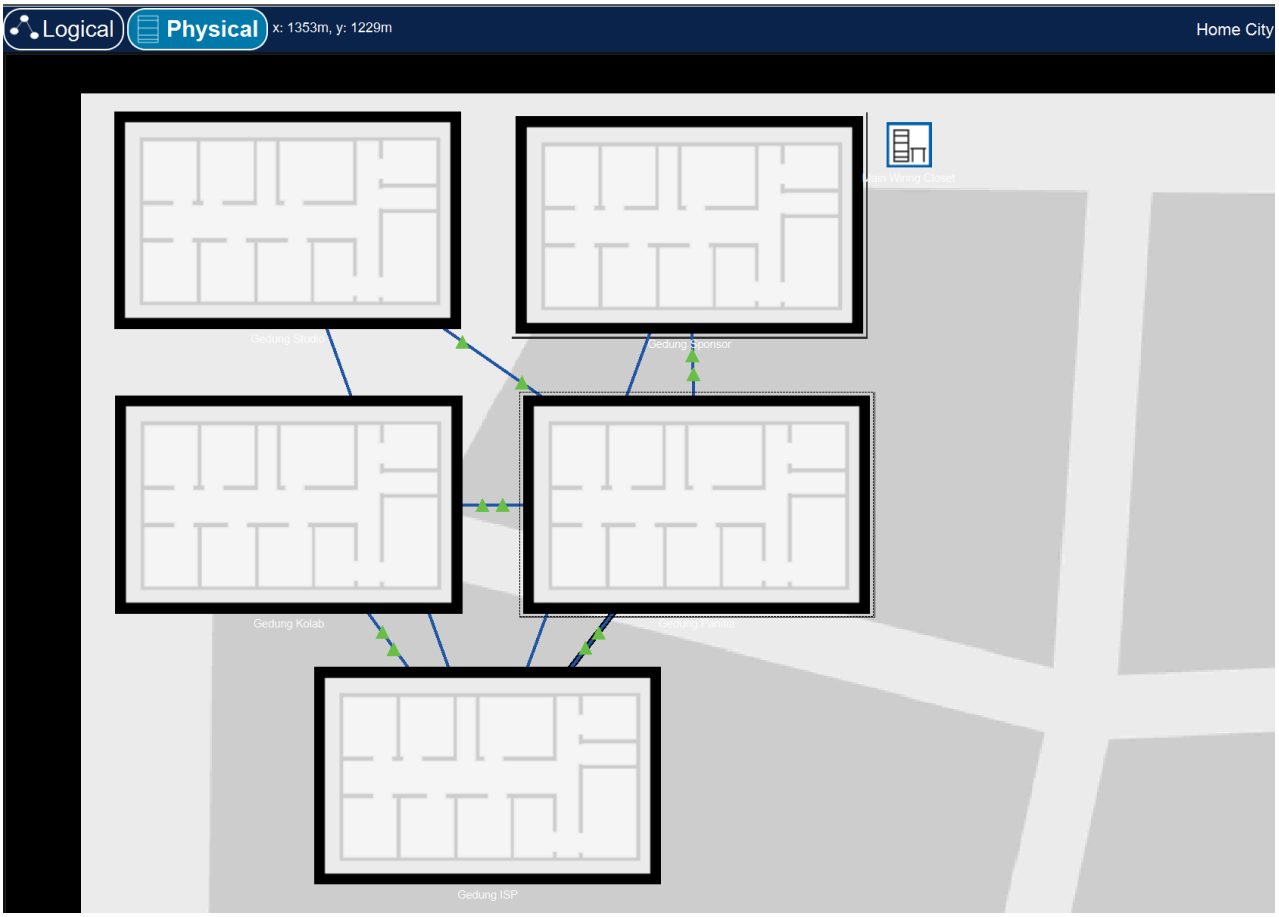
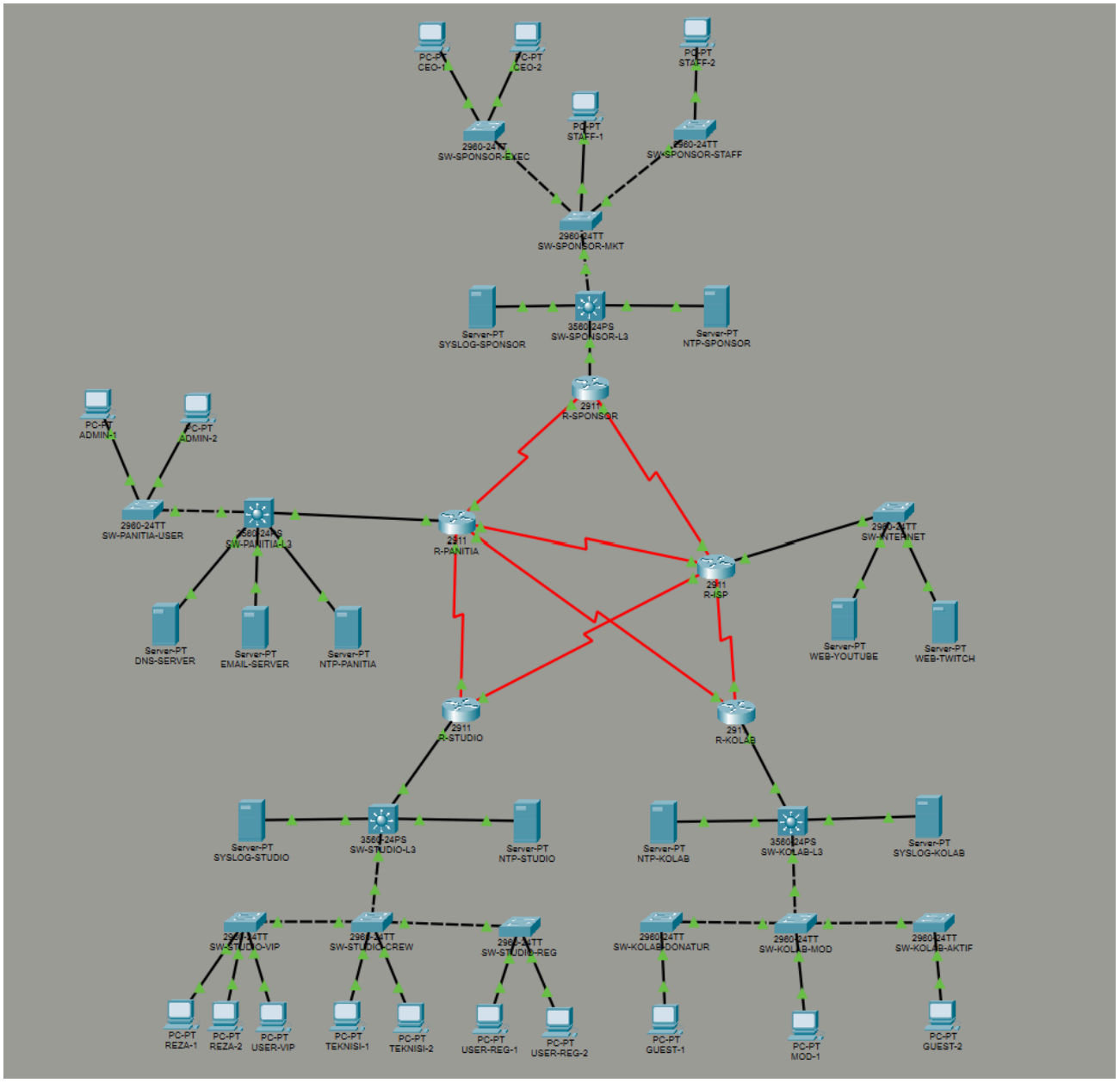
PRAKTIKUM
DESAIN DAN MANAJEMEN JARINGAN KOMPUTER

Topologi:





1. Analisis Kebutuhan Host (Penentuan Nilai X)

Bagian ini menjelaskan dasar perhitungan jumlah perangkat di seluruh jaringan.

- **Identitas Kelompok:** Kelompok 8
- **Nilai Variabel (X):** 8
- **Tabel Perhitungan Unit Dasar:**

Kategori Kelompok	Rumus	Perhitungan	Total Host
Teknisi Broadcast	X + 24	8 + 24	**32**

Kelompok 1 – 10	X + 250	8 + 250	**258**
Kelompok 11 – 15	X^2 + 60	8^2 + 60	**124**
Kelompok 16 – 20	X + 310	8 + 310	**318**
Kelompok 21 – 27	2X + 210	2(8) + 210	**226**
Total Populasi (Klp 1-27) -		258+124+318+226	**926**

2. **Struktur Organisasi Tim & Klaster (Cluster)**

Jelaskan pembagian entitas berdasarkan skenario marathon stream.

- **Cluster Studio Utama:** Pusat aktivitas Reza Arap dan kontrol siaran. Memiliki tingkat keamanan tinggi untuk mencegah kebocoran konten.
- **Cluster Sponsor:** Area terisolasi bagi mitra bisnis. Hanya CEO yang memiliki akses komunikasi terbatas ke host utama.
- **Cluster Tim Kolaborator:** Area terbuka bagi Guest Streamer dan Moderator Chat untuk interaksi publik seluas-luasnya.
- **Panitia Event:** Bertindak sebagai Central Hub (titik sentral) yang mengatur lalu lintas data antar klaster dan menyediakan layanan DNS/Email.
- **Internet Global:** Entitas luar yang menampung Web Server (Platform Streaming) yang dapat diakses sesuai kebijakan masing-masing tim.

3. **Segmentasi Jaringan (VLAN)**

Detailkan pembagian host ke dalam VLAN berdasarkan persentase yang diminta (10%, 60%, 30% dari total 926 penonton/staf).

Segmentasi VLAN Studio Utama

Nama VLAN	Persentase	Host User	Host Tambahan	Total Host
VIP & Penonton Khusus	10%	93	0	93
Teknisi & Crew	60%	555	32 Teknisi	587

Studio				
Penonton Reguler	30%	278	2 Host Reza	280

Segmentasi VLAN Sponsor

Nama VLAN	Persentase	Host User	Host Tambahan	Total Host
Eksekutif & Manajer	10%	93	2 CEO	95
Tim Marketing	60%	555	0	555
Staf Umum	30%	278	0	278

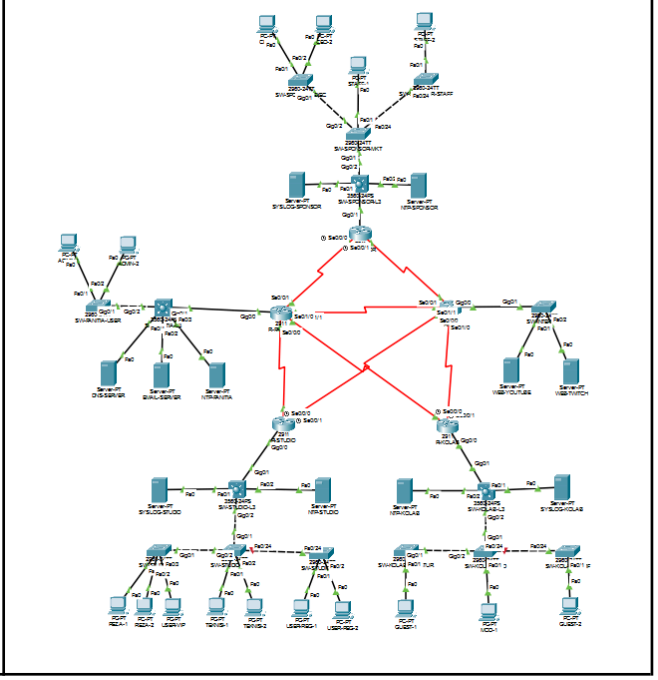
Segmentasi VLAN Kolaborator

Nama VLAN	Persentase	Host User	Host Tambahan	Total Host
Donatur & Super Moderator	10%	93	6 Guest Streamer	99
Moderator & Crew Teknis	60%	555	0	555
Penonton Aktif	30%	278	0	278

Alasan Penggunaan Segmentasi:

- **VLAN:** Digunakan untuk memisahkan domain broadcast dan meningkatkan keamanan antar departemen sesuai skenario (misal: memisahkan penonton umum dari jaringan teknisi).
- **VLSM:** Mengingat jumlah host mencapai >500 pada VLAN tertentu, penggunaan subnet mask yang fleksibel (seperti /22) diterapkan agar penggunaan alamat IP efisien dan tidak terjadi kekurangan address space.

Device	Screenshot

Topologi Jarigan	

Device	Screenshot
R-STUDIO	Router>enable Router#conf t Enter configuration commands, one per line. End with CNTL/Z. Router(config)#hostname R-STUDIO R-STUDIO(config)#no ip domain-lookup R-STUDIO(config)#banner motd #R-STUDIO# R-STUDIO(config)#interface s0/0/0 R-STUDIO(config-if)#clock rate 64000 R-STUDIO(config-if)#no shutdown %LINK-5-CHANGED: Interface Serial0/0/0, changed state to down R-STUDIO(config-if)#interface s0/0/1 R-STUDIO(config-if)#no shutdown %LINK-5-CHANGED: Interface Serial0/0/1, changed state to down R-STUDIO(config-if)#interface g0/0 R-STUDIO(config-if)#no shutdown
R-SPONSOR	Router>enable Router#conf t Enter configuration commands, one per line. End with CNTL/Z. Router(config)#hostname R-SPONSOR R-SPONSOR(config)#no ip domain-lookup R-SPONSOR(config)#banner motd #R-SPONSOR# R-SPONSOR(config)#interface s0/0/0 R-SPONSOR(config-if)#clock rate 64000 R-SPONSOR(config-if)#no shutdown %LINK-5-CHANGED: Interface Serial0/0/0, changed state to down R-SPONSOR(config-if)#interface s0/0/1 R-SPONSOR(config-if)#no shutdown %LINK-5-CHANGED: Interface Serial0/0/1, changed state to down R-SPONSOR(config-if)#interface g0/0 R-SPONSOR(config-if)#no shutdown
R-KOLAB	Router>enable Router#conf t Enter configuration commands, one per line. End with CNTL/Z. Router(config)#hostname R-KOLAB R-KOLAB(config)#no ip domain-lookup R-KOLAB(config)#banner motd #R-KOLAB# R-KOLAB(config)#interface s0/0/0 R-KOLAB(config-if)#clock rate 64000 R-KOLAB(config-if)#no shutdown %LINK-5-CHANGED: Interface Serial0/0/0, changed state to down R-KOLAB(config-if)#interface s0/0/1 R-KOLAB(config-if)#no shutdown %LINK-5-CHANGED: Interface Serial0/0/1, changed state to down R-KOLAB(config-if)#interface g0/0 R-KOLAB(config-if)#no shutdown

R-PANITIA	Router>enable Router#conf t Enter configuration commands, one per line. End with CNTL/Z. Router(config)#hostname R-PANITIA R-PANITIA(config)#no ip domain-lookup R-PANITIA(config)#banner motd #R-PANITIA# R-PANITIA(config)#interface s0/0/0 R-PANITIA(config-if)#clock rate 64000 This command applies only to DCE interfaces R-PANITIA(config-if)#no shutdown R-PANITIA(config-if)#interface s0/0/1 R-PANITIA(config-if)#clock rate 64000 This command applies only to DCE interfaces R-PANITIA(config-if)#no shutdown R-PANITIA(config-if)#interface s0/1/0 R-PANITIA(config-if)#clock rate 64000 This command applies only to DCE interfaces R-PANITIA(config-if)#no shutdown R-PANITIA(config-if)#interface s0/1/1 R-PANITIA(config-if)#no shutdown %LINK-5-CHANGED: Interface Serial0/1/1, changed state to down R-PANITIA(config-if)#interface g0/0 R-PANITIA(config-if)#no shutdown
R-ISP	Router>enable Router#conf t Enter configuration commands, one per line. End with CNTL/Z. Router(config)#hostname R-ISP R-ISP(config)#no ip domain-lookup R-ISP(config)#banner motd #R-ISP# R-ISP(config)#interface s0/0/0 R-ISP(config-if)#clock rate 64000 This command applies only to DCE interfaces R-ISP(config-if)#no shutdown R-ISP(config-if)#interface s0/0/1 R-ISP(config-if)#clock rate 64000 This command applies only to DCE interfaces R-ISP(config-if)#no shutdown R-ISP(config-if)#interface s0/1/0 R-ISP(config-if)#clock rate 64000 This command applies only to DCE interfaces R-ISP(config-if)#no shutdown R-ISP(config-if)#interface s0/1/1 R-ISP(config-if)#clock rate 64000 This command applies only to DCE interfaces R-ISP(config-if)#no shutdown R-ISP(config-if)#interface g0/0 R-ISP(config-if)#no shutdown

4. Jawaban:

Device	Screenshot
SW-STUDIO-L3	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-STUDIO-L3 SW-STUDIO-L3(config)#no ip domain-lookup SW-STUDIO-L3(config)#spanning-tree mode rapid-pvst SW-STUDIO-L3(config)#vlan 10 SW-STUDIO-L3(config-vlan)#name VIP SW-STUDIO-L3(config-vlan)#vlan 20 SW-STUDIO-L3(config-vlan)#name CREW SW-STUDIO-L3(config-vlan)#vlan 30 SW-STUDIO-L3(config-vlan)#name REGULER SW-STUDIO-L3(config-vlan)#ip routing SW-STUDIO-L3(config)#interface gi0/1 SW-STUDIO-L3(config-if)#no switchport SW-STUDIO-L3(config-if)#no shutdown SW-STUDIO-L3(config-if)#interface gi0/2 SW-STUDIO-L3(config-if)#switchport mode trunk Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode. SW-STUDIO-L3(config-if)#interface fa0/1 SW-STUDIO-L3(config-if)#switchport mode access SW-STUDIO-L3(config-if)#switchport access vlan 10 SW-STUDIO-L3(config-if)#interface fa0/2 SW-STUDIO-L3(config-if)#switchport mode access SW-STUDIO-L3(config-if)#switchport access vlan 20 SW-STUDIO-L3(config-if)#interface fa0/3 SW-STUDIO-L3(config-if)#switchport mode access SW-STUDIO-L3(config-if)#switchport access vlan 30 SW-STUDIO-L3(config-if)#interface range fa0/23-24 SW-STUDIO-L3(config-if-range)#channel-group 1 mode active %EC-5-L3DONTBNDL2: Fa0/23 suspended: LACP currently not enabled on the remote port. %EC-5-L3DONTBNDL2: Fa0/24 suspended: LACP currently not enabled on the remote port. SW-STUDIO-L3(config-if-range)#interface port-channel 1 SW-STUDIO-L3(config-if)#switchport mode trunk Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode. SW-STUDIO-L3(config-if)#spanning-tree vlan 1-100 root primary SW-STUDIO-L3(config)#end

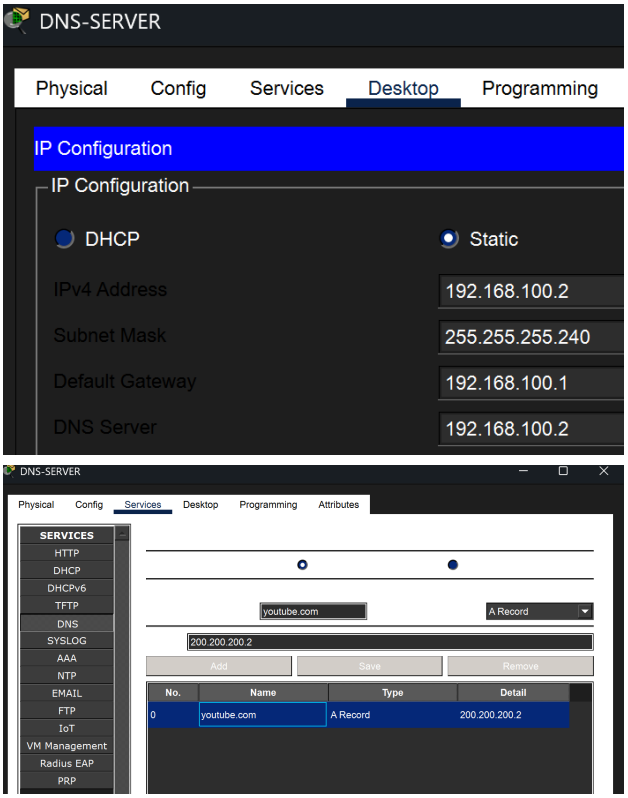
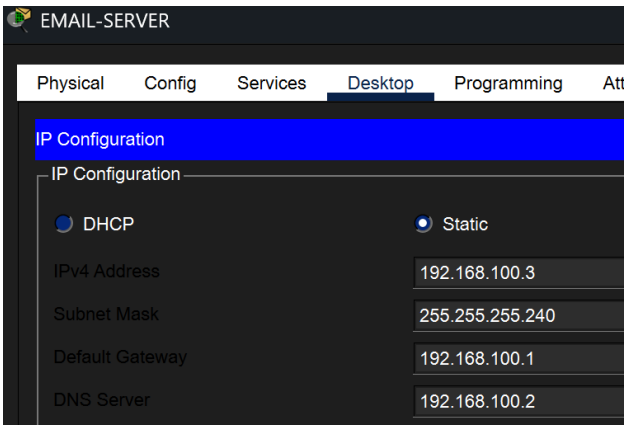
SW-STUDIO-CREW	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-STUDIO-CREW SW-STUDIO-CREW(config)#no ip domain-lookup SW-STUDIO-CREW(config)#spanning-tree mode rapid-pvst SW-STUDIO-CREW(config)#vlan 10 SW-STUDIO-CREW(config-vlan)#name VIP SW-STUDIO-CREW(config-vlan)#vlan 20 SW-STUDIO-CREW(config-vlan)#name CREW SW-STUDIO-CREW(config-vlan)#vlan 30 SW-STUDIO-CREW(config-vlan)#name REGULER SW-STUDIO-CREW(config-vlan)#interface gi0/1 SW-STUDIO-CREW(config-if)#switchport mode trunk SW-STUDIO-CREW(config-if)#interface gi0/2 SW-STUDIO-CREW(config-if)#switchport mode trunk SW-STUDIO-CREW(config-if)#interface fa0/24 SW-STUDIO-CREW(config-if)#switchport mode trunk SW-STUDIO-CREW(config-if)#interface range fa0/1-10 SW-STUDIO-CREW(config-if-range)#switchport mode access SW-STUDIO-CREW(config-if-range)#switchport access vlan 20 SW-STUDIO-CREW(config-if-range)#interface range fa0/23-24 SW-STUDIO-CREW(config-if-range)#channel-group 1 mode active %EC-5-L3DONTBNDL2: Fa0/23 suspended: LACP currently not enabled on the remote port. %EC-5-L3DONTBNDL2: Fa0/24 suspended: LACP currently not enabled on the remote port. SW-STUDIO-CREW(config-if-range)#interface port-channel 1 SW-STUDIO-CREW(config-if)#switchport mode trunk SW-STUDIO-CREW(config-if)#end
SW-STUDIO-VIP	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-STUDIO-VIP SW-STUDIO-VIP(config)#no ip domain-lookup SW-STUDIO-VIP(config)#spanning-tree mode rapid-pvst SW-STUDIO-VIP(config)#vlan 10 SW-STUDIO-VIP(config-vlan)#name VIP SW-STUDIO-VIP(config-vlan)#interface gi0/1 SW-STUDIO-VIP(config-if)#switchport mode trunk SW-STUDIO-VIP(config-if)#interface range fa0/1-10 SW-STUDIO-VIP(config-if-range)#switchport mode access SW-STUDIO-VIP(config-if-range)#switchport access vlan 10 SW-STUDIO-VIP(config-if-range)#end
SW-STUDIO-REG	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-STUDIO-REG SW-STUDIO-REG(config)#no ip domain-lookup SW-STUDIO-REG(config)#spanning-tree mode rapid-pvst SW-STUDIO-REG(config)#vlan 30 SW-STUDIO-REG(config-vlan)#name REGULER SW-STUDIO-REG(config-vlan)#interface fa0/24 SW-STUDIO-REG(config-if)#switchport mode trunk SW-STUDIO-REG(config-if)#interface range fa0/1-10 SW-STUDIO-REG(config-if-range)#switchport mode access SW-STUDIO-REG(config-if-range)#switchport access vlan 30 SW-STUDIO-REG(config-if-range)#end
SW-SPONSOR-L3	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-SPONSOR-L3 SW-SPONSOR-L3(config)#no ip domain-lookup SW-SPONSOR-L3(config)#spanning-tree mode rapid-pvst SW-SPONSOR-L3(config)#vlan 40 SW-SPONSOR-L3(config-vlan)#name EXEC SW-SPONSOR-L3(config-vlan)#vlan 50 SW-SPONSOR-L3(config-vlan)#name MARKETING SW-SPONSOR-L3(config-vlan)#vlan 60 SW-SPONSOR-L3(config-vlan)#name STAFF SW-SPONSOR-L3(config-vlan)#ip routing SW-SPONSOR-L3(config)#interface gi0/1 SW-SPONSOR-L3(config-if)#no switchport SW-SPONSOR-L3(config-if)#no shutdown SW-SPONSOR-L3(config-if)#interface gi0/2 SW-SPONSOR-L3(config-if)#switchport mode trunk Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode. SW-SPONSOR-L3(config-if)#interface fa0/1 SW-SPONSOR-L3(config-if)#switchport mode access SW-SPONSOR-L3(config-if)#switchport access vlan 40 SW-SPONSOR-L3(config-if)#interface fa0/2 SW-SPONSOR-L3(config-if)#switchport mode access SW-SPONSOR-L3(config-if)#switchport access vlan 50 SW-SPONSOR-L3(config-if)#interface fa0/3 SW-SPONSOR-L3(config-if)#switchport mode access SW-SPONSOR-L3(config-if)#switchport access vlan 60 SW-SPONSOR-L3(config-if)#interface range fa0/23-24 SW-SPONSOR-L3(config-if-range)#channel-group 2 mode active %EC-5-L3DONTBNDL2: Fa0/23 suspended: LACP currently not enabled on the remote port. %EC-5-L3DONTBNDL2: Fa0/24 suspended: LACP currently not enabled on the remote port. SW-SPONSOR-L3(config-if-range)#interface port-channel 2 SW-SPONSOR-L3(config-if)#switchport mode trunk Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode. SW-SPONSOR-L3(config-if)#spanning-tree vlan 1-100 root primary SW-SPONSOR-L3(config)#end

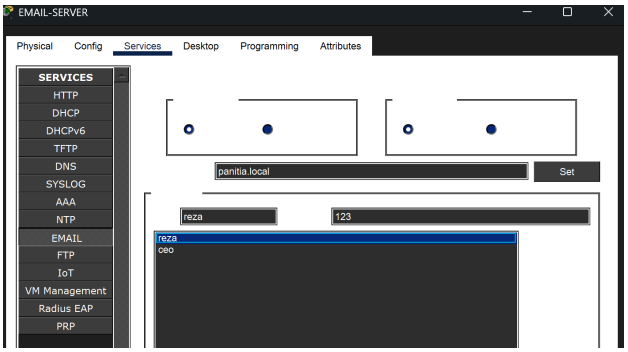
SW-SPONSOR-MKT	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-SPONSOR-MKT SW-SPONSOR-MKT(config)#no ip domain-lookup SW-SPONSOR-MKT(config)#spanning-tree mode rapid-pvst SW-SPONSOR-MKT(config)#vlan 40 SW-SPONSOR-MKT(config-vlan)#name EXEC SW-SPONSOR-MKT(config-vlan)#vlan 50 SW-SPONSOR-MKT(config-vlan)#name MARKETING SW-SPONSOR-MKT(config-vlan)#vlan 60 SW-SPONSOR-MKT(config-vlan)#name STAFF SW-SPONSOR-MKT(config-vlan)#interface gi0/1 SW-SPONSOR-MKT(config-if)#switchport mode trunk SW-SPONSOR-MKT(config-if)#interface gi0/2 SW-SPONSOR-MKT(config-if)#switchport mode trunk SW-SPONSOR-MKT(config-if)#interface fa0/24 SW-SPONSOR-MKT(config-if)#switchport mode trunk SW-SPONSOR-MKT(config-if)#interface range fa0/1-10 SW-SPONSOR-MKT(config-if-range)#switchport mode access SW-SPONSOR-MKT(config-if-range)#switchport access vlan 50 SW-SPONSOR-MKT(config-if-range)#interface range fa0/23-24 SW-SPONSOR-MKT(config-if-range)#channel-group 2 mode active %EC-5-L3DONTBNDL2: Fa0/23 suspended: LACP currently not enabled on the remote port. %EC-5-L3DONTBNDL2: Fa0/24 suspended: LACP currently not enabled on the remote port. SW-SPONSOR-MKT(config-if-range)#interface port-channel 2 SW-SPONSOR-MKT(config-if)#switchport mode trunk SW-SPONSOR-MKT(config-if)#end
SW-SPONSOR-EXEC	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-SPONSOR-EXEC SW-SPONSOR-EXEC(config)#no ip domain-lookup SW-SPONSOR-EXEC(config)#spanning-tree mode rapid-pvst SW-SPONSOR-EXEC(config)#vlan 40 SW-SPONSOR-EXEC(config-vlan)#name EXEC SW-SPONSOR-EXEC(config-vlan)#interface gi0/1 SW-SPONSOR-EXEC(config-if)#switchport mode trunk SW-SPONSOR-EXEC(config-if)#interface range fa0/1-10 SW-SPONSOR-EXEC(config-if-range)#switchport mode access SW-SPONSOR-EXEC(config-if-range)#switchport access vlan 40 SW-SPONSOR-EXEC(config-if-range)#end
SW-SPONSOR-STAFF	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-SPONSOR-STAFF SW-SPONSOR-STAFF(config)#no ip domain-lookup SW-SPONSOR-STAFF(config)#spanning-tree mode rapid-pvst SW-SPONSOR-STAFF(config)#vlan 60 SW-SPONSOR-STAFF(config-vlan)#name STAFF SW-SPONSOR-STAFF(config-vlan)#interface fa0/24 SW-SPONSOR-STAFF(config-if)#switchport mode trunk SW-SPONSOR-STAFF(config-if)#interface range fa0/1-10 SW-SPONSOR-STAFF(config-if-range)#switchport mode access SW-SPONSOR-STAFF(config-if-range)#switchport access vlan 60 SW-SPONSOR-STAFF(config-if-range)#end
SW-KOLAB-L3	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-KOLAB-L3 SW-KOLAB-L3(config)#no ip domain-lookup SW-KOLAB-L3(config)#spanning-tree mode rapid-pvst SW-KOLAB-L3(config)#vlan 70 SW-KOLAB-L3(config-vlan)#name DONATUR SW-KOLAB-L3(config-vlan)#vlan 80 SW-KOLAB-L3(config-vlan)#name MODERATOR SW-KOLAB-L3(config-vlan)#vlan 90 SW-KOLAB-L3(config-vlan)#name AKTIF SW-KOLAB-L3(config-vlan)#ip routing SW-KOLAB-L3(config)#interface gi0/1 SW-KOLAB-L3(config-if)#no switchport SW-KOLAB-L3(config-if)#no shutdown SW-KOLAB-L3(config-if)#interface gi0/2 SW-KOLAB-L3(config-if)#switchport mode trunk Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode. SW-KOLAB-L3(config-if)#interface fa0/1 SW-KOLAB-L3(config-if)#switchport mode access SW-KOLAB-L3(config-if)#switchport access vlan 70 SW-KOLAB-L3(config-if)#interface fa0/2 SW-KOLAB-L3(config-if)#switchport mode access SW-KOLAB-L3(config-if)#switchport access vlan 80 SW-KOLAB-L3(config-if)#interface fa0/3 SW-KOLAB-L3(config-if)#switchport mode access SW-KOLAB-L3(config-if)#switchport access vlan 90 SW-KOLAB-L3(config-if)#interface range fa0/23-24 SW-KOLAB-L3(config-if-range)#channel-group 3 mode active %EC-5-L3DONTBNDL2: Fa0/23 suspended: LACP currently not enabled on the remote port. %EC-5-L3DONTBNDL2: Fa0/24 suspended: LACP currently not enabled on the remote port. SW-KOLAB-L3(config-if-range)#interface port-channel 3 SW-KOLAB-L3(config-if)#switchport mode trunk Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode. SW-KOLAB-L3(config-if)#spanning-tree vlan 1-100 root primary SW-KOLAB-L3(config)#end

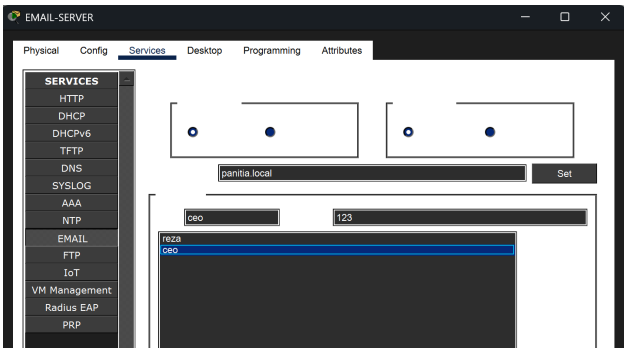
SW-KOLAB-MOD	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-KOLAB-MOD SW-KOLAB-MOD(config)#no ip domain-lookup SW-KOLAB-MOD(config)#spanning-tree mode rapid-pvst SW-KOLAB-MOD(config)#vlan 70 SW-KOLAB-MOD(config-vlan)#name DONATUR SW-KOLAB-MOD(config-vlan)#vlan 80 SW-KOLAB-MOD(config-vlan)#name MODERATOR SW-KOLAB-MOD(config-vlan)#vlan 90 SW-KOLAB-MOD(config-vlan)#name AKTIF SW-KOLAB-MOD(config-vlan)#interface gi0/1 SW-KOLAB-MOD(config-if)#switchport mode trunk SW-KOLAB-MOD(config-if)#interface gi0/2 SW-KOLAB-MOD(config-if)#switchport mode trunk SW-KOLAB-MOD(config-if)#interface fa0/24 SW-KOLAB-MOD(config-if)#switchport mode trunk SW-KOLAB-MOD(config-if)#interface range fa0/1-10 SW-KOLAB-MOD(config-if-range)#switchport mode access SW-KOLAB-MOD(config-if-range)#switchport access vlan 80 SW-KOLAB-MOD(config-if-range)#interface range fa0/23-24 SW-KOLAB-MOD(config-if-range)#channel-group 3 mode active %EC-5-L3DONTBNDL2: Fa0/23 suspended: LACP currently not enabled on the remote port. %EC-5-L3DONTBNDL2: Fa0/24 suspended: LACP currently not enabled on the remote port. SW-KOLAB-MOD(config-if-range)#interface port-channel 3 SW-KOLAB-MOD(config-if)#switchport mode trunk SW-KOLAB-MOD(config-if)#end
SW-KOLAB-DONATUR	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-KOLAB-DONATUR SW-KOLAB-DONATUR(config)#no ip domain-lookup SW-KOLAB-DONATUR(config)#spanning-tree mode rapid-pvst SW-KOLAB-DONATUR(config)#vlan 70 SW-KOLAB-DONATUR(config-vlan)#name DONATUR SW-KOLAB-DONATUR(config-vlan)#interface gi0/1 SW-KOLAB-DONATUR(config-if)#switchport mode trunk SW-KOLAB-DONATUR(config-if)#interface range fa0/1-10 SW-KOLAB-DONATUR(config-if-range)#switchport mode access SW-KOLAB-DONATUR(config-if-range)#switchport access vlan 70 SW-KOLAB-DONATUR(config-if-range)#end
SW-KOLAB-AKTIF	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-KOLAB-AKTIF SW-KOLAB-AKTIF(config)#no ip domain-lookup SW-KOLAB-AKTIF(config)#spanning-tree mode rapid-pvst SW-KOLAB-AKTIF(config)#vlan 90 SW-KOLAB-AKTIF(config-vlan)#name AKTIF SW-KOLAB-AKTIF(config-vlan)#interface fa0/24 SW-KOLAB-AKTIF(config-if)#switchport mode trunk SW-KOLAB-AKTIF(config-if)#interface range fa0/1-10 SW-KOLAB-AKTIF(config-if-range)#switchport mode access SW-KOLAB-AKTIF(config-if-range)#switchport access vlan 90 SW-KOLAB-AKTIF(config-if-range)#end
SW-PANITIA-L3	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-PANITIA-L3 SW-PANITIA-L3(config)#no ip domain-lookup SW-PANITIA-L3(config)#spanning-tree mode rapid-pvst SW-PANITIA-L3(config)#interface gi0/1 SW-PANITIA-L3(config-if)#no switchport SW-PANITIA-L3(config-if)#no shutdown SW-PANITIA-L3(config-if)#interface gi0/2 SW-PANITIA-L3(config-if)#switchport mode trunk Command rejected: An interface whose trunk encapsulation is "Auto" can not be configured to "trunk" mode. SW-PANITIA-L3(config-if)#spanning-tree vlan 1-100 root primary SW-PANITIA-L3(config)#end SW-PANITIA-L3(config)#interface fa0/1 SW-PANITIA-L3(config-if)#switchport mode access SW-PANITIA-L3(config-if)#switchport access vlan 100 SW-PANITIA-L3(config-if)#no shutdown SW-PANITIA-L3(config-if)#ex SW-PANITIA-L3(config)#interface fa0/2 SW-PANITIA-L3(config-if)#switchport mode access SW-PANITIA-L3(config-if)#switchport access vlan 100 SW-PANITIA-L3(config-if)#no shutdown
SW-PANITIA-USER	Switch>enable Switch#conf t Enter configuration commands, one per line. End with CNTL/Z. Switch(config)#hostname SW-PANITIA-USER SW-PANITIA-USER(config)#no ip domain-lookup SW-PANITIA-USER(config)#spanning-tree mode rapid-pvst SW-PANITIA-USER(config)#interface gi0/1 SW-PANITIA-USER(config-if)#switchport mode trunk SW-PANITIA-USER(config-if)#end SW-PANITIA-USER>en SW-PANITIA-USER#conf t Enter configuration commands, one per line. End with CNTL/Z. SW-PANITIA-USER(config)#interface gi0/1 SW-PANITIA-USER(config-if)#switchport mode trunk SW-PANITIA-USER(config-if)#no shutdown SW-PANITIA-USER(config-if)#interface range fa0/1 - 2 SW-PANITIA-USER(config-if-range)#switchport mode access SW-PANITIA-USER(config-if-range)#switchport access vlan 100 % Access VLAN does not exist. Creating vlan 100 SW-PANITIA-USER(config-if-range)#no shutdown

SW-INTERNET	`Switch>enable`
	`Switch#conf t`
	`Enter configuration commands, one per line.  End with CNTL/Z.`
	`Switch(config)#hostname SW-INTERNET`
	`SW-INTERNET(config)#no ip domain-lookup`
	`SW-INTERNET(config)#spanning-tree mode rapid-pvst`
	`SW-INTERNET(config)#interface gi0/1`
	`SW-INTERNET(config-if)#switchport mode trunk`
	
	`SW-INTERNET(config-if)#end`

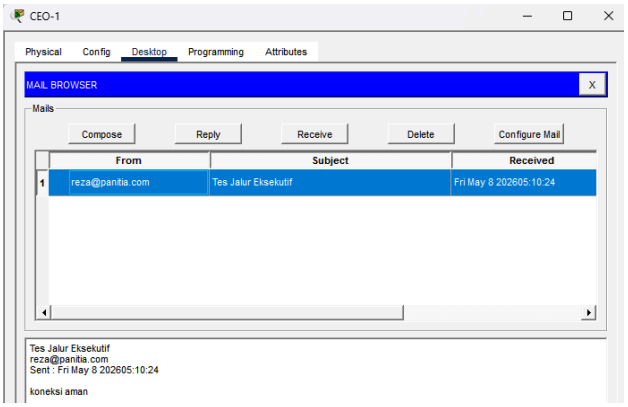
5. Penggunaan Server

Device	Screenshot
DNS SERVER	
EMAIL SERVER	

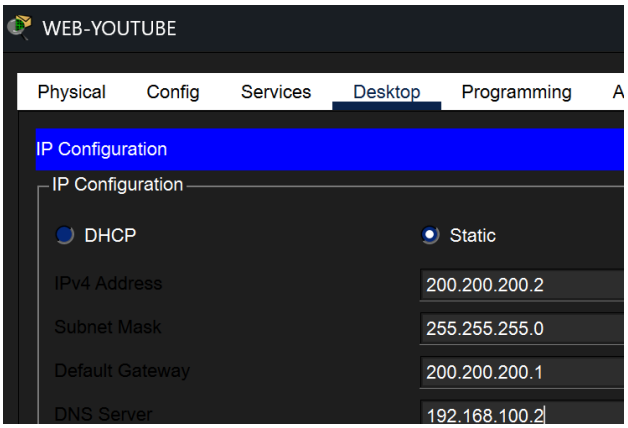


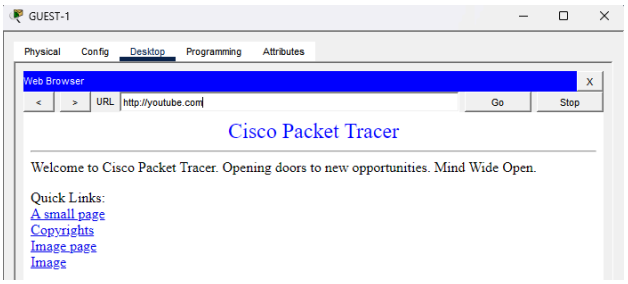


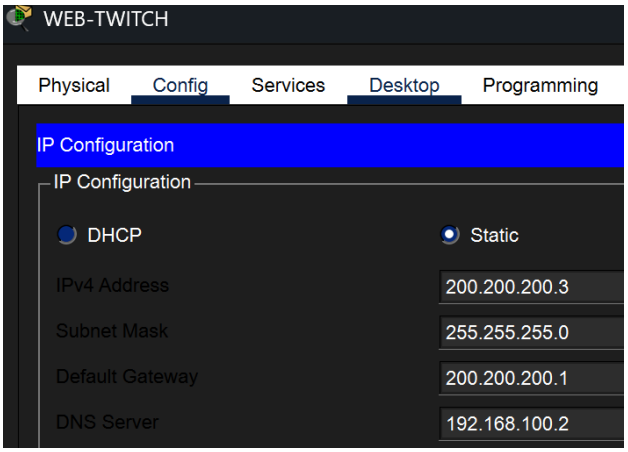
Hasil Test Email Server

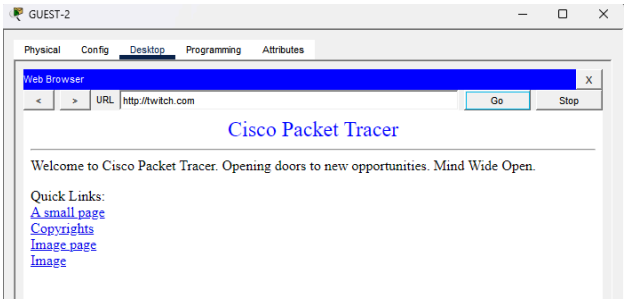
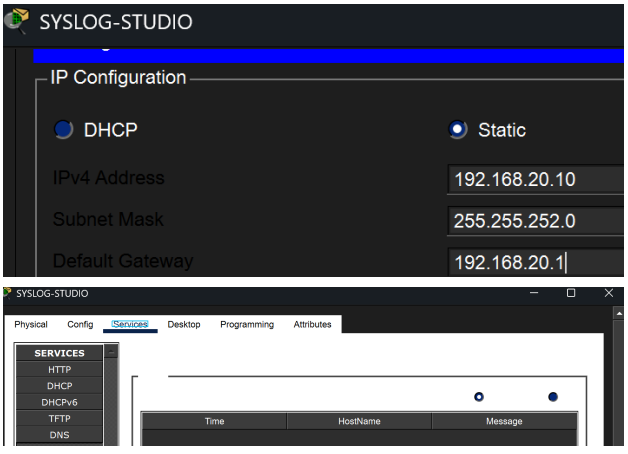


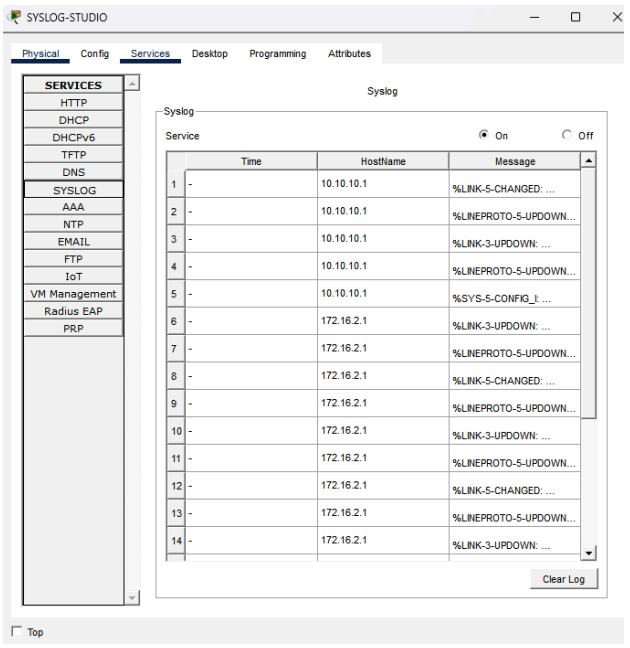
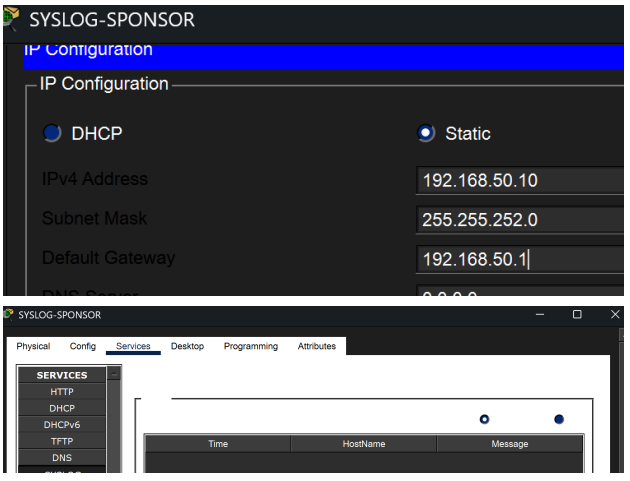
WEB-YOUTUBE

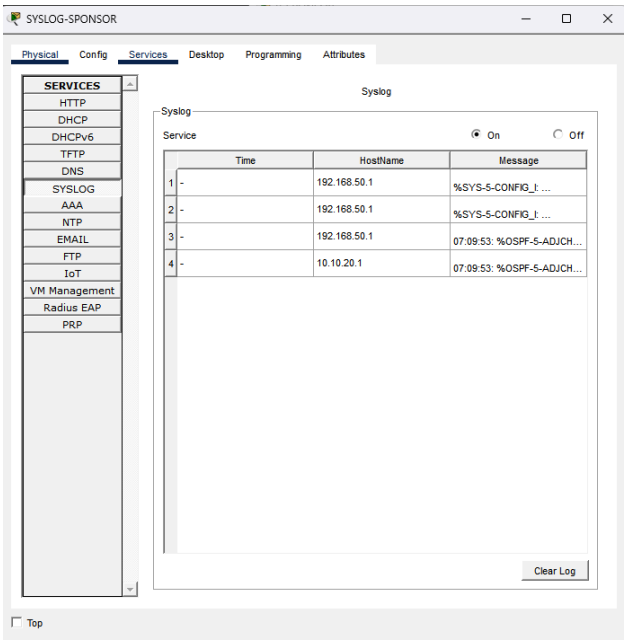
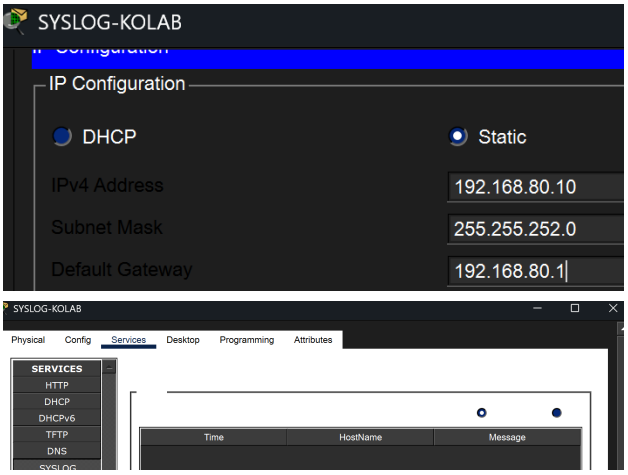
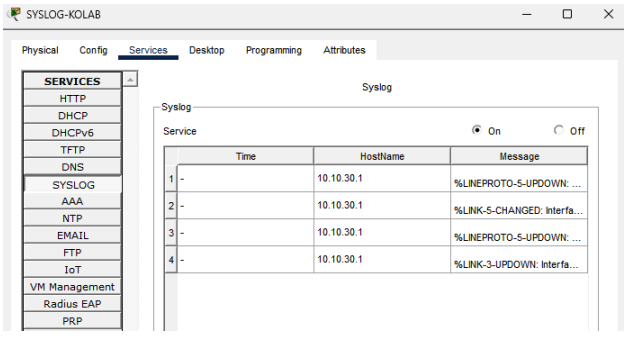


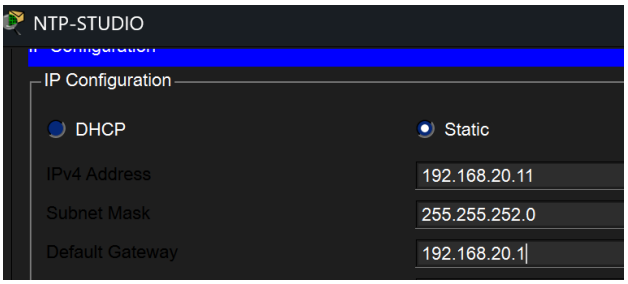
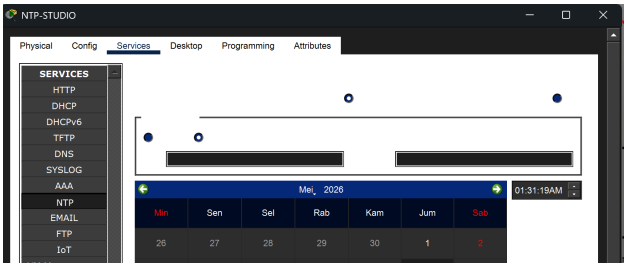
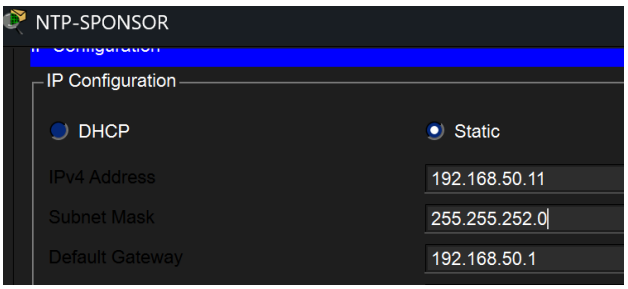
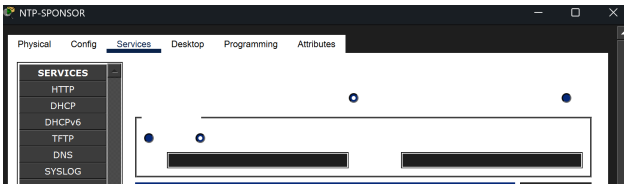
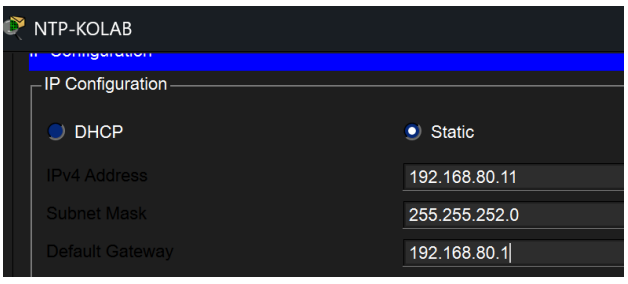
Hasil Test Youtube	

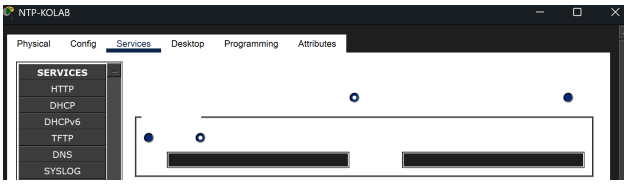
WEB-TWITCH	
	`R-ISP(config)#int g0/0`
	`R-ISP(config-if)#ip address 200.200.200.1 255.255.255.0`
	`R-ISP(config-if)#no shutdown`

Hasil Test Twitch	
SYSLOG STUDIO	

Hasil Test Syslog Studio	
SYSLOG SPONSOR	

Hasil Test Syslog Sponsor	
SYSLOG KOLAB	
Hasil Test Syslog Kolab	

NTP STUDIO	 
Hasil Test NTP Studio	R-STUDIO>en R-STUDIO#show ntp stat Clock is synchronized, stratum 2, reference is 192.168.20.11 nominal freq is 250.0000 Hz, actual freq is 249.9990 Hz, precision is 2**24 reference time is ED83FDD5.000001E8 (22:53:9.488 UTC Mon May 11 2026) clock offset is 1.00 msec, root delay is 1.00 msec root dispersion is 13.59 msec, peer dispersion is 0.12 msec. loopfilter state is 'CTRL' (Normal Controlled Loop), drift is - 0.000001193 s/s system poll interval is 4, last update was 8 sec ago. R-STUDIO#show clock 5:53:21.321 WIB Tue May 12 2026 R-STUDIO#
NTP SPONSOR	 
Hasil Test NTP Sponsor	R-SPONSOR>en R-SPONSOR#show ntp stat Clock is synchronized, stratum 2, reference is 192.168.50.11 nominal freq is 250.0000 Hz, actual freq is 249.9990 Hz, precision is 2**24 reference time is ED8354CA.00000169 (10:51:54.361 UTC Mon May 11 2026) clock offset is 1.00 msec, root delay is 0.00 msec root dispersion is 13.11 msec, peer dispersion is 0.12 msec. loopfilter state is 'CTRL' (Normal Controlled Loop), drift is - 0.000001193 s/s system poll interval is 4, last update was 16 sec ago. R-SPONSOR#show clock 17:52:14.356 WIB Mon May 11 2026 R-SPONSOR#
NTP KOLAB	

	
Hasil Test NTP Kolab	R-KOLAB>en R-KOLAB#show ntp stat Clock is synchronized, stratum 2, reference is 192.168.80.11 nominal freq is 250.0000 Hz, actual freq is 249.9990 Hz, precision is 2**24 reference time is ED83FDDD.0000021A (22:53:17.538 UTC Mon May 11 2026) clock offset is 0.00 msec, root delay is 1.00 msec root dispersion is 14.08 msec, peer dispersion is 0.12 msec. loopfilter state is 'CTRL' (Normal Controlled Loop), drift is - 0.000001193 s/s system poll interval is 4, last update was 8 sec ago. R-KOLAB#show clock 5:53:28.83 WIB Tue May 12 2026 R-KOLAB#

6. Tabel Perancangan Subnet VLAN:

VLAN	Nama VLAN	Total Host	Prefix	Subnet Mask
10	VIP & Penonton Khusus	93	/25	255.255.255.128
20	Teknisi & Crew Studio	587	/22	255.255.252.0
30	Penonton Reguler	280	/23	255.255.254.0
40	Eksekutif & Manajer	95	/25	255.255.255.128
50	Tim Marketing	555	/22	255.255.252.0
60	Staff Umum	278	/23	255.255.254.0
70	Donatur & Super Moderator	99	/25	255.255.255.128
80	Moderator & Crew Teknis	555	/22	255.255.252.0
90	Penonton Aktif	278	/23	255.255.254.0
100	Panitia Event	10	/28	255.255.255.240

Network Address:

Setiap cluster diberikan blok network berbeda untuk mempermudah proses routing, pengelolaan jaringan, troubleshooting, dan penerapan ACL keamanan antar divisi sesuai skenario pada soal.

STUDIO CLUSTER		
VLAN	Network	Gateway
VLAN 10	192.168.10.0/25	192.168.10.1
VLAN 20	192.168.20.0/22	192.168.20.1
VLAN 30	192.168.30.0/23	192.168.30.1

SPONSOR CLUSTER		
VLAN	Network	Gateway
VLAN 40	192.168.40.0/25	192.168.40.1
VLAN 50	192.168.50.0/22	192.168.50.1
VLAN 60	192.168.60.0/23	192.168.60.1

KOLAB CLUSTER		
VLAN	Network	Gateway
VLAN 70	192.168.70.0/25	192.168.70.1
VLAN 80	192.168.80.0/22	192.168.80.1
VLAN 90	192.168.90.0/23	192.168.90.1

PANITIA EVENT		
VLAN	Network	Gateway
VLAN 100	192.168.100.0/28	192.168.100.1

Tabel WAN:

Subnet /30 digunakan pada koneksi WAN antar router karena koneksi point-to-point hanya

membutuhkan dua alamat host. Penggunaan subnet /30 membuat alokasi IP address lebih hemat dan efisien.

Koneksi	Network	Router 1	Router 2
R-STUDIO ↔ R-PANITIA	172.16.1.0/30	172.16.1.1	172.16.1.2
R-SPONSOR ↔ R-PANITIA	172.16.2.0/30	172.16.2.1	172.16.2.2
R-KOLAB ↔ R-PANITIA	172.16.3.0/30	172.16.3.1	172.16.3.2
R-STUDIO ↔ R-ISP	10.10.10.0/30	10.10.10.1	10.10.10.2
R-SPONSOR ↔ R-ISP	10.10.21.0/30	10.10.21.1	10.10.21.2
R-KOLAB ↔ R-ISP	10.10.30.0/30	10.10.30.1	10.10.30.2
R-PANITIA ↔ R-ISP	10.10.40.0/30	10.10.40.1	10.10.40.2

Server Addressing:

Panitia Event	
Server	**IP**
DNS Server	192.168.100.2
Email Server	192.168.100.3

Studio	
Server	**IP**
SYSLOG-STUDIO	192.168.20.10
NTP-STUDIO	192.168.20.11

Sponsor	
Server	**IP**
SYSLOG-SPONSOR	192.168.50.10
NTP-SPONSOR	192.168.50.11

Kolaborator	
Server	**IP**
SYSLOG-KOLAB	192.168.80.10
NTP-KOLAB	192.168.80.11

Multilayer Switch (Layer 3 Switch): Switch tidak hanya switching tetapi juga routing antar VLAN, jadi menggunakan Inter-VLAN Routing menggunakan SVI. Inter-VLAN Routing digunakan agar perangkat pada VLAN yang berbeda tetap dapat saling berkomunikasi sesuai kebutuhan jaringan. Routing dilakukan menggunakan multilayer switch agar proses forwarding lebih cepat dibanding metode router-on-a-stick.

Jawaban:

Device	Screenshot

SW-STUDIO-L3	`SW-STUDIO-L3>en`
	`SW-STUDIO-L3#conf t`
	`Enter configuration commands, one per line.  End with CNTL/Z.`
	`SW-STUDIO-L3(config)#ip routing`
	Command ip routing digunakan untuk mengaktifkan kemampuan routing pada multilayer switch sehingga switch dapat melakukan komunikasi antar VLAN.
	`SW-STUDIO-L3(config)#interface vlan 10`
	`SW-STUDIO-L3(config-if)#ip address 192.168.10.1 255.255.255.128`
	`SW-STUDIO-L3(config-if)#no shutdown`
	`%LINK-5-CHANGED: Interface Vlan10, changed state to up`
	`%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan10, changed state to up`
	`SW-STUDIO-L3(config-if)#interface vlan 20`
	`SW-STUDIO-L3(config-if)#ip address 192.168.20.1 255.255.252.0`
	`SW-STUDIO-L3(config-if)#no shutdown`
	`%LINK-5-CHANGED: Interface Vlan20, changed state to up`
	`%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan20, changed state to up`
	`SW-STUDIO-L3(config-if)#interface vlan 30`
	`SW-STUDIO-L3(config-if)#ip address 192.168.30.1 255.255.254.0`
	`SW-STUDIO-L3(config-if)#no shutdown`
	`%LINK-5-CHANGED: Interface Vlan30, changed state to up`
	`%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan30, changed state to up`
	`SW-STUDIO-L3(config-if)#interface gi0/1`
	`SW-STUDIO-L3(config-if)#no switchport`
	`SW-STUDIO-L3(config-if)#ip address 10.10.10.2 255.255.255.252`
	`SW-STUDIO-L3(config-if)#no shutdown`
	`SW-STUDIO-L3(config-if)#ip route 0.0.0.0 0.0.0.0 10.10.10.1`
	Command no switchport digunakan agar interface berubah menjadi routed port sehingga dapat diberikan IP address dan digunakan untuk komunikasi Layer 3 dengan router. Lalu command ip route karena switch belum tau internet jadi semua network yang tidak dikenal, dilempar ke R-STUDIO.

R-STUDIO

Interface ke Switch

```
R-STUDIO>enable
R-STUDIO#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R-STUDIO(config)#
R-STUDIO(config)#interface g0/0
R-STUDIO(config-if)#ip address 10.10.10.1 255.255.255.252
R-STUDIO(config-if)#no shutdown
R-STUDIO(config-if)#ex
```

Interface WAN ke Panitia

```
R-STUDIO(config)#interface s0/0/0
R-STUDIO(config-if)#ip address 172.16.1.1 255.255.255.252
R-STUDIO(config-if)#clock rate 64000
R-STUDIO(config-if)#no shutdown
R-STUDIO(config-if)#ex
```

Interface ke ISP

```
R-STUDIO(config)#interface s0/0/1
R-STUDIO(config-if)#ip address 10.10.40.1 255.255.255.252
R-STUDIO(config-if)#no shutdown

R-STUDIO(config)#ip route 0.0.0.0 0.0.0.0 10.10.10.2
```

SW-SPONSOR-L3

```
SW-SPONSOR-L3>en
SW-SPONSOR-L3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
SW-SPONSOR-L3(config)#ip routing
SW-SPONSOR-L3(config)#interface vlan 40
SW-SPONSOR-L3(config-if)#ip address 192.168.40.1 255.255.255.128
SW-SPONSOR-L3(config-if)#no shutdown
%LINK-5-CHANGED: Interface Vlan40, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan40, changed state to up

SW-SPONSOR-L3(config-if)#interface vlan 50
SW-SPONSOR-L3(config-if)#ip address 192.168.50.1 255.255.252.0
SW-SPONSOR-L3(config-if)#no shutdown
%LINK-5-CHANGED: Interface Vlan50, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan50, changed state to up

SW-SPONSOR-L3(config-if)#interface vlan 60
SW-SPONSOR-L3(config-if)#ip address 192.168.60.1 255.255.254.0
SW-SPONSOR-L3(config-if)#no shutdown
%LINK-5-CHANGED: Interface Vlan60, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan60, changed state to up

SW-SPONSOR-L3(config-if)#interface gi0/1
SW-SPONSOR-L3(config-if)#no switchport
SW-SPONSOR-L3(config-if)#ip address 10.10.20.2 255.255.255.252
SW-SPONSOR-L3(config-if)#no shutdown
SW-SPONSOR-L3(config-if)#ip route 0.0.0.0 0.0.0.0 10.10.20.1
SW-SPONSOR-L3(config)#
```

R-SPONSOR

```
R-SPONSOR>en
R-SPONSOR#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R-SPONSOR(config)#interface g0/0
R-SPONSOR(config-if)#ip address 10.10.20.1 255.255.255.252
R-SPONSOR(config-if)#no shutdown
R-SPONSOR(config-if)#ex
R-SPONSOR(config)#interface s0/0/0
R-SPONSOR(config-if)#ip address 172.16.2.1 255.255.255.252
R-SPONSOR(config-if)#clock rate 64000
R-SPONSOR(config-if)#no shutdown
R-SPONSOR(config-if)#ex
R-SPONSOR(config)#interface s0/0/1
R-SPONSOR(config-if)#ip address 10.10.20.1 255.255.255.252
% 10.10.20.0 overlaps with GigabitEthernet0/0
R-SPONSOR(config-if)#no sh
R-SPONSOR(config)#interface s0/0/1
R-SPONSOR(config-if)#no ip address
R-SPONSOR(config-if)#ip address 10.10.21.1 255.255.255.252
R-SPONSOR(config-if)#no shutdown

R-SPONSOR(config)#ip route 0.0.0.0 0.0.0.0 10.10.21.2
```

R-ISP

```
R-ISP>en
R-ISP#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R-ISP(config)#interface s0/0/1
R-ISP(config-if)#ip address 10.10.21.2 255.255.255.252
R-ISP(config-if)#no shutdown
```

	R-ISP(config)#interface s0/0/0 R-ISP(config-if)#ip address 10.10.10.2 255.255.255.252 R-ISP(config-if)#no shutdown R-ISP(config-if)#ex R-ISP(config)#interface s0/1/0 R-ISP(config-if)#ip address 10.10.30.2 255.255.255.252 R-ISP(config-if)#no shutdown R-ISP(config-if)#ex R-ISP(config)#interface s0/1/1 R-ISP(config-if)#ip address 10.10.40.2 255.255.255.252 R-ISP(config-if)#no shutdown R-ISP(config-if)#ex R-ISP(config)#ip route 192.168.0.0 255.255.0.0 10.10.10.1
SW-KOLAB-L3	SW-KOLAB-L3>en SW-KOLAB-L3#conf t Enter configuration commands, one per line. End with CNTL/Z. SW-KOLAB-L3(config)#ip routing SW-KOLAB-L3(config)#interface vlan 70 SW-KOLAB-L3(config-if)#ip address 192.168.70.1 255.255.255.128 SW-KOLAB-L3(config-if)#no shutdown %LINK-5-CHANGED: Interface Vlan70, changed state to up %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan70, changed state to up SW-KOLAB-L3(config-if)#interface vlan 80 SW-KOLAB-L3(config-if)#ip address 192.168.80.1 255.255.252.0 SW-KOLAB-L3(config-if)#no shutdown %LINK-5-CHANGED: Interface Vlan80, changed state to up %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan80, changed state to up SW-KOLAB-L3(config-if)#interface vlan 90 SW-KOLAB-L3(config-if)#ip address 192.168.90.1 255.255.254.0 SW-KOLAB-L3(config-if)#no shutdown %LINK-5-CHANGED: Interface Vlan90, changed state to up %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan90, changed state to up SW-KOLAB-L3(config-if)#interface gi0/1 SW-KOLAB-L3(config-if)#no switchport SW-KOLAB-L3(config-if)#ip address 10.10.30.2 255.255.255.252 SW-KOLAB-L3(config-if)#no shutdown SW-KOLAB-L3(config-if)#ex SW-KOLAB-L3(config)#ip route 0.0.0.0 0.0.0.0 10.10.30.1
R-KOLAB	R-KOLAB>en R-KOLAB#conf t Enter configuration commands, one per line. End with CNTL/Z. R-KOLAB(config)#interface g0/0 R-KOLAB(config-if)#ip address 10.10.30.1 255.255.255.252 R-KOLAB(config-if)#no shutdown R-KOLAB(config-if)#ex R-KOLAB(config)#interface s0/0/0 R-KOLAB(config-if)#ip address 172.16.3.1 255.255.255.252 R-KOLAB(config-if)#clock rate 64000 R-KOLAB(config-if)#no shutdown R-KOLAB(config)#ip route 0.0.0.0 0.0.0.0 10.10.30.2
SW-PANITIA-L3	SW-PANITIA-L3>en SW-PANITIA-L3#conf t Enter configuration commands, one per line. End with CNTL/Z. SW-PANITIA-L3(config)#ip routing SW-PANITIA-L3(config)#interface vlan 100 SW-PANITIA-L3(config-if)#ip address 192.168.100.1 255.255.255.240 SW-PANITIA-L3(config-if)#no shutdown %LINK-5-CHANGED: Interface Vlan100, changed state to up %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state to up SW-PANITIA-L3(config-if)#interface gi0/1 SW-PANITIA-L3(config-if)#no switchport SW-PANITIA-L3(config-if)#ip address 10.10.40.2 255.255.255.252 SW-PANITIA-L3(config-if)#no shutdown SW-PANITIA-L3(config-if)#ex SW-PANITIA-L3(config)#ip route 0.0.0.0 0.0.0.0 10.10.40.1

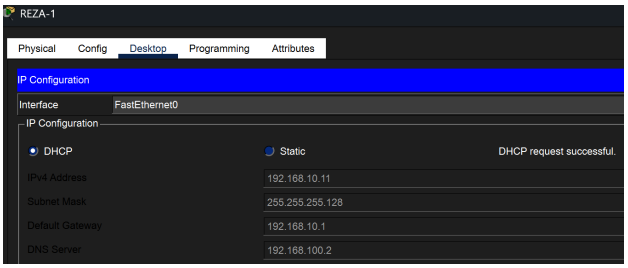
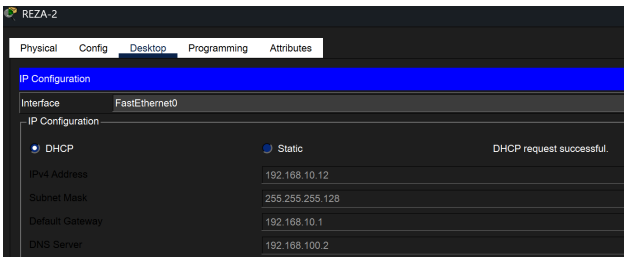
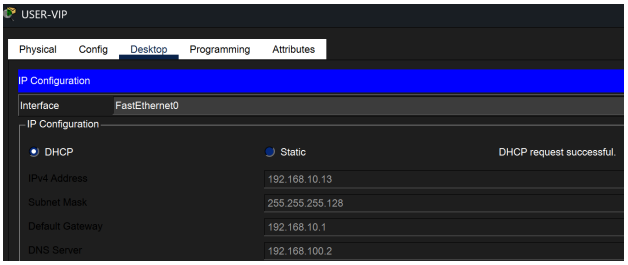
R-PANITIA	R-PANITIA>en R-PANITIA#conf t Enter configuration commands, one per line. End with CNTL/Z. R-PANITIA(config)#interface g0/0 R-PANITIA(config-if)#ip address 10.10.40.1 255.255.255.252 R-PANITIA(config-if)#no shutdown R-PANITIA(config-if)#ex R-PANITIA(config)#interface s0/0/0 R-PANITIA(config-if)#ip address 172.16.1.2 255.255.255.252 R-PANITIA(config-if)#no shutdown R-PANITIA(config-if)#ex R-PANITIA(config)#interface s0/0/1 R-PANITIA(config-if)#ip address 172.16.2.2 255.255.255.252 R-PANITIA(config-if)#no shutdown R-PANITIA(config-if)#ex R-PANITIA(config)#interface s0/1/0 R-PANITIA(config-if)#ip address 172.16.3.2 255.255.255.252 R-PANITIA(config-if)#no shutdown R-PANITIA(config-if)#ex R-PANITIA(config)#ip route 0.0.0.0 0.0.0.0 10.10.40.2

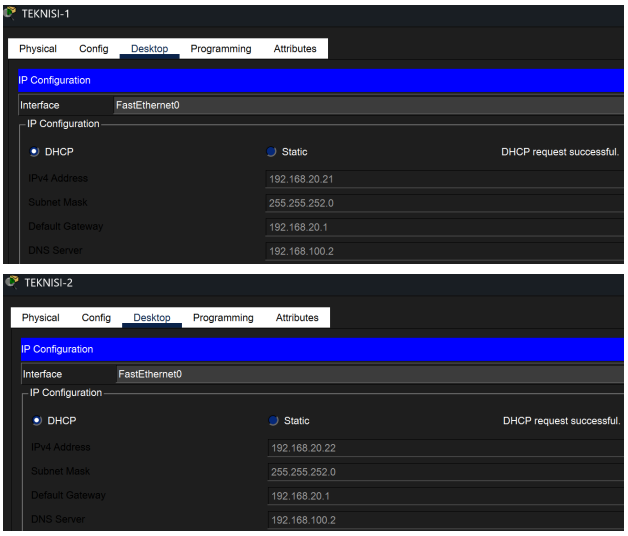
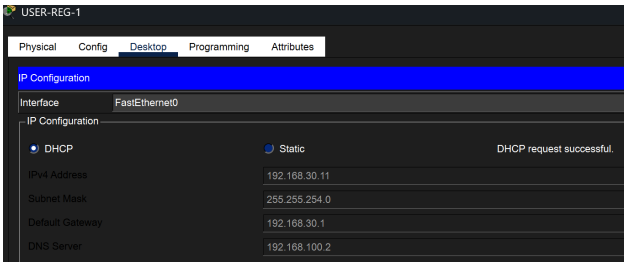
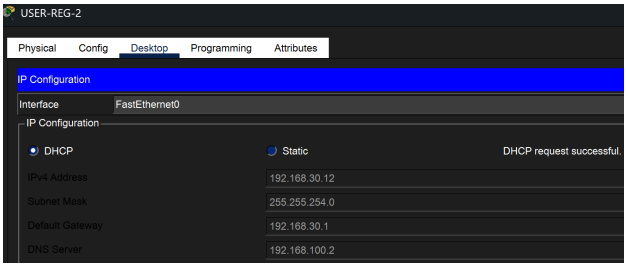
DHCP digunakan untuk memberikan alamat IP secara otomatis kepada setiap host pada jaringan sehingga proses konfigurasi client menjadi lebih cepat, efisien, dan mengurangi kesalahan konfigurasi manual.

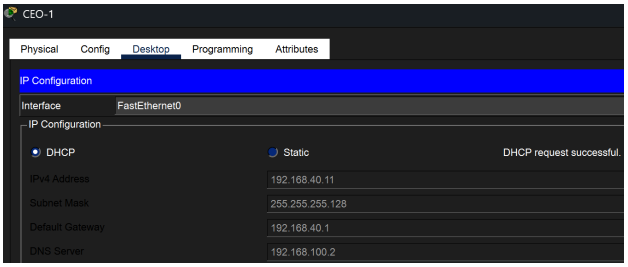
Device	Screenshot
SW-STUDIO-L3	SW-STUDIO-L3> SW-STUDIO-L3>en SW-STUDIO-L3#conf t Enter configuration commands, one per line. End with CNTL/Z. SW-STUDIO-L3(config)#ip dhcp excluded-address 192.168.10.1 192.168.10.10 SW-STUDIO-L3(config)#ip dhcp excluded-address 192.168.20.1 192.168.20.20 SW-STUDIO-L3(config)#ip dhcp excluded-address 192.168.30.1 192.168.30.10 Command ip dhcp excluded-address digunakan untuk mencegah DHCP memberikan alamat IP yang dipakai gateway atau server agar tidak terjadi konflik IP address. SW-STUDIO-L3(config)#ip dhcp pool VLAN10 SW-STUDIO-L3(dhcp-config)#network 192.168.10.0 255.255.255.128 SW-STUDIO-L3(dhcp-config)#default-router 192.168.10.1 SW-STUDIO-L3(dhcp-config)#dns-server 192.168.100.2 SW-STUDIO-L3(dhcp-config)#domain-name studio.local SW-STUDIO-L3(dhcp-config)#ex SW-STUDIO-L3(config)#ip dhcp pool VLAN20 SW-STUDIO-L3(dhcp-config)#network 192.168.20.0 255.255.252.0 SW-STUDIO-L3(dhcp-config)#default-router 192.168.20.1 SW-STUDIO-L3(dhcp-config)#dns-server 192.168.100.2 SW-STUDIO-L3(dhcp-config)#domain-name studio.local SW-STUDIO-L3(dhcp-config)#ex SW-STUDIO-L3(config)#ip dhcp pool VLAN30 SW-STUDIO-L3(dhcp-config)#network 192.168.30.0 255.255.254.0 SW-STUDIO-L3(dhcp-config)#default-router 192.168.30.1 SW-STUDIO-L3(dhcp-config)#dns-server 192.168.100.2 SW-STUDIO-L3(dhcp-config)#domain-name studio.local SW-STUDIO-L3(dhcp-config)#ex
SW-SPONSOR-L3	SW-SPONSOR-L3>en SW-SPONSOR-L3#conf t Enter configuration commands, one per line. End with CNTL/Z. SW-SPONSOR-L3(config)#ip dhcp excluded-address 192.168.40.1 192.168.40.10 SW-SPONSOR-L3(config)#ip dhcp excluded-address 192.168.50.1 192.168.50.20 SW-SPONSOR-L3(config)#ip dhcp excluded-address 192.168.60.1 192.168.60.10 SW-SPONSOR-L3(config)#ip dhcp pool VLAN40 SW-SPONSOR-L3(dhcp-config)#network 192.168.40.0 255.255.255.128 SW-SPONSOR-L3(dhcp-config)#default-router 192.168.40.1 SW-SPONSOR-L3(dhcp-config)#dns-server 192.168.100.2 SW-SPONSOR-L3(dhcp-config)#domain-name sponsor.local SW-SPONSOR-L3(dhcp-config)#ex SW-SPONSOR-L3(config)#ip dhcp pool VLAN50 SW-SPONSOR-L3(dhcp-config)#network 192.168.50.0 255.255.252.0 SW-SPONSOR-L3(dhcp-config)#default-router 192.168.50.1 SW-SPONSOR-L3(dhcp-config)#dns-server 192.168.100.2 SW-SPONSOR-L3(dhcp-config)#domain-name sponsor.local SW-SPONSOR-L3(dhcp-config)#ex SW-SPONSOR-L3(config)#ip dhcp pool VLAN60 SW-SPONSOR-L3(dhcp-config)#network 192.168.60.0 255.255.254.0 SW-SPONSOR-L3(dhcp-config)#default-router 192.168.60.1 SW-SPONSOR-L3(dhcp-config)#dns-server 192.168.100.2 SW-SPONSOR-L3(dhcp-config)#domain-name sponsor.local

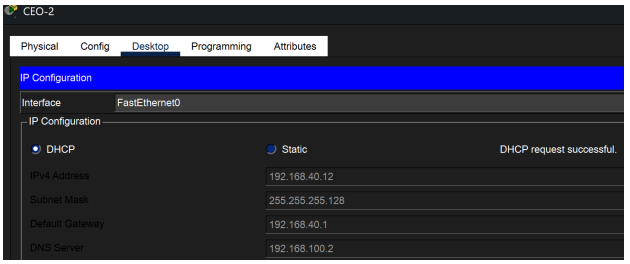
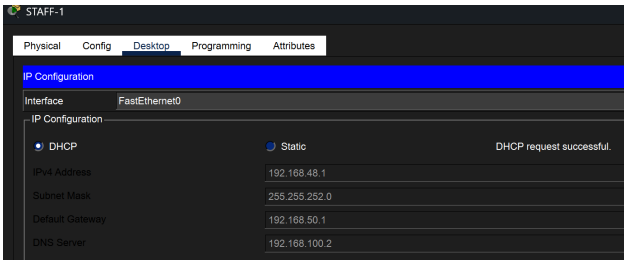
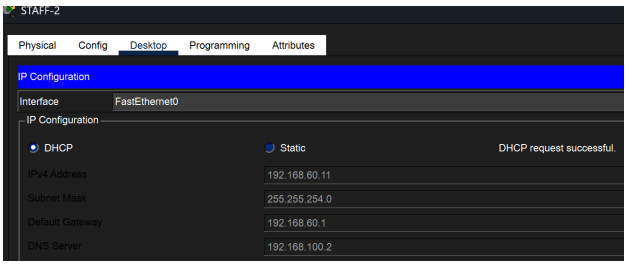
SW-KOLAB-L3	SW-KOLAB-L3>en SW-KOLAB-L3#conf t Enter configuration commands, one per line. End with CNTL/Z. SW-KOLAB-L3(config)#ip dhcp excluded-address 192.168.70.1 192.168.70.10 SW-KOLAB-L3(config)#ip dhcp excluded-address 192.168.80.1 192.168.80.20 SW-KOLAB-L3(config)#ip dhcp excluded-address 192.168.90.1 192.168.90.10 SW-KOLAB-L3(config)#ip dhcp pool VLAN70 SW-KOLAB-L3(dhcp-config)#network 192.168.70.0 255.255.255.128 SW-KOLAB-L3(dhcp-config)#default-router 192.168.70.1 SW-KOLAB-L3(dhcp-config)#dns-server 192.168.100.2 SW-KOLAB-L3(dhcp-config)#domain-name kolab.local SW-KOLAB-L3(dhcp-config)#ex SW-KOLAB-L3(config)#ip dhcp pool VLAN80 SW-KOLAB-L3(dhcp-config)#network 192.168.80.0 255.255.252.0 SW-KOLAB-L3(dhcp-config)#default-router 192.168.80.1 SW-KOLAB-L3(dhcp-config)#dns-server 192.168.100.2 SW-KOLAB-L3(dhcp-config)#domain-name kolab.local SW-KOLAB-L3(dhcp-config)#ex SW-KOLAB-L3(config)#ip dhcp pool VLAN90 SW-KOLAB-L3(dhcp-config)#network 192.168.90.0 255.255.254.0 SW-KOLAB-L3(dhcp-config)#default-router 192.168.90.1 SW-KOLAB-L3(dhcp-config)#dns-server 192.168.100.2 SW-KOLAB-L3(dhcp-config)#domain-name kolab.local
SW-PANITIA-L3	SW-PANITIA-L3>en SW-PANITIA-L3#conf t Enter configuration commands, one per line. End with CNTL/Z. SW-PANITIA-L3(config)#ip dhcp excluded-address 192.168.100.1 192.168.100.5 SW-PANITIA-L3(config)#ip dhcp pool VLAN100 SW-PANITIA-L3(dhcp-config)#network 192.168.100.0 255.255.255.240 SW-PANITIA-L3(dhcp-config)#default-router 192.168.100.1 SW-PANITIA-L3(dhcp-config)#dns-server 192.168.100.2 SW-PANITIA-L3(dhcp-config)#domain-name panitia.local

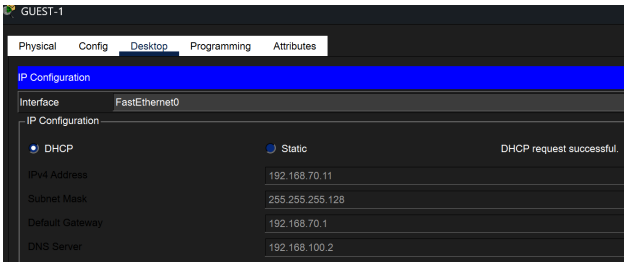
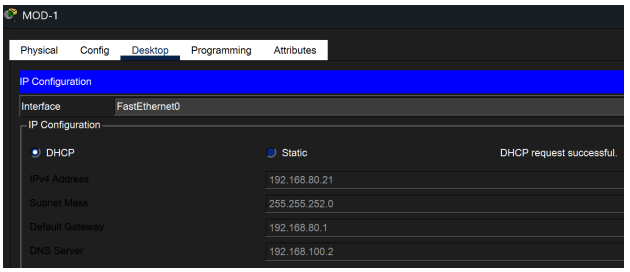
Bukti DHCP

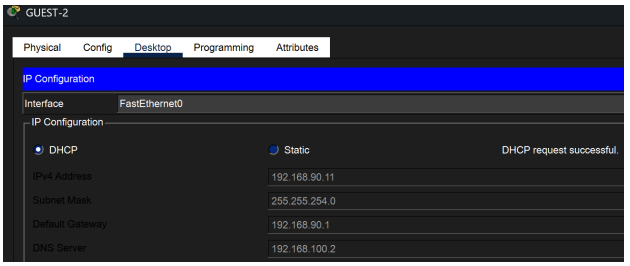
STUDIO	
Device	**Screenshot**
VLAN 10 PC VIP	  

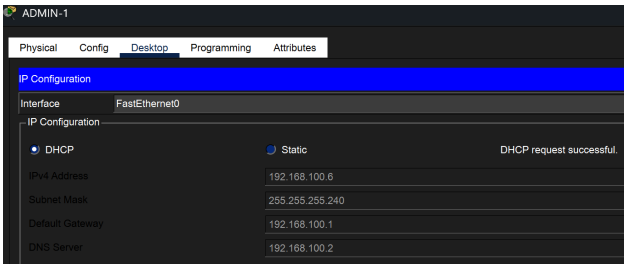
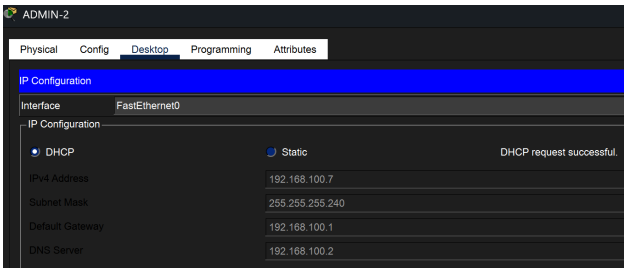
VLAN 20 PC CREW	
VLAN 30 PC REGULAR	 

SPONSOR	
Device	**Screenshot**
VLAN 40 PC Executive	

	
VLAN 50 PC Marketing	
VLAN 60 PC Staff	

KOLAB	
Device	**Screenshot**
VLAN 70 PC Donatur	
VLAN 80 PC Moderator	

VLAN 90 PC Aktif	

PANITIA	
Device	**Screenshot**
VLAN 100 PC Panitia	 

7. Kualitas Jaringan:

Device	Bukti
Bandwidth cepat	OSPF + WAN /30 Subnet /30 digunakan pada koneksi WAN point-to-point karena hanya membutuhkan dua host, sehingga penggunaan bandwidth dan IP address menjadi lebih efisien. Selain itu OSPF digunakan karena mampu memilih jalur terbaik secara otomatis dan memiliki convergence yang cepat sehingga kualitas komunikasi antar cabang tetap optimal.
Hindari loop	STP & Etherchannel

8. **VLAN atau Inter-VLAN** *terdapat pada nomer 6*.

ROUTING OSPF

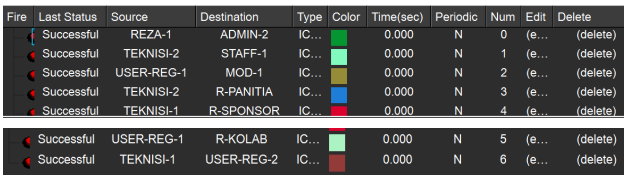
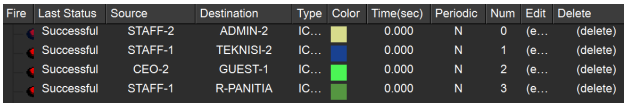
OSPF digunakan karena mendukung jaringan berskala besar, mampu melakukan update routing secara dinamis, memiliki convergence yang cepat, dan cocok digunakan pada topologi multi-router seperti pada proyek ini.

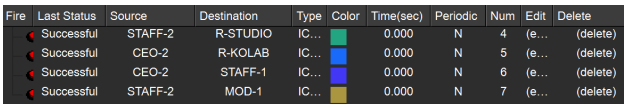
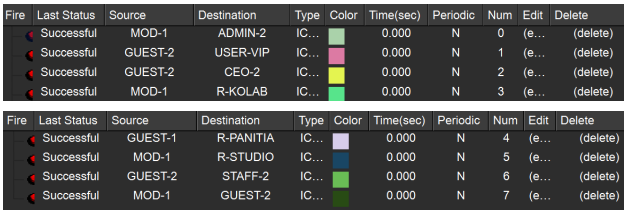
Jawaban:

Device	Screenshot
R-STUDIO	R-STUDIO(config)#router ospf 1 R-STUDIO(config-router)#router-id 1.1.1.1 R-STUDIO(config-router)#network 172.16.1.0 0.0.0.3 area 0 R-STUDIO(config-router)#network 10.10.10.0 0.0.0.3 area 0
SW-STUDIO-L3	SW-STUDIO-L3(config)#router ospf 1 SW-STUDIO-L3(config-router)#router-id 10.10.10.10 SW-STUDIO-L3(config-router)# SW-STUDIO-L3(config-router)#network 192.168.10.0 0.0.0.127 area 0 SW-STUDIO-L3(config-router)#network 192.168.20.0 0.0.3.255 area 0 SW-STUDIO-L3(config-router)#network 192.168.30.0 0.0.1.255 area 0 SW-STUDIO-L3(config-router)#network 10.10.10.0 0.0.0.3 area 0
R-SPONSOR	R-SPONSOR(config)#router ospf 1 R-SPONSOR(config-router)#router-id 2.2.2.2 R-SPONSOR(config-router)# R-SPONSOR(config-router)#network 172.16.2.0 0.0.0.3 area 0 R-SPONSOR(config-router)#network 172.20.20.0 0.0.0.3 area 0 R-SPONSOR(config)#router ospf 1 R-SPONSOR(config-router)#no network 10.10.20.0 0.0.0.3 area 0 R-SPONSOR(config-router)#network 10.10.21.0 0.0.0.3 area 0 R-SPONSOR(config-router)#router ospf 1 R-SPONSOR(config-router)#no network 10.10.21.0 0.0.0.3 area 0 R-SPONSOR(config-router)# 04:23:28: %OSPF-5-ADJCHG: Process 1, Nbr 5.5.5.5 on Serial0/0/1 or detached R-SPONSOR(config-router)#etwork 10.10.20.0 0.0.0.3 area 0 ^ % Invalid input detected at '^' marker. R-SPONSOR(config-router)#network 10.10.20.0 0.0.0.3 area 0
SW-SPONSOR-L3	SW-SPONSOR-L3(config)#router ospf 1 SW-SPONSOR-L3(config-router)#router-id 20.20.20.20 SW-SPONSOR-L3(config-router)# SW-SPONSOR-L3(config-router)#network 192.168.40.0 0.0.0.127 area 0 SW-SPONSOR-L3(config-router)#network 192.168.50.0 0.0.3.255 area 0 SW-SPONSOR-L3(config-router)#network 192.168.60.0 0.0.1.255 area 0 SW-SPONSOR-L3(config-router)#network 10.10.20.0 0.0.0.3 area 0
R-KOLAB	R-KOLAB(config)#router ospf 1 R-KOLAB(config-router)#router-id 3.3.3.3 R-KOLAB(config-router)# R-KOLAB(config-router)#network 172.16.3.0 0.0.0.3 area 0 R-KOLAB(config-router)#network 10.10.30.0 0.0.0.3 area 0
SW-KOLAB-L3	SW-KOLAB-L3(config)#router ospf 1 SW-KOLAB-L3(config-router)#router-id 30.30.30.30 SW-KOLAB-L3(config-router)# SW-KOLAB-L3(config-router)#network 192.168.70.0 0.0.0.127 area 0 SW-KOLAB-L3(config-router)#network 192.168.80.0 0.0.3.255 area 0 SW-KOLAB-L3(config-router)#network 192.168.90.0 0.0.1.255 area 0 SW-KOLAB-L3(config-router)#network 10.10.30.0 0.0.0.3 area 0

R-PANITIA	R-PANITIA(config)#router ospf 1 R-PANITIA(config-router)#router-id 4.4.4.4 R-PANITIA(config-router)# R-PANITIA(config-router)#network 172.16.1.0 0.0.0.3 area 0 R-PANITIA(config-router)#network 172.16.2.0 0.0.0.3 area 0 R-PANITIA(config-router)#network 172.16.3.0 0.0.0.3 area 0 R-PANITIA(config-router)#network 10.10.40.0 0.0.0.3 area 0
SW-PANITIA-L3	SW-PANITIA-L3(config)#router ospf 1 SW-PANITIA-L3(config-router)#router-id 40.40.40.40 SW-PANITIA-L3(config-router)# SW-PANITIA-L3(config-router)#network 192.168.100.0 0.0.0.15 area 0 SW-PANITIA-L3(config-router)#network 10.10.40.0 0.0.0.3 area 0
R-ISP	R-ISP(config)#router ospf 1 R-ISP(config-router)#router-id 5.5.5.5 R-ISP(config-router)# R-ISP(config-router)#network 10.10.10.0 0.0.0.3 area 0 R-ISP(config-router)#network 10.10.20.0 0.0.0.3 area 0 R-ISP(config-router)#network 10.10.30.0 0.0.0.3 area 0 R-ISP(config-router)#network 10.10.40.0 0.0.0.3 area 0 R-ISP(config-router)# R-ISP(config)#ip route 0.0.0.0 0.0.0.0 g0/0 %Default route without gateway, if not a point-to-point interface, may impact performance R-ISP(config)#router ospf 1 R-ISP(config-router)#default-information originate Command default-information originate digunakan agar router ISP dapat menyebarkan default route ke seluruh router lain sehingga semua jaringan dapat mengakses Internet Global. R-ISP(config)#router ospf 1 R-ISP(config-router)#no network 10.10.20.0 0.0.0.3 area 0 R-ISP(config-router)#network 10.10.21.0 0.0.0.3 area 0 Karena subnet sponsor 10.10.21.0/30 R-ISP(config)#router ospf 1 R-ISP(config-router)#network 200.200.200.0 0.0.0.255 area 0

Bukti OSPF berhasil:

Device	Screenshot
PC Studio ke PC router lain	
PC Panitia ke PC router lain	
PC Sponsor ke PC router lain	

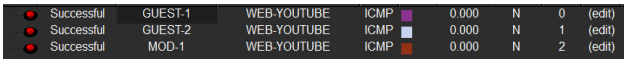
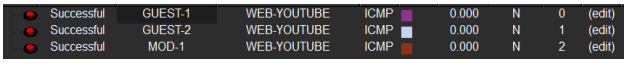
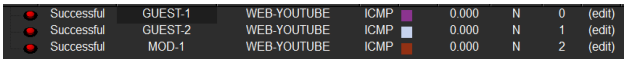
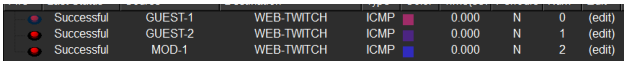
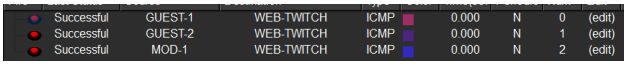
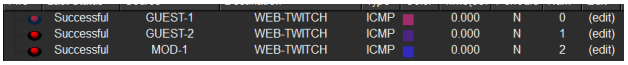
	
PC Kolab ke PC router lain	

9. Konfigurasi NAT

Device	Screenshot

R-ISP	`R-ISP>enable`
	`R-ISP#configure terminal`
	`Enter configuration commands, one per line.  End with CNTL/Z.`
	`R-ISP(config)#access-list 1 permit 192.168.0.0 0.0.255.255`
	`R-ISP(config)#ip nat inside source list 1 interface g0/0 overload`
	`R-ISP(config)#interface g0/0`
	`R-ISP(config-if)#ip nat outside`
	`R-ISP(config-if)#exit`
	`R-ISP(config)#interface s0/0/0`
	`R-ISP(config-if)#ip nat inside`
	`R-ISP(config-if)#exit`
	`R-ISP(config)#interface s0/0/1`
	`R-ISP(config-if)#ip nat inside`
	`R-ISP(config-if)#exit`
	`R-ISP(config)#interface s0/1/0`
	`R-ISP(config-if)#ip nat inside`
	`R-ISP(config-if)#exit`
	`R-ISP(config)#interface s0/1/1`
	`R-ISP(config-if)#ip nat inside`
	`R-ISP(config-if)#exit`

Bukti NAT berhasil:

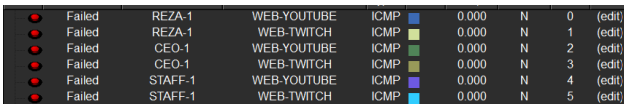
Device	Screenshot
PC GUEST-1 ke WEB-YOUTUBE	
PC GUEST-2 ke WEB-YOUTUBE	
PC MOD-1 ke WEB-YOUTUBE	
PC GUEST-1 ke WEB-TWITCH	
PC GUEST-2 ke WEB-TWITCH	
PC MOD-1 ke WEB-TWITCH	

10. Konfigurasi ACL

Device	Screenshot
R-STUDIO	R-STUDIO>enable R-STUDIO#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R-STUDIO(config)#ip access-list extended BLOKIR_PENONTON R-STUDIO(config-ext-nacl)#deny ip 192.168.30.0 0.0.1.255 200.200.200.0 0.0.0.255 R-STUDIO(config-ext-nacl)#permit ip any any R-STUDIO(config-ext-nacl)#exit R-STUDIO(config)#interface g0/0 R-STUDIO(config-if)#ip access-group BLOKIR_PENONTON in R-STUDIO(config-if)#exit R-STUDIO(config)#interface Tunnel0 R-STUDIO(config-if)#ip address 10.255.255.1 255.255.255.252 R-STUDIO(config-if)#tunnel source s0/0/0 R-STUDIO(config-if)#tunnel destination 172.16.2.1 R-STUDIO(config-if)#exit R-STUDIO(config)#ip route 192.168.40.0 255.255.255.128 10.255.255.2 R-STUDIO(config)#logging 192.168.20.10 R-STUDIO(config)#ntp server 192.168.20.11 R-STUDIO(config)#exit %LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel0, changed state to up
R-SPONSOR	R-SPONSOR>enable R-SPONSOR#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R-SPONSOR(config)#ip access-list extended BLOKIR_SPONSOR_INTERNET R-SPONSOR(config-ext-nacl)#deny ip 192.168.40.0 0.0.0.127 200.200.200.0 0.0.0.255 R-SPONSOR(config-ext-nacl)#deny ip 192.168.50.0 0.0.3.255 200.200.200.0 0.0.0.255 R-SPONSOR(config-ext-nacl)#deny ip 192.168.60.0 0.0.1.255 200.200.200.0 0.0.0.255 R-SPONSOR(config-ext-nacl)#permit ip any any R-SPONSOR(config-ext-nacl)#exit R-SPONSOR(config)#interface g0/0 R-SPONSOR(config-if)#ip access-group BLOKIR_SPONSOR_INTERNET in R-SPONSOR(config-if)#exit R-SPONSOR(config)#interface Tunnel0 R-SPONSOR(config-if)#ip address 10.255.255.2 255.255.255.252 R-SPONSOR(config-if)#tunnel source s0/0/0 R-SPONSOR(config-if)#tunnel destination 172.16.1.1 R-SPONSOR(config-if)#exit R-SPONSOR(config)#ip route 192.168.10.0 255.255.255.128 10.255.255.1 R-SPONSOR(config)#logging 192.168.50.10 R-SPONSOR(config)#ntp server 192.168.50.11 R-SPONSOR(config)#exit %LINK-5-CHANGED: Interface Tunnel0, changed state to up %LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel0, changed state to up

Bukti ACL berhasil:

Device	Screenshot
PC REZA-1 ke WEB-YOUTUBE	Failed REZA-1 WEB-YOUTUBE ICMP 0.000 N 0 (edit) Failed REZA-1 WEB-TWITCH ICMP 0.000 N 1 (edit) Failed CEO-1 WEB-YOUTUBE ICMP 0.000 N 2 (edit) Failed CEO-1 WEB-TWITCH ICMP 0.000 N 3 (edit) Failed STAFF-1 WEB-YOUTUBE ICMP 0.000 N 4 (edit) Failed STAFF-1 WEB-TWITCH ICMP 0.000 N 5 (edit)
PC REZA-1 ke WEB-TWITCH	Failed REZA-1 WEB-YOUTUBE ICMP 0.000 N 0 (edit) Failed REZA-1 WEB-TWITCH ICMP 0.000 N 1 (edit) Failed CEO-1 WEB-YOUTUBE ICMP 0.000 N 2 (edit) Failed CEO-1 WEB-TWITCH ICMP 0.000 N 3 (edit) Failed STAFF-1 WEB-YOUTUBE ICMP 0.000 N 4 (edit) Failed STAFF-1 WEB-TWITCH ICMP 0.000 N 5 (edit)
PC CEO-1 ke WEB-YOUTUBE	Failed REZA-1 WEB-YOUTUBE ICMP 0.000 N 0 (edit) Failed REZA-1 WEB-TWITCH ICMP 0.000 N 1 (edit) Failed CEO-1 WEB-YOUTUBE ICMP 0.000 N 2 (edit) Failed CEO-1 WEB-TWITCH ICMP 0.000 N 3 (edit) Failed STAFF-1 WEB-YOUTUBE ICMP 0.000 N 4 (edit) Failed STAFF-1 WEB-TWITCH ICMP 0.000 N 5 (edit)
PC CEO-1 ke WEB-TWITCH	Failed REZA-1 WEB-YOUTUBE ICMP 0.000 N 0 (edit) Failed REZA-1 WEB-TWITCH ICMP 0.000 N 1 (edit) Failed CEO-1 WEB-YOUTUBE ICMP 0.000 N 2 (edit) Failed CEO-1 WEB-TWITCH ICMP 0.000 N 3 (edit) Failed STAFF-1 WEB-YOUTUBE ICMP 0.000 N 4 (edit) Failed STAFF-1 WEB-TWITCH ICMP 0.000 N 5 (edit)
PC STAFF-1 ke WEB-YOUTUBE	Failed REZA-1 WEB-YOUTUBE ICMP 0.000 N 0 (edit) Failed REZA-1 WEB-TWITCH ICMP 0.000 N 1 (edit) Failed CEO-1 WEB-YOUTUBE ICMP 0.000 N 2 (edit) Failed CEO-1 WEB-TWITCH ICMP 0.000 N 3 (edit) Failed STAFF-1 WEB-YOUTUBE ICMP 0.000 N 4 (edit) Failed STAFF-1 WEB-TWITCH ICMP 0.000 N 5 (edit)

PC STAFF-1 ke WEB-TWITCH	

11. Konfigurasi GRE Tunneling

Device	Screenshot

R-STUDIO	`R-STUDIO>enable`
	`R-STUDIO#configure terminal`
	`Enter configuration commands, one per line.  End with CNTL/Z.`
	`R-STUDIO(config)#interface Tunnel0`
	`R-STUDIO(config-if)#ip address 10.255.255.1 255.255.255.252`
	`R-STUDIO(config-if)#tunnel source s0/0/0`
	`R-STUDIO(config-if)#tunnel destination 172.16.2.1`
	`R-STUDIO(config-if)#exit`
	`R-STUDIO(config)#ip route 192.168.40.0 255.255.255.128 10.255.255.2`
	`R-STUDIO(config)#exit`
	`R-STUDIO#`
	`%SYS-5-CONFIG I: Configured from console by console`

R-SPONSOR	`R-SPONSOR>enable`
	`R-SPONSOR#configure terminal`
	`Enter configuration commands, one per line.  End with CNTL/Z.`
	`R-SPONSOR(config)#interface Tunnel0`
	`R-SPONSOR(config-if)#ip address 10.255.255.2 255.255.255.252`
	`R-SPONSOR(config-if)#tunnel source s0/0/0`
	`R-SPONSOR(config-if)#tunnel destination 172.16.1.1`
	`R-SPONSOR(config-if)#exit`
	`R-SPONSOR(config)#ip route 192.168.10.0 255.255.255.128 10.255.255.1`
	`R-SPONSOR(config)#exit`
	`R-SPONSOR#`
	`%SYS-5-CONFIG I: Configured from console by console`

Bukti GRE Tunneling berhasil:

Device	Screenshot

PC REZA-1	`C:\>ping 10.255.255.2`
	
	`Pinging 10.255.255.2 with 32 bytes of data:`
	
	`Reply from 10.255.255.2: bytes=32 time=2ms TTL=252`
	`Reply from 10.255.255.2: bytes=32 time=10ms TTL=253`
	`Reply from 10.255.255.2: bytes=32 time=2ms TTL=252`
	`Reply from 10.255.255.2: bytes=32 time=3ms TTL=253`
	
	`Ping statistics for 10.255.255.2:`
	`    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),`
	`Approximate round trip times in milli-seconds:`
	`    Minimum = 2ms, Maximum = 10ms, Average = 4ms`

12. Konfigurasi Syslog & NTP Server

Device	Screenshot

R-STUDIO	`R-STUDIO>enable`
	`R-STUDIO#configure terminal`
	`Enter configuration commands, one per line.  End with CNTL/Z.`
	`R-STUDIO(config)#logging 192.168.20.10`
	`R-STUDIO(config)#ntp server 192.168.20.11`
	`R-STUDIO(config)#exit`
	`R-STUDIO#`
	`%SYS-5-CONFIG_I: Configured from console by console`

SW-STUDIO-L3	SW-STUDIO-L3>enable SW-STUDIO-L3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. SW-STUDIO-L3(config)#logging 192.168.20.10 SW-STUDIO-L3(config)#ntp server 192.168.20.11 SW-STUDIO-L3(config)#exit SW-STUDIO-L3# %SYS-5-CONFIG I: Configured from console by console
R-SPONSOR	R-SPONSOR>enable R-SPONSOR#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R-SPONSOR(config)#logging 192.168.50.10 R-SPONSOR(config)#ntp server 192.168.50.11 R-SPONSOR(config)#exit
SW-SPONSOR-L3	SW-SPONSOR-L3>enable SW-SPONSOR-L3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. SW-SPONSOR-L3(config)#logging 192.168.50.10 SW-SPONSOR-L3(config)#ntp server 192.168.50.11 SW-SPONSOR-L3(config)#exit SW-SPONSOR-L3# %SYS-5-CONFIG I: Configured from console by console
R-KOLAB	R-KOLAB>enable R-KOLAB#configure terminal Enter configuration commands, one per line. End with CNTL/Z. R-KOLAB(config)#logging 192.168.80.10 R-KOLAB(config)#ntp server 192.168.80.11 R-KOLAB(config)#exit R-KOLAB# %SYS-5-CONFIG I: Configured from console by console
SW-KOLAB-L3	SW-KOLAB-L3>enable SW-KOLAB-L3#configure terminal Enter configuration commands, one per line. End with CNTL/Z. SW-KOLAB-L3(config)#logging 192.168.80.10 SW-KOLAB-L3(config)#ntp server 192.168.80.11 SW-KOLAB-L3(config)#exit SW-KOLAB-L3# %SYS-5-CONFIG_I: Configured from console by console