99220040530
G.Madhu

Ex.No:	Networking Basic Commands
Date :	

Objectives:

To analyze the network basic commands.

Introduction:

In networking there are various commands that can be used to check the connectivity of the networking devices and it is also required at time of troubleshooting of devices. We will be discussing few of the networking commands such as color help, ipconfig ,ipconfig/all ,nslookup ,tracert commands.

Requirements:

1. End Device (Command Prompt)
2. Ethernet & Internet Services
3. Commands

Commands Execution:

1. ipconfig:

This networking commands is used to the IP configuration details. This command provides you the details like IPv4 address ,Subnet Mask or Default Gateway.

C:\Users\KARE>ipconfig Output:

```
Windows IP Configuration


Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::b75b:d75:d12:8b99%14
   IPv4 Address. . . . . . . . . . . : 10.2.27.133
   Subnet Mask . . . . . . . . . . . : 255.255.224.0
   Default Gateway . . . . . . . . . : 10.2.0.1

Wireless LAN adapter Local Area Connection* 2:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::cdb9:9662:4b20:c8cf%10
   IPv4 Address. . . . . . . . . . . : 192.168.137.1
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :

Ethernet adapter Bluetooth Network Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
```

2. ipconfig /all:

This command can be understood as the updated version of the ipconfig command. This command tells us the physical address of our device. It tells us various details of our computer such as IPv4,IPv6 default Gateway ,subnet mask ,also it tells to which devices our device is connected ,configuration details of the devices to which are devices are connected.

C:\Users\KARE>ipconfig /all Output:

```
C:\Users\Madhu_5134>ipconfig/all

Windows IP Configuration

   Host Name . . . . . . . . . . . . : Madhu
   Primary Dns Suffix  . . . . . . . :
   Node Type . . . . . . . . . . . . : Mixed
   IP Routing Enabled. . . . . . . . : No
   WINS Proxy Enabled. . . . . . . . : No

Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
   Physical Address. . . . . . . . . : A0-59-50-93-48-F2
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Intel(R) Wi-Fi 6E AX211 160MHz
   Physical Address. . . . . . . . . : A0-59-50-93-48-F1
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::b75b:d75:d12:8b99%14(Preferred)
   IPv4 Address. . . . . . . . . . . : 10.2.27.133(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.224.0
   Lease Obtained. . . . . . . . . . : 08 January 2025 07:41:37
   Lease Expires . . . . . . . . . . : 09 January 2025 06:10:57
   Default Gateway . . . . . . . . . : 10.2.0.1
   DHCP Server . . . . . . . . . . . : 10.2.0.2
   DHCPv6 IAID . . . . . . . . . . . : 111171920
   DHCPv6 Client DUID. . . . . . . . : 00-01-00-01-2E-F5-DC-2D-A0-59-50-93-48-F1
   DNS Servers . . . . . . . . . . . : 172.16.103.254
                                       4.2.2.2
                                       8.8.8.8
   NetBIOS over Tcpip. . . . . . . . : Enabled

Wireless LAN adapter Local Area Connection* 2:

   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #2
   Physical Address. . . . . . . . . : A2-59-50-93-48-F1
   DHCP Enabled. . . . . . . . . . . : No
   Autoconfiguration Enabled . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::cdb9:9662:4b20:c8cf%10(Preferred)
   IPv4 Address. . . . . . . . . . . : 192.168.137.1(Preferred)
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . :
   NetBIOS over Tcpip. . . . . . . . : Enabled

Ethernet adapter Bluetooth Network Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
   Description . . . . . . . . . . . : Bluetooth Device (Personal Area Network)
   Physical Address. . . . . . . . . : A0-59-50-93-48-F5
   DHCP Enabled. . . . . . . . . . . : Yes
   Autoconfiguration Enabled . . . . : Yes
```

3. hostname:

The hostname command displays the hostname of the system. The hostname command is much easier to use than going into the system settings to search for it.

C:\Users\KARE>hostname Output:

```
C:\Users\Madhu_5134>hostname
Madhu
```

4. systeminfo:

This Command is used to display all the necessary information about our System such as configuration, version, hostname, processor details network card details etc.

C:\Users\KARE>systeminfo Output:

```
C:\Users\Madhu_5134>systeminfo

Host Name:                 MADHU
OS Name:                   Microsoft Windows 11 Home Single Language
OS Version:                10.0.26100 N/A Build 26100
OS Manufacturer:           Microsoft Corporation
OS Configuration:          Standalone Workstation
OS Build Type:             Multiprocessor Free
Registered Owner:          maheshgujjula2001@gmail.com
Registered Organization:   N/A
Product ID:                00356-24667-67306-AAOEM
Original Install Date:     19-12-2024, 18:35:30
System Boot Time:          01-01-2025, 17:14:50
System Manufacturer:       ASUSTeK COMPUTER INC.
System Model:              VivoBook_ASUSLaptop K3402ZA_S3402ZA
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 154 Stepping 3 GenuineIntel ~2500 Mhz
BIOS Version:              American Megatrends International, LLC. K3402ZA.309, 05-09-2023
Windows Directory:         C:\WINDOWS
System Directory:          C:\WINDOWS\system32
Boot Device:               \Device\HarddiskVolume1
System Locale:             en-us;English (United States)
Input Locale:              00004009
Time Zone:                 (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi
Total Physical Memory:     7,813 MB
Available Physical Memory: 1,174 MB
Virtual Memory: Max Size:  12,677 MB
Virtual Memory: Available: 2,930 MB
Virtual Memory: In Use:    9,747 MB
Page File Location(s):     C:\pagefile.sys
Domain:                    WORKGROUP
Logon Server:              \\MADHU
Hotfix(s):                 3 Hotfix(s) Installed.
                           [01]: KB5048162
                           [02]: KB5048667
                           [03]: KB5049685
Network Card(s):           3 NIC(s) Installed.
                           [01]: Intel(R) Wi-Fi 6E AX211 160MHz
                                 Connection Name: Wi-Fi
                                 DHCP Enabled:    Yes
                                 DHCP Server:     10.2.0.2
                                 IP address(es)
                                 [01]: 10.2.27.133
                                 [02]: fe80::b75b:d75:d12:8b99
                           [02]: Microsoft Wi-Fi Direct Virtual Adapter
                                 Connection Name: Local Area Connection* 2
                                 DHCP Enabled:    No
                                 IP address(es)
                                 [01]: 192.168.137.1
                                 [02]: fe80::cdb9:9662:4b20:c8cf
                           [03]: Bluetooth Device (Personal Area Network)
                                 Connection Name: Bluetooth Network Connection
                                 Status:          Media disconnected
Virtualization-based security: Status: Not enabled
                           App Control for Business policy: Enforced
                           App Control for Business user mode policy: Off
                           Security Features Enabled:
Hyper-V Requirements:      VM Monitor Mode Extensions: Yes
                           Virtualization Enabled In Firmware: Yes
                           Second Level Address Translation: Yes
                           Data Execution Prevention Available: Yes
```

5. nslookup:

This command is use to transform the given searched words into their corresponding IP addresses.

C:\Users\KARE>nslookup

C:\Users\KARE>nslookup Destination Hostname / Destination IP Address Output:

```
C:\Users\Madhu_5134>nslookup
Default Server:  UnKnown
Address:  172.16.103.254

> www.google.com
Server:  UnKnown
Address:  172.16.103.254

Non-authoritative answer:
Name:    www.google.com
Addresses:  2404:6800:4007:82a::2004
          142.250.196.36
```

6. ping:

Ping command is used to get to know if the particular site can be reached by the ping command. The ping command checks this by sending the packets of data to the destination address and if the data returns to us in the given time frame then it means that the particular website can be reached .We can do this by writing the ping and we write the IP address of the site we want to search.

C:\Users\KARE>ping IPAddress (or) C:\Users\KARE>ping hostname

C:\Users\KARE>ping -t IPAddress / Hostname

Output:

```
C:\Users\Madhu_5134>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.
```

7. tracert:

This command can be understood as trace root. Which tells that our computer reaches or hits whichwhich server for reaching the particular root.

C:\Users\KARE>tracert IPAddress (or) C:\Users\KARE>tracert hostname

Output:

```
C:\Users\Madhu_5134>tracert

Usage: tracert [-d] [-h maximum_hops] [-j host-list] [-w timeout]
               [-R] [-S srcaddr] [-4] [-6] target_name

Options:
    -d                 Do not resolve addresses to hostnames.
    -h maximum_hops    Maximum number of hops to search for target.
    -j host-list       Loose source route along host-list (IPv4-only).
    -w timeout         Wait timeout milliseconds for each reply.
    -R                 Trace round-trip path (IPv6-only).
    -S srcaddr         Source address to use (IPv6-only).
    -4                 Force using IPv4.
    -6                 Force using IPv6.
```

8. pathping:

pathping is similar to tracert, except it is more informative and takes a lot longer to execute. After sending out packets from you to a given destination, it analyzes the route taken and computes packet loss on a per-hop basis.

C:\Users\KARE>pathping IPAddress (or) C:\Users\KARE>pathping hostname Output:

```
C:\Users\Madhu_5134>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.
```

99220040530
G.Madhu

9. netstat:

It is a command line tool that is identify and display the connections and ports connected to our computer when we write netstat command on CLI(Command Line Interface). It tells us active connections with our computer and it tells us local address ,foreign address and the state of the device. In local address first 8 digits specify the local address of our computer and and last 5 digits tells the port number to which our computer is connected . In netstat command there are various subcommands such as netstat -n, netstat -a,netstat -b, netstat -f.

C:\Users\KARE>netstat Output:

```
C:\Users\Madhu_5134>netstat

Active Connections

  Proto  Local Address          Foreign Address        State
  TCP    10.2.27.133:7680       10.2.14.15:61968       TIME_WAIT
  TCP    10.2.27.133:7680       10.2.14.71:58827       ESTABLISHED
  TCP    10.2.27.133:7680       10.2.14.71:59281       TIME_WAIT
  TCP    10.2.27.133:7680       DESKTOP-39DEM2A:57691  TIME_WAIT
  TCP    10.2.27.133:7680       10.2.14.232:55624      TIME_WAIT
  TCP    10.2.27.133:7680       10.2.20.241:52787      TIME_WAIT
  TCP    10.2.27.133:7680       10.2.27.124:64274      ESTABLISHED
  TCP    10.2.27.133:7680       LAPTOP-8B3E68LK:55283  TIME_WAIT
  TCP    10.2.27.133:49455      20.198.118.190:https   ESTABLISHED
  TCP    10.2.27.133:55509      si-in-f188:5228        ESTABLISHED
  TCP    10.2.27.133:57599      10.2.24.142:ms-do      ESTABLISHED
  TCP    10.2.27.133:58155      maa05s18-in-f10:https  ESTABLISHED
```

10. getmac:

Getmac is a Windows command used to display the Media Access Control (MAC) addresses for each network adapter in the computer.

C:\Users\KARE>getmac Output:

```
C:\Users\Madhu_5134>getmac

Physical Address    Transport Name
=================== ==========================================================
A0-59-50-93-48-F1   \Device\Tcpip_{785550FE-BDAA-4E2F-A940-51B53CC35564}
A2-59-50-93-48-F1   \Device\Tcpip_{56194A7F-4886-445F-A57D-EB4EF3895C86}
A0-59-50-93-48-F5   Media disconnected
```

11. ARP:

The arp command displays and modifies the Internet-to-adapter address translation tables used by the Address in Networks and communication management. The arp command displays the current ARP entry for the host specified by the HostName variable. The host can be specified by name or number, using Internet dotted decimal notation.

C:\Users\KARE>arp -a Output:

```
C:\Users\Madhu_5134>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.
```

12. route:

The route command allows you to make manual entries into the network routing tables. The route command distinguishes between routes to hosts and routes to networks by interpreting the network address of the Destination variable, which can be specified either by symbolic name or numeric address. The route command resolves all symbolic names into addresses, using either the /etc/hosts file or the network name server.

C:\Users\KARE>route (or) C:\Users\KARE>route print

99220040530
G.Madhu

Output:

```
C:\Users\Madhu_5134>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
```