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)

Where and when?
IPv4 Allocations from RIRs to LIRs/ISPs Yearly Comparison


Where and when?
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?