



UNITINS
UNIVERSIDADE ESTADUAL DO TOCANTINS

TOCANTINS
GOVERNO DO ESTADO



Redes de Computadores II

Relatório Cenário 02 - BGP-4.

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Palmas - TO

A rede está dividida em dois sistemas autônomos:

- **AS 6500** (Roteadores 1, 2 e 3)
- **AS 1900** (Roteadores 4, 5 e 6)

Endereçamento

Os principais endereços utilizados são:

- **AS 6500**
 - PC1: 172.16.10.10/24
 - R1: 172.16.10.1/24, 172.16.20.1/24
 - R2: 172.16.20.2/24, 172.16.30.1/24
 - R3: 172.16.30.2/24, 172.31.10.1/24
- **AS 1900**
 - PC2: 192.168.10.20/24
 - R4: 172.31.10.2/24, 192.168.30.1/24
 - R5: 192.168.30.2/24, 192.168.20.2/24
 - R6: 192.168.20.1/24, 192.168.10.1/24

3. Configuração do OSPF

Antes de configurar o BGP, foi estabelecido o roteamento interno com OSPF. Seguem os comandos utilizados em cada roteador.

Roteador 1 (R1)

```
router ospf 1
network 172.16.10.0 0.0.0.255 area 0
network 172.16.20.0 0.0.0.255 area 0
```



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```
IMUNES: router1 (console) vtysh
router1# sh ip-route
% Unknown command.
router1# sh ip route
Codes: K - kernel route, C - connected, S - static, R - RIP,
       O - OSPF, I - IS-IS, B - BGP, P - PIM, A - Babel, N - NHRP,
       > - selected route, * - FIB route

C>* 127.0.0.0/8 is directly connected, lo0
O  172.16.10.0/24 [110/10] is directly connected, eth0, 00:03:59
C>* 172.16.10.0/24 is directly connected, eth0
O  172.16.20.0/24 [110/10] is directly connected, eth1, 00:03:59
C>* 172.16.20.0/24 is directly connected, eth1
router1#
```

Roteador 2 (R2)

router ospf 1

network 172.16.20.0 0.0.0.255 area 0

network 172.16.30.0 0.0.0.255 area 0

```
IMUNES: router2 (console) vtysh
router2# sh ip route
Codes: K - kernel route, C - connected, S - static, R - RIP,
       O - OSPF, I - IS-IS, B - BGP, P - PIM, A - Babel, N - NHRP,
       > - selected route, * - FIB route

C>* 127.0.0.0/8 is directly connected, lo0
O>* 172.16.10.0/24 [110/20] via 172.16.20.1, eth0, 00:00:33
O  172.16.20.0/24 [110/10] is directly connected, eth0, 00:00:38
C>* 172.16.20.0/24 is directly connected, eth0
O  172.16.30.0/24 [110/10] is directly connected, eth1, 00:00:40
C>* 172.16.30.0/24 is directly connected, eth1
--More--(END)
```

Roteador 3 (R3)

router ospf 1

network 172.16.30.0 0.0.0.255 area 0

network	172.31.10.0	0.0.0.255	area	0
---------	-------------	-----------	------	---

```
IMUNES: router3 (console) vtysh
router3# sh ip route
Codes: K - kernel route, C - connected, S - static, R - RIP,
       O - OSPF, I - IS-IS, B - BGP, P - PIM, A - Babel, N - NHRP,
       > - selected route, * - FIB route

C>* 127.0.0.0/8 is directly connected, lo0
O>* 172.16.10.0/24 [110/30] via 172.16.30.1, eth0, 00:00:39
O>* 172.16.20.0/24 [110/20] via 172.16.30.1, eth0, 00:00:39
O  172.16.30.0/24 [110/10] is directly connected, eth0, 00:00:44
C>* 172.16.30.0/24 is directly connected, eth0
C>* 172.31.10.0/24 is directly connected, eth1
--More--(END)
```

Roteador 4 (R4)

router ospf 1

network 172.31.10.0 0.0.0.255 area 0

network 192.168.30.0 0.0.0.255 area 0



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```
IMUNES: router4 (console) vtysh

Hello, this is Quagga (version 1.2.4).
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router4# configure t
router4(config)# router ospf
router4(config-router)# 192.168.0.0/16 area 0
% Unknown command.
router4(config-router)# network 192.168.0.0/16 area 0
router4(config-router)# end
router4# sh ip route
Codes: K - kernel route, C - connected, S - static, R - RIP,
       O - OSPF, I - IS-IS, B - BGP, P - PIM, A - Babel, N - NHRP,
       > - selected route, * - FIB route

C>* 127.0.0.0/8 is directly connected, lo0
C>* 172.31.10.0/24 is directly connected, eth0
O   192.168.30.0/24 [110/10] is directly connected, eth1, 00:00:10
C>* 192.168.30.0/24 is directly connected, eth1
--More--(END)
```

Roteador 5 (R5)

router ospf 1

network 192.168.30.0 0.0.0.255 area 0

network 192.168.20.0 0.0.0.255 area 0

```
IMUNES: router5 (console) vtysh

Hello, this is Quagga (version 1.2.4).
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router5# configure t
router5(config)# router ospf
router5(config-router)# network 192.168.0.0/16 area 0
router5(config-router)# end
router5# sh ip route
Codes: K - kernel route, C - connected, S - static, R - RIP,
       O - OSPF, I - IS-IS, B - BGP, P - PIM, A - Babel, N - NHRP,
       > - selected route, * - FIB route

C>* 127.0.0.0/8 is directly connected, lo0
O   192.168.20.0/24 [110/10] is directly connected, eth1, 00:00:10
C>* 192.168.20.0/24 is directly connected, eth1
O   192.168.30.0/24 [110/10] is directly connected, eth0, 00:00:07
C>* 192.168.30.0/24 is directly connected, eth0
--More--(END)
```

4. Configuração do BGP

Após o OSPF estar funcionando corretamente, foi estabelecido o roteamento externo via BGP.

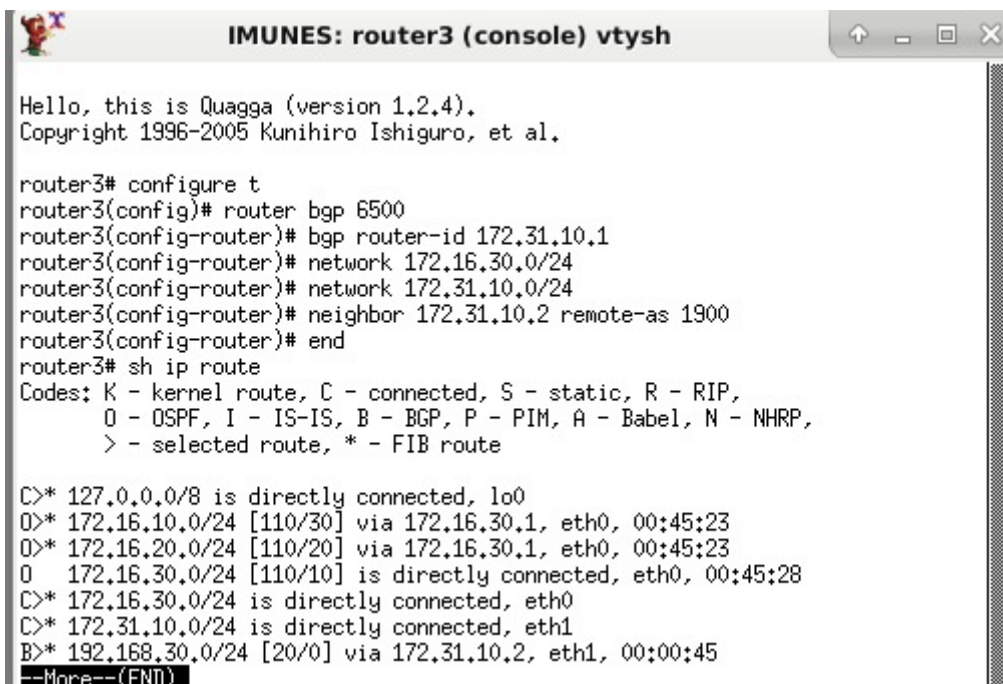
Roteador 3 (R3) - AS 6500

```
router bgp 6500
```

```
bgp router-id 172.31.10.1
```

```
neighbor 172.31.10.2 remote-as 1900
```

```
network 172.16.10.0 mask 255.255.255.0
```



```
IMUNES: router3 (console) vtysh

Hello, this is Quagga (version 1.2.4).
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router3# configure t
router3(config)# router bgp 6500
router3(config-router)# bgp router-id 172.31.10.1
router3(config-router)# network 172.16.30.0/24
router3(config-router)# network 172.31.10.0/24
router3(config-router)# neighbor 172.31.10.2 remote-as 1900
router3(config-router)# end
router3# sh ip route
Codes: K - kernel route, C - connected, S - static, R - RIP,
       O - OSPF, I - IS-IS, B - BGP, P - PIM, A - Babel, N - NHRP,
       > - selected route, * - FIB route

C>* 127.0.0.0/8 is directly connected, lo0
O>* 172.16.10.0/24 [110/30] via 172.16.30.1, eth0, 00:45:23
O>* 172.16.20.0/24 [110/20] via 172.16.30.1, eth0, 00:45:23
O 172.16.30.0/24 [110/10] is directly connected, eth0, 00:45:28
C>* 172.16.30.0/24 is directly connected, eth0
C>* 172.31.10.0/24 is directly connected, eth1
B>* 192.168.30.0/24 [20/0] via 172.31.10.2, eth1, 00:00:45
--More--(END)
```

Roteador 4 (R4) - AS 1900

```
router bgp 1900
```

```
bgp router-id 172.31.10.2
```

```
neighbor 172.31.10.1 remote-as 6500
```

```
network 192.168.10.0 mask 255.255.255.0
```



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```
IMUNES: router4 (console) vtysh
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router4# configure t
router4(config)# router bgp 1900
router4(config-router)# bgp router-id 192.168.30.1
router4(config-router)# newtwork 192.168.30.0/24
% Unknown command.
router4(config-router)# network 192.168.30.0/24
router4(config-router)# network 172.31.10.0/24
router4(config-router)# neighbor 172.31.10.1 remote-as 6500
router4(config-router)# end
router4# sh ip route
Codes: K - kernel route, C - connected, S - static, R - RIP,
       O - OSPF, I - IS-IS, B - BGP, P - PIM, A - Babel, N - NHRP,
       > - selected route, * - FIB route

C>* 127.0.0.0/8 is directly connected, lo0
B>* 172.16.30.0/24 [20/0] via 172.31.10.1, eth0, 00:00:17
C>* 172.31.10.0/24 is directly connected, eth0
O>* 192.168.10.0/24 [110/30] via 192.168.30.2, eth1, 00:42:40
O>* 192.168.20.0/24 [110/20] via 192.168.30.2, eth1, 00:43:15
O  192.168.30.0/24 [110/10] is directly connected, eth1, 00:44:00
C>* 192.168.30.0/24 is directly connected, eth1
--More--(END)
```

5. Tabelas de Roteamento e Troca de Mensagens

As tabelas de roteamento foram verificadas em cada roteador. Exemplos:

Tabela de Roteamento do R3

show ip route

Saída:



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```

IMUNES: router3 (console) vtysh

Hello, this is Quagga (version 1.2.4).
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router3# show ip bgp summary
BGP router identifier 172.31.10.1, local AS number 6500
RIB entries 5, using 360 bytes of memory
Peers 1, using 4944 bytes of memory

Neighbor      V      AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/P
fxRcd
172.31.10.2    4  1900      8     57       0    0    0 00:05:19    2

Total number of neighbors 1

Total num. Established sessions 1
Total num. of routes received    2
--More--(END)

```

```

IMUNES: router4 (console) vtysh

B>* 172.16.30.0/24 [20/0] via 172.31.10.1, eth0, 00:05:40
router4# show ip route summary
Route Source      Routes      FIB (vrf 0)
connected         3           3
ospf              3           2
ebgp              1           1
ibgp              0           0
-----
Totals            7           6

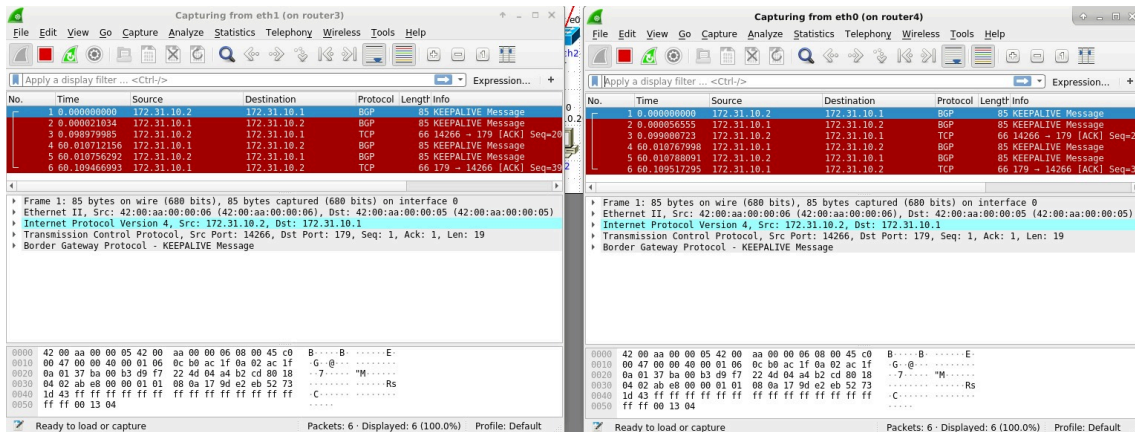
router4# show ip bgp summary
BGP router identifier 192.168.30.1, local AS number 1900
RIB entries 5, using 360 bytes of memory
Peers 1, using 4944 bytes of memory

Neighbor      V      AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/P
fxRcd
172.31.10.1    4  6500     10     11       0    0    0 00:06:06    2

Total number of neighbors 1

Total num. Established sessions 1
Total num. of routes received    2
--More--(END)

```

The image displays two side-by-side screenshots of the Wireshark network protocol analyzer. Both windows show a capture from the 'eth0' interface. The left window, titled 'Capturing from eth1 (on router3)', shows a list of captured packets with a filter 'Expression...'. The right window, titled 'Capturing from eth0 (on router4)', shows a similar list of packets. Both windows have a detailed view pane at the bottom showing the selected packet's structure, including Ethernet II, Internet Protocol Version 4, and Border Gateway Protocol - KEEPALIVE Message. The packet list in both windows shows a sequence of BGP KEEPALIVE messages and a TCP ACK packet.

7. Conclusão

A configuração da rede envolveu a implementação de OSPF para roteamento interno e BGP para roteamento entre os sistemas autônomos. A tabela de roteamento indicou que as rotas estavam sendo propagadas corretamente, mas problemas de firewall ou rotas padrão podem ter afetado a conectividade total. Com as correções realizadas, a comunicação entre as redes foi estabelecida.

8. Anexos

- Prints das tabelas de roteamento
- Mensagens trocadas pelos roteadores (logs)