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ARQUITETURA E GESTÃO DE REDES

LABORATORY GUIDE

Objectives
- NAT, PAT, SNAT
- Dynamic default routes propagation
- Weighted static routes

NAT/PAT and Stateful NAT (SNAT) mechanisms

1. Configure the following network according to the following figure and the following constrains:
   - Router2 and Router3 have the following pool of IP public addresses: 193.136.0.1-128
   - Routers1, 2 and 3 have OSPF routing protocol active in the interfaces connected to the private networks, Router1 should have a **dynamic** preferential default route via Router3.
   - Router4 should have a **static** route to network 192.136.0.0/24 via Router2.
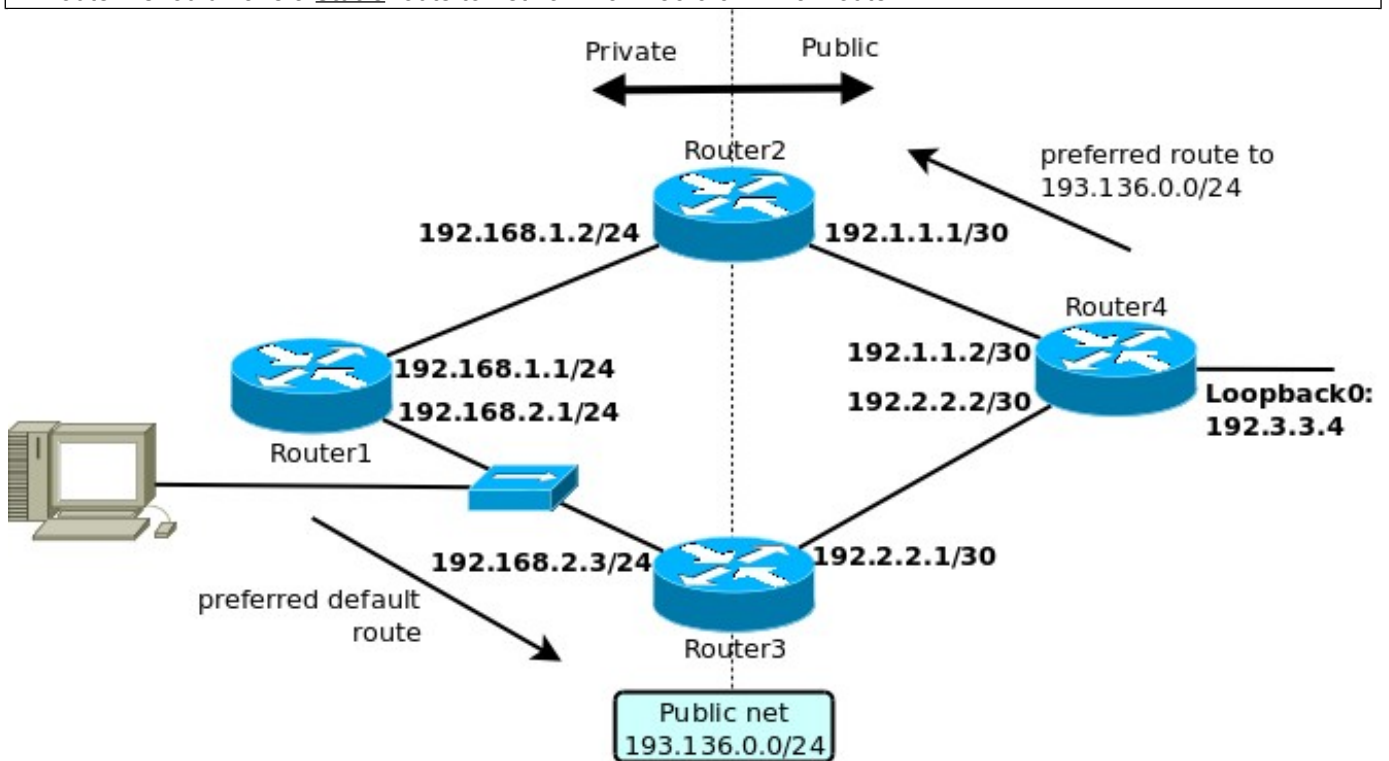
Specific configurations. Basic configurations are not included.

```
#In Router2
 Router2(config)# router ospf 1
 Router2(config-router)# network 192.168.1.0 0.0.0.255 area 0
#To announce default route with metric 10 (not preferred/backup)
 Router2(config-router)# default-information originate always metric 10
#Default route via 192.1.1.2
 Router2(config)# ip route 0.0.0.0 0.0.0.0 192.1.1.2


#In Router3
 Router3(config)# router ospf 1
 Router3(config-router)# network 192.168.2.0 0.0.0.255 area 0
#To announce default route with metric 5 (preferred)
 Router3(config-router)# default-information originate always metric 5
#Default route via 192.2.2.2
 Router3(config)# ip route 0.0.0.0 0.0.0.0 192.2.2.2
```

```
#In Router4
#Creation/activation of a loopback interface
 Router4(config)# interface Loopback0
 Router4(config-if)# ip address 192.3.3.4 255.255.255.0
 Router4(config-if)# no shutdown
 #Weighted static routes to network 193.136.0.0/25
 #using Router 2 metric 1 (preferred)
 Router4(config)# ip route 193.136.0.0 255.255.255.128 192.1.1.1
```

```
#using Router 2 metric 10 (not preferred/backup)
Router4(config)# ip route 193.136.0.0 255.255.255.128 192.2.2.1 10
```

2. Verify the full connectivity within the private networks. Test the connectivity between Router1 and Router4's Loopback0 interface. Explain the obtained results.

3. Activate the NAT/PAT mechanism in Router2 and Router3. Test the connectivity between Router1 and Router4's Loopback0 interface. Explain the obtained results.

#In Router2
#Private networks
```
 Router2(config)# access-list 1 permit 192.168.1.0 0.0.0.255
 Router2(config)# access-list 1 permit 192.168.2.0 0.0.0.255
```
#Public addresses pool (first half)
```
 Router2(config)# ip nat pool POOLR 193.136.0.1 193.136.0.128 netmask 255.255.255.0
```
#Association between public pool address and private networks (NAT+PAT)
```
 Router2(config)# ip nat inside source list 1 pool POOLR overload
```

#In Router3
#Private networks
```
 Router3(config)# access-list 1 permit 192.168.1.0 0.0.0.255
 Router3(config)# access-list 1 permit 192.168.2.0 0.0.0.255
```
#Public addresses pool (second half)
```
 Router3(config)# ip nat pool POOLR 193.136.0.1 193.136.0.128 netmask 255.255.255.0
```
#Association between public pool address and private networks (NAT+PAT)
```
 Router3(config)# ip nat inside source list 1 pool POOLR overload
```

Activate the NAT mechanisms at the respective interfaces using the commands `ip nat inside` and `ip nat outside`. Verify the NAT mechanism status (in Router2 and Router3) with the commands:
```
 show ip nat translations
 show ip nat translations verbose
```

4. Activate the SNAT mechanism between Router2 and Router3 (Router3 as primary and Router2 as backup). Test the connectivity between Router1 and Router4's Loopback0 interface. Explain the obtained results.

#In Router2
#SNAT configuration
```
 Router2(config)# ip nat Stateful id 2
 Router2(config-ipnat-snat)# backup 192.168.1.2
 Router2(config-ipnat-snat-bkp)# peer 192.168.2.3
 Router2(config-ipnat-snat-bkp)# mapping-id 10
```
#Association between public pool address and private networks (NAT+PAT+SNAT)
```
 Router2(config)# no ip nat inside source list 1 pool POOLR overload
 Router2(config)# ip nat inside source list 1 pool POOLR mapping-id 10 overload
```

#In Router3
#SNAT configuration
```
 Router3(config)# ip nat Stateful id 3
 Router3(config-ipnat-snat)# primary 192.168.2.3
 Router3(config-ipnat-snat-bkp)# peer 192.168.1.2
 Router3(config-ipnat-snat-bkp)# mapping-id 10
```
#Association between public pool address and private networks (NAT+PAT+SNAT)
```
 Router3(config)# no ip nat inside source list 1 pool POOLR overload
 Router3(config)# ip nat inside source list 1 pool POOLR mapping-id 10 overload
```
Verify the SNAT mechanism status (in Router2 and Router3) with the commands:
```
 show ip snat distributed verbose
```