



COMPUTER NETWORKS

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TY Comp Div-2, T4 Batch

1. ifconfig

- Description: Displays or configures network interface parameters.
- Syntax: `ifconfig [interface] [options]`
- Use: Used to view or configure network interface settings, IP addresses, and network-related statistics.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ ifconfig  
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
    inet 172.27.98.249 netmask 255.255.240.0 broadcast 172.27.111.255  
    inet6 fe80::215:5dff:fe7c:25ec prefixlen 64 scopeid 0x20<link>  
    ether 00:15:5d:7c:25:ec txqueuelen 1000 (Ethernet)  
    RX packets 513 bytes 269223 (269.2 KB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 167 bytes 12310 (12.3 KB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536  
    inet 127.0.0.1 netmask 255.0.0.0  
    inet6 ::1 prefixlen 128 scopeid 0x10<host>  
    loop txqueuelen 1000 (Local Loopback)  
    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  
  
Sarvesh:~$
```

2. ip

- Description: A versatile tool for network configuration and management.
- Syntax: `ip [options] object command`
- Use: Used for a wide range of networking tasks, including configuring interfaces, routing tables, and more. Replaces many functionalities of `ifconfig` and `route`.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ ip  
Usage: ip [ OPTIONS ] OBJECT { COMMAND | help }  
       ip [ -force ] -batch filename  
where  OBJECT := { address | addrlabel | fou | help | ila | ioam | l2tp | link |  
                  macsec | maddress | monitor | mptcp | mroute | mrule |  
                  neighbor | neighbour | netconf | netns | nexthop | ntable |  
                  ntbl | route | rule | sr | tap | tcpmetrics |  
                  token | tunnel | tuntap | vrf | xfrm }  
OPTIONS := { -V[ersion] | -s[tatistics] | -d[etails] | -r[esolve] |  
             -h[uman-readable] | -iec | -j[son] | -p[retty] |  
             -f[amily] { inet | inet6 | mpls | bridge | link } |  
             -4 | -6 | -M | -B | -O |  
             -l[oops] { maximum-addr-flush-attempts } | -br[ief] |  
             -o[neline] | -t[imestamp] | -ts[hort] | -b[atch] [filename] |  
             -xc[vbuf] [size] | -n[etns] name | -N[umeric] | -a[ll] |  
             -c[olor]}
```

3. traceroute

- Description: Traces the route that packets take to reach a destination.
- Syntax: traceroute [options] destination
- Use: Helps diagnose network connectivity issues by showing the path and delays packets encounter on their way to a destination.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ traceroute sarveshmankar.github.io  
traceroute to sarveshmankar.github.io (185.199.110.153), 64 hops max  
 1  172.27.96.1  0.466ms  0.253ms  0.398ms  
 2  192.168.204.128  2.360ms  3.031ms  1.843ms  
 3  * * *  
 4  56.8.162.197  350.393ms  56.8.162.173  236.526ms  56.8.162.189  470.609ms  
 5  192.168.92.151  442.754ms  192.168.92.155  371.884ms  297.630ms  
 6  * * *  
 7  * * *  
 8  * * *  
 9  * * *  
10  * * *  
11  * * *  
12  * * *  
13  * * *  
14  * * 49.44.18.38  59.597ms
```

4. tracepath

- Description: A simplified alternative to traceroute .
- Syntax: tracepath [options] destination
- Use: Similar to traceroute but with a simpler output format for quick network troubleshooting.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ tracepath sarveshmankar.github.io  
1?: [LOCALHOST] pmtu 1500  
1: Sarvesh.mshome.net 0.170ms  
1: Sarvesh.mshome.net 0.160ms  
2: 192.168.204.128 2.951ms  
3: no reply  
4: ??? 110.535ms  
5: 192.168.92.157 150.426ms  
6: no reply  
7: no reply
```

5. ping

- Description: Sends ICMP echo requests to a host to check its network reachability.
- Syntax: ping [options] destination
- Use: Used for basic network connectivity testing. It measures round-trip time and packet loss to a target host.

```

sarvesh@Sarvesh: ~$ ping sarveshmankar.github.io
PING sarveshmankar.github.io (185.199.110.153) 56(84) bytes of data.
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=1 ttl=52 time=71.9 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=2 ttl=52 time=51.5 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=3 ttl=52 time=47.8 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=4 ttl=52 time=58.5 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=5 ttl=52 time=82.2 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=6 ttl=52 time=990 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=7 ttl=52 time=391 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=8 ttl=52 time=165 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=9 ttl=52 time=51.8 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=10 ttl=52 time=63.3 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=11 ttl=52 time=52.3 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=12 ttl=52 time=96.0 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=13 ttl=52 time=55.1 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=14 ttl=52 time=50.1 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=15 ttl=52 time=50.2 ms
64 bytes from cdn-185-199-110-153.github.com (185.199.110.153): icmp_seq=16 ttl=52 time=51.2 ms
^C
--- sarveshmankar.github.io ping statistics ---
16 packets transmitted, 16 received, 0% packet loss, time 14997ms
rtt min/avg/max/mdev = 47.831/145.470/989.756/233.275 ms
Sarvesh:~$

```

6. netstat

- Description: Displays network statistics and active network connections.
- Syntax: netstat [options]
- Use: Useful for monitoring network connections, routing tables, and interface statistics.

```

Sarvesh:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags               Type                   State                  I-Node    Path
unix  2      [ ]               DGRAM                 0                      17492     /var/run/chrony/chronyd.sock
unix  3      [ ]               STREAM                CONNECTED              17535
unix  3      [ ]               STREAM                CONNECTED              20539
unix  3      [ ]               STREAM                CONNECTED              25
unix  3      [ ]               STREAM                CONNECTED              23571
unix  3      [ ]               STREAM                CONNECTED              18556     /tmp/dbus-fc57xAiY25
unix  3      [ ]               STREAM                CONNECTED              17532
unix  3      [ ]               STREAM                CONNECTED              20540
unix  2      [ ]               STREAM                CONNECTED              19481
unix  3      [ ]               STREAM                CONNECTED              23574
unix  2      [ ]               STREAM                CONNECTED              20560
unix  3      [ ]               STREAM                CONNECTED              24
unix  3      [ ]               STREAM                CONNECTED              20555     /tmp/.X11-unix/X0
unix  3      [ ]               STREAM                CONNECTED              20528
unix  3      [ ]               STREAM                CONNECTED              23573
unix  3      [ ]               STREAM                CONNECTED              20529
unix  3      [ ]               STREAM                CONNECTED              23572
Sarvesh:~$

```

7. nslookup

- Description: Queries DNS servers for domain name information.
- Syntax: nslookup [options] hostname
- Use: Used to resolve domain names into IP addresses and vice versa, as well as to query DNS server information.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ nslookup sarveshmankar.github.io  
Server:      172.27.96.1  
Address:     172.27.96.1#53  
  
Non-authoritative answer:  
Name:   sarveshmankar.github.io  
Address: 185.199.110.153  
Name:   sarveshmankar.github.io  
Address: 185.199.111.153  
Name:   sarveshmankar.github.io  
Address: 185.199.108.153  
Name:   sarveshmankar.github.io  
Address: 185.199.109.153  
Name:   sarveshmankar.github.io  
Address: 2606:50c0:8000::153  
Name:   sarveshmankar.github.io  
Address: 2606:50c0:8001::153  
Name:   sarveshmankar.github.io  
Address: 2606:50c0:8002::153  
Name:   sarveshmankar.github.io  
Address: 2606:50c0:8003::153  
  
Sarvesh:~$
```

8. dig

- Description: A more advanced DNS query tool.
- Syntax: dig [options] hostname
- Use: Provides detailed DNS information, including DNS records, server responses, and more.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ dig sarveshmankar.github.io  
  
;<<>> DiG 9.18.1-lubuntu1.3-Ubuntu <<>> sarveshmankar.github.io  
;; global options: +cmd  
;; Got answer:  
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 59180  
;; flags: qr rd ad; QUERY: 1, ANSWER: 4, AUTHORITY: 0, ADDITIONAL: 0  
;; WARNING: recursion requested but not available  
  
;; QUESTION SECTION:  
;sarveshmankar.github.io.      IN      A  
  
;; ANSWER SECTION:  
sarveshmankar.github.io. 0      IN      A      185.199.110.153  
sarveshmankar.github.io. 0      IN      A      185.199.111.153  
sarveshmankar.github.io. 0      IN      A      185.199.108.153  
sarveshmankar.github.io. 0      IN      A      185.199.109.153  
  
;; Query time: 10 msec  
;; SERVER: 172.27.96.1#53(172.27.96.1) (UDP)  
;; WHEN: Sun Sep 10 21:36:57 IST 2023  
;; MSG SIZE  rcvd: 128  
  
Sarvesh:~$
```


9. route

- Description: Manages the IP routing table.
- Syntax: `route [options]`
- Use: Used to display or modify the kernel routing table, which determines how packets are forwarded in a network.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ route  
Kernel IP routing table  
Destination      Gateway          Genmask          Flags Metric Ref    Use Iface  
default          Sarvesh.mshome. 0.0.0.0          UG    0      0      0 eth0  
172.27.96.0      0.0.0.0          255.255.240.0    U      0      0      0 eth0  
Sarvesh:~$ ip route  
default via 172.27.96.1 dev eth0 proto kernel  
172.27.96.0/20 dev eth0 proto kernel scope link src 172.27.98.249  
Sarvesh:~$
```

10. host

- Description: Performs DNS lookups on a given hostname.
- Syntax: `host [options] hostname`
- Use: Similar to `nslookup`, it resolves hostnames to IP addresses and vice versa.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ host sarveshmankar.github.io  
sarveshmankar.github.io has address 185.199.110.153  
sarveshmankar.github.io has address 185.199.111.153  
sarveshmankar.github.io has address 185.199.108.153  
sarveshmankar.github.io has address 185.199.109.153  
sarveshmankar.github.io has IPv6 address 2606:50c0:8000::153  
sarveshmankar.github.io has IPv6 address 2606:50c0:8001::153  
sarveshmankar.github.io has IPv6 address 2606:50c0:8002::153  
sarveshmankar.github.io has IPv6 address 2606:50c0:8003::153  
Sarvesh:~$
```

11. arp

- Description: Displays and manages the ARP (Address Resolution Protocol) cache.
- Syntax: `arp [options]`
- Use: Used to view and manipulate ARP cache entries, which map IP addresses to MAC addresses on a local network.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ arp  
Address          HWtype  HWaddress      Flags Mask      Iface  
Sarvesh.mshome.net ether    00:15:5d:7c:2a:6c C                eth0  
Sarvesh:~$ arp sarveshmankar.github.io  
sarveshmankar.github.io (185.199.110.153) -- no entry  
Sarvesh:~$ arp google.com  
google.com (142.251.42.110) -- no entry  
Sarvesh:~$ arp localhost  
localhost (127.0.0.1) -- no entry  
Sarvesh:~$ arp -a  
Sarvesh.mshome.net (172.27.96.1) at 00:15:5d:7c:2a:6c [ether] on eth0  
Sarvesh:~$
```

12. iwconfig

- Description: Configures wireless network interfaces.
- Syntax: iwconfig [interface] [options]
- Use: Primarily used to configure wireless network settings and view information about wireless interfaces.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ iwconfig  
lo          no wireless extensions.  
  
eth0        no wireless extensions.  
  
Sarvesh:~$
```

13. curl

- Description: A command-line tool for transferring data with URLs.
- Syntax: curl [options] URL
- Use: Used to fetch data from or send data to remote servers, making it useful for testing network services.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ curl https://sarveshmankar.github.io  
<!DOCTYPE html>  
<html lang="en">  
<head>  
<meta charset="UTF-8">  
<meta name="viewport" content="width=device-width, initial-scale=1.0">  
  
<meta http-equiv="X-UA-Compatible" content="ie=edge">  
  
<meta name="copyright" content="MACode ID, https://www.macodeid.com/">  
  
<title>Portfolio</title>  
  
<link rel="shortcut icon" href="assets/coding.png" type="image/x-icon">  
  
<link rel="stylesheet" type="text/css" href="assets/css/themify-icons.css">  
  
<link rel="stylesheet" type="text/css" href="assets/css/bootstrap.css">  
  
<link rel="stylesheet" type="text/css" href="assets/vendor/animate/animate.css">  
  
<link rel="stylesheet" type="text/css" href="assets/vendor/owl-carousel/owl.carousel.css">  
  
<!-- <link rel="stylesheet" type="text/css" href="assets/vendor/perfect-scrollbar/css/perfect-scrollbar.css"> -->  
  
<link rel="stylesheet" type="text/css" href="assets/vendor/nice-select/css/nice-select.css">  
  
<link rel="stylesheet" type="text/css" href="assets/vendor/fancybox/css/jquery.fancybox.min.css">  
  
<link rel="stylesheet" type="text/css" href="assets/css/virtual.css">
```

14. wget

- Description: Downloads files from the internet using HTTP, HTTPS, or FTP.
- Syntax: `wget [options] URL`
- Use: Used for downloading files or web pages from the internet via the command line.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ wget sarveshmankar.github.io  
--2023-09-10 21:52:21-- http://sarveshmankar.github.io/  
Resolving sarveshmankar.github.io (sarveshmankar.github.io) ... 185.199.110.153, 185.199.111.153, 185.199.108.153, ...  
Connecting to sarveshmankar.github.io (sarveshmankar.github.io)|185.199.110.153|:80 ... connected.  
HTTP request sent, awaiting response ... 301 Moved Permanently  
Location: https://sarveshmankar.github.io/ [following]  
--2023-09-10 21:52:21-- https://sarveshmankar.github.io/  
Connecting to sarveshmankar.github.io (sarveshmankar.github.io)|185.199.110.153|:443 ... connected.  
HTTP request sent, awaiting response ... 200 OK  
Length: 38393 (37K) [text/html]  
Saving to: 'index.html'  
  
index.html      100%[=====>] 37.49K  105KB/s  in 0.4s  
  
2023-09-10 21:52:21 (105 KB/s) - 'index.html' saved [38393/38393]  
  
Sarvesh:~$
```

15. telnet

- Description: Provides terminal access to remote hosts.
- Syntax: `telnet [options] hostname [port]`
- Use: Allows interactive access to remote systems over a network, but is considered less secure and less commonly used today.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ telnet  
telnet> h  
Commands may be abbreviated.  Commands are:  
  
close          close current connection  
logout         forcibly logout remote user and close the connection  
display        display operating parameters  
mode           try to enter line or character mode ('mode ?' for more)  
open           connect to a site  
quit           exit telnet  
send           transmit special characters ('send ?' for more)  
set            set operating parameters ('set ?' for more)  
unset          unset operating parameters ('unset ?' for more)  
status         print status information  
toggle         toggle operating parameters ('toggle ?' for more)  
slc            set treatment of special characters  
  
z             suspend telnet  
environ        change environment variables ('environ ?' for more)  
telnet> open localhost  
Trying 127.0.0.1 ...  
telnet: Unable to connect to remote host: Connection refused  
telnet> open sarveshmankar.github.io  
Trying 185.199.110.153 ...  
[ ]
```


16. whois

- Description: Queries WHOIS databases for domain registration information.
- Syntax: `whois [options] domain`
- Use: Retrieves domain registration information, including ownership details, from WHOIS databases.

```
sarvesh@Sarvesh: ~  
Sarvesh:~$ whois sarveshmankar.github.io  
Malformed request.  
>>> Last update of WHOIS database: 2023-09-10T17:47:20Z <<<  
  
Terms of Use: Access to WHOIS information is provided to assist persons in determining the contents of a domain name registration record in the registry database. The data in this record is provided by Identity Digital or the Registry Operator for informational purposes only, and accuracy is not guaranteed. This service is intended only for query-based access. You agree that you will use this data only for lawful purposes and that, under no circumstances will you use this data to (a) allow, enable, or otherwise support the transmission by e-mail, telephone, or facsimile of mass unsolicited, commercial advertising or solicitations to entities other than the data recipient's own existing customers; or (b) enable high volume, automated, electronic processes that send queries or data to the systems of Registry Operator, a Registrar, or Identity Digital except as reasonably necessary to register domain names or modify existing registrations. When using the Whois service, please consider the following: The Whois service is not a replacement for standard EPP commands to the SRS service. Whois is not considered authoritative for registered domain objects. The Whois service may be scheduled for downtime during production or OT&E maintenance periods. Queries to the Whois services are throttled. If too many queries are received from a single IP address within a specified time, the service will begin to reject further queries for a period of time to prevent disruption of Whois service access. Abuse of the Whois system through data mining is mitigated by detecting and limiting bulk query access from single sources. Where applicable, the presence of a [Non-Public Data] tag indicates that such data is not made publicly available due to applicable data privacy laws or requirements. Should you wish to contact the registrant, please refer to the Whois records available through the registrar URL listed above. Access to non-public data may be provided, upon request, where it can be reasonably confirmed that the requester holds a specific legitimate interest and a proper legal basis for accessing the withheld data. Access to this data provided by Identity Digital can be requested by submitting a request via the form found at https://www.identity.digital/about/policies/whois-layered-access/. The Registrar of Record identified in this output may have an RDDS service that can be queried for additional information on how to contact the Registrant, Admin, or Tech contact of the queried domain name. Identity Digital Inc. and Registry Operator reserve the right to modify these terms at any time. By submitting this query, you agree to abide by this policy.  
Sarvesh:~$
```

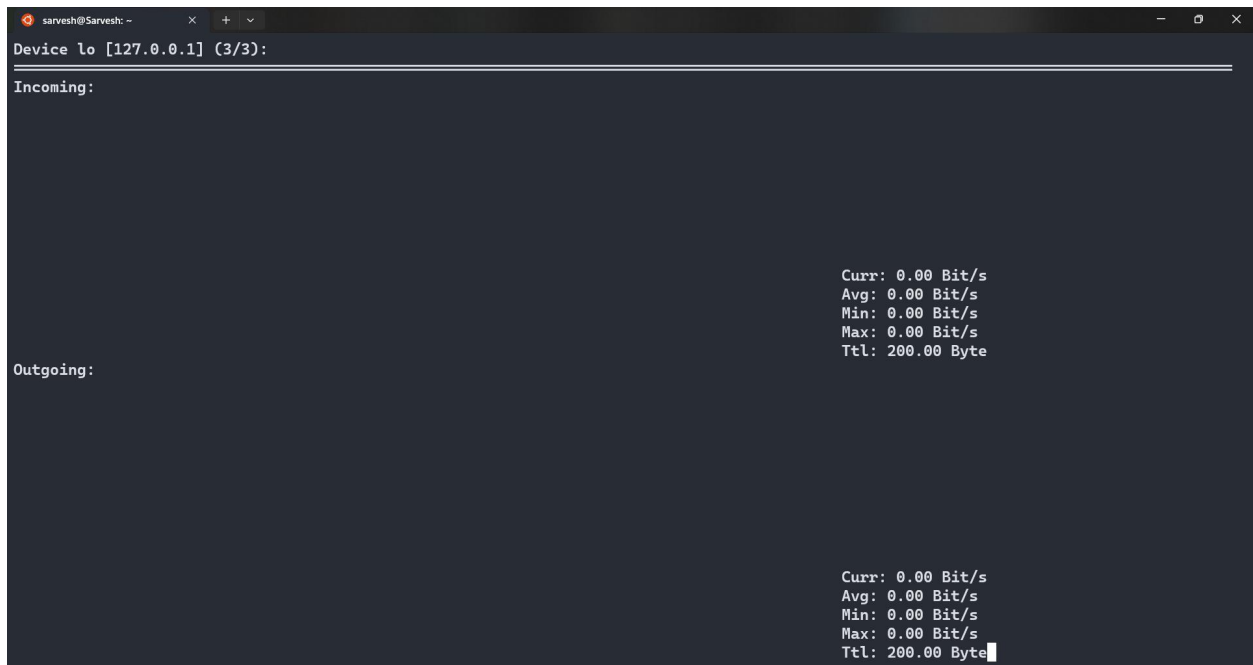
17. ifplugstatus

- Description: Checks the link status of network interfaces.
- Syntax: `ifplugstatus [interface]`
- Use: Used to determine whether a network cable is connected or disconnected to a specific network interface.

```
root@Sarvesh: /home/sarvesh  
Sarvesh:~$ ifplugstatus  
lo: link beat detected  
eth0: link beat detected  
Sarvesh:~$ ifplugstatus localhost  
localhost: not supported (Retry as root?)  
Failure (No such device)  
Sarvesh:~$ sudo su  
root@Sarvesh:/home/sarvesh# ifplugstatus localhost  
localhost: not supported  
Failure (No such device)  
root@Sarvesh:/home/sarvesh# ifplugstatus sarveshmankar.github.io  
sarveshmankar.github.io: not supported  
Failure (No such device)  
root@Sarvesh:/home/sarvesh# ifplugstatus google.com  
google.com: not supported  
Failure (No such device)  
root@Sarvesh:/home/sarvesh#
```

18. nload

- Description: Monitors network traffic and bandwidth usage in real-time.
- Syntax: `nload [options] [interface]`
- Use: Provides a visual representation of network traffic, including incoming and outgoing data rates.



The screenshot shows a terminal window titled 'sarvesh@Sarvesh: ~'. The command 'Device lo [127.0.0.1] (3/3):' has been entered. The output is divided into two sections: 'Incoming:' and 'Outgoing:'. Each section displays a large, dark, rectangular area representing a progress bar, which is currently empty. To the right of each progress bar, the following statistics are listed: Curr: 0.00 Bit/s, Avg: 0.00 Bit/s, Min: 0.00 Bit/s, Max: 0.00 Bit/s, and Ttl: 200.00 Byte.

```
sarvesh@Sarvesh: ~  
Device lo [127.0.0.1] (3/3):  
Incoming:  
  
Outgoing:  
  
Curr: 0.00 Bit/s  
Avg: 0.00 Bit/s  
Min: 0.00 Bit/s  
Max: 0.00 Bit/s  
Ttl: 200.00 Byte
```

19. mail

- Description: Sends and receives email from the command line.
- Syntax: `mail [options] [recipient]`
- Use: Used to send, receive, and manage email messages directly from the command line.