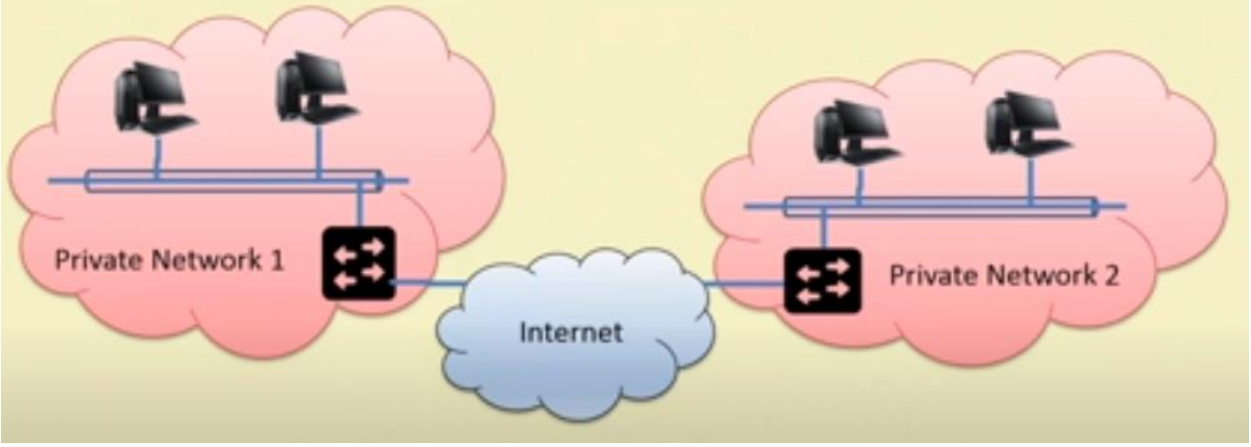
Network Address Translation (NAT)



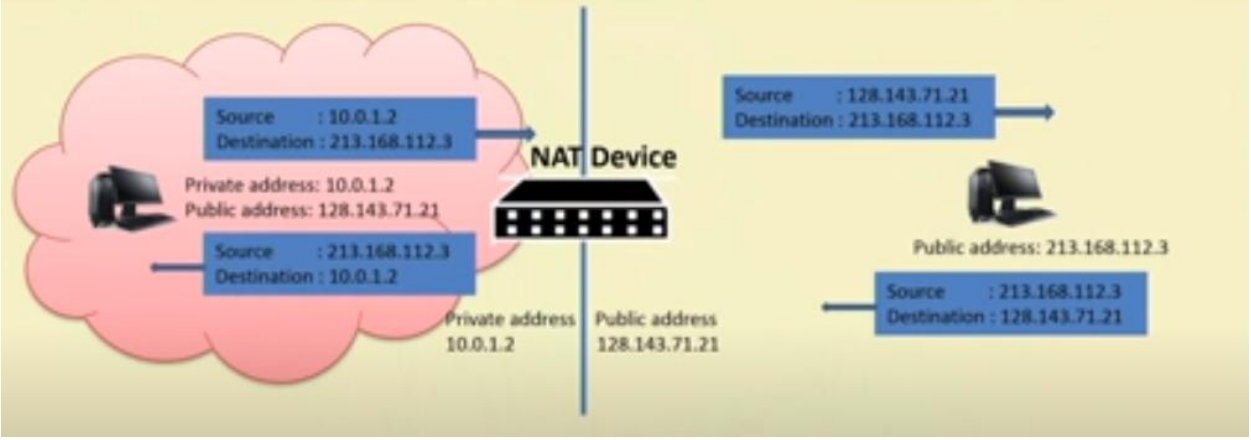
Issues with IPv4 Addressing

- The address space is limited - number of devices (networking equipment) are increasing exponentially.
- A large number of addresses are wasted or remain unutilized (Class D or Class E).
- **Solution:** Make the address reusable, leveraging on the fact that not all users or all devices will connect to the Internet at the same time.

Network Address Translation (NAT)

- Divide addresses into reusable (private) and non-reusable (public) blocks
- Translate internal (private) addresses to external (public) addresses
- Hide internal machines from external devices
- Allow Internet access to large number of users via few public addresses
  - IPv4 private address
    - 10.0.0.0-10.255.255.255
    - 172.16.0.0-172.32.255.255
    - 192.168.0.0-192.168.255.255

Basic Operation of NAT



Working Principles of NAT

- Organizations manages internal private network
- NAT boxes manages a pool of public IP address
- For outgoing connections, NAT boxes selects one of the IP address from its pool, and forward packet from that IP

Migration between ISPs

- An organization can connect to multiple ISPs for better reliability
- NAT allow easy interchange between ISPs by changing IP addresses in NAT boxes
  - Without NAT, every internal system address need to be changed to reflect the network IP of the ISP
- NAT box can be configured to use alternative ISPs in case of a failure

Migration between Network Service Provider