

## PRACTICAL – #01

**AIM:** Use Of Ping and Tracert/Traceroute and ARP Utilities

**Software:** Cisco Packet Tracer

### SOLUTION

Diagnostic commands help you detect TCP/IP networking problems. Some of the diagnostic commands are arp, hostname, ipconfig, netstat, ping, route, and tracert.

#### (i) arp:

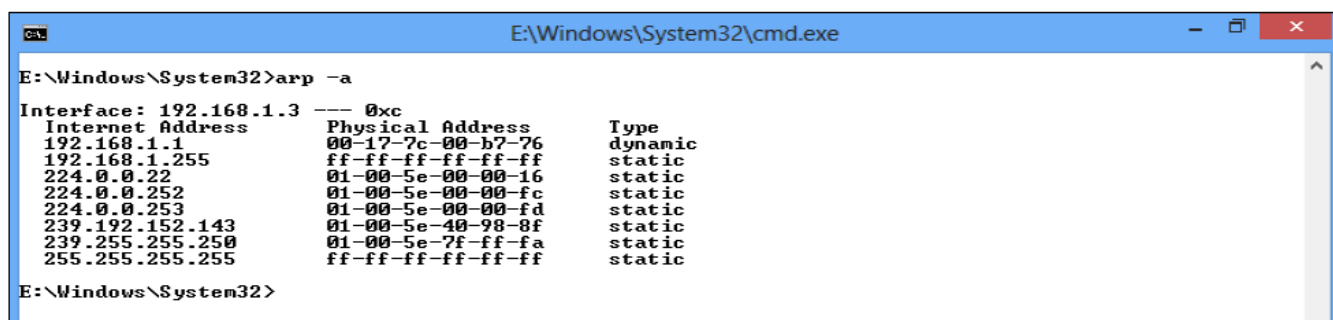
This diagnostic command displays and modifies the IP-to-Ethernet or Token Ring physical address translation tables used by the Address Resolution Protocol (ARP).

#### Syntax:

```
arp -a [inet_addr] [-N [if_addr]] arp -d inet_addr [if_addr]  
arp -s inet_addr ether_addr [if_addr]
```

#### Parameters:

- a – Displays current ARP entries by querying TCP/IP. If `inet_addr` is specified, only the IP and physical addresses for the specified host are displayed.
- d – Deletes the entry specified by `inet_addr`.
- s – Adds an entry in the ARP cache to associate the IP address `inet_addr` with the physical address `ether_addr`. The physical address is given as 6 hexadecimal bytes separated by hyphens. The IP address is specified using dotted decimal notation. The entry is static. It will not be automatically removed from the cache after the timeout expires and will not exist after a reboot of your computer.
- N – [if\_addr] Displays the ARP entries for the network interface specified by `if_addr`. `ether_addr` Specifies a physical address. `if_addr` Specifies, if present, the IP address of the interface whose address translation table should be modified. If not present, the first applicable interface will be used. `inet_addr` Specifies an IP address in dotted decimal notation.



```
E:\Windows\System32>arp -a  
Interface: 192.168.1.3 --- 0xc  
Internet Address      Physical Address      Type  
192.168.1.1          00-17-7c-00-b7-76    dynamic  
192.168.1.255        ff-ff-ff-ff-ff-ff    static  
224.0.0.22          01-00-5e-00-00-16    static  
224.0.0.252         01-00-5e-00-00-fc    static  
224.0.0.253         01-00-5e-00-00-fd    static  
239.192.152.143     01-00-5e-40-98-8f    static  
239.255.255.250     01-00-5e-7f-ff-fa    static  
255.255.255.255     ff-ff-ff-ff-ff-ff    static  
E:\Windows\System32>
```

```

E:\Windows\System32>arp -a -v

Interface: 127.0.0.1 --- 0x1
Internet Address      Physical Address      Type
224.0.0.22           00-00-00-00-00-00    static
224.0.0.252          00-00-00-00-00-00    static
224.1.1.1             00-00-00-00-00-00    static
239.192.152.143      00-00-00-00-00-00    static
239.255.255.250      00-00-00-00-00-00    static

Interface: 192.168.1.3 --- 0xc
Internet Address      Physical Address      Type
192.168.1.1           00-17-7c-00-b7-76    dynamic
192.168.1.2           00-00-00-00-00-00    invalid
192.168.1.4           00-00-00-00-00-00    invalid
192.168.1.7           00-00-00-00-00-00    invalid
192.168.1.11          00-00-00-00-00-00    invalid
192.168.1.32          00-00-00-00-00-00    invalid
192.168.1.57          00-00-00-00-00-00    invalid
192.168.1.64          00-00-00-00-00-00    invalid
192.168.1.72          00-00-00-00-00-00    invalid
192.168.1.100         00-00-00-00-00-00    invalid
192.168.1.102         00-00-00-00-00-00    invalid
192.168.1.113         00-00-00-00-00-00    invalid
192.168.1.117         00-00-00-00-00-00    invalid
192.168.1.134         00-00-00-00-00-00    invalid
192.168.1.135         00-00-00-00-00-00    invalid
192.168.1.255         ff-ff-ff-ff-ff-ff    static
224.0.0.22            01-00-5e-00-00-16    static
224.0.0.252           01-00-5e-00-00-fc    static
224.0.0.253           01-00-5e-00-00-fd    static
239.192.152.143      01-00-5e-40-98-8f    static
239.255.255.250      01-00-5e-7f-ff-fa    static
255.255.255.255      ff-ff-ff-ff-ff-ff    static

E:\Windows\System32>
    
```

```

E:\Windows\System32>arp -a -v

Interface: 127.0.0.1 --- 0x1
Internet Address      Physical Address      Type
224.0.0.22           00-00-00-00-00-00    static
224.0.0.252          00-00-00-00-00-00    static
224.1.1.1             00-00-00-00-00-00    static
239.192.152.143      00-00-00-00-00-00    static
239.255.255.250      00-00-00-00-00-00    static

Interface: 192.168.1.3 --- 0xc
Internet Address      Physical Address      Type
192.168.1.1           00-17-7c-00-b7-76    dynamic
192.168.1.2           00-00-00-00-00-00    invalid
192.168.1.4           00-00-00-00-00-00    invalid
192.168.1.7           00-00-00-00-00-00    invalid
192.168.1.11          00-00-00-00-00-00    invalid
192.168.1.32          00-00-00-00-00-00    invalid
192.168.1.57          00-00-00-00-00-00    invalid
192.168.1.64          00-00-00-00-00-00    invalid
192.168.1.72          00-00-00-00-00-00    invalid
192.168.1.100         00-00-00-00-00-00    invalid
192.168.1.102         00-00-00-00-00-00    invalid
192.168.1.113         00-00-00-00-00-00    invalid
192.168.1.117         00-00-00-00-00-00    invalid
192.168.1.134         00-00-00-00-00-00    invalid
192.168.1.135         00-00-00-00-00-00    invalid
192.168.1.255         ff-ff-ff-ff-ff-ff    static
224.0.0.22            01-00-5e-00-00-16    static
224.0.0.252           01-00-5e-00-00-fc    static
224.0.0.253           01-00-5e-00-00-fd    static
239.192.152.143      01-00-5e-40-98-8f    static
239.255.255.250      01-00-5e-7f-ff-fa    static
255.255.255.255      ff-ff-ff-ff-ff-ff    static

E:\Windows\System32>
    
```

(ii) hostname:

This command has no parameters.

(iii) ipconfig:

This diagnostic command displays all current TCP/IP network configuration values. This command is useful on computers running DHCP because it enables users to determine which TCP/IP configuration values have been configured by DHCP. If you enter only ipconfig without parameters, the response is a display of all of the current TCP/IP configuration values, including IP address, subnet mask, and default gateway.

Syntax:

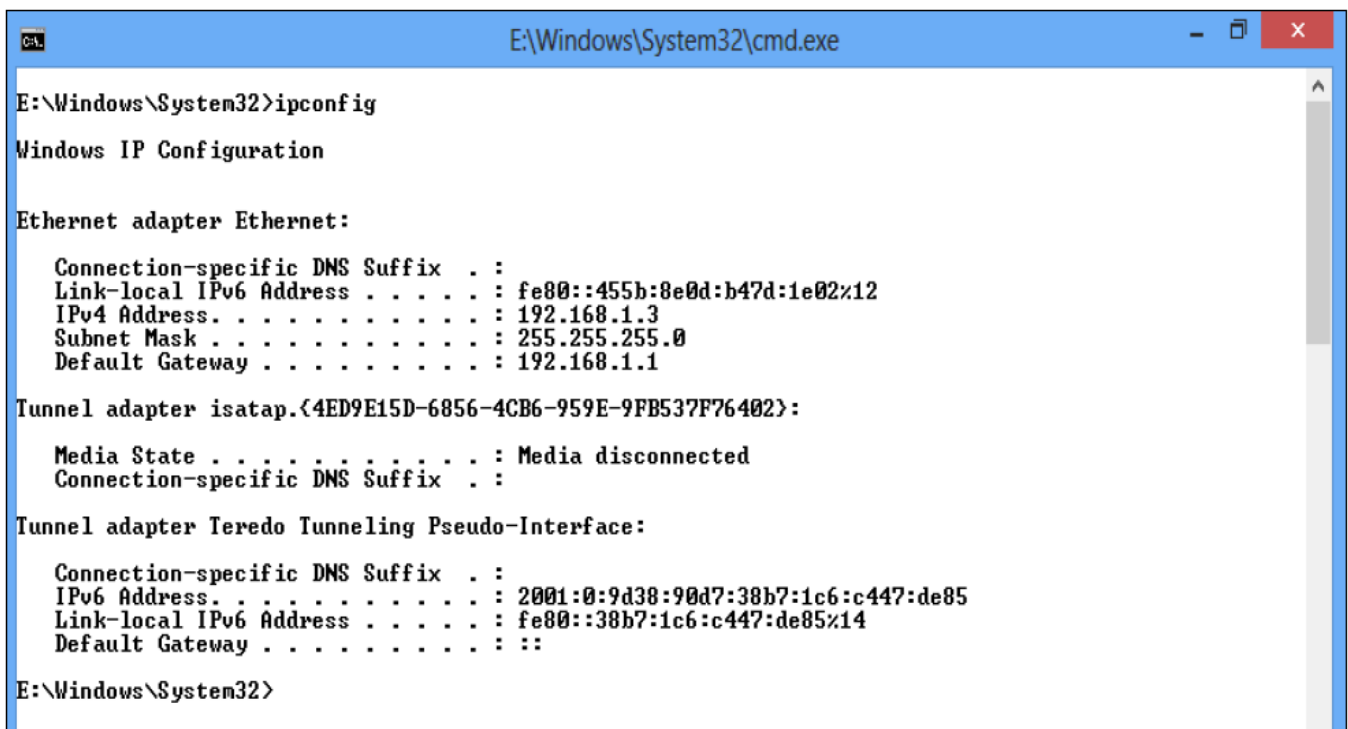
```
ipconfig [/all | /renew [adapter] | /release [adapter]]
```

Parameters:

**all** – Produces a full display. Without this switch, ipconfig displays only the IP address, subnet mask, and default gateway values for each network card.

**renew [adapter]** – Renews DHCP configuration parameters. This option is available only on computers running the DHCP Client service. To specify an adapter name, type the adapter name that appears when you use ipconfig without parameters.

**release [adapter]** – Releases the current DHCP configuration. This option disables TCP/IP on the local computer and is available only on DHCP clients. To specify an adapter name, type the adapter name that appears when you use ipconfig without parameters.



```
E:\Windows\System32>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::455b:8e0d:b47d:1e02%12
    IPv4 Address. . . . . : 192.168.1.3
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

Tunnel adapter isatap.<4ED9E15D-6856-4CB6-959E-9FB537F76402>:

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

Tunnel adapter Teredo Tunneling Pseudo-Interface:

    Connection-specific DNS Suffix  . : 
    IPv6 Address. . . . . : 2001:0:9d38:90d7:38b7:1c6:c447:de85
    Link-local IPv6 Address . . . . . : fe80::38b7:1c6:c447:de85%14
    Default Gateway . . . . . : ::

E:\Windows\System32>
```

```
E:\Windows\System32>ipconfig /release

Windows IP Configuration

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . . . :
    Link-local IPv6 Address . . . . . : fe80::455b:8e0d:b47d:1e02%12
    Default Gateway . . . . . :

Tunnel adapter isatap.{4ED9E15D-6856-4CB6-959E-9FB537F76402}:

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

Tunnel adapter Teredo Tunneling Pseudo-Interface:

    Connection-specific DNS Suffix  . . :
    IPv6 Address . . . . . : 2001:0:9d38:90d7:38b7:1c6:c447:de85
    Link-local IPv6 Address . . . . . : fe80::38b7:1c6:c447:de85%14
    Default Gateway . . . . . : ::

E:\Windows\System32>
```

```
E:\Windows\System32>ipconfig /renew

Windows IP Configuration

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . . . :
    Link-local IPv6 Address . . . . . : fe80::455b:8e0d:b47d:1e02%12
    IPv4 Address . . . . . : 192.168.1.3
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

Tunnel adapter isatap.{4ED9E15D-6856-4CB6-959E-9FB537F76402}:

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

Tunnel adapter Teredo Tunneling Pseudo-Interface:

    Connection-specific DNS Suffix  . . . :
    IPv6 Address . . . . . : 2001:0:9d38:6abd:188f:f81:c447:de85
    Link-local IPv6 Address . . . . . : fe80::188f:f81:c447:de85%14
    Default Gateway . . . . . : ::

E:\Windows\System32>
```

**(iv) netstat:**

This diagnostic command displays protocol statistics and current TCP/IP network connections.

**Syntax:**

```
netstat [-a] [-e][-n][-s] [-p protocol] [-r] [interval]
```

**Parameters:**

- a – Displays all connections and listening ports; server connections are usually not shown.
- e – Displays Ethernet statistics. This can be combined with the -s option.
- n – Displays addresses and port numbers in numerical form (rather than attempting name lookups).
- s – Displays per-protocol statistics. By default, statistics are shown for TCP, UDP, ICMP, and IP;
- p – The -p option can be used to specify a subset of the default.

- p protocol – Shows connections for the protocol specified.
- r – Displays the contents of the routing table.
- interval – Redisplays selected statistics, pausing interval seconds between each display.

```

C:\WINDOWS\system32\cmd.exe
C:\>netstat -a
Active Connections

Proto Local Address           Foreign Address         State
TCP   computer_1:smtp        computer_1:0            LISTENING
TCP   computer_1:http        computer_1:0            LISTENING
TCP   computer_1:epsmap     computer_1:0            LISTENING
TCP   computer_1:https      computer_1:0            LISTENING
TCP   computer_1:microsoft-ds computer_1:0            LISTENING
TCP   computer_1:1035       computer_1:0            LISTENING
TCP   computer_1:1044       computer_1:0            LISTENING
TCP   computer_1:1110       computer_1:0            LISTENING
TCP   computer_1:2393       computer_1:0            LISTENING
TCP   computer_1:2394       computer_1:0            LISTENING
TCP   computer_1:2725       computer_1:0            LISTENING
TCP   computer_1:27657      computer_1:0            LISTENING
TCP   computer_1:1078       computer_1:0            LISTENING
TCP   computer_1:5152       computer_1:0            LISTENING
TCP   computer_1:10000      computer_1:0            LISTENING
TCP   computer_1:netbios-ssn computer_1:0            LISTENING
TCP   computer_1:6405       130.117.190.216:https  TIME_WAIT
TCP   computer_1:6408       130.117.190.216:https  TIME_WAIT
TCP   computer_1:6410       38.113.165.80:https   TIME_WAIT
TCP   computer_1:6411       195.122.169.7:htp     TIME_WAIT
TCP   computer_1:6413       38.113.165.80:https   TIME_WAIT
TCP   computer_1:6414       ii54.IP-82.178.78.omantel.net.on:18964 SYN_SE
TCP   computer_1:6415       130.117.190.207:https TIME_WAIT
TCP   computer_1:6416       38.113.165.80:https   TIME_WAIT
TCP   computer_1:6417       94.75.236.122:htp     TIME_WAIT
TCP   computer_1:6419       tracker.publicbt.com:htp SYN_SENT
TCP   computer_1:6420       82.178.113.7:61015    SYN_SENT
UDP   computer_1:microsoft-ds *:*
UDP   computer_1:isakmp     *:*
UDP   computer_1:1136       *:*
UDP   computer_1:1137       *:*
UDP   computer_1:1142       *:*
UDP   computer_1:ras-ql-n   *:*
UDP   computer_1:3456       *:*
UDP   computer_1:4500       *:*
UDP   computer_1:6771       *:*
UDP   computer_1:27657      *:*
UDP   computer_1:ntp        *:*
UDP   computer_1:1041       *:*
UDP   computer_1:1900       *:*
UDP   computer_1:ntp        *:*
UDP   computer_1:netbios-ns *:*
UDP   computer_1:netbios-dgm *:*
UDP   computer_1:1079       *:*
UDP   computer_1:1900       *:*
    
```

```

C:\WINDOWS\system32\cmd.exe
C:\>netstat -e
Interface Statistics

          Received          Sent
Bytes          26520289          39481237
Unicast packets      62492             80110
Non-unicast packets    858              582
Discards            0
Errors              0
Unknown protocols     0

C:\>netstat -n
Active Connections

Proto Local Address           Foreign Address         State
TCP   192.168.1.2:6432        117.200.54.179:42596    ESTABLISHED
TCP   192.168.1.2:6443        117.254.37.99:44240    FIN_WAIT_1
TCP   192.168.1.2:6446        115.135.209.124:30441  LAST_ACK
TCP   192.168.1.2:6450        119.152.38.16:33423    ESTABLISHED
TCP   192.168.1.2:6455        130.117.190.207:443    TIME_WAIT
TCP   192.168.1.2:6456        119.154.182.5:48599    TIME_WAIT
TCP   192.168.1.2:6459        115.241.108.53:51574   TIME_WAIT
TCP   192.168.1.2:6460        111.92.29.227:51602    LAST_ACK
TCP   192.168.1.2:6463        122.167.70.201:49384   TIME_WAIT
TCP   192.168.1.2:6471        81.29.28.116:18168     TIME_WAIT
TCP   192.168.1.2:6478        38.113.165.80:443      TIME_WAIT
TCP   192.168.1.2:6479        130.117.190.207:443    TIME_WAIT
TCP   192.168.1.2:6480        59.161.60.52:10648     SYN_SENT
TCP   192.168.1.2:6481        59.99.32.102:30300     TIME_WAIT
TCP   192.168.1.2:6488        197.226.112.11:25786   SYN_SENT
TCP   192.168.1.2:6489        39.48.151.125:35684    TIME_WAIT
TCP   192.168.1.2:6491        130.117.190.207:443    TIME_WAIT
TCP   192.168.1.2:6492        27.107.10.22:26129     ESTABLISHED
TCP   192.168.1.2:6494        217.164.47.146:12971   SYN_SENT
TCP   192.168.1.2:6495        94.75.236.122:80       TIME_WAIT
TCP   192.168.1.2:6497        14.97.35.166:32802     ESTABLISHED
TCP   192.168.1.2:6498        14.98.55.11:45327     SYN_SENT
TCP   192.168.1.2:6499        14.99.16.6:48962       SYN_SENT
TCP   192.168.1.2:6500        180.234.95.68:59435    SYN_SENT
TCP   192.168.1.2:6501        223.176.222.63:48430   SYN_SENT
    
```

```

C:\WINDOWS\system32\cmd.exe
C:\>netstat -p
Active Connections
    Proto Local Address          Foreign Address        State
C:\>netstat -R
Route Table
-----
Interface List
0x1 ..... MS TCP Loopback interface
0x2 ...00 0f b0 da c1 34 ..... Realtek RTL8139 Family PCI Fast Ethernet NIC -
Packet Scheduler Miniport
0x3 ...00 16 6f 0f 2d b5 ..... Intel(R) PRO/Wireless 2200BG Network Connectio
n Packet Scheduler Miniport
-----
Active Routes:
Network Destination    Netmask          Gateway          Interface        Metric
0.0.0.0                0.0.0.0          192.168.1.1      192.168.1.2      20
127.0.0.0              255.0.0.0        127.0.0.1        127.0.0.1        1
192.168.1.0            255.255.255.0    192.168.1.2      192.168.1.2      20
192.168.1.2            255.255.255.255  127.0.0.1        127.0.0.1        20
192.168.1.255         255.255.255.255  192.168.1.2      192.168.1.2      20
224.0.0.0              240.0.0.0        192.168.1.2      192.168.1.2      20
255.255.255.255       255.255.255.255  192.168.1.2      192.168.1.2      1
255.255.255.255       255.255.255.255  192.168.1.2      192.168.1.2      3
Default Gateway:      192.168.1.1
-----
Persistent Routes:
None
C:\>_
    
```

**(v) ping:**

This diagnostic command verifies connections to one or more remote computers.

**Syntax:**

```
ping [-t] [-a] [-n count] [-l length] [-f] [-i ttl] [-v tos] [-r count] [-s count] [[-j host-list] | [-k host-list]] [-w timeout] destination-list
```

**Parameters:**

- t – Pings the specified host until interrupted.
- a – Resolves addresses to host names.
- n count – Sends the number of ECHO packets specified by count. The default is 4.
- l length – Sends ECHO packets containing the amount of data specified by length. The default is 64 bytes; the maximum is 8192.
- f – Sends a Do Not Fragment flag in the packet. The packet will not be fragmented by gateways on the route.
- i ttl – Sets the time to live field to the value specified by ttl.
- v tos – Sets the type of service field to the value specified by tos.
- r count – Records the route of the outgoing packet and the returning packet in the record route field. A minimum of 1 to a maximum of 9 hosts must be specified by count.
- s count – Specifies the timestamp for the number of hops specified by count.
- j host-list – Routes packets via the list of hosts specified by host-list. Consecutive hosts can be separated by intermediate gateways (loose source routed). The maximum number allowed by IP is 9.

**-k host-list** – Routes packets via the list of hosts specified by host-list. Consecutive hosts cannot be separated by intermediate gateways (strict source routed). The maximum number allowed by IP is 9.

**-w timeout** – Specifies a timeout interval in milliseconds.

**destination-list** – Specifies the remote hosts to ping.

```

C:\WINDOWS\system32\cmd.exe - ping -t 192.168.1.2
C:\>ping -t 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

```

```

C:\WINDOWS\system32\cmd.exe
C:\>ping -a 192.168.1.2

Pinging computer_1 [192.168.1.2] with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping -n 6 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 6, Received = 6, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping -l 3 192.168.1.2

Pinging 192.168.1.2 with 3 bytes of data:

Reply from 192.168.1.2: bytes=3 time<1ms TTL=128
Reply from 192.168.1.2: bytes=3 time<1ms TTL=128
Reply from 192.168.1.2: bytes=3 time<1ms TTL=128
Reply from 192.168.1.2: bytes=3 time<1ms TTL=128

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

```

```

C:\WINDOWS\system32\cmd.exe

C:\>ping -f 192.168.1.2
Pinging 192.168.1.2 with 32 bytes of data:
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping -i 2 192.168.1.2
Pinging 192.168.1.2 with 32 bytes of data:
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping -i 2 192.168.1.2
Pinging 192.168.1.2 with 32 bytes of data:
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Reply from 192.168.1.2: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
    
```

```

E:\Windows\System32\cmd.exe

E:\Windows\System32>ping google.co.in
Pinging google.co.in [173.194.36.23] with 32 bytes of data:
Reply from 173.194.36.23: bytes=32 time=31ms TTL=58
Reply from 173.194.36.23: bytes=32 time=31ms TTL=58
Reply from 173.194.36.23: bytes=32 time=31ms TTL=58
Reply from 173.194.36.23: bytes=32 time=32ms TTL=58
Ping statistics for 173.194.36.23:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 31ms, Maximum = 32ms, Average = 31ms

E:\Windows\System32>_
    
```

**(vi) route:**

This diagnostic command manipulates network routing tables.

**Syntax:**

route [-f] [command [destination] [MASK netmask] [gateway] [METRIC metric]]

**Parameters:**

-f – Clears the routing tables of all gateway entries. If this parameter is used in conjunction with one of the commands, the tables are cleared prior to running the command.



**command** – Specifies one of four commands below:

- (1) **print**: Prints a route.
- (2) **add**: Adds a route.
- (3) **delete**: Deletes a route.
- (4) **change**: Modifies an existing route.

**destination** – Specifies the host to send command.

**MASK** – Specifies, if present, that the next parameter be interpreted as the netmask parameter.

**netmask** – Specifies, if present, the subnet mask value to be associated with this route entry. If not present, this parameter defaults to 255.255.255.255.

**gateway** – Specifies the gateway.

**METRIC** – Specifies the route metric (cost) for the destination.

```

C:\WINDOWS\system32\cmd.exe

C:\>route PRINT
-----
Interface List
0x1 ..... MS TCP Loopback interface
0x2 ...00 0f b0 da c1 34 ..... Realtek RTL8139 Family PCI Fast Ethernet NIC
Packet Scheduler Miniport
0x3 ...00 16 6f 0f 2d b5 ..... Intel(R) PRO/Wireless 2200BG Network Connecti
- Packet Scheduler Miniport
-----
Active Routes:
Network Destination        Netmask          Gateway          Interface        Metric
127.0.0.0                  255.0.0.0        127.0.0.1       127.0.0.1         1
192.168.1.0                255.255.255.0    192.168.1.2     192.168.1.2      20
192.168.1.2                255.255.255.255  127.0.0.1       127.0.0.1         20
192.168.1.255             255.255.255.255  192.168.1.2     192.168.1.2      20
224.0.0.0                  240.0.0.0        192.168.1.2     192.168.1.2      20
255.255.255.255           255.255.255.255  192.168.1.2     192.168.1.2       1
255.255.255.255           255.255.255.255  192.168.1.2     3                 1
-----
Persistent Routes:
None

C:\>route PRINT 169*
-----
Interface List
0x1 ..... MS TCP Loopback interface
0x2 ...00 0f b0 da c1 34 ..... Realtek RTL8139 Family PCI Fast Ethernet NIC
Packet Scheduler Miniport
0x3 ...00 16 6f 0f 2d b5 ..... Intel(R) PRO/Wireless 2200BG Network Connecti
- Packet Scheduler Miniport
-----
Active Routes:
None
Persistent Routes:
None
    
```

(vii) tracert

This diagnostic utility determines the route taken to a destination by sending Internet Control Message Protocol (ICMP) echo packets with varying time-to-live (TTL) values to the destination. Each router along the path is required to decrement the TTL on a packet by at least 1 before forwarding it, so the TTL is effectively a hop count. When the TTL on a packet reaches 0, the router is supposed to send back an ICMP Time Exceeded message to the source computer.

Tracert determines the route by sending the first echo packet with a TTL of 1 and incrementing the TTL by 1 on each subsequent transmission until the target responds or the maximum TTL is reached. The route is determined by examining the ICMP Time Exceeded messages sent back by intermediate routers. Notice that some routers silently drop packets with expired TTLs and will be invisible to tracert.

Syntax:

```
tracert[-d] [-h maximum_hops] [-j host-list] [-w timeout] target_name
```

Parameters:

- d – Specifies not to resolve addresses to host names.
- h **maximum\_hops** – Specifies maximum number of hops to search for target.
- j **host-list** – Specifies loose source route along host-list.
- w **timeout** – Waits the number of milliseconds specified by timeout for each reply.
- target\_name** – Name of the target host.

```

E:\Windows\System32>tracert google.co.in

Tracing route to google.co.in [173.194.36.23]
over a maximum of 30 hops:
  0  <1 ms    <1 ms    <1 ms    mygateway1.ar7 [192.168.1.1]
  1  32 ms    32 ms    31 ms    triband-mum-59.184.63.254.mtnl.net.in [59.184.63.254]
  2  32 ms    32 ms    32 ms    static-mum-59.185.4.37.mtnl.net.in [59.185.4.37]
  3  31 ms    31 ms    31 ms    74.125.51.205
  4  31 ms    31 ms    30 ms    209.85.241.52
  5  32 ms    31 ms    31 ms    209.85.241.187
  6  31 ms    32 ms    31 ms    bom04s01-in-f23.1e100.net [173.194.36.23]

Trace complete.

E:\Windows\System32>
    
```