



UFES

Universidade Federal do Espírito Santo

Trabalho Roteamento

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Matrícula: 2019202307

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Vitória

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Considerações iniciais:

Construção da Topologia e Endereçamento

Minha matrícula é 2019202307, como contém três números iguais a zero encontrei dificuldade na divisão do endereçamento.

Como todos possuem o ano de matrícula começando por 20, para o ipv4, eu decidi usar o “19” apenas e o número do período de entrada “2” como ano de matrícula, formando 192.

Exemplo de como encontrei a forma endereçável para o IPV4:

- 2019.20.23.07 -> retirei o 20, do ano.
- 19.20.23.07-> retirei os zeros e o último dígito da matrícula
- 192.23 .x.x -> o x é para simplificar o endereçamento dos roteadores.

Então eu tomei a decisão de usar o “192” como o ano de matrícula e “23” como número de matrícula.

2019202307

..192..23..

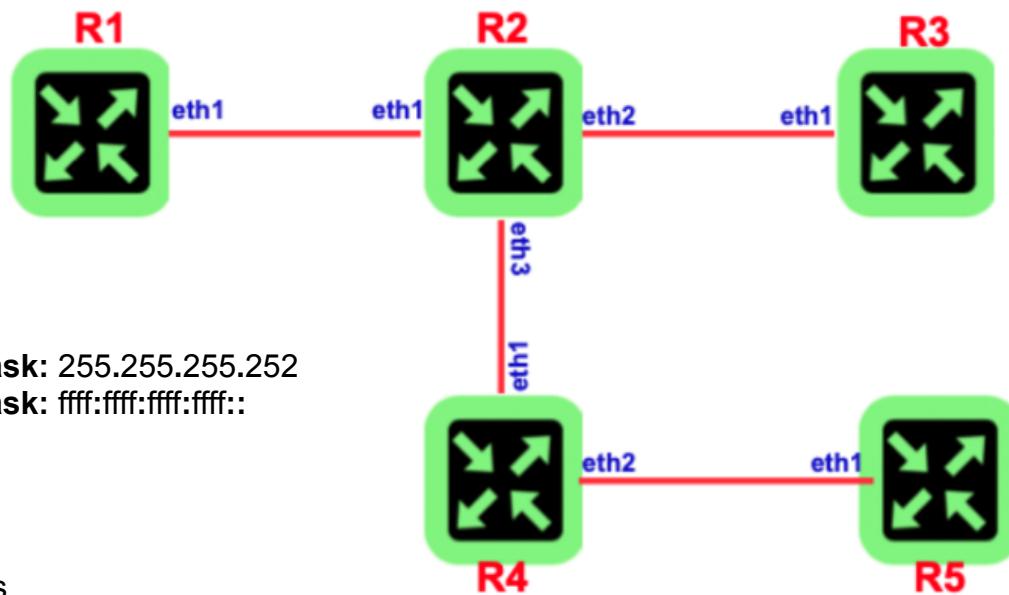
Como o ipv6 é mais fácil de endereçar, eu decidi manter o mesmo número de matrícula escolhido no ipv4, mudando apenas o ano de 192, para 2019.

2019202307

2019..23..

Topologia 1 - Endereçamento

Na topologia 1, temos uma rede com 5 roteadores, implementada com roteamento estático.



IPV4 -> Mask: 255.255.255.252

IPV6 -> Mask: ffff:ffff:ffff:ffff::

Roteadores

- [R1]

ipv4:	ipv6:	description :
eth1:192.23.1.1	eth1:2019:23:1::1	R1 -> R2
- [R2]

ipv4:	ipv6:	description :
eth1:192.23.1.1	eth1:2019:23:1::1	R2 -> R1
eth1:192.23.2.1	eth1:2019:23:2::1	R2 -> R3
eth1:192.23.3.1	eth1:2019:23:3::1	R2 -> R4
- [R3]

ipv4:	ipv6:	description :
eth1:192.23.2.2	eth1:2019:23:2::2	R3 -> R2
- [R4]

ipv4:	ipv6:	description :
eth1:192.23.3.2	eth1:2019:23:3::2	R4 -> R2
eth1:192.23.4.1	eth1:2019:23:4::1	R4 -> R5
- [R5]

ipv4:	ipv6:	description :
eth1:192.23.4.2	eth1:2019:23:4::2	R5 -> R4

Topologia 1 - Execução

Para executar é necessário entrar no diretório que contém a topologia 1 “static_topologia1”:

```
dsbrito@DESKTOP-RGB92UP: ~/dionatas/static_topologia1
dsbrito@DESKTOP-RGB92UP:~/dionatas$ cd static_topologia1/
dsbrito@DESKTOP-RGB92UP:~/dionatas/static_topologia1$ ls
hw-sw  rtr.jar  start-static.sh  stop-static.sh
```

O próximo passo ao está dentro do diretório “static_topologia1”, é executar o arquivo “start-static.sh”.

obs: caso apareça algo como isso “./start-static.sh: Permission denied”, devemos da permissão para .sh com o comando “**chmod -R 777 .**”

```
dsbrito@DESKTOP-RGB92UP: ~/dionatas/static_topologia1
dsbrito@DESKTOP-RGB92UP:~/dionatas/static_topologia1$ ./start-static.sh
Initializing routers (10 seconds)..
```

obs: pode ser necessário ajustar o tempo de sleep (no meu caso 10 segundos), entre os comandos para abrir os terminais telnet devido ao tempo necessário para “subir” os roteadores ser diferente em cada computador...

Após ter inicializado, irá ser mostrado no terminal a seguinte interface:

```
dsbrito@DESKTOP-RGB92UP: ~/dionatas/static_topologia1
t localhost 26002
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
welcome
line ready
[TP1]R2_dsbrito#

telnet localhost 26005
telnet localhost 26005P:~/dionatas/static_topologia1$
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
welcome
line ready
[TP1]R5_dsbrito#

telnet localhost 26003
dsbrito@DESKTOP-RGB92UP:~/dionatas/static_topologia1$ telnet localhost 26003
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
welcome
line ready
[TP1]R3_dsbrito#

[TP1]R1_dsbrito#
[TP1]R1_dsbrito#
[TP1]R1_dsbrito#

telnet localhost 26004
dsbrito@DESKTOP-RG4
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
welcome
line ready
[TP1]R4_dsbrito#

[TP1]R1_dsbrito" 22:22 29-Jan-23
```

Topologia 1 - Testes

Para mostrar a tabela de rotas para o ipv4 e ipv6 dessa implementação deve usar o comando “**show ipv4 route v1**” e “**show ipv6 route v1**”

obs: para caminhar entre as telas deve utilizar ctrl+b+o (eu usei esse) ou ctrl+b+ setas _do_ teclado

obs: as imagens a seguir são iguais (apenas para visualização completa x reduzida)

[IPV4] Imagem reduzida (para melhor visualização/acaba cortando alguns dados:

```
dsbrito@DESKTOP-RGB92UP: ~/dionatas/static_topologia1
typ prefix metric iface hop time S 192.23.2.0/30 1/0 ethernet1 192.23.4.1 00:00:06
C 192.23.4.0/30 0/0 ethernet1 null 00:00:06 LOC 192.23.4.2/32 0/1 ethernet1 null 00:00:06 LOC 192.23.4.1/32 0/1 ethernet2 null 00:00:12
[TP1]R5_dsbrito# [TP1]R4_dsbrito#

[TP1]R3_dsbrito#show ipv4 route v1
typ prefix metric iface hop time S 0.0.0.0/0 1/0 ethernet1 192.23.2.1 00:00:16
C 192.23.2.0/30 0/0 ethernet1 null 00:00:17 LOC 192.23.2.2/32 0/1 ethernet1 null 00:00:17
[TP1]R3_dsbrito# [TP1]R2_dsbrito#

welcome
line ready
[TP1]R1_dsbrito# [TP1]R1_[TP1]R1_dsbrito#show ipv4 route v1
typ prefix metric iface hop time S 0.0.0.0/0 1/0 ethernet1 192.23.1.2 00:00:27
C 192.23.1.0/30 0/0 ethernet1 null 00:00:27 LOC 192.23.1.1/32 0/1 ethernet1 null 00:00:27
[TP1]R1_dsbrito#
[telnet] 0:telnet* "[TP1]R4_dsbrito" 22:39 29-Jan-23
```

[IPV4] Imagem completa (imagem com todos os dados do ipv4):

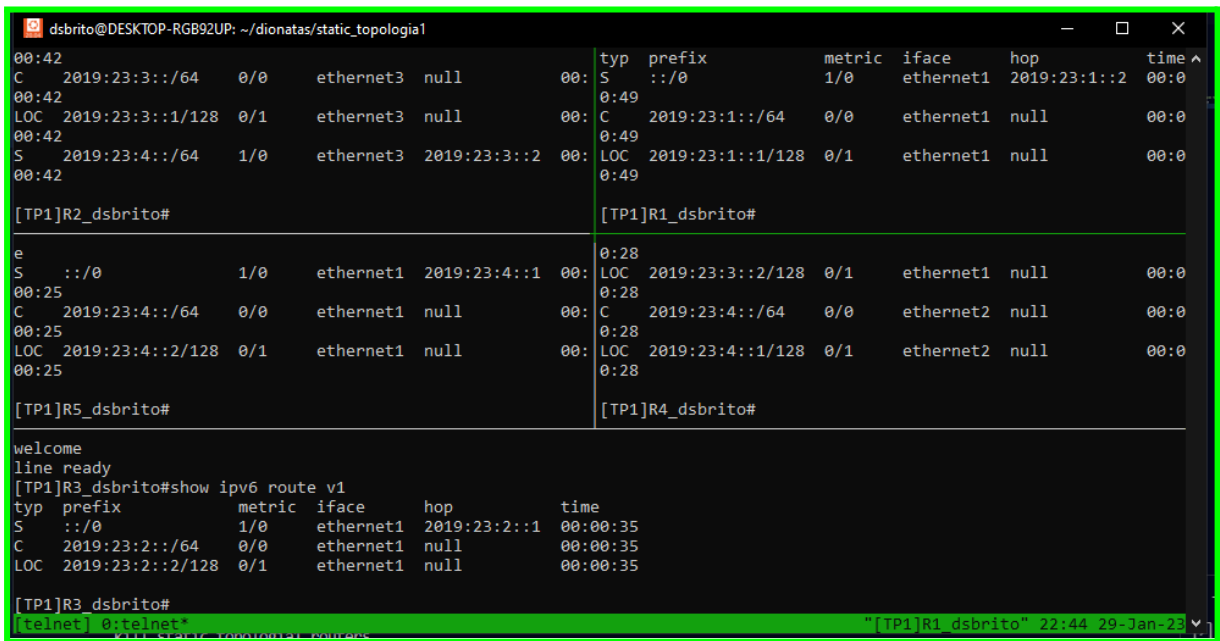
```
dsbrito@DESKTOP-RGB92UP: ~/dionatas/static_topologia1
telnet localhost 26005
telnet localhost 26005P:~/dionatas/static_topologia1$
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^'.
welcome
line ready
[TP1]R5_dsbrito#show ipv4 route v1
typ prefix metric iface hop time S 0.0.0.0/0 1/0 ethernet1 192.23.4.1 00:00:06
C 192.23.4.0/30 0/0 ethernet1 null 00:00:06 LOC 192.23.4.2/32 0/1 ethernet1 null 00:00:06 LOC 192.23.4.1/32 0/1 ethernet2 null 00:00:12
[TP1]R5_dsbrito# [TP1]R4_dsbrito#

telnet localhost 26003
dsbrito@DESKTOP-RGB92UP:~/dionatas/static_topologia1$ telnet localhost 26003
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^'.
welcome
line ready
[TP1]R3_dsbrito#show ipv4 route v1
typ prefix metric iface hop time S 0.0.0.0/0 1/0 ethernet1 192.23.2.1 00:00:16
C 192.23.2.0/30 0/0 ethernet1 null 00:00:17 LOC 192.23.2.2/32 0/1 ethernet1 null 00:00:17
[TP1]R3_dsbrito# [TP1]R2_dsbrito#

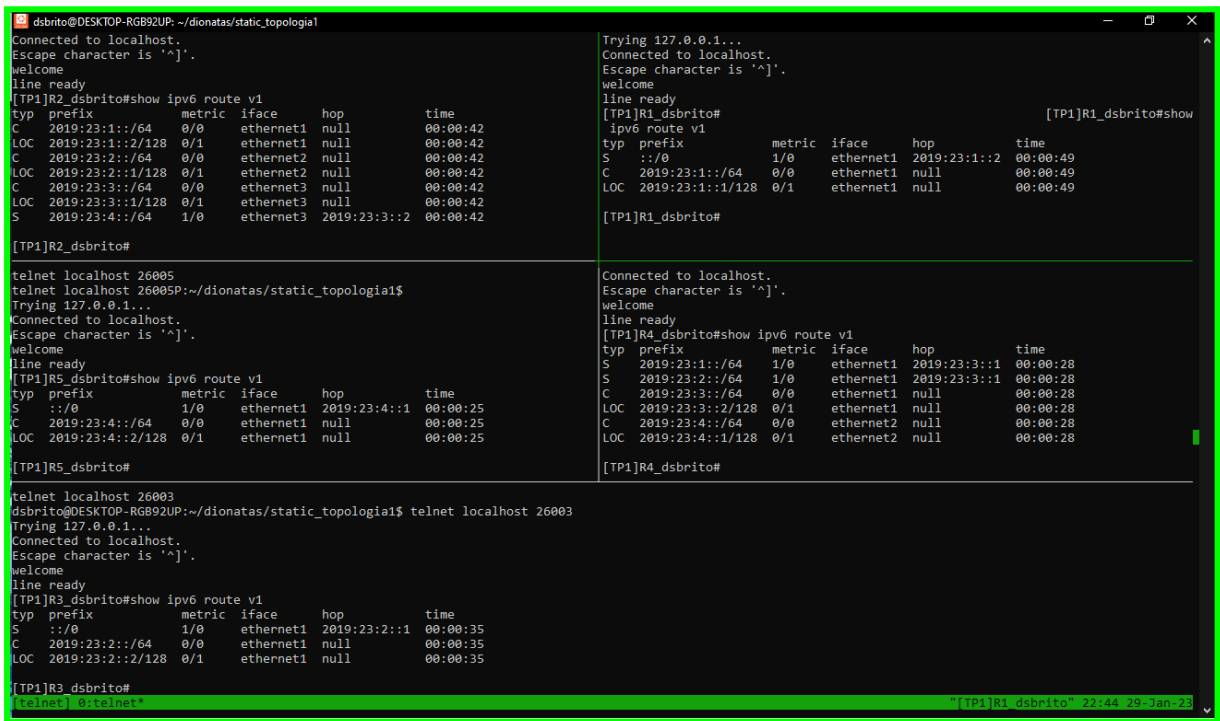
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^'.
welcome
line ready
[TP1]R1_dsbrito# [TP1]R1_[TP1]R1_dsbrito#show ipv4 route v1
typ prefix metric iface hop time S 0.0.0.0/0 1/0 ethernet1 192.23.1.2 00:00:27
C 192.23.1.0/30 0/0 ethernet1 null 00:00:27 LOC 192.23.1.1/32 0/1 ethernet1 null 00:00:27
[TP1]R1_dsbrito#
[telnet] 0:telnet* "[TP1]R4_dsbrito" 22:36 29-Jan-23
```

obs: as imagens a seguir são iguais (apenas para visualização completa x reduzida)

[IPV6] Imagem reduzida (para melhor visualização/acaba cortando alguns dados:



[IPV6] Imagem reduzida (para melhor visualização/acaba cortando alguns dados:



Para testar o ping dessa implementação deve usar o comando “`ping <ip> vrf v1`”

Ex:

Teste de ping no roteador R1 para o roteador R5:

usando ipv4: `ping 192.23.4.2 vrf v1`

```
[TP1]R1_dsbrito#ping 192.23.4.2 vrf v1
pinging 192.23.4.2, src=null, vrf=v1, cnt=5, len=64, df=false, tim=1000, gap=0,
ttl=255, tos=0, sgt=0, flow=0, fill=0, alrt=-1, sweep=false, multi=false
!!!!
result=100.0%, rcv/sent/lost/err=5/5/0/0, took 51, min/avg/max/dev rtt=2/2.0/2/
0.0, ttl 253/253/253/0.0, tos 0/0.0/0/0.0
[TP1]R1_dsbrito#
```

usando ipv6: `ping 2019:23:4::2 vrf v1`

```
[TP1]R1_dsbrito#ping 2019:23:4::2 vrf v1
pinging 2019:23:4::2, src=null, vrf=v1, cnt=5, len=64, df=false, tim=1000, gap=0
, ttl=255, tos=0, sgt=0, flow=0, fill=0, alrt=-1, sweep=false, multi=false
!!!!
result=100.0%, rcv/sent/lost/err=5/5/0/0, took 11, min/avg/max/dev rtt=1/1.6/3/
0.6, ttl 253/253/253/0.0, tos 0/0.0/0/0.0
[TP1]R1_dsbrito#
```

Para testar o traceroute dessa implementação deve usar o comando “`traceroute <ip> vrf v1`”

Ex:

Teste de traceroute no roteador R1 para o roteador R5 usando ipv6:

usando ipv6: `traceroute 2019:23:4::2 vrf v1`

```
[TP1]R1_dsbrito#tracerout 2019:23:4::2 vrf v1
tracing 2019:23:4::2, src=null, vrf=v1, prt=0/33440, tim=1000, tos=0, flow=0, le
n=64
via ::/0 1/0 ethernet1 2019:23:1::2 00:07:09
1 2019:23:1::2 time=1
2 2019:23:3::2 time=1
3 2019:23:4::2 time=1
[TP1]R1_dsbrito#
```

usando ipv4: `traceroute 192.23.4.2 vrf v1`

```
[TP1]R1_dsbrito#tracerout 192.23.4.2 vrf v1
tracing 192.23.4.2, src=null, vrf=v1, prt=0/33440, tim=1000, tos=0, flow=0, len=
64
via 0.0.0.0/0 1/0 ethernet1 192.23.1.2 00:14:37
1 192.23.1.2 time=3
2 192.23.3.2 time=1
3 192.23.4.2 time=1
[TP1]R1_dsbrito#
```

Para desligar alguma interface de ethernet é necessário entrar na “conf” do roteador que deseja desligar.

Ex:

Desligar a interface eth1 do R2.

Comandos:

conf t -> entrar no modo conf

int eth1 -> acessar a eth1

shutdown -> desligar

end -> para sair do (cfg-if)

```
[TP1]R2_dsbrito#conf t
[TP1]R2_dsbrito(cfg)#int eth1
[TP1]R2_dsbrito(cfg-if)#shutdown
[TP1]R2_dsbrito(cfg-if)#end
[TP1]R2_dsbrito#
```

Verificando agora se foi desligada, com o ping e traceroute pelo roteador R1

- ping

```
[TP1]R1_dsbrito#ping 192.23.4.2 vrf v1
pinging 192.23.4.2, src=null, vrf=v1, cnt=5, len=64, df=false, tim=1000, gap=0,
ttl=255, tos=0, sgt=0, flow=0, fill=0, alrt=-1, sweep=false, multi=false
.....
result=0.0%, rcv/sent/lost/err=0/5/5/0, took 5002, min/avg/max/dev rtt=10000/0.
0/0/0.0, ttl 256/0.0/0/0.0, tos 256/0.0/0/0.0
[TP1]R1_dsbrito#
```

S 2019:23:41:/64 1/0 ethernet3 2019:23:3::2 00:00:42	[TP1]R1_dsbrito#ping 192.23.4.2 vrf v1 pinging 192.23.4.2, src=null, vrf=v1, cnt=5, len=64, df=false, tim=1000, gap=0, ttl=255, tos=0, sgt=0, flow=0, fill=0, alrt=-1, sweep=false, multi=false result=0.0%, rcv/sent/lost/err=0/5/5/0, took 5002, min/avg/max/dev rtt=10000/0. 0/0/0.0, ttl 256/0.0/0/0.0, tos 256/0.0/0/0.0 [TP1]R1_dsbrito#
--	--

- traceroute (ele tenta vai até a tentativa 17)

```
[TP1]R1_dsbrito#tracerout 192.23.4.2 vrf v1
tracing 192.23.4.2, src=null, vrf=v1, prt=0/33440, tim=1000, tos=0, flow=0, len=
64
via 0.0.0.0/0 1/0 ethernet1 192.23.1.2 00:30:17
1 null time=1000
2 null time=1000
3 null time=1000
4 null time=1000
5 null time=1000
```


Observa-se que os pacotes não chegam mais até R2 a partir de R1. Ao religar a interface eth1 em R2, a rede volta a funcionar normalmente sem problemas.

Topologia 1 - Finalizando

Para finalizar a topologia, caso estiver utilizando somente um terminal deve usar o comando `exit` em qualquer uma das janelas e em seguida, usar o comando `./stop-static.sh`

```
LOC 2019:23:4::2/128 0/1 ethernet  
[TP1]R5_dsbrito#exit
```

```
[TP1]R5_dsbrito#exit  
see you later  
Connection closed by foreign host.  
dsbrito@DESKTOP-RGB92UP:~/dionatas/static_topologia1$
```

```
[TP1]R5_dsbrito#exit  
see you later  
Connection closed by foreign host.  
dsbrito@DESKTOP-RGB92UP:~/dionatas/static_topologia1$ ./stop-static.sh
```

Caso estiver utilizando dois terminais, deve usar o comando `./stop-static.sh` diretamente.

```
dsbrito@DESKTOP-RGB92UP:~/dionatas/static_topologia1$ ./stop-static.sh  
kill static_topologia1 routers..  
byebye..
```

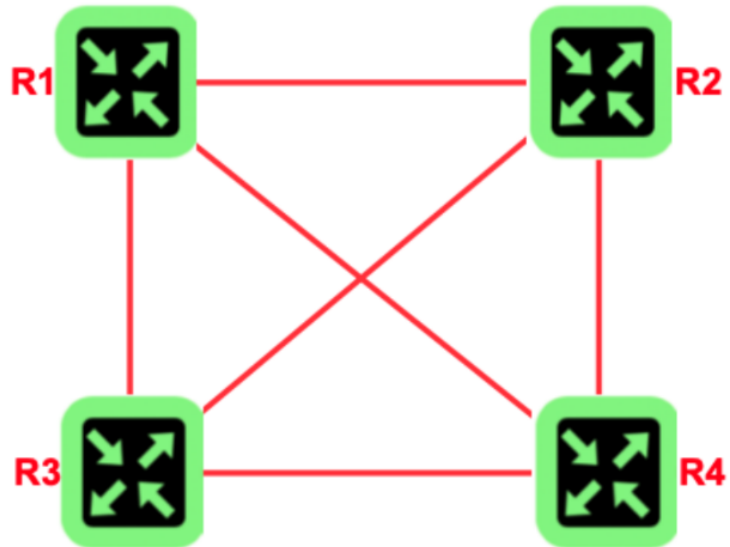
obs: deve está no diretório `static_topologia1` para utilizar o comando.

Topologia 2

Para a topologia 2, foi utilizado o mesmo modelo de endereçamento da topologia 1, nela temos uma rede com 4 roteadores, Full-mesh implementada com o algoritmo de roteamento RIP

IPV4 -> Mask: 255.255.255.252

IPV6 -> Mask: ffff:ffff:ffff:ffff::



Roteadores

- [R1]

ipv4:	ipv6:	description :
eth1:192.23.1.1	eth1:2019:23:1::1	R1 -> R2
eth2:192.23.2.1	eth2:2019:23:2::1	R1 -> R3
eth3:192.23.3.1	eth3:2019:23:3::1	R1 -> R4
- [R2]

ipv4:	ipv6:	description :
eth1:192.23.1.2	eth1:2019:23:1::2	R2 -> R1
eth2:192.23.4.1	eth2:2019:23:4::1	R2 -> R3
eth3:192.23.5.1	eth3:2019:23:5::1	R2 -> R4
- [R3]

ipv4:	ipv6:	description :
eth1:192.23.2.2	eth1:2019:23:2::2	R3 -> R1
eth2:192.23.4.2	eth2:2019:23:4::2	R3 -> R2
eth3:192.23.6.1	eth3:2019:23:6::1	R3 -> R4
- [R4]

ipv4:	ipv6:	description :
eth1:192.23.3.2	eth1:2019:23:3::2	R4 -> R1
eth2:192.23.5.2	eth2:2019:23:5::2	R4 -> R2
eth3:192.23.6.2	eth3:2019:23:6::2	R4 -> R3

Topologia 1 - Execução

Para executar é necessário entrar no diretório que contém a topologia 2 “static_topologia2”:

```
dsbrito@DESKTOP-RGB92UP: ~/dionatas/rip_topologia2
dsbrito@DESKTOP-RGB92UP:~/dionatas$ cd rip_topologia2/
dsbrito@DESKTOP-RGB92UP:~/dionatas/rip_topologia2$ ls
freertr-rip.sh  hw-sw  rtr.jar  start-rip.sh  stop-rip.sh
dsbrito@DESKTOP-RGB92UP:~/dionatas/rip_topologia2$
```

O próximo passo ao está dentro do diretório “static_topologia1”, é executar o arquivo “start-rip.sh”.

- obs: caso apareça algo como isso “./start-rip.sh: Permission denied”, devemos da permissão para .sh com o comando “**chmod -R 777 ./**”

```
dsbrito@DESKTOP-RGB92UP: ~/dionatas/rip_topologia2
dsbrito@DESKTOP-RGB92UP:~/dionatas/rip_topologia2$ ./start-rip.sh
Creating tmux panels...
Starting routers...
Done.
Opening tmux in 3..2..1.._
```

Após ter inicializado, irá ser mostrado no terminal a seguinte interface:

```
dsbrito@DESKTOP-RGB92UP: ~/dionatas/rip_topologia2
can do whatever you want with this stuff. if we meet some day, and you think this stuff is worth it, you can buy me a beer in return
info cfgInit.doInit:cfgInit.java:776 booting
info cfgInit.doInit:cfgInit.java:958 initializing hardware
info cfgInit.doInit:cfgInit.java:964 applying defaults
info cfgInit.doInit:cfgInit.java:985 applying configuration
info cfgInit.doInit:cfgInit.java:1020 boot completed
welcome
line ready
[TP2]R1_dsbrito#
[TP2]R1_dsbrito#

can do whatever you want with this stuff. if we meet some day, and you think this stuff is worth it, you can buy me a beer in return
info cfgInit.doInit:cfgInit.java:776 booting
info cfgInit.doInit:cfgInit.java:958 initializing hardware
info cfgInit.doInit:cfgInit.java:964 applying defaults
info cfgInit.doInit:cfgInit.java:985 applying configuration
info cfgInit.doInit:cfgInit.java:1020 boot completed
welcome
line ready
[TP2]R3_dsbrito#
[TP2]R3_dsbrito#
[FREERTR] 0:main*

can do whatever you want with this stuff. if we meet some day, and you think this stuff is worth it, you can buy me a beer in return
info cfgInit.doInit:cfgInit.java:776 booting
info cfgInit.doInit:cfgInit.java:958 initializing hardware
info cfgInit.doInit:cfgInit.java:964 applying defaults
info cfgInit.doInit:cfgInit.java:985 applying configuration
info cfgInit.doInit:cfgInit.java:1020 boot completed
welcome
line ready
[TP2]R4_dsbrito#
[TP2]R4_dsbrito#
"[TP2]R4_dsbrito" 23:50 29-Jan-23
```

Topologia 1 - Testes

Para mostrar a tabela de rotas para o ipv4 e ipv6 dessa implementação deve usar o comando “**show ipv4 route v1**” e “**show ipv6 route v1**”

obs: para caminhar entre as telas deve utilizar ctrl+b+o (eu usei esse) ou ctrl+b+ setas_do_teclado

[IPV4] Quando se inicia.

```
dsbrito@DESKTOP-RGB92UP: ~/dionatas/rip_topologia2
[TP2]R4_dsbrito#
[TP2]R4_dsbrito#show ipv4 route v1
[TP2]R4_dsbrito#show ipv4 route v1
[TP2]R4_dsbrito#show ipv4 route v1
typ prefix metric iface hop time
C 192.23.3.0/30 0/0 ethernet1 null 00:00:05
LOC 192.23.3.2/32 0/1 ethernet1 null 00:00:05
C 192.23.5.0/30 0/0 ethernet2 null 00:00:04
LOC 192.23.5.2/32 0/1 ethernet2 null 00:00:04
C 192.23.6.0/30 0/0 ethernet3 null 00:00:04
LOC 192.23.6.2/32 0/1 ethernet3 null 00:00:04

[TP2]R4_dsbrito#
[TP2]R4_dsbrito#

[TR2]R2_dsbrito#
[TR2]R2_dsbrito#show ipv4 route v1
[TR2]R2_dsbrito#show ipv4 route v1
[TR2]R2_dsbrito#show ipv4 route v1
typ prefix metric iface hop time
C 192.23.1.0/30 0/0 ethernet1 null 00:00:09
LOC 192.23.1.2/32 0/1 ethernet1 null 00:00:09
C 192.23.4.0/30 0/0 ethernet2 null 00:00:09
LOC 192.23.4.1/32 0/1 ethernet2 null 00:00:09
C 192.23.5.0/30 0/0 ethernet3 null 00:00:08
LOC 192.23.5.1/32 0/1 ethernet3 null 00:00:08

[TR2]R2_dsbrito#
[TR2]R2_dsbrito#

[TP2]R1_dsbrito#
[TP2]R1_dsbrito#show ipv4 route v1
[TP2]R1_dsbrito#show ipv4 route v1
[TP2]R1_dsbrito#show ipv4 route v1
typ prefix metric iface hop time
C 192.23.1.0/30 0/0 ethernet1 null 00:00:07
LOC 192.23.1.1/32 0/1 ethernet1 null 00:00:07
C 192.23.2.0/30 0/0 ethernet2 null 00:00:06
LOC 192.23.2.1/32 0/1 ethernet2 null 00:00:06
C 192.23.3.0/30 0/0 ethernet3 null 00:00:06
LOC 192.23.3.1/32 0/1 ethernet3 null 00:00:06

[TP2]R1_dsbrito#
[TP2]R1_dsbrito#

[TP2]R3_dsbrito#
[TP2]R3_dsbrito#show ipv4 route v1
[TP2]R3_dsbrito#show ipv4 route v1
[TP2]R3_dsbrito#show ipv4 route v1
typ prefix metric iface hop time
C 192.23.2.0/30 0/0 ethernet1 null 00:00:12
LOC 192.23.2.2/32 0/1 ethernet1 null 00:00:12
C 192.23.4.0/30 0/0 ethernet2 null 00:00:12
LOC 192.23.4.2/32 0/1 ethernet2 null 00:00:12
C 192.23.6.0/30 0/0 ethernet3 null 00:00:12
LOC 192.23.6.1/32 0/1 ethernet3 null 00:00:12

[TP2]R3_dsbrito#
[TP2]R3_dsbrito#

" [TP2]R3_dsbrito" 23:55 29-Jan-23
```

[IPV4] Ao realizar comando de show ipv4 novamente, é possível perceber que o RIP entra em funcionamento com a atualização das rotas após aproximadamente 30 segundos.

```
dsbrito@DESKTOP-RGB92UP: ~/dionatas/rip_topologia2
[TP2]R4_dsbrito#show ipv4 route v1
typ prefix metric iface hop time
R 192.23.1.0/30 120/1 ethernet1 192.23.3.1 00:00:08
R 192.23.2.0/30 120/1 ethernet3 192.23.6.1 00:00:08
C 192.23.3.0/30 0/0 ethernet1 null 00:00:39
LOC 192.23.3.2/32 0/1 ethernet1 null 00:00:39
R 192.23.4.0/30 120/1 ethernet3 192.23.6.1 00:00:08
C 192.23.5.0/30 0/0 ethernet2 null 00:00:39
LOC 192.23.5.2/32 0/1 ethernet2 null 00:00:39
C 192.23.6.0/30 0/0 ethernet3 null 00:00:38
LOC 192.23.6.2/32 0/1 ethernet3 null 00:00:38

[TP2]R4_dsbrito#
[TP2]R4_dsbrito#

[TR2]R2_dsbrito#show ipv4 route v1
typ prefix metric iface hop time
C 192.23.1.0/30 0/0 ethernet1 null 00:00:49
LOC 192.23.1.2/32 0/1 ethernet1 null 00:00:49
R 192.23.2.0/30 120/1 ethernet2 192.23.4.2 00:00:19
R 192.23.3.0/30 120/1 ethernet1 192.23.1.1 00:00:19
C 192.23.4.0/30 0/0 ethernet2 null 00:00:49
LOC 192.23.4.1/32 0/1 ethernet2 null 00:00:49
C 192.23.5.0/30 0/0 ethernet3 null 00:00:49
LOC 192.23.5.1/32 0/1 ethernet3 null 00:00:49
R 192.23.6.0/30 120/1 ethernet3 192.23.5.2 00:00:19

[TR2]R2_dsbrito#
[TR2]R2_dsbrito#

[TP2]R1_dsbrito#show ipv4 route v1
typ prefix metric iface hop time
R 192.23.1.0/30 120/1 ethernet1 192.23.2.1 00:00:45
LOC 192.23.1.1/32 0/1 ethernet1 null 00:00:45
C 192.23.2.0/30 0/0 ethernet2 null 00:00:45
LOC 192.23.2.1/32 0/1 ethernet2 null 00:00:45
C 192.23.3.0/30 0/0 ethernet3 null 00:00:45
LOC 192.23.3.1/32 0/1 ethernet3 null 00:00:45
R 192.23.4.0/30 120/1 ethernet2 192.23.2.2 00:00:15
R 192.23.5.0/30 120/1 ethernet1 192.23.1.2 00:00:15
R 192.23.6.0/30 120/1 ethernet3 192.23.3.2 00:00:15

[TP2]R1_dsbrito#
[TP2]R1_dsbrito#

[TP2]R3_dsbrito#show ipv4 route v1
typ prefix metric iface hop time
R 192.23.1.0/30 120/1 ethernet1 192.23.2.1 00:00:22
C 192.23.2.0/30 0/0 ethernet1 null 00:00:52
LOC 192.23.2.2/32 0/1 ethernet1 null 00:00:52
R 192.23.3.0/30 120/1 ethernet1 192.23.2.1 00:00:22
C 192.23.4.0/30 0/0 ethernet2 null 00:00:52
LOC 192.23.4.2/32 0/1 ethernet2 null 00:00:52
R 192.23.5.0/30 120/1 ethernet2 192.23.4.1 00:00:42
C 192.23.6.0/30 0/0 ethernet3 null 00:00:52
LOC 192.23.6.1/32 0/1 ethernet3 null 00:00:52

[TP2]R3_dsbrito#
[TP2]R3_dsbrito#

" [TP2]R3_dsbrito" 23:58 29-Jan-23
```

[IPv6] Quando se inicia.

```
dsbrito@DESKTOP-RGB92UP: ~/dionatas/rip_topologia2
[TP2]R4_dsbrito#show ipv6 route v1
[TP2]R4_dsbrito#show ipv6 route v1
typ prefix metric iface hop time
C 2019:23:3::/64 0/0 ethernet1 null 00:00:02
LOC 2019:23:3::2/128 0/1 ethernet1 null 00:00:02
C 2019:23:5::/64 0/0 ethernet2 null 00:00:02
LOC 2019:23:5::2/128 0/1 ethernet2 null 00:00:02
C 2019:23:6::/64 0/0 ethernet3 null 00:00:01
LOC 2019:23:6::2/128 0/1 ethernet3 null 00:00:01

[TP2]R4_dsbrito#
[TP2]R4_dsbrito#warning rtrRip4.datagramAccept:rtrRip4.java:243 neighbor 192.23.5.1 up

[TP2]R2_dsbrito#
[TP2]R2_dsbrito#show ipv6 route v1
[TP2]R2_dsbrito#show ipv6 route v1
[TP2]R2_dsbrito#show ipv6 route v1
typ prefix metric iface hop time
C 2019:23:1::/64 0/0 ethernet1 null 00:00:08
LOC 2019:23:1::2/128 0/1 ethernet1 null 00:00:08
C 2019:23:4::/64 0/0 ethernet2 null 00:00:07
LOC 2019:23:4::1/128 0/1 ethernet2 null 00:00:07
C 2019:23:5::/64 0/0 ethernet3 null 00:00:07
LOC 2019:23:5::1/128 0/1 ethernet3 null 00:00:07

[TP2]R2_dsbrito#
[TP2]R2_dsbrito#

[TP2]R1_dsbrito#
[TP2]R1_dsbrito#show ipv6 route v1
[TP2]R1_dsbrito#show ipv6 route v1
[TP2]R1_dsbrito#show ipv6 route v1
typ prefix metric iface hop time
C 2019:23:1::/64 0/0 ethernet1 null 00:00:05
LOC 2019:23:1::1/128 0/1 ethernet1 null 00:00:05
C 2019:23:2::/64 0/0 ethernet2 null 00:00:05
LOC 2019:23:2::1/128 0/1 ethernet2 null 00:00:05
C 2019:23:3::/64 0/0 ethernet3 null 00:00:05
LOC 2019:23:3::1/128 0/1 ethernet3 null 00:00:05

[TP2]R3_dsbrito#
[TP2]R3_dsbrito#show ipv6 route v1
[TP2]R3_dsbrito#show ipv6 route v1
[TP2]R3_dsbrito#show ipv6 route v1
typ prefix metric iface hop time
C 2019:23:2::/64 0/0 ethernet1 null 00:00:10
LOC 2019:23:2::2/128 0/1 ethernet1 null 00:00:10
C 2019:23:4::/64 0/0 ethernet2 null 00:00:10
LOC 2019:23:4::2/128 0/1 ethernet2 null 00:00:10
C 2019:23:6::/64 0/0 ethernet3 null 00:00:10
LOC 2019:23:6::1/128 0/1 ethernet3 null 00:00:10

[TP2]R3_dsbrito#
[TP2]R3_dsbrito#
[TP2]R3_dsbrito" 00:10 30-Jan-23
```

[IPv6] Ao realizar comando de show ipv4 novamente, é possível perceber que o RIP entra em funcionamento com a atualização das rotas após aproximadamente 30 segundos.

```
dsbrito@DESKTOP-RGB92UP: ~/dionatas/rip_topologia2
[TP2]R4_dsbrito#show ipv6 route v1
[TP2]R4_dsbrito#show ipv6 route v1
typ prefix metric iface hop time
R 2019:23:1::/64 120/1 ethernet2 2019:23:5::1 00:00:14
R 2019:23:2::/64 120/1 ethernet1 2019:23:3::1 00:00:14
C 2019:23:3::/64 0/0 ethernet1 null 00:00:45
LOC 2019:23:3::2/128 0/1 ethernet1 null 00:00:45
R 2019:23:4::/64 120/1 ethernet2 2019:23:5::1 00:00:14
C 2019:23:5::/64 0/0 ethernet2 null 00:00:45
LOC 2019:23:5::2/128 0/1 ethernet2 null 00:00:45
C 2019:23:6::/64 0/0 ethernet3 null 00:00:45
LOC 2019:23:6::2/128 0/1 ethernet3 null 00:00:45

[TP2]R4_dsbrito#
[TP2]R4_dsbrito#

[TP2]R2_dsbrito#show ipv6 route v1
[TP2]R2_dsbrito#show ipv6 route v1
typ prefix metric iface hop time
C 2019:23:1::/64 0/0 ethernet1 null 00:00:52
LOC 2019:23:1::2/128 0/1 ethernet1 null 00:00:52
R 2019:23:2::/64 120/1 ethernet1 2019:23:1::1 00:00:22
R 2019:23:3::/64 120/1 ethernet3 2019:23:5::2 00:00:22
C 2019:23:4::/64 0/0 ethernet2 null 00:00:52
LOC 2019:23:4::1/128 0/1 ethernet2 null 00:00:52
C 2019:23:5::/64 0/0 ethernet3 null 00:00:51
LOC 2019:23:5::1/128 0/1 ethernet3 null 00:00:51
R 2019:23:6::/64 120/1 ethernet2 2019:23:4::2 00:00:22

[TP2]R2_dsbrito#
[TP2]R2_dsbrito#

[TP2]R1_dsbrito#show ipv6 route v1
[TP2]R1_dsbrito#show ipv6 route v1
typ prefix metric iface hop time
C 2019:23:1::/64 0/0 ethernet1 null 00:00:49
LOC 2019:23:1::1/128 0/1 ethernet1 null 00:00:49
C 2019:23:2::/64 0/0 ethernet2 null 00:00:49
LOC 2019:23:2::1/128 0/1 ethernet2 null 00:00:49
C 2019:23:3::/64 0/0 ethernet3 null 00:00:48
LOC 2019:23:3::1/128 0/1 ethernet3 null 00:00:48
R 2019:23:4::/64 120/1 ethernet1 2019:23:1::2 00:00:19
R 2019:23:5::/64 120/1 ethernet3 2019:23:3::2 00:00:19
R 2019:23:6::/64 120/1 ethernet2 2019:23:2::2 00:00:19

[TP2]R1_dsbrito#
[TP2]R1_dsbrito#

[TP2]R3_dsbrito#show ipv6 route v1
[TP2]R3_dsbrito#show ipv6 route v1
typ prefix metric iface hop time
R 2019:23:1::/64 120/1 ethernet2 2019:23:4::1 00:00:25
C 2019:23:2::/64 0/0 ethernet1 null 00:00:56
LOC 2019:23:2::2/128 0/1 ethernet1 null 00:00:56
R 2019:23:3::/64 120/1 ethernet3 2019:23:6::2 00:00:25
C 2019:23:4::/64 0/0 ethernet2 null 00:00:55
LOC 2019:23:4::2/128 0/1 ethernet2 null 00:00:55
R 2019:23:5::/64 120/1 ethernet3 2019:23:6::2 00:00:25
C 2019:23:6::/64 0/0 ethernet3 null 00:00:55
LOC 2019:23:6::1/128 0/1 ethernet3 null 00:00:55

[TP2]R3_dsbrito#
[TP2]R3_dsbrito#
```

Avisos no terminal do roteador de que chega um "datagram" que os vizinhos estão "up"

```
dsbrito@DESKTOP-RGB92UP: ~/dionatas/rip_topologia2
[TP2]R4_dsbrito#
[TP2]R4_dsbrito#warning rtrRip4.datagramAccept:rtrRip4.java:243 neighbor 192.23.6.1 up
arning rtrRip6.datagramAccept:rtrRip6.java:238 neighbor 2019:23:6::1 up
arning rtrRip4.datagramAccept:rtrRip4.java:243 neighbor 192.23.5.1 up
arning rtrRip6.datagramAccept:rtrRip6.java:238 neighbor 2019:23:5::1 up
arning rtrRip4.datagramAccept:rtrRip4.java:243 neighbor 192.23.3.1 up
arning rtrRip6.datagramAccept:rtrRip6.java:238 neighbor 2019:23:3::1 up
[TP2]R2_dsbrito#
[TP2]R2_dsbrito#warning rtrRip4.datagramAccept:rtrRip4.java:243 neighbor 192.23.5.2 up
arning rtrRip6.datagramAccept:rtrRip6.java:238 neighbor 2019:23:5::2 up
arning rtrRip6.datagramAccept:rtrRip6.java:238 neighbor 2019:23:1::1 up
arning rtrRip4.datagramAccept:rtrRip4.java:243 neighbor 192.23.1.1 up
arning rtrRip4.datagramAccept:rtrRip4.java:243 neighbor 192.23.4.2 up
arning rtrRip6.datagramAccept:rtrRip6.java:238 neighbor 2019:23:4::2 up
[TP2]R1_dsbrito#
[TP2]R1_dsbrito#warning rtrRip4.datagramAccept:rtrRip4.java:243 neighbor 192.23.3.2 up
warning rtrRip6.datagramAccept:rtrRip6.java:238 neighbor 2019:23:3::2 up
warning rtrRip4.datagramAccept:rtrRip4.java:243 neighbor 192.23.1.2 up
warning rtrRip4.datagramAccept:rtrRip4.java:243 neighbor 192.23.2.2 up
warning rtrRip6.datagramAccept:rtrRip6.java:238 neighbor 2019:23:2::2 up
warning rtrRip6.datagramAccept:rtrRip6.java:238 neighbor 2019:23:1::2 up
[TP2]R3_dsbrito#
[TP2]R3_dsbrito#warning rtrRip4.datagramAccept:rtrRip4.java:243 neighbor 192.23.6.2 up
warning rtrRip6.datagramAccept:rtrRip6.java:238 neighbor 2019:23:6::2 up
warning rtrRip4.datagramAccept:rtrRip4.java:243 neighbor 192.23.4.1 up
warning rtrRip6.datagramAccept:rtrRip6.java:238 neighbor 2019:23:4::1 up
warning rtrRip4.datagramAccept:rtrRip4.java:243 neighbor 192.23.2.1 up
warning rtrRip6.datagramAccept:rtrRip6.java:238 neighbor 2019:23:2::1 up
FREERT# 0:main* "[TP2]R3_dsbrito" 23:56 29-Jan-23
```

Para testar o ping dessa implementação deve usar o comando "ping <ip> vrf v1"

Ex:

Teste de ping no roteador se iniciando em R1 para o roteador R3 e R3:

usando ipv4: ping 192.23.5.2 vrf v1

```
[TP2]R1_dsbrito#ping 192.23.5.2 vrf v1
pinging 192.23.5.2, src=null, vrf=v1, cnt=5, len=64, df=false, tim=1000, gap=0, ttl=255, tos=0, sgt=0, flow=0, fill=0, alrt=-1, sweep=false, multi=false
!!!!
result=100.0%, rcv/sent/lost/err=5/5/0/0, took 39, min/avg/max/dev rtt=0/1.5/7/7.4, ttl 255/255/255/0.0, tos 0/0.0/0/0.0
[TP2]R1_dsbrito#
```

usando ipv6: ping 2019:23:5::2 vrf v1

```
[TP2]R1_dsbrito# ping 2019:23:5::2 vrf v1
pinging 2019:23:5::2, src=null, vrf=v1, cnt=5, len=64, df=false, tim=1000, gap=0, ttl=255, tos=0, sgt=0, flow=0, fill=0, alrt=-1, sweep=false, multi=false
!!!!
result=100.0%, rcv/sent/lost/err=5/5/0/0, took 5, min/avg/max/dev rtt=0/0.8/2/0.5, ttl 255/255/255/0.0, tos 0/0.0/0/0.0
[TP2]R1_dsbrito#
```


Para testar o traceroute dessa implementação deve usar o comando “**traceroute**
<ip> vrf v1”

Ex:

Teste de traceroute no roteador R1 para o roteador R5 usando ipv6:
usando ipv6: **traceroute 2019:23:5::2 vrf v1**

```
[TP2]R1_dsbrito#traceroute 2019:23:5::2 vrf v1
tracing 2019:23:5::2, src=null, vrf=v1, prt=0/33440, tim=1000, tos=0, flow=0,
len=64
via 2019:23:5::/64 120/1 ethernet3 2019:23:3::2 00:01:18
1 2019:23:5::2 time=4
[TP2]R1_dsbrito#
```

usando ipv4: **traceroute 192.23.5.2 vrf v1**

```
[TP2]R1_dsbrito# traceroute 192.23.5.2 vrf v1
tracing 192.23.5.2, src=null, vrf=v1, prt=0/33440, tim=1000, tos=0, flow=0, le
n=64
via 192.23.5.0/30 120/1 ethernet1 192.23.1.2 00:06:32
1 192.23.1.2 time=1
2 192.23.5.2 time=1
[TP2]R1_dsbrito#
```

Para desligar alguma interface de Ethernet é necessário entrar na “conf” do roteador que deseja desligar e irá vir um avisando que houve o desligamento daquela ethernet.

Ex:

Desligar a interface eth2 do R4.

Comandos:

conf t -> entrar no modo conf

int eth1 -> acessar a eth1

shutdown -> desligar

end -> para sair do (cfg-if)

```
[TP2]R4_dsbrito#conf t
warning userLineHandler.doExec:userLine.java:875 <nobody> configuring from con
sole
[TP2]R4_dsbrito(cfg)#int eth1
[TP2]R4_dsbrito(cfg)#int eth1
[TP2]R4_dsbrito(cfg-if)#shutdown
[TP2]R4_dsbrito(cfg-if)#shutdown
error rtrRip4.datagramClosed:rtrRip4.java:275 neighbor 192.23.3.1 down
error rtrRip6.datagramClosed:rtrRip6.java:270 neighbor 2019:23:3::1 down
[TP2]R4_dsbrito(cfg-if)#
```

Ao desligar, o datagram avisa que a ethernet alvo (no caso a ethernet 1) caiu “down”
eth3:192.23.3.1 era o endereçamento direto do roteador 1 para o 4.

```
interface ethernet1
description R4 -> R1
vrf forwarding v1
ipv4 address 192.23.3.2 255.255.255.252
ipv6 address 2019:23:3::2 ffff:ffff:ffff:ffff::
router rip4 1 enable
router rip6 1 enable
no shutdown
no log-link-change
```

```
interface ethernet3
description R1 -> R4
vrf forwarding v1
ipv4 address 192.23.3.1 255.255.255.252
ipv6 address 2019:23:3::1 ffff:ffff:ffff:ffff::
router rip4 1 enable
router rip6 1 enable
no shutdown
no log-link-change
exit
!
```

Se verificarmos o traceroute e ping com ipv4 ou ipv6 novamente, em relação a ligação direta que havia entre o R1 e o R4.

ping

ping 192.23.3.2 vrf v1

```
[TP2]R1_dsbrito# ping 192.23.3.2 vrf v1
pinging 192.23.3.2, src=null, vrf=v1, cnt=5, len=64, df=false, tim=1000, gap=0,
ttl=255, tos=0, sgt=0, flow=0, fill=0, alrt=-1, sweep=false, multi=false
.....
result=0.0%, rcv/sent/lost/err=0/5/5/0, took 5024, min/avg/max/dev rtt=10000/0.
0/0/0.0, ttl 256/0.0/0/0.0, tos 256/0.0/0/0.0
[TP2]R1_dsbrito#
```


traceroute:

traceroute 192.23.3.2 vrf v1

```
[TP2]R1_dsbritto# traceroute 192.23.5.2 vrf v1
tracing 192.23.5.2, src=null, vrf=v1, prt=0/33440, tim=1000, tos=0, flow=0, len=
64
via 192.23.5.0/30 120/1 ethernet1 192.23.1.2 00:01:17
1 null time=1000
2 null time=1000
3 192.23.5.2 time=3
[TP2]R1_dsbritto#
```

```
[TP2]R1_dsbritto#traceroute 192.23.3.2 vrf v1
tracing 192.23.3.2, src=null, vrf=v1, prt=0/33440, tim=1000, tos=0, flow=0, len=
64
via 192.23.3.0/30 0/0 ethernet3 null 00:22:29
1 null time=1000
2 null time=1000
3 null time=1000
4 null time=1000
5 null time=1000
6 null time=1000
7 null time=1000
8 null time=1000
```

traceroute 2019:23:5::2 vrf v1

```
[TP2]R1_dsbritto#traceroute 2019:23:5::2 vrf v1
[TP2]R1_dsbritto#traceroute 2019:23:5::2 vrf v1
tracing 2019:23:5::2, src=null, vrf=v1, prt=0/33440, tim=1000, tos=0, flow=0, le
n=64
via 2019:23:5::/64 120/1 ethernet3 2019:23:3::2 00:06:03
1 null time=1000
2 null time=1000
3 null time=1000
4 null time=1000
5 null time=1000
6 null time=1000
```

Observa-se que os pacotes não chegam mais até R4 a partir de eth3 de R1.

Quando isso acontece, o RIP entra em ação (com cerca de 90 segundos) ele tenta encontrar a melhor rota novamente.

```

17 null time=1000
[TP2]R1_dsbrito#traceroute 2019:23:5::2 vrf v1
[TP2]R1_dsbrito#traceroute 2019:23:5::2 vrf v1
tracing 2019:23:5::2, src=null, vrf=v1, prt=0/33440, tim=1000, tos=0, flow=0, len=64
via 2019:23:5::/64 120/1 ethernet3 2019:23:3::2 00:08:24
1 null time=1000
2 null time=1000
3 null time=1000
4 null time=1000
5 null time=1000
6 null time=1000
7 2019:23:5::2 time=3
[TP2]R1_dsbrito#traceroute 2019:23:5::2 vrf v1
[TP2]R1_dsbrito#traceroute 2019:23:5::2 vrf v1
tracing 2019:23:5::2, src=null, vrf=v1, prt=0/33440, tim=1000, tos=0, flow=0, len=64
via 2019:23:5::/64 120/1 ethernet1 2019:23:1::2 00:00:07
1 2019:23:1::2 time=1
2 2019:23:5::2 time=2
[TP2]R1_dsbrito#

```

Com o traceroute, é possível observar que ele ao invés de passar pela ethernet3 2019:23:3::2, está indo pelo caminho da ethernet1 2019:23:1::2

Verificando a tabela de rotas temos:

show ipv6 route v1

```

[TP2]R1_dsbrito#show ipv4 route v1
[TP2]R1_dsbrito#show ipv4 route v1

```

typ	prefix	metric	iface	hop	time
C	192.23.1.0/30	0/0	ethernet1	null	00:06:53
LOC	192.23.1.1/32	0/1	ethernet1	null	00:06:53
C	192.23.2.0/30	0/0	ethernet2	null	00:06:53
LOC	192.23.2.1/32	0/1	ethernet2	null	00:06:53
C	192.23.3.0/30	0/0	ethernet3	null	00:06:53
LOC	192.23.3.1/32	0/1	ethernet3	null	00:06:53
R	192.23.4.0/30	120/1	ethernet2	192.23.2.2	00:06:23
R	192.23.5.0/30	120/1	ethernet1	192.23.1.2	00:06:23
R	192.23.6.0/30	120/1	ethernet2	192.23.2.2	00:02:23

```

[TP2]R1_dsbrito#

```

No roteador R1, a rota que passava por eth3 agora esta passando por eth2.

```
[TP2]R1_dsbrito#show ipv6 route v1
[TP2]R1_dsbrito#show ipv6 route v1
typ  prefix          metric  iface      hop          time
C    2019:23:1::/64    0/0     ethernet1  null         00:08:11
LOC  2019:23:1::/128    0/1     ethernet1  null         00:08:11
C    2019:23:2::/64    0/0     ethernet2  null         00:08:10
LOC  2019:23:2::/128    0/1     ethernet2  null         00:08:10
C    2019:23:3::/64    0/0     ethernet3  null         00:08:10
LOC  2019:23:3::/128    0/1     ethernet3  null         00:08:10
R    2019:23:4::/64    120/1    ethernet1  2019:23:1::2 00:07:40
R    2019:23:5::/64    120/1    ethernet1  2019:23:1::2 00:04:10
R    2019:23:6::/64    120/1    ethernet2  2019:23:2::2 00:07:41
[TP2]R1_dsbrito#
```

traceroute 192.23.5.2 vrf v1

traceroute 2019:23:5::2 vrf v1

```
now ipv4 route v1
[TP2]R4_dsbrito#show ipv4 route v1
typ  prefix          metric  iface      hop          time
C    192.23.1.0/30    120/1    ethernet1  192.23.3.1  00:00:10
C    192.23.2.0/30    120/1    ethernet3  192.23.6.1  00:00:10
C    192.23.3.0/30    0/0      ethernet1  null         00:00:41
LOC  192.23.3.2/32     0/1      ethernet1  null         00:00:41
C    192.23.4.0/30    120/1    ethernet3  192.23.6.1  00:00:10
C    192.23.5.0/30    0/0      ethernet2  null         00:00:40
LOC  192.23.5.2/32     0/1      ethernet2  null         00:00:40
C    192.23.6.0/30    0/0      ethernet3  null         00:00:40
LOC  192.23.6.2/32     0/1      ethernet3  null         00:00:40
[TP2]R4_dsbrito#
```

```
[TP2]R4_dsbrito#show ipv4 route v1
[TP2]R4_dsbrito#show ipv4 route v1
typ  prefix          metric  iface      hop          time
R    192.23.1.0/30    120/1    ethernet2  192.23.5.1  00:00:26
R    192.23.2.0/30    120/1    ethernet3  192.23.6.1  00:01:27
R    192.23.3.0/30    120/2    ethernet2  192.23.5.1  00:00:26
R    192.23.4.0/30    120/1    ethernet3  192.23.6.1  00:01:27
C    192.23.5.0/30    0/0      ethernet2  null         00:01:57
LOC  192.23.5.2/32     0/1      ethernet2  null         00:01:57
C    192.23.6.0/30    0/0      ethernet3  null         00:01:57
LOC  192.23.6.2/32     0/1      ethernet3  null         00:01:57
[TP2]R4_dsbrito#
```

```

show ipv4 route v1
[TP2]R1_dsbrito#show ipv4 route v1
typ  prefix      metric  iface    hop      time
C    192.23.1.0/30  0/0     ethernet1 null      00:00:48
LOC  192.23.1.1/32  0/1     ethernet1 null      00:00:48
C    192.23.2.0/30  0/0     ethernet2 null      00:00:47
LOC  192.23.2.1/32  0/1     ethernet2 null      00:00:47
C    192.23.3.0/30  0/0     ethernet3 null      00:00:47
LOC  192.23.3.1/32  0/1     ethernet3 null      00:00:47
R    192.23.4.0/30  120/1   ethernet2 192.23.2.2 00:00:18
R    192.23.5.0/30  120/1   ethernet1 192.23.1.2 00:00:17
R    192.23.6.0/30  120/1   ethernet3 192.23.3.2 00:00:17

[TP2]R1_dsbrito#

```

```

R    192.23.2.0/30  120/1   ethernet2 192.23.4.2 00:03:05
R    192.23.3.0/30  120/1   ethernet1 192.23.1.1 00:03:05
C    192.23.4.0/30  0/0     ethernet2 null      00:03:35
LOC  192.23.4.1/32  0/1     ethernet2 null      00:03:35
C    192.23.5.0/30  0/0     ethernet3 null      00:03:35
LOC  192.23.5.1/32  0/1     ethernet3 null      00:03:35
R    192.23.6.0/30  120/1   ethernet3 192.23.5.2 00:03:05

[TP2]R2_dsbrito#show ipv4 route v1
[TP2]R2_dsbrito#show ipv4 route v1
typ  prefix      metric  iface    hop      time
C    192.23.1.0/30  0/0     ethernet1 null      00:04:30
LOC  192.23.1.2/32  0/1     ethernet1 null      00:04:30
R    192.23.2.0/30  120/1   ethernet2 192.23.4.2 00:04:00
R    192.23.3.0/30  120/1   ethernet1 192.23.1.1 00:04:00
C    192.23.4.0/30  0/0     ethernet2 null      00:04:30
LOC  192.23.4.1/32  0/1     ethernet2 null      00:04:30
C    192.23.5.0/30  0/0     ethernet3 null      00:04:29
LOC  192.23.5.1/32  0/1     ethernet3 null      00:04:29
R    192.23.6.0/30  120/1   ethernet3 192.23.5.2 00:04:00

[TP2]R2_dsbrito#
[TP2]R3_dsbrito#show ipv4 route v1
[TP2]R3_dsbrito#show ipv4 route v1
typ  prefix      metric  iface    hop      time
R    192.23.1.0/30  120/1   ethernet1 192.23.2.1 00:04:02
C    192.23.2.0/30  0/0     ethernet1 null      00:04:32
LOC  192.23.2.2/32  0/1     ethernet1 null      00:04:32
R    192.23.3.0/30  120/1   ethernet1 192.23.2.1 00:04:02
C    192.23.4.0/30  0/0     ethernet2 null      00:04:32
LOC  192.23.4.2/32  0/1     ethernet2 null      00:04:32
R    192.23.5.0/30  120/1   ethernet2 192.23.4.1 00:04:01
C    192.23.6.0/30  0/0     ethernet3 null      00:04:32
LOC  192.23.6.1/32  0/1     ethernet3 null      00:04:32

[TP2]R3_dsbrito#
R    192.23.1.0/30  120/1   ethernet2 192.23.5.1 00:02:12
R    192.23.2.0/30  120/1   ethernet3 192.23.6.1 00:03:13
R    192.23.3.0/30  120/2   ethernet2 192.23.5.1 00:02:12
R    192.23.4.0/30  120/1   ethernet3 192.23.6.1 00:03:13
C    192.23.5.0/30  0/0     ethernet2 null      00:03:43
LOC  192.23.5.2/32  0/1     ethernet2 null      00:03:43
R    192.23.6.0/30  0/0     ethernet3 null      00:03:43
LOC  192.23.6.2/32  0/1     ethernet3 null      00:03:43

[TP2]R4_dsbrito#show ipv4 route v1
[TP2]R4_dsbrito#show ipv4 route v1
typ  prefix      metric  iface    hop      time
R    192.23.1.0/30  120/1   ethernet2 192.23.5.1 00:03:03
R    192.23.2.0/30  120/1   ethernet3 192.23.6.1 00:04:04
R    192.23.3.0/30  120/2   ethernet2 192.23.5.1 00:03:03
R    192.23.4.0/30  120/1   ethernet3 192.23.6.1 00:04:04
C    192.23.5.0/30  0/0     ethernet2 null      00:04:34
LOC  192.23.5.2/32  0/1     ethernet2 null      00:04:34
R    192.23.6.0/30  0/0     ethernet3 null      00:04:34
LOC  192.23.6.2/32  0/1     ethernet3 null      00:04:34

[TP2]R4_dsbrito#
[TP2]R1_dsbrito#show ipv4 route v1
[TP2]R1_dsbrito#show ipv4 route v1
typ  prefix      metric  iface    hop      time
C    192.23.1.0/30  0/0     ethernet1 null      00:04:38
LOC  192.23.1.1/32  0/1     ethernet1 null      00:04:38
C    192.23.2.0/30  0/0     ethernet2 null      00:04:37
LOC  192.23.2.1/32  0/1     ethernet2 null      00:04:37
C    192.23.3.0/30  0/0     ethernet3 null      00:04:37
LOC  192.23.3.1/32  0/1     ethernet3 null      00:04:37
R    192.23.4.0/30  120/1   ethernet2 192.23.2.2 00:04:07
R    192.23.5.0/30  120/1   ethernet1 192.23.1.2 00:04:07
R    192.23.6.0/30  120/1   ethernet2 192.23.2.2 00:00:07

```

Após os testes com essa topologia, foi possível notar que o tempo para que a tabela seja atualizada quando um vizinho está "up" é mais aproximadamente três vezes mais rápido do que quando um vizinho cai ("down").

Tempo de queda: aproximadamente 90 segundos

Tempo de subida: 30 segundos.

Topologia 1 - Finalizando

Para finalizar a topologia, caso estiver utilizando somente um terminal deve usar o comando `exit` (ou `ctrl +c`) em qualquer uma das janelas e em seguida, usar o comando `./stop-rip.sh`

```
R2# 192.23.6.0/30 120/1 ethernet3  
[TR2]R2_dsbrito#exit
```

Caso estiver utilizando dois terminais, deve usar o comando `./stop-static.sh` diretamente.

```
dsbrito@DESKTOP-RGB92UP:~/UFES/dionatas/rip_topologia2$ ./stop-rip.sh  
kill rip_topologia2 routers..  
byebye..
```

obs: deve está no diretório `rip_topologiae` para utilizar o comando.