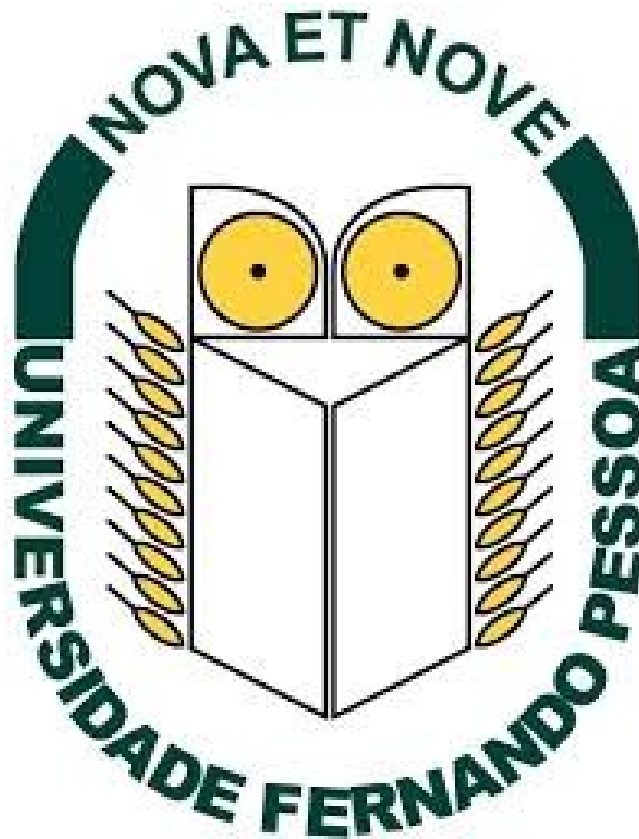


Universidade Fernando Pessoa

Curso de engenharia informática



Relatório de projeto

Disciplina: Redes de Computadores II

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Tráfego a comprovar a correta tradução do NAT configurado

Topologia 1

```
CE1#sh run | sec nat
ip nat inside
ip nat inside
ip nat inside
ip nat outside
ip nat inside source list NAT interface GigabitEthernet0/3 overload
```

Frames do ping de PC2 para PE1 (capturados na ligação entre CE1 e PE1)

| | | | | | | | |
|-----|-------------|------------|------------|------|----|---------------------|--|
| 115 | 293.9166... | 22.22.22.2 | 22.22.22.1 | ICMP | 98 | Echo (ping) request | id=0x004c, seq=2/512, ttl=62 (reply in 116) |
| 116 | 293.9178... | 22.22.22.1 | 22.22.22.2 | ICMP | 98 | Echo (ping) reply | id=0x004c, seq=2/512, ttl=255 (request in 115) |

Demonstração da filtragem de tráfego pelas ACL's instaladas

Topologia 1

Pc1 não consegue comunicar com o exterior (tentativa de ping à lo de PE1)

```
root@PC1-SSH:/# ping 2.2.2.2
PING 2.2.2.2 (2.2.2.2) 56(84) bytes of data.
From 22.22.22.1 icmp_seq=1 Destination Host Unreachable
From 22.22.22.1 icmp_seq=2 Destination Host Unreachable
From 22.22.22.1 icmp_seq=3 Destination Host Unreachable
```

Telnet de pc2 para pc3 bloqueado pela ACL

```
root@PC2:~# telnet 192.168.1.192
Trying 192.168.1.192...
^C
```

Pc2 não consegue acedar ao servidor de PC3

```
PING 192.168.1.194 (192.168.1.194) 56(84) bytes of data.
From 192.168.1.253 icmp_seq=2 Packet filtered
From 192.168.1.253 icmp_seq=3 Packet filtered
From 192.168.1.253 icmp_seq=4 Packet filtered
From 192.168.1.253 icmp_seq=5 Packet filtered
From 192.168.1.253 icmp_seq=6 Packet filtered
```

Os leases realizados pelo DHCP

Topologia 1

Negociação DHCP de PC1

| | | | | | | | |
|----|-----------|---------------|------------------|------|-----|---------------------|-----------------------------|
| 7 | 10.092100 | 0.0.0.0 | 255.255.255.2... | DHCP | 342 | DHCP Discover | - Transaction ID 0xe014f84f |
| 8 | 10.549852 | 192.168.1.1 | 192.168.1.12 | DHCP | 342 | DHCP Offer | - Transaction ID 0xe014f84f |
| 9 | 10.550241 | 0.0.0.0 | 255.255.255.2... | DHCP | 342 | DHCP Request | - Transaction ID 0xe014f84f |
| 10 | 10.554279 | 192.168.1.245 | 192.168.1.12 | ICMP | 70 | Echo (ping) request | id=0x0003, seq=0/0, tt |
| 11 | 10.577373 | 192.168.1.1 | 192.168.1.12 | DHCP | 342 | DHCP ACK | - Transaction ID 0xe014f84f |

Negociação DHCP de PC2

| | | | | | | | |
|----|-----------|---------------|------------------|------|-----|--------------|-----------------------------|
| 15 | 39.358186 | 192.168.1.129 | 192.168.1.140 | DHCP | 342 | DHCP Offer | - Transaction ID 0x7463ac17 |
| 16 | 39.358349 | 0.0.0.0 | 255.255.255.2... | DHCP | 342 | DHCP Request | - Transaction ID 0x7463ac17 |
| 17 | 39.361273 | | | | 70 | <Ignored> | |
| 18 | 39.366573 | 192.168.1.129 | 192.168.1.140 | DHCP | 342 | DHCP ACK | - Transaction ID 0x7463ac17 |

A propagação das rotas via RIPv2

Topologia 1

Comunicação das rotas RIPv2 entre CE1 e SEDE2, depois de reiniciar SEDE2

| | | | | | | |
|----|-------------|---------------|---------------|--------|-----|----------|
| 32 | 151.9872... | 192.168.1.253 | 224.0.0.9 | RIP... | 126 | Response |
| 41 | 180.2824... | 192.168.1.254 | 224.0.0.9 | RIP... | 66 | Request |
| 42 | 180.2839... | 192.168.1.253 | 192.168.1.254 | RIP... | 126 | Response |
| 47 | 181.0523... | 192.168.1.253 | 224.0.0.9 | RIP... | 126 | Response |

Comunicação das rotas RIPv2 entre CE1 e SEDE1, depois de reiniciar CE1

| | | | | | | |
|----|-----------|---------------|---------------|--------|-----|----------|
| 8 | 50.670400 | 192.168.1.246 | 224.0.0.9 | RIP... | 106 | Response |
| 16 | 75.789391 | 192.168.1.245 | 224.0.0.9 | RIP... | 66 | Request |
| 17 | 75.790480 | 192.168.1.246 | 192.168.1.245 | RIP... | 106 | Response |
| 23 | 78.028565 | 192.168.1.245 | 224.0.0.9 | RIP... | 126 | Response |
| 24 | 78.167270 | 192.168.1.246 | 224.0.0.9 | RIP... | 106 | Response |

A propagação das rotas via OSPF

Topologia 2

Divulgação das rotas via OSPF entre R1 e R3

| | | | | | |
|----|-------------|------------|------------|------|--------------------|
| 49 | 124.2723... | 13.13.13.1 | 224.0.0.5 | OSPF | 94 Hello Packet |
| 50 | 128.3385... | 13.13.13.1 | 13.13.13.2 | OSPF | 78 DB Description |
| 51 | 129.1013... | 13.13.13.2 | 224.0.0.5 | OSPF | 94 Hello Packet |
| 52 | 134.8193... | 13.13.13.2 | 13.13.13.1 | OSPF | 78 DB Description |
| 53 | 135.0726... | 13.13.13.1 | 13.13.13.2 | OSPF | 138 DB Description |
| 54 | 135.4555... | 13.13.13.2 | 13.13.13.1 | OSPF | 118 DB Description |
| 55 | 135.6365... | 13.13.13.1 | 13.13.13.2 | OSPF | 82 LS Request |
| 56 | 135.6424... | 13.13.13.1 | 13.13.13.2 | OSPF | 78 DB Description |
| 57 | 136.1003... | 13.13.13.2 | 13.13.13.1 | OSPF | 146 LS Update |
| 58 | 136.1124... | 13.13.13.2 | 13.13.13.1 | OSPF | 94 LS Request |
| 59 | 136.1259... | 13.13.13.1 | 13.13.13.2 | OSPF | 202 LS Update |
| 60 | 138.4139... | 13.13.13.2 | 224.0.0.5 | OSPF | 142 LS Update |
| 62 | 143.1336... | 13.13.13.1 | 224.0.0.6 | OSPF | 138 LS Acknowledge |
| 63 | 144.0802... | 13.13.13.2 | 224.0.0.5 | OSPF | 118 LS Acknowledge |
| 65 | 147.6215... | 13.13.13.1 | 224.0.0.6 | OSPF | 122 LS Update |
| 66 | 148.4611... | 13.13.13.2 | 224.0.0.5 | OSPF | 122 LS Update |
| 67 | 149.3538... | 13.13.13.1 | 224.0.0.5 | OSPF | 94 Hello Packet |
| 68 | 154.8742... | 13.13.13.2 | 224.0.0.5 | OSPF | 78 LS Acknowledge |
| 69 | 154.8748... | 13.13.13.2 | 224.0.0.5 | OSPF | 94 Hello Packet |

A propagação das rotas via BGP

Topologia 2

Propagação das rotas via BGP entre R3 e R5

| | | | | | |
|----|-------------|------------|------------|-----|--|
| 34 | 49.018648 | 35.35.35.1 | 35.35.35.2 | BGP | 111 OPEN Message |
| 36 | 49.558277 | 35.35.35.2 | 35.35.35.1 | BGP | 111 OPEN Message |
| 37 | 49.560453 | 35.35.35.2 | 35.35.35.1 | BGP | 73 KEEPALIVE Message |
| 39 | 49.677276 | 35.35.35.1 | 35.35.35.2 | BGP | 73 KEEPALIVE Message |
| 53 | 198.9016... | 35.35.35.2 | 35.35.35.1 | BGP | 73 KEEPALIVE Message |
| 56 | 200.1781... | 35.35.35.1 | 35.35.35.2 | BGP | 73 KEEPALIVE Message |
| 57 | 200.1906... | 35.35.35.1 | 35.35.35.2 | BGP | 252 UPDATE Message, UPDATE Message, UPDATE Message, UPDATE Message |
| 59 | 201.8598... | 35.35.35.2 | 35.35.35.1 | BGP | 204 UPDATE Message, UPDATE Message, UPDATE Message |
| 69 | 285.8740... | 35.35.35.2 | 35.35.35.1 | BGP | 178 UPDATE Message, UPDATE Message |
| 78 | 315.6895... | 35.35.35.1 | 35.35.35.2 | BGP | 73 KEEPALIVE Message |
| 82 | 325.4247... | 35.35.35.2 | 35.35.35.1 | BGP | 110 UPDATE Message |
| 92 | 369.9871... | 35.35.35.1 | 35.35.35.2 | BGP | 73 KEEPALIVE Message |
| 97 | 377.8665... | 35.35.35.2 | 35.35.35.1 | BGP | 73 KEEPALIVE Message |

Propagação das rotas via BGP entre R2 e R5

| | | | | | |
|----|-------------|------------|------------|-----|--|
| 29 | 42.906476 | 25.25.25.1 | 25.25.25.2 | BGP | 111 OPEN Message |
| 32 | 43.284557 | 25.25.25.2 | 25.25.25.1 | BGP | 111 OPEN Message |
| 33 | 43.287678 | 25.25.25.2 | 25.25.25.1 | BGP | 73 KEEPALIVE Message |
| 36 | 43.586424 | 25.25.25.1 | 25.25.25.2 | BGP | 73 KEEPALIVE Message |
| 55 | 202.4003... | 25.25.25.1 | 25.25.25.2 | BGP | 73 KEEPALIVE Message |
| 57 | 204.6272... | 25.25.25.2 | 25.25.25.1 | BGP | 73 KEEPALIVE Message |
| 58 | 204.8218... | 25.25.25.2 | 25.25.25.1 | BGP | 204 UPDATE Message, UPDATE Message, UPDATE Message |
| 60 | 205.2670... | 25.25.25.1 | 25.25.25.2 | BGP | 252 UPDATE Message, UPDATE Message, UPDATE Message, UPDATE Message |
| 69 | 288.8359... | 25.25.25.2 | 25.25.25.1 | BGP | 178 UPDATE Message, UPDATE Message |
| 75 | 314.4653... | 25.25.25.1 | 25.25.25.2 | BGP | 73 KEEPALIVE Message |
| 81 | 326.1891... | 25.25.25.1 | 25.25.25.2 | BGP | 117 UPDATE Message |
| 84 | 328.3818... | 25.25.25.2 | 25.25.25.1 | BGP | 110 UPDATE Message |
| 91 | 357.8357... | 25.25.25.1 | 25.25.25.2 | BGP | 82 UPDATE Message |
| 01 | 387.1043... | 25.25.25.2 | 25.25.25.1 | BGP | 73 KEEPALIVE Message |
| 09 | 420.7546... | 25.25.25.1 | 25.25.25.2 | BGP | 73 KEEPALIVE Message |

Comunicação entre dispositivos em UFP-SEDE e UFP-HE via MPLS

Ping de Pc 4 para PC 3

```
root@PC4:~# ping 192.168.1.194
PING 192.168.1.194 (192.168.1.194) 56(84) bytes of data:
64 bytes from 192.168.1.194: icmp_seq=1 ttl=59 time=154 ms
64 bytes from 192.168.1.194: icmp_seq=2 ttl=59 time=5.39 ms
64 bytes from 192.168.1.194: icmp_seq=3 ttl=59 time=6.87 ms
64 bytes from 192.168.1.194: icmp_seq=4 ttl=59 time=8.16 ms
```

Routes para a vrf UFP em PE1

```
PE1#sh ip route vrf ufp

Routing Table: ufp
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       a - application route
       + - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is not set

    22.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       22.22.22.0/24 is directly connected, GigabitEthernet0/1
L       22.22.22.1/32 is directly connected, GigabitEthernet0/1
    33.0.0.0/24 is subnetted, 1 subnets
B       33.33.33.0 [200/0] via 3.3.3.3, 00:21:36
    172.12.0.0/30 is subnetted, 1 subnets
B       172.12.0.0 [200/2] via 3.3.3.3, 00:21:36
    192.168.1.0/24 is variably subnetted, 6 subnets, 4 masks
O E2    192.168.1.0/25 [110/20] via 22.22.22.2, 00:22:38, GigabitEthernet0/1
O E2    192.168.1.128/26
         [110/20] via 22.22.22.2, 00:22:38, GigabitEthernet0/1
O E2    192.168.1.192/27
         [110/20] via 22.22.22.2, 00:22:38, GigabitEthernet0/1
O E2    192.168.1.244/30
         [110/20] via 22.22.22.2, 00:22:38, GigabitEthernet0/1
O E2    192.168.1.248/30
         [110/20] via 22.22.22.2, 00:22:38, GigabitEthernet0/1
O E2    192.168.1.252/30
         [110/20] via 22.22.22.2, 00:22:38, GigabitEthernet0/1
```

Frames deste ping capturadas entre PE2 e CE3

| | | | | | | |
|---|----------|---------------|---------------|------|------------------------|---|
| 5 | 7.488850 | 172.12.0.2 | 192.168.1.194 | ICMP | 98 Echo (ping) request | id=0x0041, seq=1/256, ttl=63 (reply in 6) |
| 6 | 7.495196 | 192.168.1.194 | 172.12.0.2 | ICMP | 98 Echo (ping) reply | id=0x0041, seq=1/256, ttl=60 (request in 5) |
| 7 | 8.490493 | 172.12.0.2 | 192.168.1.194 | ICMP | 98 Echo (ping) request | id=0x0041, seq=2/512, ttl=63 (reply in 8) |
| 8 | 8.495491 | 192.168.1.194 | 172.12.0.2 | ICMP | 98 Echo (ping) reply | id=0x0041, seq=2/512, ttl=60 (request in 7) |
| 9 | 9.493124 | 172.12.0.2 | 192.168.1.194 | ICMP | 98 Echo (ping) request | id=0x0041, seq=3/768, ttl=63 (reply in 10) |