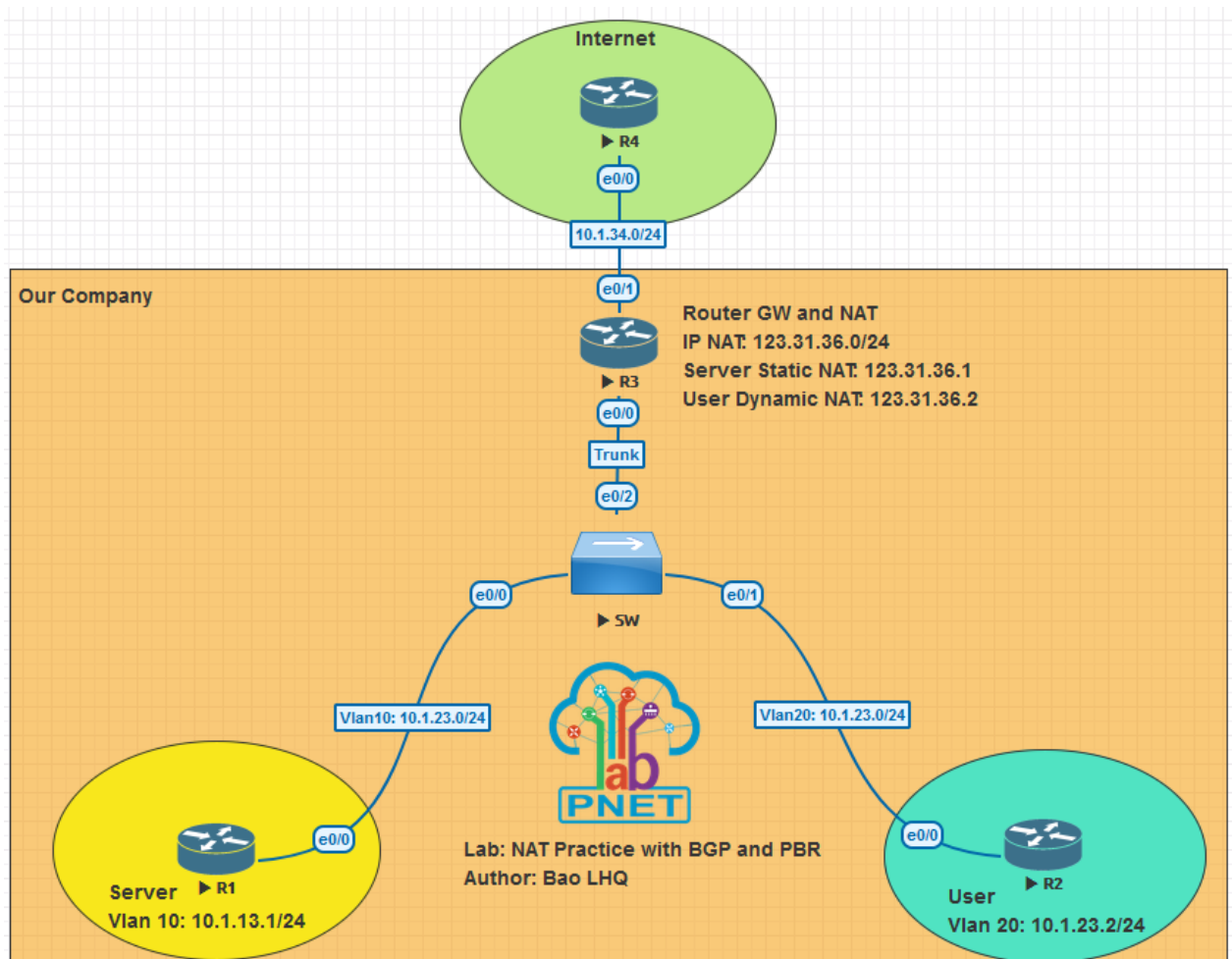


NAT Practice with BGP and PBR

Lab Topology:

The lab network topology is illustrated below:



<https://user.pnetlab.com/store/labs/detail?id=16042993804260>

Lab Objective:

The objective of this lab exercise is for you to learn and understand NAT in real world.

Task:

Our Company have 2 vlans:

Vlan 10 for server: 10.1.13.0/24 (R1)

Vlan 20 for user: 10.1.23.0/24 (R2)

R3 is Router Gateway and it will NAT all inside to IP 123.31.36.0/24

R4 is Internet Router that have a loopback 4.4.4.4/32

R3 and R4 are running BGP Protocol.

Here is our task:

1. Configured NAT:
 - IP server: 10.1.13.1 --> Nat static: 123.31.36.1
 - IP user: 10.1.23.2 --> Nat dynamic: 123.31.36.2
 - R1 and R2 need to ping to L0 of R4
 - R4 need to ping to R1 via IP Public
2. R2 need to ping to R1 via IP Public in order check IP Public of Server that working or not.

Solution

Basic Configuration:

Router	R1	R2
Configuration	<pre>interface Ethernet0/0 no shutdown ip address 10.1.13.1 255.255.255.0 ! ip route 0.0.0.0 0.0.0.0 10.1.13.3</pre>	<pre>interface Ethernet0/0 no shutdown ip address 10.1.23.2 255.255.255.0 ! ip route 0.0.0.0 0.0.0.0 10.1.23.3</pre>

Router	R3	R4
Configuration	<pre>interface Ethernet0/0 no shutdown no ip address ! interface Ethernet0/0.10 no shutdown encapsulation dot1Q 10 ip address 10.1.13.3 255.255.255.0 ! interface Ethernet0/0.20 no shutdown encapsulation dot1Q 20 ip address 10.1.23.3 255.255.255.0 ! interface Ethernet0/1 no shutdown ip address 10.1.34.3 255.255.255.0 !</pre>	<pre>interface Loopback0 no shutdown ip address 4.4.4.4 255.255.255.255 ! interface Ethernet0/0 no shutdown ip address 10.1.34.4 255.255.255.0 ! router bgp 2 bgp log-neighbor-changes neighbor 10.1.34.3 remote-as 1</pre>

	router bgp 1 bgp log-neighbor-changes neighbor 10.1.34.4 remote-as 2	
--	--	--

Router	SW
Configuration	vlan 10 ! Vlan 20 ! interface Ethernet0/0 no shutdown switchport access vlan 10 switchport mode access ! interface Ethernet0/1 no shutdown switchport access vlan 20 switchport mode access ! interface Ethernet0/2 no shutdown switchport trunk encapsulation dot1q switchport mode trunk

Configured NAT

First, we need to advertise L0 of R4 to R3 and 123.31.36.0/24 of R3 to R4:

```

R3(config)#ip route 123.31.36.0 255.255.255.0 Null 0
R3(config)#router bgp 1
R3(config-router)#net 123.31.36.0 mask 255.255.255.0

R4(config)#router bgp 2
R4(config-router)#net 4.4.4.4 mask 255.255.255.255

```

Let's check:

```
R3#show ip route bgp
```

4.0.0.0/32 is subnetted, 1 subnets

B 4.4.4.4 [20/0] via 10.1.34.4, 00:01:26

R4#show ip route bgp

123.0.0.0/24 is subnetted, 1 subnets

B 123.31.36.0 [20/0] via 10.1.34.3, 00:02:00

Now, we will configure NAT for server and client:

```
R3(config)#ip nat inside source static 10.1.13.1 123.31.36.1
R3(config)#access-list 1 permit host 10.1.23.2
R3(config)#ip nat pool User 123.31.36.2 123.31.36.2 netmask 255.255.255.0
R3(config)#ip nat inside source list 1 pool User
R3(config)#interface e0/0.10
R3(config-subif)#ip nat inside
R3(config-subif)#interface e0/0.20
R3(config-subif)#ip nat inside
R3(config-subif)#interface e0/1
R3(config-if)#ip nat outside
```

Let's check ping from R1 and R2:

R1#ping 4.4.4.4

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 4.4.4.4, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 2/2/2 ms

R2#ping 4.4.4.4

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 4.4.4.4, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/2 ms

R3#show ip nat translations

Pro	Inside global	Inside local	Outside local	Outside global
icmp	123.31.36.1:0	10.1.13.1:0	4.4.4.4:0	4.4.4.4:0
---	123.31.36.1	10.1.13.1	---	---
icmp	123.31.36.2:0	10.1.23.2:0	4.4.4.4:0	4.4.4.4:0
---	123.31.36.2	10.1.23.2	---	---

It is working. Now, we check from R4 ping to R1 via IP Public:

```
R3#clear ip nat translation *
```

```
R4#ping 123.31.36.1
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 123.31.36.1, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 2/2/3 ms

```
R3#show ip nat translations
```

Pro	Inside global	Inside local	Outside local	Outside global
icmp	123.31.36.1:0	10.1.13.1:0	10.1.34.4:0	10.1.34.4:0
---	123.31.36.1	10.1.13.1	---	---

So, we have done task 1.

R2 need to ping to R1 via IP Public

Let's try to generate ping from R2

```
R2#ping 123.31.36.1
```

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 123.31.36.1, timeout is 2 seconds:

U.U.U

Success rate is 0 percent (0/5)

```
R3#show ip route 123.31.36.2
```

Routing entry for 123.31.36.0/24

Known via "static", distance 1, metric 0 (connected)

Advertised by bgp 1

Routing Descriptor Blocks:

* directly connected, via Null0

Route metric is 0, traffic share count is 1

You can see that R2 can not reach to R1 via IP Public. When packet from R2 go to R3, R3 will forward all packet that want to reach 123.31.36.0/24 into Null0.

So we need to a route-map in order to solve this problem:

```
R3(config)#access-list 101 per ip any 123.31.36.0 0.0.0.255
```

```
R3(config)#route-map R2R1 per 10
```

```
R3(config-route-map)#match ip address 101
```

```
R3(config-route-map)#set ip next-hop 10.1.34.4
```



```
R3(config)#interface e0/0.10
R3(config-subif)#ip policy route-map R2R1
R3(config-subif)#interface e0/0.20
R3(config-subif)#ip policy route-map R2R1
```

I have pushed all packet from Inside that want to reach 123.31.36.0/24 to next-hop 10.1.34.4. Let's check again:

```
R2#ping 123.31.36.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 123.31.36.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/4/5 ms
```

```
R2#traceroute 123.31.36.1
Type escape sequence to abort.
Tracing the route to 123.31.36.1
VRF info: (vrf in name/id, vrf out name/id)
 1 10.1.23.3 3 msec 1 msec 1 msec
 2 10.1.34.4 3 msec 1 msec 2 msec
 3 10.1.34.3 1 msec 5 msec 4 msec
 4 * * *
```

```
R3#show ip nat translations
Pro Inside global    Inside local    Outside local    Outside global
icmp 123.31.36.1:2   10.1.13.1:2    123.31.36.2:2   123.31.36.2:2
--- 123.31.36.1     10.1.13.1     ---             ---
icmp 123.31.36.2:2   10.1.23.2:2    123.31.36.1:2   123.31.36.1:2
--- 123.31.36.2     10.1.23.2     ---             ---
```

Great! Everything is working.

