**CS 315: Computer Networks Laboratory**

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**Task 1:**

1. **ping** [www.google.com](http://www.google.com) is used to test the reachability of host and also get the RTT. Low values of the RTT and loss percentage indicates that the connection is successful. Other information includes IP address google (142.250.183.228). Size of packets 56(84) bytes of data. The ttl and the RTT time for each packet.The statistics of each packet :

rtt min/avg/max/mdev = 33.657/36.255/83.894/5.248 ms.

1. **traceroute** [**www.google.com**](http://www.google.com) **:** command that is used to trace the route that your router takes from local machine to the [www.google.com](http://www.google.com). Indicates total number of Hops and also Hop information(hop number, IP address and hostname of router, RTT values).
2. **Arp (**address resolution protocol**):** Relationship between IP and MAC address for devices on network. Includes Address: IP address , HWType: hardware type, HWaddress: MAC address corresponding to IP address, Flags:Indicate success of the arp cache entry, Mask: Network Mask, Iface: Network entry used (ethernet,Wlan).
3. **ifconfig**: display information about network interfaces on a system. Interface names and types, IP Addresses, MAC Addresses, Network Flags, TX and RX Statistics, MTU(Maximum Trasmission Unit),Collisions
4. **hostname:** Gives information about DNS name of the system.
5. cat name of file: to get the data stored in the file
   * **/etc/hostname**: Displays the hostname of machine, stored in file. To change system’s hostname we can edit this file.
   * **/etc/hosts** : It serves as a simple mapping of IP addresses to hostnames. It is used to manually associate IP addresses with hostnames without relying on DNS (Domain Name System) resolution. Changes made to the file are local to the machine.

127.0.0.1 localhost

127.0.1.1 Hostname

* + **/etc/resolv.conf:** Specifies the servers that machine should use for Domain name resolution.
  + **/etc/protocols:** Specifies the protocols along with their numbers.
  + **/etc/services:** Used to translate Services such as SMTP, htttps etc to their port numbers when a machine is connected to the host.

**Task 2:**

1. **hostname**: hrishi **command**: hostname

**IP Address**: 172.29.87.21 **command:** hostname -I

1. Next hop is the gateway. Whenever we use traceroute [www.website.com](http://www.website.com) the ip address of first hop is the the same.

This is the IP Address of **First Hop :172.29.80.1** . **Mac address:00:15:5d:85:63:39** obtained by using arp command

1. DNS address of local server 172.29.80.1 this is stored in /etc/resolv.conf file can be obtained by using cat command
2. protocol names and their numeric representations for communication between networked device, appears in IP header. Using the services file we can get this information.

**Command**: **grep -w “service\_name” /etc/services**

**Service Name Port Number**

ssh 22/tcp

ftp 21/tcp

nfs 2049/tcp

nfs 2049/udp

smtp 25/tcp

1. Open a web browser and search for "What is my IP" or "My IP address." This should display your public IP address.

Navigate to "Settings" > "Network & Internet" > "Wi-Fi" (or similar).Tap on the connected Wi-Fi network to view details. Here, you may find the IP address assigned to your device.

DNS server’s IP Address can be viewed by going into wifi settings and then changing IP settings from DHCP to Static

**Task 3:**

(i)

--- www.iitb.ac.in ping statistics ---

93 packets transmitted, 0 received, 100% packet loss, time 95674ms

--- www.amazon.in ping statistics ---

12 packets transmitted, 12 received, 0% packet loss, time 11134ms

Observations:there is an issue with reaching www.iitb.ac.in, resulting in packet loss, while www.amazon.in is reachable without any packet loss.

The absence of RTT values for www.iitb.ac.in indicates that there was no successful communication during the ping test.

Whereas it can be present for amazon website as indicated by the packet loss values.

(ii)

(a) Total Number of Hops = 5

traceroute to www.amazon.in (18.66.55.107), 30 hops max, 60 byte packets

1 \*\*\*\*.mshome.net (172.29.80.1) 3.020 ms 2.969 ms 2.952 ms

2 10.196.3.250 (10.196.3.250) 4.062 ms 4.044 ms 4.267 ms

3 10.240.0.1 (10.240.0.1) 4.232 ms 4.212 ms 3.662 ms

4 10.240.240.1 (10.240.240.1) 3.814 ms 3.796 ms 3.780 ms

5 117.205.73.161 (117.205.73.161) 5.077 ms 5.061 ms 5.047 ms

6 \* \* \*

7 \* \* \*

8 \* \* \*

9 \* \* \*

10 \* \* \*

11 \* \* \*

-->the IP address after www.amazon.in indicates the IP address of destination with 30 max Hops and packet of size 60

-->The \* indicates there is network congestion or high packet loss.

-->If the final Hop shows the destination hostname/IP address we can conclude that destination is reached.

-->The -w option allows you to specify the time to wait for a response from each hop. If the response time exceeds this value, the packet is considered lost.

Hop Map

(172.29.80.1)->(10.196.3.250)->(10.240.0.1)->(10.240.240.1)->(117.205.73.161)

(b)Using traceroute -m <max\_hops> www.amazon.in we can change the maximum hops.

(c) At each router 3 packets are delivered and the three columns indicate the RTT time for those. In order to change the number of packets sent at each hop use traceroute -q <new\_packet\_numebr> ww.amazon.com

(d)The TTL field is important in case of ICMP so that the packets are not stuck in infinite loop, discarding the out-of-Date Packets and also helps in aiding the network diagonistics, to check for congestion.