NAT

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NAT (Network Address Translation) is a service used in routers to translate IP addresses. Its main purpose is to conserve the limited supply of IPv4 public IP addresses. While IPv4 offers over 4 billion addresses, this proved insufficient for the vast number of devices needing internet access.

To address this shortage, engineers developed private IP addresses and NAT. Public IP addresses are registered on the internet and are required for direct internet access, while private IP addresses are used internally within a home or business network and cannot directly access the internet. Routers assign private IP addresses to internal devices.

When a device with a private IP address needs to access the internet, NAT translates its private IP to the router's single public IP address. Conversely, when an external computer wants to communicate with an internal device, NAT translates the public IP address back to the private IP.

In the future, NAT and private IP addresses will become unnecessary due to IPv6. IPv6 can produce an enormous number of IP addresses (over 340 undecillion), ensuring that every device can have its own public IP address, eliminating the need for address translation.