



Date: 06/07/2025

Lab Practical #01:

Study of basic networking commands and IP configuration.

Practical Assignment #01:

1. Perform and explain various networking commands listed below:
 - i. ipconfig
 - ii. ping
 - iii. getmac
 - iv. systeminfo
 - v. traceroute / tracert
 - vi. netstat
 - vii. nslookup
 - viii. hostname
 - ix. pathping
 - x. arp

1. ipconfig

Description:

ipconfig shows your computer's internet details—like IP address and connection info. It helps check, fix, and understand how your device connects to a network or internet.

No.	Option	Description
1	ipconfig - displaydns	Shows the list of recently visited website addresses stored in your computer's DNS cache to speed up future access.
2	ipconfig -all	Shows full network details, including IP address, MAC address, and DNS info for all adapters.
3	ipconfig -release	Removes the current IP address from your computer, disconnecting it from the network temporarily.
4	ipconfig -renew	Requests a new IP address from the network, reconnecting your computer with fresh connection settings.
5	ipconfig -flushdns	Clears the DNS cache on your computer, helping fix website loading or name resolution problems.



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Implementation:

```
C:\windows\system32\cmd.exe
C:\Users\dhola>ipconfig

Windows IP Configuration

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:

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

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . :
    IPv6 Address. . . . . : 2401:4900:aa1:d1e4:2b63:48e7:cbdd:4af7
    Temporary IPv6 Address. . . . . : 2401:4900:aa1:d1e4:d13d:e65c:ec31:da72
    Link-Local IPv6 Address. . . . . : fe80::e39f:ebbb:903c:b286%12
    IPv4 Address. . . . . : 10.166.198.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : fe80::879:5aff:fe94:77c%12
                               10.166.198.165

Ethernet adapter Bluetooth Network Connection:

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

C:\Users\dhola>
```

```
C:\windows\system32\cmd.exe
C:\Users\dhola>ipconfig -all

Windows IP Configuration

    Host Name . . . . . : LAPTOP-4TBD77BK
    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. . . . . : FA-54-F6-9F-76-A9
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 2:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :
    Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #2
    Physical Address. . . . . : FE-54-F6-9F-76-A9
    DHCP Enabled. . . . . : No
    Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix . :
    Description . . . . . : Realtek RTL8822CE 802.11ac PCIe Adapter
    Physical Address. . . . . : F8-54-F6-9F-76-A9
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
    IPv6 address. . . . . : 2401:4900:aa1:d1e4:2b63:48e7:cbdd:4af7(Preferred)
    Temporary IPv6 Address. . . . . : 2401:4900:aa1:d1e4:d13d:e65c:ec31:da72(Preferred)
    Link-Local IPv6 Address. . . . . : fe80::e39f:ebbb:903c:b286%12(Preferred)
    IPv4 Address. . . . . : 10.166.198.1(Preferred)
    Subnet Mask . . . . . : 255.255.255.0
    Lease Obtained. . . . . : 09 August 2025 13:19:17
    Lease Expires . . . . . : 09 August 2025 14:19:16
    Default Gateway . . . . . : fe80::879:5aff:fe94:77c%12
                               10.166.198.165
    DHCP Server . . . . . : 10.166.198.165
    DHCPv6 IAID . . . . . : 133715190
    DHCPv6 Client DUID. . . . . : 00-01-00-01-2C-92-8A-79-0C-37-96-65-D3-31
    DNS Servers . . . . . : 10.166.198.165
    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. . . . . : F8-54-F6-9F-76-A8
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
```



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```
C:\windows\system32\cmd.exe
C:\Users\dholn>ipconfig -release

Windows IP Configuration

No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Bluetooth Network Connection while it has its media disconnected.

Wireless LAN adapter Local Area Connection* 1:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :
Wireless LAN adapter Local Area Connection* 2:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :
Wireless LAN adapter Wi-Fi:
    Connection-specific DNS Suffix  . :
    IPv6 Address. . . . . : 2401:4900:aaf1:d1e4:2b63:48e7:cbdd:4af7
    Temporary IPv6 Address. . . . . : 2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72
    Link-local IPv6 Address . . . . . : fe80::e39f:ebbb:903c:b286%12
    Default Gateway . . . . . : fe80::879:5aff:fe94:77c%12
Ethernet adapter Bluetooth Network Connection:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :
C:\Users\dholn>
```

```
C:\Users\dholn>ipconfig -renew

Windows IP Configuration

No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.
No operation can be performed on Bluetooth Network Connection while it has its media disconnected.

Wireless LAN adapter Local Area Connection* 1:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :
Wireless LAN adapter Local Area Connection* 2:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :
Wireless LAN adapter Wi-Fi:
    Connection-specific DNS Suffix  . :
    IPv6 Address. . . . . : 2401:4900:aaf1:d1e4:2b63:48e7:cbdd:4af7
    Temporary IPv6 Address. . . . . : 2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72
    Link-local IPv6 Address . . . . . : fe80::e39f:ebbb:903c:b286%12
    IPv4 Address. . . . . : 10.166.198.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : fe80::879:5aff:fe94:77c%12
                             10.166.198.165
Ethernet adapter Bluetooth Network Connection:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :
```

```
C:\Users\dholn>ipconfig -flushdns

Windows IP Configuration

Successfully flushed the DNS Resolver Cache.
```



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2. ping

Description:

The ping command checks if another computer or device is reachable over a network. It sends a signal and waits for a reply to test connection and speed.

No.	Option	Description
1	-a	Finds the hostname of an IP address by sending a network signal and showing its name if available.
2	-t	Ping the specified host until stopped. To see statistics and continue - type Control-Break;
3	-l	Sets the size of the packet sent, useful for testing with bigger or smaller data packets.
4	-n	Sets how many times to ping the target instead of the default 4 times.
5	-f	Sends ping packets without allowing fragmentation, used to test network's ability to handle large packets without breaking.

Implementation:

```
C:\Users\dholn>ping google.com

Pinging google.com [2404:6800:4009:802::200e] with 32 bytes of data:
Reply from 2404:6800:4009:802::200e: time=42ms
Reply from 2404:6800:4009:802::200e: time=43ms
Reply from 2404:6800:4009:802::200e: time=192ms
Reply from 2404:6800:4009:802::200e: time=42ms

Ping statistics for 2404:6800:4009:802::200e:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 42ms, Maximum = 192ms, Average = 79ms
```



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```
C:\Windows\system32\cmd.exe
C:\Users\dhoin>ping -t google.com

Pinging google.com [2404:6800:4009:802::200e] with 32 bytes of data:
Reply from 2404:6800:4009:802::200e: time=84ms
Reply from 2404:6800:4009:802::200e: time=197ms
Reply from 2404:6800:4009:802::200e: time=198ms
Reply from 2404:6800:4009:802::200e: time=45ms
Reply from 2404:6800:4009:802::200e: time=169ms
Reply from 2404:6800:4009:802::200e: time=136ms
Reply from 2404:6800:4009:802::200e: time=38ms
Reply from 2404:6800:4009:802::200e: time=68ms
Reply from 2404:6800:4009:802::200e: time=44ms
Reply from 2404:6800:4009:802::200e: time=189ms
Reply from 2404:6800:4009:802::200e: time=40ms
Reply from 2404:6800:4009:802::200e: time=58ms
Reply from 2404:6800:4009:802::200e: time=135ms
Reply from 2404:6800:4009:802::200e: time=156ms
Reply from 2404:6800:4009:802::200e: time=161ms
Reply from 2404:6800:4009:802::200e: time=141ms
Reply from 2404:6800:4009:802::200e: time=149ms
Reply from 2404:6800:4009:802::200e: time=57ms
Reply from 2404:6800:4009:802::200e: time=160ms
Reply from 2404:6800:4009:802::200e: time=151ms
Reply from 2404:6800:4009:802::200e: time=59ms
Reply from 2404:6800:4009:802::200e: time=196ms
Reply from 2404:6800:4009:802::200e: time=185ms
Reply from 2404:6800:4009:802::200e: time=156ms
Reply from 2404:6800:4009:802::200e: time=168ms
Reply from 2404:6800:4009:802::200e: time=154ms
Reply from 2404:6800:4009:802::200e: time=148ms
Reply from 2404:6800:4009:802::200e: time=136ms
Reply from 2404:6800:4009:802::200e: time=83ms
Reply from 2404:6800:4009:802::200e: time=165ms
Reply from 2404:6800:4009:802::200e: time=116ms
Reply from 2404:6800:4009:802::200e: time=98ms
Reply from 2404:6800:4009:802::200e: time=164ms
Reply from 2404:6800:4009:802::200e: time=149ms
Reply from 2404:6800:4009:802::200e: time=158ms
Reply from 2404:6800:4009:802::200e: time=152ms
Reply from 2404:6800:4009:802::200e: time=126ms
Reply from 2404:6800:4009:802::200e: time=133ms
Reply from 2404:6800:4009:802::200e: time=161ms
Reply from 2404:6800:4009:802::200e: time=128ms
Reply from 2404:6800:4009:802::200e: time=105ms
Reply from 2404:6800:4009:802::200e: time=169ms
Reply from 2404:6800:4009:802::200e: time=183ms
Reply from 2404:6800:4009:802::200e: time=183ms
Reply from 2404:6800:4009:802::200e: time=168ms
Reply from 2404:6800:4009:802::200e: time=69ms
Reply from 2404:6800:4009:802::200e: time=178ms
Reply from 2404:6800:4009:802::200e: time=165ms
Reply from 2404:6800:4009:802::200e: time=144ms
Reply from 2404:6800:4009:802::200e: time=178ms
Reply from 2404:6800:4009:802::200e: time=136ms
Reply from 2404:6800:4009:802::200e: time=91ms
Reply from 2404:6800:4009:802::200e: time=152ms
Reply from 2404:6800:4009:802::200e: time=39ms
Reply from 2404:6800:4009:802::200e: time=166ms
```

```
C:\Windows\system32\cmd.exe
C:\Users\dhoin>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]
          [-u] [-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.

C:\Users\dhoin>ping -a google.com

Pinging google.com [2404:6800:4009:802::200e] with 32 bytes of data:
Reply from 2404:6800:4009:802::200e: time=51ms
Reply from 2404:6800:4009:802::200e: time=245ms
Reply from 2404:6800:4009:802::200e: time=53ms
Reply from 2404:6800:4009:802::200e: time=65ms

Ping statistics for 2404:6800:4009:802::200e:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 51ms, Maximum = 245ms, Average = 103ms

C:\Users\dhoin>
```

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```
C:\Users\dholn>ping -l 4 google.com

Pinging google.com [2404:6800:4009:802::200e] with 4 bytes of data:
Reply from 2404:6800:4009:802::200e: time=50ms
Reply from 2404:6800:4009:802::200e: time=244ms
Reply from 2404:6800:4009:802::200e: time=150ms
Reply from 2404:6800:4009:802::200e: time=202ms

Ping statistics for 2404:6800:4009:802::200e:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 50ms, Maximum = 244ms, Average = 161ms

C:\Users\dholn>ping -4 google.com

Pinging google.com [142.251.42.78] with 32 bytes of data:
Reply from 142.251.42.78: bytes=32 time=79ms TTL=117
Reply from 142.251.42.78: bytes=32 time=232ms TTL=117
Reply from 142.251.42.78: bytes=32 time=139ms TTL=117
Reply from 142.251.42.78: bytes=32 time=113ms TTL=117

Ping statistics for 142.251.42.78:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 79ms, Maximum = 232ms, Average = 140ms
```

3. getmac

Description:

getmac is a command used to show the MAC (Media Access Control) address of your computer's network adapter. It helps identify devices connected to a network.

No.	Option	Description
1	/s	Connects to a remote computer by name or IP address to get its MAC address information from your system.
2	/nh	Specifies that the "Column Header" should not be displayed in the output. Valid only for TABLE and CSV formats
3	/p	Provides the password for the specified user. If not included, it asks you to type the password manually.
4	/fo	Changes how results are displayed. Options are: TABLE (grid), LIST (detailed), or CSV (comma-separated values for Excel use).
5	/v	Specifies that verbose output is displayed.



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Implementation:

```
C:\Users\dhohn>getmac
```

```
Physical Address      Transport Name
=====
F8-54-F6-9F-76-A8    Media disconnected
F8-54-F6-9F-76-A9    \Device\Tcpip_{631AF955-A3D9-4B8E-A61C-15C71EDED16A}
```

```
C:\Users\dhohn>getmac /fo table
```

```
Physical Address      Transport Name
=====
F8-54-F6-9F-76-A8    Media disconnected
F8-54-F6-9F-76-A9    \Device\Tcpip_{631AF955-A3D9-4B8E-A61C-15C71EDED16A}
```

```
C:\Users\dhohn>getmac /fo list
```

```
Physical Address: F8-54-F6-9F-76-A8
Transport Name:   Media disconnected

Physical Address: F8-54-F6-9F-76-A9
Transport Name:   \Device\Tcpip_{631AF955-A3D9-4B8E-A61C-15C71EDED16A}
```

```
C:\Users\dhohn>getmac /v
```

```
Connection Name Network Adapter Physical Address      Transport Name
=====
Bluetooth Netwo Bluetooth Devic F8-54-F6-9F-76-A8    Media disconnected
Wi-Fi          Realtek RTL8822 F8-54-F6-9F-76-A9    \Device\Tcpip_{631AF955-A3D9-4B8E-A61C-15C71EDED16A}
```

```
C:\Users\dhohn>getmac /nh
```

```
F8-54-F6-9F-76-A8    Media disconnected
F8-54-F6-9F-76-A9    \Device\Tcpip_{631AF955-A3D9-4B8E-A61C-15C71EDED16A}
```

4. systeminfo

Description:

systeminfo is a command that shows detailed information about your computer, like system name, OS version, memory, processor, network, and more — helpful for checking system details quickly.

No.	Option	Description
1	/s	Connects to a remote computer using its name or IP to get system information from that remote machine.



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2	/u	Lets you enter a specific username to access the remote computer and view its system information securely.
3	/?	It shows the help manual for any command in the Command Prompt (CMD)
4	/fo	Changes how the system info is displayed. Options are: table, list, or CSV (for spreadsheet use).
5	/nh	Hides column headers from the output. Useful when using the data in scripts or for simpler output.

Implementation:

```
C:\Users\dholn>systeminfo

Host Name:                LAPTOP-4TBD77BK
OS Name:                  Microsoft Windows 11 Home Single Language
OS Version:               10.0.22631 N/A Build 22631
OS Manufacturer:         Microsoft Corporation
OS Configuration:        Standalone Workstation
OS Build Type:             Multiprocessor Free
Registered Owner:         dholnamra@gmail.com
Registered Organization:   HP
Product ID:                00342-42658-67801-AAOEM
Original Install Date:     09-11-2023, 23:13:54
System Boot Time:          09-08-2025, 13:18:10
System Manufacturer:      HP
System Model:              HP Laptop 15s-fr4xxx
System Type:               x64-based PC
Processor(s):              1 Processor(s) Installed.
                           [01]: Intel64 Family 6 Model 140 Stepping 2 GenuineIntel ~2496 Mhz
BIOS Version:              AMI F.33, 04-10-2023
Windows Directory:         C:\Windows
System Directory:          C:\Windows\system32
Boot Device:                \Device\HarddiskVolume1
System Locale:              en-us;English (United States)
Input Locale:               00000409
Time Zone:                  (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi
Total Physical Memory:      16,028 MB
Available Physical Memory:  7,632 MB
Virtual Memory: Max Size:  18,460 MB
Virtual Memory: Available: 9,425 MB
Virtual Memory: In Use:     9,035 MB
Page File Location(s):      C:\pagefile.sys
Domain:                     WORKGROUP
Logon Server:               \\LAPTOP-4TBD77BK
Hotfix(s):                  6 Hotfix(s) Installed.
                           [01]: KB5056580
                           [02]: KB5027397
                           [03]: KB5031274
                           [04]: KB5032381
                           [05]: KB5060999
                           [06]: KB5058546
Network Card(s):            2 NIC(s) Installed.
                           [01]: Bluetooth Device (Personal Area Network)
                               Connection Name: Bluetooth Network Connection
                               Status: Media disconnected
                           [02]: Realtek RTL8822CE 802.11ac PCIe Adapter
                               Connection Name: Wi-Fi
                               DHCP Enabled: Yes
                               DHCP Server: 10.166.198.165
                               IP address(es)
                               [01]: 10.166.198.1
                               [02]: fe80::e39f:ebbb:903c:b286
                               [03]: 2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72
                               [04]: 2401:4900:aaf1:d1e4:2b63:48e7:cbdd:4af7
Hyper-V Requirements:      A hypervisor has been detected. Features required for Hyper-V will not be displayed.
```




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```
C:\Users\dholn>systeminfo /?
```

```
SYSTEMINFO [/S system [/U username [/P [password]]]] [/FO format] [/NH]
```

Description:

This tool displays operating system configuration information for a local or remote machine, including service pack levels.

Parameter List:

/S	system	Specifies the remote system to connect to.
/U	[domain\]user	Specifies the user context under which the command should execute.
/P	[password]	Specifies the password for the given user context. Prompts for input if omitted.
/FO	format	Specifies the format in which the output is to be displayed. Valid values: "TABLE", "LIST", "CSV".
/NH		Specifies that the "Column Header" should not be displayed in the output. Valid only for "TABLE" and "CSV" formats.
/?		Displays this help message.

Examples:

```
SYSTEMINFO
SYSTEMINFO /?
SYSTEMINFO /S system
SYSTEMINFO /S system /U user
SYSTEMINFO /S system /U domain\user /P password /FO TABLE
SYSTEMINFO /S system /FO LIST
SYSTEMINFO /S system /FO CSV /NH
```

```
C:\Users\dholn>systeminfo /fo csv /nh
"\"LAPTOP-4TBD77BK","Microsoft Windows 11 Home Single Language","10.0.22631 N/A Build 22631","Microsoft Corporation","Standalone Workstation","Multiprocessor Free","dholnamra@gmail.com","HP","00342-42658-67881-AAOEM","09-11-2023, 23:13:54","09-08-2025, 13:18:10","HP","HP Laptop 15s-fr4xxx","x64-based PC","1 Processor(s) Installed., [01]: Intel64 Family 6 Model 140 Stepping 2 GenuineIntel ~2496 Mhz","AMI F.33, 04-10-2023","C:\windows","C:\windows\system32","\\Device\HarddiskVolume1","en-us;English (United States)","000004009","(UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi","16,028 MB","7,726 MB","18,460 MB","9,349 MB","9,079 MB","C:\pagefile.sys","WORKGROUP","\\LAPTOP-4TBD77BK","6 Hotfix(s) Installed., [01]: KB5056580,[02]: KB5027397,[03]: KB5031274,[04]: KB5032381,[05]: KB5060999,[06]: KB5058546","2 NIC(s) Installed., [01]: Bluetooth Device (Personal Area Network), Connection Name: Bluetooth Network Connection, Status: Media disconnected,[02]: Realtek RTL8822CE 802.11ac PCIe Adapter, Connection Name: Wi-Fi 6E, Status: Connected","Dhcp Enabled: Yes, Dhcp Server: 10.166.198.165, IP address(es), [01]: 10.166.198.1, [02]: fe80::e39f:ebbb:9b3c:b286, [03]: 2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72, [04]: 2401:4900:aaf1:d1e4:2b63:4be7:cbdd:4af7","A hypervisor has been detected. Features required for Hyper-V will not be displayed."
```

```
C:\Users\dholn>systeminfo /fo table
Host Name OS Name OS Version OS Manufacturer OS Configuration OS Build Type Registered O
ner System Model System Type Input Locale Page File Location(s) Time Zone Domain Logon Server Hotfix(s) Network Card(s)
System Directory Available Virtual Memory: In Use Hyper-V Requirements
=====
LAPTOP-4TBD77BK Microsoft Windows 11 Home Sing 10.0.22631 N/A Build 22631 Microsoft Corporation Standalone Workstation Multiprocessor Free dholnamra@gm
ail.com HP HP 1 Processor(s) Installed., [01]: Intel64 Fam F.33, 04-10-2023 C:\windows 09-11-2023, 23:13:54 09-08-2025, 13:18:10 HP
HP Laptop 15s-fr4xxx x64-based PC 1 Processor(s) Installed., [01]: Intel64 Fam F.33, 04-10-2023 C:\windows 09-11-2023, 23:13:54 09-08-2025, 13:18:10 HP
;English (United States) 000004009 (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi 16,028 MB 7,726 MB 18,460 MB 9,349 MB
9,111 MB C:\pagefile.sys WORKGROUP \\LAPTOP-4TBD77BK 6 Hotfix(s) Install, 2 NIC(s) Installed., [01]: Bluetooth Device (Personal Area Network),
Connection Name: Bluetooth A hypervisor has been detected. Features required for Hyper-V will not be displayed.
```



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```
C:\Users\dhoin>systeminfo /fo list

Host Name: LAPTOP-4TBD77BK
OS Name: Microsoft Windows 11 Home Single Language
OS Version: 10.0.22631 N/A Build 22631
OS Manufacturer: Microsoft Corporation
OS Configuration: Standalone Workstation
OS Build Type: Multiprocessor Free
Registered Owner: dhoinamra@gmail.com
Registered Organization: HP
Product ID: 00342-42658-67801-AAOEM
Original Install Date: 09-11-2023, 23:13:54
System Boot Time: 09-08-2025, 13:18:10
System Manufacturer: HP
System Model: HP Laptop 15s-fr4xxx
System Type: x64-based PC
Processor(s): 1 Processor(s) Installed.
[01]: Intel64 Family 6 Model 140 Stepping 2 GenuineIntel ~2496 Mhz
BIOS Version: AMI F.33, 04-10-2023
Windows Directory: C:\windows
System Directory: C:\windows\system32
Boot Device: \Device\HarddiskVolume1
System Locale: en-us;English (United States)
Input Locale: 00000409
Time Zone: (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi
Total Physical Memory: 16,028 MB
Available Physical Memory: 7,737 MB
Virtual Memory: Max Size: 18,460 MB
Virtual Memory: Available: 9,359 MB
Virtual Memory: In Use: 9,101 MB
Page File Location(s): C:\pagefile.sys
Domain: WORKGROUP
Logon Server: \\LAPTOP-4TBD77BK
Hotfix(s): 6 Hotfix(s) Installed.
[01]: KB5056580
[02]: KB5027397
[03]: KB5031274
[04]: KB5032381
[05]: KB5060999
[06]: KB5058546
Network Card(s): 2 NIC(s) Installed.
[01]: Bluetooth Device (Personal Area Network)
Connection Name: Bluetooth Network Connection
Status: Media disconnected
[02]: Realtek RTL8822CE 802.11ac PCIe Adapter
Connection Name: Wi-Fi
DHCP Enabled: Yes
DHCP Server: 10.166.198.165
IP address(es)
[01]: 10.166.198.1
[02]: fe80::e39f:ebbb:903c:b286
[03]: 2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72
[04]: 2401:4900:aaf1:d1e4:2b63:48e7:cbdd:4af7
Hyper-V Requirements: A hypervisor has been detected. Features required for Hyper-V will not be displayed.
```

5. Tracert

Description:

tracert is a command that shows the path your data takes to reach another computer or website, including all the stops (hops) between your system and the destination.

No.	Option	Description
1	/R	Traces the route to a destination and back (round trip), showing the path in both directions. Windows-only option.
2	/d	Do not resolve hostnames (faster output by skipping DNS lookups).
3	/h	Set maximum number of hops
4	/w	Timeout in milliseconds to wait for each reply.
5	/4	Forces IPv4 tracing



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Implementation:

```
C:\Users\dhohn>tracert google.com

Tracing route to google.com [2404:6800:4009:802::200e]
over a maximum of 30 hops:

  1    5 ms    5 ms    4 ms  2401:4900:aaf1:d1e4::c
  2    *      *      *      Request timed out.
  3   34 ms   83 ms   26 ms  fc00:0:2:1b2::1
  4  184 ms   37 ms   58 ms  2404:a800:2a00:100::6
  5  144 ms   40 ms   36 ms  2404:a800:2a00:100::5
  6   93 ms   66 ms   51 ms  2404:a800::167
  7   71 ms   74 ms   43 ms  2001:4860:1:1::3900
  8   47 ms   55 ms   55 ms  2001:4860:0:1::87f3
  9   64 ms  114 ms   74 ms  2001:4860:0:1::7ba3
 10   77 ms   41 ms   79 ms  pnbomb-aa-in-x0e.1e100.net [2404:6800:4009:802::200e]

Trace complete.
```

```
C:\Users\dhohn>tracert /d google.com

Tracing route to google.com [2404:6800:4009:802::200e]
over a maximum of 30 hops:

  1    96 ms    3 ms   15 ms  2401:4900:aaf1:d1e4::c
  2    *      *      *      Request timed out.
  3   31 ms   61 ms   50 ms  fc00:0:2:1b2::1
  4  219 ms   40 ms   30 ms  2404:a800:2a00:100::6
  5   38 ms   58 ms   77 ms  2404:a800:2a00:100::5
  6   53 ms   43 ms   52 ms  2404:a800::167
  7   95 ms   55 ms   94 ms  2001:4860:1:1::3900
  8  159 ms   41 ms   53 ms  2001:4860:0:1::87f3
  9   72 ms   61 ms   69 ms  2001:4860:0:1::7ba3
 10   85 ms   51 ms   43 ms  2404:6800:4009:802::200e

Trace complete.

C:\Users\dhohn>
```

```
C:\Users\dhohn>tracert /4 google.com

Tracing route to google.com [142.251.42.78]
over a maximum of 30 hops:

  1    5 ms    6 ms    5 ms  10.166.198.165
  2    *      *      *      Request timed out.
  3  158 ms   75 ms   44 ms  192.168.197.241
  4   45 ms  106 ms   48 ms  182.78.246.94
  5  178 ms   82 ms   68 ms  182.78.246.93
  6   59 ms   75 ms   60 ms  116.119.106.214
  7   77 ms   84 ms   75 ms  72.14.212.48
  8  239 ms   63 ms   79 ms  142.251.225.77
  9   58 ms   76 ms  320 ms  142.251.69.105
 10   81 ms   71 ms   76 ms  bom12s21-in-f14.1e100.net [142.251.42.78]
```



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```
C:\windows\system32\cmd.exe
C:\Users\dholn>tracert /h google.com
Bad value for option /h.

C:\Users\dholn>tracert /h 10 google.com

Tracing route to google.com [2404:6800:4009:802::200e]
over a maximum of 10 hops:

  1    2 ms    2 ms    2 ms  2401:4900:aaf1:d1e4::c
  2    *      *      *      Request timed out.
  3    61 ms   33 ms   58 ms  fc00:0:2:1b2::1
  4   168 ms   45 ms   44 ms  2404:a800:2a00:100::6
  5    49 ms   46 ms   87 ms  2404:a800:2a00:100::5
  6   167 ms   51 ms   57 ms  2404:a800::167
  7   170 ms   64 ms   61 ms  2001:4860:1:1::3900
  8    59 ms   76 ms  115 ms  2001:4860:0:1::87f3
  9   178 ms   45 ms   72 ms  2001:4860:0:1::7ba3
 10    61 ms   42 ms   74 ms  pnbomb-aa-in-x0e.1e100.net [2404:6800:4009:802::200e]

Trace complete.

C:\Users\dholn>
```

```
C:\Users\dholn>tracert /w 100 google.com

Tracing route to google.com [2404:6800:4009:802::200e]
over a maximum of 30 hops:

  1     3 ms     3 ms     2 ms  2401:4900:aaf1:d1e4::c
  2     *      *      *      Request timed out.
  3    55 ms    36 ms    53 ms  fc00:0:2:1b2::1
  4   122 ms    73 ms    80 ms  2404:a800:2a00:100::6
  5     *      93 ms    54 ms  2404:a800:2a00:100::5
  6    68 ms    75 ms   103 ms  2404:a800::167
  7    60 ms    58 ms    58 ms  2001:4860:1:1::3900
  8   176 ms    71 ms    56 ms  2001:4860:0:1::87f3
  9   167 ms     *      82 ms  2001:4860:0:1::7ba3
 10   124 ms    74 ms    39 ms  pnbomb-aa-in-x0e.1e100.net [2404:6800:4009:802::200e]

Trace complete.
```

6. Netstat

Description:

netstat is a command that shows network connections, open ports, and network statistics. It helps check which programs are using the internet or network on your computer.

No.	Option	Description
1	-d	Displays DSCP (priority) values for each connection, showing how network traffic is being handled or prioritized.
2	-a	Shows all connections and listening ports



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3	-n	Shows IP addresses and port numbers without DNS names (faster)
4	-r	Displays the routing table (same as route print).
5	-o	Displays the owning process ID (PID) for each connection.

Implementation:

```
C:\Users\dholn>netstat -n
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	10.166.198.1:50133	52.187.79.109:443	ESTABLISHED
TCP	10.166.198.1:50144	148.113.20.98:443	ESTABLISHED
TCP	10.166.198.1:50351	52.104.79.55:443	TIME_WAIT
TCP	10.166.198.1:50353	13.107.137.11:443	ESTABLISHED
TCP	10.166.198.1:50354	52.104.79.55:443	ESTABLISHED
TCP	10.166.198.1:50355	20.189.173.27:443	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49409	[2603:1040:a06:6::2]:443	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49410	[2603:1040:a06:6::1]:443	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49721	[2603:1040:a03:9::1ad]:443	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49738	[2603:1040:a06:6::2]:443	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49750	[2404:6800:4009:821::200a]:443	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50307	[2404:6800:4009:801::200a]:443	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50308	[2a03:2880:f33e:122:face:b00c:0:7260]:5222	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50321	[2404:6800:4009:82a::200a]:443	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50325	[2600:140f:4::17da:f91b]:443	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50330	[2404:6800:4009:807::200a]:443	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50334	[2001:4860:4802:36::223]:443	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50337	[2001:4860:4802:36::223]:443	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50340	[2001:4860:4802:36::223]:443	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50356	[2603:1063:27:1::14]:443	ESTABLISHED



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```
C:\Users\dhohn>netstat -a
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	0.0.0.0:135	LAPTOP-4TBD77BK:0	LISTENING
TCP	0.0.0.0:445	LAPTOP-4TBD77BK:0	LISTENING
TCP	0.0.0.0:5040	LAPTOP-4TBD77BK:0	LISTENING
TCP	0.0.0.0:7070	LAPTOP-4TBD77BK:0	LISTENING
TCP	0.0.0.0:49664	LAPTOP-4TBD77BK:0	LISTENING
TCP	0.0.0.0:49665	LAPTOP-4TBD77BK:0	LISTENING
TCP	0.0.0.0:49666	LAPTOP-4TBD77BK:0	LISTENING
TCP	0.0.0.0:49667	LAPTOP-4TBD77BK:0	LISTENING
TCP	0.0.0.0:49668	LAPTOP-4TBD77BK:0	LISTENING
TCP	0.0.0.0:49670	LAPTOP-4TBD77BK:0	LISTENING
TCP	0.0.0.0:49671	LAPTOP-4TBD77BK:0	LISTENING
TCP	10.166.198.1:139	LAPTOP-4TBD77BK:0	LISTENING
TCP	10.166.198.1:50133	52.187.79.109:https	ESTABLISHED
TCP	10.166.198.1:50144	relay-a93c9237:https	ESTABLISHED
TCP	10.166.198.1:50343	52.104.79.55:https	TIME_WAIT
TCP	10.166.198.1:50351	52.104.79.55:https	ESTABLISHED
TCP	127.0.0.1:27017	LAPTOP-4TBD77BK:0	LISTENING
TCP	:::135	LAPTOP-4TBD77BK:0	LISTENING
TCP	:::445	LAPTOP-4TBD77BK:0	LISTENING
TCP	:::7070	LAPTOP-4TBD77BK:0	LISTENING
TCP	:::49664	LAPTOP-4TBD77BK:0	LISTENING
TCP	:::49665	LAPTOP-4TBD77BK:0	LISTENING
TCP	:::49666	LAPTOP-4TBD77BK:0	LISTENING
TCP	:::49667	LAPTOP-4TBD77BK:0	LISTENING
TCP	:::49668	LAPTOP-4TBD77BK:0	LISTENING
TCP	:::49670	LAPTOP-4TBD77BK:0	LISTENING
TCP	:::49671	LAPTOP-4TBD77BK:0	LISTENING
TCP	:::7679	LAPTOP-4TBD77BK:0	LISTENING
TCP	:::42050	LAPTOP-4TBD77BK:0	LISTENING
TCP	:::49669	LAPTOP-4TBD77BK:0	LISTENING
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49409	[2603:1040:a06:6::2]:https	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49410	[2603:1040:a06:6::1]:https	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49721	[2603:1040:a03:9::1ad]:https	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49738	[2603:1040:a06:6::2]:https	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49750	bom12s11-in-x0a:https	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50307	bom07s10-in-x0a:https	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50308	whatsapp-chatd-edge6-shv-03-bom2:5222	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50321	bom12s17-in-x0a:https	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50325	g2600-140f-0004-0000-0000-0000-17da-f91b:https	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50330	bom05s08-in-x0a:https	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50334	[2001:4860:4802:36::223]:https	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50337	[2001:4860:4802:36::223]:https	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50340	[2001:4860:4802:36::223]:https	CLOSE_WAIT
UDP	0.0.0.0:5050	::*	
UDP	0.0.0.0:5353	::*	
UDP	0.0.0.0:5353	::*	
UDP	0.0.0.0:5353	::*	
UDP	0.0.0.0:5355	::*	
UDP	0.0.0.0:50001	::*	
UDP	10.166.198.1:137	::*	
UDP	10.166.198.1:138	::*	
UDP	10.166.198.1:1900	::*	

```
C:\Users\dhohn>netstat
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	10.166.198.1:50133	52.187.79.109:https	ESTABLISHED
TCP	10.166.198.1:50144	relay-a93c9237:https	ESTABLISHED
TCP	10.166.198.1:50341	20.190.146.37:https	TIME_WAIT
TCP	10.166.198.1:50343	52.104.79.55:https	TIME_WAIT
TCP	10.166.198.1:50351	52.104.79.55:https	ESTABLISHED
TCP	10.166.198.1:50352	20.42.65.91:https	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49409	[2603:1040:a06:6::2]:https	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49410	[2603:1040:a06:6::1]:https	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49721	[2603:1040:a03:9::1ad]:https	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49738	[2603:1040:a06:6::2]:https	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:49750	bom12s11-in-x0a:https	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50307	bom07s10-in-x0a:https	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50308	whatsapp-chatd-edge6-shv-03-bom2:5222	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50321	bom12s17-in-x0a:https	ESTABLISHED
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50325	g2600-140f-0004-0000-0000-0000-17da-f91b:https	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50330	bom05s08-in-x0a:https	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50334	[2001:4860:4802:36::223]:https	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50337	[2001:4860:4802:36::223]:https	CLOSE_WAIT
TCP	[2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]:50340	[2001:4860:4802:36::223]:https	CLOSE_WAIT



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```
C:\Users\dhohn>netstat -r

=====
Interface List
18...fa 54 f6 9f 76 a9 .....Microsoft Wi-Fi Direct Virtual Adapter
 5...fe 54 f6 9f 76 a9 .....Microsoft Wi-Fi Direct Virtual Adapter #2
12...f8 54 f6 9f 76 a9 .....Realtek RTL8822CE 802.11ac PCIe Adapter
 3...f8 54 f6 9f 76 a8 .....Bluetooth Device (Personal Area Network)
 1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination        Netmask          Gateway           Interface        Metric
0.0.0.0                    0.0.0.0          10.166.198.165    10.166.198.1     35
10.166.198.0                255.255.255.0    On-link           10.166.198.1     291
10.166.198.1                255.255.255.255  On-link           10.166.198.1     291
10.166.198.255              255.255.255.255  On-link           10.166.198.1     291
127.0.0.0                  255.0.0.0        On-link           127.0.0.1        331
127.0.0.1                  255.255.255.255  On-link           127.0.0.1        331
127.255.255.255            255.255.255.255  On-link           127.0.0.1        331
224.0.0.0                  240.0.0.0        On-link           127.0.0.1        331
224.0.0.0                  240.0.0.0        On-link           10.166.198.1     291
255.255.255.255            255.255.255.255  On-link           127.0.0.1        331
255.255.255.255            255.255.255.255  On-link           10.166.198.1     291
=====

Persistent Routes:
None

IPv6 Route Table
=====
Active Routes:
If Metric Network Destination      Gateway
12      51  ::/0                      fe80::879:5aff:fe94:77c
1       331  ::1/128                    On-link
12      51  2401:4900:aaf1:d1e4::/64 On-link
12      291  2401:4900:aaf1:d1e4:2b63:48e7:cbdd:4af7/128
                                           On-link
12      291  2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72/128
                                           On-link
12      291  fe80::/64                  On-link
12      291  fe80::e39f:ebbb:903c:b286/128
                                           On-link
```

7. Nslookup

Description:

nslookup is a command used to find the IP address of a website or domain name. It helps check and troubleshoot DNS (Domain Name System) problems easily.

No.	Option	Description
1	Nslookup	is a command-line tool used to query DNS servers and retrieve information about domain names, IP addresses, mail servers, and more
2	-type=A	Lookup IPv4 address records (default).
3	-type=AAAA	Lookup IPv6 address records



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4	-type=MX	Displays the routing table (same as route print).
5	8.8.8.8	Reverse IP lookup

```
C:\Users\dholn>nslookup -type=MX
Default Server:  UnKnown
Address:  10.166.198.165

> |
```

```
C:\Users\dholn>nslookup google.com
Server:  UnKnown
Address:  10.166.198.165

Non-authoritative answer:
Name:     google.com
Addresses: 2404:6800:4009:831::200e
          142.251.221.238

C:\Users\dholn>|
```

```
C:\Users\dholn>nslookup -type=A google.com
Server:  UnKnown
Address:  10.166.198.165

Non-authoritative answer:
Name:     google.com
Address:  142.251.221.238
```




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```
C:\Users\dholn>nslookup google.com 8.8.8.8
Server: dns.google
Address: 8.8.8.8

Non-authoritative answer:
Name: google.com
Addresses: 2404:6800:4009:804::200e
          216.58.203.14
```

8. Hostname

Description:

No.	Option	Description
1	Hostname	The hostname command is used to display the name of the current computer (host) on a network.

```
C:\Users\dholn>hostname
LAPTOP-4TBD77BK
```

9.Pathping

Description:

No.	Option	Description
1	Pathping	pathping is especially helpful for detecting where in a network path packet loss occurs. Let me know if you want a comparison with ping and tracert or want results explained.
2	/n	Do not resolve IP addresses to hostnames (faster output)
3	/h	Limit the maximum number of hops (default is 30)
4	/g	Specify a list of gateways (routers) the packet must go through.
5	/p	Set the wait time (in milliseconds) between pings (default is 250ms).



Date: 06/07/2025

```
C:\Users\dholn>pathping google.com

Tracing route to google.com [2404:6800:4009:810::200e]
over a maximum of 30 hops:
 0 LAPTOP-4TBD77BK [2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]
 1 2401:4900:aaf1:d1e4::c
 2 * * *
Computing statistics for 25 seconds...
    Source to Here    This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
 0          0/ 100 = 0%      0/ 100 = 0%  LAPTOP-4TBD77BK [2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]
 1    4ms    0/ 100 = 0%      0/ 100 = 0%  2401:4900:aaf1:d1e4::c
Trace complete.
```

```
C:\Users\dholn>pathping -h 3 google.com

Tracing route to google.com [2404:6800:4009:810::200e]
over a maximum of 3 hops:
 0 LAPTOP-4TBD77BK [2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]
 1 2401:4900:aaf1:d1e4::c
 2 * * *
Computing statistics for 25 seconds...
    Source to Here    This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
 0          0/ 100 = 0%      0/ 100 = 0%  LAPTOP-4TBD77BK [2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]
 1    4ms    0/ 100 = 0%      0/ 100 = 0%  2401:4900:aaf1:d1e4::c
Trace complete.
```

```
C:\Users\dholn>pathping -p 200 google.com

Tracing route to google.com [2404:6800:4009:810::200e]
over a maximum of 30 hops:
 0 LAPTOP-4TBD77BK [2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]
 1 2401:4900:aaf1:d1e4::c
 2 * * *
Computing statistics for 20 seconds...
    Source to Here    This Node/Link
Hop  RTT    Lost/Sent = Pct  Lost/Sent = Pct  Address
 0          0/ 100 = 0%      0/ 100 = 0%  LAPTOP-4TBD77BK [2401:4900:aaf1:d1e4:d13d:e65c:ec31:da72]
 1    5ms    0/ 100 = 0%      0/ 100 = 0%  2401:4900:aaf1:d1e4::c
Trace complete.
```



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```
C:\Users\dholn>pathping /g 192.168.1.1 10.0.0.1 google.com

Tracing route to google.com [142.251.221.238]
over a maximum of 30 hops:
  0  LAPTOP-4TBD77BK [10.166.198.1]
  1  *          *          *
Computing statistics for 0 seconds...
      Source to Here   This Node/Link
Hop  RTT   Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                LAPTOP-4TBD77BK [10.166.198.1]

Trace complete.

C:\Users\dholn>pathping /g 192.168.1.1 10.0.0.1 google.com

Tracing route to google.com [142.251.222.110]
over a maximum of 30 hops:
  0  LAPTOP-4TBD77BK [10.166.198.1]
  1  *          *          *
Computing statistics for 0 seconds...
      Source to Here   This Node/Link
Hop  RTT   Lost/Sent = Pct  Lost/Sent = Pct  Address
  0                LAPTOP-4TBD77BK [10.166.198.1]

Trace complete.
```

10 . Arp

Description:

No.	Option	Description
1	Arp	The arp command is used to view and manage the ARP (Address Resolution Protocol) cache on a computer. It helps map IP addresses to MAC (hardware) addresses, which is essential for network communication within a local subnet
2	-a	Display current ARP entries
3	-g	Same as -a
4	-v	Verbose mode – show more details
5	-d*	Delete all ARP entries



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```
C:\Users\dholn>arp -a
```

```
Interface: 10.166.198.1 --- 0xc
Internet Address      Physical Address      Type
10.166.198.165        0a-79-5a-94-07-7c     dynamic
10.166.198.255        ff-ff-ff-ff-ff-ff     static
224.0.0.22            01-00-5e-00-00-16     static
224.0.0.251          01-00-5e-00-00-fb     static
224.0.0.252          01-00-5e-00-00-fc     static
255.255.255.255       ff-ff-ff-ff-ff-ff     static
```

```
C:\Users\dholn>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.
```

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```
C:\Users\dholn>arp -g
```

```
Interface: 10.166.198.1 --- 0xc
Internet Address      Physical Address      Type
10.166.198.165        0a-79-5a-94-07-7c     dynamic
10.166.198.255        ff-ff-ff-ff-ff-ff     static
224.0.0.22            01-00-5e-00-00-16     static
224.0.0.251           01-00-5e-00-00-fb     static
224.0.0.252           01-00-5e-00-00-fc     static
255.255.255.255       ff-ff-ff-ff-ff-ff     static
```

```
C:\Users\dholn>arp -d 192.168.1.100
```

The ARP entry deletion failed: The requested operation requires elevation.

```
C:\Users\dholn>arp -v
```

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.
```

```
C:\Users\dholn>arp -d 192.168.1.100
```

The ARP entry deletion failed: The requested operation requires elevation.