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Experiment-1 **Networking Commands**

Aim:- In this experiment, we learnt about networking commands.

Theory:-

1. arp -a: This command displays the ARP (Address Resolution Protocol) cache, which contains a mapping of IP addresses to MAC addresses on your network.

```
PS C:\Users\Viraj Wankhede> arp -a

Interface: 192.168.29.90 --- 0x3
    Internet Address      Physical Address      Type
    192.168.29.1          f0-ed-b8-d0-16-09    dynamic
    192.168.29.92         90-e8-68-81-cc-a7    dynamic
    192.168.29.255        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
    239.255.255.250       01-00-5e-7f-ff-fa    static
    255.255.255.255       ff-ff-ff-ff-ff-ff    static
PS C:\Users\Viraj Wankhede>
```

2. flushdns: This command is used to clear the DNS resolver cache, helping to resolve DNS-related issues by removing cached DNS records.

```
PS C:\Users\Viraj Wankhede> ipconfig /flushdns
```

```
Windows IP Configuration
```

```
Successfully flushed the DNS Resolver Cache.
```

```
PS C:\Users\Viraj Wankhede>
```

3. ipconfig: Running "ipconfig" provides detailed information about your network interfaces, including IP addresses, subnet masks, and gateway information.

```
Windows PowerShell
PS C:\Users\Viraj Wankhede> ipconfig

Windows IP Configuration

Ethernet adapter Ethernet 2:

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

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. . . . . : 2405:201:31:d0a3:3544:c948:5eb9:e048
    Temporary IPv6 Address. . . . . : 2405:201:31:d0a3:9c06:9535:c67e:46e3
    Link-local IPv6 Address . . . . . : fe80::31fe:c5ae:a57a:42cf%3
    IPv4 Address. . . . . : 192.168.29.90
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : fe80::f2ed:b8ff:fed0:1609%3
                                192.168.29.1
```

4. ipconfig release: This command releases the current DHCP lease on your network interface, allowing it to request a new IP address from a DHCP server.

```
PS C:\Users\Viraj Wankhede> ipconfig /release

Windows IP Configuration

No operation can be performed on Ethernet 2 while it has its media disconnected.
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.

Ethernet adapter Ethernet 2:

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

Wireless LAN adapter Local Area Connection* 1:

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

Wireless LAN adapter Local Area Connection* 2:
```

5. nbtstat: The NetBIOS over TCP/IP (NBT) Statistics utility, "nbtstat," displays NetBIOS information and statistics about your system's network connections.

```

PS C:\Users\Viraj Wankhede> nbtstat -n

Ethernet 2:
Node IpAddress: [0.0.0.0] Scope Id: []

    No names in cache

Wi-Fi:
Node IpAddress: [192.168.29.90] Scope Id: []

    NetBIOS Local Name Table

    Name                                     Type      Status
    -----
    DESKTOP-92UERPI<20>    UNIQUE    Registered
    DESKTOP-92UERPI<00>    UNIQUE    Registered
    WORKGROUP              <00>     GROUP     Registered

Local Area Connection* 1:
Node IpAddress: [0.0.0.0] Scope Id: []

    No names in cache

Local Area Connection* 2:
Node IpAddress: [0.0.0.0] Scope Id: []

    No names in cache
PS C:\Users\Viraj Wankhede>

```

6. netsh advfirewall show all profile: This command shows detailed information about the Windows Firewall's configuration and profiles.

```

PS C:\Users\Viraj Wankhede> netsh advfirewall show allprofiles

Domain Profile Settings:
-----
State                                ON
Firewall Policy                      BlockInbound,AllowOutbound
LocalFirewallRules                   N/A (GPO-store only)
LocalConSecRules                     N/A (GPO-store only)
InboundUserNotification              Enable
RemoteManagement                    Disable
UnicastResponseToMulticast           Enable

Logging:
LogAllowedConnections                Disable
LogDroppedConnections                Disable
FileName                             %systemroot%\system32\LogFiles\Fir
ewall\pfirewall.log
MaxFileSize                           4096

Private Profile Settings:
-----
State                                ON

```

7. netsh interface ipv4 show config: It displays the IPv4 configuration for all network interfaces using the netsh command.

```
PS C:\Users\Viraj Wankhede> netsh interface ipv4 show config
```

```
Configuration for interface "Ethernet 2"
```

```
DHCP enabled:                Yes
InterfaceMetric:             2
DNS servers configured through DHCP:  None
Register with which suffix:   Primary only
WINS servers configured through DHCP:  None
```

```
Configuration for interface "Local Area Connection* 1"
```

```
DHCP enabled:                Yes
InterfaceMetric:             25
DNS servers configured through DHCP:  None
Register with which suffix:   Primary only
WINS servers configured through DHCP:  None
```

```
Configuration for interface "Local Area Connection* 2"
```

```
DHCP enabled:                Yes
InterfaceMetric:             25
DNS servers configured through DHCP:  None
Register with which suffix:   Primary only
WINS servers configured through DHCP:  None
```

```
Configuration for interface "Wi-Fi"
```

8. netsh wlan show profiles: This command lists all the wireless network profiles saved on your system.

```

PS C:\Users\Viraj Wankhede> netsh wlan show profiles

Profiles on interface Wi-Fi:

Group policy profiles (read only)
-----
<None>

User profiles
-----
All User Profile      : Comp & IT LAB 01
All User Profile      : Mahesh
All User Profile      : motorola edge 20 fusion_9472
All User Profile      : RK
All User Profile      : Comp & IT LAB 02
All User Profile      : D109-108_5G
All User Profile      : D109-108
All User Profile      : Dean VJTI_4G
All User Profile      : moto e13
All User Profile      : B47_5G
All User Profile      : B47
All User Profile      : Galaxy M018f00
All User Profile      : Dean_5G
All User Profile      : Dr.B.R.ambedkar_Library_5G
All User Profile      : DrBRAMbedkar_Library
All User Profile      : Comp_AL004
All User Profile      : Redmi 9 Power
All User Profile      : Vivek's iPhone
All User Profile      : wireless
All User Profile      : COMP & IT INTERNET LAB

```

9. netsh: The "netsh" command is a versatile utility for configuring various Windows networking components. It provides different contexts for different networking tasks.

```

PS C:\Users\Viraj Wankhede> netsh
netsh>

```

10. netstat: This command displays active network connections, routing tables, and network statistics on your system.

```
Windows PowerShell
PS C:\Users\Viraj Wankhede> netstat

Active Connections

Proto Local Address           Foreign Address         State
TCP    127.0.0.1:49671          DESKTOP-92UERPI:49672  ESTABLISHED
TCP    127.0.0.1:49672          DESKTOP-92UERPI:49671  ESTABLISHED
TCP    127.0.0.1:49673          DESKTOP-92UERPI:49674  ESTABLISHED
TCP    127.0.0.1:49674          DESKTOP-92UERPI:49673  ESTABLISHED
TCP    127.0.0.1:55036          DESKTOP-92UERPI:55037  ESTABLISHED
TCP    127.0.0.1:55037          DESKTOP-92UERPI:55036  ESTABLISHED
TCP    127.0.0.1:55508          DESKTOP-92UERPI:60110  ESTABLISHED
TCP    127.0.0.1:60110          DESKTOP-92UERPI:55508  ESTABLISHED
TCP    192.168.29.90:55065      20.198.119.143:https    ESTABLISHED
TCP    192.168.29.90:57210      20.212.88.117:https     ESTABLISHED
TCP    192.168.29.90:57702      181:https               TIME_WAIT
TCP    192.168.29.90:57704      181:https               ESTABLISHED
TCP    192.168.29.90:57728      88.85.73.100:https      ESTABLISHED
TCP    192.168.29.90:57780      e2a:https               ESTABLISHED
TCP    192.168.29.90:57797      192.168.0.147:ms-do     SYN_SENT
TCP    192.168.29.90:57798      181:https               ESTABLISHED
TCP    [2405:201:31:d0a3:9c06:9535:c67e:46e3]:57103  si-in-f188:5228        ESTABLISHED
```

11. net view: "Net view" lists the shared resources and computers available on the network.

```
PS C:\Users\Viraj Wankhede> net view
System error 1231 has occurred.

The network location cannot be reached. For information about network troubleshooting, see Windows Help.

PS C:\Users\Viraj Wankhede>
```

12. nslookup: The "nslookup" command is used to query DNS servers to retrieve DNS information, such as IP addresses associated with domain names.


```
Windows PowerShell
PS C:\Users\Viraj Wankhede> nslookup www.google.com
Server:  reliance.reliance
Address:  2405:201:31:d0a3::c0a8:1d01

Non-authoritative answer:
Name:    www.google.com
Addresses:  2404:6800:4009:81f::2004
           142.250.182.228

PS C:\Users\Viraj Wankhede>
```

13. pathping: Pathping is a network diagnostic tool that combines the functionality of "ping" and "tracert." It provides information about the network path and latency to a destination.

```
PS C:\Users\Viraj Wankhede> pathping www.google.com

Tracing route to www.google.com [2404:6800:4009:81f::2004]
over a maximum of 30 hops:
 0  DESKTOP-92UERPI [2405:201:31:d0a3:9c06:9535:c67e:46e3]
 1  2405:201:31:d0a3:f2ed:b8ff:fed0:1609
 2  * * *
Computing statistics for 25 seconds...

```

Hop	RTT	Source to Here Lost/Sent = Pct	This Node/Link Lost/Sent = Pct	Address
0			0/ 100 = 0%	DESKTOP-92UERPI [2405:201:31:d0a3:9c06:9535:c67e:46e3]
1	2ms	0/ 100 = 0%	0/ 100 = 0%	2405:201:31:d0a3:f2ed:b8ff:fed0:1609

```
Trace complete.
PS C:\Users\Viraj Wankhede>
```

14. ping: "Ping" is used to test network connectivity by sending ICMP echo requests to a host and measuring the response time.

```
Windows PowerShell
PS C:\Users\Viraj Wankhede> ping www.google.com

Pinging www.google.com [2404:6800:4009:81f::2004] with 32 bytes of data:Reply from 2404:6800:4009:81f::2004: time=34ms
Reply from 2404:6800:4009:81f::2004: time=53ms
Reply from 2404:6800:4009:81f::2004: time=6ms
Reply from 2404:6800:4009:81f::2004: time=7ms

Ping statistics for 2404:6800:4009:81f::2004:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 53ms, Average = 25ms
PS C:\Users\Viraj Wankhede>
```

15. renew: "Renew" is used in combination with "ipconfig" to renew the DHCP lease on a network interface.

```
PS C:\Users\Viraj Wankhede> ipconfig /renew

Windows IP Configuration

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    Media State . . . . . : Media disconnected
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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. . . . . : 2405:201:31:d0a3:3544:c948:5eb9:e048
    Temporary IPv6 Address. . . . . : 2405:201:31:d0a3:9c06:9535:c67e:46e3
    Link-local IPv6 Address . . . . . : fe80::31fe:c5ae:a57a:42cf%3
    IPv4 Address. . . . . : 192.168.29.90
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : fe80::f2ed:b8ff:fed0:1609%3
                                192.168.29.1
PS C:\Users\Viraj Wankhede>
```

16. route print: This command displays the routing table, showing the paths that network packets take when traveling to their destinations.

```

PS C:\Users\Viraj Wankhede> route print
=====
Interface List
 8...00 ff 58 bc b6 c1 .....Sophos TAP Adapter
 6...3e 55 76 a1 ac 35 .....Microsoft Wi-Fi Direct Virtual Adapter
13...be 55 76 a1 ac 35 .....Microsoft Wi-Fi Direct Virtual Adapter #2
 3...3c 55 76 a1 ac 35 .....Realtek 8821CE Wireless LAN 802.11ac PCI-E NIC
 1.....Software Loopback Interface 1
=====

IPv4 Route Table
=====
Active Routes:
Network Destination        Netmask          Gateway           Interface        Metric
-----
0.0.0.0                    0.0.0.0          192.168.29.1      192.168.29.90    35
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
192.168.29.0               255.255.255.0    On-link           192.168.29.90    291
192.168.29.90              255.255.255.255  On-link           192.168.29.90    291
192.168.29.255             255.255.255.255  On-link           192.168.29.90    291
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           192.168.29.90    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           192.168.29.90    291
=====
Persistent Routes:
None

IPv6 Route Table
=====
Active Routes:
If Metric Network Destination      Gateway
3      51 ::/0 fe80::f2ed:b8ff:fed0:1609
1      331 ::1/128 On-link

```

17. tasklist: "Tasklist" provides a list of running processes and their details on a Windows system.

```
PS C:\Users\Viraj Wankhede> tasklist

Image Name                      PID Session Name        Session#    Mem U
=====
====
System Idle Process             0 Services            0
8 K
System                          4 Services            0
12 K
Secure System                   108 Services          0          30,4
36 K
Registry                       152 Services          0          31,2
64 K
smss.exe                       564 Services          0           9
68 K
csrss.exe                      880 Services          0          4,6
00 K
wininit.exe                    520 Services          0          5,0
60 K
services.exe                  1076 Services          0          8,5
04 K
LsaIso.exe                    1108 Services          0          3,0
00 K
```

18. tracert -d: Similar to "tracert" on Linux, "tracert" traces the route that packets take to a destination, and the "-d" flag prevents it from resolving hostnames.

```

PS C:\Users\Viraj Wankhede> tracert -d -h 30 -w 500 www.google.com

Tracing route to www.google.com [2404:6800:4009:81f::2004]
over a maximum of 30 hops:

 1      2 ms      2 ms      2 ms  2405:201:31:d0a3:f2ed:b8ff:fed0:1609
 2      *        *        *      Request timed out.
 3      5 ms      5 ms      6 ms  2405:203:400:100:172:31:2:24
 4      7 ms      6 ms      7 ms  2001:4860:1:1::167a
 5      6 ms      7 ms      6 ms  2001:4860:1:1::167a
 6      6 ms      6 ms      6 ms  2404:6800:80df::1
 7      7 ms      6 ms      5 ms  2001:4860:0:1::443e
 8      6 ms      5 ms      5 ms  2001:4860:0:1::4fe3
 9     12 ms      7 ms     12 ms  2404:6800:4009:81f::2004

Trace complete.
PS C:\Users\Viraj Wankhede>

```

19. tracert: This command traces the route that packets take to a destination, displaying the IP addresses of routers and hosts along the way.

```

Windows PowerShell
PS C:\Users\Viraj Wankhede> tracert www.google.com

Tracing route to www.google.com [2404:6800:4009:81f::2004]
over a maximum of 30 hops:

 1      2 ms      1 ms      2 ms  2405:201:31:d0a3:f2ed:b8ff:fed0:1609
 2      *        *        *      Request timed out.
 3      5 ms      5 ms      4 ms  2405:203:400:100:172:31:2:24
 4      7 ms      6 ms      9 ms  2001:4860:1:1::167a
 5      7 ms      7 ms      6 ms  2001:4860:1:1::167a
 6      7 ms      6 ms      7 ms  2404:6800:80df::1
 7      5 ms      6 ms     21 ms  2001:4860:0:1::443e
 8      5 ms      6 ms      6 ms  2001:4860:0:1::4fe3
 9      5 ms      6 ms      5 ms  bom07s29-in-x04.1e100.net [2404:6800:4009:81f::2004]

Trace complete.
PS C:\Users\Viraj Wankhede>

```

Conclusion:-

Networking commands are executed and studied successfully.