

## Experiment -01

### BASIC NETWORKING COMMANDS

**AIM: - Study of various Network commands used in Linux and Windows**

<b><u>arp -a:</u></b> ARP is short form of address resolution protocol, It will show the IP address of your computer along with the IP address and MAC address of your router.
<b><u>hostname:</u></b> This is the simplest of all TCP/IP commands. It simply displays the name of your computer.
<b><u>ipconfig /all:</u></b> This command displays detailed configuration information about your TCP/IP connection including Router, Gateway, DNS, DHCP, and type of Ethernet adapter in your system
<b><u>nbtstat -a:</u></b> This command helps solve problems with NetBIOS name resolution. (Nbt stands for NetBIOS over TCP/IP)
<b><u>netstat:</u></b> (network statistics) netstat displays a variety of statistics about a computers active TCP/IP connections. It is a command line tool for monitoring network connections both incoming and outgoing as well as viewing routing tables, interface statistics etc. e.g.:- netstat -r
<b><u>nslookup:</u></b> (name server lookup) is a tool used to perform DNS lookups in Linux. It is used to display DNS details, such as the IP address of a particular computer, the MX records for a domain or the NS servers of a domain. nslookup can operate in two modes: interactive and non-interactive. e.g.:- nslookup <a href="http://www.google.com">www.google.com</a>
<b><u>pathping:</u></b> Pathping is unique to Window's, and is basically a combination of the Ping and Tracert commands. Pathping traces the route to the destination address then launches a 25 second test of each router along the way, gathering statistics on the rate of data loss along each hop.
<b><u>ping:</u></b> (Packet INternet Groper) command is the best way to test connectivity between two nodes. Ping use ICMP (Internet Control Message Protocol) to communicate to other devices. <ol style="list-style-type: none"><li>1. #ping hostname( ping localhost)</li><li>2. #ping ip address (ping 4.2.2.2)</li><li>3. #ping fully qualified domain name(ping <a href="http://www.facebook.com">www.facebook.com</a>)</li></ol>
<b><u>Route:</u></b> route command is used to show/manipulate the IP routing table. It is primarily used to setup static routes to specific host or networks via an interface.

Windows PowerShell

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PS C:\Users\Lenovo> arp

Displays and modifies the IP-to-Physical address translation tables used by address resolution protocol (ARP).

ARP -s inet\_addr eth\_addr [if\_addr]

ARP -d inet\_addr [if\_addr]

ARP -a [inet\_addr] [-N if\_addr] [-v]

-a	Displays current ARP entries by interrogating the current protocol data. If inet_addr is specified, the IP and Physical addresses for only the specified computer are displayed. If more than one network interface uses ARP, entries for each ARP table are displayed.
-g	Same as -a.
-v	Displays current ARP entries in verbose mode. All invalid entries and entries on the loop-back interface will be shown.
inet_addr	Specifies an internet address.
-N if_addr	Displays the ARP entries for the network interface specified by if_addr.
-d	Deletes the host specified by inet_addr. inet_addr may be wildcarded with * to delete all hosts.
-s	Adds the host and associates the Internet address inet_addr with the Physical address eth_addr. The Physical address is given as 6 hexadecimal bytes separated by hyphens. The entry is permanent.
eth_addr	Specifies a physical address.
if_addr	If present, this specifies the Internet address of the interface whose address translation table should be modified. If not present, the first applicable interface will be used.

Example:

```
> arp -s 157.55.85.212 00-aa-00-62-c6-09 .... Adds a static entry.  
> arp -a .... Displays the arp table.
```

PS C:\Users\Lenovo> hostname

DESKTOP-C01BH7D

PS C:\Users\Lenovo> ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

Connection-specific DNS Suffix	:	
Link-local IPv6 Address . . . . .	:	fe80::a098:b3f4:e84d:50c5%5
IPv4 Address. . . . .	:	172.16.75.153
Subnet Mask . . . . .	:	255.255.248.0

```
Default Gateway . . . . . : 172.16.72.1
PS C:\Users\Lenovo> route
```

Manipulates network routing tables.

```
ROUTE [-f] [-p] [-4|-6] command [destination]
      [MASK netmask] [gateway] [METRIC metric] [IF interface]
```

-f	Clears the routing tables of all gateway entries. If this is used in conjunction with one of the commands, the tables are cleared prior to running the command.
-p	When used with the ADD command, makes a route persistent across boots of the system. By default, routes are not preserved when the system is restarted. Ignored for all other commands, which always affect the appropriate persistent routes.
-4	Force using IPv4.
-6	Force using IPv6.
command	One of these: PRINT Prints a route ADD Adds a route DELETE Deletes a route CHANGE Modifies an existing route
destination	Specifies the host.
MASK	Specifies that the next parameter is the 'netmask' value.
netmask	Specifies a subnet mask value for this route entry. If not specified, it defaults to 255.255.255.255.
gateway	Specifies gateway.
interface	the interface number for the specified route.
METRIC	specifies the metric, ie. cost for the destination.

All symbolic names used for destination are looked up in the network database file NETWORKS. The symbolic names for gateway are looked up in the host name database file HOSTS.

If the command is PRINT or DELETE. Destination or gateway can be a wildcard, (wildcard is specified as a star '\*'), or the gateway argument may be omitted.

If Dest contains a \* or ?, it is treated as a shell pattern, and only matching destination routes are printed. The '\*' matches any string, and '?' matches any one char. Examples: 157.\*.1, 157.\*, 127.\*, \*224\*.

Pattern match is only allowed in PRINT command.

Diagnostic Notes:

Invalid MASK generates an error, that is when (DEST & MASK) != DEST.

Example> route ADD 157.0.0.0 MASK 155.0.0.0 157.55.80.1 IF 1

The route addition failed: The specified mask parameter is invalid. (Destination & Mask) != Destination.

Examples:

```
> route PRINT
> route PRINT -4
> route PRINT -6
> route PRINT 157*      .... Only prints those matching 157*

> route ADD 157.0.0.0 MASK 255.0.0.0 157.55.80.1 METRIC 3 IF 2
      destination^      ^mask      ^gateway      metric^      ^
                          Interface^
    If IF is not given, it tries to find the best interface for a given
    gateway.
> route ADD 3ffe::/32 3ffe::1

> route CHANGE 157.0.0.0 MASK 255.0.0.0 157.55.80.5 METRIC 2 IF 2

    CHANGE is used to modify gateway and/or metric only.

> route DELETE 157.0.0.0
> route DELETE 3ffe::/32
PS C:\Users\Lenovo> ping

Usage: ping [-t] [-a] [-n count] [-l size] [-f] [-i TTL] [-v TOS]
           [-r count] [-s count] [[-j host-list] | [-k host-list]]
           [-w timeout] [-R] [-S srcaddr] [-c compartment] [-p]
           [-4] [-6] target_name

Options:
  -t           Ping the specified host until stopped.
               To see statistics and continue - type Control-Break;
               To stop - type Control-C.
  -a           Resolve addresses to hostnames.
  -n count     Number of echo requests to send.
  -l size      Send buffer size.
  -f           Set Don't Fragment flag in packet (IPv4-only).
  -i TTL       Time To Live.
  -v TOS       Type Of Service (IPv4-only. This setting has been deprecated
               and has no effect on the type of service field in the IP
               Header).
  -r count     Record route for count hops (IPv4-only).
  -s count     Timestamp for count hops (IPv4-only).
  -j host-list Loose source route along host-list (IPv4-only).
  -k host-list Strict source route along host-list (IPv4-only).
  -w timeout   Timeout in milliseconds to wait for each reply.
  -R           Use routing header to test reverse route also (IPv6-only).
               Per RFC 5095 the use of this routing header has been
               deprecated. Some systems may drop echo requests if
               this header is used.
  -S srcaddr   Source address to use.
  -c compartment Routing compartment identifier.
  -p           Ping a Hyper-V Network Virtualization provider address.
```

```

-4          Force using IPv4.
-6          Force using IPv6.

PS C:\Users\Lenovo> nbtstat

Displays protocol statistics and current TCP/IP connections using NBT
(NetBIOS over TCP/IP).

NBTSTAT [ [-a RemoteName] [-A IP address] [-c] [-n]
          [-r] [-R] [-RR] [-s] [-S] [interval] ]

-a (adapter status) Lists the remote machine's name table given its name
-A (Adapter status) Lists the remote machine's name table given its
                        IP address.
-c (cache)           Lists NBT's cache of remote [machine] names and their IP addresses
-n (names)           Lists local NetBIOS names.
-r (resolved)        Lists names resolved by broadcast and via WINS
-R (Reload)          Purges and reloads the remote cache name table
-S (Sessions)        Lists sessions table with the destination IP addresses
-s (sessions)        Lists sessions table converting destination IP
                        addresses to computer NETBIOS names.
-RR (ReleaseRefresh) Sends Name Release packets to WINS and then, starts Refresh

RemoteName  Remote host machine name.
IP address   Dotted decimal representation of the IP address.
interval    Redisplays selected statistics, pausing interval seconds
            between each display. Press Ctrl+C to stop redisplaying
            statistics.

PS C:\Users\Lenovo> pathping

Usage: pathping [-g host-list] [-h maximum_hops] [-i address] [-n]
               [-p period] [-q num_queries] [-w timeout]
               [-4] [-6] target_name

Options:
  -g host-list    Loose source route along host-list.
  -h maximum_hops Maximum number of hops to search for target.
  -i address      Use the specified source address.
  -n             Do not resolve addresses to hostnames.
  -p period       Wait period milliseconds between pings.
  -q num_queries  Number of queries per hop.
  -w timeout      Wait timeout milliseconds for each reply.
  -4             Force using IPv4.
  -6             Force using IPv6.

```

### **RESULT:**

the Study of various Network commands used in Linux and Windows has been studied successfully