PROGRAM -2:

Aim: To understand and use various network utility commands such as PING, NETSTAT, IPCONFIG, IFCONFIG, ARP, TRACE-ROUTE, NSLOOKUP, and PATHPING to monitor and troubleshoot network configurations.

Theoretical Description:

Network utility commands are used to perform a variety of network-related operations. These commands allow users to check network status, troubleshoot issues, and gather information about devices and network routes. Here's a brief description of each command**:**

- PING: Sends ICMP echo requests to a target IP address or hostname to verify connectivity.
- NETSTAT: Displays active connections, listening ports, routing tables, and network statistics.
- IPCONFIG (Windows) / IFCONFIG (Linux): Shows the IP configuration of network interfaces.
- ARP: Displays the ARP table (mapping of IP addresses to MAC addresses) used in a network.
- TRACE-ROUTE: Traces the route that packets take to reach a destination, displaying each hop.
- NSLOOKUP: Queries DNS servers for IP addresses corresponding to domain names.
- PATHPING: Combines PING and TRACE-ROUTE functionalities, showing packet loss and latency over each hop.

Algorithm: For each command, the algorithm generally follows this pattern:

1. Open a Command Prompt (Windows) or Terminal (Linux).
2. Run the command with necessary parameters (e.g., IP address, hostname).
3. Observe the output for insights into network status or issues.
4. Interpret the results based on what the command outputs (e.g., latency for PING, route for TRACE-ROUTE).

Source Code:

This section describes the syntax and examples for each network utility command:

1. PING (Test connectivity):

ping google.com

ping 192.168.1.1

2. NETSTAT (View network connections):

netstat -a (Shows all active connections)

netstat -r (Displays routing table)

netstat -e (Shows Ethernet statistics)

3. IPCONFIG (Windows) / IFCONFIG (Linux):

ipconfig (Windows)

ifconfig (Linux)

ipconfig /all (Displays detailed info in Windows)

4. ARP (View ARP table):

arp -a

5. TRACE-ROUTE (Trace packet path to a destination):

tracert google.com (Windows)

traceroute google.com (Linux)

6. NSLOOKUP (Query DNS):

nslookup google.com

7. PATHPING (Check route and latency):

pathping google.com

Output:

1. PING:

Reply from 142.250.72.238: bytes=32 time=25ms TTL=55

Reply from 142.250.72.238: bytes=32 time=26ms TTL=55

2. NETSTAT:

Active Connections:

Proto Local Address Foreign Address State

TCP 192.168.1.10:49704 142.250.72.238:https ESTABLISHED

3. IPCONFIG (Windows):

Ethernet adapter Local Area Connection:

IPv4 Address: 192.168.1.10

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.1.1

4. IFCONFIG (Linux):

eth0 Link encap:Ethernet HWaddr 00:1C:C0:AE:B4:89

inet addr:192.168.1.10 Bcast:192.168.1.255 Mask:255.255.255.0

5. ARP:

Interface: 192.168.1.10 --- 0x6

Internet Address Physical Address Type

192.168.1.1 00-14-22-01-23-45 dynamic

6. TRACE-ROUTE:

Tracing route to google.com [142.250.72.238]

1 1 ms 1 ms 1 ms 192.168.1.1

2 15 ms 15 ms 14 ms 10.100.20.1

3 25 ms 26 ms 25 ms 142.250.72.238

7. NSLOOKUP:

Server: dns.google

Address: 8.8.8.8

Name: google.com

Address: 142.250.72.238

8. PATHPING:

Tracing route to google.com [142.250.72.238]

Hop	RTT	Lost/Sent	Address
1	<1ms	0/100	192.168.1.1
2	20ms	0/100	10.100.20.1

Conclusion: In this experiment, we explored different network utility commands that allow us to check network configurations, trace routes, and troubleshoot network issues. Each command serves a specific purpose, ranging from checking basic connectivity (PING) to analyzing network traffic (NETSTAT) and route discovery (TRACE-ROUTE, PATHPING). These tools are vital for network administrators to ensure proper network functionality and identify potential issues.

Viva Questions:

1. **What is the function of the PING command?**
2. **Explain the difference between IPCONFIG and IFCONFIG.**
3. **How does the TRACE-ROUTE command help in identifying network issues?**
4. **What does the NSLOOKUP command do?**