Certainly! Below are explanations and demonstrations of how to use various network tools such as Ping, TCPDump, Traceroute, Netstat, and IPconfig on a command prompt (cmd) in Windows.

**1. Ping**

Ping is used to check the reachability of a host on an IP network and to measure the round-trip time for messages sent from the originating host to a destination computer.

**Usage in cmd:**

cmd

Copy code

ping <hostname or IP address>

**Example:**

cmd

Copy code

ping google.com

Output:

plaintext

Copy code

Pinging google.com [142.250.182.206] with 32 bytes of data:

Reply from 142.250.182.206: bytes=32 time=14ms TTL=116

Reply from 142.250.182.206: bytes=32 time=13ms TTL=116

Reply from 142.250.182.206: bytes=32 time=14ms TTL=116

Reply from 142.250.182.206: bytes=32 time=13ms TTL=116

Ping statistics for 142.250.182.206:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 13ms, Maximum = 14ms, Average = 13ms

**2. TCPDump**

TCPDump is a powerful command-line packet analyzer. It allows the user to display TCP/IP and other packets being transmitted or received over a network to which the computer is attached. Note: TCPDump is typically used in Unix/Linux systems.

**Installation on Windows (using WinDump):**

* Download WinDump from the official WinDump page.
* Install WinPcap, which is required by WinDump.

**Usage in cmd:**

cmd

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windump -i <interface>

**Example:**

cmd

Copy code

windump -i 2

Output (sample):

plaintext

Copy code

14:14:55.987654 IP your\_machine.1035 > dns\_server.53: 64210+ A? google.com. (28)

14:14:55.987890 IP dns\_server.53 > your\_machine.1035: 64210 1/0/0 A 142.250.182.206 (44)

**3. Traceroute**

Traceroute is a network diagnostic tool used to track the pathway taken by a packet on an IP network from source to destination. In Windows, it is called tracert.

**Usage in cmd:**

cmd

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tracert <hostname or IP address>

**Example:**

cmd

Copy code

tracert google.com

Output:

plaintext

Copy code

Tracing route to google.com [142.250.182.206] over a maximum of 30 hops:

1 1 ms 1 ms 1 ms 192.168.1.1

2 14 ms 13 ms 14 ms 10.0.0.1

3 12 ms 13 ms 12 ms 192.168.0.1

4 15 ms 13 ms 14 ms 142.250.182.206

Trace complete.

**4. Netstat**

Netstat (network statistics) displays network connections (both incoming and outgoing), routing tables, and a number of network interface statistics.

**Usage in cmd:**

cmd

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netstat

**Example:**

cmd

Copy code

netstat -an

Output:

plaintext

Copy code

Active Connections

Proto Local Address Foreign Address State

TCP 192.168.1.5:5000 93.184.216.34:443 ESTABLISHED

TCP 192.168.1.5:6000 142.250.182.206:443 TIME\_WAIT

UDP 192.168.1.5:123 \*:\*

**5. IPConfig**

IPConfig is used to display all current TCP/IP network configuration values and refresh Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) settings.

**Usage in cmd:**

cmd

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ipconfig

**Example:**

cmd

Copy code

ipconfig /all

Output:

plaintext

Copy code

Windows IP Configuration

Host Name . . . . . . . . . . . . : MyPC

Primary Dns Suffix . . . . . . . :

Node Type . . . . . . . . . . . . : Hybrid

IP Routing Enabled. . . . . . . . : No

WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter Ethernet:

Connection-specific DNS Suffix . :

Description . . . . . . . . . . . : Intel(R) Ethernet Connection

Physical Address. . . . . . . . . : 00-AA-BB-CC-DD-EE

DHCP Enabled. . . . . . . . . . . : Yes

Autoconfiguration Enabled . . . . : Yes

IPv4 Address. . . . . . . . . . . : 192.168.1.5

Subnet Mask . . . . . . . . . . . : 255.255.255.0

Default Gateway . . . . . . . . . : 192.168.1.1

DHCP Server . . . . . . . . . . . : 192.168.1.1

DNS Servers . . . . . . . . . . . : 8.8.8.8

8.8.4.4

Lease Obtained. . . . . . . . . . : Wednesday, June 5, 2024 12:00:00 PM

Lease Expires . . . . . . . . . . : Wednesday, June 12, 2024 12:00:00 PM

These tools are essential for network diagnostics and monitoring, allowing you to troubleshoot connectivity issues, monitor traffic, and manage network settings.