

Project 1: Part 1  
Bradly T Booth  
20220508

## Question 1: Ping

### 1) Screenshot of Output:

```
brad@betsyU:~/ECS_152a$ python3 udp_ping_BradlyTBooth_919346279.py
Packet 1: Pinging 173.230.149.18
Message: b'PING' recieved from ('173.230.149.18', 12000). Round Trip Time: 0.02267599105834961
Packet 2: Pinging 173.230.149.18
Message: b'PING' recieved from ('173.230.149.18', 12000). Round Trip Time: 0.018771648406982422
Packet 3: Pinging 173.230.149.18
Message: b'PING' recieved from ('173.230.149.18', 12000). Round Trip Time: 0.017986059188842773
Packet 4: Pinging 173.230.149.18
Message: b'PING' recieved from ('173.230.149.18', 12000). Round Trip Time: 0.020030736923217773
Packet 5: Pinging 173.230.149.18
Message: b'PING' recieved from ('173.230.149.18', 12000). Round Trip Time: 0.018896102905273438
Packet 6: Pinging 173.230.149.18
Message: b'PING' recieved from ('173.230.149.18', 12000). Round Trip Time: 0.020044565200805664
Packet 7: Pinging 173.230.149.18
Message: b'PING' recieved from ('173.230.149.18', 12000). Round Trip Time: 0.018970966339111328
Packet 8: Pinging 173.230.149.18
Message: b'PING' recieved from ('173.230.149.18', 12000). Round Trip Time: 0.018961429595947266
Packet 9: Pinging 173.230.149.18
Message: b'PING' recieved from ('173.230.149.18', 12000). Round Trip Time: 0.01892995834350586
Packet 10: Pinging 173.230.149.18
Message: b'PING' recieved from ('173.230.149.18', 12000). Round Trip Time: 0.019495725631713867

Ping Statistics: Packets Sent: 10, Packets Received: 10, Packets Lost: 0
Max RTT: 0.02267599105834961 seconds.
Min RTT: 0.017986059188842773 seconds.
Sum RTT: 0.19476318359375 seconds.
Average RTT: 0.019476318359375 seconds.
brad@betsyU:~/ECS_152a$
```

2) 10 Packets were delivered; 0 Packets were lost.

3) Min RTT  $\approx$  18 ms

Max RTT  $\approx$  23 ms

Average RTT  $\approx$  19 ms

Sum of RTT  $\approx$  0.19 seconds

4) WireShark Screenshot:

ip.addr==173.230.149.18								
No.	Time	Source	Destination	Protocol	Length	Info		
15531	148.973609920	173.230.149.18	10.0.0.186	LLC	56	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15529	148.954551397	173.230.149.18	10.0.0.186	LLC	56	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15527	148.935585379	173.230.149.18	10.0.0.186	LLC	56	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15525	148.916606246	173.230.149.18	10.0.0.186	LLC	56	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15521	148.896127815	173.230.149.18	10.0.0.186	LLC	56	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15519	148.872999177	173.230.149.18	10.0.0.186	LLC	56	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15515	148.853569920	173.230.149.18	10.0.0.186	LLC	56	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15513	148.833648599	173.230.149.18	10.0.0.186	LLC	56	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15511	148.814467328	173.230.149.18	10.0.0.186	LLC	56	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15509	148.794523674	173.230.149.18	10.0.0.186	LLC	56	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15508	148.954643153	10.0.0.186	173.230.149.18	LLC	46	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15528	148.935668629	10.0.0.186	173.230.149.18	LLC	46	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15526	148.916659378	10.0.0.186	173.230.149.18	LLC	46	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15522	148.896210935	10.0.0.186	173.230.149.18	LLC	46	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15520	148.873081155	10.0.0.186	173.230.149.18	LLC	46	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15516	148.853659703	10.0.0.186	173.230.149.18	LLC	46	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15514	148.834052835	10.0.0.186	173.230.149.18	LLC	46	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15512	148.814494851	10.0.0.186	173.230.149.18	LLC	46	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15510	148.794575373	10.0.0.186	173.230.149.18	LLC	46	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		
15508	148.773721341	10.0.0.186	173.230.149.18	LLC	46	I P, N(R)=35, N(S)=39; DSAP 0x50 Individual, SSAP 0x48 Response		

▶ Frame 15531: 56 bytes on wire (448 bits), 56 bytes captured (448 bits) on interface wlp3s0, id 0  
 ▶ Ethernet II, Src: ARRISGro\_73:a3:70 (9c:34:26:73:a3:70), Dst: IntelCor\_84:95:68 (38:68:93:84:95:68)  
 ▶ Internet Protocol Version 4, Src: 173.230.149.18, Dst: 10.0.0.186  
 ▶ User Datagram Protocol, Src Port: 12000, Dst Port: 49702  
 ▶ Logical-Link Control

Filter: "ip.addr == 173.230.149.18"

This filter catches all packets sent to the host and received by the host. As you can see, there are 20 packets; 10 that were sent by me and 10 sent by host.

## Question 2: Iperf

### 5) Iperf Output Screenshot:

```
brad@betsyU:~/ECS_152a$ python3 udp_iperf.py
Received %: 0
Received %: 1
Received %: 1
Received %: 1
Received %: 2
Received %: 2
Received %: 2
Received %: 3
Received %: 3
Received %: 3
Received %: 3
Received %: 4
Received %: 4
Received %: 4
Received %: 5
Received %: 5
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Received %: 97
Received %: 98
Received %: 98
Received %: 98
Received %: 99
Received %: 99
Received %: 99
Received %: 100
Received %: 100
Received %: 100
Time elapsed: 6.474169015884399 seconds
File Size: 1300000 bytes
Throughput: 200797.970644641 bytes per second
brad@betsyU:~/ECS_152a$
```

## 6) Wireshark Screenshot:

ip.addr == 173.230.149.18

No.	Time	Source	Destination	Protocol	Length	Info
5	4.915581982	10.0.0.186	173.230.149.18	UDP	46	40391 → 5007 Len=4
6	4.940615433	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=88b8) [Reassembled in #8]
7	4.940615723	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=88b8) [Reassembled in #8]
8	4.940615783	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
9	4.959169264	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=88bb) [Reassembled in #11]
10	4.959169605	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=88bb) [Reassembled in #11]
11	4.959536663	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
12	4.978299292	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=88c0) [Reassembled in #14]
13	4.978299512	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=88c0) [Reassembled in #14]
14	4.978297596	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
15	4.998258996	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=88c3) [Reassembled in #17]
16	4.998258347	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=88c3) [Reassembled in #17]
17	4.998691590	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
19	5.019773963	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=88c5) [Reassembled in #21]
20	5.019773303	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=88c5) [Reassembled in #21]
21	5.020695596	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
22	5.039197992	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=88c8) [Reassembled in #24]
23	5.039198232	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=88c8) [Reassembled in #24]
24	5.039532468	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
25	5.059191673	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=88ce) [Reassembled in #27]
26	5.059191913	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=88ce) [Reassembled in #27]
27	5.059499659	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
952	11.192091321	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
953	11.211715838	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=8d1d) [Reassembled in #955]
954	11.211716069	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=8d1d) [Reassembled in #955]
955	11.212167227	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
956	11.232132160	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=8d20) [Reassembled in #958]
957	11.232132450	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=8d20) [Reassembled in #958]
958	11.232132480	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
959	11.253547662	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=8d23) [Reassembled in #961]
960	11.253547963	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=8d23) [Reassembled in #961]
961	11.254345670	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
962	11.272560674	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=8d26) [Reassembled in #964]
963	11.272560955	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=8d26) [Reassembled in #964]
964	11.272898563	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
965	11.293545118	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=8d2d) [Reassembled in #967]
966	11.293545409	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=8d2d) [Reassembled in #967]
967	11.293960978	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
968	11.313479012	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=8d33) [Reassembled in #970]
969	11.313479293	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=8d33) [Reassembled in #970]
970	11.314128407	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
971	11.334966974	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=8d35) [Reassembled in #973]
972	11.335283897	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=8d35) [Reassembled in #973]
973	11.335284207	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
974	11.354613251	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=8d38) [Reassembled in #976]
975	11.354613541	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=8d38) [Reassembled in #976]
976	11.355038109	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
977	11.374752485	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=8d3b) [Reassembled in #979]
978	11.374752786	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=1480, ID=8d3b) [Reassembled in #979]
979	11.375058167	173.230.149.18	10.0.0.186	UDP	1150	5007 → 40391 Len=4068
980	11.393659496	173.230.149.18	10.0.0.186	IPv4	1514	Fragmented IP protocol (proto=UDP 17, off=0, ID=8d40) [Reassembled in #981]
981	11.393659697	173.230.149.18	10.0.0.186	UDP	870	5007 → 40391 Len=2308

Frame (870 bytes) Reassembled IPv4 (2316 bytes)

Bytes 0-869: Frame (frame)

Packets: 2954 · Displayed: 960 (32.5%)

Profile: Default

981 – 5 = 976.

Received 976 packets.

Filter = "ip.addr == 173.230.149.18"

7) Total Time  $\approx$  6.5 seconds

8) Throughput  $\approx$  200,798 bytes per second