

The whole commands are in project_part1.sh and project_part2.sh.

Part1

1.

a)

```
docker cp /var/lib/dhcp/dhcpd.leases R1:/var/lib/dhcp/dhcpd.leases
docker cp dhcpd_R1.conf R1:/dhcpd.conf
docker exec R1 /usr/sbin/dhcpd -4 -pf /run/dhcp-server-dhcpd.pid -cf /dhcpd.conf R1br0
docker exec BRG1 dhclient BRG1br0
docker exec BRG2 dhclient BRG2br0
```

Since the new created container does not have dhcpd.leases, I cp it from host to container. Then use the dhcpd to launch the dhcp service.

```
root@eb0f90f32f5b:/# dhclient -d BRG1br0
Internet Systems Consortium DHCP Client 4.3.3
Copyright 2004-2015 Internet Systems Consortium.
All rights reserved.
For info, please visit https://www.isc.org/software/dhcp/

Listening on LPF/BRG1br0/9a:04:5c:ec:33:3b
Sending on LPF/BRG1br0/9a:04:5c:ec:33:3b
Sending on Socket/fallback
DHCPDISCOVER on BRG1br0 to 255.255.255.255 port 67 interval 3 (xid=0x270e8361)
DHCPREQEST of 172.27.0.51 on BRG1br0 to 255.255.255.255 port 67 (xid=0x61830e27)
DHCPOFFER of 172.27.0.51 from 172.27.0.1
DHCPACK of 172.27.0.51 from 172.27.0.1
bound to 172.27.0.51 -- renewal in 20347 seconds.
^C
root@eb0f90f32f5b:/# ifconfig
BRG1br0  Link encap:Ethernet  HWaddr 9a:04:5c:ec:33:3b
          inet addr:172.27.0.51  Bcast:172.27.0.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:58 errors:0 dropped:0 overruns:0 frame:0
          TX packets:5 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:7412 (7.4 KB)  TX bytes:830 (830.0 B)
```

b)

```
docker exec R1 iptables -t nat -A POSTROUTING -o R1R2 --source 172.27.0.0/24 -j SNAT --to 140.114.0.1
```

```
root@603b65b31dfc:/# iptables -t nat -L POSTROUTING
Chain POSTROUTING (policy ACCEPT)
target     prot opt source                destination
SNAT       all  --  172.27.0.0/24          anywhere                to:140.114.0.1
```

c)

```
docker exec BRG1 ip link add GRETAP type gretap remote 140.113.0.2 local \
`docker exec BRG1 ifconfig BRG1br0 | grep 'inet addr:' | cut -d: -f2 | awk '{ print $1}'` key 1 encap fou encap-sport 22222 encap-dport 44444
docker exec BRG1 ip link set GRETAP up
docker exec BRG1 ip link add br0 type bridge
docker exec BRG1 ip link set BRG1h1 master br0
docker exec BRG1 ip link set GRETAP master br0
docker exec BRG1 ip link set br0 up
docker exec BRG1 ip fou add port 22222 ipproto 47
```

BRG1 can ping BRGr

```
eric070021@ubuntu:~/Desktop$ docker exec -it BRG1 bash
root@795ee072203b:/# ping 140.113.0.2 -c 3
PING 140.113.0.2 (140.113.0.2) 56(84) bytes of data.
64 bytes from 140.113.0.2: icmp_seq=1 ttl=62 time=0.231 ms
64 bytes from 140.113.0.2: icmp_seq=2 ttl=62 time=0.134 ms
64 bytes from 140.113.0.2: icmp_seq=3 ttl=62 time=0.105 ms

--- 140.113.0.2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2030ms
rtt min/avg/max/mdev = 0.105/0.156/0.231/0.055 ms
```

BRG1 interface:

```
root@795ee072203b:/# ifconfig
BRG1br0    Link encap:Ethernet  HWaddr 46:01:af:e0:ec:11
           inet addr:172.27.0.50  Bcast:172.27.0.255  Mask:255.255.255.0
           UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
           RX packets:70 errors:0 dropped:0 overruns:0 frame:0
           TX packets:11 errors:0 dropped:0 overruns:0 carrier:0
           collisions:0 txqueuelen:1000
           RX bytes:8636 (8.6 KB)  TX bytes:1374 (1.3 KB)

BRG1h1     Link encap:Ethernet  HWaddr 1a:a1:8b:45:68:db
           UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
           RX packets:0 errors:0 dropped:0 overruns:0 frame:0
           TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
           collisions:0 txqueuelen:1000
           RX bytes:0 (0.0 B)  TX bytes:108 (108.0 B)

GRETAP     Link encap:Ethernet  HWaddr 0a:60:a5:ea:7f:7b
           UP BROADCAST RUNNING MULTICAST  MTU:1450  Metric:1
           RX packets:0 errors:0 dropped:0 overruns:0 frame:0
           TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
           collisions:0 txqueuelen:1000
           RX bytes:0 (0.0 B)  TX bytes:80 (80.0 B)

br0        Link encap:Ethernet  HWaddr 0a:60:a5:ea:7f:7b
           UP BROADCAST RUNNING MULTICAST  MTU:1450  Metric:1
           RX packets:0 errors:0 dropped:0 overruns:0 frame:0
           TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
           collisions:0 txqueuelen:1000
           RX bytes:0 (0.0 B)  TX bytes:108 (108.0 B)

lo         Link encap:Local Loopback
           inet addr:127.0.0.1  Mask:255.0.0.0
           UP LOOPBACK RUNNING  MTU:65536  Metric:1
           RX packets:0 errors:0 dropped:0 overruns:0 frame:0
           TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
           collisions:0 txqueuelen:1000
           RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

BRGr interface:

```
root@7c957694ae0e:/# ifconfig
BRGrGWr  Link encap:Ethernet  HWaddr c2:f2:c7:ca:47:c2
          inet addr:20.0.1.2  Bcast:0.0.0.0  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:58 errors:0 dropped:0 overruns:0 frame:0
          TX packets:7 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:6878 (6.8 KB)  TX bytes:938 (938.0 B)

BRGrR2   Link encap:Ethernet  HWaddr b6:11:6f:4e:2d:34
          inet addr:140.113.0.2  Bcast:0.0.0.0  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:10 errors:0 dropped:0 overruns:0 frame:0
          TX packets:15 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:1820 (1.8 KB)  TX bytes:2390 (2.3 KB)

GRETAP-BRG1 Link encap:Ethernet  HWaddr 32:40:41:36:05:30
          UP BROADCAST RUNNING MULTICAST  MTU:1450  Metric:1
          RX packets:5 errors:0 dropped:0 overruns:0 frame:0
          TX packets:12 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:830 (830.0 B)  TX bytes:1118 (1.1 KB)

br0      Link encap:Ethernet  HWaddr 32:40:41:36:05:30
          UP BROADCAST RUNNING MULTICAST  MTU:1450  Metric:1
          RX packets:8 errors:0 dropped:0 overruns:0 frame:0
          TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:962 (962.0 B)  TX bytes:108 (108.0 B)

lo       Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

d)

GWr dhcp command

```
/usr/sbin/dhcpd -4 -pf /run/dhcp-server-dhcpd.pid -cf ./dhcpd.conf GWrBRGr
```

H1 can acquire ip and address from GWr.

```
eric070021@ubuntu:~$ docker exec -it h1 bash
root@8bfd610b3c59:/# dhclient -d h1BRG1
Internet Systems Consortium DHCP Client 4.3.3
Copyright 2004-2015 Internet Systems Consortium.
All rights reserved.
For info, please visit https://www.isc.org/software/dhcp/

Listening on LPF/h1BRG1/7e:f5:e0:91:33:bc
Sending on   LPF/h1BRG1/7e:f5:e0:91:33:bc
Sending on   Socket/fallback
DHCPDISCOVER on h1BRG1 to 255.255.255.255 port 67 interval 3 (xid=0x8f08ae0d)
DHCPDISCOVER on h1BRG1 to 255.255.255.255 port 67 interval 5 (xid=0x8f08ae0d)
DHCPPREQUEST of 20.0.1.50 on h1BRG1 to 255.255.255.255 port 67 (xid=0xdae088f)
DHCPOFFER of 20.0.1.50 from 20.0.1.1
DHCPACK of 20.0.1.50 from 20.0.1.1
mv: cannot move '/etc/resolv.conf.dhclient-new.34' to '/etc/resolv.conf': Device or resource busy
bound to 20.0.1.50 -- renewal in 17143 seconds.
^C
root@8bfd610b3c59:/# ifconfig
h1BRG1      Link encap:Ethernet  HWaddr 7e:f5:e0:91:33:bc
            inet addr:20.0.1.50  Bcast:20.0.1.255  Mask:255.255.255.0
            UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
            RX packets:12 errors:0 dropped:0 overruns:0 frame:0
            TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:1000
            RX bytes:1286 (1.2 KB)  TX bytes:1172 (1.1 KB)
```

e)

```
iptables -t nat -A POSTROUTING -o ens33 --source 20.0.1.0/24 -j MASQUERADE
```

```
eric070021@ubuntu:~$ sudo iptables -t nat -L POSTROUTING
[sudo] password for eric070021:
Chain POSTROUTING (policy ACCEPT)
target     prot opt source                destination
MASQUERADE all  --  172.17.0.0/16          anywhere
MASQUERADE all  --  20.0.1.0/24           anywhere
```

f)

```
eric070021@ubuntu:~$ docker exec -it h1 bash
root@8bfd610b3c59:/# ping 8.8.8.8 -c 5
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=127 time=8.34 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=127 time=8.97 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=127 time=9.16 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=127 time=9.62 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=127 time=11.3 ms

--- 8.8.8.8 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4007ms
rtt min/avg/max/mdev = 8.342/9.485/11.321/1.013 ms
```


2.

BRG1:

```
eric070021@ubuntu:~$ docker exec -it BRG1 bash
root@ca28f7ab8cf4:/# tcpdump -i BRG1br0 -nXX
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on BRG1br0, link-type EN10MB (Ethernet), capture size 262144 bytes
15:28:24.339338 IP 172.27.0.50.22222 > 140.113.0.2.44444: UDP, length 106
0x0000: d2a5 a208 cf84 6a37 e23c a773 0800 4500 .....j7.<.s..E.
0x0010: 0086 a940 4000 4011 5866 ac1b 0032 8c71 ...@@.@.Xf...2.q
0x0020: 0002 56ce ad9c 0072 0000 2000 6558 0000 ..V....r....eX..
0x0030: 0001 b61c 2b23 414a 7ef5 e091 33bc 0800 ..+AJ~...3...E.
0x0040: 4500 0054 dc5e 4000 4001 3909 1400 0132 E..T.^@.@.9....2
0x0050: 0808 0808 0800 de54 0038 0001 980f 6862 .....T.8....hb
0x0060: 0000 0000 552d 0500 0000 0000 1011 1213 ....U-.....
0x0070: 1415 1617 1819 1a1b 1c1d 1e1f 2021 2223 .....!"#
0x0080: 2425 2627 2829 2a2b 2c2d 2e2f 3031 3233 $%&'()*+,-./0123
0x0090: 3435 3637 4567
```

BRGr:

```
root@7c957694ae0e:/# tcpdump -i BRGrGWr -nXX
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on BRGrGWr, link-type EN10MB (Ethernet), capture size 262144 bytes
15:28:24.339503 IP 20.0.1.50 > 8.8.8.8: ICMP echo request, id 56, seq 1, length 64
0x0000: b61c 2b23 414a 7ef5 e091 33bc 0800 4500 ..+AJ~...3...E.
0x0010: 0054 dc5e 4000 4001 3909 1400 0132 0808 .T.^@.@.9....2..
0x0020: 0808 0800 de54 0038 0001 980f 6862 0000 .....T.8....hb..
0x0030: 0000 552d 0500 0000 0000 1011 1213 1415 ..U-.....
0x0040: 1617 1819 1a1b 1c1d 1e1f 2021 2223 2425 .....!"#$$%
0x0050: 2627 2829 2a2b 2c2d 2e2f 3031 3233 3435 &'()*+,-./012345
0x0060: 3637 67
```

GWr:

```
eric070021@ubuntu:~$ sudo tcpdump -i GWrBRGr -nXX
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on GWrBRGr, link-type EN10MB (Ethernet), capture size 262144 bytes
08:28:24.339523 IP 20.0.1.50 > 8.8.8.8: ICMP echo request, id 56, seq 1, length 64
0x0000: b61c 2b23 414a 7ef5 e091 33bc 0800 4500 ..+AJ~...3...E.
0x0010: 0054 dc5e 4000 4001 3909 1400 0132 0808 .T.^@.@.9....2..
0x0020: 0808 0800 de54 0038 0001 980f 6862 0000 .....T.8....hb..
0x0030: 0000 552d 0500 0000 0000 1011 1213 1415 ..U-.....
0x0040: 1617 1819 1a1b 1c1d 1e1f 2021 2223 2425 .....!"#$$%
0x0050: 2627 2829 2a2b 2c2d 2e2f 3031 3233 3435 &'()*+,-./012345
0x0060: 3637 67
```

```
eric070021@ubuntu:~$ sudo tcpdump -i ens33 -nXX
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on ens33, link-type EN10MB (Ethernet), capture size 262144 bytes
01:00:39.427036 IP 192.168.88.128 > 8.8.8.8: ICMP echo request, id 47, seq 1, length 64
0x0000: 0050 56e2 99e4 000c 29d7 ee5c 0800 4500 .PV.....)\..E.
0x0010: 0054 8e3f 4000 3f01 8431 c0a8 5880 0808 .T.?@.?..1..X...
0x0020: 0808 0800 f71e 002f 0001 27f8 6862 0000 ...../...'..hb..
0x0030: 0000 ab83 0600 0000 0000 1011 1213 1415 .....
0x0040: 1617 1819 1a1b 1c1d 1e1f 2021 2223 2425 .....!"#$$%
0x0050: 2627 2829 2a2b 2c2d 2e2f 3031 3233 3435 &'()*+,-./012345
0x0060: 3637 67
```

Edge router input:

```
root@8fb124fa48f5:/# tcpdump -i R1br0 -nXX
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on R1br0, link-type EN10MB (Ethernet), capture size 262144 bytes
15:28:24.339448 IP 172.27.0.50.22222 > 140.113.0.2.44444: UDP, length 106
    0x0000: d2a5 a208 cf84 6a37 e23c a773 0800 4500 .....j7.<.s..E.
    0x0010: 0086 a940 4000 4011 5866 ac1b 0032 8c71 ...@@.@.Xf...2.q
    0x0020: 0002 56ce ad9c 0072 0000 2000 6558 0000 ..V....r....eX..
    0x0030: 0001 b61c 2b23 414a 7ef5 e091 33bc 0800 ....+AJ~....3...
    0x0040: 4500 0054 dc5e 4000 4001 3909 1400 0132 E..T.^@.@.9....2
    0x0050: 0808 0808 0800 de54 0038 0001 980f 6862 .....T.8....hb
    0x0060: 0000 0000 552d 0500 0000 0000 1011 1213 ....U-.....
    0x0070: 1415 1617 1819 1a1b 1c1d 1e1f 2021 2223 .....!"#
    0x0080: 2425 2627 2829 2a2b 2c2d 2e2f 3031 3233 $%&'()*+,-./0123
    0x0090: 3435 3637                                4567
```

Edge router output:

```
root@dbd124468b89:/# tcpdump -i R1R2 -nXX
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on R1R2, link-type EN10MB (Ethernet), capture size 262144 bytes
07:57:24.666227 IP 140.114.0.1.22222 > 140.113.0.2.44444: UDP, length 106
    0x0000: 2a80 05d0 7720 42cf 6432 b5bb 0800 4500 *...w.B.d2....E.
    0x0010: 0086 2e32 4000 3f11 f44e 8c72 0001 8c71 ...2@.?.N.r...q
    0x0020: 0002 56ce ad9c 0072 0000 2000 6558 0000 ..V....r....eX..
    0x0030: 0001 de6d d32f 0074 ca5f 03bc 8179 0800 ...m./t._...y..
    0x0040: 4500 0054 65cf 4000 4001 af98 1400 0132 E..Te.@.@.....2
    0x0050: 0808 0808 0800 7b7b 002d 0001 64f7 6862 .....{[.-..d.hb
    0x0060: 0000 0000 e629 0a00 0000 0000 1011 1213 .....).....
    0x0070: 1415 1617 1819 1a1b 1c1d 1e1f 2021 2223 .....!"#
    0x0080: 2425 2627 2829 2a2b 2c2d 2e2f 3031 3233 $%&'()*+,-./0123
    0x0090: 3435 3637                                4567
```

H1:20.0.1.50 -> BRG1:172.27.0.50:22222(encapsulate gre header) ->
edge router input:172.27.0.50:22222 -> edge router
output:140.114.0.1:22222(SNAT translation from private to public ip) ->
BRGr:20.0.1.50(decapsulate GRE header) -> GWr:192.168.88.128(SNAT
by masquerade to pass the packet through ens33)

3.

a)

Part2

1.

a)

create ovs bridge:

```
ovs-vsctl add-br br0
ovs-vsctl set bridge br0 protocols=OpenFlow13
ovs-vsctl -- set bridge br0 fail-mode=secure # delete default flow control
```

Create GRE tunnel:

```
docker exec BRG1 ip link add GRETAP type gretap remote 140.113.0.2 local \
`docker exec BRG1 ifconfig BRG1br0 | grep 'inet addr:' | cut -d: -f2 | awk '{ print $1}'` key 1 encap fou encap-sport 22222 encap-dport 44444
docker exec BRG1 ip link set GRETAP up
docker exec BRG1 ip link add br0 type bridge
docker exec BRG1 ip link set BRG1h1 master br0
docker exec BRG1 ip link set GRETAP master br0
docker exec BRG1 ip link set br0 up
docker exec BRG1 ip fou add port 22222 ipproto 47
```

Attach the GRETAP interface to OVS bridge

```
ovs-vsctl add-port br0 BRG1h1 -- set Interface BRG1h1 ofport_request=1
ovs-vsctl add-port br0 GRETAP -- set Interface GRETAP ofport_request=2
```

b)

```
root@3610cbf7b59f:/# ovs-ofctl -O OpenFlow13 show br0
OFPST_FEATURES_REPLY (OF1.3) (xid=0x2): dpid:00001687fac05d41
n_tables:254, n_buffers:0
capabilities: FLOW_STATS TABLE_STATS PORT_STATS GROUP_STATS QUEUE_STATS
OFPST_PORT_DESC reply (OF1.3) (xid=0x3):
  1(BRG1h1): addr:7a:b5:1d:00:e8:fb
    config: 0
    state: LIVE
    current: 10GB-FD COPPER
    speed: 10000 Mbps now, 0 Mbps max
  2(GRETAP): addr:1a:7f:40:a0:49:79
    config: 0
    state: LIVE
    speed: 0 Mbps now, 0 Mbps max
  LOCAL(br0): addr:16:87:fa:c0:5d:41
    config: PORT_DOWN
    state: LINK_DOWN
    speed: 0 Mbps now, 0 Mbps max
OFPST_GET_CONFIG_REPLY (OF1.3) (xid=0x9): frags=normal miss_send_len=0
```

2.

a)

add meter entry:

```
ovs-ofctl -O OpenFlow13 add-meter br0 meter=1,kbps,band=type=drop,rate=1000
```


Add flow rule to redirect flow to meter entry:

```
ovs-ofctl -O OpenFlow13 add-flow br0 in port=1,actions=meter:1,output:2
```

b)

meter entries:

```
root@3610cbf7b59f:/# ovs-ofctl -O OpenFlow13 dump-meters br0
OFPST_METER_CONFIG reply (OF1.3) (xid=0x2):
meter=1 kbps bands=
type=drop rate=1000
```

flow entries:

```
root@3610cbf7b59f:/# ovs-ofctl -O OpenFlow13 dump-flows br0
cookie=0x0, duration=120.692s, table=0, n_packets=3, n_bytes=238, in_port=BRG1h
1 actions=meter:1,output:GRETAP
cookie=0x0, duration=115.312s, table=0, n_packets=3, n_bytes=238, in_port=GRETAP
actions=output:BRG1h1
```

c)

before meter entry:

```
eric070021@ubuntu: ~/Desktop
File Edit View Search Terminal Help
eric070021@ubuntu:~/Desktop$ iperf3 -s -B 20.0.1.1
Server listening on 5201
Accepted connection from 20.0.1.51, port 40326
[ ID] Interval      Transfer     Bandwidth   Jitter    Lost/Totl  Datagrams
[ 5] 0.00-1.00 sec  10.9 MBytes  91.7 Mbits/sec  0.001 ms  0/9564 (0%)
[ 5] 1.00-2.00 sec  12.1 MBytes  101 Mbits/sec  0.002 ms  0/10567 (0%)
[ 5] 2.00-3.00 sec  11.9 MBytes  99.9 Mbits/sec  0.002 ms  0/10401 (0%)
[ 5] 3.00-4.00 sec  12.2 MBytes  102 Mbits/sec  0.000 ms  0/10654 (0%)
[ 5] 4.00-5.00 sec  11.7 MBytes  98.3 Mbits/sec  0.001 ms  0/10242 (0%)
[ 5] 5.00-6.00 sec  12.3 MBytes  103 Mbits/sec  0.001 ms  0/10727 (0%)
[ ID] Interval      Transfer     Bandwidth   Jitter    Lost/Totl  Datagrams
[ 5] 0.00-6.00 sec  60.0 Bytes  0.00 bits/sec  0.001 ms  0/65838 (0%)
iperf3: the client has terminated
Server listening on 5201

root@de3f4ff695f1: /
File Edit View Search Terminal Help
max_meter:4294967295 max_bands:1 max_color:0
band_types: drop
capabilities: kbps pktps burst stats
root@de3f4ff695f1:/# exit
exit
eric070021@ubuntu:~$ docker exec -it h1 bash
root@de3f4ff695f1:/# iperf3 -u -b 100M -c 20.0.1.1 --length 1200
Connecting to host 20.0.1.1, port 5201
[ 4] local 20.0.1.51 port 41141 connected to 20.0.1.1 port 5201
[ ID] Interval      Transfer     Bandwidth   Jitter    Lost/Totl  Datagrams
[ 4] 0.00-1.00 sec  10.9 MBytes  91.8 Mbits/sec  0.000 ms  0/9564 (0%)
[ 4] 1.00-2.00 sec  12.1 MBytes  101 Mbits/sec  0.000 ms  0/10567 (0%)
[ 4] 2.00-3.00 sec  11.9 MBytes  99.9 Mbits/sec  0.000 ms  0/10401 (0%)
[ 4] 3.00-4.00 sec  12.2 MBytes  102 Mbits/sec  0.000 ms  0/10654 (0%)
[ 4] 4.00-5.00 sec  11.7 MBytes  98.4 Mbits/sec  0.000 ms  0/10242 (0%)
[ 4] 5.00-6.00 sec  12.3 MBytes  103 Mbits/sec  0.000 ms  0/10727 (0%)
^C[ 4] 6.00-6.38 sec  4.21 MBytes  94.1 Mbits/sec  3683
[ ID] Interval      Transfer     Bandwidth   Jitter    Lost/Totl  Datagrams
[ 4] 0.00-6.38 sec  75.3 MBytes  99.1 Mbits/sec  0.000 ms  0/65838 (0%)
[ 4] Sent 65838 datagrams
iperf3: interrupt - the client has terminated
root@de3f4ff695f1:/#
```

After meter entry:

```
eric070021@ubuntu: ~/Desktop
File Edit View Search Terminal Help
Accepted connection from 20.0.1.51, port 40350
[ ID] Interval      Transfer     Bandwidth   Jitter    Lost/Totl  Datagrams
[ 5] 0.00-1.00 sec  332 KBytes  2.71 Mbits/sec  0.058 ms  8181/8464 (97%)
[ 5] 1.00-2.00 sec  118 KBytes  970 Kbits/sec  0.197 ms  10701/10802 (99%)
[ 5] 2.00-3.00 sec  118 KBytes  971 Kbits/sec  0.092 ms  10679/10780 (99%)
[ 5] 3.00-4.00 sec  118 KBytes  969 Kbits/sec  0.096 ms  10565/10666 (99%)
[ 5] 4.00-5.00 sec  117 KBytes  960 Kbits/sec  0.091 ms  9820/9920 (99%)
[ 5] 5.00-6.00 sec  117 KBytes  960 Kbits/sec  0.052 ms  9767/9867 (99%)
[ 5] 6.00-7.00 sec  118 KBytes  969 Kbits/sec  0.192 ms  10570/10671 (99%)
[ 5] 6.00-7.00 sec  118 KBytes  969 Kbits/sec  0.192 ms  10570/10671 (99%)
[ ID] Interval      Transfer     Bandwidth   Jitter    Lost/Totl  Datagrams
[ 5] 0.00-7.00 sec  600 Bytes  0.00 bits/sec  0.031 ms  74276/75283 (99%)

root@de3f4ff695f1: /
File Edit View Search Terminal Help
root@de3f4ff695f1:/# iperf3 -u -b 100M -c 20.0.1.1 --length 1200
Connecting to host 20.0.1.1, port 5201
[ 4] local 20.0.1.51 port 52235 connected to 20.0.1.1 port 5201
[ ID] Interval      Transfer     Bandwidth   Jitter    Lost/Totl  Datagrams
[ 4] 0.00-1.00 sec  10.8 MBytes  90.8 Mbits/sec  0.000 ms  0/9475 (0%)
[ 4] 1.00-2.00 sec  12.0 MBytes  100 Mbits/sec  0.000 ms  0/10457 (0%)
[ 4] 2.00-3.00 sec  11.9 MBytes  100 Mbits/sec  0.000 ms  0/10418 (0%)
[ 4] 3.00-4.00 sec  11.9 MBytes  100 Mbits/sec  0.000 ms  0/10420 (0%)
[ 4] 4.00-5.00 sec  11.9 MBytes  99.9 Mbits/sec  0.000 ms  0/10411 (0%)
[ 4] 5.00-6.00 sec  11.8 MBytes  99.1 Mbits/sec  0.000 ms  0/10323 (0%)
[ 4] 6.00-7.00 sec  12.0 MBytes  101 Mbits/sec  0.000 ms  0/10502 (0%)
^C[ 4] 7.00-7.37 sec  4.71 MBytes  107 Mbits/sec  4119
[ ID] Interval      Transfer     Bandwidth   Jitter    Lost/Totl  Datagrams
[ 4] 0.00-7.37 sec  87.1 MBytes  99.2 Mbits/sec  0.000 ms  0/76125 (0%)
[ 4] Sent 76125 datagrams
iperf3: interrupt - the client has terminated
root@de3f4ff695f1:/#
```