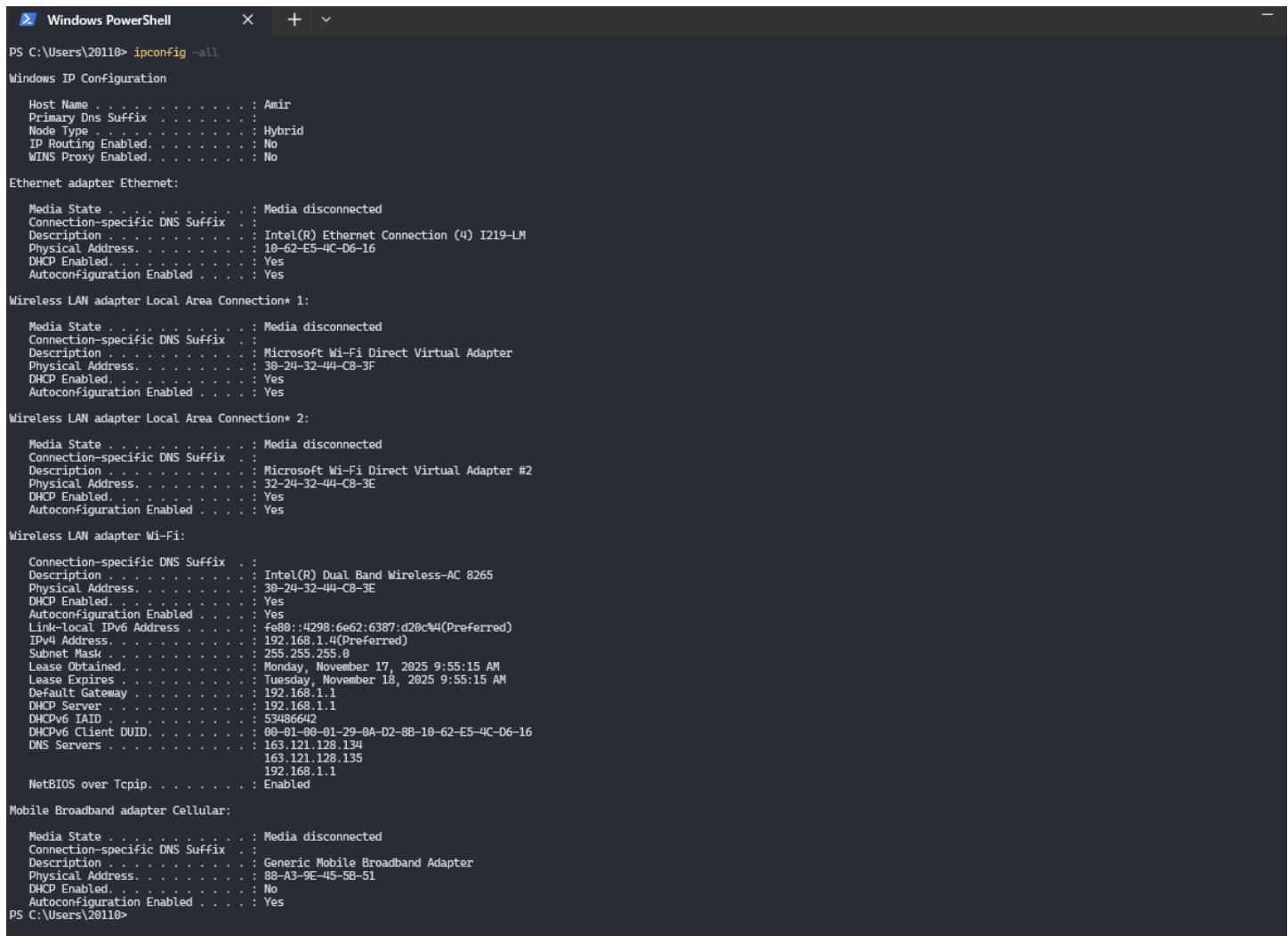


# Lab 1: Network Commands & IP Addressing

## Checking Physical (MAC) Address

- What command shows all network details including the physical (MAC) address?
  - ipconfig /all



```
Windows PowerShell      + 
PS C:\Users\20110> ipconfig /all
Windows IP Configuration

Host Name . . . . . : Amir
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled . . . . . : No
WINS Proxy Enabled . . . . . : No

Ethernet adapter Ethernet:

  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . . . . . :
  Description . . . . . : Intel(R) Ethernet Connection (4) I219-LM
  Physical Address . . . . . : 10-62-E5-4C-D6-16
  DHCP Enabled . . . . . : Yes
  Autoconfiguration Enabled . . . . . : Yes

Wireless LAN adapter Local Area Connection* 1:

  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . . . . . :
  Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter
  Physical Address . . . . . : 30-24-32-44-C8-3F
  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 . . . . . : 32-24-32-44-C8-3E
  DHCP Enabled . . . . . : Yes
  Autoconfiguration Enabled . . . . . : Yes

Wireless LAN adapter Wi-Fi:

  Connection-specific DNS Suffix . . . . . :
  Description . . . . . : Intel(R) Dual Band Wireless-AC 8265
  Physical Address . . . . . : 30-24-32-44-C8-3E
  DHCP Enabled . . . . . : Yes
  Autoconfiguration Enabled . . . . . : Yes
  Link-local IPv6 Address . . . . . :
    fe80::4298:6e62:6387:d20c%4(Preferred)
    192.168.1.4(Preferred)
  IPv4 Address . . . . . :
    Subnet Mask . . . . . : 255.255.255.0
    Lease Obtained . . . . . : Monday, November 17, 2025 9:55:15 AM
    Lease Expires . . . . . : Tuesday, November 18, 2025 9:55:15 AM
    Default Gateway . . . . . :
      192.168.1.1
    DHCP Server . . . . . :
      192.168.1.1
    DHCPv6 IAID . . . . . : 53486642
    DHCPv6 Client DUID . . . . . : 00-01-00-01-29-0A-D2-88-10-62-E5-4C-D6-16
    DNS Servers . . . . . :
      163.121.128.134
      163.121.128.135
      192.168.1.1
  NetBIOS over Tcpip. . . . . : Enabled

Mobile Broadband adapter Cellular:

  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . . . . . :
  Description . . . . . : Generic Mobile Broadband Adapter
  Physical Address . . . . . : 88-A3-9E-45-5B-51
  DHCP Enabled . . . . . : No
  Autoconfiguration Enabled . . . . . : Yes

PS C:\Users\20110>
```

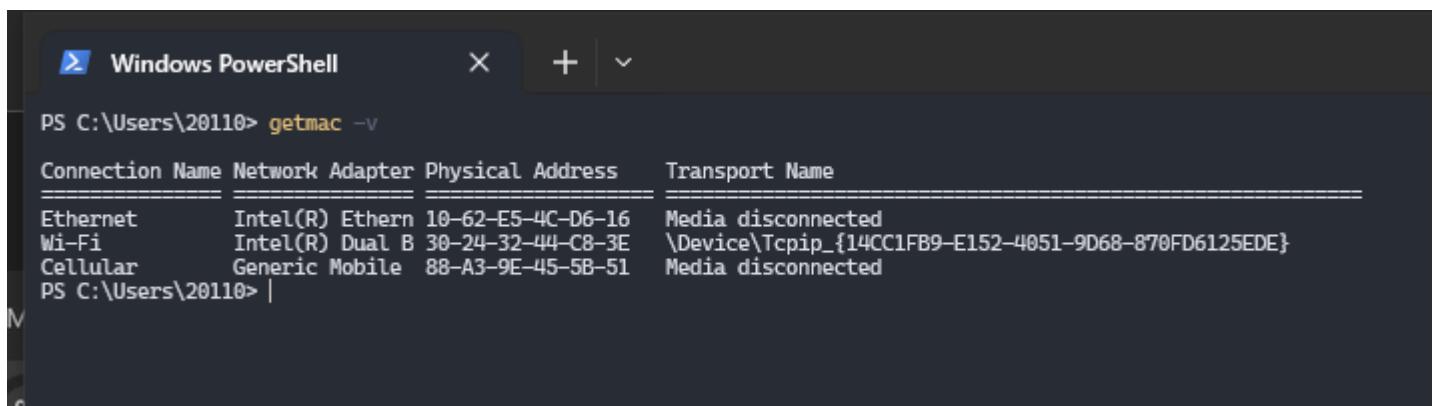
○

- How can you see your device's MAC address?
  - Getmac

```
PS C:\Users\20110> Getmac
Physical Address      Transport Name
=====
10-62-E5-4C-D6-16    Media disconnected
30-24-32-44-C8-3E   \Device\Tcpip_{14CC1FB9-E152-4051-9D68-870FD6125EDE}
88-A3-9E-45-5B-51    Media disconnected
PS C:\Users\20110> |
```

3. How can you show the MAC address with more details?

- getmac /v



A screenshot of a Windows PowerShell window titled "Windows PowerShell". The command "getmac -v" is run, displaying detailed information for three network adapters: Ethernet, Wi-Fi, and Cellular. The table includes columns for Connection Name, Network Adapter, Physical Address, and Transport Name.

Connection Name	Network Adapter	Physical Address	Transport Name
Ethernet	Intel(R) Ethern	10-62-E5-4C-D6-16	Media disconnected
Wi-Fi	Intel(R) Dual B	30-24-32-44-C8-3E	\Device\Tcpip_{14CC1FB9-E152-4051-9D68-870FD6125EDE}
Cellular	Generic Mobile	88-A3-9E-45-5B-51	Media disconnected

- 

---

## APIPA & IP Configuration

4. What is the default APIPA address when the device fails to get an IP from DHCP?

- Starts with: 169.254.x.x

```
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::4298:6e62:6387:d20c%4
Autoconfiguration IPv4 Address . . . : 169.254.91.107
Subnet Mask . . . . . : 255.255.0.0
Default Gateway . . . . . :
```

- 

5. What command shows your current IP settings?

- Ipconfig

```
Windows PowerShell + 
PS C:\Users\20110> ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:
  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 . .
  Link-local IPv6 Address . . . . . : fe80::4298:6e62:6387:d20c%4
  IPv4 Address . . . . . : 192.168.1.4
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . : 192.168.1.1

Mobile Broadband adapter Cellular:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . .
PS C:\Users\20110> |
```

○

## 6. How do you release your current IP address?

- ipconfig /release

```
Windows PowerShell + 
PS C:\Users\20110> ipconfig /release

Windows IP Configuration

No operation can be performed on Ethernet 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:
  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 . .

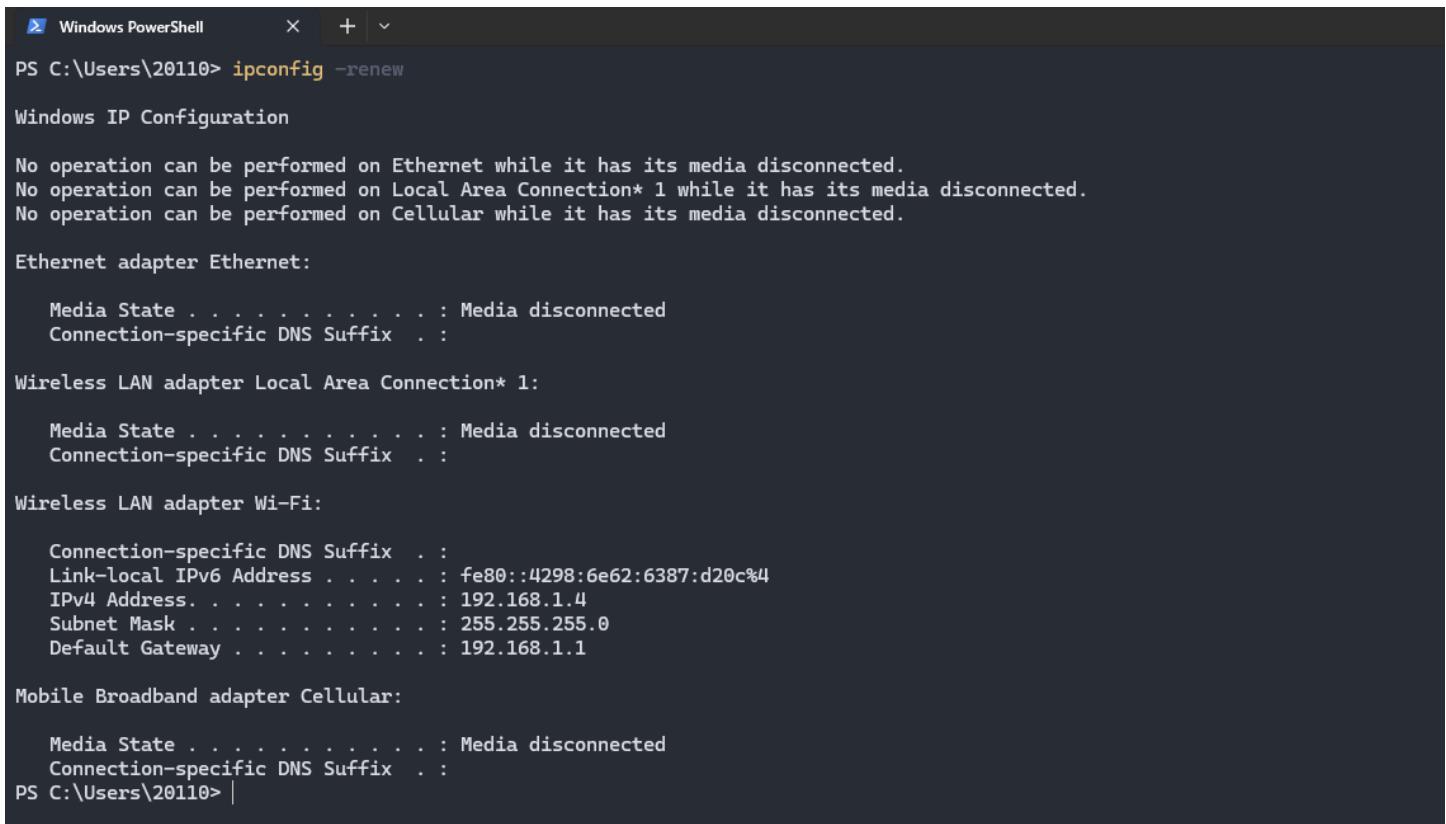
Wireless LAN adapter Wi-Fi:
  Connection-specific DNS Suffix . .
  Link-local IPv6 Address . . . . . : fe80::4298:6e62:6387:d20c%4
  Default Gateway . . . . . :

Mobile Broadband adapter Cellular:
  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . .
PS C:\Users\20110> |
```

○

## 7. How do you request a new IP address from DHCP?

- o ipconfig /renew



```
Windows PowerShell      X + ▾
PS C:\Users\20110> ipconfig /renew

Windows IP Configuration

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

Ethernet adapter Ethernet:

  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 Wi-Fi:

  Connection-specific DNS Suffix . :
  Link-local IPv6 Address . . . . . : fe80::4298:6e62:6387:d20c%4
  IPv4 Address . . . . . : 192.168.1.4
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . : 192.168.1.1

Mobile Broadband adapter Cellular:

  Media State . . . . . : Media disconnected
  Connection-specific DNS Suffix . :
PS C:\Users\20110> |
```

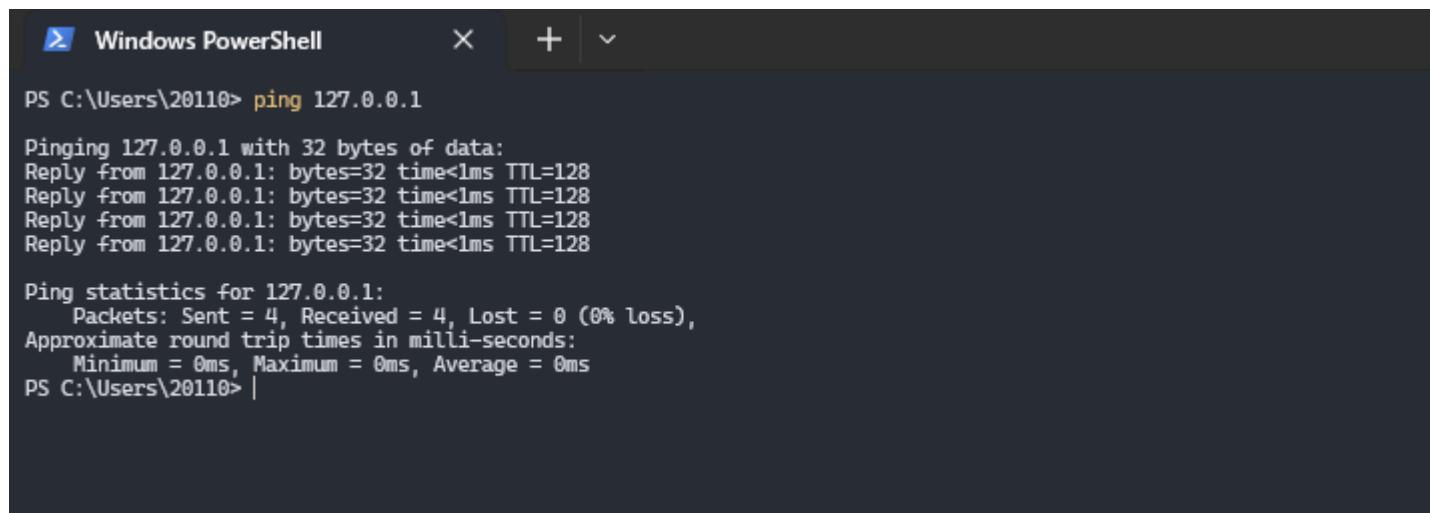
o

---

## Ping Commands

### 9. How do you test connection to an IP address?

- o ping [IP address]



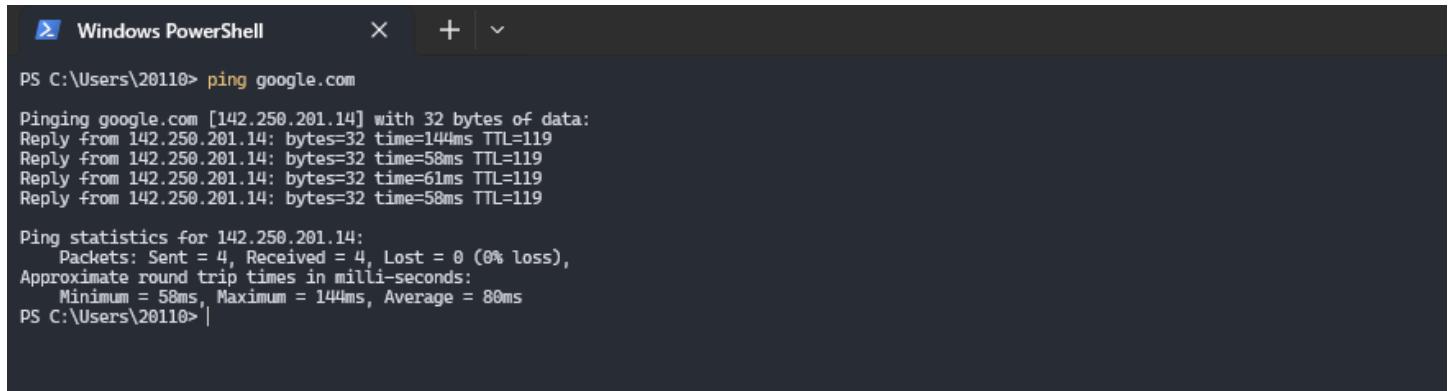
```
Windows PowerShell      X + ▾
PS C:\Users\20110> ping 127.0.0.1

Pinging 127.0.0.1 with 32 bytes of data:
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 127.0.0.1:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
PS C:\Users\20110> |
```

10. How do you test connection to a website (URL)?

- o ping [www.example.com](http://www.example.com)



```
Windows PowerShell

PS C:\Users\20110> ping google.com

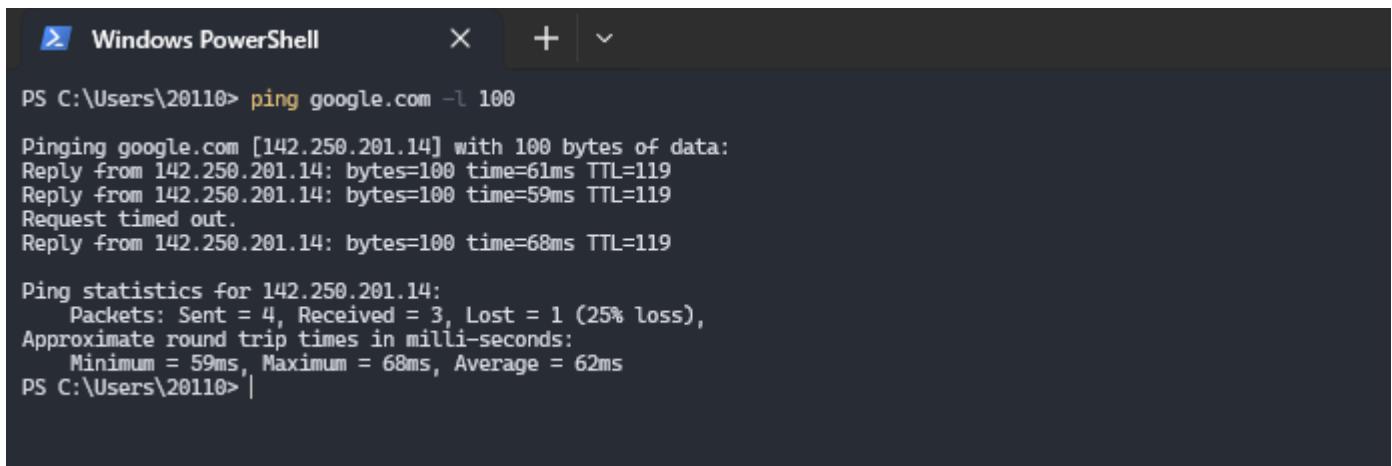
Pinging google.com [142.250.201.14] with 32 bytes of data:
Reply from 142.250.201.14: bytes=32 time=144ms TTL=119
Reply from 142.250.201.14: bytes=32 time=58ms TTL=119
Reply from 142.250.201.14: bytes=32 time=61ms TTL=119
Reply from 142.250.201.14: bytes=32 time=58ms TTL=119

Ping statistics for 142.250.201.14:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 58ms, Maximum = 144ms, Average = 80ms
PS C:\Users\20110>
```

o

11. How do you send a ping with a specific data size?

- o ping [IP]-l [size]



```
Windows PowerShell

PS C:\Users\20110> ping google.com -l 100

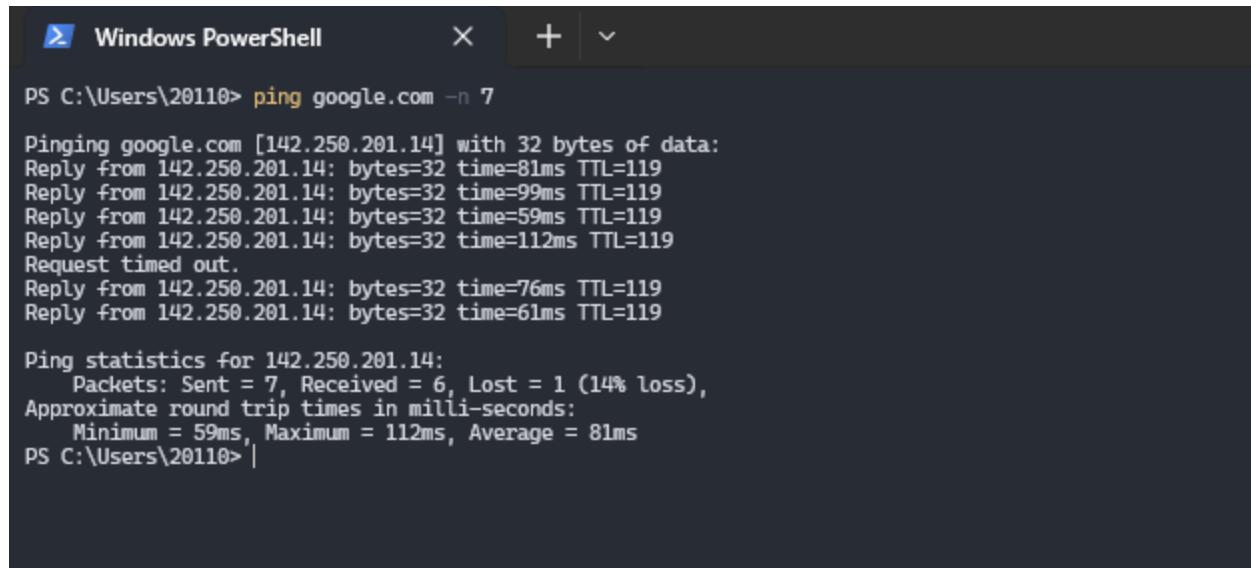
Pinging google.com [142.250.201.14] with 100 bytes of data:
Reply from 142.250.201.14: bytes=100 time=61ms TTL=119
Reply from 142.250.201.14: bytes=100 time=59ms TTL=119
Request timed out.
Reply from 142.250.201.14: bytes=100 time=68ms TTL=119

Ping statistics for 142.250.201.14:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 59ms, Maximum = 68ms, Average = 62ms
PS C:\Users\20110>
```

o

12. How do you send a specific number of ping requests?

- o ping [IP]-n [count]



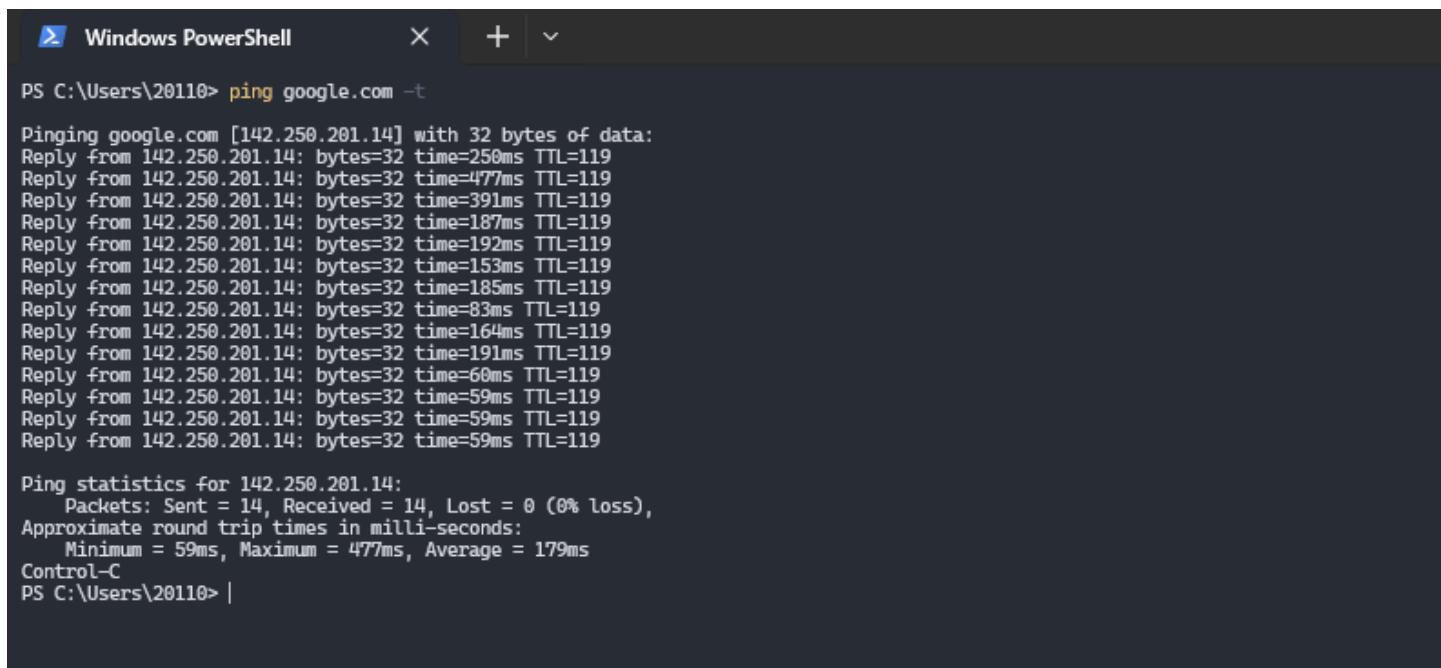
```
PS C:\Users\20110> ping google.com -n 7

Pinging google.com [142.250.201.14] with 32 bytes of data:
Reply from 142.250.201.14: bytes=32 time=81ms TTL=119
Reply from 142.250.201.14: bytes=32 time=99ms TTL=119
Reply from 142.250.201.14: bytes=32 time=59ms TTL=119
Reply from 142.250.201.14: bytes=32 time=112ms TTL=119
Request timed out.
Reply from 142.250.201.14: bytes=32 time=76ms TTL=119
Reply from 142.250.201.14: bytes=32 time=61ms TTL=119

Ping statistics for 142.250.201.14:
    Packets: Sent = 7, Received = 6, Lost = 1 (14% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 59ms, Maximum = 112ms, Average = 81ms
PS C:\Users\20110>
```

13. How do you send continuous ping requests until you stop it manually?

- o ping [IP]-t



```
PS C:\Users\20110> ping google.com -t

Pinging google.com [142.250.201.14] with 32 bytes of data:
Reply from 142.250.201.14: bytes=32 time=250ms TTL=119
Reply from 142.250.201.14: bytes=32 time=477ms TTL=119
Reply from 142.250.201.14: bytes=32 time=391ms TTL=119
Reply from 142.250.201.14: bytes=32 time=187ms TTL=119
Reply from 142.250.201.14: bytes=32 time=192ms TTL=119
Reply from 142.250.201.14: bytes=32 time=153ms TTL=119
Reply from 142.250.201.14: bytes=32 time=185ms TTL=119
Reply from 142.250.201.14: bytes=32 time=83ms TTL=119
Reply from 142.250.201.14: bytes=32 time=164ms TTL=119
Reply from 142.250.201.14: bytes=32 time=191ms TTL=119
Reply from 142.250.201.14: bytes=32 time=60ms TTL=119
Reply from 142.250.201.14: bytes=32 time=59ms TTL=119
Reply from 142.250.201.14: bytes=32 time=59ms TTL=119
Reply from 142.250.201.14: bytes=32 time=59ms TTL=119

Ping statistics for 142.250.201.14:
    Packets: Sent = 14, Received = 14, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 59ms, Maximum = 477ms, Average = 179ms
Control-C
PS C:\Users\20110>
```

o

---

## Netstat

19. How do you show all active connections?

- o netstat-a

Proto	Local Address	Foreign Address	State
Active Connections			
TCP	0.0.0.0:135	Aml:0	LISTENING
TCP	0.0.0.0:445	Aml:0	LISTENING
TCP	0.0.0.0:673	Aml:0	LISTENING
TCP	0.0.0.0:1153	Aml:0	LISTENING
TCP	0.0.0.0:2261	Aml:0	LISTENING
TCP	0.0.0.0:3935	Aml:0	LISTENING
TCP	0.0.0.0:3936	Aml:0	LISTENING
TCP	0.0.0.0:3588	Aml:0	LISTENING
TCP	0.0.0.0:8382	Aml:0	LISTENING
TCP	0.0.0.0:1549	Aml:0	LISTENING
TCP	0.0.0.0:5357	Aml:0	LISTENING
TCP	0.0.0.0:76380	Aml:0	LISTENING
TCP	0.0.0.0:8080	Aml:0	LISTENING
TCP	0.0.0.0:16592	Aml:0	LISTENING
TCP	0.0.0.0:33860	Aml:0	LISTENING
TCP	0.0.0.0:49664	Aml:0	LISTENING
TCP	0.0.0.0:1545	Aml:0	LISTENING
TCP	0.0.0.0:49666	Aml:0	LISTENING
TCP	0.0.0.0:49667	Aml:0	LISTENING
TCP	0.0.0.0:49668	Aml:0	LISTENING
TCP	0.0.0.0:1541	Aml:0	LISTENING
TCP	0.0.0.0:50111	Aml:0	LISTENING
TCP	0.0.0.0:59111	Aml:0	LISTENING
TCP	127.0.0.1:135	Aml:189	ESTABLISHED
TCP	127.0.0.1:1838	Aml:1829	ESTABLISHED
TCP	127.0.0.1:1831	Aml:0	LISTENING
TCP	127.0.0.1:1832	Aml:1833	ESTABLISHED
TCP	127.0.0.1:1833	Aml:1832	ESTABLISHED
TCP	127.0.0.1:1839	Aml:0	LISTENING
TCP	127.0.0.1:1941	Aml:0	LISTENING
TCP	127.0.0.1:1844	Aml:0	LISTENING
TCP	127.0.0.1:1855	Aml:1065	ESTABLISHED
TCP	127.0.0.1:1856	Aml:1866	ESTABLISHED
TCP	127.0.0.1:1858	Aml:1851	ESTABLISHED
TCP	127.0.0.1:1859	Aml:1859	ESTABLISHED
TCP	127.0.0.1:1862	Aml:1852	ESTABLISHED
TCP	127.0.0.1:1853	Aml:1854	ESTABLISHED
TCP	127.0.0.1:1854	Aml:1853	ESTABLISHED
TCP	127.0.0.1:1855	Aml:1854	ESTABLISHED
TCP	127.0.0.1:1856	Aml:1857	ESTABLISHED
TCP	127.0.0.1:1857	Aml:1856	ESTABLISHED
TCP	127.0.0.1:1869	Aml:1844	ESTABLISHED
TCP	127.0.0.1:1870	Aml:1855	ESTABLISHED
TCP	127.0.0.1:1876	Aml:1866	ESTABLISHED
TCP	127.0.0.1:1868	Aml:1869	ESTABLISHED
TCP	127.0.0.1:1869	Aml:1868	ESTABLISHED
TCP	127.0.0.1:1870	Aml:1868	ESTABLISHED
TCP	127.0.0.1:1888	Aml:1887	ESTABLISHED
TCP	127.0.0.1:1889	Aml:61908	ESTABLISHED
TCP	127.0.0.1:1890	Aml:1	ESTABLISHED
TCP	127.0.0.1:1901	Aml:1899	ESTABLISHED
TCP	127.0.0.1:1194	Aml:1165	ESTABLISHED
TCP	127.0.0.1:1195	Aml:1184	ESTABLISHED
TCP	127.0.0.1:1201	Aml:1221	ESTABLISHED
TCP	127.0.0.1:1122	Aml:1121	ESTABLISHED
TCP	127.0.0.1:27017	Aml:0	LISTENING
TCP	127.0.0.1:61908	Aml:0	LISTENING
TCP	127.0.0.1:1889	Aml:1882	ESTABLISHED
TCP	127.0.0.1:610998	Aml:1889	ESTABLISHED
TCP	128.168.1.1:1800	Aml:0	LISTENING
TCP	128.168.1.1:1800	56.168.116.108:1800	ESTABLISHED
TCP	128.168.1.1:4591	S 52.123.137.100:80	ESTABLISHED
TCP	128.168.1.1:4591	98.66.133.186:https	ESTABLISHED
TCP	128.168.1.1:41989	a9293e9fb5d201d2:https	ESTABLISHED
TCP	128.168.1.1:41989	74.202.255.116:https	ESTABLISHED
TCP	128.168.1.1:41982	52.123.208.39:https	ESTABLISHED
TCP	128.168.1.1:41993	52.123.208.39:https	ESTABLISHED

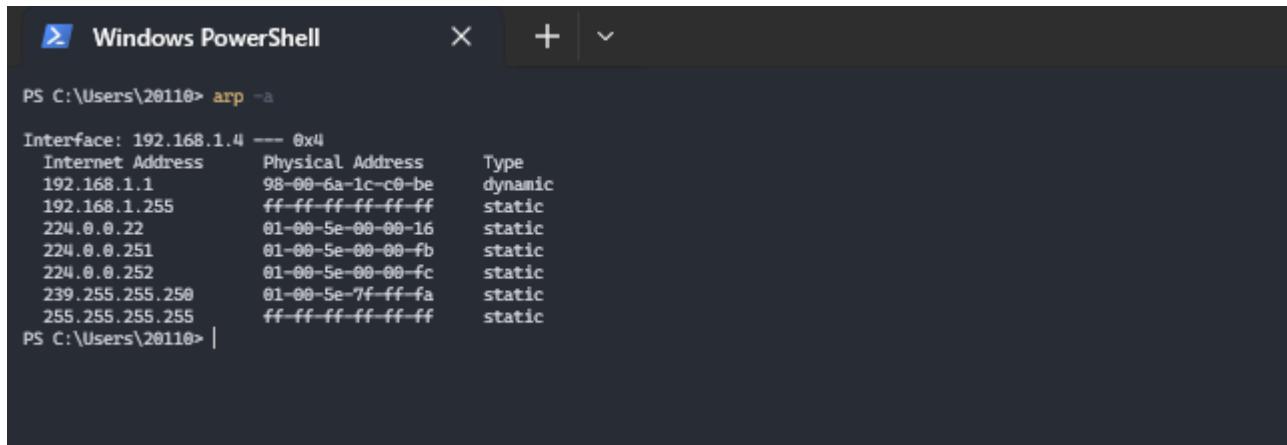
20. How do you show active connections with numbers only?

#### ◦ netstat-n

o

21. What command shows MAC addresses of other devices on the network?

arp -a



```
Windows PowerShell

PS C:\Users\20110> arp -a

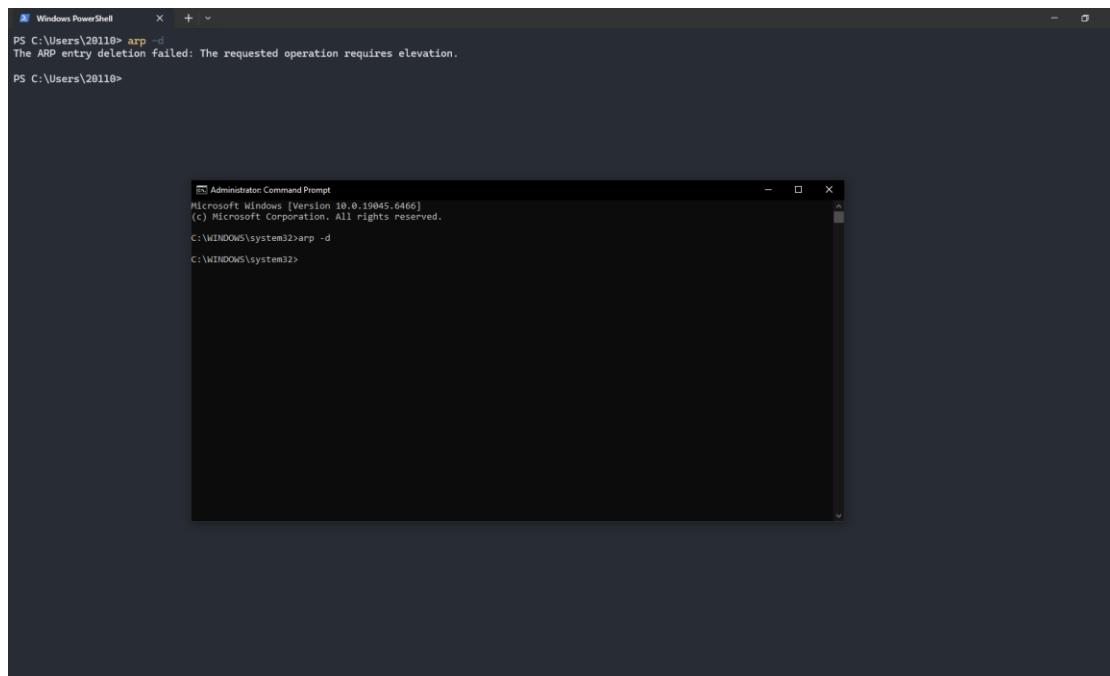
Interface: 192.168.1.4 --- 0x4
   Internet Address          Physical Address      Type
   192.168.1.1               98-00-6a-1c-c0-be  dynamic
   192.168.1.255             ff-ff-ff-ff-ff-ff  static
   224.0.0.22                01-00-5e-00-00-16  static
   224.0.0.251               01-00-5e-00-00-fb  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\20110>
```

22.

23. What command deletes the ARP cache?

arp -d



```
Windows PowerShell

PS C:\Users\20110> arp -d
The ARP entry deletion failed: The requested operation requires elevation.

PS C:\Users\20110>

Administrator: Command Prompt
Microsoft Windows [Version 10.0.19045.6466]
(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>arp -d
C:\WINDOWS\system32>
```

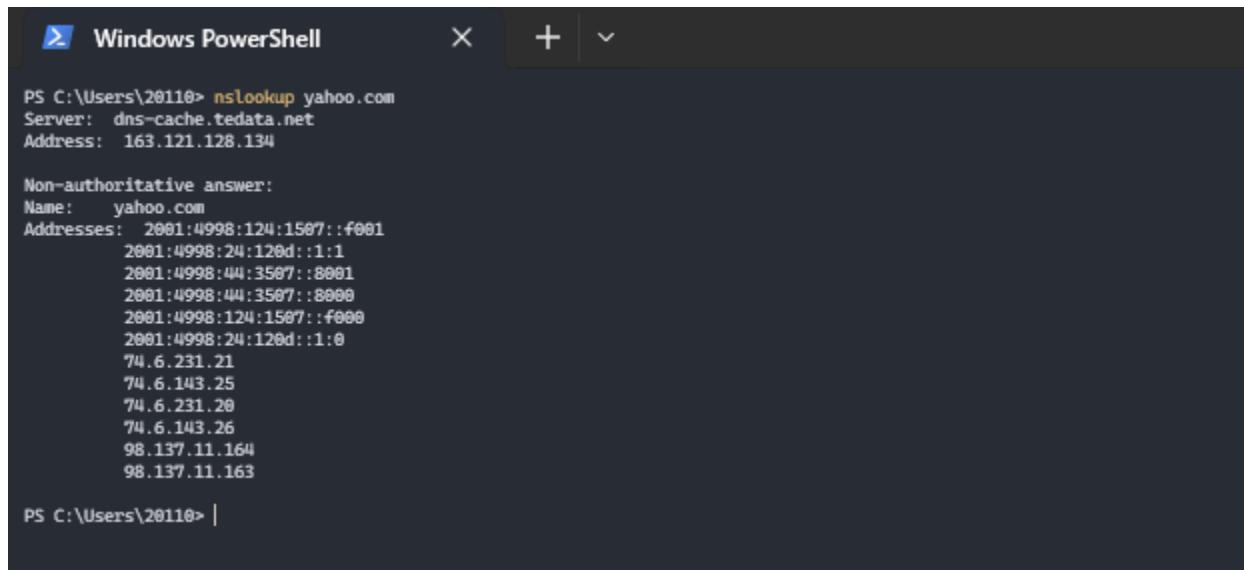
24.

25. To know which IP address belongs to a domain name:

`nslookup Domain_Name`

Example:

`nslookup Yahoo.com`



A screenshot of a Windows PowerShell window titled "Windows PowerShell". The command `nslookup yahoo.com` is run, and the output shows the IP addresses associated with the domain name yahoo.com. The output includes the server information (dns-cache.tedata.net, 163.121.128.134), a non-authoritative answer section listing various IPv4 and IPv6 addresses, and a list of A records for yahoo.com.

```
PS C:\Users\20110> nslookup yahoo.com
Server: dns-cache.tedata.net
Address: 163.121.128.134

Non-authoritative answer:
Name: yahoo.com
Addresses: 2001:4998:124:1507::f001
          2001:4998:24:120d::1:1
          2001:4998:44:3507::8001
          2001:4998:44:3507::8000
          2001:4998:124:1507::f000
          2001:4998:24:120d::1:0
          74.6.231.21
          74.6.143.25
          74.6.231.20
          74.6.143.26
          98.137.11.164
          98.137.11.163

PS C:\Users\20110> |
```

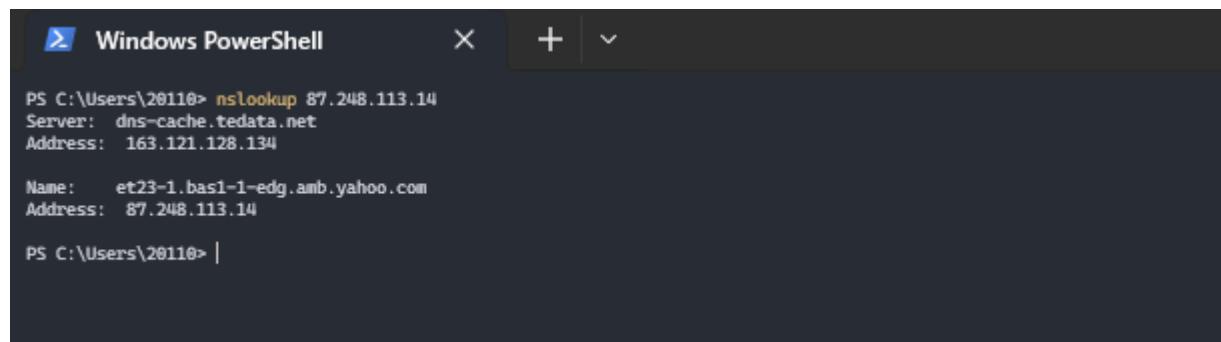
26. To know which domain name belongs to a specific IP address:

Type this command:

`nslookup IP_address`

Example:

`nslookup 87.248.113.14`



A screenshot of a Windows PowerShell window titled "Windows PowerShell". The command `nslookup 87.248.113.14` is run, and the output shows the domain name associated with the IP address 87.248.113.14. The output includes the server information (dns-cache.tedata.net, 163.121.128.134) and a single A record for et23-1.bas1-1-edg.amb.yahoo.com.

```
PS C:\Users\20110> nslookup 87.248.113.14
Server: dns-cache.tedata.net
Address: 163.121.128.134

Name: et23-1.bas1-1-edg.amb.yahoo.com
Address: 87.248.113.14

PS C:\Users\20110> |
```