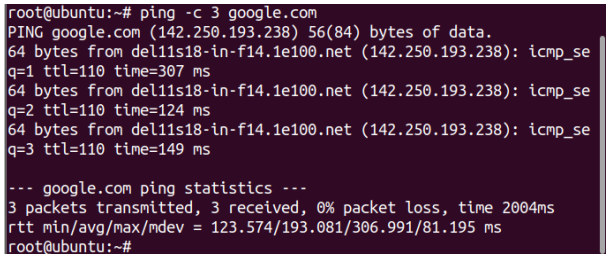
Troubleshooting:

Ping (packet internet Groper) command:

The ping command in Linux is used to send **ICMP** Echo Request messages (ping) to network hosts. It is a basic and useful tool for troubleshooting network connectivity and testing the reachability of a host.

Ping www.google.com

Ping -c 3 google.com → to specify how many packets you want to send



ping -i 2 google.com → to mention the interval between the request we are sending to server

ping -c 3 -q google.com --. This command will only respond you the summery

ping -f google.com --. If want to send packets at fast pace to check the connectivity of network

ping -s 100 google.com --. With this you can specify the packets size

Keep in mind that not all networks or hosts may allow or respond to ICMP packets of larger sizes. Some firewalls or routers might filter or fragment larger ICMP packets. Additionally, some networks may have policies in place that limit the size of ICMP packets.

Ping -w 5 google.com → we can use this -w to stop printing the response from server after 5 seconds

IFConfig Command:

The ifconfig command provides information about network interfaces and allows you to configure them.

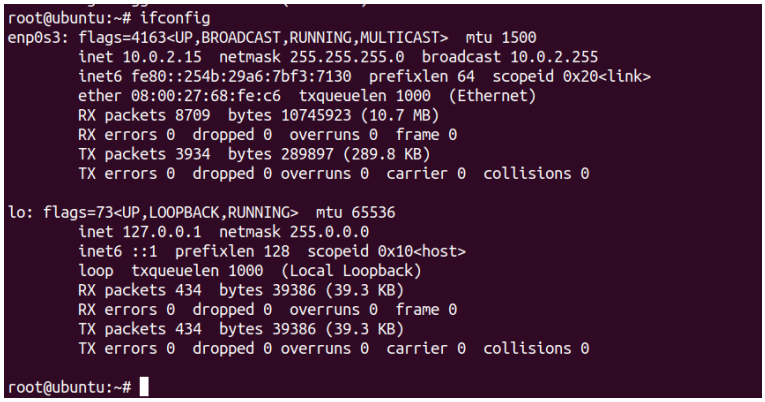
Install “apt-get install net-tools”

Ifconfig → this command shows you the information like IP, broadcast IP and all such info under an interface name

emp0s3 is a convention for naming network interfaces in Linux, and it typically represents a wired Ethernet interface. This naming convention is often used by systems that adopt Predictable Network Interface Names.

The name **enp0s3** is composed of the following elements:

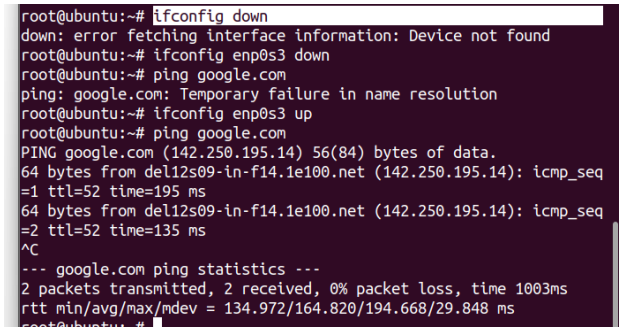
- **e: Indicates that it's an Ethernet interface.**
- **mp0s3**: The unique identifier for the interface.



How to stop Internet connection

Ifconfig enp0s3 down

Ifconfig enp0s3 up



Traceroute in Linux:

Traceroute is a command-line tool available in Linux (and other operating systems) that is used to trace the route that packets take across an IP network from your local machine to a destination host. It helps in diagnosing network connectivity issues and provides insights into the network path and potential delays.

First install it as it will not be in your system by-default

“apt-get install traceroute”

traceroute google.com

When you see *** after the first hop in the output of the traceroute command, it typically indicates that the router at the first hop is not responding to the ICMP Time Exceeded messages that traceroute uses to map the route. There are a few potential reasons for this behavior:

Firewall or ICMP Filtering:

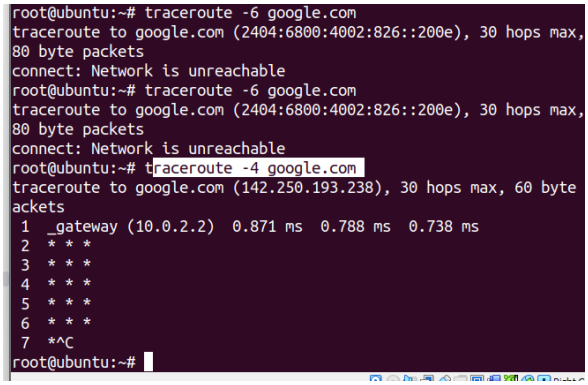
The router or firewall at the first hop may be configured to block or filter ICMP packets, including the Time Exceeded messages that traceroute relies on.

Some network devices are configured not to respond to ICMP for security reasons.

Traceroute google.com 100 → 100 is use to alter the number of packets we are sending

Traceroute -q 1 google.com → the default number of packets per HOP is 3 if you want to make that 1 then use -q

traceroute -4/6 google.com → to specify IPV4 or IPV6



The error "Network is unreachable" when using traceroute -6 to perform IPv6 traceroute to google.com typically means that your system is unable to reach the IPv6 network or that there might be an issue with your IPv6 connectivity.

Other DNS troubleshooting tools:

Domain Name System (DNS), records are pieces of information associated with a domain that provide various types of data. Each record type serves a specific purpose in translating human-readable domain names to IP addresses or providing other domain-related information. Here are some common DNS record types:

1. **A (Address) Record:**

Purpose: Associates a domain with an IPv4 address.

Example: example.com. IN A 192.168.1.1

2. **AAAA (IPv6 Address) Record:**

Purpose: Associates a domain with an IPv6 address.

Example: example.com. IN AAAA 2001:db8::1

3. **MX (Mail Exchange) Record:**

Purpose: Specifies mail servers responsible for receiving emails for the domain.

Example: example.com. IN MX 10 mail.example.com

4. **CNAME (Canonical Name) Record:**

Purpose: Creates an alias for a domain, pointing it to another domain's canonical (official) name.

Example: www.example.com. IN CNAME example.com

5. **NS (Name Server) Record:**

Purpose: Specifies authoritative name servers for the domain.

Example: example.com. IN NS ns1.example.com

Practice:

1. Query NS Record
   dig google.com
   dig google.com -t NS (-t is for type of record) (NS is for NS Record)
   dig google.com -t NS +short (this shows only the output specific to request)

```
root@ubuntu:/home# dig google.com -t NS +short
ns1.google.com.
ns3.google.com.
ns4.google.com.
ns2.google.com.
root@ubuntu:/home#
```

2. Query MX Record (mail servers of google)
   dig google.com -t mx +short

```
root@ubuntu:/home# dig google.com -t MX

; <<>> DiG 9.18.12-0ubuntu0.22.04.3-Ubuntu <<>> google.com -t MX
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 60536
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;google.com.                    IN      MX

;; ANSWER SECTION:
google.com.             283     IN      MX      10 smtp.google.com.

;; Query time: 8 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Thu Nov 30 13:53:42 IST 2023
;; MSG SIZE  rcvd: 60
```

3. Query AAAA (IPV6) record

```
root@ubuntu:/home# dig google.com -t AAAA

; <<>> DiG 9.18.12-0ubuntu0.22.04.3-Ubuntu <<>> google.com -t AAAA
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 30686
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;google.com.                    IN      AAAA

;; ANSWER SECTION:
google.com.             94      IN      AAAA    2404:6800:4002:821::200e

;; Query time: 220 msec
;; SERVER: 127.0.0.53#53(127.0.0.53) (UDP)
;; WHEN: Thu Nov 30 13:56:09 IST 2023
;; MSG SIZE  rcvd: 67
```

HOST Command:

1. It resolves the DNS into IP address

```
root@ubuntu:/home# host google.com
google.com has address 142.250.194.110
google.com has IPv6 address 2404:6800:4002:821::200e
google.com mail is handled by 10 smtp.google.com.
root@ubuntu:/home#
```

2. Host -t ns google.com
3. Host -t mx google.com