Introduction to IPv6

Why a new version for IP ?

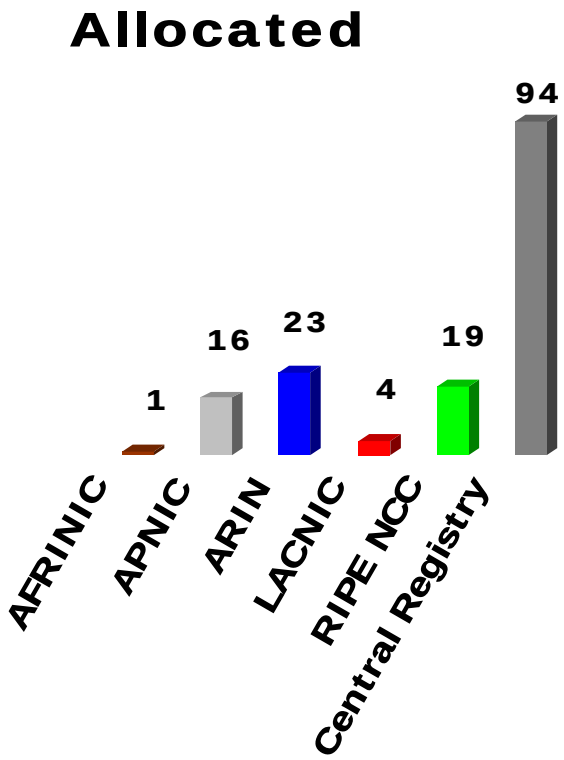
Agenda

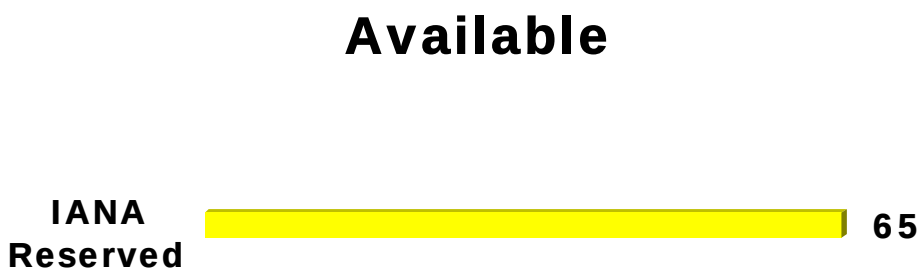
- Historical facts
- IPv4 address space status
- From Emergency measures …
- … to IPv6

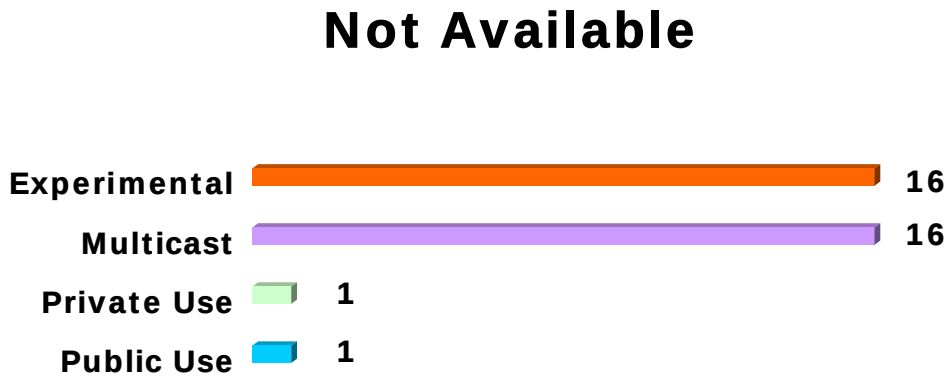
Historical facts

- 1983 : Research network for ~ 100 computers
- 1992 : Commercial activity
- Exponential growth
- 1993 : Exhaustion of the class B address space
- Forecast of network collapse for 1994!
- NRO statistics (Sep. 2005)

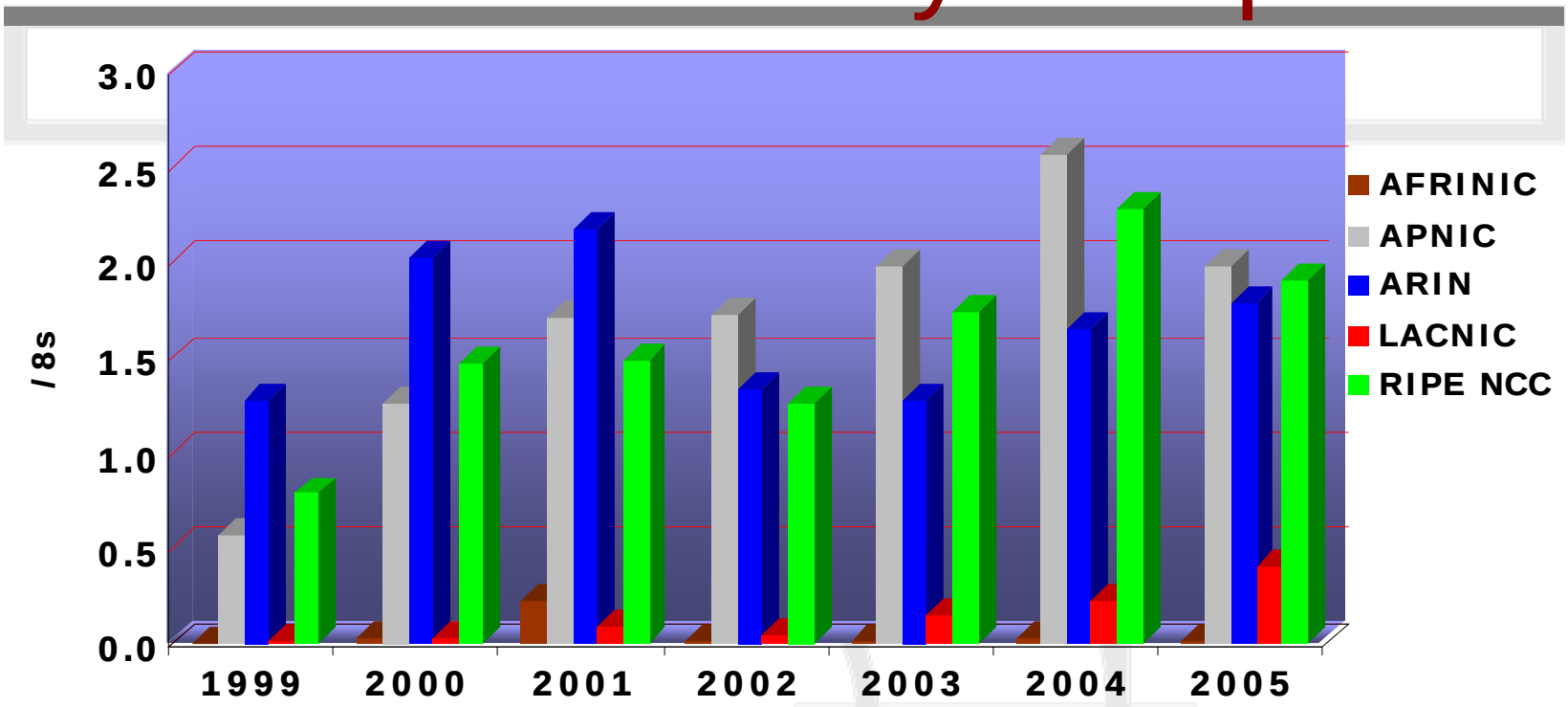
IPv4 /8 Address Space Status (sep. 2005)







IPv4 Allocations from RIRs to LIRs/ISPs Yearly Comparison



- More info : http://www.nro.net/statistics/

Emergency measures

CIDR …

- Allocate exceptionally class B addresses
- Re-use class C address space
- CIDR (*Classless Internet Domain Routing*)
  - RFC 1519 (PS)
  - network address = prefix/prefix length
  - less address waste
  - allows aggregation (reduces routing table size)

Private Addresses (RFC 1918 BCP)

- Allow private addressing plans
- Addresses are used internally
- Similar to security architecture with firewall
- Use of proxies or NAT to go outside
  - RFC 1631, 2663 and 2993
- NAT-PT is the most commonly used of NAT variations

NAT (continued)

- Advantages:
  - Reduce the need of official addresses
  - Ease the internal addressing plan
  - Transparent to some applications
  - “Security”
  - Netadmins/sysadmin
- Disadvantages:
  - Translation sometime complex (e.g. FTP)
  - Apps using dynamic ports
  - Does not scale
  - Introduce states inside the network:
    - Multihomed networks
  - Breaks the end-to-end paradigm
  - Security with IPsec

=> Should be reserved for small sites in Client/Server mode

Emergency Measures

- These emergency measures gave time to develop a new version of IP, named IPv6
- IPv6 keeps principles that have made the success of IP
- Corrects what was wrong with the current version (v4)
- BUT are emergency measures enough?