



deploy

Introduction to IPv6

IPv6 Workshop

Trieste, Italy – 28th February / 1st March 2011



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04/2009

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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

1991 Nov.: IETF starts looking for solutions to address exhaustion

1992 : Internet is open to the commercial sector :

- Exponential growth
- IETF urged to work on a IP next generation protocol

1993 : - Exhaustion of the class B address space

Forecast of network collapse for 1994 !

- RFC 1519 (CIDR) published

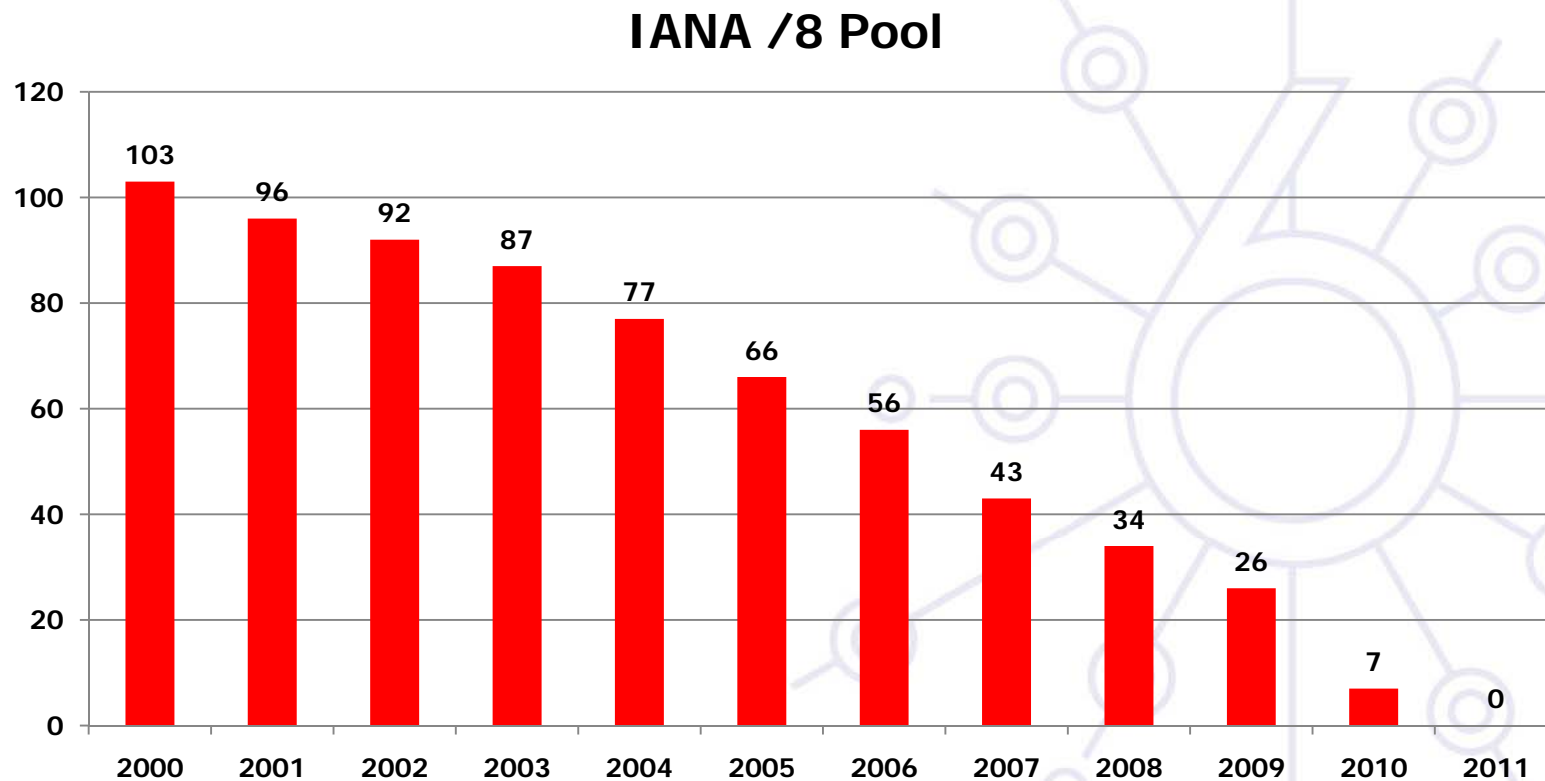
1994 May: RFC 1631, "The IP Network Address Translator (NAT)"

1995 : RFC 1883 (IPv6 specs) published

1996 Feb.: RFC 1918, "Address Allocation for Private Internets"

1998 Dic.: RFC 2460 Obsoleted RFC1883

IPv4 prefixes consumption pace



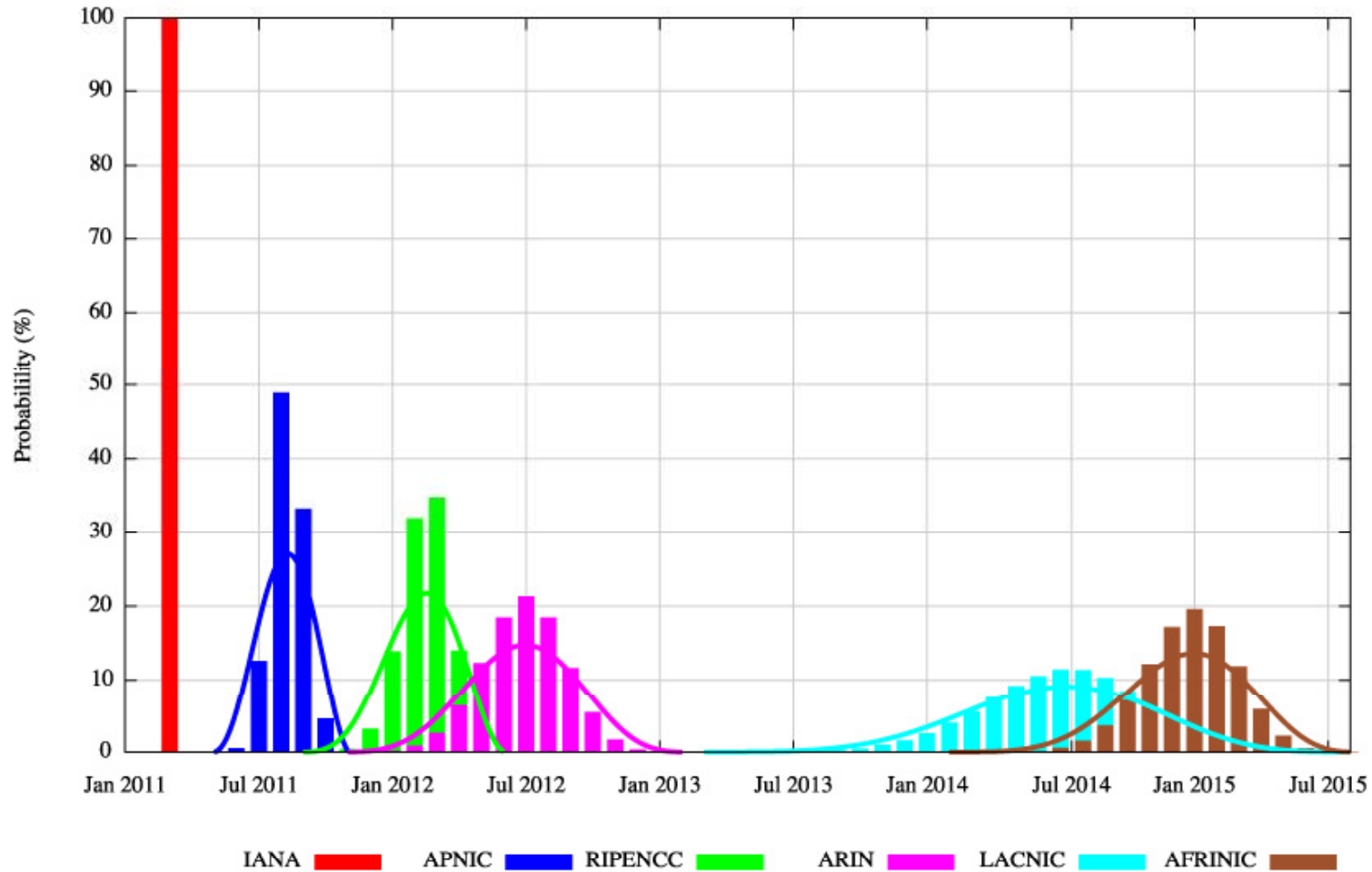
- END OF IANA IPv4 Pool: 3rd February 2011
(<http://www.nro.net/news/ipv4-free-pool-depleted>)

IPv4 address space depletion



IPv4 address space depletion

Registry Exhaustion Dates



<http://www.potaroo.net/tools/ipv4/rir.jpg> (24-02-2011) 9

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Emergency measures ...

Summary

CIDR

Private addresses

NAT



CIDR ...

Allocate former “class B” addresses exceptionally

- known as /16 prefixes since then

Re-use “class C” address space

- Without any more address classes

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)

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

- the most commonly used of NAT variations in the IPv6 world

NAT (continued)

Advantages:

- Reduce the need of official addresses
- Ease the internal addressing plan
- Transparent to some applications
- "Security" vs obscurity
- 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
- Vista and Windows 2008 (servers) are IPv6 enabled by default

Then the question is not "if" but "when ?" and "how ?"



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Questions ...