

Computer Networks Lab

Week 1

Basic Network Commands

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2023002536

IP ADDRESS: 192.168.29.226

MAC ADDRESS: DC-46-28-A8-84-0B

Objective:- To understand basic network commands and to test the speed of the network.

Network commands:

- 1) **ping:-** This command is used to check the connectivity of your device and another device or server on a network, typically over the Internet Protocol(IP).

```
PS C:\Users\Akshith Kalvakota> ping google.com

Pinging google.com [142.250.196.174] with 32 bytes of data:
Reply from 142.250.196.174: bytes=32 time=40ms TTL=111
Reply from 142.250.196.174: bytes=32 time=39ms TTL=111
Reply from 142.250.196.174: bytes=32 time=39ms TTL=111
Reply from 142.250.196.174: bytes=32 time=40ms TTL=111

Ping statistics for 142.250.196.174:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 39ms, Maximum = 40ms, Average = 39ms
```

SUBTASKS:

- a) Ping two different machines, one within India and the other one outside India, and for Example: gitam.edu and cmu.edu.

```
PS C:\Users\Akshith Kalvakota> ping www.cmu.edu

Pinging WWW.R53.cmu.edu [128.2.42.52] with 32 bytes of data:
Reply from 128.2.42.52: bytes=32 time=248ms TTL=223
Reply from 128.2.42.52: bytes=32 time=3091ms TTL=223
Reply from 128.2.42.52: bytes=32 time=3479ms TTL=223
Reply from 128.2.42.52: bytes=32 time=2486ms TTL=223

Ping statistics for 128.2.42.52:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 248ms, Maximum = 3479ms, Average = 2326ms
```

```

PS C:\Users\Akshith Kalvakota> ping www.gitam.edu

Pinging d1fpxgow2s34g.cloudfront.net [13.32.251.117] with 32 bytes of data:
Reply from 13.32.251.117: bytes=32 time=118ms TTL=243
Reply from 13.32.251.117: bytes=32 time=23ms TTL=243
Reply from 13.32.251.117: bytes=32 time=21ms TTL=243
Reply from 13.32.251.117: bytes=32 time=20ms TTL=243

Ping statistics for 13.32.251.117:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 20ms, Maximum = 118ms, Average = 45ms

```

b) Does ping makes any difference between www.gitam.edu and gitam.edu?

- Yes there's a difference between the both.

```

PS C:\Users\Akshith Kalvakota> ping www.gitam.edu

Pinging d1fpxgow2s34g.cloudfront.net [13.32.251.52] with 32 bytes of data:
Reply from 13.32.251.52: bytes=32 time=17ms TTL=243
Reply from 13.32.251.52: bytes=32 time=20ms TTL=243
Reply from 13.32.251.52: bytes=32 time=18ms TTL=243
Reply from 13.32.251.52: bytes=32 time=21ms TTL=243

Ping statistics for 13.32.251.52:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 17ms, Maximum = 21ms, Average = 19ms

```

```

PS C:\Users\Akshith Kalvakota> ping gitam.edu

Pinging gitam.edu [103.23.29.184] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 103.23.29.184:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

```

c) ping your nearby local machine by specifying IP address.

```

PS C:\Users\Akshith Kalvakota> ping 142.250.194.206

Pinging 142.250.194.206 with 32 bytes of data:
Reply from 142.250.194.206: bytes=32 time=56ms TTL=112
Reply from 142.250.194.206: bytes=32 time=42ms TTL=112
Reply from 142.250.194.206: bytes=32 time=42ms TTL=112
Reply from 142.250.194.206: bytes=32 time=43ms TTL=112

Ping statistics for 142.250.194.206:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 42ms, Maximum = 56ms, Average = 45ms

```

- 2) **ifconfig**:- It is a Linux based command used to configure and display network interface information. It's fullform is interface configuration.

```

PS C:\Users\Akshith Kalvakota> 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  . :
    IPv4 Address. . . . . : 192.168.29.226
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.29.1

```

It has options like:

- eth0:- To display the status of given interface only.
- a:-To display the status of all interfaces.

```

PS C:\Users\Akshith Kalvakota> ipconfig /all

Windows IP Configuration

Host Name . . . . . : Akshith
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
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. . . . . : DC-46-28-A8-84-0B
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. . . . . : DE-46-28-A8-84-0A
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes

Wireless LAN adapter Wi-Fi:

Connection-specific DNS Suffix . :
Description . . . . . : Intel(R) Wi-Fi 6E AX211 160MHz
Physical Address. . . . . : DC-46-28-A8-84-0A
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
IPv4 Address. . . . . : 192.168.29.226(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Lease Obtained. . . . . : 14 December 2024 21:44:31
Lease Expires . . . . . : 16 December 2024 10:28:52
Default Gateway . . . . . : 192.168.29.1
DHCP Server . . . . . : 192.168.29.1
DNS Servers . . . . . : 192.168.29.1
NetBIOS over Tcpip. . . . . : Enabled

```

SUBTASKS:-

a) What is the IPv4 address for your system?

- The IPv4 address of my system is 192.168.29.226.

b) What is the MAC address/HW address of your NIC (Network Interface card)?

- DE-46-28-A8-84-0A is the MAC address of my NIC card.

c) What is the MAC address/HW address of your NIC card?

- DE-46-28-A8-84-0A is the MAC address of my NIC card.

d) What is the subnet mask of your computer?

- 255.255.255.0 is the subnet mask of my computer.

- 3) **nslookup:-** This command is used to query DNS (Domain Name System) to obtain information about domain names and IP addresses.

```

PS C:\Users\Akshith Kalvakota> nslookup
Default Server:  reliance.reliance
Address:  192.168.29.1

> google.co.in
Server:  reliance.reliance
Address:  192.168.29.1

Non-authoritative answer:
Name:    google.co.in
Addresses:  2404:6800:4009:813::2003
           142.250.195.67

```

We are now in an interactive mode. To leave this mode, type **exit**. To set options we use set type=<option>.

```

> set type=ns
> google.co.in
Server:  reliance.reliance
Address:  192.168.29.1

Non-authoritative answer:
google.co.in      nameserver = ns3.google.com
google.co.in      nameserver = ns4.google.com
google.co.in      nameserver = ns1.google.com
google.co.in      nameserver = ns2.google.com
> exit
PS C:\Users\Akshith Kalvakota> |

```

SUBTASKS:

i) Find the IP addresses of the following:

a) www.gitam.edu

```

PS C:\Users\Akshith Kalvakota> nslookup gitam.edu
Server:  reliance.reliance
Address:  192.168.29.1

Non-authoritative answer:
Name:    gitam.edu
Address:  103.23.29.184

```

b) <https://gevents.gitam.edu>

```
Server:  reliance.reliance
Address: 192.168.29.1

Non-authoritative answer:
Name:    gevents.gitam.edu
Address: 103.23.29.179
```

c) <https://glearn.gitam.edu>

```
PS C:\Users\Akshith Kalvakota> nslookup glearn.gitam.edu
Server:  reliance.reliance
Address: 192.168.29.1

Non-authoritative answer:
Name:    glearn.gitam.edu
Address: 103.23.29.247
```

d) **Can a website have more than one IP addresses?. Justify your answer.**

- Yes a website can have more than one IP addresses, this could be because one is IPv4 address and the other one is IPv6 address. Or could be to distribute incoming traffic across multiple servers so that a single server is not overwhelmed.

```
PS C:\Users\Akshith Kalvakota> nslookup www.gitam.edu
Server:  reliance.reliance
Address: 192.168.29.1

Non-authoritative answer:
Name:    d1fpxgow2s34g.cloudfront.net
Addresses: 2600:9000:2632:5800:1a:5f90:3400:93a1
           2600:9000:2632:f600:1a:5f90:3400:93a1
           2600:9000:2632:b600:1a:5f90:3400:93a1
           2600:9000:2632:8c00:1a:5f90:3400:93a1
           2600:9000:2632:7c00:1a:5f90:3400:93a1
           2600:9000:2632:3000:1a:5f90:3400:93a1
           2600:9000:2632:2400:1a:5f90:3400:93a1
           2600:9000:2632:4800:1a:5f90:3400:93a1
           13.32.251.59
           13.32.251.52
           13.32.251.53
           13.32.251.117
Aliases:  www.gitam.edu
```

As we can see more than 1 addresses.

4) **Traceroute:-** This command is used to trace the route that packets take from your computer to a specific destination, such as a website or an IP address.

```

PS C:\Users\Akshith Kalvakota> tracert google.co.in

Tracing route to google.co.in [142.250.183.163]
over a maximum of 30 hops:

  1    19 ms    2 ms    2 ms  reliance.reliance [192.168.29.1]
  2     9 ms    4 ms    5 ms  10.1.120.1
  3     7 ms    4 ms    5 ms  172.31.0.140
  4     8 ms    4 ms    3 ms  192.168.171.112
  5    12 ms    9 ms   21 ms  172.17.185.180
  6     7 ms    4 ms    4 ms  172.17.185.162
  7     8 ms    9 ms    8 ms  192.168.171.108
  8     *      *      *      Request timed out.
  9     *      *      *      Request timed out.
 10    27 ms   28 ms   29 ms  209.85.168.26
 11    31 ms   25 ms   26 ms  142.251.225.67
 12    26 ms   25 ms   25 ms  142.251.64.13
 13    27 ms   26 ms   24 ms  bom07s32-in-f3.1e100.net [142.250.183.163]

```

SUBTASKS:

a) traceroute to gitam.edu, google.co.in, then find out the IP address of the first hop router?

```

PS C:\Users\Akshith Kalvakota> tracert gitam.edu

Tracing route to gitam.edu [103.23.29.184]
over a maximum of 30 hops:

  1     3 ms    1 ms    1 ms  reliance.reliance [192.168.29.1]
  2     5 ms    4 ms    5 ms  10.1.120.1
  3     7 ms    4 ms    4 ms  172.31.0.140
  4     6 ms    4 ms    5 ms  192.168.171.118
  5     7 ms    4 ms    6 ms  172.17.185.180
  6     7 ms    4 ms   12 ms  172.17.185.163
  7    46 ms    9 ms    7 ms  192.168.90.142
  8     *      *      *      Request timed out.
  9     *      *      *      Request timed out.
 10    41 ms   27 ms   20 ms  182.79.245.210
 11    41 ms   40 ms   39 ms  116.119.68.110
 12    48 ms    *      48 ms  nsg-corporate-230.120.187.122.airtel.in [122.187.120.230]
 13    53 ms   52 ms   50 ms  111.93.26.118
 14     *      *      *      Request timed out.
 15     *      *      *      Request timed out.
 16     *      *      *      Request timed out.
 17     *      *      *      Request timed out.
 18     *      *      *      Request timed out.
 19     *      *      *      Request timed out.
 20     *      *      *      Request timed out.
 21     *      *      *      Request timed out.
 22     *      *      *      Request timed out.
 23     *      *      *      Request timed out.
 24     *      *      *      Request timed out.
 25     *      *      *      Request timed out.
 26     *      *      *      Request timed out.
 27     *      *      *      Request timed out.
 28     *      *      *      Request timed out.
 29     *      *      *      Request timed out.
 30     *      *      *      Request timed out.

```

Already done google.co.in above.

b) How many packets are sent from your system?

- 3 Packets are sent from my system.

c) Observe the latency for every hop. Is it the same at every hop or not? Yes or No, justify your answer.

-No it is not same for every hop. It could be due to the traffic load on the router or even the distance between the system and the router and can also be affected by packet loss.

So if we look at the above gitam.edu example, the first hop has very low latency of 1ms. Then second has it a bit higher with 2-3 ms. Then seventh hop, first packet is almost increased by 40 ms. And so on.

e) Display the route of your friend's system by specifying his/her IP address.

```
PS C:\Users\Akshith Kalvakota> tracert 172.23.142.94

Tracing route to 172.23.142.94 over a maximum of 30 hops

  1     3 ms     1 ms     2 ms  reliance.reliance [192.168.29.1]
  2     *         *         *    Request timed out.
  3     *         *         *    Request timed out.
  4     *         *         *    Request timed out.
  5     *         *         *    Request timed out.
  6     *         *         *    Request timed out.
  7     *         *         *    Request timed out.
  8     *         *         *    Request timed out.
  9     *         *         *    Request timed out.
 10     *         *         *    Request timed out.
 11     *         *         *    Request timed out.
 12     *         *         *    Request timed out.
 13     *         *         *    Request timed out.
 14     *         *         *    Request timed out.
 15     *         *         *    Request timed out.
 16     *         *         *    Request timed out.
 17     *         *         *    Request timed out.
 18     *         *         *    Request timed out.
 19     *         *         *    Request timed out.
 20     *         *         *    Request timed out.
 21     *         *         *    Request timed out.
 22     *         *         *    Request timed out.
 23     *         *         *    Request timed out.
 24     *         *         *    Request timed out.
 25     *         *         *    Request timed out.
 26     *         *         *    Request timed out.
 27     *         *         *    Request timed out.
 28     *         *         *    Request timed out.
 29     *         *         *    Request timed out.
 30     *         *         *    Request timed out.

Trace complete.
```

e) Try a different website and list of all ISPs which your search explored.

```
PS C:\Users\Akshith Kalvakota> tracert www.facebook.com

Tracing route to star-mini.c10r.facebook.com [163.70.140.35]
over a maximum of 30 hops:

  1     8 ms     4 ms     5 ms  reliance.reliance [192.168.29.1]
  2     7 ms     4 ms     4 ms  10.1.120.1
  3     9 ms     4 ms     3 ms  172.31.0.140
  4    16 ms     7 ms     4 ms  192.168.171.114
  5     6 ms     3 ms    10 ms  172.17.185.180
  6     7 ms     6 ms     7 ms  172.17.185.162
  7     8 ms     5 ms     3 ms  192.168.171.104
  8     *         *         *    Request timed out.
  9     *         *         *    Request timed out.
 10     *         *         *    Request timed out.
 11     8 ms     7 ms     6 ms  ae2.pr02.hyd1.tfbnw.net [157.240.89.212]
 12    10 ms     7 ms     6 ms  po202.asw02.hyd1.tfbnw.net [129.134.96.216]
 13    10 ms     7 ms     7 ms  psw04.hyd1.tfbnw.net [129.134.115.155]
 14    13 ms     8 ms    15 ms  msw1ao.01.hyd1.tfbnw.net [129.134.115.140]
 15    50 ms    10 ms     9 ms  edge-star-mini-shv-01-hyd1.facebook.com [163.70.140.35]
```


Different ISPs explored are:

- 1) ae2.pr02.hyd1.tfbnw.net [157.240.89.212]
- 2) po202.asw02.hyd1.tfbnw.net [129.134.96.216]
- 3) psw04.hyd1.tfbnw.net [129.134.115.155]
- 4) msw1ao.01.hyd1.tfbnw.net [129.134.115.140]
- 5) edge-star-mini-shv-01-hyd1.facebook.com [163.70.140.35]