

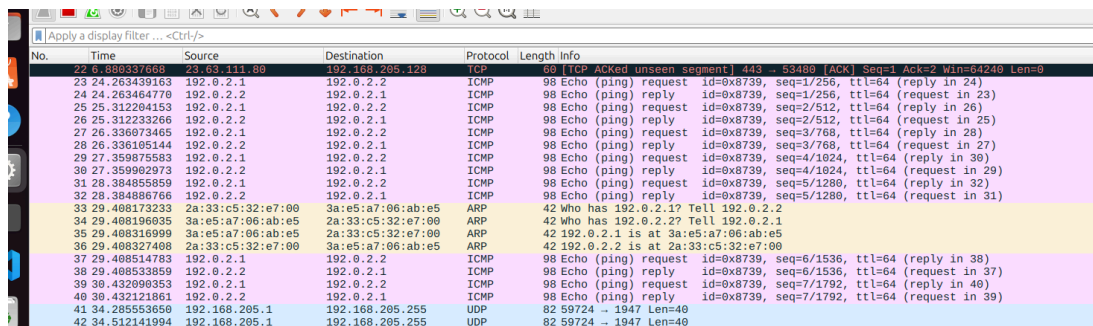
Lab Assignment 2

B21140 / Swarnarup

1. Create four network namespaces, say NetNsA ... NetNsD. In each of these, create one network interface. Experiment with the following:

- Run ping between NetNsA and NetNsB. Observe the traffic using Wireshark.
- Add a queue discipline with fixed loss of say 20%, and run ping. Observe the traffic using Wireshark.

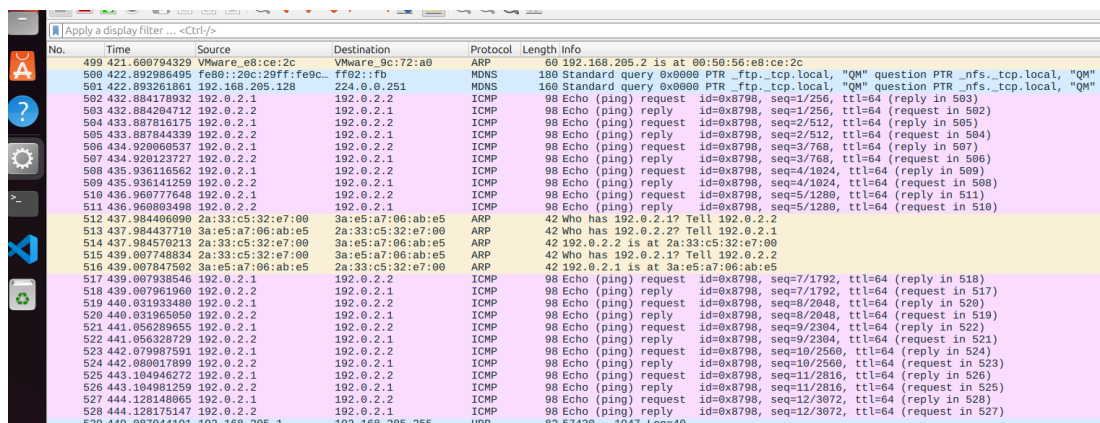
- a. Running the test.py script creates NetNsA to NetNsD, 4 namespaces and corresponding macvlan1 to macvlan4 are created and assigned to each namespaces. Now NetNsA ping to NetNsB and check through wireshark.



No.	Time	Source	Destination	Protocol	Length	Info
23	24.263439163	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8739, seq=1/256, ttl=64 (reply in 24)
24	24.263464770	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8739, seq=1/256, ttl=64 (request in 23)
25	25.312204153	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8739, seq=2/512, ttl=64 (reply in 26)
26	25.312233266	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8739, seq=2/512, ttl=64 (request in 25)
27	26.336973465	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8739, seq=3/768, ttl=64 (reply in 28)
28	26.336105144	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8739, seq=3/768, ttl=64 (request in 27)
29	27.359875583	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8739, seq=4/1024, ttl=64 (reply in 30)
30	27.359902973	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8739, seq=4/1024, ttl=64 (request in 29)
31	28.384855859	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8739, seq=5/1280, ttl=64 (reply in 32)
32	28.384886766	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8739, seq=5/1280, ttl=64 (request in 31)
33	29.408173233	2a:33:c5:32:e7:00	3a:e5:a7:06:ab:e5	ARP	42	Who has 192.0.2.1? Tell 192.0.2.2
34	29.408196935	3a:e5:a7:06:ab:e5	2a:33:c5:32:e7:00	ARP	42	Who has 192.0.2.2? Tell 192.0.2.1
35	29.408316999	3a:e5:a7:06:ab:e5	2a:33:c5:32:e7:00	ARP	42	192.0.2.1 is at 3a:e5:a7:06:ab:e5
36	29.408327468	2a:33:c5:32:e7:00	3a:e5:a7:06:ab:e5	ARP	42	192.0.2.2 is at 2a:33:c5:32:e7:00
37	29.408514753	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8739, seq=6/1536, ttl=64 (reply in 38)
38	29.408533859	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8739, seq=6/1536, ttl=64 (request in 37)
39	30.432090353	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8739, seq=7/1792, ttl=64 (reply in 40)
40	30.432121861	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8739, seq=7/1792, ttl=64 (request in 39)
41	34.285533650	192.168.205.1	192.168.205.255	UDP	82	59724 → 1947 Len=40
42	34.512141994	192.168.205.1	192.168.205.255	UDP	82	59724 → 1947 Len=40

- b. After adding a queue discipline with fixed loss of 20% for NetNsA the wireshark result:

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bhunia@bhunia-VMware-Virtual-Platform:~/Desktop/assignment2$ sudo ip netns exec NetNsA tc qdisc add dev macvlan1 root netem loss 20%
```



No.	Time	Source	Destination	Protocol	Length	Info
499	421.600794329	VMware_e8:ce:2c	VMware_9c:72:a0	ARP	60	192.168.205.2 is at 00:50:56:e8:ce:2c
500	422.892986495	fe80::20c:29ff:fe9c	ff02::fb	MDNS	180	Standard query 0x0000 PTR _ftp._tcp.local, "QM" question PTR _nfs._tcp.local, "QM" q
501	422.893261861	192.168.205.128	224.0.0.251	MDNS	160	Standard query 0x0000 PTR _ftp._tcp.local, "QM" question PTR _nfs._tcp.local, "QM" q
502	432.884178932	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8798, seq=1/256, ttl=64 (reply in 503)
503	432.884204712	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8798, seq=1/256, ttl=64 (request in 502)
504	433.887816175	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8798, seq=2/512, ttl=64 (reply in 505)
505	433.887841292	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8798, seq=2/512, ttl=64 (request in 504)
506	434.920606537	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8798, seq=3/768, ttl=64 (reply in 507)
507	434.920123727	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8798, seq=3/768, ttl=64 (request in 506)
508	435.936116562	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8798, seq=4/1024, ttl=64 (reply in 509)
509	435.936141259	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8798, seq=4/1024, ttl=64 (request in 508)
510	436.960777648	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8798, seq=5/1280, ttl=64 (reply in 511)
511	436.960803498	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8798, seq=5/1280, ttl=64 (request in 510)
512	437.984406909	2a:33:c5:32:e7:00	3a:e5:a7:06:ab:e5	ARP	42	Who has 192.0.2.1? Tell 192.0.2.2
513	437.984437710	3a:e5:a7:06:ab:e5	2a:33:c5:32:e7:00	ARP	42	Who has 192.0.2.2? Tell 192.0.2.1
514	437.984578213	2a:33:c5:32:e7:00	3a:e5:a7:06:ab:e5	ARP	42	192.0.2.2 is at 2a:33:c5:32:e7:00
515	439.007748834	2a:33:c5:32:e7:00	3a:e5:a7:06:ab:e5	ARP	42	Who has 192.0.2.1? Tell 192.0.2.2
516	439.007847592	3a:e5:a7:06:ab:e5	2a:33:c5:32:e7:00	ARP	42	192.0.2.1 is at 3a:e5:a7:06:ab:e5
517	439.007930546	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8798, seq=7/1792, ttl=64 (reply in 518)
518	439.007961960	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8798, seq=7/1792, ttl=64 (request in 517)
519	440.031933480	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8798, seq=8/2048, ttl=64 (reply in 520)
520	440.031965050	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8798, seq=8/2048, ttl=64 (request in 519)
521	441.056289655	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8798, seq=9/2304, ttl=64 (reply in 522)
522	441.056328729	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8798, seq=9/2304, ttl=64 (request in 521)
523	442.079987591	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8798, seq=10/2560, ttl=64 (reply in 524)
524	442.080017899	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8798, seq=10/2560, ttl=64 (request in 523)
525	443.104946272	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8798, seq=11/2816, ttl=64 (reply in 526)
526	443.104981259	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8798, seq=11/2816, ttl=64 (request in 525)
527	444.128140865	192.0.2.1	192.0.2.2	ICMP	98	Echo (ping) request id=0x8798, seq=12/3072, ttl=64 (reply in 528)
528	444.128175147	192.0.2.2	192.0.2.1	ICMP	98	Echo (ping) reply id=0x8798, seq=12/3072, ttl=64 (request in 527)
529	449.087044191	192.168.205.1	192.168.205.255	UDP	82	57420 → 1947 Len=40

Observations:

From the terminal alone we can see the ICMP packet loss that's happening during the ping request.

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bhunia@bhunia-VMware-Virtual-Platform:~/Desktop/assignment2$ sudo ip netns exec
NetNsA ping -I 192.0.2.1 192.0.2.2
[sudo] password for bhunia:
PING 192.0.2.2 (192.0.2.2) from 192.0.2.1 : 56(84) bytes of data.
64 bytes from 192.0.2.2: icmp_seq=1 ttl=64 time=0.050 ms
64 bytes from 192.0.2.2: icmp_seq=2 ttl=64 time=0.066 ms
64 bytes from 192.0.2.2: icmp_seq=3 ttl=64 time=0.076 ms
64 bytes from 192.0.2.2: icmp_seq=4 ttl=64 time=0.070 ms
64 bytes from 192.0.2.2: icmp_seq=5 ttl=64 time=0.088 ms
64 bytes from 192.0.2.2: icmp_seq=6 ttl=64 time=0.046 ms
64 bytes from 192.0.2.2: icmp_seq=7 ttl=64 time=0.080 ms
^C
--- 192.0.2.2 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6169ms
rtt min/avg/max/mdev = 0.046/0.068/0.088/0.014 ms

Setting the network namespace NetNsA failed: operation not permitted
bhunia@bhunia-VMware-Virtual-Platform:~/Desktop/assignment2$ sudo ip netns exec
NetNsA tc qdisc add dev macvlan1 root netem loss 20%
bhunia@bhunia-VMware-Virtual-Platform:~/Desktop/assignment2$ sudo ip netns exec
NetNsA ping -I 192.0.2.1 192.0.2.2
PING 192.0.2.2 (192.0.2.2) from 192.0.2.1 : 56(84) bytes of data.
64 bytes from 192.0.2.2: icmp_seq=1 ttl=64 time=0.053 ms
64 bytes from 192.0.2.2: icmp_seq=2 ttl=64 time=0.065 ms
64 bytes from 192.0.2.2: icmp_seq=3 ttl=64 time=0.131 ms
64 bytes from 192.0.2.2: icmp_seq=4 ttl=64 time=0.057 ms
64 bytes from 192.0.2.2: icmp_seq=5 ttl=64 time=0.058 ms
64 bytes from 192.0.2.2: icmp_seq=7 ttl=64 time=0.055 ms
64 bytes from 192.0.2.2: icmp_seq=8 ttl=64 time=0.073 ms
64 bytes from 192.0.2.2: icmp_seq=9 ttl=64 time=0.081 ms
64 bytes from 192.0.2.2: icmp_seq=10 ttl=64 time=0.069 ms
64 bytes from 192.0.2.2: icmp_seq=11 ttl=64 time=0.073 ms
64 bytes from 192.0.2.2: icmp_seq=12 ttl=64 time=0.062 ms
^C
--- 192.0.2.2 ping statistics ---
13 packets transmitted, 11 received, 15.3846% packet loss, time 12268ms
rtt min/avg/max/mdev = 0.053/0.070/0.131/0.020 ms
bhunia@bhunia-VMware-Virtual-Platform:~/Desktop/assignment2$ S
```

Without the qdisc out of 7 pkt sent 7 were received. With fixed loss queue discipline out of 13 pkts 11 received i.e. around 15% packet loss is happening.

Time taken has also increased from 6196ms to 12268ms. RTT has also been increased.

This shows that with increasing pkt loss, there will be increased delay and stability of the network will decrease.