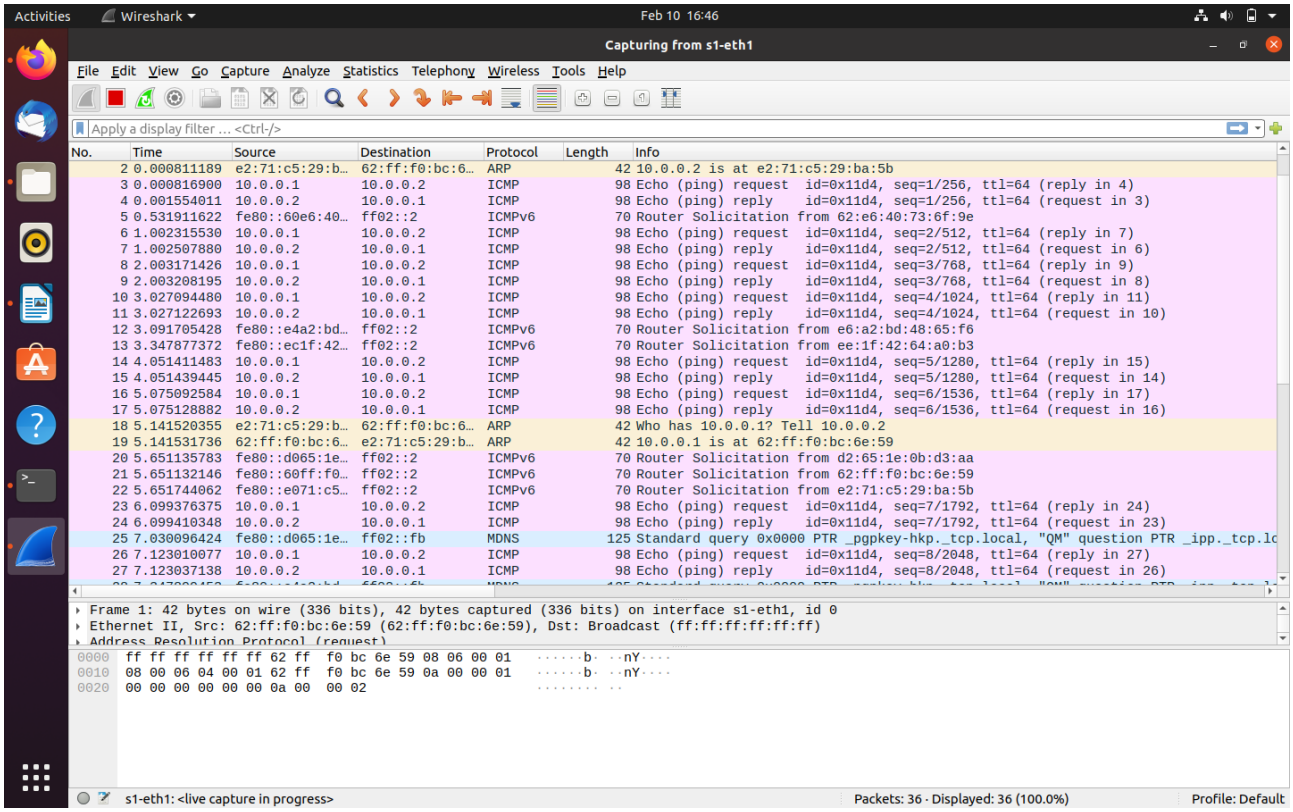
Code:

```
from mininet.net import Mininet
from mininet.node import Controller, OVSController
from mininet.cli import CLI
from mininet.link import TCLink
from mininet.log import setLogLevel, info

net = Mininet()
h1 = net.addHost( 'h1' )
h2 = net.addHost( 'h2' )
h3 = net.addHost( 'h3' )
h4 = net.addHost( 'h4' )
s1 = net.addSwitch( 's1' )
s2 = net.addSwitch( 's2' )
net.addLink( h1, s1, bw=10, delay='10ms' )
net.addLink( h2, s1, bw=10, delay='10ms' )
net.addLink( h3, s2, bw=10, delay='10ms' )
net.addLink( h4, s2, bw=10, delay='10ms' )

net.addLink( s1, s2, bw=20, delay='10ms' )
c0 = net.addController('c0')

net.start()
CLI( net )
net.stop()
```

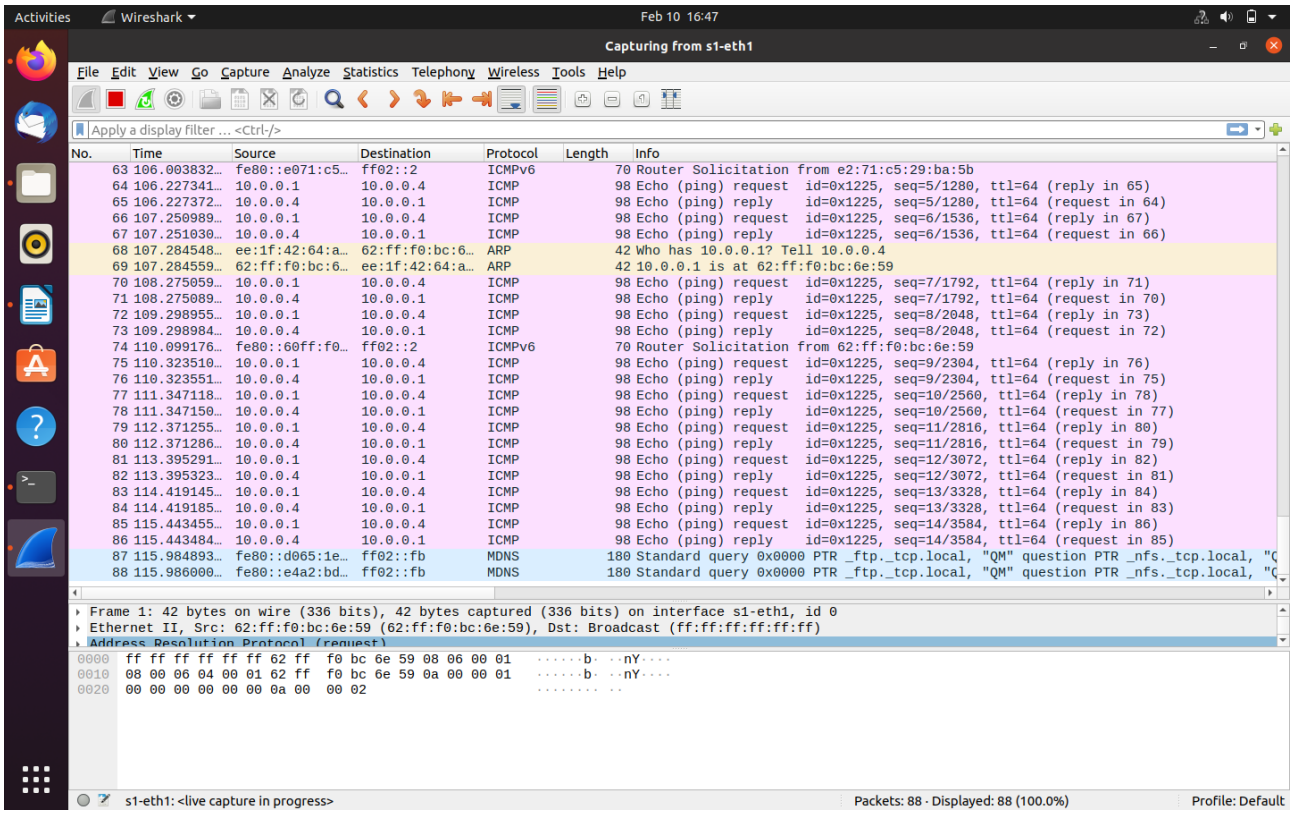
```
root@dubuntu:~/mininet/custom# python2.7 topo-2sw-4host.py
mininet> nodes
available nodes are:
c0 h1 h2 h3 h4 s1 s2
mininet> links
h1-eth0<->s1-eth1 (OK OK)
h2-eth0<->s1-eth2 (OK OK)
h3-eth0<->s2-eth1 (OK OK)
h4-eth0<->s2-eth2 (OK OK)
s1-eth3<->s2-eth3 (OK OK)
mininet> pingall
*** Ping: testing ping reachability
h1 -> h2 h3 h4
h2 -> h1 h3 h4
h3 -> h1 h2 h4
h4 -> h1 h2 h3
*** Results: 0% dropped (12/12 received)

mininet> h1 ping h2
PING 10.0.0.2 (10.0.0.2) 56(84) bytes of data.
64 bytes from 10.0.0.2: icmp_seq=1 ttl=64 time=1.58 ms
```

64 bytes from 10.0.0.2: icmp_seq=2 ttl=64 time=0.217 ms
64 bytes from 10.0.0.2: icmp_seq=3 ttl=64 time=0.068 ms
64 bytes from 10.0.0.2: icmp_seq=4 ttl=64 time=0.055 ms
64 bytes from 10.0.0.2: icmp_seq=5 ttl=64 time=0.053 ms
64 bytes from 10.0.0.2: icmp_seq=6 ttl=64 time=0.068 ms
64 bytes from 10.0.0.2: icmp_seq=7 ttl=64 time=0.064 ms
64 bytes from 10.0.0.2: icmp_seq=8 ttl=64 time=0.052 ms
^C
--- 10.0.0.2 ping statistics ---
8 packets transmitted, 8 received, 0% packet loss, time 7123ms
rtt min/avg/max/mdev = 0.052/0.269/1.578/0.497 ms
mininet>



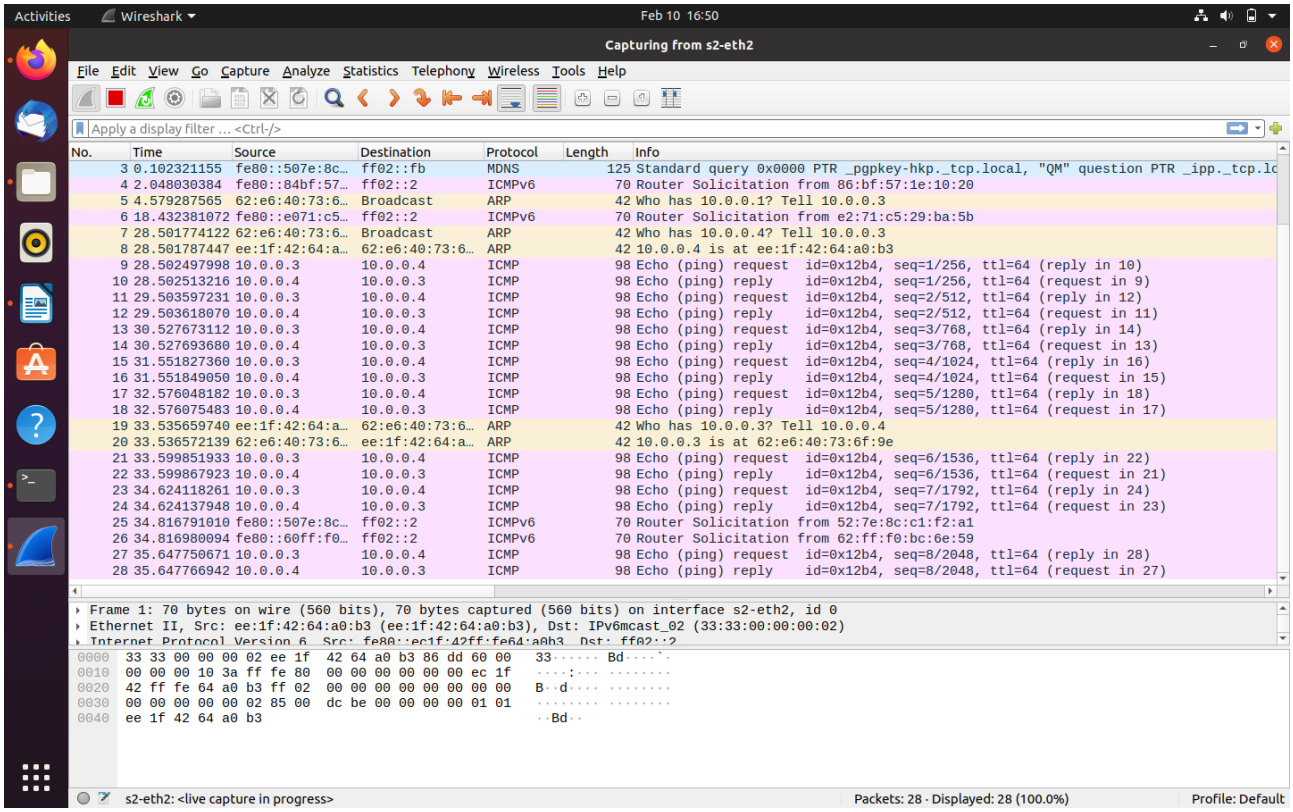
mininet> h1 ping h4
PING 10.0.0.4 (10.0.0.4) 56(84) bytes of data.
64 bytes from 10.0.0.4: icmp_seq=1 ttl=64 time=3.56 ms
64 bytes from 10.0.0.4: icmp_seq=2 ttl=64 time=0.259 ms
64 bytes from 10.0.0.4: icmp_seq=3 ttl=64 time=0.050 ms
64 bytes from 10.0.0.4: icmp_seq=4 ttl=64 time=0.069 ms
64 bytes from 10.0.0.4: icmp_seq=5 ttl=64 time=0.056 ms
64 bytes from 10.0.0.4: icmp_seq=6 ttl=64 time=0.072 ms
64 bytes from 10.0.0.4: icmp_seq=7 ttl=64 time=0.057 ms
64 bytes from 10.0.0.4: icmp_seq=8 ttl=64 time=0.051 ms
64 bytes from 10.0.0.4: icmp_seq=9 ttl=64 time=0.074 ms
64 bytes from 10.0.0.4: icmp_seq=10 ttl=64 time=0.070 ms
64 bytes from 10.0.0.4: icmp_seq=11 ttl=64 time=0.058 ms
64 bytes from 10.0.0.4: icmp_seq=12 ttl=64 time=0.058 ms

64 bytes from 10.0.0.4: icmp_seq=13 ttl=64 time=0.072 ms
64 bytes from 10.0.0.4: icmp_seq=14 ttl=64 time=0.050 ms
^C
--- 10.0.0.4 ping statistics ---
14 packets transmitted, 14 received, 0% packet loss, time 13274ms
rtt min/avg/max/mdev = 0.050/0.325/3.562/0.899 ms
mininet>

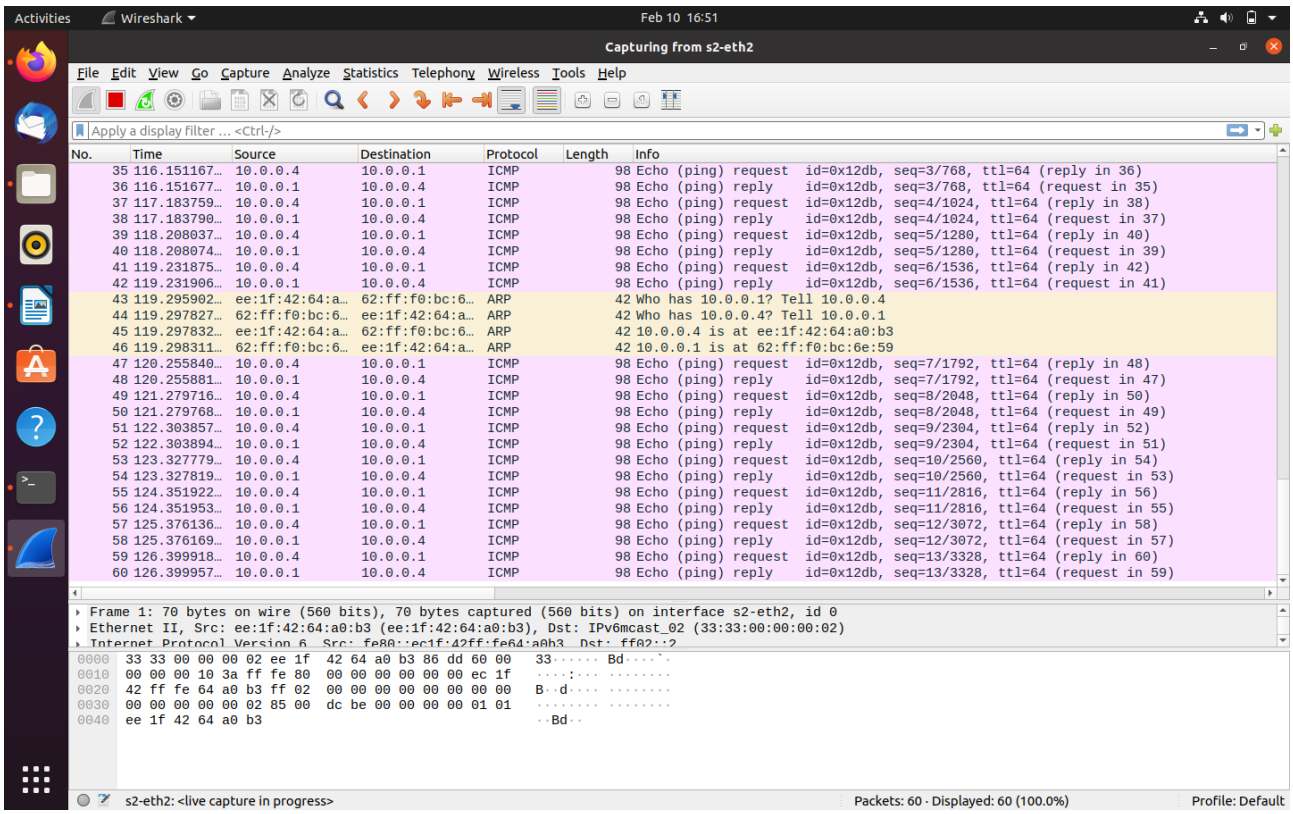


mininet> h3 ping h4

PING 10.0.0.4 (10.0.0.4) 56(84) bytes of data.
64 bytes from 10.0.0.4: icmp_seq=1 ttl=64 time=1.42 ms
64 bytes from 10.0.0.4: icmp_seq=2 ttl=64 time=0.293 ms
64 bytes from 10.0.0.4: icmp_seq=3 ttl=64 time=0.065 ms
64 bytes from 10.0.0.4: icmp_seq=4 ttl=64 time=0.070 ms
64 bytes from 10.0.0.4: icmp_seq=5 ttl=64 time=0.079 ms
64 bytes from 10.0.0.4: icmp_seq=6 ttl=64 time=0.051 ms
64 bytes from 10.0.0.4: icmp_seq=7 ttl=64 time=0.066 ms
64 bytes from 10.0.0.4: icmp_seq=8 ttl=64 time=0.055 ms
^C
--- 10.0.0.4 ping statistics ---
8 packets transmitted, 8 received, 0% packet loss, time 7146ms
rtt min/avg/max/mdev = 0.051/0.262/1.420/0.443 ms
mininet>




```
mininet> h4 ping h1
PING 10.0.0.1 (10.0.0.1) 56(84) bytes of data.
64 bytes from 10.0.0.1: icmp_seq=1 ttl=64 time=1.23 ms
64 bytes from 10.0.0.1: icmp_seq=2 ttl=64 time=1.43 ms
64 bytes from 10.0.0.1: icmp_seq=3 ttl=64 time=0.536 ms
64 bytes from 10.0.0.1: icmp_seq=4 ttl=64 time=0.061 ms
64 bytes from 10.0.0.1: icmp_seq=5 ttl=64 time=0.064 ms
64 bytes from 10.0.0.1: icmp_seq=6 ttl=64 time=0.055 ms
64 bytes from 10.0.0.1: icmp_seq=7 ttl=64 time=0.072 ms
64 bytes from 10.0.0.1: icmp_seq=8 ttl=64 time=0.086 ms
64 bytes from 10.0.0.1: icmp_seq=9 ttl=64 time=0.063 ms
64 bytes from 10.0.0.1: icmp_seq=10 ttl=64 time=0.069 ms
64 bytes from 10.0.0.1: icmp_seq=11 ttl=64 time=0.054 ms
64 bytes from 10.0.0.1: icmp_seq=12 ttl=64 time=0.059 ms
64 bytes from 10.0.0.1: icmp_seq=13 ttl=64 time=0.071 ms
^C
--- 10.0.0.1 ping statistics ---
13 packets transmitted, 13 received, 0% packet loss, time 12252ms
rtt min/avg/max/mdev = 0.054/0.296/1.432/0.460 ms
mininet>
```


Activities
Wireshark
Feb 10 16:51
Capturing from s2-eth2
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help
Apply a display filter ... <Ctrl-/>
No. Time Source Destination Protocol Length Info
35 116.151167… 10.0.0.4 10.0.0.1 ICMP 98 Echo (ping) request id=0x12db, seq=3/768, ttl=64 (reply in 36)
36 116.151677… 10.0.0.1 10.0.0.4 ICMP 98 Echo (ping) reply id=0x12db, seq=3/768, ttl=64 (request in 35)
37 117.183759… 10.0.0.4 10.0.0.1 ICMP 98 Echo (ping) request id=0x12db, seq=4/1024, ttl=64 (reply in 38)
38 117.183790… 10.0.0.1 10.0.0.4 ICMP 98 Echo (ping) reply id=0x12db, seq=4/1024, ttl=64 (request in 37)
39 118.208037… 10.0.0.4 10.0.0.1 ICMP 98 Echo (ping) request id=0x12db, seq=5/1280, ttl=64 (reply in 40)
40 118.208074… 10.0.0.1 10.0.0.4 ICMP 98 Echo (ping) reply id=0x12db, seq=5/1280, ttl=64 (request in 39)
41 119.231875… 10.0.0.4 10.0.0.1 ICMP 98 Echo (ping) request id=0x12db, seq=6/1536, ttl=64 (reply in 42)
42 119.231906… 10.0.0.1 10.0.0.4 ICMP 98 Echo (ping) reply id=0x12db, seq=6/1536, ttl=64 (request in 41)
43 119.295902… ee:1f:42:64:a… 62:ff:f0:bc:6… ARP 42 Who has 10.0.0.1? Tell 10.0.0.4
44 119.297827… 62:ff:f0:bc:6… ee:1f:42:64:a… ARP 42 Who has 10.0.0.4? Tell 10.0.0.1
45 119.297832… ee:1f:42:64:a… 62:ff:f0:bc:6… ARP 42 10.0.0.4 is at ee:1f:42:64:a0:b3
46 119.298311… 62:ff:f0:bc:6… ee:1f:42:64:a… ARP 42 10.0.0.1 is at 62:ff:f0:bc:6e:59
47 120.255840… 10.0.0.4 10.0.0.1 ICMP 98 Echo (ping) request id=0x12db, seq=7/1792, ttl=64 (reply in 48)
48 120.255881… 10.0.0.1 10.0.0.4 ICMP 98 Echo (ping) reply id=0x12db, seq=7/1792, ttl=64 (request in 47)
49 121.279716… 10.0.0.4 10.0.0.1 ICMP 98 Echo (ping) request id=0x12db, seq=8/2048, ttl=64 (reply in 50)
50 121.279768… 10.0.0.1 10.0.0.4 ICMP 98 Echo (ping) reply id=0x12db, seq=8/2048, ttl=64 (request in 49)
51 122.303857… 10.0.0.4 10.0.0.1 ICMP 98 Echo (ping) request id=0x12db, seq=9/2304, ttl=64 (reply in 52)
52 122.303894… 10.0.0.1 10.0.0.4 ICMP 98 Echo (ping) reply id=0x12db, seq=9/2304, ttl=64 (request in 51)
53 123.327779… 10.0.0.4 10.0.0.1 ICMP 98 Echo (ping) request id=0x12db, seq=10/2560, ttl=64 (reply in 54)
54 123.327819… 10.0.0.1 10.0.0.4 ICMP 98 Echo (ping) reply id=0x12db, seq=10/2560, ttl=64 (request in 53)
55 124.351922… 10.0.0.4 10.0.0.1 ICMP 98 Echo (ping) request id=0x12db, seq=11/2816, ttl=64 (reply in 56)
56 124.351953… 10.0.0.1 10.0.0.4 ICMP 98 Echo (ping) reply id=0x12db, seq=11/2816, ttl=64 (request in 55)
57 125.376136… 10.0.0.4 10.0.0.1 ICMP 98 Echo (ping) request id=0x12db, seq=12/3072, ttl=64 (reply in 58)
58 125.376169… 10.0.0.1 10.0.0.4 ICMP 98 Echo (ping) reply id=0x12db, seq=12/3072, ttl=64 (request in 57)
59 126.399918… 10.0.0.4 10.0.0.1 ICMP 98 Echo (ping) request id=0x12db, seq=13/3328, ttl=64 (reply in 60)
60 126.399957… 10.0.0.1 10.0.0.4 ICMP 98 Echo (ping) reply id=0x12db, seq=13/3328, ttl=64 (request in 59)
Frame 1: 70 bytes on wire (560 bits), 70 bytes captured (560 bits) on interface s2-eth2, id 0
Ethernet II, Src: ee:1f:42:64:a0:b3 (ee:1f:42:64:a0:b3), Dst: IPv6mcast_02 (33:33:00:00:00:02)
Internet Protocol Version 6, Src: fe80::ec1f:42ff:fe64:a0b3, Dst: ff02::2
0000 33 33 00 00 00 02 ee 1f 42 64 a0 b3 86 dd 60 00
0010 00 00 00 10 3a ff fe 80 00 00 00 00 00 00 ec 1f
0020 42 ff fe 64 a0 b3 ff 02 00 00 00 00 00 00 00 00
0030 00 00 00 00 00 02 85 00 dc be 00 00 00 00 01 01
0040 ee 1f 42 64 a0 b3
s2-eth2: <live capture in progress>
Packets: 60 · Displayed: 60 (100.0%)
Profile: Default