



INSTITUTO FEDERAL
SANTA CATARINA

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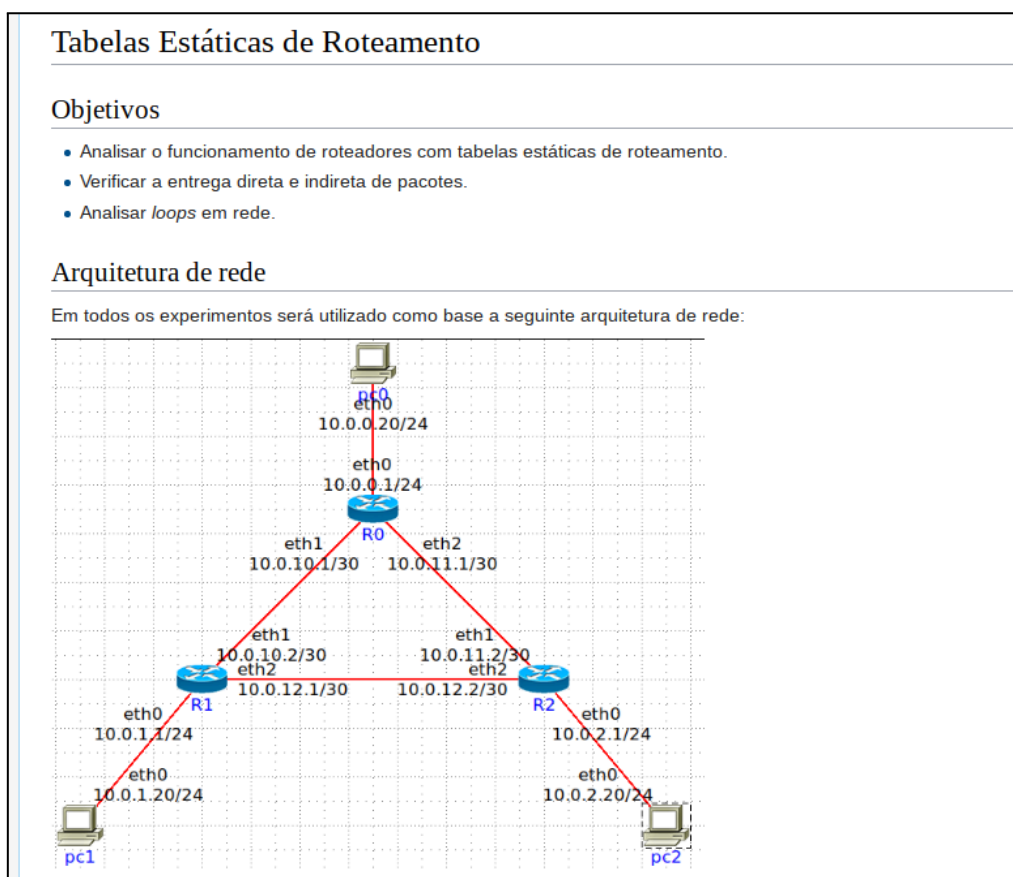
CURSO DE ENGENHARIA DE TELECOMUNICAÇÕES - CÂMPUS SÃO JOSÉ

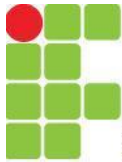
RELATÓRIO TÉCNICO

Tabelas Estáticas de Roteamento

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TAREFA:





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1) Testes de conectividade de enlace e configuração do default gateway.

- No pc0 execute o comando “ ping 10.0.0.1”. Obteve sucesso? Sim ou não e por quê?

R: Não, pois não há uma rota para a rede onde o IP 10.0.0.1 está contido;

```
root@pcl:/# ping 10.0.0.1
connect: Network is unreachable
root@pcl:/# route -n
Kernel IP routing table
Destination      Gateway         Genmask         Flags Metric Ref    Use Iface
10.0.1.0         0.0.0.0         255.255.255.0   U        0      0        0 eth0
```

Com os default Gateways aplicados:

2) Teste novamente a conectividade, no pc0 execute o comando “ping 10.0.10.1” e “ping 10.0.10.2”.

- Obteve sucesso?

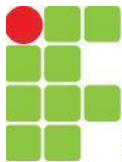
R: Apenas em um dos pings.

- O comportamento foi o mesmo das tentativas anteriores?

R: Não, ao configurar a rota para o default gateway, o computador entende que precisa enviar o pacote para o gateway para roteamento, portanto um dos testes funciona.

- Sim ou não e por quê? Qual foi o erro observado?

R: O primeiro teste não obteve retorno pois o roteador de destino não sabe para quem deve responder, pois não conhece diretamente o IP de origem, e como não há uma rota para a rede o IP de origem, o roteador não consegue responder a mensagem.



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CURSO DE ENGENHARIA DE TELECOMUNICAÇÕES - CÂMPUS SÃO JOSÉ

```
root@pcl:/# ping 10.0.10.1
PING 10.0.10.1 (10.0.10.1) 56(84) bytes of data.
^C
--- 10.0.10.1 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 1027ms

root@pcl:/# ping 10.0.10.2
PING 10.0.10.2 (10.0.10.2) 56(84) bytes of data.
64 bytes from 10.0.10.2: icmp_seq=1 ttl=64 time=0.078 ms
64 bytes from 10.0.10.2: icmp_seq=2 ttl=64 time=0.056 ms
^C
--- 10.0.10.2 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1011ms
rtt min/avg/max/mdev = 0.056/0.067/0.078/0.011 ms
```

3) Com os ping do item anterior ativos (um a cada tempo) rode o Wireshark no R0 (clique com o botão direito do mouse sobre o R0 e em seguida no menu wireshark eth0).

- Qual a origem e destino dos pacotes? Explique?

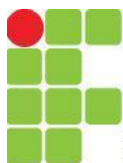
R: A origem das solicitações de ping vem do 10.0.0.20, e o destino é respectivamente 10.0.10.1 e 10.0.10.2

- Qual a diferença no ping entre os dois itens?

R: O primeiro ping obteve sucesso, pois ocorreu respostas de Echo Reply.

No.	Time	Source	Destination	Protocol	Length	Info
0	0.000048	10.0.0.20	10.0.10.1	ICMP	98	Echo (ping) request id=0x0048, seq=1/256, ttl=64 (reply in 4)
1	0.000083	10.0.10.1	10.0.0.20	ICMP	98	Echo (ping) reply id=0x0048, seq=1/256, ttl=64 (request in 3)
1	0.026659	10.0.0.20	10.0.10.1	ICMP	98	Echo (ping) request id=0x0048, seq=2/512, ttl=64 (reply in 6)
1	0.026698	10.0.10.1	10.0.0.20	ICMP	98	Echo (ping) reply id=0x0048, seq=2/512, ttl=64 (request in 5)
4	1.175594	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request id=0x0049, seq=1/256, ttl=64 (no response found!)
5	1.866645	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request id=0x0049, seq=2/512, ttl=64 (no response found!)
6	2.106652	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request id=0x0049, seq=3/768, ttl=64 (no response found!)

▶ Frame 3: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface 0
▶ Ethernet II, Src: 42:00:aa:00:00:01 (42:00:aa:00:00:01), Dst: 42:00:aa:00:00:00 (42:00:aa:00:00:00)
▶ Internet Protocol Version 4, Src: 10.0.0.20, Dst: 10.0.10.1
▼ Internet Control Message Protocol
Type: 8 (Echo (ping) request)
Code: 0
Checksum: 0x544c [correct]
[Checksum Status: Good]
Identifier (BE): 72 (0x0048)
Identifier (LE): 18432 (0x4800)
Sequence number (BE): 1 (0x0001)
Sequence number (LE): 256 (0x0100)
[Response frame: 4]
Timestamp from icmp data: Nov 21, 2022 10:13:23.000000000 -03
[Timestamp from icmp data (relative): 0.113495000 seconds]
▶ Data (48 bytes)



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- 4) Deixe o ping do do pc0 para o R1 e o wireshark - eth0 no R0 rodando e estabeleça uma rota no roteador R1 com o comando “route add -net 10.0.0.0/24 gw 10.0.10.1”:

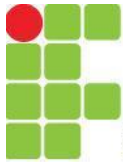
- O que ocorreu com o ping e o wireshark? Por quê?

R: No momento em que a rota foi adicionada, o ping passou a responder, pois o roteador conseguiu entender para quem deveria enviar a mensagem de resposta para que chegasse ao destinatário.

283.554654	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=79/20224,	ttl=64	(no response found!)
284.578650	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=80/20480,	ttl=64	(no response found!)
285.602653	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=81/20736,	ttl=64	(no response found!)
286.626655	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=82/20992,	ttl=64	(no response found!)
287.650651	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=83/21248,	ttl=64	(no response found!)
288.674655	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=84/21504,	ttl=64	(no response found!)
289.698654	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=85/21760,	ttl=64	(no response found!)
290.722657	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=86/22016,	ttl=64	(no response found!)
291.746658	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=87/22272,	ttl=64	(no response found!)
292.770650	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=88/22528,	ttl=64	(no response found!)
293.794646	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=89/22784,	ttl=64	(no response found!)
294.818650	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=90/23040,	ttl=64	(reply in 109)
294.818717	10.0.10.2	10.0.0.20	ICMP	98	Echo (ping) reply	id=0x004a, seq=90/23040,	ttl=63	(request in 108)
295.842658	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=91/23296,	ttl=64	(reply in 111)
295.842719	10.0.10.2	10.0.0.20	ICMP	98	Echo (ping) reply	id=0x004a, seq=91/23296,	ttl=63	(request in 110)
296.866650	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=92/23552,	ttl=64	(reply in 113)
296.866706	10.0.10.2	10.0.0.20	ICMP	98	Echo (ping) reply	id=0x004a, seq=92/23552,	ttl=63	(request in 112)
297.890656	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=93/23808,	ttl=64	(reply in 115)
297.890714	10.0.10.2	10.0.0.20	ICMP	98	Echo (ping) reply	id=0x004a, seq=93/23808,	ttl=63	(request in 114)
298.914640	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=94/24064,	ttl=64	(reply in 117)
298.914695	10.0.10.2	10.0.0.20	ICMP	98	Echo (ping) reply	id=0x004a, seq=94/24064,	ttl=63	(request in 116)
299.938644	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=95/24320,	ttl=64	(reply in 119)
299.938705	10.0.10.2	10.0.0.20	ICMP	98	Echo (ping) reply	id=0x004a, seq=95/24320,	ttl=63	(request in 118)
300.962641	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=96/24576,	ttl=64	(reply in 123)
300.962685	10.0.10.2	10.0.0.20	ICMP	98	Echo (ping) reply	id=0x004a, seq=96/24576,	ttl=63	(request in 122)
301.986655	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=97/24832,	ttl=64	(reply in 125)
301.986711	10.0.10.2	10.0.0.20	ICMP	98	Echo (ping) reply	id=0x004a, seq=97/24832,	ttl=63	(request in 124)
303.010636	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=98/25088,	ttl=64	(reply in 127)
303.010692	10.0.10.2	10.0.0.20	ICMP	98	Echo (ping) reply	id=0x004a, seq=98/25088,	ttl=63	(request in 126)
304.034585	10.0.0.20	10.0.10.2	ICMP	98	Echo (ping) request	id=0x004a, seq=99/25344,	ttl=64	(reply in 129)

Tabelas de roteamento criadas nos roteadores R1, R2 e R3:

root@R1:/# route -n						
Kernel IP routing table						
Destination	Gateway	Genmask	Flags	Metric	Ref	Use Iface
10.0.0.0	10.0.10.1	255.255.255.0	UG	0	0	0 eth1
10.0.1.0	0.0.0.0	255.255.255.0	U	0	0	0 eth0
10.0.2.0	10.0.12.2	255.255.255.0	UG	0	0	0 eth2
10.0.10.0	0.0.0.0	255.255.255.252	U	0	0	0 eth1
10.0.11.0	10.0.12.2	255.255.255.252	UG	0	0	0 eth2
10.0.12.0	0.0.0.0	255.255.255.252	U	0	0	0 eth2



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SECRETARIA DE EDUCAÇÃO PROFISSIONAL E TECNOLÓGICA

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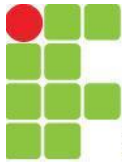
```
root@R2:/# route -n
Kernel IP routing table
Destination      Gateway          Genmask          Flags Metric Ref    Use Iface
10.0.0.0          10.0.11.1        255.255.255.0    UG      0      0      0 eth1
10.0.1.0          10.0.12.1        255.255.255.0    UG      0      0      0 eth2
10.0.2.0          0.0.0.0          255.255.255.0    U       0      0      0 eth0
10.0.10.0         10.0.11.1        255.255.255.252  UG      0      0      0 eth1
10.0.11.0         0.0.0.0          255.255.255.252  U       0      0      0 eth1
10.0.12.0         0.0.0.0          255.255.255.252  U       0      0      0 eth2
```

```
root@R0:/# route -n
Kernel IP routing table
Destination      Gateway          Genmask          Flags Metric Ref    Use Iface
10.0.0.0          0.0.0.0          255.255.255.0    U       0      0      0 eth0
10.0.1.0          10.0.10.2        255.255.255.0    UG      0      0      0 eth1
10.0.2.0          10.0.11.1        255.255.255.0    UG      0      0      0 eth2
10.0.10.0         0.0.0.0          255.255.255.252  U       0      0      0 eth1
10.0.11.0         0.0.0.0          255.255.255.252  U       0      0      0 eth2
10.0.12.0         10.0.10.2        255.255.255.252  UG      0      0      0 eth1
```

Com as tabelas de roteamento criadas, fiz um teste de rede entre cada computador:

```
root@pc0:/# ping 10.0.10.2
PING 10.0.10.2 (10.0.10.2) 56(84) bytes of data.
64 bytes from 10.0.10.2: icmp_seq=1 ttl=63 time=0.114 ms
64 bytes from 10.0.10.2: icmp_seq=2 ttl=63 time=0.099 ms
64 bytes from 10.0.10.2: icmp_seq=3 ttl=63 time=0.099 ms
64 bytes from 10.0.10.2: icmp_seq=4 ttl=63 time=0.100 ms
^C
--- 10.0.10.2 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3070ms
rtt min/avg/max/mdev = 0.099/0.103/0.114/0.006 ms
```

```
root@pc1:/# ping 10.0.2.20
PING 10.0.2.20 (10.0.2.20) 56(84) bytes of data.
64 bytes from 10.0.2.20: icmp_seq=1 ttl=62 time=0.175 ms
64 bytes from 10.0.2.20: icmp_seq=2 ttl=62 time=0.086 ms
64 bytes from 10.0.2.20: icmp_seq=3 ttl=62 time=0.093 ms
64 bytes from 10.0.2.20: icmp_seq=4 ttl=62 time=0.093 ms
^C
--- 10.0.2.20 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3070ms
rtt min/avg/max/mdev = 0.086/0.111/0.175/0.038 ms
```

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SECRETARIA DE EDUCAÇÃO PROFISSIONAL E TECNOLÓGICA

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CURSO DE ENGENHARIA DE TELECOMUNICAÇÕES - CÂMPUS SÃO JOSÉ

```
root@pc2:/# ping 10.0.0.20
PING 10.0.0.20 (10.0.0.20) 56(84) bytes of data.
64 bytes from 10.0.0.20: icmp_seq=1 ttl=62 time=0.125 ms
64 bytes from 10.0.0.20: icmp_seq=2 ttl=62 time=0.114 ms
64 bytes from 10.0.0.20: icmp_seq=3 ttl=62 time=0.114 ms
64 bytes from 10.0.0.20: icmp_seq=4 ttl=62 time=0.116 ms
^C
--- 10.0.0.20 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3069ms
rtt min/avg/max/mdev = 0.114/0.117/0.125/0.008 ms
```

Teste de roteamento entre os computadores:

```
root@pc2:/# traceroute 10.0.0.20
traceroute to 10.0.0.20 (10.0.0.20), 30 hops max, 60 byte packets
 1  10.0.2.1 (10.0.2.1)  0.071 ms  0.022 ms  0.018 ms
 2  10.0.11.1 (10.0.11.1)  0.043 ms  0.030 ms  0.027 ms
 3  10.0.0.20 (10.0.0.20)  0.076 ms  0.044 ms  0.041 ms
```

```
root@pc1:/# traceroute 10.0.2.20
traceroute to 10.0.2.20 (10.0.2.20), 30 hops max, 60 byte packets
 1  10.0.1.1 (10.0.1.1)  0.067 ms  0.021 ms  0.017 ms
 2  10.0.12.2 (10.0.12.2)  0.046 ms  0.029 ms  0.028 ms
 3  10.0.2.20 (10.0.2.20)  0.048 ms  0.037 ms  0.036 ms
```

```
root@pc0:/# traceroute 10.0.1.20
traceroute to 10.0.1.20 (10.0.1.20), 30 hops max, 60 byte packets
 1  10.0.0.1 (10.0.0.1)  0.092 ms  0.043 ms  0.034 ms
 2  10.0.10.2 (10.0.10.2)  0.051 ms  0.035 ms  0.032 ms
 3  10.0.1.20 (10.0.1.20)  0.053 ms  0.057 ms  0.056 ms
```

O que ocorreu com o ping e o wireshark? Por quê? Com este enlace comprometido, qual seria a solução para a continuidade de funcionamento de toda a rede?

Os pacotes de ping não conseguiram ser encaminhados, pois o enlace entre R0 e R2 foi derrubado.



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24.576087	10.0.1.20	10.0.1.20	ICMP	98	Echo (ping) request	id=0x0085, seq=38/9728, ttl=64 (request in 49)
25.599946	10.0.0.20	10.0.1.20	ICMP	98	Echo (ping) reply	id=0x0085, seq=39/9984, ttl=64 (reply in 52)
25.600004	10.0.1.20	10.0.0.20	ICMP	98	Echo (ping) request	id=0x0085, seq=39/9984, ttl=64 (request in 51)
26.623972	10.0.0.20	10.0.1.20	ICMP	98	Echo (ping) reply	id=0x0085, seq=40/10240, ttl=64 (reply in 54)
26.624051	10.0.1.20	10.0.0.20	ICMP	98	Echo (ping) request	id=0x0085, seq=40/10240, ttl=64 (request in 53)
27.648013	10.0.0.20	10.0.1.20	ICMP	98	Echo (ping) reply	id=0x0085, seq=41/10496, ttl=64 (reply in 56)
27.648087	10.0.1.20	10.0.0.20	ICMP	98	Echo (ping) request	id=0x0085, seq=41/10496, ttl=64 (request in 55)
28.672011	10.0.0.20	10.0.1.20	ICMP	98	Echo (ping) reply	id=0x0085, seq=42/10752, ttl=64 (no response found!)
28.672058	10.0.0.1	10.0.0.20	ICMP	126	Destination unreachable (Network unreachable)	
29.696014	10.0.0.20	10.0.1.20	ICMP	98	Echo (ping) request	id=0x0085, seq=43/11008, ttl=64 (no response found!)
29.696058	10.0.0.1	10.0.0.20	ICMP	126	Destination unreachable (Network unreachable)	
30.720013	10.0.0.20	10.0.1.20	ICMP	98	Echo (ping) request	id=0x0085, seq=44/11264, ttl=64 (no response found!)
30.720057	10.0.0.1	10.0.0.20	ICMP	126	Destination unreachable (Network unreachable)	
31.743998	10.0.0.20	10.0.1.20	ICMP	98	Echo (ping) request	id=0x0085, seq=45/11520, ttl=64 (no response found!)
31.744041	10.0.0.1	10.0.0.20	ICMP	126	Destination unreachable (Network unreachable)	
32.767998	10.0.0.20	10.0.1.20	ICMP	98	Echo (ping) request	id=0x0085, seq=46/11776, ttl=64 (no response found!)
32.768042	10.0.0.1	10.0.0.20	ICMP	126	Destination unreachable (Network unreachable)	
33.792007	10.0.0.20	10.0.1.20	ICMP	98	Echo (ping) request	id=0x0085, seq=47/12032, ttl=64 (no response found!)
33.792047	10.0.0.1	10.0.0.20	ICMP	126	Destination unreachable (Network unreachable)	
34.816017	10.0.0.20	10.0.1.20	ICMP	98	Echo (ping) request	id=0x0085, seq=48/12288, ttl=64 (no response found!)
34.816062	10.0.0.1	10.0.0.20	ICMP	126	Destination unreachable (Network unreachable)	

Testando campo TTL com loop na rede

1. Baixe o arquivo de configuração da rede, no terminal digite:

```
wget -4 http://docente.ifsc.edu.br/odilson/RED29004/3_rotadores_tab_estaticas_com_loop.imn
```

2. Execute o Imunes.
3. Carregue o arquivo de configuração:

```
File >> Open >> /home/aluno/3_rotadores_tab_estaticas_com_loop.imn
```

4. Inicie a simulação no Imunes:

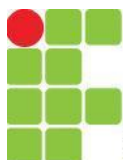
Qual mensagem de erro foi recebida no terminal do pc0?

```
root@pc0:/# ping -c1 10.0.2.20
PING 10.0.2.20 (10.0.2.20) 56(84) bytes of data.
From 10.0.0.1 icmp_seq=1 Time to live exceeded

--- 10.0.2.20 ping statistics ---
1 packets transmitted, 0 received, +1 errors, 100% packet loss, time 0ms
```

Analisando as capturas dos Wireshark responda:

Aproximadamente em qual roteador o pacote foi descartado? Procure pelo menor valor de ttl.



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CURSO DE ENGENHARIA DE TELECOMUNICAÇÕES - CÂMPUS SÃO JOSÉ

No.	Time	Source	Destination	Protocol	Length	Info
0	0.000028	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=61 (no response found!)
0	0.000046	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=58 (no response found!)
0	0.000059	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=55 (no response found!)
0	0.000072	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=52 (no response found!)
0	0.000085	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=49 (no response found!)
0	0.000097	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=46 (no response found!)
0	0.000110	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=43 (no response found!)
0	0.000123	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=40 (no response found!)
0	0.000136	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=37 (no response found!)
0	0.000149	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=34 (no response found!)
0	0.000161	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=31 (no response found!)
0	0.000174	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=28 (no response found!)
0	0.000187	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=25 (no response found!)
0	0.000200	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=22 (no response found!)
0	0.000213	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=19 (no response found!)
0	0.000226	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=16 (no response found!)
0	0.000239	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=13 (no response found!)
0	0.000251	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=10 (no response found!)
0	0.000266	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=7 (no response found!)
0	0.000279	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=4 (no response found!)
0	0.000292	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=1 (no response found!)

Foi descartado no R2, como pode-se notar na captura acima o TTL em 1.

Qual o significado da linha com o seguinte conteúdo parcial: Time-to-live exceeded (Time to live exceeded in transit)?

A mensagem TTL- exceeded serve para informar ao remetente que o pacote não conseguiu chegar ao destino pois passou por muitos saltos. Essa informação pode ser utilizada por exemplo, para determinar a rota entre dois equipamentos (comando traceroute).

No.	Time	Source	Destination	Protocol	Length	Info
26	502140	10.0.0.20	10.0.2.20	ICMP	98	Echo (ping) request id=0x0090, seq=1/256, ttl=64 (no response found!)
26	502545	10.0.0.1	10.0.0.20	ICMP	126	Time-to-live exceeded (Time to live exceeded in transit)

▶ Frame 4: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface 0
▶ Ethernet II, Src: 42:00:aa:00:00:01 (42:00:aa:00:00:01), Dst: 42:00:aa:00:00:00 (42:00:aa:00:00:00)
▼ Internet Protocol Version 4, Src: 10.0.0.20, Dst: 10.0.2.20
0100 = Version: 4
.... 0101 = Header Length: 20 bytes (5)
▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
Total Length: 84
Identification: 0x4c35 (19509)
▶ Flags: 0x4000, Don't fragment
Fragment offset: 0
Time to live: 64
Protocol: ICMP (1)
Header checksum: 0xd84c [validation disabled]
[Header checksum status: Unverified]
Source: 10.0.0.20
Destination: 10.0.2.20
▶ Internet Control Message Protocol

Explique qual o objetivo do campo ttl no cabeçalho IP?

Evitar loops de roteamento na rede, o TTL descarta o pacote e evita que o loop se intensifique.