Don Bosco Institute of Technology

Department of Electronics and Telecommunications Engineering

Class: Sem VI   **Subject Code: ECL 602**

Subject Name: Computer Communication Network Laboratory

Experiment No.2

Aim : Performance of basic networking commands.

Learning Objectives:

- To introduce students to essential network commands.

Learning Outcomes:

After successful completion of the experiment students will be able to:

- Find host/domain name and IP address.
- Get network configuration.
- Test the network connectivity between computers and know statistics for communication.
- Trace the path between source and destination nodes.

Theory:

Computers are connected in a network to exchange information or resources each other. Two or more computer connected through network media called computer network. There are number of network devices or media are involved to form computer network. Maintaining of system and network up and running is a task of System / Network Administrator's job. In this experiment, frequently used network configuration and troubleshoot commands would be performed.

1. **Hostname**- It is a name assigned to the host (the computer connected to the network) which uniquely identifies it on the network and thus allows it to be addressed without using full IP address. Execute hostname command to see the hostname of your machine.

2. **PING**(**Packet INternet Groper**) **-** ping command is the best way to test connectivity between two nodes. Whether it is Local Area Network (LAN) or Wide Area Network (WAN).

Ping uses ICMP (Internet Control Message Protocol) to communicate to other devices. This command takes as input the IP address or the URL and sends a data packet to the specified address with the message "PING" and get a response from the server/host this time is recorded which is called latency.

Example: ping www.google.com

3. **IPCONFIG** - stands for **Internet Protocol Configuration**. This is a command-line application which displays all the current TCP/IP (Transmission Control Protocol/Internet Protocol) network configuration, refreshes the DHCP (Dynamic Host Configuration Protocol) and DNS (Domain Name Server). It also displays IP address, subnet mask, and default gateway for all adapters.

To use the command, just type ipconfig at the Command Prompt to see a list of all the network connections your computer is using.

4. **nslookup -** nslookup stands for "name server lookup", is a useful tool for finding out information about a named domain.By default, nslookup will translate a domain name to an IP address. The syntax for nslookup is –

nslookup or nslookup[domain name]

Example: nslookup www.google.com

5. **ARP (Address Resolution Protocol) -** ARP is the abbreviation for Address Resolution Protocol, which is used to find the address of a network neighbor for a given IPv4 address. This protocol is used by network nodes to resolve IP addresses to their corresponding MAC addresses. The mapping of the IP addresses to MAC addresses is stored in a cache on the system so that this information does not need to be retrieved repeatedly while the system communicates with its neighbouring devices over the network. The purpose of the arp protocol is twofold i.e. it determines the physical/MAC address of the destination device while sending a data packet and it responds with the MAC address of the machine on which it is running as answers queries received from other machines. arp command is useful to view / add the contents of the kernel's ARP tables.

To display ARP cache tables for all interfaces use the command

arp –a

6. **route –** All computers and network devices connected to Internet use routing tables to compute the next hop for a packet. It is electronic table that is stored in a router or a networked computer. The routing table stores the routes (and in some cases, metrics associated with those routes) to particular network destinations. This information contains the topology of the network immediately around it. The construction of routing table is the primary goal of routing protocols and static routes. route command   shows and manipulates ip routing table.Its primary use is to set up static routes to specific hosts or networks via an interface.

To display the device routing tables simply type

routeprint

7. **Netstat** (**Network Statistic**) - netstat command displays about ongoing connections on the local system and ports (i.e., services) that are listening, indicating that services are waiting for requests to come through. When used without any parameters it displays active TCP connections.It can also be used with the following parameters-

-a   Displays all connections and listening ports.

-e   Displays Ethernet statistics. This may be combined with the -s option.

-n   Displays addresses and port numbers in numerical form.

-p   Shows connections for the protocol specified by proto; proto may be TCP or UDP. If used with the -s option to display per-protocol statistics, proto may be TCP, UDP, or IP.

-r   Displays the routing table.

-s   Displays per-protocol statistics. By default, statistics are shown for TCP, UDP and IP; the -p option may be used to specify a subset of the default.
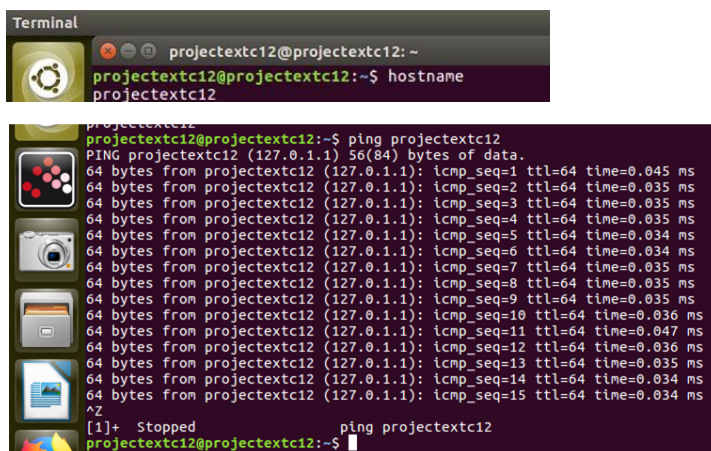

8. **tracert -** Determines the path taken to a destination by sending Internet Control Message Protocol (ICMP) Echo Request messages to the destination with incrementally increasing Time to Live (TTL) field values. When used without parameters, tracert displays help. Each router along the path is required to decrement the TTL in an IP packet by at least 1 before forwarding it.The maximum number of hops is 30 by default.

Example: To trace the path to the host named www.google.com use the the command
tracert www.google.com

Procedure:

1. Run all the commands and observe the outputs.

2. Take screenshot of the output of each of the commands.

3. Make conclusive statements about the ouputsobtained.

Screenshot of O/P:

```
projectextc12@projectextc12: ~
projectextc12@projectextc12:~$ ping 127.0.1.1
PING 127.0.1.1 (127.0.1.1) 56(84) bytes of data.
64 bytes from 127.0.1.1: icmp_seq=1 ttl=64 time=0.038 ms
64 bytes from 127.0.1.1: icmp_seq=2 ttl=64 time=0.035 ms
64 bytes from 127.0.1.1: icmp_seq=3 ttl=64 time=0.034 ms
64 bytes from 127.0.1.1: icmp_seq=4 ttl=64 time=0.035 ms
64 bytes from 127.0.1.1: icmp_seq=5 ttl=64 time=0.035 ms
64 bytes from 127.0.1.1: icmp_seq=6 ttl=64 time=0.035 ms
64 bytes from 127.0.1.1: icmp_seq=7 ttl=64 time=0.036 ms
64 bytes from 127.0.1.1: icmp_seq=8 ttl=64 time=0.032 ms
64 bytes from 127.0.1.1: icmp_seq=9 ttl=64 time=0.032 ms
^C
--- 127.0.1.1 ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 8181ms
rtt min/avg/max/mdev = 0.032/0.034/0.038/0.007 ms
projectextc12@projectextc12:~$
```

```
rtt min/avg/max/mdev = 0.032/0.034/0.038/0.007 ms
projectextc12@projectextc12:~$ ping google.com
PING google.com (142.250.192.46) 56(84) bytes of data.
From newipcop.lan.dbit.in (10.0.1.1) icmp_seq=1 Destination Net Prohibited
From newipcop.lan.dbit.in (10.0.1.1) icmp_seq=2 Destination Net Prohibited
From newipcop.lan.dbit.in (10.0.1.1) icmp_seq=3 Destination Net Prohibited
From newipcop.lan.dbit.in (10.0.1.1) icmp_seq=4 Destination Net Prohibited
From newipcop.lan.dbit.in (10.0.1.1) icmp_seq=5 Destination Net Prohibited
From newipcop.lan.dbit.in (10.0.1.1) icmp_seq=6 Destination Net Prohibited
From newipcop.lan.dbit.in (10.0.1.1) icmp_seq=7 Destination Net Prohibited
From newipcop.lan.dbit.in (10.0.1.1) icmp_seq=8 Destination Net Prohibited
From newipcop.lan.dbit.in (10.0.1.1) icmp_seq=9 Destination Net Prohibited
^Z
[2]+  Stopped                 ping google.com
projectextc12@projectextc12:~$
```

```
projectextc12@projectextc12: ~
projectextc12@projectextc12:~$ ping -c5 projectextc12
PING projectextc12 (127.0.1.1) 56(84) bytes of data.
64 bytes from projectextc12 (127.0.1.1): icmp_seq=1 ttl=64 time=0.031 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=2 ttl=64 time=0.034 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=3 ttl=64 time=0.032 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=4 ttl=64 time=0.036 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=5 ttl=64 time=0.034 ms

--- projectextc12 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4082ms
rtt min/avg/max/mdev = 0.031/0.033/0.036/0.005 ms
```

```
projectextc12@projectextc12:~$ ping -S100 projectextc12
PING projectextc12 (127.0.1.1) 56(84) bytes of data.
64 bytes from projectextc12 (127.0.1.1): icmp_seq=1 ttl=64 time=0.034 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=2 ttl=64 time=0.034 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=3 ttl=64 time=0.035 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=4 ttl=64 time=0.034 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=5 ttl=64 time=0.036 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=6 ttl=64 time=0.035 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=7 ttl=64 time=0.036 ms
^Z
[3]+  Stopped                 ping -S100 projectextc12
projectextc12@projectextc12:~$
```

```
projectextc12@projectextc12: ~
projectextc12@projectextc12:~$ ping -c5 -i3 projectextc12
PING projectextc12 (127.0.1.1) 56(84) bytes of data.
64 bytes from projectextc12 (127.0.1.1): icmp_seq=1 ttl=64 time=0.035 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=2 ttl=64 time=0.036 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=3 ttl=64 time=0.035 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=4 ttl=64 time=0.037 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=5 ttl=64 time=0.037 ms

--- projectextc12 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 12290ms
rtt min/avg/max/mdev = 0.035/0.036/0.037/0.000 ms
```

```
projectextc12@projectextc12:~$ ping -c5 -i0.5 projectextc12
PING projectextc12 (127.0.1.1) 56(84) bytes of data.
64 bytes from projectextc12 (127.0.1.1): icmp_seq=1 ttl=64 time=0.031 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=2 ttl=64 time=0.040 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=3 ttl=64 time=0.032 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=4 ttl=64 time=0.034 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=5 ttl=64 time=0.035 ms

--- projectextc12 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 2066ms
rtt min/avg/max/mdev = 0.031/0.034/0.040/0.006 ms
projectextc12@projectextc12:~$
```

```
projectextc12@projectextc12: ~
projectextc12@projectextc12:~$ ping -c5 -i2 projectextc12
PING projectextc12 (127.0.1.1) 56(84) bytes of data.
64 bytes from projectextc12 (127.0.1.1): icmp_seq=1 ttl=64 time=0.031 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=2 ttl=64 time=0.035 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=3 ttl=64 time=0.035 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=4 ttl=64 time=0.036 ms
64 bytes from projectextc12 (127.0.1.1): icmp_seq=5 ttl=64 time=0.035 ms

--- projectextc12 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 8051ms
rtt min/avg/max/mdev = 0.031/0.034/0.036/0.005 ms
projectextc12@projectextc12:~$ ping -c5 -i0.1 projectextc12
PING projectextc12 (127.0.1.1) 56(84) bytes of data.
ping: cannot flood; minimal interval allowed for user is 200ms
```

```
projectextc12@projectextc12:~$ ifconfig
enp2s0    Link encap:Ethernet  HWaddr 8c:89:a5:92:69:87
          inet addr:10.0.3.82  Bcast:10.0.7.255  Mask:255.255.248.0
          inet6 addr: fe80::abcc:be54:9b:692b/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:110542 errors:0 dropped:0 overruns:0 frame:0
          TX packets:886 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:13132012 (13.1 MB)  TX bytes:124287 (124.2 KB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:506 errors:0 dropped:0 overruns:0 frame:0
          TX packets:506 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:42690 (42.6 KB)  TX bytes:42690 (42.6 KB)

projectextc12@projectextc12:~$
```

```
projectextc12@projectextc12: ~
projectextc12@projectextc12:~$ arp -a
? (10.0.1.148) at 00:13:3b:0f:a3:63 [ether] on enp2s0
? (10.0.7.99) at 00:90:a9:e4:d2:d6 [ether] on enp2s0
? (10.0.1.254) at 10:78:d2:e9:1a:52 [ether] on enp2s0
newipcop.lan.dbit.in (10.0.1.1) at 00:10:b5:12:cf:1e [ether] on enp2s0
? (10.0.1.12) at d4:3d:7e:a1:22:2f [ether] on enp2s0
projectextc12@projectextc12:~$ netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address          State
tcp       20      0 10.0.3.82:44112        10.0.7.99:netbios-ssn    ESTABLISHED
Active UNIX domain sockets (w/o servers)
Proto RefCnt Flags      Type       State         I-Node   Path
unix  2      [ ]        DGRAM                    21482    /run/user/1000/systemd/
notify
unix  3      [ ]        DGRAM                    14597    /run/systemd/notify
unix  2      [ ]        DGRAM                    14598    /run/systemd/cgroups-ag
ent
unix  15     [ ]        DGRAM                    14607    /run/systemd/journal/de
v-log
unix  2      [ ]        DGRAM                    14608    /run/systemd/journal/sy
slog
unix  7      [ ]        DGRAM                    14611    /run/systemd/journal/so
cket
unix  3      [ ]        STREAM     CONNECTED     29539    @/tmp/dbus-Vh4fywgapI
unix  3      [ ]        STREAM     CONNECTED     27460
unix  3      [ ]        STREAM     CONNECTED     27677
unix  3      [ ]        STREAM     CONNECTED     25781
unix  3      [ ]        STREAM     CONNECTED     27009    @/tmp/ibus/dbus-EUoT07f
H
unix  3      [ ]        STREAM     CONNECTED     23156
unix  3      [ ]        STREAM     CONNECTED     26694
unix  3      [ ]        STREAM     CONNECTED     25447    /run/systemd/journal/st
dout
```

Conclusion: