Computer - Network

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Enrolments Number : SAU/CS(M)/2021/26

Subject : Computer - Network

MSc (Computer Science) – 2nd semester

Computer Network Assignment work

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(a) What is the option required to specify the number of echo requests to send with ping?

Answer -

Ping command	What the Command Does
c (count)	Limits the number of send request

```
manish@Mrs-MacBook-Air ~ % ping -c 5 www.nseindia.com
PING www.nseindia.com (23.8.184.103): 56 data bytes
64 bytes from 23.8.184.103: icmp_seq=0 ttl=54 time=37.576 ms
64 bytes from 23.8.184.103: icmp_seq=1 ttl=54 time=38.394 ms
64 bytes from 23.8.184.103: icmp_seq=2 ttl=54 time=38.931 ms
64 bytes from 23.8.184.103: icmp_seq=3 ttl=54 time=38.160 ms
64 bytes from 23.8.184.103: icmp_seq=4 ttl=54 time=38.215 ms

--- www.nseindia.com ping statistics ---
5 packets transmitted, 5 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 37.576/38.255/38.931/0.435 ms
manish@Mrs-MacBook-Air ~ % ping -c 3 8.8.8.8
PING 8.8.8.8 (8.8.8.8): 56 data bytes
64 bytes from 8.8.8.8: icmp_seq=0 ttl=56 time=8.172 ms
64 bytes from 8.8.8.8: icmp_seq=1 ttl=56 time=7.590 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=56 time=8.477 ms

--- 8.8.8.8 ping statistics ---
3 packets transmitted, 3 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 7.590/8.080/8.477/0.368 ms
manish@Mrs-MacBook-Air ~ %
```

-c specifies the number of echo request as indicated by the -c

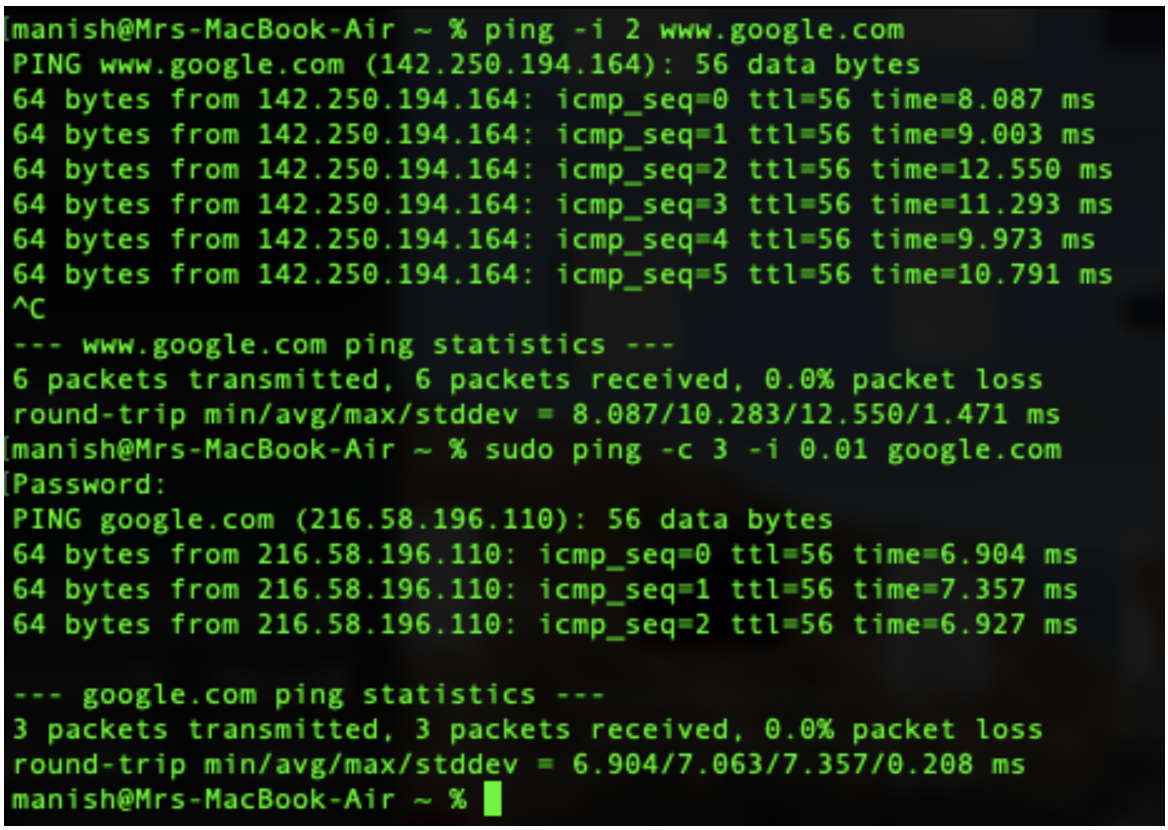
Count variable, to be send (and received)

Example: manish@Mrs-MacBook-Air ~ % ping -c 5 www.nseindia.com

(if you . Run this command it send echo request and received till you not stop but if you use **ping -c 2 www.google.com** then after sending and receiving two echo request it automatically stop.

(b) What is the option required to set time interval (in seconds), rather than the default one second interval, between two successive ping ECHO_REQUESTs?

Answer - By default ping waits for 1 second before sending the next packet.



You can increase or decrease this using option **-i**

Example:

Wait for 2 seconds before sending the next packet

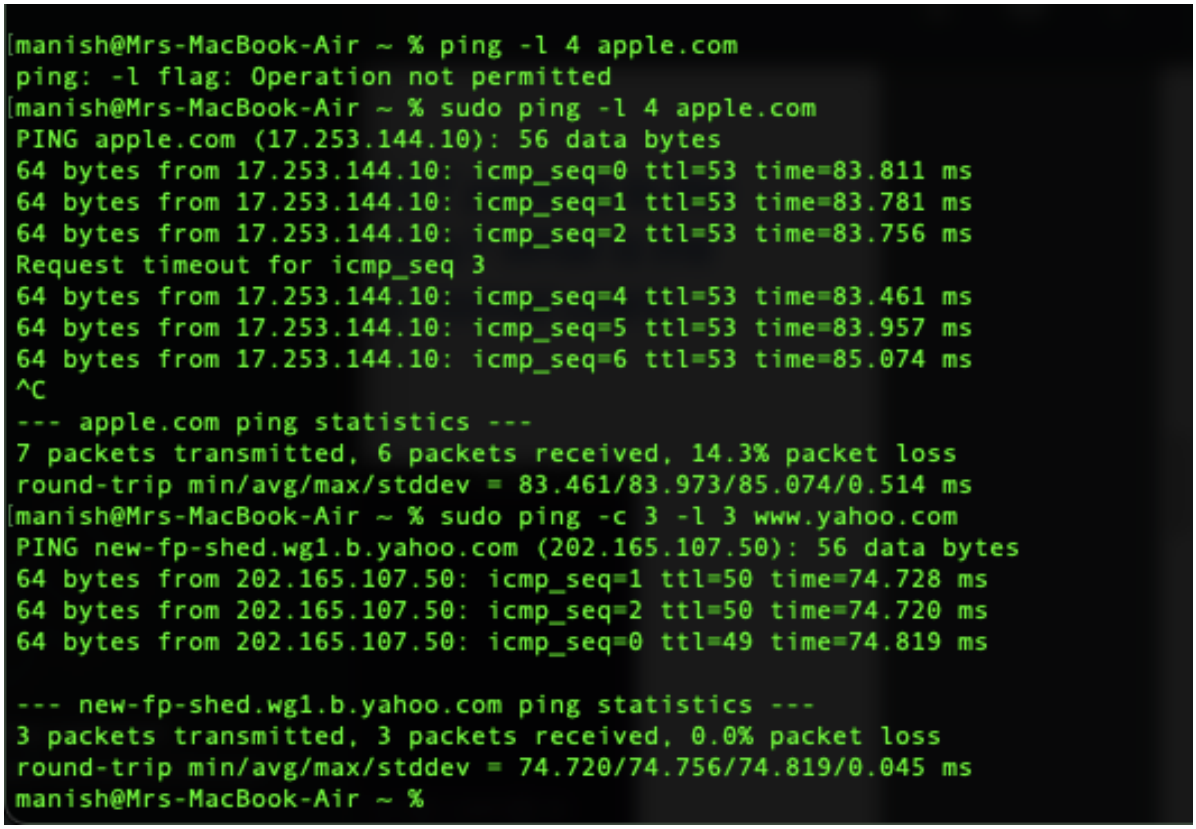
manish@Mrs-MacBook-Air ~ % **ping -i 5 www.google.com**

Only super user can specify interval less than 0.01 seconds. manish@Mrs-MacBook-Air ~ % **ping -i -0.1 www.google.com**

(c) What is the command to send ECHO_REQUEST packets to the destination one after another without waiting for a reply? What is the limit for sending such ECHO_REQUEST packets by normal users (not super user)?

Answer - **-l preload**

If preload is specified, ping sends that many packets as fast as possible before falling into its normal mode of behaviour. Only the super-user may use this option

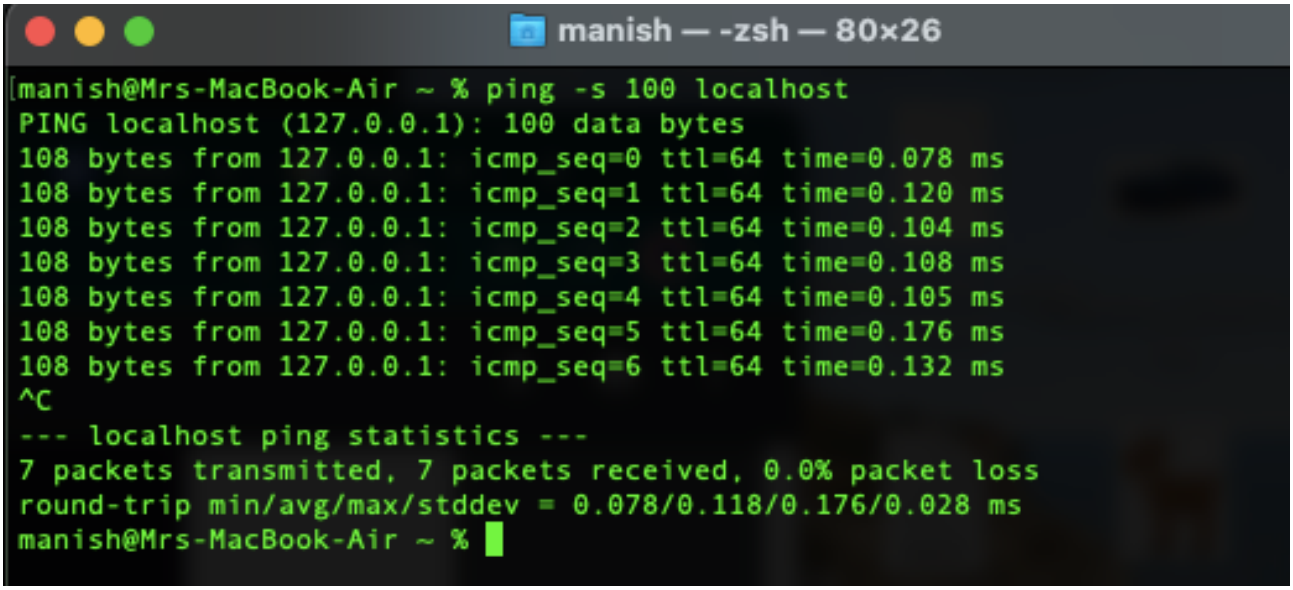


Example:

manish@Mrs-MacBook-Air ~ % sudo ping -l 4 apple.com

(d) What is the command to set the ECHO_REQUEST packet size (in bytes)? If the PacketSize is set to 64 bytes, what will be the total packet size?

Answer - change the packet size of ping command using -s option. But An ICMP packet consists of an 8-byte ICMP header followed by the ICMP packet data, for that if the packet size is set to 100 bytes, then the total packet size will be 108 bytes.



Example:

manish@Mrs-MacBook-Air ~ % **ping -s 100 localhost**

PING localhost (127.0.0.1): 100 data bytes
manish@Mrs-MacBook-Air ~ % ping -s 100 localhost
PING localhost (127.0.0.1): 100 data bytes
108 bytes from 127.0.0.1: icmp_seq=0 ttl=64 time=0.078 ms
108 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.120 ms
108 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.104 ms
108 bytes from 127.0.0.1: icmp_seq=3 ttl=64 time=0.108 ms
108 bytes from 127.0.0.1: icmp_seq=4 ttl=64 time=0.105 ms
108 bytes from 127.0.0.1: icmp_seq=5 ttl=64 time=0.176 ms
108 bytes from 127.0.0.1: icmp_seq=6 ttl=64 time=0.132 ms
^C
--- localhost ping statistics ---
7 packets transmitted, 7 packets received, 0.0% packet loss
round-trip min/avg/max/stddev = 0.078/0.118/0.176/0.028 ms

Q2.

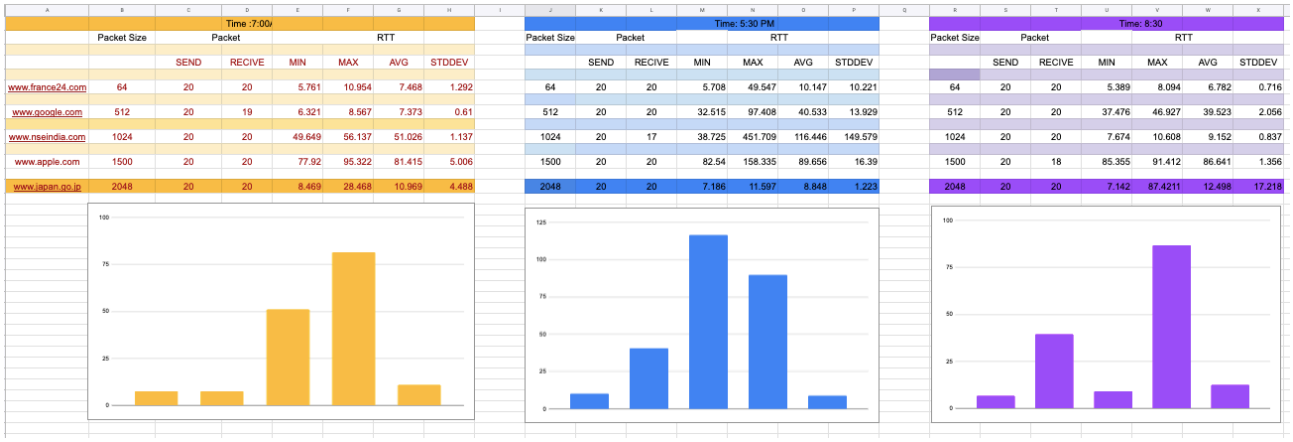
Select five hosts of your choice in the Internet (mention the list in your report) and experiment with pinging each host 20 times (i.e., one invocation with 20 ECHO_REQUESTs) at three different hours of the day. Check if there exist cases, which shows packet loss greater than 0% and provide reasoning. Find out average RTT for each host and explain whether measured RTTs are strongly or weakly correlated with the geographical distance of the hosts? Pick one of the above used hosts and repeat the experiment with different packet sizes ranging from 64-bytes to 2048-bytes. Plot the average RTT and explain how change in packet size and time of the day impacts RTT

Answer-

five hosts I select that are : **www.france24.com** , **www.google.com** , **www.nseindia.com** , **www.apple.com** , **www.japan.go.jp**

A router, switch, firewall or other system on the internet has more traffic coming at it than it can't handle. One standard way to deal with such congestion is to drop packets -- just throw them away to focus capacity on the rest of the traffic. Intentionally dropped packets are the No. 1 source of packet loss on the internet. Other causes include equipment failure, equipment degradation and transmission errors due to interference, especially with wireless connections
There is a positive correlation between distance and RTT. There are a number of reasons for this. For example, an increased hop count. The packets have to through more routers, at each router there may be a delay, the more routers, the longer the RTT.

For Graph Click Hare



Time :7:00

	Packet Size	Packet		RTT			
		SEND	RECIVE	MIN	MAX	AVG	STDDEV
www.france24.com	64	20	20	5.761	10.954	7.468	1.292
www.google.com	512	20	19	6.321	8.567	7.373	0.61
www.nseindia.com	1024	20	20	49.649	56.137	51.026	1.137
www.apple.com	1500	20	20	77.92	95.322	81.415	5.006
www.japan.go.jp	2048	20	20	8.469	28.468	10.969	4.488

Time: 5:30 PM

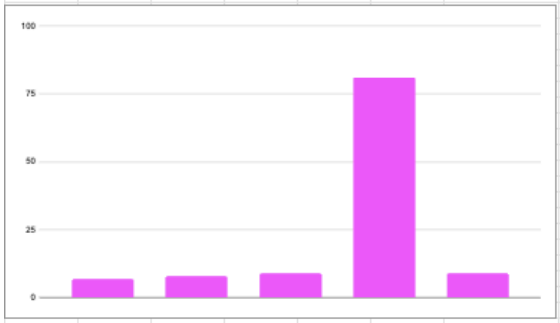
Packet Size	Packet		RTT			
	SEND	RECIVE	MIN	MAX	AVG	STDDEV
64	20	20	5.708	49.547	10.147	10.221
512	20	20	32.515	97.408	40.533	13.929
1024	20	17	38.725	451.709	116.446	149.579
1500	20	20	82.54	158.335	89.656	16.39
2048	20	20	7.186	11.597	8.848	1.223

Time: 8:30

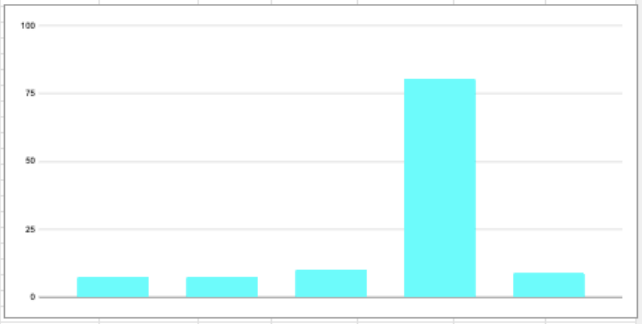
Packet Size	Packet		RTT			
	SEND	RECIVE	MIN	MAX	AVG	STDDEV
64	20	20	5.389	8.094	6.782	0.716
512	20	20	37.476	46.927	39.523	2.056
1024	20	20	7.674	10.608	9.152	0.837
1500	20	18	85.355	91.412	86.641	1.356
2048	20	20	7.142	87.4211	12.498	17.218

For Graph Click Hare

Time: 11:30						
Packet Size	Packet		RTT			
	SEND	RECIVE	MIN	MAX	AVG	STDDEV
64	20	20	5.546	8.058	6.693	0.699
512	20	20	6.638	9.031	7.636	0.685
1024	20	20	7.747	12.32	8.913	1.017
1500	20	20	79.778	84.564	80.985	1.24
2048	20	20	7.284	12.945	8.681	1.215



Time:2:30						
Packet Size	Packet		RTT			
	SEND	RECIVE	MIN	MAX	AVG	STDDEV
64	20	20	5.803	10.994	7.435	1.271
512	20	20	6.361	9.012	7.554	0.727
1024	20	20	7.566	38.956	10.225	6.614
1500	20	20	78.287	84.251	80.251	1.241
2048	20	20	6.993	16.596	8.834	1.982



Q3. Select an IP address (eg, 202.141.80.14) of your choice connected in the Intranet (mention the list in your report). Capture the outcome of 1,000 ping ECHO_REQUESTs in to separate files by executing the following ping commands.
- ping -n <IP Address>
- ping -p ff00 <IP Address>

(a) What was the packet loss rate for each command?

Answer -

Test -1: manish@Mrs-MacBook-Air ~ % ping -n -c 1000 -i 0.1 17.253.144.10

17.253.144.10 ping statistics ---

1000 packets transmitted, 970 packets received, 3.0% packet loss

— —

manish@Mrs-MacBook-Air ~ % ping -p ff00 -c 1000 -i 0.1 17.253.144.10

--- 17.253.144.10 ping statistics —
1000 packets transmitted, 960 packets received, 4.0% packet loss

Test -2: manish@Mrs-MacBook-Air ~ % ping -n -c 1000 -i 0.1 17.253.144.10

—- 17.253.144.10 ping statistics ---

1000 packets transmitted, 954 packets received, 4.6% packet loss

——

manish@Mrs-MacBook-Air ~ % ping -p ff00 -c 1000 -i 0.1 17.253.144.10

--- 17.253.144.10 ping statistics —

1000 packets transmitted, 972 packets received, 2.8% packet loss

****

Test -3: manish@Mrs-MacBook-Air ~ % ping -n -c 1000 -i 0.1 17.253.144.10

17.253.144.10 ping statistics ---

1000 packets transmitted, 959 packets received, 4.1% packet loss

——

manish@Mrs-MacBook-Air ~ % ping -p ff00 -c 1000 -i 0.1 17.253.144.10

--- 17.253.144.10 ping statistics —

1000 packets transmitted, 974 packets received, 2.6% packet loss

(b) What was the minimum, maximum, mean, and median latency/Round Trip Time (RTT) of the pings that succeeded?

Test 1: manish@Mrs-MacBook-Air ~ % ping -n -c 1000 -i 0.1 17.253.144.10

--- 17.253.144.10 ping statistics ---

1000 packets transmitted, 970 packets received, 3.0% packet loss
round-trip min =78.122
Average : 86.249
Max : 505.506
Stddev: 31.994 ms

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manish@Mrs-MacBook-Air ~ % ping -p ff00 -c 1000 -i 0.1 17.253.144.10

--- 17.253.144.10 ping statistics ---

1000 packets transmitted, 960 packets received, 4.0% packet loss
round-trip min =78.374
Average : 93.364
Max : 785.965
Stddev: 50.574 ms

Test 2: manish@Mrs-MacBook-Air ~ % ping -n -c 1000 -i 0.1 17.253.144.10

--- 17.253.144.10 ping statistics ---

1000 packets transmitted, 954 packets received,4.6% packet loss
round-trip min =78.387
Average : 87.943
Max : 526.043
Stddev: 33.024 ms

---

manish@Mrs-MacBook-Air ~ % ping -p ff00 -c 1000 -i 0.1 17.253.144.10

--- 17.253.144.10 ping statistics ---

1000 packets transmitted, 972 packets received, 2.8% packet loss
round-trip min =78.409
Average : 94.256
Max : 730.572
Stddev: 61.793 ms

****

Test 3: manish@Mrs-MacBook-Air ~ % ping -n -c 1000 -i 0.1 17.253.144.10

--- 17.253.144.10 ping statistics ---

1000 packets transmitted, 959 packets received, 4.1% packet loss
round-trip min =78.753
Average : 84.111
Max : 136.944
Stddev: 7.323 ms

---

manish@Mrs-MacBook-Air ~ % ping -p ff00 -c 1000 -i 0.1 17.253.144.10

--- 17.253.144.10 ping statistics ---

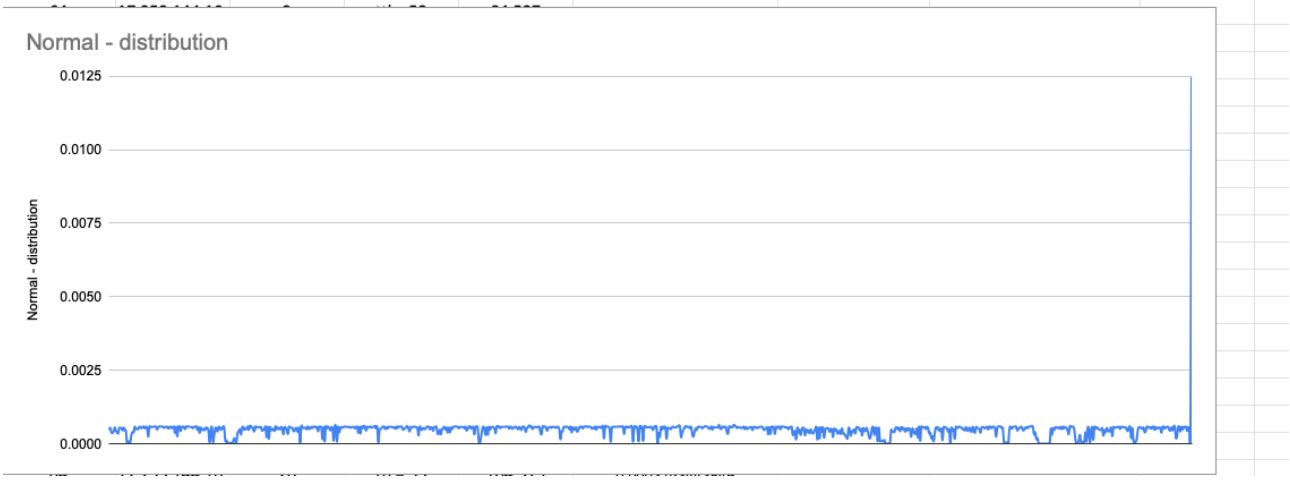
1000 packets transmitted, 974packets received, 2.6% packet loss
round-trip min =81.182
Average : 85.291
Max : 142.658
Stddev: 6.728 ms

(c) Plot graphs to visualize the normal distribution of the ping latencies. The goal here is to find a method to present the data in a way that is clear and easy to understand.

Answer - For graph Click Hare

manish@Mrs-MacBook-Air ~ % ping -n -c 1000 -i 0.1 17.253.144.10

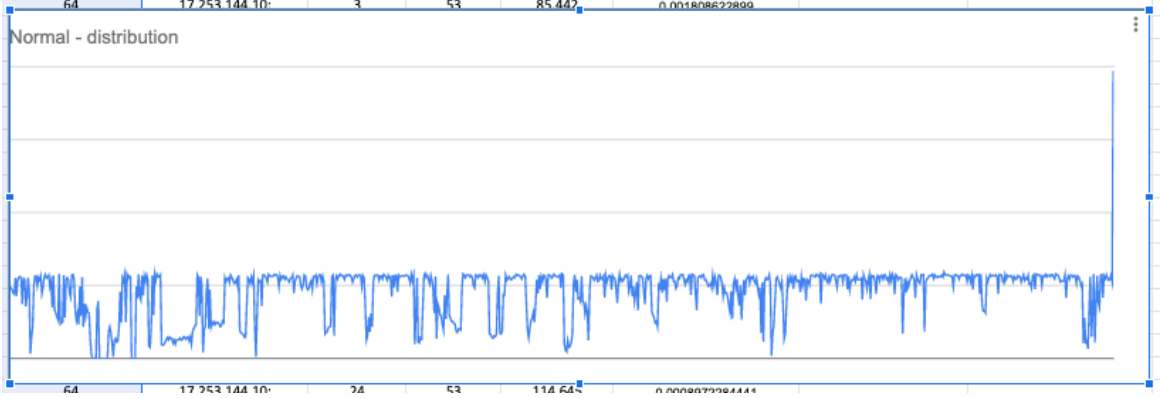
DATA in Bytes	IP Address	Icmp_seq	TTL	Time (ms)	Normal - distribution	mean	Sandard deviation
64	17.253.144.10:	0	ttl = 53	79.994	0.0004685771852	86.24850206	32.01005264
64	17.253.144.10:	1	ttl = 53	81.996	0.0005383783436		
64	17.253.144.10:	2	ttl = 53	80.242	0.0003811562243		



manish@Mrs-MacBook-Air ~ % ping -p ff00 -c 1000 -i 0.1 17.253.144.10

For graph Click Hare

DATA in Bytes	IP Address	Icmp_seq	TTL	Time (ms)	Normal - distribution	mean	Sandard deviation
64	17.253.144.10:	0	53	84.819	0.001947073085	93.36392083	50.60021361
64	17.253.144.10:	1	53	84.626	0.001951194595		
64	17.253.144.10:	2	53	84.562	0.001895014927		
64	17.253.144.10:	3	53	85.447	0.001808622899		



64	17.253.144.10:	24	53	114.645	0.000897228444		

(d) Describe the significant network behavior you observed between the two experiments. The two scenarios were set up to be very similar except for two aspects. Describe your answer precisely, as best as you can.

Answer -

- manish@Mrs-MacBook-Air ~ % ping -n -c 1000 -i 0.1 17.253.144.10
  -n Numeric output only. No attempt will be made to lookup symbolic names for host addresses. i.e , no DNS name resolution takes place. Which enhances the Round Trip TIme(RTT) for packet transfer.

- manish@Mrs-MacBook-Air ~ % ping -p ff00 -c 1000 -i 0.1 17.253.144.10
  - p pattern
  You may specify up to 16 “pad” bytes to fill out the packet you send. This is useful for diagnosing data-dependent problems in a network. For example, “-p ff” will cause the sent packet to be filled with all ones
  This is useful for diagnosing data-dependent problems in a network.
  In the above example, -p ff00 will cause the sent packet to be filled with 16 ones and 16 zeros

_____***_____***_____***_____

END