CECS 303 NETWORKS AND NETWORK SECURITY

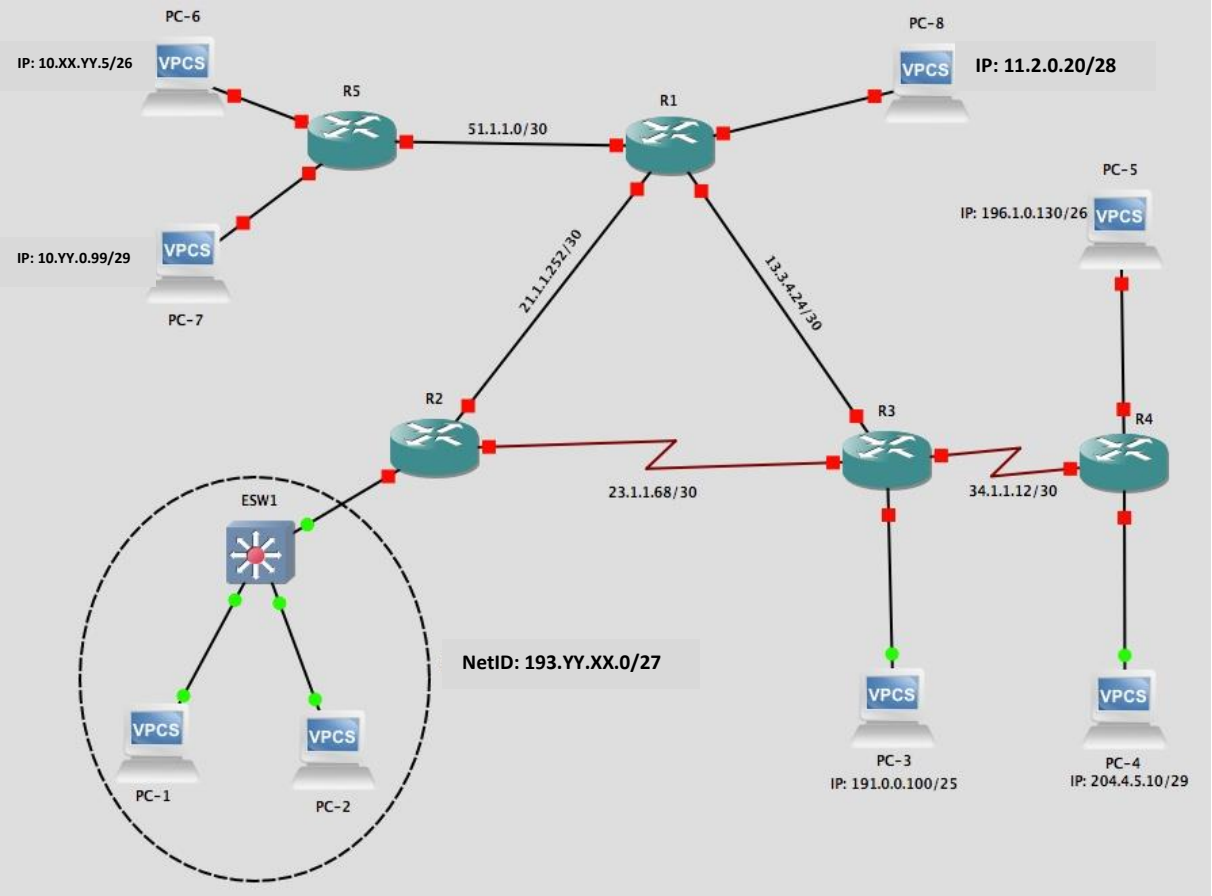
Netlab 4: Routing Topology in GNS3

Purpose: In this Lab exercise, you will build a more advanced network topology in GNS3. This exercise will help you to understand the principles of routing with the use of GNS3.

Procedure

You will continue using the ***IOS reference sheet*** for the commands required to configure the topology.

Launch GNS3 from the shortcut on your desktop. Create a new project, name the project "Lab4_yourname". Once the program is running, you can start building the topology portrayed below.



The routers in this topology are NetLab routers, the switches are the NetLab Ethernet Switches (ESWs). You might need to add more interfaces to the routers. Notice that in the topology there are Ethernet (straight line links) and serial T1 connections (lightning-bolt looking line links).

Once everything is connected, fill the following table with the needed information to configure your devices.

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Router	Name of Interface	IP Address with CIDR mask
R1	f0/0	21.1.1.253/30
R1	f0/1	13.3.4.25/30
R1	f1/0	51.1.1.1/30
R1	f2/0	11.2.0.17/28
Router	**Name of Interface**	**IP Address with CIDR mask**
R2	s0/0	23.1.1.69/30
R2	f0/1	21.1.1.254/30
R2	f0/0	193.6.75.1/27
Router	**Name of Interface**	**IP Address with CIDR mask**
R3	f0/0	13.3.4.26/30
R3	s0/0	23.1.1.70/30
R3	f0/1	191.0.0.1/25
R3	s0/1	34.1.1.13/30
Router	**Name of Interface**	**IP Address with CIDR mask**
R4	f0/0	204.4.5.9/29
R4	s0/1	34.1.1.14/30
R4	f0/1	196.1.0.129/26
Router	**Name of Interface**	**IP Address with CIDR mask**
R5	f0/0	51.1.1.2/30
R5	f0/1	10.75.6.1/26
R5	f1/0	10.6.0.97/29

Q.- How many broadcasts domains or networks do you have in the topology? 5

Complete the info in the following table with the IP addresses you planned to assign to the VPCs:

VPC	IP Address with mask in CIDR format	Gateway IP Address
1	193.6.75.2/27	193.6.75.1
2	193.6.75.3/27	193.6.75.1
3	191.0.0.100/25	191.0.0.1
4	204.4.5.10/29	204.4.5.9
5	196.1.0.130/26	196.1.0.129
6	10.75.6.5/26	10.75.6.1
7	10.6.0.99/29	10.6.0.97
8	11.2.0.20/28	11.2.0.17

Now let's configure the router's interfaces and VPC with the IPs in your tables (use the IOS reference sheet)

Try to ping between the VPCs in different broadcast domains. Does the ping work?
__no_____

If your answer is NO, you need to implement a routing technique to make all the VPCs talk to each other. Use the commands from the *Cisco IOS Reference Sheet* to setup static IP routes

Router	Network ID with Mask	Next-Hop
R1	191.0.0.0 255.255.255.128	13.3.4.26
R1	204.4.5.8 255.255.255.248	13.3.4.26
R1	196.1.0.128 255.255.255.192	13.3.4.26
R1	10.75.6.0 255.255.255.192	51.1.1.2
R1	10.6.0.96 255.255.255.248	21.1.1.2
R1	193.6.75.0 255.255.255.224	21.1.1.254
R2	191.0.0.0 255.255.255.128	23.1.1.70
R2	204.4.5.8 255.255.255.248	23.1.1.70
R2	196.1.0.128 255.255.255.192	23.1.1.70
R2	1.1.1.1 255.255.255.255	21.1.1.253
R2	10.75.6.0 255.255.255.192	21.1.1.253
R2	10.6.0.96 255.255.255.248	21.1.1.253
R2	11.2.0.16 255.255.255.240	21.1.1.253
R3	11.0.0.16 255.255.255.240	13.3.4.25
R3	10.84.61.0 255.255.255.192	13.3.4.25
R3	10.6.0.96 255.255.255.248	13.3.4.25
R3	204.4.5.8 255.255.255.248	34.1.1.14
R3	196.1.0.128 255.255.255.192	34.1.1.14
R3	196.6.75.0 255.255.255.224	23.1.1.69
R4	191.0.0.0 255.255.255.128	34.1.1.13
R4	0.0.0.0 0.0.0.0	34.1.1.13
R4	10.65.6.0 255.255.255.128	34.1.1.13
R4	10.6.0.96 255.255.255.248	34.1.1.13
R5	0.0.0.0 0.0.0.0	51.1.1.1
R5	204.4.5.8 255.255.255.248	51.1.1.1
R5	196.1.0.128 255.255.255.192	51.1.1.1
R5	11.2.0.16 255.255.255.240	51.1.1.1

Procedure - Part 2

Similar to the work in previous Labs, you will deploy a DHCP server for this lab. This time, it will be one single DHCP server for the entire topology. Router R1 will play the role of this global DHCP server. You need an IP helper-address (see your *Cisco IOS Reference Sheet)* to convert from broadcast to unicast the DHCP messages. This "helper" has to be implemented since routers cannot forward broadcast messages between subnets.

Network ID	Mask	Helper IP	Gateway	Excluded IPs
193.6.75.0	255.255.255.224	1.1.1.1	193.6.75.1	193.6.75.1, 193.6.75.10
191.0.0.0	255.255.255.128	1.1.1.1	191.0.0.1	191.0.0.1, 191.0.0.110
204.4.5.8	255.255.255.248	1.1.1.1	204.4.5.9	204.4.5.9, 204.4.5.12
196.1.0.128	255.255.255.192	1.1.1.1	196.1.0.129	196.1.0.129, 196.1.0.140
11.2.0.16	255.255.255.240	1.1.1.1	11.2.0.17	11.2.0.17, 11.2.0.25
10.75.6.0	255.255.255.192	1.1.1.1	10.75.6.1	10.75.6.1, 10.75.6.10
10.6.0.96	255.255.255.248	1.1.1.1	10.6.0.97	10.6.0.97, 10.6.0.100

Start a Wireshark packet capture in one of the point-to-point interfaces of router R1.

Q.- What type of DHCP messages do you see?

DHCP discover, offer, request and ACK interactions

Q.- What is the source and destination IP addresses in one of the incoming messages?

Source: 193.6.75.1 Destination: 1.1.1.1
Source: 21.1.1.253
Destination: 193.6.75.1

Q.- Are you able to execute inter-networks pings?

No

Procedure - Part 3

Now, you will add dynamic routing. Your instructor will provide guidance about what your routing protocol options you have.

Q.- Which dynamic routing protocol are you going to implement?
OSPF

Q.- What is the optimal route to send messages from PC4 to PC1?
R4 to R3 to R2 to 193.6.75.0

Q.- What is the optimal route to send messages from PC5 to PC6?
R4 to R3 to R1 to R5 to 10.75.6.5

Q.- Compare the content of your dynamic forwarding table with the table you build for static routing. Describe and explaing you findings:
Static routers are manually configured whereas dynamic routers are remote networks. Static table is preconfigured which makes them slower whereas dynamic tries to find the fastest possible option.