

UTS – JARINGAN MOBILE CIE514



Dosen :

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Langkah-Langkah membuat topology UTS Jaringan Mobile

1. menentukan perangkat keras dan kabel yang di gunakan:

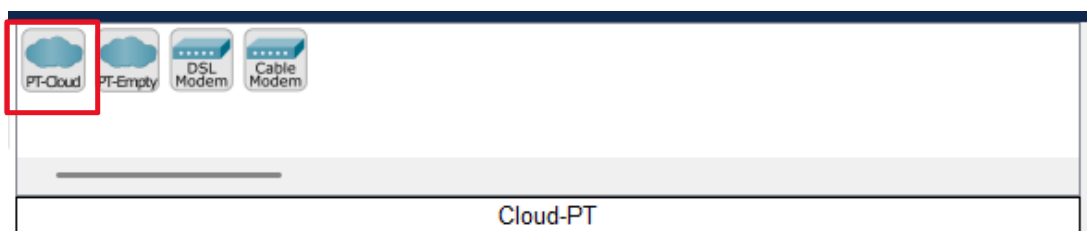
1) kabel yang di gunakan

- kabel copper straight-Through

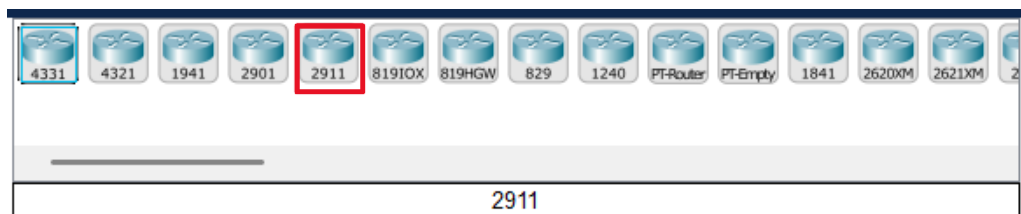


2) Perangkat yang di gunakan

- Cloud PT



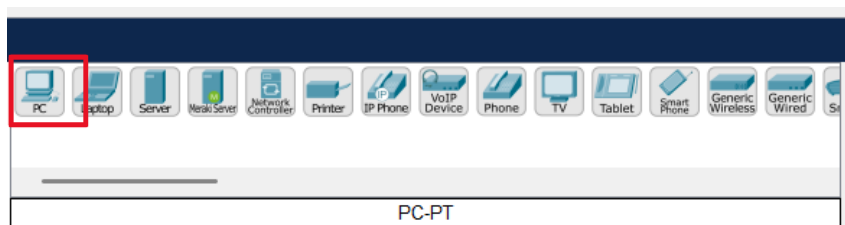
- Router 2911



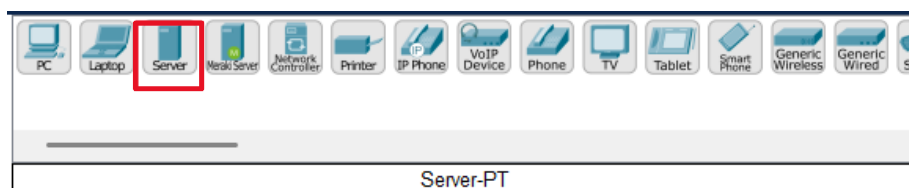
- Switch 2960



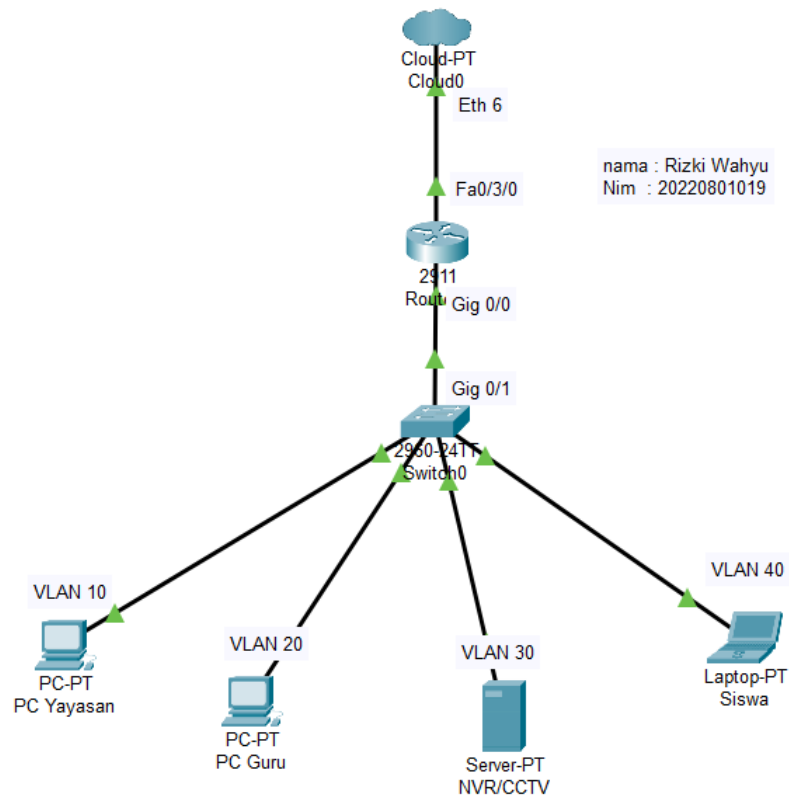
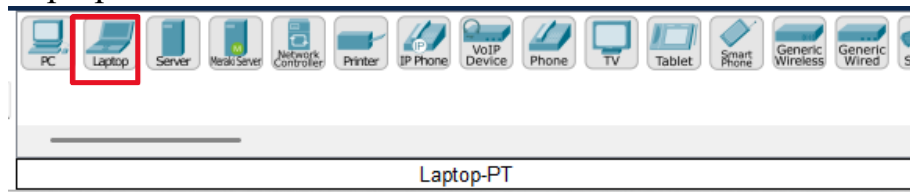
- PC-PT



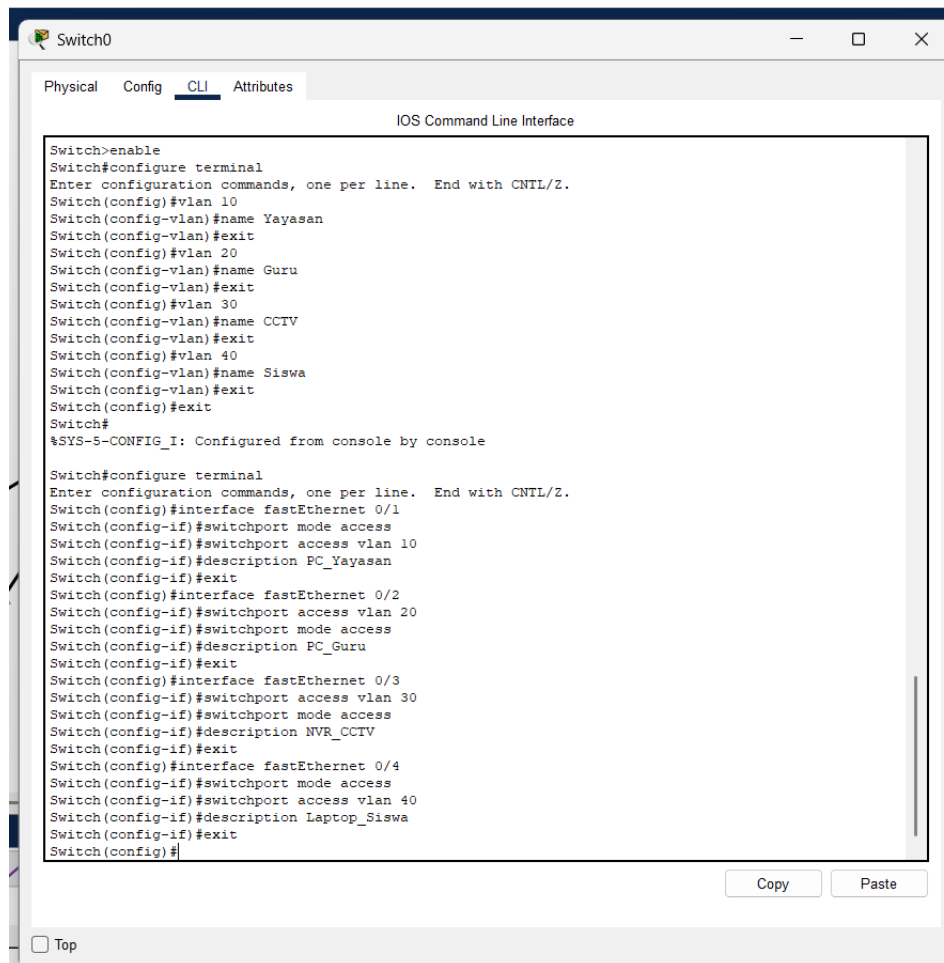
- Server



- Laptop



2. Konfigurasi Switch



```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name Yayasan
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name Guru
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name CCTV
Switch(config-vlan)#exit
Switch(config)#vlan 40
Switch(config-vlan)#name Siswa
Switch(config-vlan)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface fastEthernet 0/1
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#description PC_Yayasan
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/2
Switch(config-if)#switchport access vlan 20
Switch(config-if)#switchport mode access
Switch(config-if)#description PC_Guru
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/3
Switch(config-if)#switchport access vlan 30
Switch(config-if)#switchport mode access
Switch(config-if)#description NVR_CCTV
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/4
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 40
Switch(config-if)#description Laptop_Siswa
Switch(config-if)#exit
Switch(config)#
```

Konfigurasi ini bertujuan untuk membuat pemisahan jaringan menggunakan VLAN (Virtual Local Area Network) agar setiap bagian jaringan memiliki segmen tersendiri sesuai fungsinya. Dengan VLAN, komunikasi antar divisi atau perangkat bisa diatur dan diamankan lebih mudah.

1) Pembuatan VLAN

Pada bagian awal, dibuat empat VLAN dengan perintah:

VLAN 10 (Yayasan): untuk perangkat administrasi yayasan.

VLAN 20 (Guru): untuk komputer guru.

VLAN 30 (CCTV): untuk perangkat kamera dan NVR.

VLAN 40 (Siswa): untuk komputer siswa.

Setiap VLAN memiliki ID unik yang akan digunakan untuk membedakan lalu lintas data di dalam jaringan.

2) Pengaturan Port Akses

Setiap port pada switch diatur agar hanya menjadi anggota dari satu VLAN tertentu dengan mode access:

Konfigurasi serupa dilakukan pada port lain:

- port Fa0/1 terhubung ke komputer yayasan dan hanya berkomunikasi di VLAN 10.
- Fa0/2 → VLAN 20 (PC_Guru)
- Fa0/3 → VLAN 30 (NVR_CCTV)
- Fa0/4 → VLAN 40 (Laptop_Siswa)

Dengan pengaturan ini, tiap perangkat hanya dapat berkomunikasi dengan perangkat lain yang berada dalam VLAN yang sama — meningkatkan keamanan dan efisiensi jaringan.

3) Penjelasan Konfigurasi Trunk pada Switch

```
Switch(config-if)#exit
Switch(config)#interface gigabitEthernet 0/1
Switch(config-if)#switchport mode trunk

Switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan 10,20,30,40
Switch(config-if)#description
% Incomplete command.
Switch(config-if)#description Trunk_to_Router
Switch(config-if)#exit
Switch(config)#
```

Bagian konfigurasi ini digunakan untuk menghubungkan switch ke router melalui port GigabitEthernet0/1 dengan mode trunk.

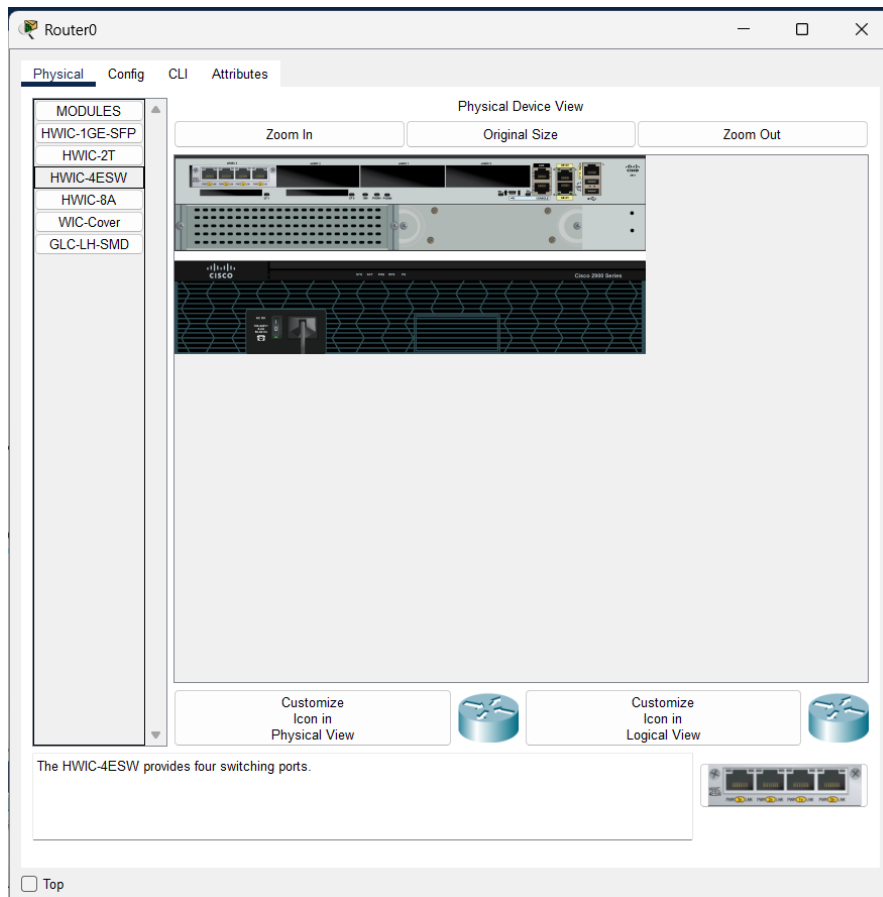
Tujuan utamanya adalah agar satu kabel antar perangkat bisa membawa lalu lintas dari beberapa VLAN sekaligus (inter-VLAN communication).

Fungsi Konfigurasi:

- switchport mode trunk
- Mengaktifkan mode trunk pada port agar dapat mengirim dan menerima frame dari berbagai VLAN yang telah dibuat sebelumnya.
- switchport trunk allowed vlan 10,20,30,40
- Menentukan VLAN mana saja yang boleh melewati port trunk. Dalam hal ini VLAN 10 (Yayasan), VLAN 20 (Guru), VLAN 30 (CCTV), dan VLAN 40 (Siswa).
- description Trunk_to_Router
- Memberi keterangan pada port bahwa sambungan ini terhubung ke router (memudahkan identifikasi saat troubleshooting).

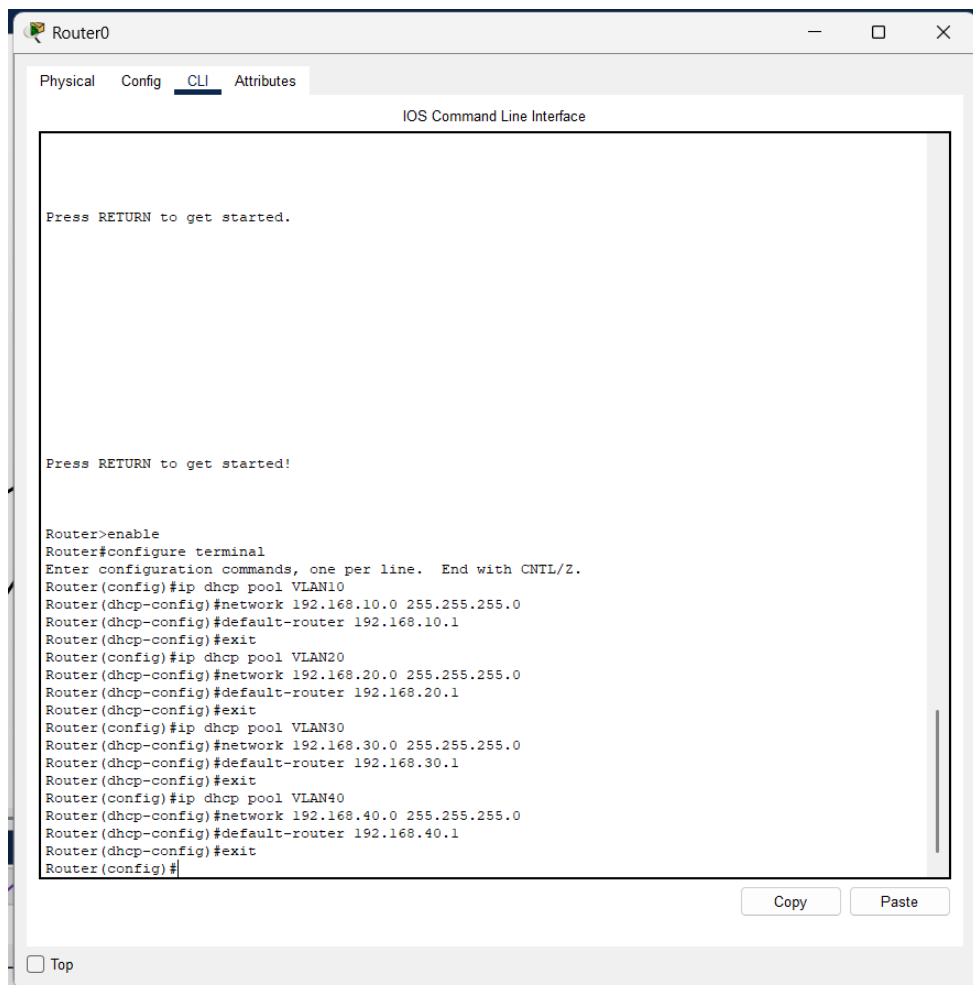
3. Konfigurasi Router

1) Menambahkan port fastethernet



Saya menambahkan ini untuk menghubungkan router dengan ISP menggunakan fastEthernet karena sebelumnya tidak ada port fastEthernet, dengan begitu saya menambahkan modules HWIC-4ESW.

2) Konfigurasi DHCP pada Router



```
Router0
Physical Config CLI Attributes
IOS Command Line Interface

Press RETURN to get started.

Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip dhcp pool VLAN10
Router(dhcp-config)#network 192.168.10.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.10.1
Router(dhcp-config)#exit
Router(config)#ip dhcp pool VLAN20
Router(dhcp-config)#network 192.168.20.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.20.1
Router(dhcp-config)#exit
Router(config)#ip dhcp pool VLAN30
Router(dhcp-config)#network 192.168.30.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.30.1
Router(dhcp-config)#exit
Router(config)#ip dhcp pool VLAN40
Router(dhcp-config)#network 192.168.40.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.40.1
Router(dhcp-config)#exit
Router(config)#
```

Bagian konfigurasi ini bertujuan agar router berfungsi sebagai DHCP Server untuk setiap VLAN. Dengan DHCP, setiap perangkat yang terhubung ke jaringan dapat memperoleh alamat IP secara otomatis tanpa harus dikonfigurasi manual.

Pembuatan Pool DHCP

Setiap pool DHCP dibuat khusus untuk masing-masing VLAN:

- VLAN10 (Yayasan) → Network 192.168.10.0/24, Gateway 192.168.10.1
- VLAN20 (Guru) → Network 192.168.20.0/24, Gateway 192.168.20.1
- VLAN30 (CCTV) → Network 192.168.30.0/24, Gateway 192.168.30.1
- VLAN40 (Siswa) → Network 192.168.40.0/24, Gateway 192.168.40.1

Fungsi Konfigurasi

- ip dhcp pool VLANxx → Membuat pool alamat IP baru untuk VLAN tertentu.
- network → Menentukan jaringan dan subnet mask yang akan diberikan ke klien.
- default-router → Menetapkan alamat gateway (biasanya IP subinterface router).

Dengan konfigurasi ini, setiap VLAN akan memiliki server DHCP terpisah, sehingga klien di VLAN10 hanya mendapatkan IP dari jaringan 192.168.10.x, dan seterusnya.

3) Penjelasan Konfigurasi Subinterface Router (Inter-VLAN Routing)

```
Router0
Physical Config CLI Attributes
IOS Command Line Interface

Router(dhcp-config)#exit
Router(config)#ip dhcp pool VLAN40
Router(dhcp-config)#network 192.168.40.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.40.1
Router(dhcp-config)#exit
Router(config)#interface gigabitEthernet 0/0.10
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.10, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.10, changed state to up
Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip address 192.168.10.1 255.255.255.0
Router(config-subif)#exit
Router(config)#interface gigabitEthernet 0/0.20
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.20, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.20, changed state to up
Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip address 192.168.20.1 255.255.255.0
Router(config-subif)#exit
Router(config)#interface gigabitEthernet 0/0.30
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.30, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.30, changed state to up
Router(config-subif)#encapsulation dot1Q 30
Router(config-subif)#ip address 192.168.30.1 255.255.255.0
Router(config-subif)#exit
Router(config)#interface gigabitEthernet 0/0.40
Router(config-subif)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0.40, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.40, changed state to up
Router(config-subif)#encapsulation dot1Q 40
Router(config-subif)#ip address 192.168.40.1 255.255.255.0
Router(config-subif)#exit
Router(config)#
```

Konfigurasi ini digunakan agar router dapat menghubungkan antar VLAN (inter-VLAN routing) dengan menggunakan satu port fisik yang dipecah menjadi beberapa subinterface.

Masing-masing subinterface akan berfungsi sebagai gateway untuk VLAN tertentu.

Pembuatan Subinterface

Perintah yang digunakan:

```
interface gigabitEthernet 0/0.10
encapsulation dot1Q 10
ip address 192.168.10.1 255.255.255.0
```

dan seterusnya untuk VLAN 20, 30, dan 40.

Artinya:

- interface gigabitEthernet 0/0.10 → membuat subinterface dari port utama Gi0/0 khusus untuk VLAN 10.
- encapsulation dot1Q 10 → menandakan bahwa subinterface ini hanya akan menangani lalu lintas VLAN dengan ID 10.
- ip address 192.168.10.1 255.255.255.0 → memberikan IP address yang berfungsi sebagai gateway untuk VLAN 10.

Langkah ini diulang untuk:

- Gi0/0.20 → VLAN 20, IP 192.168.20.1
- Gi0/0.30 → VLAN 30, IP 192.168.30.1
- Gi0/0.40 → VLAN 40, IP 192.168.40.1

Fungsi Konfigurasi

- Subinterface memungkinkan beberapa VLAN mengakses satu jalur trunk ke router (Router-on-a-Stick).
- Router dapat melakukan routing antar VLAN, misalnya komunikasi antara VLAN 10 (Yayasan) dan VLAN 20 (Guru).
- IP yang diberikan pada tiap subinterface akan menjadi default gateway bagi klien di VLAN tersebut.

Hubungan dengan DHCP

Alamat gateway yang digunakan di konfigurasi DHCP sebelumnya (default-router) harus sesuai dengan IP subinterface ini.

Contoh:

- VLAN10 → gateway 192.168.10.1
- VLAN20 → gateway 192.168.20.1

dst.

Dengan begitu, ketika perangkat di VLAN10 menerima IP otomatis dari DHCP, ia juga mendapatkan gateway ke subinterface router.

4. Testing

Disini saya menggunakan PC untuk client Yayasan, Guru, lalu untuk server untuk CCTV, dan yang terakhir Laptop untuk Siswa.

1) PC Yayasan

The screenshot shows a configuration window titled "PC Yayasan" with tabs for Physical, Config, Desktop, Programming, and Attributes. The "Config" tab is active, and the "IP Configuration" section is expanded. The interface is "FastEthernet0". Under "IP Configuration", the "DHCP" radio button is selected. The "IPv4 Address" is set to "192.168.10.2", "Subnet Mask" is "255.255.255.0", "Default Gateway" is "192.168.10.1", and "DNS Server" is "0.0.0.0". Under "IPv6 Configuration", the "Static" radio button is selected. The "IPv6 Address" field is empty, "Link Local Address" is "FE80::230:F2FF:FE78:B56B", "Default Gateway" is empty, and "DNS Server" is empty. At the bottom, there is a section for "802.1X" with a checkbox for "Use 802.1X Security" (unchecked), "Authentication" set to "MD5", and fields for "Username" and "Password". A "Top" button is at the bottom left.

```
PC Yayasan
Physical Config Desktop Programming Attributes
Command Prompt
Minimum = 0ms, Maximum = 24ms, Average = 8ms

C:\>ping 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Reply from 192.168.20.2: bytes=32 time<1ms TTL=127
Reply from 192.168.20.2: bytes=32 time<1ms TTL=127
Reply from 192.168.20.2: bytes=32 time<1ms TTL=127
Reply from 192.168.20.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.20.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.30.2

Pinging 192.168.30.2 with 32 bytes of data:

Reply from 192.168.30.2: bytes=32 time<1ms TTL=127
Reply from 192.168.30.2: bytes=32 time<1ms TTL=127
Reply from 192.168.30.2: bytes=32 time<1ms TTL=127
Reply from 192.168.30.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.30.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.40.2

Pinging 192.168.40.2 with 32 bytes of data:

Reply from 192.168.40.2: bytes=32 time<1ms TTL=127
Reply from 192.168.40.2: bytes=32 time<1ms TTL=127
Reply from 192.168.40.2: bytes=32 time<1ms TTL=127
Reply from 192.168.40.2: bytes=32 time=9ms TTL=127

Ping statistics for 192.168.40.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 9ms, Average = 2ms

C:\>
```

☐ Top

2) PC Guru

PC Guru

Physical Config **Desktop** Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

☒ DHCP ☐ Static

IPv4 Address 192.168.20.2

Subnet Mask 255.255.255.0

Default Gateway 192.168.20.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::201:C7FF:FE80:3845

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

PC Guru

Physical Config **Desktop** Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time<1ms TTL=127
Reply from 192.168.10.2: bytes=32 time<1ms TTL=127
Reply from 192.168.10.2: bytes=32 time<1ms TTL=127
Reply from 192.168.10.2: bytes=32 time<1ms TTL=127

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 = 0ms, Average = 0ms

C:\>ping 192.168.30.2

Pinging 192.168.30.2 with 32 bytes of data:

Reply from 192.168.30.2: bytes=32 time<1ms TTL=127
Reply from 192.168.30.2: bytes=32 time<1ms TTL=127
Reply from 192.168.30.2: bytes=32 time<1ms TTL=127
Reply from 192.168.30.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.30.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.40.2

Pinging 192.168.40.2 with 32 bytes of data:

Reply from 192.168.40.2: bytes=32 time<1ms TTL=127
Reply from 192.168.40.2: bytes=32 time<1ms TTL=127
Reply from 192.168.40.2: bytes=32 time<1ms TTL=127
Reply from 192.168.40.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.40.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>|
```

☐ Top

3) NVR/CCTV

NVR/CCTV

Physical Config Services **Desktop** Programming Attributes

IP Configuration

IP Configuration

☒ DHCP ☐ Static

IPv4 Address 192.168.30.2

Subnet Mask 255.255.255.0

Default Gateway 192.168.30.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::20C:85FF:FED6:5781

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

NVR/CCTV

Physical Config Services **Desktop** Programming Attributes

Command Prompt

```
Cisco Packet Tracer SERVER Command Line 1.0
C:\>PING 192.168.10.2

Pinging 192.168.10.2 with 32 bytes of data:

Reply from 192.168.10.2: bytes=32 time=8ms TTL=127
Reply from 192.168.10.2: bytes=32 time<1ms TTL=127
Reply from 192.168.10.2: bytes=32 time<1ms TTL=127
Reply from 192.168.10.2: bytes=32 time<1ms TTL=127

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 = 8ms, Average = 2ms

C:\>PING 192.168.20.2

Pinging 192.168.20.2 with 32 bytes of data:

Reply from 192.168.20.2: bytes=32 time<1ms TTL=127
Reply from 192.168.20.2: bytes=32 time<1ms TTL=127
Reply from 192.168.20.2: bytes=32 time<1ms TTL=127
Reply from 192.168.20.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.20.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>PING 192.168.40.2

Pinging 192.168.40.2 with 32 bytes of data:

Reply from 192.168.40.2: bytes=32 time<1ms TTL=127
Reply from 192.168.40.2: bytes=32 time<1ms TTL=127
Reply from 192.168.40.2: bytes=32 time<1ms TTL=127
Reply from 192.168.40.2: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.40.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

☐ Top

4) Laptop Siswa

