Arquitetura de Redes Avançadas

Laboratory Guide

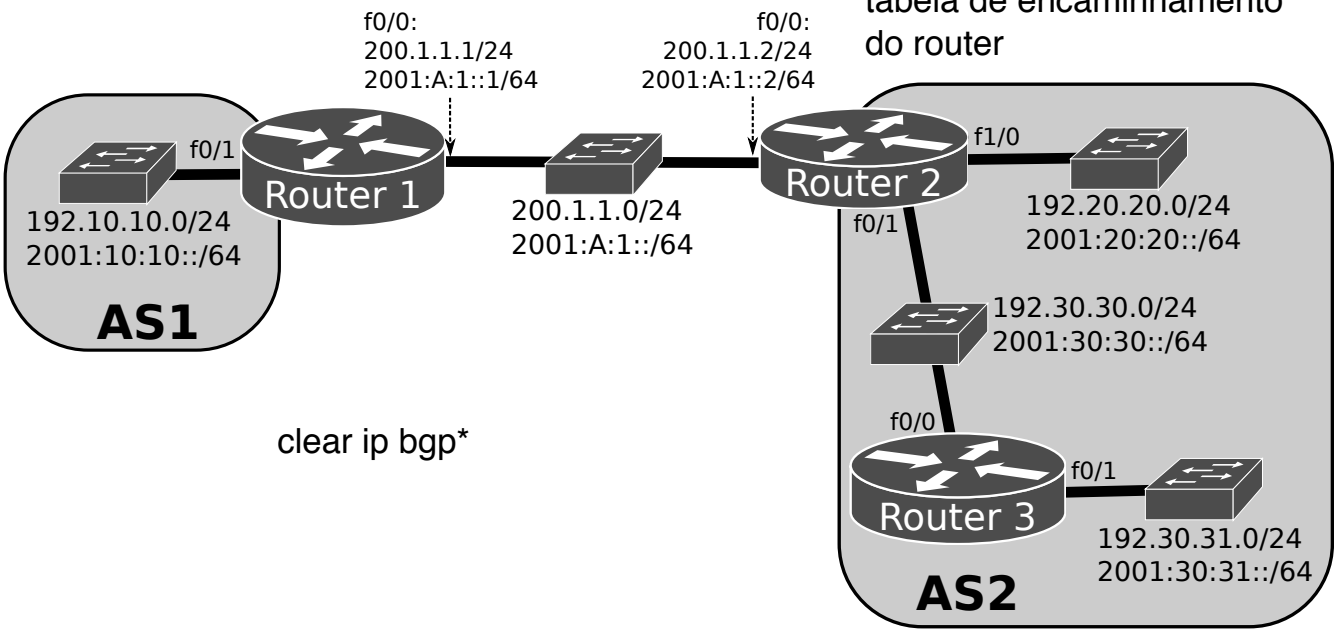
BGP and MP-BGP (part 1)

Objectives

- Introduction to BGP and MP-BGP

Introduction to BGP

bgp envia todos
as rotas que estão na
tabela de encaminhamento
do router



clear ip bgp*

1. Assemble and configure (only IPv4 addresses) the above depicted network with two Autonomous Systems (AS). Start a packet capture on link R1-R2 (with TCP filter). The internal routing protocol in AS2 is OSPF (network 192.20.20.0 is not included in the process. Router 2 announces a default route.). The AS exchange routes using BGP. Routing configurations:

```
Router1(config)# router bgp 1
Router1(config-router)# neighbor 200.1.1.2 remote-as 2
Router1(config-router)# network 192.10.10.0
---
Router2(config)# router ospf 1
Router2(config-router)# network 192.30.30.0 0.0.0.255 area 0
Router2(config-router)# default-information originate always
Router2(config)# router bgp 2
Router2(config-router)# neighbor 200.1.1.1 remote-as 1
Router2(config-router)# redistribute ospf 1
Router2(config-router)# network 192.20.20.0    !Explicit inclusion. Not in OSPF 1.
---
Router3(config)# router ospf 1
Router3(config-router)# network 192.30.30.0 0.0.0.255 area 0
Router3(config-router)# network 192.30.31.0 0.0.0.255 area 0
```

Understand/explain the purpose off all commands.

Analyze the content of the captured BGP packets (and associated TCP acknowledgments) and identify the BGP packet types, their purposes and periodicity. Analyze the IPv4 routing tables and test full connectivity. Explain how IPv4 routes are announced to the remote BGP peers.

2. While capturing packets on link R1-R2, disable Router 3's f0/1 interface (`shutdown`) to simulate a link failure. Wait a couple of minutes, and enable again the interface (`no shutdown`) .

Analyze the captured packets, and identify how a network unreachability is announced to a remote BGP peer. And how a newly available network is announced to a remote BGP peer.

A principal vantagem é que as rotas são sumariadas e é apenas enviado um identificador para aquelas duas rotas, simplifica a tabela de encaminhamento mas apenas vai deixar de anunciar essas redes quando as duas forem "á vida". Se apenas uma for à vida ele continua a anunciar essas rotas.

3. Change Router 2 BGP configurations in order that networks 192.30.30.0/24 and 192.30.31.0/24 are announced as an aggregate:

```
Router2(config)# router bgp 2
Router2(config-router)# aggregate-address 192.30.30.0 255.255.254.0 summary-only
```

Analyze the routing tables of all routers. Analyze how the network aggregate is announced to the remote BGP peer (identify relevant BGP attributes). Identify the main advantage of network aggregates.

4. While capturing packets on link R1-R2 and with the networks aggregation active, disable Router 3's f0/1 interface (`shutdown`) to simulate a link failure. Wait a couple of minutes, and enable again the interface (`no shutdown`) .

Ele não vai enviar uma mensagem de UPDATE porque ainda tem uma rede ativa.

Compare the results with the ones obtained in experiment 2.

5. Simulate now a link failure on Router 2's f0/1 interface. Compare the results and captured packets with the ones obtained in experiments 2 and 4. Identify one disadvantage of using network aggregates in BGP.

Introduction to MP-BGP

6. Configure the network IPv6 addresses and activate IPv6 routing (`ipv6 unicast-routing`). Delete the previous configured BGP processes and reconfigure new BGP processes to support simultaneously IPv4 and IPv6 network announcements (over IPv4 and IPv6, respectively) using MP-BGP address family specific configurations. AS2 IPv6 internal routing protocol should be OSPFv3. Main routing configurations:

```
Router1(config)# no router bgp 1
Router1(config)# router bgp 1
Router1(config-router)# address-family ipv4 unicast
Router1(config-router-af)# network 192.10.10.0
Router1(config-router-af)# neighbor 200.1.1.2 remote-as 2
Router1(config-router-af)# address-family ipv6 unicast
Router1(config-router-af)# network 2001:10:10::/64
Router1(config-router-af)# neighbor 2001:A:1::2 remote-as 2
---
Router2(config)# ipv6 router ospf 1
Router2(config-rtr)#default-information originate always
Router2(config)# interface FastEthernet0/1
Router2(config-if)# ipv6 ospf 1 area 0
!
Router2(config)# no router bgp 2
Router2(config)# router bgp 2
Router2(config-router)# address-family ipv4 unicast
Router2(config-router-af)# network 192.20.20.0
Router2(config-router-af)# aggregate-address 192.30.30.0 255.255.254.0 summary-only
Router2(config-router-af)# redistribute ospf 1
Router2(config-router-af)# neighbor 200.1.1.1 remote-as 1
Router2(config-router-af)# address-family ipv6 unicast
Router2(config-router-af)# neighbor 2001:A:1::1 remote-as 1
Router2(config-router-af)# network 2001:20:20::/64   !Not in OSPF 1.
Router2(config-router-af)# redistribute ospf 1
```

Router 3 também é preciso

2001:30:30::/64

Activate OSPFv3 in all Router 3's interfaces. Understand/explain the purpose off all commands.

Analyze the content of the captured BGP packets (over IPv4 and IPv6) and identify the MP-BGP packet types, their purposes and periodicity. Analyze the IPv4 and IPv6 routing tables and test full IPv4 and IPv6 connectivity. Explain how IPv6 routes are announced to the remote BGP peers.