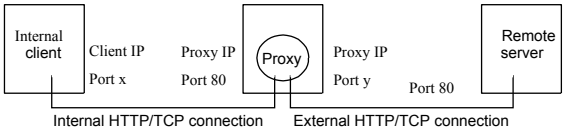
Running out of addresses

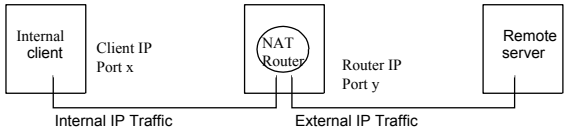
- ~ 4 billion IPv4 addresses total
  - Available space can't all be used
- Hide hosts
  - Application proxies (mail, web, ftp, telnet, …)
    - May be used for policy or performance reasons as well as reducing number of IP addresses in use (see p. 610ff)
  - Network Address Translation (NAT)
    - Temporary (connection-lifetime) assignment of public (host,port) pair to private (host,port) pairb
- Expand the available address space (IPv6)

(Web) Proxy Structure



NAT structure
IP layer proxy

- Address and port translation

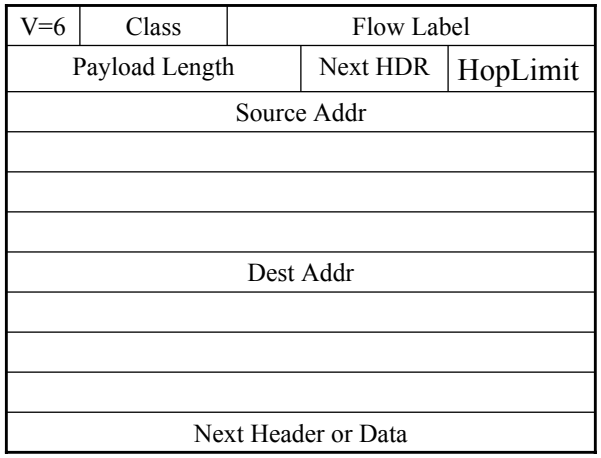


- Address translation only
- Problems
  - NAT is not completely transparent – application protocols may contain IP addresses
  - NAT'd hosts do not have full connectivity

IP Version 6

- Features
  - 128-bit addresses (classless)
  - multicast
  - real-time service (QoS)
  - authentication and security
  - autoconfiguration
  - end-to-end fragmentation
  - protocol extensions
- Header
  - 40-byte "base" header
  - extension headers (fixed order, mostly fixed length)
    - Fragmentation – routers don't do fragmentation, only the source does
    - source routing
    - authentication and security
    - other options

IPv6 Header Format



IPv6 Availability

- www.ipv6.org
- Linux, Solaris, FreeBSD, HPUX, Windows 2000 (add-on), Windows XP (built-in)
  - Ipv6 use is not main-stream at this time
  - But the pieces needed are widely available if you need them for research
- Study point: understand section 4.3.5 fully and you will know a great deal about networking