What is NAT —

NAT (Network Address Translation) is a process done by a router or similar device that changes the IP addresses in data packets as they move b/w a private network and the internet.

- It translates private IP address (used inside local network) into a single public IP address (assigned to the router) so that devices in the network can share one public IP address to access the internet.
- This allows multiple devices to go online using just one public IP, and also adds a layer of security by hiding internal IP addresses from the outside world.

- How NAT Works —

In a home network devices like a laptop, smartphone and gaming console each have private IP addresses (eg 192.168.1.10, 192.168.1.11, 192.168.1.12) The router has —

- A LAN interface with a private IP (192.168.1.1)
- A WAN interface with a public IP (203.0.113.50) from ISP.

When the laptop (192.168.1.10) tries to visit a website (like www.google.com) it sends a request to the router. The router uses NAT to change the source IP from 192.168.1.10 to its public IP 203.0.113.50.

This modified packet goes to the website. The web server responds to the router's public IP. The router then

08.00 looks into it's NAT table, which maps —
203.0.113.50 :4444 → 192.168.1.10 :5555
09.00 (The port numbers are temporary and used to track connections)
10.00 • The router translates the public IP back to the laptop's private IP and forwards the response to the laptop
11.00 — completeing the communication.

12 This is how NAT lets many private devices share one public IP for internet access.
13.00

• Types of NAT —
14.00 There are three main types of NAT, each used for different purpose —
15.00 1. Static NAT —
• Creates a one-to-one mapping b/w a private IP
16.00 and a public IP.
• Each private device always uses the same public IP.
17.00 2. Dynamic NAT —
• Assigns a public IP from a pool to a private IP
18.00 when needed.
• The mapping changes based on availability and
Notes demand.

3. Port Address Translation (PAT) (also called NAT overload)
• The most common NAT Type in homes and small offices.
• Many private IPs share one public IP, and each

connection is tracked using port numbers.

- Allows multiple devices to access internet at the same time using a single public IP.