

بنام خدا



درس آزمایشگاه شبکه‌های کامپیوتری

آزمایش ۴

تهیه‌کنندگان:

الناز رضایی ۹۸۴۱۱۳۸۷

حوریه سبزواری ۹۸۴۱۲۰۰۴

(۱) با استفاده از NAT این مشکل حل می‌شود. نیازمند یک آدرس IP واقعی روی اینترفیس eth1-h3 از ماشین h3 هستیم. همچنین باید ترافیک وارده از سوی h1 و h2 را جعل هویت یا اصطلاحاً masquerade نماییم.

(۲) eth1 به اینترنت متصل است. آدرس ip برابر 10.0.0.15 می‌باشد.

Capturing from eth1						
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help						
Apply a display filter ... <Ctrl-/>						
No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	10.0.2.15	142.250.185.46	ICMP	98	Echo (ping) request id
2	0.375325147	142.250.185.46	10.0.2.15	ICMP	98	Echo (ping) reply id
3	1.000485941	10.0.2.15	142.250.185.46	ICMP	98	Echo (ping) request id
4	1.053991159	142.250.185.46	10.0.2.15	ICMP	98	Echo (ping) reply id
5	2.002101457	10.0.2.15	142.250.185.46	ICMP	98	Echo (ping) request id
6	2.050062608	142.250.185.46	10.0.2.15	ICMP	98	Echo (ping) reply id
7	3.004035403	10.0.2.15	142.250.185.46	ICMP	98	Echo (ping) request id
8	3.060680635	142.250.185.46	10.0.2.15	ICMP	98	Echo (ping) reply id
9	4.006110701	10.0.2.15	142.250.185.46	ICMP	98	Echo (ping) request id
10	4.055229208	142.250.185.46	10.0.2.15	ICMP	98	Echo (ping) reply id
11	11.396973665	10.0.2.15	109.110.160.172	NTP	90	NTP Version 4, client
12	11.414198328	109.110.160.172	10.0.2.15	NTP	90	NTP Version 4, server

  

Frame 1: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface eth1, id 0	
Ethernet II, Src: PcsCompu 91:28:8a (08:00:27:91:28:8a), Dst: RealtekU_12:35:02 (52:54:00:12:35:02)	
Internet Protocol Version 4, Src: 10.0.2.15, Dst: 142.250.185.46	
Internet Control Message Protocol	

  

0000	52 54 00 12 35 02 08 00	27 91 28 8a 08 00 45 00	RT 5...	' (...E
0010	00 54 f9 40 40 00 40 01	ed 30 0a 00 02 0f 0e fa	T @ @ - 0 -	.....
0020	b9 2e 08 00 e2 a6 00 05	00 01 7f 81 56 62 00 00	.....	.....Vb..
0030	00 00 75 9c 0b 00 00 00	00 00 10 11 12 13 14 15	.....	.....
0040	16 17 18 19 1a 1b 1c 1d	1e 1f 20 21 22 23 24 25	.....	.....!#\$%

```
mininet> sh ovs-vsctl add-port s3 eth0
mininet> sh ovs-vsctl show
38f09442-9c39-4e0d-8c48-747b22b3fcfa
    Bridge "s3"
        Controller "tcp:127.0.0.1:6633"
            is_connected: true
        fail_mode: secure
        Port "s3"
            Interface "s3"
                type: internal
        Port "s3-eth1"
            Interface "s3-eth1"
        Port "eth0"
            Interface "eth0"
    Bridge "s12"
        Controller "tcp:127.0.0.1:6633"
            is_connected: true
        fail_mode: secure
        Port "s12-eth3"
            Interface "s12-eth3"
        Port "s12"
            Interface "s12"
                type: internal
```

```

h3
root@TCPIP-VM:~/Desktop/shared/4# dhclient h3-eth1
root@TCPIP-VM:~/Desktop/shared/4# ping 8.8.8.8 -c 1
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=109 time=288 ms

--- 8.8.8.8 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 288.743/288.743/288.743/0.000 ms
root@TCPIP-VM:~/Desktop/shared/4#

```

همانطور که می‌بینیم با تنظیمات انجام شده، می‌توانیم گوگل را از h3 پینگ کنیم.

(ب-۲)

```

h1
root@TCPIP-VM:~/Desktop/shared/4# wireshark &
[1] 12263
root@TCPIP-VM:~/Desktop/shared/4# ping 8.8.8.8 -c 1
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.

--- 8.8.8.8 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

root@TCPIP-VM:~/Desktop/shared/4#

```

Capturing from h1-eth0

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	a2:bf:6a:af:5d:29	Broadcast	ARP	42	Who has 10.0.0.100? Tell 10.0.0.1
2	0.001269107	c2:ee:24:38:81:05	a2:bf:6a:af:5d:29	ARP	42	10.0.0.100 is at c2:ee:24:38:81:05
3	0.001276180	10.0.0.1	8.8.8.8	ICMP	98	Echo (ping) request id=0x3024, seq=1/256, ttl=64 (no response found!)

Capturing from h3-eth1

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
2	0.996757428	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
3	1.996912583	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
4	4.998507267	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
5	5.996796684	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
6	6.996794649	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
7	76.384407845	10.0.0.1	8.8.8.8	ICMP	98	Echo (ping) request id=0x3024, seq=1/256, ttl=62 (no response found!)
8	76.458784942	RealtekU_12:35:02	Broadcast	ARP	60	Who has 10.0.0.1? Tell 10.0.2.2

از h1-eth0 نمی‌توان گوگل را پینگ کرد.

(۳) زیرا بسته‌هایی که از اینترفیس خروجی پل می‌گذرند، آدرس ip لوکال h1 را دارند و اجازه‌ی خروج و پینگ کردن گوگل را ندارند. لذا بسته drop می‌شود.

۴) پاسخی برای پینگ یافت نمی‌شود. زیرا بسته‌های صادره از h1 آدرس ip مجاز برای رد شدن از پل را ندارند.

۵) با دستور زیر بسته‌های گذرنده از h3 و صادره از h1 آدرس ip مجاز h3-eth1 را گرفته و گوگل از h1 پینگ می‌شود.

```
[1] 12202
root@TCPIP-VM:~/Desktop/shared/4# iptables -t nat -A POSTROUTING -o h3-eth1 -j MASQUERADE
root@TCPIP-VM:~/Desktop/shared/4#
```

```
h1
root@TCPIP-VM:~/Desktop/shared/4# wireshark &
[1] 12263
root@TCPIP-VM:~/Desktop/shared/4# ping 8.8.8.8 -c 1
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.

--- 8.8.8.8 ping statistics ---
1 packets transmitted, 0 received, 100% packet loss, time 0ms

root@TCPIP-VM:~/Desktop/shared/4# ping 8.8.8.8 -c 1
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=107 time=92.6 ms

--- 8.8.8.8 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 92.627/92.627/92.627/0.000 ms
root@TCPIP-VM:~/Desktop/shared/4#
```

Capturing from h3-eth1						
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help						
Apply a display filter ... <Ctrl-/>						
No.	Time	Source	Destination	Protocol	Length	Info
10	522.9969732	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
11	523.9966990	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
12	524.7647372	10.0.2.15	8.8.8.8	ICMP	98	Echo (ping) request id=0x3029, seq=1/256, ttl=62 (reply in 13)
13	524.8552742	8.8.8.8	10.0.2.15	ICMP	98	Echo (ping) reply id=0x3029, seq=1/256, ttl=109 (request in 12)
14	525.9983000	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
15	526.9965066	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
16	527.9966416	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
17	529.7649021	36:5e:a6:65:cc:c1	RealtekU_12:35:02	ARP	42	Who has 10.0.2.2? Tell 10.0.2.15
18	529.7752453	RealtekU_12:35:02	36:5e:a6:65:cc:c1	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
19	535.9990774	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
20	536.9966658	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02
21	537.9965191	RealtekU_12:35:02	PcsCompu_ff:be:55	ARP	60	10.0.2.2 is at 52:54:00:12:35:02

۶) در بسته‌های پاسخ ICMP فیلدی به نام QueryID وجود دارد که مشخص می‌شود این بسته پاسخ درخواست h1 است و سورس حقیقی هر بسته را مشخص می‌کند.