ping (Packet Internet Groper)

Checks whether a host is reachable by sending ICMP Echo Request packets.

Examples:

```
ping google.com
ping -c 4 8.8.8.8
ping -i 2 google.com
```

Explanation:

- ping google.com → Continuous test until stopped.

- ping -c 4 8.8.8.8 → Sends exactly 4 packets.

- ping -i 2 google.com → Sends packets every 2 seconds.

traceroute (Trace Route)

Shows the path your packets take to reach a destination.

Examples:

```
traceroute google.com
traceroute -n 8.8.8.8
traceroute -m 5 google.com
```

Explanation:

- traceroute google.com → Shows all hops to google.com.

- traceroute -n 8.8.8.8 → Displays hops as IP addresses only.

- traceroute -m 5 google.com → Limits hops to 5.

ifconfig (Interface Configuration)

Displays or configures network interfaces (older tool, replaced by ip).

Examples:

```
ifconfig
ifconfig eth0
ifconfig eth0 down
```

Explanation:

- ifconfig → Lists all interfaces.

- ifconfig eth0 → Shows only eth0 details.

- ifconfig eth0 down → Disables eth0 interface.

ip (IP Routing / Interface Command)

Modern tool to manage IP addresses, interfaces, and routes.

Examples:

```
ip addr show
ip link set eth0 up
ip route show
```

Explanation:

- ip addr show → Lists IP addresses.

- ip link set eth0 up → Enables eth0.

- ip route show → Displays routing table.

netstat (Network Statistics)

Shows network connections, routing tables, and interface statistics.

Examples:

```
netstat -tuln
netstat -r
netstat -anp
```

Explanation:

- netstat -tuln → Lists listening ports.

- netstat -r → Shows kernel routing table.

- netstat -anp → Shows all connections with process IDs.

route (Routing Table Manipulation)

Displays or modifies the system routing table.

Examples:

```
route
route -n
route add default gw 192.168.1.1
```

Explanation:

- route → Shows routing table.

- route -n → Shows routing table without DNS resolution.

- route add default gw 192.168.1.1 → Adds a default gateway.

hostname (Host Name)

Displays or sets the hostname of the system.

Examples:

```
hostname
hostname -I
hostnamectl
```

Explanation:

- hostname → Shows current hostname.

- hostname -I → Displays system IP addresses.

- hostnamectl → Shows or sets hostname with systemd.

nslookup (Name Server Lookup)

Queries DNS to get domain or IP address information.

Examples:

```
nslookup google.com
nslookup 8.8.8.8
nslookup facebook.com 1.1.1.1
```

Explanation:

- nslookup google.com → Resolves domain to IP.

- nslookup 8.8.8.8 → Reverse lookup of IP.

- nslookup facebook.com 1.1.1.1 → Queries specific DNS server.

curl (Client URL)

Transfers data from or to a server using HTTP, HTTPS, FTP, etc.

Examples:

```
curl google.com
curl -I https://example.com
curl -o page.html https://example.com
```

Explanation:

- curl google.com → Fetches page content.

- curl -I https://example.com → Shows only headers.

- curl -o page.html https://example.com → Saves output to file.

wget (World Wide Web Get)

Downloads files from the internet via HTTP, HTTPS, or FTP.

Examples:

```
wget https://example.com/file.zip
wget -c https://example.com/file.zip
wget -r https://example.com/docs/
```

Explanation:

- wget https://example.com/file.zip → Downloads file.

- wget -c https://example.com/file.zip → Resumes interrupted download.

- wget -r https://example.com/docs/ → Downloads site recursively.

whois (WHOIS Query)

Retrieves registration details of domain names or IP addresses.

Examples:

```
whois google.com
whois example.org
whois 8.8.8.8
```

Explanation:

- whois google.com → Shows domain details.

- whois example.org → Displays ownership info.

- whois 8.8.8.8 → Looks up IP info.

ethtool (Ethernet Tool)

Displays or changes Ethernet interface parameters.

Examples:

```
ethtool eth0
ethtool -i eth0
ethtool -S eth0
```

Explanation:

- ethtool eth0 → Shows interface details.

- ethtool -i eth0 → Displays driver info.

- ethtool -S eth0 → Shows interface statistics.

Static IP Setup (Manual Configuration (No DHCP/systemd/netplan))

Assigns a static IP, default gateway, and DNS manually.

Examples:

```
sudo ip addr add 192.168.1.100/24 dev eth0
sudo ip route add default via 192.168.1.1
echo "nameserver 8.8.8.8" | sudo tee /etc/resolv.conf
```

Explanation:

- Assigns 192.168.1.100 to eth0.

- Sets 192.168.1.1 as default gateway.

- Defines 8.8.8.8 as DNS server.