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!
IPv6 Workshop

IPv4 /8s Address Space Status (sep. 2006)

- Allocated
  - IANA Reserved
  - Experimental
  - Multicast
  - Private Use
  - Public Use
- Available
- Not Available

IPv4 /8s Address Space Status (dec. 2006)

- Allocated
  - IANA Reserved
  - Experimental
  - Multicast
  - Private Use
  - Public Use
- Available
- Not Available
IPv6 Workshop

IPv4 Allocations
RIRs to LIRs/ISPs
Yearly Comparison

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
  - Classes abandon = 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
**IPv6 Workshop**

**Création BT**

---

**NAT (RFC 2663)**

- Public address space
- Private address space

---

**Internet**

---

**Company**
Network Address Translation

<table>
<thead>
<tr>
<th>Public address space</th>
<th>private address space</th>
</tr>
</thead>
</table>

Internet

Company

Routable address pool

NAT (continued)

128.1.2.3

192.1.1.1 <-> 192.1.1.1

10.1.1.1

10.1.1.1 -> 128.1.2.3

10.1.1.1 -> 128.1.2.3
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?

From emergency to IPv6

- IPv6 is already there ...
  - Internet v6 is there today :
  - NRENs in EU, North America, Asia ... are interconnected in IPv6
  - Lots of IXP are offering IPv6 connectivity
  - ISPs and Telcos exchange IPv6 routes
- Then the question is not “if” but “when” and “how” ...
Questions ?