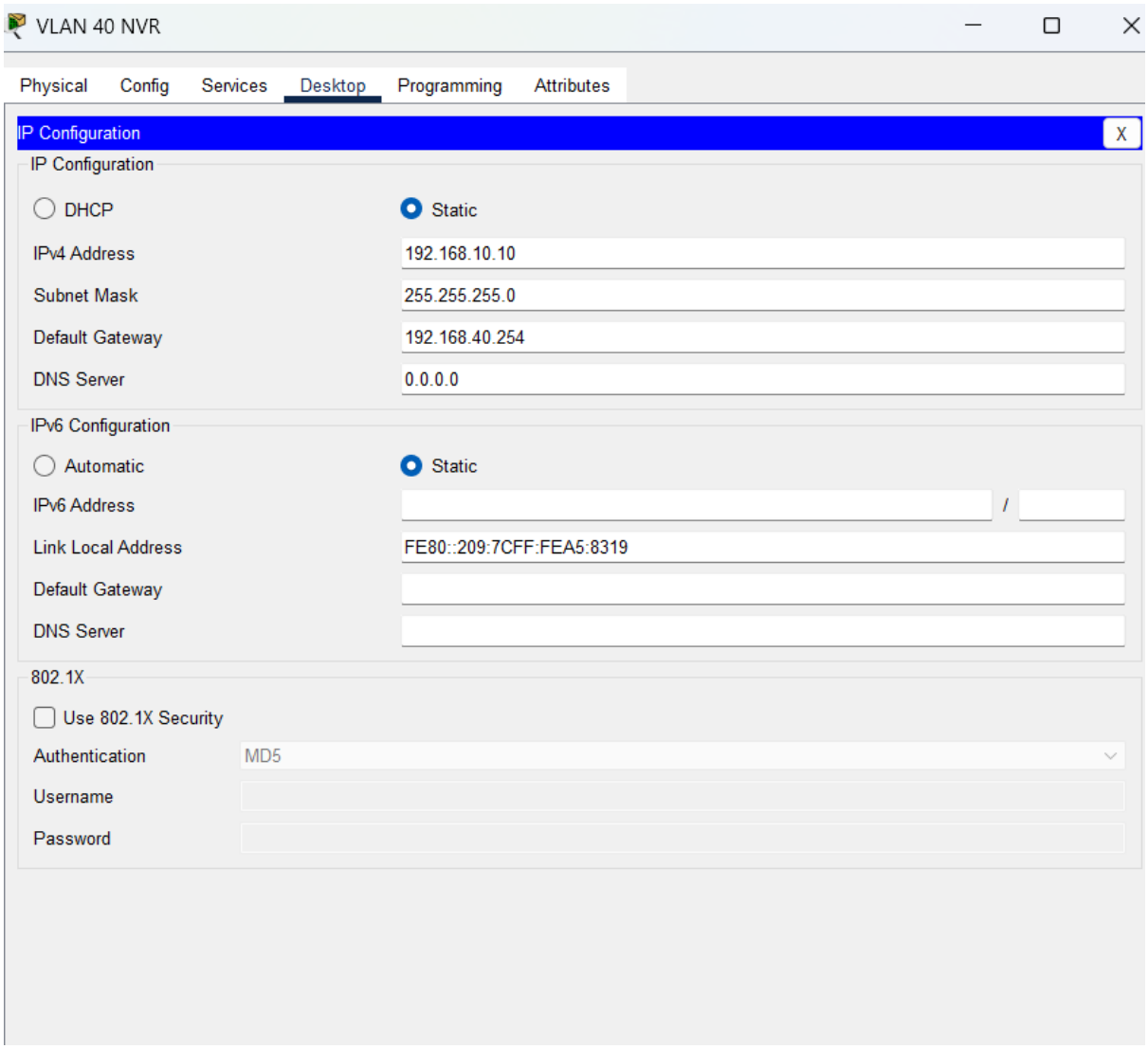
Test Ping Antar Perangkat (Inter-VLAN Routing)




VLAN 10 Yayasan
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.10.10
Subnet Mask
255.255.255.0
Default Gateway
192.168.10.254
DNS Server
8.8.8.8
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::20D:BDFF:FE1E:2607
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password
Top


VLAN 20 Guru
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.10.10
Subnet Mask
255.255.255.0
Default Gateway
192.168.20.254
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::203:E4FF:FE90:51C6
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password


VLAN 30 CCTV
Physical
Config
Desktop
Programming
Attributes
IP Configuration
X
Interface
FastEthernet0
IP Configuration
DHCP
Static
IPv4 Address
192.168.10.10
Subnet Mask
255.255.255.0
Default Gateway
192.168.30.254
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::2E0:8FFF:FE8E:480E
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password


VLAN 40 NVR
Physical
Config
Services
Desktop
Programming
Attributes
IP Configuration
X
IP Configuration
DHCP
Static
IPv4 Address
192.168.10.10
Subnet Mask
255.255.255.0
Default Gateway
192.168.40.254
DNS Server
0.0.0.0
IPv6 Configuration
Automatic
Static
IPv6 Address
/
Link Local Address
FE80::209:7CFF:FEA5:8319
Default Gateway
DNS Server
802.1X
Use 802.1X Security
Authentication
MD5
Username
Password