Network Commands

	Registration Number	Surname	Forename	% Contribution
Student 1	001141646	Iz	Ekrem	25
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Task 1 →

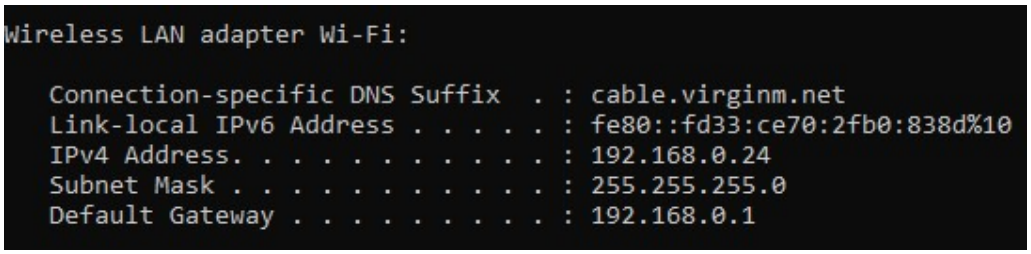
	Computer 1	Computer 2	Computer 3
IP Address	192.168.12.113	192.168.12.205	192.168.112.97
Subnet Mask	255.255.255.0	255.255.255.0	255.255.255.0
Default Gateway	192.168.12.1	192.168.12.1	192.168.112.1

Computer 1 and Computer 2 can communicate with each other. As we can see by analysing the subnet masks. The first three octets of all the three computers' IP addresses belong to network. Therefore, computer 3 has a different network address than computer 1 and computer 2. So, computer 3 cannot communicate with computer 1 and computer 2. However, as the computer 1

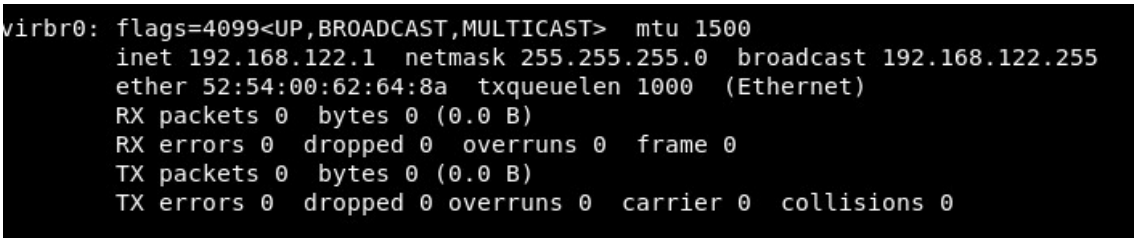
and computer 2 are on the same network, they can communicate between each other (Hunter, 2021).

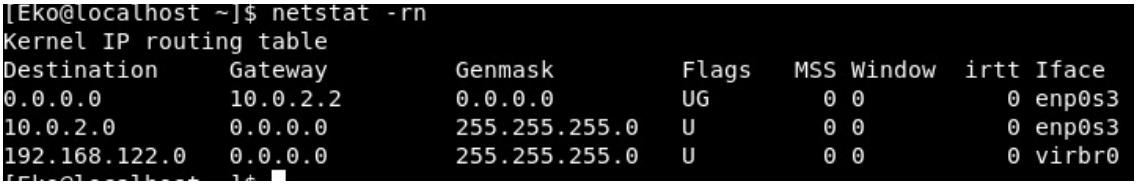
Task 2→

Windows→



CentOS7 →



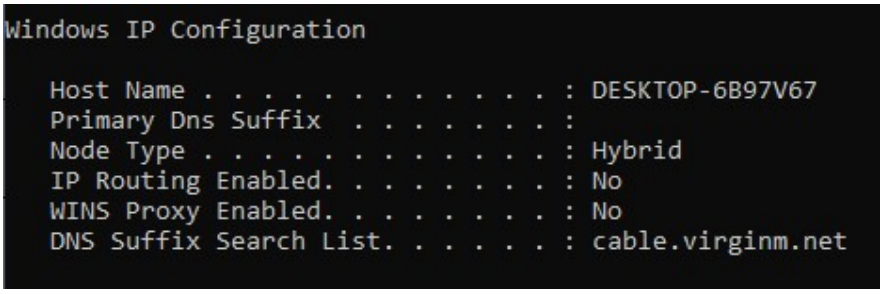


	Windows	CentOS 7
IPv4 Address	192.168.0.24	192.168.122.1
Subnet Mask	255.255.255.0	255.255.255.0
Default Gateway	192.168.0.1	0.0.0.0 → this means unspecified/there is no gateway.

Network Address	192.168.0.0	192.168.122.0
Broadcast Address	192.168.0.255	192.168.122.255
No. Hosts	Range between 192.168.0.0 – 192.168.0.255 → 256-2 = 254 hosts	Range between 192.168.122.0 – 192.168.122.255 → 256-2 = 254 hosts

Task 3 →

Windows →



```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . : cable.virginm.net
   Description . . . . . . . . . . . : Intel(R) Wi-Fi 6 AX200 160MHz
   Physical Address. . . . . . . . . : B8-9A-2A-DB-6C-B2
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::fd33:ce70:2fb0:838d%10(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.0.24(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Lease Obtained. . . . . . . . . . : 23 October 2021 00:02:20
   Lease Expires . . . . . . . . . . : 24 October 2021 16:17:24
   Default Gateway . . . . . . . . . : 192.168.0.1
   DHCP Server . . . . . . . . . . . : 192.168.0.1
   DHCPv6 IAID . . . . . . . . . . . : 179870250
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-27-F2-EA-CB-80-FA-5B-83-1F-AF
   DNS Servers . . . . . . . . . . . : 194.168.4.100
                                       194.168.8.100
   NetBIOS over Tcpip. . . . . . . . : Enabled
```

CentOS7 →

```
[Eko@localhost ~]$ hostname
localhost.localdomain
[Eko@localhost ~]$ cat /etc/resolv.conf
# Generated by NetworkManager
search cable.virginm.net
nameserver 194.168.4.100
nameserver 194.168.8.100
[Eko@localhost ~]$ netstat -rn
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
0.0.0.0         10.0.2.2        0.0.0.0         UG        0 0          0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U         0 0          0 enp0s3
192.168.122.0   0.0.0.0         255.255.255.0   U         0 0          0 virbr0
```

```
virbr0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 192.168.122.1  netmask 255.255.255.0  broadcast 192.168.122.255
        ether 52:54:00:62:64:8a  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

	Windows	CentOS 7
Host Name	DESKTOP-6B97V67	Localhost.localdomain
IPv4 Address	192.168.0.24	192.168.122.1
Subnet Mask	255.255.255.0	255.255.255.0
Default Gateway	192.168.0.1	0.0.0.0
DHCP Server	192.168.0.1	In Centos you cannot see DHCP address
DNS Servers	194.168.4.100 194.168.8.100	194.168.4.100 194.168.8.100
Physical Address	B8-9A-2A-DB-6C-B2	52:54:00:62:64:8a
NIC Manufacturer	Intel Corporate	No vendor exists(might be cause of using VirtualBox)

Task 4 →

a)

ping	Windows	CentOS 7
127.0.0.1	*Success!* Avg rtt = <0ms	*Success!* Avg rtt = 0.039ms

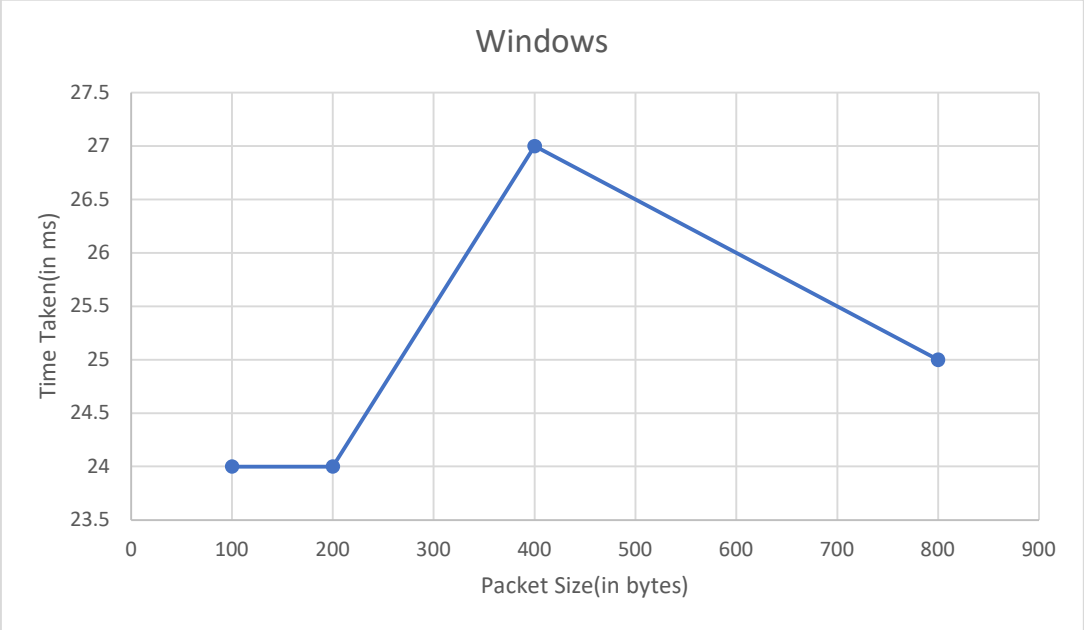
b)

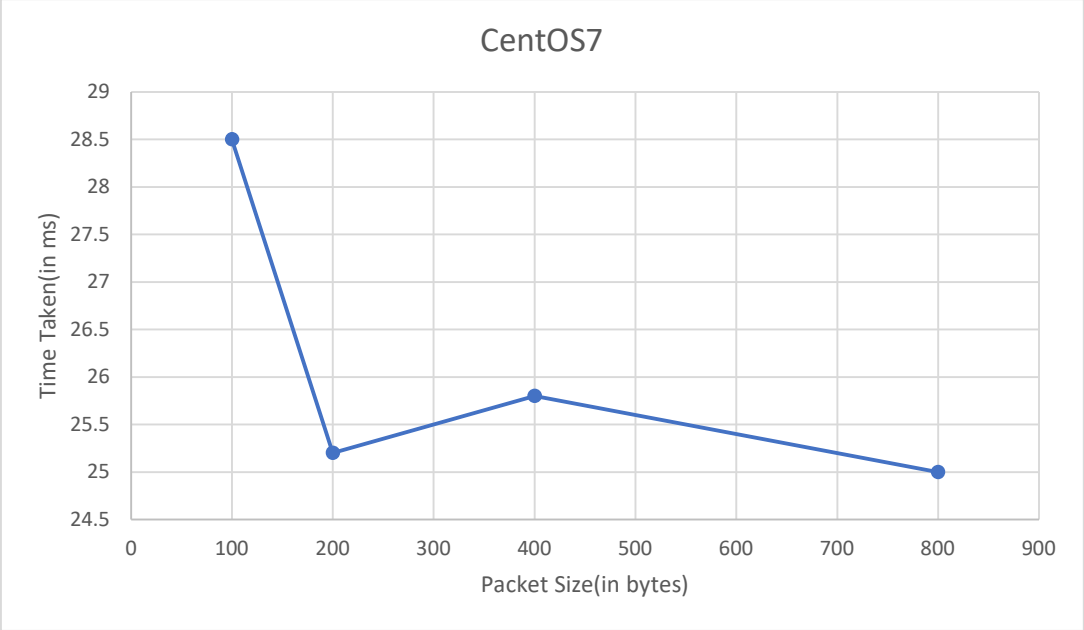
ping	Windows	CentOS 7
www.gre.ac.uk	Avg rtt = 15ms	Avg rtt = 16.486ms
www.sky.com	Avg rtt = 17ms	Avg rtt = 15.698ms
www.virgin.co.uk	Avg rtt = 25ms	Avg rtt = 13.621ms
www.cisco.com	Avg rtt = 16ms	Avg rtt = 18.416ms
www.microsoft.com	Avg rtt = 18ms	Avg rtt = 18.115ms

c)

ping	Windows	CentOS 7
Australia	www.abc.net.au Avg rtt = 20ms	www.abc.net.au Avg rtt = 17.249
Canada	www.canada.ca Avg rtt = 15ms	www.canada.ca Avg rtt = 15.237ms
South Africa	www.gov.za Avg rtt = 186ms	www.gov.za Avg rtt = 189.370ms

e) 10 datagrams have been sent to www.github.com starting from 100 bytes each time we doubled the packet size. Such as, 100, 200, 400 and so on.





We were unable to send 1600bytes packet.

The largest packet we could be able to send was 1450 bytes.

We thought that as we double the size of the packet, the time taken to deliver would increase. However, it didn't happen. As we can see in both graphs the time taken to deliver a packet randomly increasing and decreasing.

By looking at the graphs, the network performance has increased and decreased randomly regardless of the size of the packets.

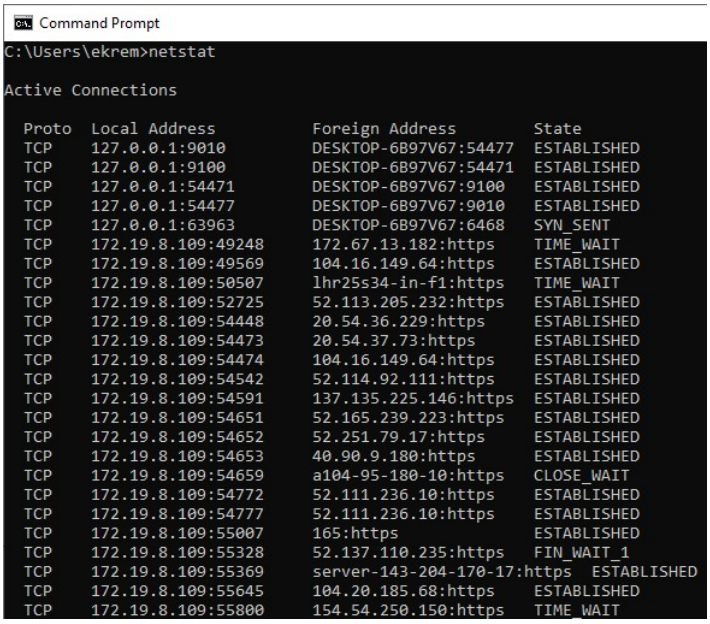
Task 5 →

# of hops	Windows	CentOS 7
Australia	www.abc.net.au 11 hops	www.abc.net.au 9 or more hops since it shows *** until 30
Canada	www.canada.ca 11 hops	www.canada.ca 9 or more hops since it shows *** until 30
South Africa	www.gov.za 17 hops	www.gov.za 15 or more hops since it shows *** until 30

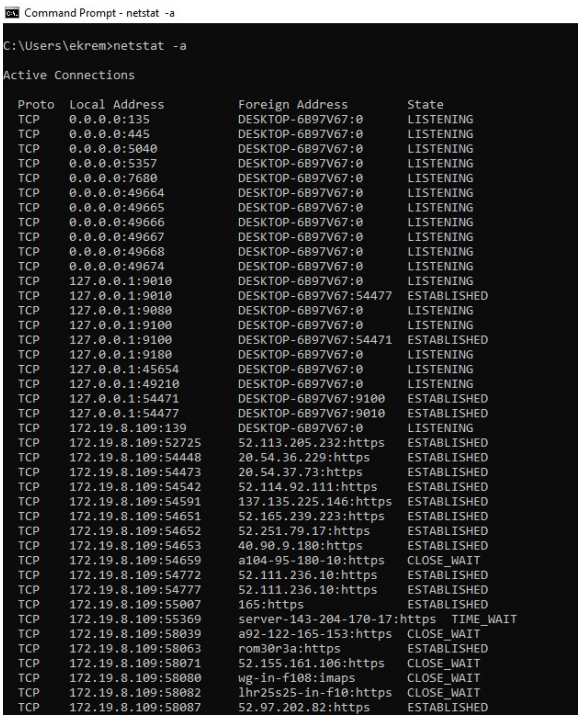
Task 6→

Windows:

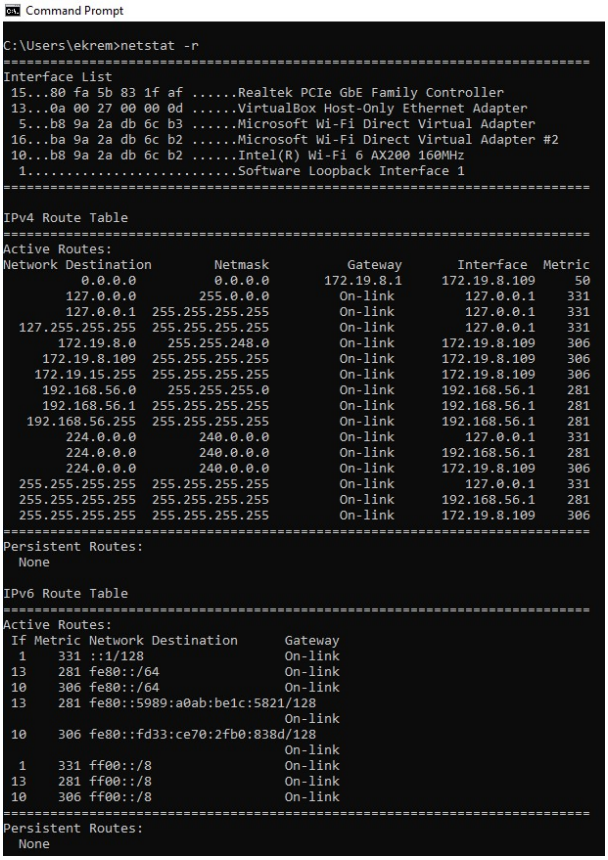
netstat command



netstat -a command



netstat -r command



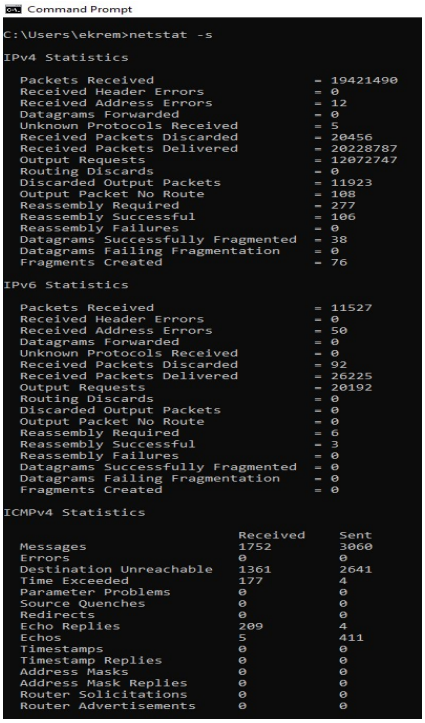
```
Command Prompt

C:\Users\ekrem>netstat -r
===========================================================================
Interface List
 15...80 fa 5b 83 1f af ......Realtek PCIe GbE Family Controller
 13...0a 00 27 00 00 0d ......VirtualBox Host-Only Ethernet Adapter
  5...b8 9a 2a db 6c b3 ......Microsoft Wi-Fi Direct Virtual Adapter
 16...ba 9a 2a db 6c b2 ......Microsoft Wi-Fi Direct Virtual Adapter #2
 10...b8 9a 2a db 6c b2 ......Intel(R) Wi-Fi 6 AX200 160MHz
  1...........................Software Loopback Interface 1
===========================================================================

IPv4 Route Table
===========================================================================
Active Routes:
Network Destination        Netmask          Gateway       Interface  Metric
          0.0.0.0          0.0.0.0      172.19.8.1    172.19.8.109     50
        127.0.0.0        255.0.0.0         On-link         127.0.0.1    331
        127.0.0.1  255.255.255.255         On-link         127.0.0.1    331
  127.255.255.255  255.255.255.255         On-link         127.0.0.1    331
       172.19.8.0    255.255.248.0         On-link      172.19.8.109    306
     172.19.8.109  255.255.255.255         On-link      172.19.8.109    306
    172.19.15.255  255.255.255.255         On-link      172.19.8.109    306
     192.168.56.0    255.255.255.0         On-link      192.168.56.1    281
     192.168.56.1  255.255.255.255         On-link      192.168.56.1    281
   192.168.56.255  255.255.255.255         On-link      192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link         127.0.0.1    331
        224.0.0.0        240.0.0.0         On-link      192.168.56.1    281
        224.0.0.0        240.0.0.0         On-link      172.19.8.109    306
  255.255.255.255  255.255.255.255         On-link         127.0.0.1    331
  255.255.255.255  255.255.255.255         On-link      192.168.56.1    281
  255.255.255.255  255.255.255.255         On-link      172.19.8.109    306
===========================================================================
Persistent Routes:
  None

IPv6 Route Table
===========================================================================
Active Routes:
 If Metric Network Destination      Gateway
  1    331 ::1/128                  On-link
 13    281 fe80::/64                On-link
 10    306 fe80::/64                On-link
 13    281 fe80::5989:a0ab:be1c:5821/128
                                    On-link
 10    306 fe80::fd33:ce70:2fb0:838d/128
                                    On-link
  1    331 ff00::/8                 On-link
 13    281 ff00::/8                 On-link
 10    306 ff00::/8                 On-link
===========================================================================
Persistent Routes:
  None
```

netstat -s command



```
Command Prompt

C:\Users\ekrem>netstat -s

IPv4 Statistics

  Packets Received                   = 19421490
  Received Header Errors             = 0
  Received Address Errors            = 12
  Datagrams Forwarded                = 0
  Unknown Protocols Received         = 5
  Received Packets Discarded         = 20456
  Received Packets Delivered         = 20228787
  Output Requests                    = 12072747
  Routing Discards                   = 0
  Discarded Output Packets           = 11923
  Output Packet No Route             = 108
  Reassembly Required                = 277
  Reassembly Successful              = 106
  Reassembly Failures                = 0
  Datagrams Successfully Fragmented  = 38
  Datagrams Failing Fragmentation    = 0
  Fragments Created                  = 76

IPv6 Statistics

  Packets Received                   = 11527
  Received Header Errors             = 0
  Received Address Errors            = 50
  Datagrams Forwarded                = 0
  Unknown Protocols Received         = 0
  Received Packets Discarded         = 92
  Received Packets Delivered         = 26225
  Output Requests                    = 20192
  Routing Discards                   = 0
  Discarded Output Packets           = 0
  Output Packet No Route             = 0
  Reassembly Required                = 6
  Reassembly Successful              = 3
  Reassembly Failures                = 0
  Datagrams Successfully Fragmented  = 0
  Datagrams Failing Fragmentation    = 0
  Fragments Created                  = 0

ICMPv4 Statistics

                           Received    Sent
  Messages                 1752        3060
  Errors                   0           0
  Destination Unreachable  1361        2641
  Time Exceeded            177         4
  Parameter Problems       0           0
  Source Quenches          0           0
  Redirects                0           0
  Echo Replies             209         4
  Echos                    5           411
  Timestamps               0           0
  Timestamp Replies        0           0
  Address Masks            0           0
  Address Mask Replies     0           0
  Router Solicitations     0           0
  Router Advertisements    0           0
```

```
ICMPv6 Statistics

                           Received    Sent
  Messages                 3055        516
  Errors                   0           0
  Destination Unreachable  0           0
  Packet Too Big           0           0
  Time Exceeded            0           0
  Parameter Problems       0           0
  Echos                    42          0
  Echo Replies             0           0
  MLD Queries              737         0
  MLD Reports              0           0
  MLD Dones                0           0
  Router Solicitations     0           175
  Router Advertisements    0           0
  Neighbor Solicitations   178         104
  Neighbor Advertisements  2098        237
  Redirects                0           0
  Router Renumberings      0           0

TCP Statistics for IPv4

  Active Opens                        = 73126
  Passive Opens                       = 325
  Failed Connection Attempts          = 43928
  Reset Connections                   = 7216
  Current Connections                 = 41
  Segments Received                   = 11924376
  Segments Sent                       = 3219074
  Segments Retransmitted              = 0

TCP Statistics for IPv6

  Active Opens                        = 129
  Passive Opens                       = 34
  Failed Connection Attempts          = 432
  Reset Connections                   = 2
  Current Connections                 = 0
  Segments Received                   = 2035
  Segments Sent                       = 897
  Segments Retransmitted              = 0

UDP Statistics for IPv4

  Datagrams Received    = 8834071
  No Ports              = 20448
  Receive Errors        = 3
  Datagrams Sent        = 8314351

UDP Statistics for IPv6

  Datagrams Received    = 30424
  No Ports              = 8
  Receive Errors        = 0
  Datagrams Sent        = 15596
```

CentOS7:

netstat

```
[Eko@localhost ~]$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 localhost.localdo:34918 lhr48s28-in-f1.1e:https TIME_WAIT
tcp        0      0 localhost.localdo:34906 lhr48s28-in-f1.1e:https TIME_WAIT
tcp        0      0 localhost.localdo:35766 5.180.211.190:http      TIME_WAIT
tcp        0      0 localhost.localdo:59494 lhr48s09-in-f10.1:https TIME_WAIT
tcp        0      0 localhost.localdo:59014 5.153.223.4.ip.sta:http TIME_WAIT
tcp        0      0 localhost.localdo:59012 5.153.223.4.ip.sta:http TIME_WAIT
tcp       32      0 localhost.localdo:37238 oscp-router03.gno:https CLOSE_WAIT
tcp        0      0 localhost.localdo:52484 lhr25s34-in-f13.1:https TIME_WAIT
tcp        0      0 localhost.localdo:59026 5.153.223.4.ip.sta:http TIME_WAIT
tcp        0      0 localhost.localdo:35780 5.180.211.190:http      TIME_WAIT
tcp        0      0 localhost.localdo:40074 lhr48s08-in-f10.1:https TIME_WAIT
tcp        0      0 localhost.localdo:41322 ams16s22-in-f10.1:https TIME_WAIT
tcp        0      0 localhost.localdo:41288 ams16s22-in-f10.1:https TIME_WAIT
tcp        0      0 localhost.localdo:45664 lhr25s31-in-f10.1:https TIME_WAIT
tcp        0      0 localhost.localdo:45048 lhr25s33-in-f10.1:https ESTABLISHED
tcp        0      0 localhost.localdo:34908 lhr48s28-in-f1.1e:https TIME_WAIT
tcp        0      0 localhost.localdo:35768 5.180.211.190:http      TIME_WAIT
tcp        0      0 localhost.localdo:37938 lhr25s32-in-f10.1:https TIME_WAIT
tcp        0      0 localhost.localdo:42962 ec2-34-210-104-24:https ESTABLISHED
tcp        0      0 localhost.localdo:35786 5.180.211.190:http      TIME_WAIT
tcp        0      0 localhost.localdo:59024 5.153.223.4.ip.sta:http TIME_WAIT
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags       Type       State         I-Node   Path
```

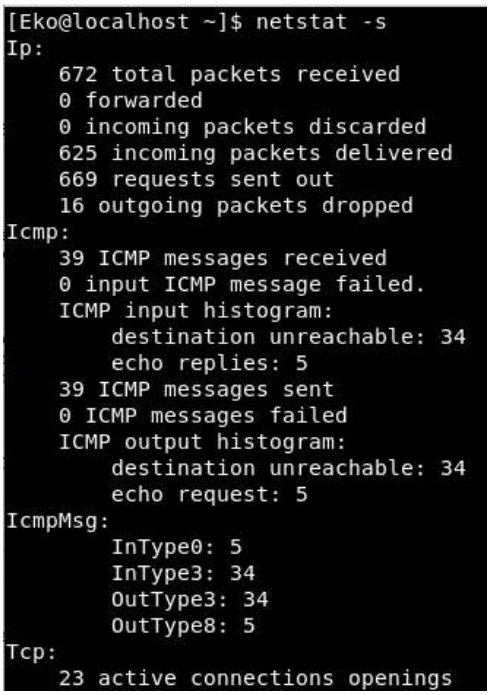
netstat -a

```
[Eko@localhost ~]$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 0.0.0.0:sunrpc          0.0.0.0:*               LISTEN
tcp        0      0 localhost.locald:domain 0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:ssh             0.0.0.0:*               LISTEN
tcp        0      0 localhost:ipp           0.0.0.0:*               LISTEN
tcp        0      0 localhost:smtp          0.0.0.0:*               LISTEN
tcp6       0      0 [::]:sunrpc             [::]:*                  LISTEN
tcp6       0      0 [::]:ssh                [::]:*                  LISTEN
tcp6       0      0 localhost:ipp           [::]:*                  LISTEN
tcp6       0      0 localhost:smtp          [::]:*                  LISTEN
udp        0      0 0.0.0.0:43466           0.0.0.0:*
udp        0      0 localhost.locald:domain 0.0.0.0:*
udp        0      0 0.0.0.0:bootps          0.0.0.0:*
udp        0      0 0.0.0.0:bootpc          0.0.0.0:*
udp        0      0 0.0.0.0:sunrpc          0.0.0.0:*
udp        0      0 localhost:323           0.0.0.0:*
udp        0      0 0.0.0.0:ideafarm-panic  0.0.0.0:*
udp        0      0 0.0.0.0:mdns            0.0.0.0:*
udp6       0      0 [::]:sunrpc             [::]:*
udp6       0      0 localhost:323           [::]:*
udp6       0      0 [::]:ideafarm-panic     [::]:*
raw6       0      0 [::]:ipv6-icmp          [::]:*                  7
Active UNIX domain sockets (servers and established)
```

netstat -r

```
[Eko@localhost ~]$ netstat -r
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
default         gateway         0.0.0.0         UG        0 0          0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U         0 0          0 enp0s3
192.168.122.0   0.0.0.0         255.255.255.0   U         0 0          0 virbr0
```

netstat -s



References

Hunter, S., 2021. *How do computers communicate with each other?.* [Online]
Available at: https://levelup.gitconnected.com/how-do-computers-communicate-with-each-other-50636acbeb4c
[Accessed 26 10 2021].