Network Address Translation (RFC 3022)

**Goal:** conserve IP address space.

**Fact:** most packet exchanges between nodes within a limited scope (private network).

**Solution:**

- Locally unique private IP addresses for internal communication.
- Globally unique IP addresses for external communication.
- NAT box for address translation.
NAT: Address Blocks

- Addresses assigned by Internet Assigned Numbers Authority (IANA).

- Private address blocks:
  10.0.0.0/8, 172.16.0.0/12, 192.168.0.0/16.

- Small block of globally unique addresses assigned to private network.

- Can use port numbers to extend capability: Network Address Port Translation (NAPT).
NAT Characteristics

- Primarily unidirectional sessions: outbound from private network.
- Address binding done when first outgoing session initiated.
- Binding terminated after last session.
- Static address map for inbound sessions.
- Consistent translation table required if multiple NAT boxes for a stub network.
Network Address Port Translation (NAPT)

- **Swaps** (local IP address, local port number) to (registered IP address, assigned port number).
- Statically map local node to a port number of inbound access.
- Well known service port numbers can be mapped to servers in private network.
- NAPT translation will fail for outbound TCP/UDP fragments:
  - same destination,
  - different sources mapped to same IP address, using same fragment id.