DEPARTAMENTO DE ELECTRÓNICA, TELECOMUNICAÇÕES E INFORMÁTICA
LICENCIATURA EM ENG. DE COMPUTADORES E INFORMÁTICA

REDES DE COMUNICAÇÃO I

LABORATORY GUIDE NO. 4

NAT/PAT, DHCP, SUBNETTING AND IPv6 BASICS

Objectives
- Study of the NAT/PAT mechanisms.
- Study of DHCP.
- Subnetting
- Study of IPv6

Duration
3 weeks
In the end of the class, send your report to your Professor.

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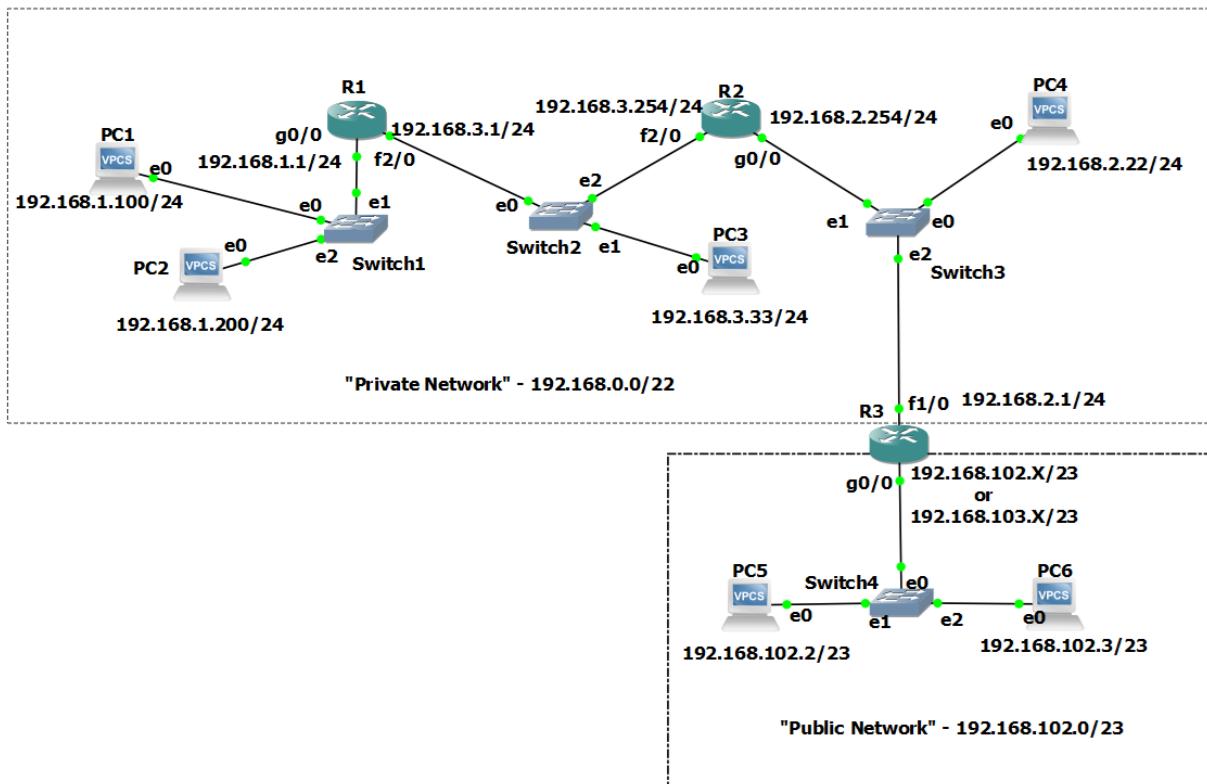
Part 1 – NAT/PAT

1. Dynamic NAT

1.1. Base Network configuration

Assemble and configure (using the GNS3 and VPCS hosts) the network depicted in the following figure which represents a small company network (this network is based on the network from Guide 2). The company decided to configure IP private addressing using the network 192.168.0.0/22 and NAT mechanism (without PAT) to manage all Internet accesses.

a) Create default routes on R1 and R2 towards the "Public Network"
R1:
R1# **configure terminal**   // conf t
R1(config)# **ip route 0.0.0.0 0.0.0.0 192.168.3.254**

R2:
R2# **configure terminal**   // conf t
R2(config)# **ip route 0.0.0.0 0.0.0.0 192.168.2.1**

b) Configure R3 network interfaces (please refer to the annex to get the g0/0 IP address corresponding to your ID –"X" value) and routing for the internal networks.
R3:
R3# configure terminal   // conf t
R3(config)# int g0/0
R3(config-if)# ip address 192.168.10**2/3.X** 255.255.25**4**.0 // Refer to the annex
R3(config-if)# no shut
R3(config)# int f1/0
R3(config-if)# ip address 192.168.2.1 255.255.255.0
R3(config-if)# no shut
R3(config-if)#exit
R3(config)#ip route 192.168.0.0 255.255.25**2**.0 192.168.2.254 // R2 is the GW to the inside

c) Configure VPCs 5 and 6 with the corresponding IP addresses (do not configure gateway).

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1.2. Dynamic NAT configuration

In order to define a pool of global addresses to be allocated by the dynamic NAT process, issue the following command on Router 3 (refer to the annex for the value of "Y"):

R3:
R3# **configure terminal**   // conf t
R3(config)# *ip nat pool MYNATPOOL 192.168.102/3.Y 192.168.102/3.Y netmask 255.255.255.0*

This command defines a pool with a single public address (192.168.102/3.Y).

The name **MYNATPOOL** is the name of the address pool. The first **192.168.102/3.Y** in the command is the first IP address in the pool, and the second **192.168.102/3.Y** is the last IP address in the pool (this command creates a pool that contains only a single address, since the first and the last value have the same IP address).

Next, configure a standard **access list** to define which internal source addresses can be translated. Since any users on the private network are being translated, use the following command:

R3(config)# *access-list 2 permit 192.168.0.0 0.0.3.255*

This command defines that the networks 192.168.0.0/24, 192.168.1.0/24, 192.168.2.0/24 and 192.168.3.0/24 will be allowed (permitted) on the NAT process.

Finally, the establish the dynamic NAT translation, it is necessary to link the access list to the name of the NAT pool, as follows:

R3(config)# *ip nat inside source list 2 pool MYNATPOOL*

Note that "source list 2" refers to the "access-list 2" created before, and "pool MYNATPOOL" refers to the "nat pool" created before (be careful to guarantee that the names are exactly the same)

Finally, specify **an interface on the Router to be used by inside network hosts** requiring address translation:

R3(config)# **interface f1/0**
R3(config-if)# **ip nat inside**

Also, specify **an interface to be used as the outside NAT interface** as follows:

R3(config)# **interface g0/0**
R3(config-if)# **ip nat outside**

NOTE: If you are using different router interfaces, please adapt the commands to match the interfaces you are using.

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1.2.1.   Start a packet capture on the public network (between R3 g0/0 and Switch4) and another on the private network (between R3 f1/0 and Switch3). At PC1 execute a ping to PC5 (192.168.102.2), and on PC2 execute a ping also to PC5 (192.168.102.2). Verify (on the router) the active NAT translations and NAT activity statistics, use the commands

     R3# **show ip nat translations**
     R3# **show ip nat statistics**

>> Which packets had the source IP addresses translated? Explain the obtained results.

1.2.2.   Execute on the router the command to clear the NAT translation table:
     R3# **clear ip nat translation ***

and execute again a ping at PC2 to **192.168.102.3**

>> Explain the observed results.

1.2.3.   Change NAT timeout to 60 seconds and clear the NAT translations table:
     R3(config)# *ip nat translation timeout 60*
     R3# **clear ip nat translation ***
At PC1 execute a ping to **192.168.102.2**, and immediately after, at PC2 execute repeatedly a ping to **192.168.102.2**. How much time does it take to obtain connectivity between PC2 and host **192.168.102.2**?

>> Explain the observed results.

1.2.4.   Restore NAT timeout value to 86400 seconds (24 hours):
     R3(config)# **ip nat translation timeout 86400**

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1.3. Dynamic NAT/PAT

1.3.1. The most powerful feature of NAT is **address overloading, or port address translation (PAT)**. Overloading allows multiple inside addresses to map to a single global address. With PAT, the NAT router keeps track of the different conversations by mapping TCP and UDP port numbers. After defining the pool of global addresses to be allocated by the dynamic NAT process and configuring the standard access list that defines which internal source addresses can be translated, configure address overloading on Router with the following command:

R3(config)# **ip nat inside source list 2 pool MYNATPOOL <u>overload</u>**

Note: You may have to reset the active NAT translations with **<u>clear ip nat translation *</u>**

Repeat experience 1.2.1.

>>Which are the advantages of using NAT and PAT mechanisms?

1.3.2. From PC1 (and PC2) try to establish UDP and TCP connections (ports 80 and 22) to the host 192.168.102.2:

PC> ping **192.168.102.2** -2 -p 80	! UDP port 80
PC> ping **192.168.102.2** -2 -p 22	! UDP port 22
PC> ping **192.168.102.2** -3 -p 80	! TCP port 80
PC> ping **192.168.102.2** -3 -p 22	! TCP port 22

Note: The option -p must have a space after (before the port number).

>> Verify (on the router) the active NAT translations and NAT activity statistics. Explain the obtained results.

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1.4. Static NAT/PAT Translations

1.4.1. Try to ping the private network machines (PC1, 2, 3 or 4 or router interfaces) from PC5 or PC6.

>> Explain the results.

1.4.1. Suppose that now you have another public IP address available (address W on the annex). Configure the router in order to allow the PC5 or 6 to access PC1.

A static translation between the inside local address of a host and one of the inside global addresses can be created using the following commands:

R3(config)# **ip nat inside source static 192.168.1.100 192.168.102/3.W**

From PC5, ping PC1's static public address (**192.168.102/3.W**)

PC5> **ping 192.168.102/3.W**

>> Analyze the captured packets on the private network and explain the obtained results.

>> Discuss a scenario where static NAT/PAT is required.

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Part 2 - DHCP

2. DHCP

2.1. DHCP server on a Cisco Router.

   2.1.1. Configure Router 1 (R1) as DHCP server for the private network. Assume that you want to dynamically assign addresses from the range 192.168.1.101 to 192.168.1.199

```
R1(config)# service dhcp
R1(config)# ip dhcp excluded-address 192.168.1.1 192.168.1.100
R1(config)# ip dhcp excluded-address 192.168.1.200 192.168.1.254
R1(config)# ip dhcp pool 1
R1(dhcp-config)# network 192.168.1.0 255.255.255.0
R1(dhcp-config)# default-router 192.168.1.1
```

   Use the following commands to verify the configuration and status of the DHCP server:

```
R1# show ip dhcp pool
R1# show ip dhcp server statistics
R1# show ip dhcp binding
```

2.2. Start a capture on Router 1's G0/0 interface.

   Configure PC1 to acquire the IPv4 address dynamically:

```
PC1> ip dhcp
```

   Configure PC1 to renew the IPv4 address dynamically:

```
PC1> ip dhcp -r
```

   Configure PC1 to release the IPv4 address dynamically:

```
PC1> ip dhcp -x
```

   Configure PC1 to acquire again the IPv4 address dynamically:

```
PC1> ip dhcp
```

Note: you may need to reset PC1 IP address. (remove and save configuration without IP)
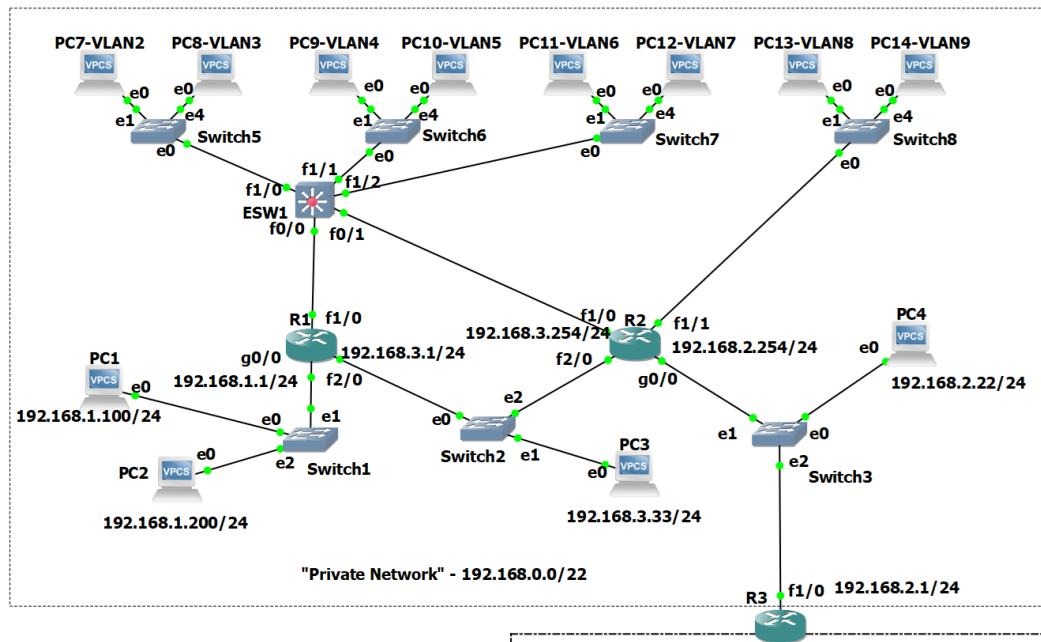
>> In each step, analyze the exchanged DHCP packets and the contents of the DHCP Bindings at Router 1.

At this point, you may configure DHCP Pools on R1 for the remaining networks on the private part. On R2, interface g0/0, you will need to add the command "**ip helper-address 192.168.3.1**" and provide the general **service dhcp** command.

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Part 3 – Subnetting

2.2.1. Subnetting

Continue using the network from the previous section, add an ESW and 4 switches. Configure the network topology as follows:

Use the network 172.25.X.0/22 to provide addresses for all the VLANs above, according to the following requirements:

VLAN2 – at least 500 addresses + router/ESW/VLAN interface

VLAN3 – at least 16 addresses + router/ESW/VLAN interface

VLAN4 – at least 61 addresses + router/ESW/VLAN interface

VLAN5 – at least 125 addresses + router/ESW/VLAN interface

VLAN6 – at least 70 addresses + router/ESW/VLAN interface

VLAN7 – at least 30 addresses + router/ESW/VLAN interface

VLAN8 – at least 25 addresses + router/ESW/VLAN interface

VLAN9 – at least 5 addresses + router/ESW/VLAN interface

The router inter-connections (R1–ESW1 and R2-ESW1) must use /30 subnets from the same address space.

>> Divide the address space to meet the requirements. Present it on a table. Show how you did, using a diagram.

	Network	Mask	Broadcast	Gateway Addr.	Available Address Space
VLAN2					-
VLAN3					-
VLAN4					-
VLAN5					-
VLAN6					-
VLAN7					-
VLAN8					-
VLAN9					-

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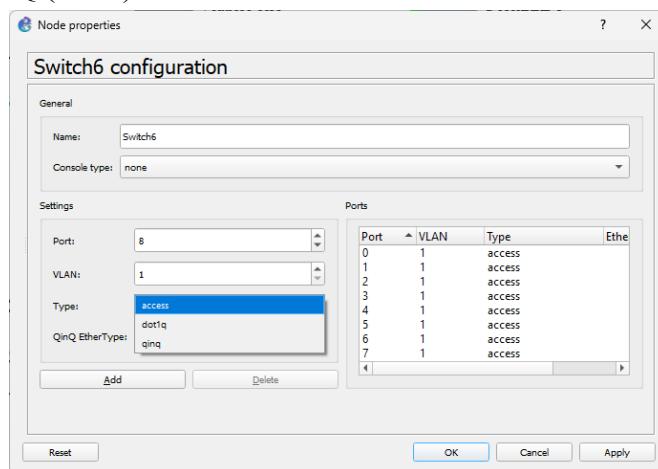
Interconnections		
NETWORK / MASK	**ESW1**	**R1/R2**

2.2.2. Configure the ESW and R2 with the specified VLANs

Refer to the VLANs guide to the specific commands. Do not forget to configure the ESW to perform "ipv4 routing" and "service dhcp".

2.2.3. Configure the switch ports to according to this scenario

Some ports must be dot1Q (trunk)

2.2.4. **Configure the interconnections**

>> Verify connectivity between the routers

2.2.5. Configure routing between the routers to allow full connectivity on all the network. Use a default route whenever is possible.

>> Present the routing tables of R1, R2, R3 and ESW.
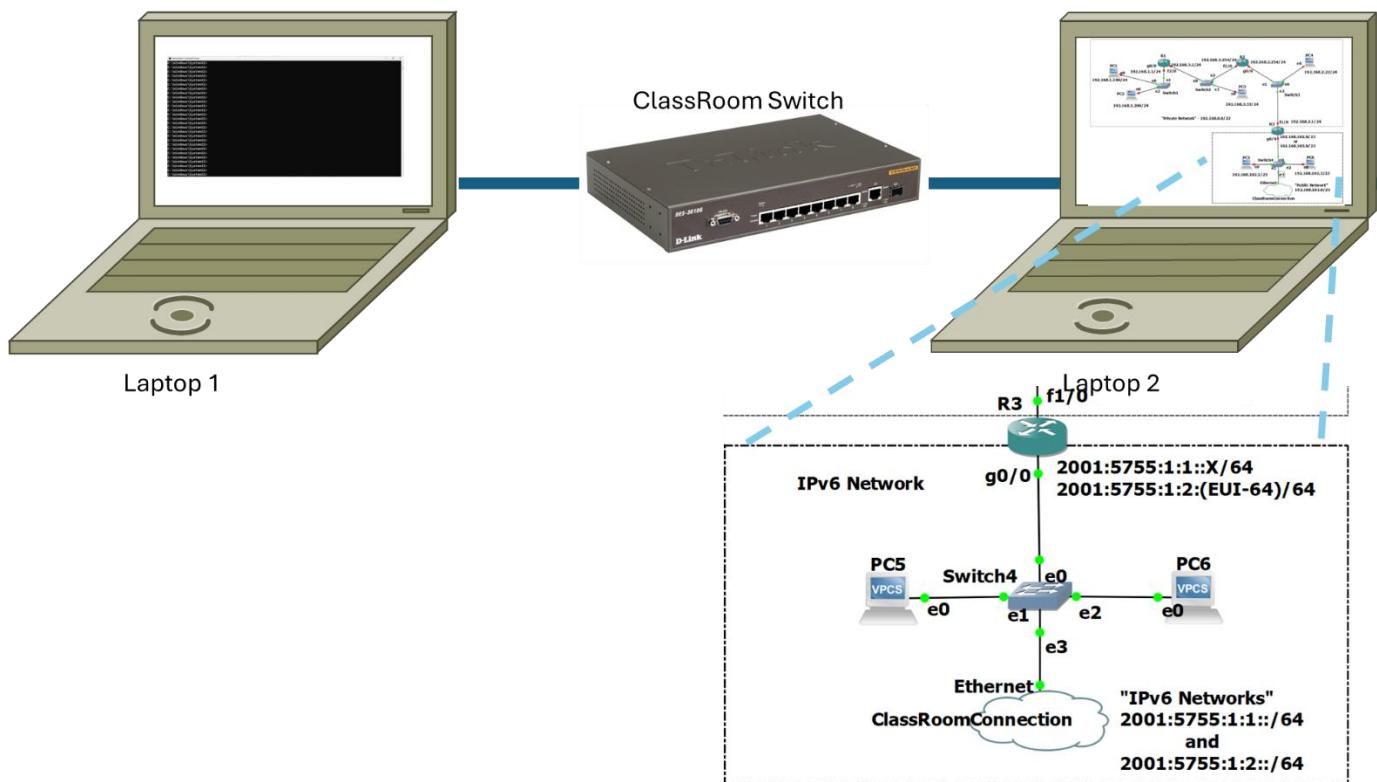
2.2.6. Configure DHCP pools to all the VLANs on R1. On R2 and on ESW, use the "ip helper-address" command on the VLAN interfaces, pointing to R1

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Part 4 – Ipv6
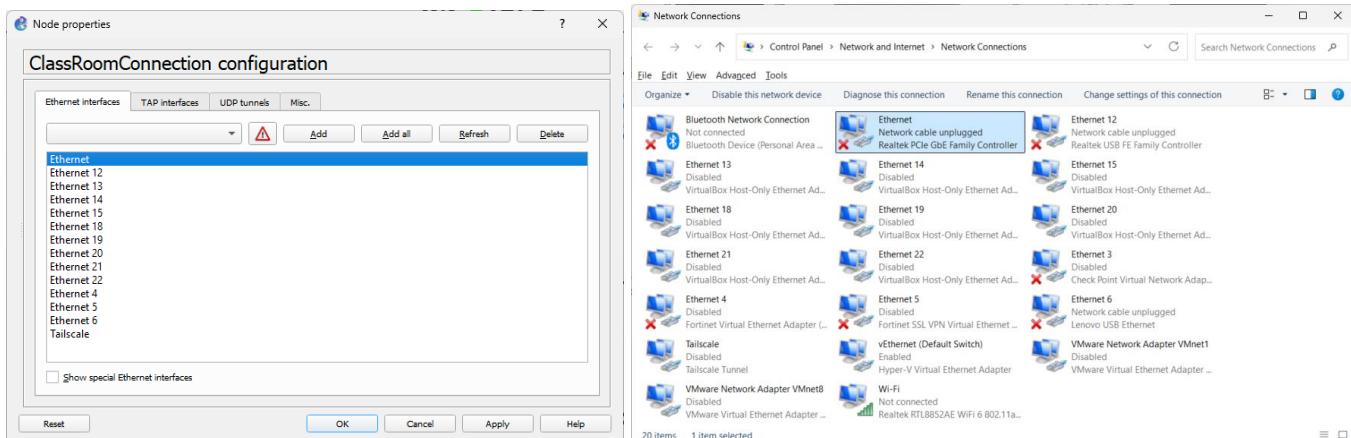
3. IPv6 Basic Mechanisms

3.1.1. Continue using the same network and add a "cloud" as shown on the picture below (You may use the classroom PC as "Laptop 1"). Connect the Cloud to one of the switch ports and to the Ethernet network adapter of your laptop (if your laptop does not have a built-in Ethernet adapter, use a USB-to-Ethernet adapter).

(Note: you may cross-configure this scenario: each Laptop will simultaneously act as Laptop 1 and Laptop 2)

The connection on the cloud must be done to the correct interface, corresponding to the Ethernet adapter. If you "right click" on the Cloud, you may choose "Configure" to check if the right adapter is present. On the PC ("view network connections" on Windows), you may check the name of the Ethernet adapter.

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3.1.2. Start a capture in the link between the Cloud and the switch inside GNS3. Turn off and back on the Laptop1 Ethernet interface. Both laptops must have the IPv6 protocol enabled on the Ethernet interfaces.

>>Stop the capture and analyze the IPv6 packets. Do you see any IPv6 packets? If yes, which? If not, do you know why?

Re-start the capture in the link between the Cloud and the Switch. Power on R3 (if it is powered down) and configure its interface to network A (g0/0).

R3(config)# **ipv6 unicast-routing**   //enable IPv6 routing on this router
R3(config)# **interface g0/0**
R3(config-if)# **ipv6 enable**   //enable IPv6 routing on this interface (g0/0)
R3(config-if)# **no shutdown**

Verify router's interfaces names and configuration:
R3# **show ipv6 interface**
R3# **show ipv6 interface brief**

Restart PC's Ethernet interface and verify its interface information:
Windows: ipconfig /all

Linux: sudo ifconfig eth0 down   (sudo ip link set eth0 down)
          sudo ifconfig eth0 up   (sudo ip link set eth0 up)
          ifconfig eth0   (sudo ip address)
* it may not be "eth0" – Check with "sudo ifconfig"

Stop the capture and analyze the IPv6 packets and equipment's information. Use the following commands to verify interfaces' IPv6 addressing and verify router's IPv6 routing table:

R3#**show ipv6 interface brief**
R3#**show ipv6 route**

>> Register the output from the previous commands

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3.1.3. Re-start a capture in the link between the PC and the Switch. Configure Router's interface with a manually defined IPv6 global address from network 2001:5755:1:1::/64.

    R3(config)# interface g0/0
    R3(config-if)# ipv6 address 2001:5755:1:1::X/64   //**refer to the annex for the values of "X")**

>> Verify Laptop 1 Ethernet interface information.

Stop the capture and analyze the IPv6 packets.

>> Verify the Router's interfaces IPv6 addresses and the router's IPv6 routing table.

>> Explain the process by which the Laptop 1 obtained the IPv6 addresses.

3.1.4. Re-start a capture in the link between the Cloud and the Switch.
Configure Router's interface in order to add a second IPv6, this time with a EUI-64 based IPv6 global address from network 2001:5755:1:2::/64.

    R1(config)# interface g0/0
    R1(config-if)# ipv6 address 2001:5755:1:2::/64 eui-64

>> Verify Laptop 1 Ethernet interface information.

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Stop the capture and analyze the IPv6 packets.

>>Verify the Router's interfaces IPv6 addressing and the router's IPv6 routing table.

>> Explain the process by which the Router completed the last 64 bits of its IPv6 addresses.

>> Discuss a possible disadvantage of using the standard EUI-64 at routers' interfaces.

>> Does the process, by which the PC obtained the IPv6 addresses, change by using the EUI-64 standard at the Router?

3.1.5.   Re-start a capture in the link between the Cloud and the Switch.

At the laptop, using the command ping6 perform a ping to:

a) Router's R3 Link-Local address

Linux: you need to define the output interface with option "-I eth0" or "-I enp4s0".

Windows: you need to specify the source address (ping -S srcaddr destaddr).

b) Router's Global address from network 2001:5755:1:1::/64.

c) Router's Global address from network 2001:5755:1:2::/64.

Stop the capture and analyze the IPv6/ICMPv6 packets.

>> Explain the physical addresses resolution process in IPv6.

At this point, go to PC5 and PC6 and perform the command "ip auto" and check if they both get a global IPv6 address (due to a limitation on the VPC, unlike the Laptops, the VPCs can only have one IPv6 address).

Mec Num	Name	"Public GW Address" (X)			"NAT Pool Address" (Y)			"NAT Fixed Address" (W)		
60727	TIAGO JOÃO PEREIRA GOMES	192.168.	102	. 4	192.168.	102	. 5	192.168.	102	. 6
72476	MARIA LUISA RODRIGUES DA SILVEIRA LEITE	192.168.	102	. 8	192.168.	102	. 9	192.168.	102	. 10
77129	ANDRADE ANTÓNIO FRANCISCO	192.168.	102	. 12	192.168.	102	. 13	192.168.	102	. 14
79319	SIMONE RAQUEL NOVO PASCOAL	192.168.	102	. 16	192.168.	102	. 17	192.168.	102	. 18
96661	NICOLE MONTEIRO RAKOV	192.168.	102	. 20	192.168.	102	. 21	192.168.	102	. 22
97288	RÚBEN JORGE ESPÍRITO SANTO PEREIRA	192.168.	102	. 24	192.168.	102	. 25	192.168.	102	. 26
102394	ISABEL MARIA CASACA DA SILVA	192.168.	102	. 28	192.168.	102	. 29	192.168.	102	. 30
103583	JUAN SEBASTIAN PEREIRA CARPINTERO	192.168.	102	. 32	192.168.	102	. 33	192.168.	102	. 34
107987	GABRIEL ESTÊVÃO SAL MONTEIRO	192.168.	102	. 36	192.168.	102	. 37	192.168.	102	. 38
108154	TOMÁS CORREIA DE SÁ DOS SANTOS ALVES	192.168.	102	. 40	192.168.	102	. 41	192.168.	102	. 42
110509	RUI PEREIRA DE MELO SILVA DE ALBUQUERQUE	192.168.	102	. 44	192.168.	102	. 45	192.168.	102	. 46
112771	GONÇALO MARIA MOREIRA MENDES OLIVEIRA DA MOTA	192.168.	102	. 48	192.168.	102	. 49	192.168.	102	. 50
114251	RÚBEN MIGUEL ALMEIDA COELHO	192.168.	102	. 52	192.168.	102	. 53	192.168.	102	. 54
114292	DIOGO CAPÃO GRANGEIA	192.168.	102	. 56	192.168.	102	. 57	192.168.	102	. 58
114557	GUSTAVO GUEDES GARCIA	192.168.	102	. 56	192.168.	102	. 57	192.168.	102	. 58
114982	MARCOS MATOS KOUFALIOTIS	192.168.	102	. 60	192.168.	102	. 61	192.168.	102	. 62
115876	GUILHERME DA COSTA GRAÇA	192.168.	102	. 64	192.168.	102	. 65	192.168.	102	. 66
115879	JOAO PEDRO RAMOS VITORIA DA SILVA	192.168.	102	. 68	192.168.	102	. 69	192.168.	102	. 70
116113	TIAGO RAFAEL CANDEIAS PEDROSA	192.168.	102	. 72	192.168.	102	. 73	192.168.	102	. 74
117592	RUBÉM MAMBO GARCIA ANDRÉ	192.168.	102	. 76	192.168.	102	. 77	192.168.	102	. 78
118621	MATHEUS CONCEIÇÃO PINTO	192.168.	102	. 80	192.168.	102	. 81	192.168.	102	. 82
118643	JOÃO ANTÓNIO HENRIQUES VIEIRA	192.168.	102	. 84	192.168.	102	. 85	192.168.	102	. 86
118648	GUILHERME ALVES ESCÓRCIO	192.168.	102	. 88	192.168.	102	. 89	192.168.	102	. 90
118683	TIAGO PEREIRA CARVALHO DOS SANTOS PREGUIÇA	192.168.	102	. 92	192.168.	102	. 93	192.168.	102	. 94
118781	PEDRO MIGUEL DA SILVA CORADO	192.168.	102	. 96	192.168.	102	. 97	192.168.	102	. 98
118799	DANIEL BOIAN ZAMURCA	192.168.	102	. 100	192.168.	102	. 101	192.168.	102	. 102
119012	HUGO AFONSO DE TAVARES LOPES	192.168.	102	. 104	192.168.	102	. 105	192.168.	102	. 106
119187	MIGUEL CASTANHEIRA FERNANDES	192.168.	102	. 108	192.168.	102	. 109	192.168.	102	. 110
119241	ANDRÉ DIAS CORREIA	192.168.	102	. 112	192.168.	102	. 113	192.168.	102	. 114
119527	RODRIGO CONROY NUNES	192.168.	102	. 116	192.168.	102	. 117	192.168.	102	. 118
119583	ALEXANDRE OLIVEIRA SILVA	192.168.	102	. 120	192.168.	102	. 121	192.168.	102	. 122
119649	MIGUEL MAGALHAES SANTOS	192.168.	102	. 124	192.168.	102	. 125	192.168.	102	. 126
119744	NICOLAS BOTELHO DE SOUSA	192.168.	102	. 128	192.168.	102	. 129	192.168.	102	. 130
119832	VASCO PEIXOTO ARAÚJO	192.168.	102	. 132	192.168.	102	. 133	192.168.	102	. 134
119844	JOANA CASTRO E SILVA	192.168.	102	. 136	192.168.	102	. 137	192.168.	102	. 138
119859	JOÃO PEREIRA LEITE	192.168.	102	. 140	192.168.	102	. 141	192.168.	102	. 142
119871	ALEXANDRE RAFAEL DE ALMEIDA PEREIRA	192.168.	102	. 144	192.168.	102	. 145	192.168.	102	. 146
119928	MADALENA MESQUITA CEREJEIRA AMARO DIOGO	192.168.	102	. 148	192.168.	102	. 149	192.168.	102	. 150
120009	JOSÉ RAFAEL MATEUS COELHO	192.168.	102	. 152	192.168.	102	. 153	192.168.	102	. 154
120120	LUCAS PIRES ROCHINHA	192.168.	102	. 156	192.168.	102	. 157	192.168.	102	. 158
120124	PEDRO FRANCISCO DIAS TAVARES	192.168.	102	. 160	192.168.	102	. 161	192.168.	102	. 162
120172	JOÃO PEDRO DIAS DA SILVA	192.168.	102	. 164	192.168.	102	. 165	192.168.	102	. 166
120173	JOÃO MIGUEL TAVARES MARQUES	192.168.	102	. 168	192.168.	102	. 169	192.168.	102	. 170
120284	JOÃO DIOGO DA SILVA CORREIA TEIXEIRA MARTINS	192.168.	102	. 172	192.168.	102	. 173	192.168.	102	. 174
120300	ÂNGELO MANUEL CAUCHIE FIGUEIREDO	192.168.	102	. 176	192.168.	102	. 177	192.168.	102	. 178
120353	VIACHESLAV SEREDA	192.168.	102	. 180	192.168.	102	. 181	192.168.	102	. 182
120383	PEDRO NUNO DE PINA BARBEDO MONTEIRO	192.168.	102	. 184	192.168.	102	. 185	192.168.	102	. 186
120393	EDUARDO MORENO	192.168.	102	. 188	192.168.	102	. 189	192.168.	102	. 190
120958	GONÇALO AZEVEDO MOREIRA	192.168.	102	. 192	192.168.	102	. 193	192.168.	102	. 194

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Mec Num	Name	"Public GW Address" (X)			"NAT Pool Address" (Y)			"NAT Fixed Address" (W)		
121728	JOÃO MOISÉS KUTAYA	192.168.	102	196	192.168.	102	197	192.168.	102	198
122892	LAURA MORAES TAKIGAMI GARCIA	192.168.	102	200	192.168.	102	201	192.168.	102	202
122895	JOSUÉ KAHUÃ GOMES DOS SANTOS	192.168.	102	204	192.168.	102	205	192.168.	102	206
123430	SANJAY THARU	192.168.	102	208	192.168.	102	209	192.168.	102	210
123433	FERNANDA ISABEL DO NASCIMENTO FLORIANO	192.168.	102	212	192.168.	102	213	192.168.	102	214
124686	RODRIGO MIGUEL CRUZ ANDRADE	192.168.	102	216	192.168.	102	217	192.168.	102	218
124693	DAVIDE DOS SANTOS SILVA	192.168.	102	220	192.168.	102	221	192.168.	102	222
124750	RODRIGO EDUARDO NEVES GONÇALVES	192.168.	102	224	192.168.	102	225	192.168.	102	226
124765	ANDRÉ HILÁRIO BRAZ	192.168.	102	228	192.168.	102	229	192.168.	102	230
124779	DANIEL FERREIRA CARVALHO	192.168.	102	232	192.168.	102	233	192.168.	102	234
124788	ANTÓNIO BERNARDO NUNES DE LIMA	192.168.	102	236	192.168.	102	237	192.168.	102	238
124823	LEONARDO GOMES DA SILVA	192.168.	102	240	192.168.	102	241	192.168.	102	242
124896	ANDRÉ FILIPE VIEIRA BRANDÃO	192.168.	102	244	192.168.	102	245	192.168.	102	246
124917	DUARTE ALMEIDA PEREIRA COELHO	192.168.	102	248	192.168.	102	249	192.168.	102	250
124921	NELSON ROCHA RAMOS	192.168.	102	252	192.168.	102	253	192.168.	102	254
124926	SANTIAGO RODRIGUES DOS SANTOS	192.168.	103	4	192.168.	103	5	192.168.	103	6
124972	SAMUEL LUCAS ROCHA RAMOS	192.168.	103	8	192.168.	103	9	192.168.	103	10
125016	LUIS CARLOS DE CASTRO OLIVEIRA	192.168.	103	12	192.168.	103	13	192.168.	103	14
125039	GUILHERME COIMBRA ANTUNES	192.168.	103	16	192.168.	103	17	192.168.	103	18
125050	TOMAS CARDOSO E PINTO	192.168.	103	20	192.168.	103	21	192.168.	103	22
125087	HENRIQUE PAESE TARDELLI	192.168.	103	24	192.168.	103	25	192.168.	103	26
125122	MARTIM BATISTA LEITNER	192.168.	103	28	192.168.	103	29	192.168.	103	30
125160	VICENTE AMORIM SILVA	192.168.	103	32	192.168.	103	33	192.168.	103	34
125171	RODRIGO MIGUEL CASTRO E SILVA	192.168.	103	36	192.168.	103	37	192.168.	103	38
125193	BRUNO FILIPE OLIVEIRA GONÇALVES	192.168.	103	40	192.168.	103	41	192.168.	103	42
125214	FRANCISCO RICARDO SALAZAR E SILVA	192.168.	103	44	192.168.	103	45	192.168.	103	46
125270	PEDRO JORGE LOPES RAMOS	192.168.	103	48	192.168.	103	49	192.168.	103	50
125293	RICARDO FRANCISCO ASSEMBLEIA FRANCISCO	192.168.	103	52	192.168.	103	53	192.168.	103	54
125302	JOÃO MANUEL SOARES PEREIRA	192.168.	103	56	192.168.	103	57	192.168.	103	58
125305	ANA MARGARIDA DUARTE REIS	192.168.	103	60	192.168.	103	61	192.168.	103	62
125413	LARA RODRIGUES MARQUES	192.168.	103	64	192.168.	103	65	192.168.	103	66
125442	AFONSO ALMEIDA CRUZ	192.168.	103	68	192.168.	103	69	192.168.	103	70
125518	GONÇALO DE PINHO SOUSA	192.168.	103	72	192.168.	103	73	192.168.	103	74
125527	GUILHERME TAVARES OLIVEIRA	192.168.	103	76	192.168.	103	77	192.168.	103	78
125549	JOÃO SINARÉ TORRES DE OLIVEIRA	192.168.	103	80	192.168.	103	81	192.168.	103	82
125636	GUILHERME VIVEIROS COSTA	192.168.	103	84	192.168.	103	85	192.168.	103	86
125718	FÁBIO EMANUEL MOREIRA RENDA	192.168.	103	88	192.168.	103	89	192.168.	103	90
125738	INES VEIGAS CARDOSO	192.168.	103	92	192.168.	103	93	192.168.	103	94
125761	AFONSO PINTO CORREIA COELHO	192.168.	103	96	192.168.	103	97	192.168.	103	98
125804	DINIS FILIPE DA SILVA NÉRI MARQUES CARVALHO	192.168.	103	100	192.168.	103	101	192.168.	103	102
125828	LOURENÇO GOMES SECO	192.168.	103	104	192.168.	103	105	192.168.	103	106
125836	PEDRO MIGUEL ALMEIDA BELEZA	192.168.	103	108	192.168.	103	109	192.168.	103	110
125855	JOÃO GABRIEL DA SILVA ROCHA	192.168.	103	112	192.168.	103	113	192.168.	103	114
125982	LUCAS GASPAR MARQUES	192.168.	103	116	192.168.	103	117	192.168.	103	118
125986	EDUARDO CONSTANTINO VAZ ALVES	192.168.	103	120	192.168.	103	121	192.168.	103	122
125996	TIAGO FILIPE ALMEIDA TRUTA	192.168.	103	124	192.168.	103	125	192.168.	103	126
126008	FILIPE SEQUEIRA CARDOSO GOMES	192.168.	103	128	192.168.	103	129	192.168.	103	130
126011	MARGARIDA DA SILVA TEIXEIRA	192.168.	103	132	192.168.	103	133	192.168.	103	134
126033	GUSTAVO NOVAIS RODRIGUES	192.168.	103	136	192.168.	103	137	192.168.	103	138
126036	DINIS PEDRO MONTEIRO	192.168.	103	140	192.168.	103	141	192.168.	103	142
126124	RODRIGO BARBOSA FIGUEIREDO	192.168.	103	144	192.168.	103	145	192.168.	103	146

Mec Num	Name	"Public GW Address" (X)			"NAT Pool Address" (Y)			"NAT Fixed Address" (W)		
126132	MARTIM JESUS PEREIRA DE ALMEIDA	192.168.	103	. 148	192.168.	103	. 149	192.168.	103	. 150
126154	MARCO ANTÓNIO CRUZ FLOR	192.168.	103	. 152	192.168.	103	. 153	192.168.	103	. 154
126164	FELIPE DE OLIVEIRA SILVA ROCHA	192.168.	103	. 156	192.168.	103	. 157	192.168.	103	. 158
126180	GABRIEL EDUARDO DE JÉSUS TARACHE GUZMÁN	192.168.	103	. 160	192.168.	103	. 161	192.168.	103	. 162
126193	EDGAR SIMÃO NOVO PASCOAL	192.168.	103	. 164	192.168.	103	. 165	192.168.	103	. 166
126209	LUÍS RODRIGO DA SILVA LOPES	192.168.	103	. 168	192.168.	103	. 169	192.168.	103	. 170
126252	RODRIGO CARREIRA DA SILVA	192.168.	103	. 172	192.168.	103	. 173	192.168.	103	. 174
126253	PEDRO SANTOS TAVARES	192.168.	103	. 176	192.168.	103	. 177	192.168.	103	. 178
126265	SAMUEL JOSÉ MÓNICA CARVALHAIS	192.168.	103	. 180	192.168.	103	. 181	192.168.	103	. 182
126290	ELIANA HUANG	192.168.	103	. 184	192.168.	103	. 185	192.168.	103	. 186
126392	DIOGO PAIVA VEIGA	192.168.	103	. 188	192.168.	103	. 189	192.168.	103	. 190
126418	CÉSAR GONÇALVES CARVALHO	192.168.	103	. 192	192.168.	103	. 193	192.168.	103	. 194
126421	MANUEL AGUIAR CAMPOS CARDOSO DA SILVA	192.168.	103	. 196	192.168.	103	. 197	192.168.	103	. 198
126426	GONÇALO COSTA SILVA	192.168.	103	. 200	192.168.	103	. 201	192.168.	103	. 202
126460	GABRIEL MARQUES CANHÃO	192.168.	103	. 204	192.168.	103	. 205	192.168.	103	. 206
126480	JOÃO MARIA FIGUEIREDO RIBEIRO	192.168.	103	. 208	192.168.	103	. 209	192.168.	103	. 210
126489	JOANA CATARINA NOGUEIRA GIÃO	192.168.	103	. 212	192.168.	103	. 213	192.168.	103	. 214
126541	JÉSSICA ZHENG	192.168.	103	. 216	192.168.	103	. 217	192.168.	103	. 218
127378	AFONSO MIGUEL LOUREIRO MELO	192.168.	103	. 220	192.168.	103	. 221	192.168.	103	. 222
127419	MIGUEL BATISTA LOPES	192.168.	103	. 224	192.168.	103	. 225	192.168.	103	. 226
127548	GONÇALO MEDEIROS MOURA	192.168.	103	. 228	192.168.	103	. 229	192.168.	103	. 230
129512	JORGE MANUEL MORAIS	192.168.	103	. 232	192.168.	103	. 233	192.168.	103	. 234
130382	VÍCTOR GIL SANZ	192.168.	103	. 236	192.168.	103	. 237	192.168.	103	. 238