



deploy

Introduction to IPv6

Formation IPv6

Marrakech, Maroc –Avril 2009



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Looking for a contact ?

- ***Mail to : martin.potts@martel-consulting.ch***
- ***Or bernard.tuy@renater.fr***

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Pour tout contact :

- *Mail à Martin.Potts@martel-consulting.ch*
- *Ou Bernard.Tuy@renater.fr*

Contribs & updates

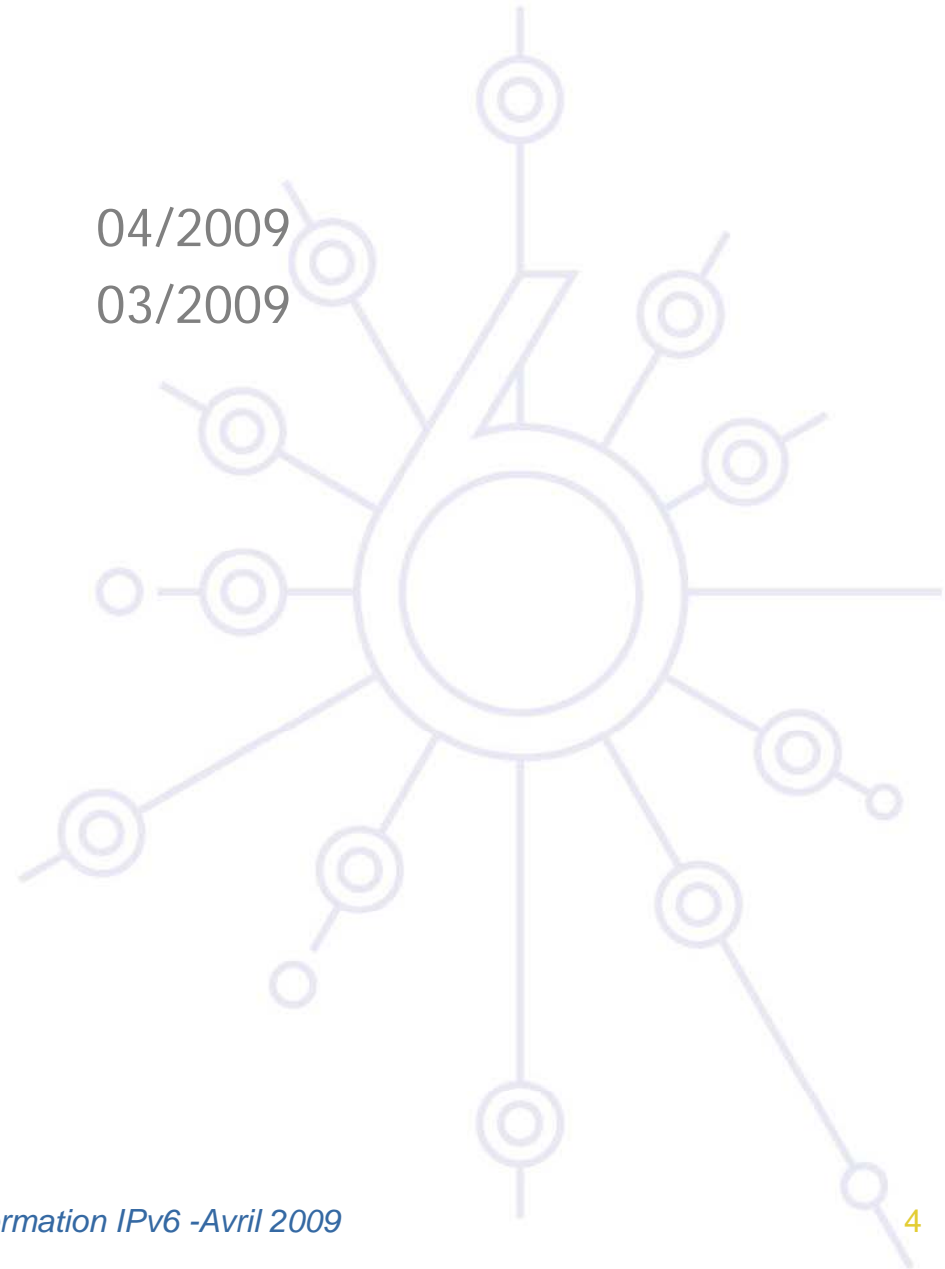
Bernard Tuy, RENATER

Alvaro Vives, Consulintel

Laurent Toutain, Telecom B.

04/2009

03/2009



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 : 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 !

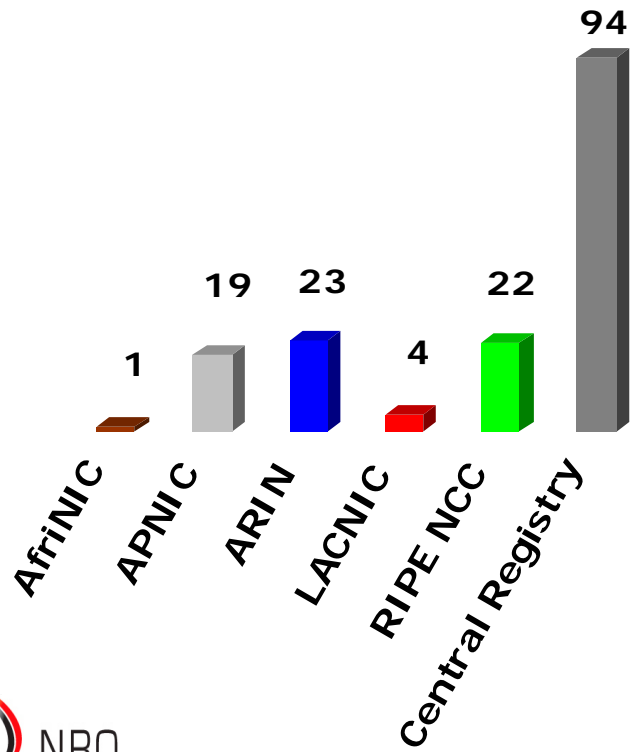
- RFC 1519 (CIDR) published

1995 : RFC 1883 (IPv6 specs) published

- First RFC about IPv6

IPv4 Address Space Status (sep. 2006)

Allocated



Available

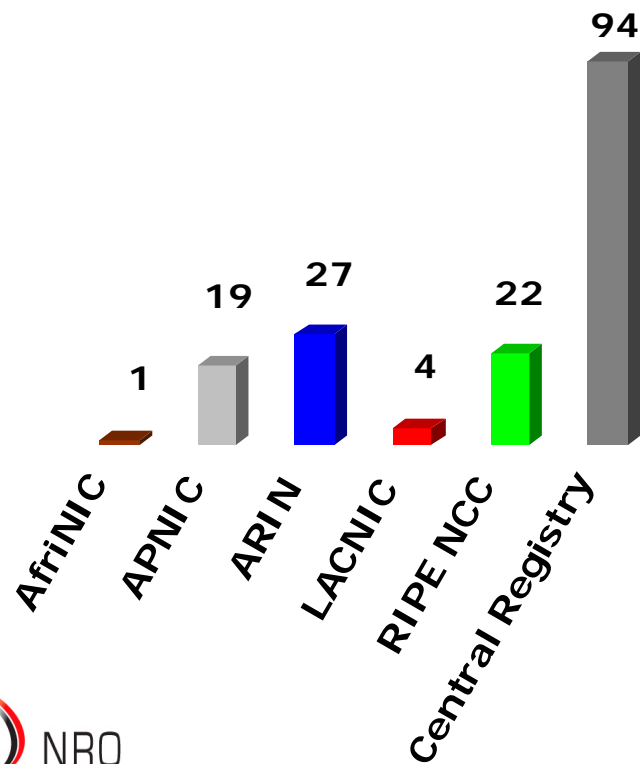


Not Available



IPv4 Address Space Status (dec.2006)

Allocated



Available

IANA Reserved 55

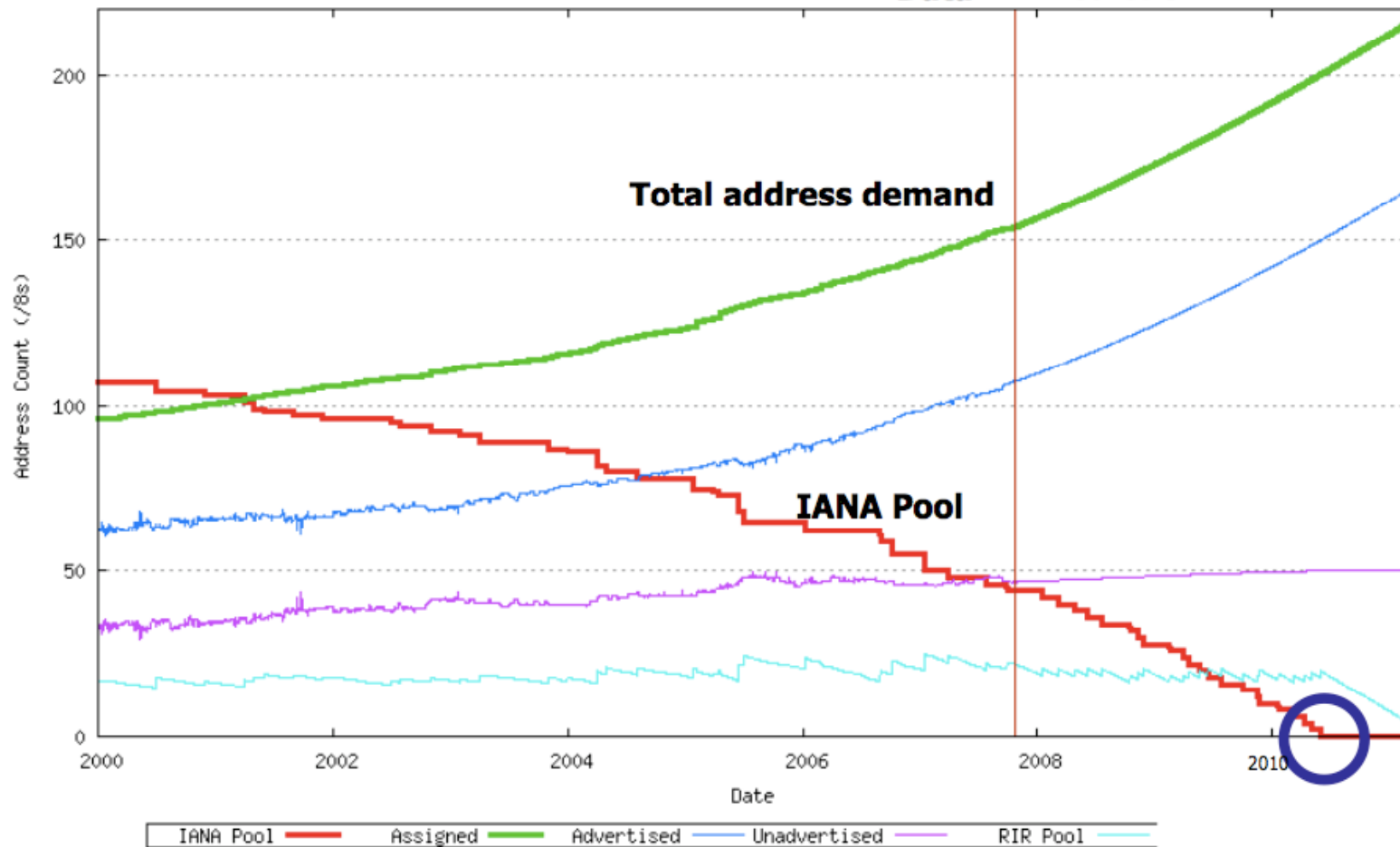
Not Available



IPv4 prefixes consumption pace

Year	Month	available /8s (IANA)	Yearly consumption
2006	September	59	
	December	55	16
2007	September	44	15
	December	42	14
2008	June	39 (-2) ?	11 (13) ?
	December	34	11
2009	March	32	11

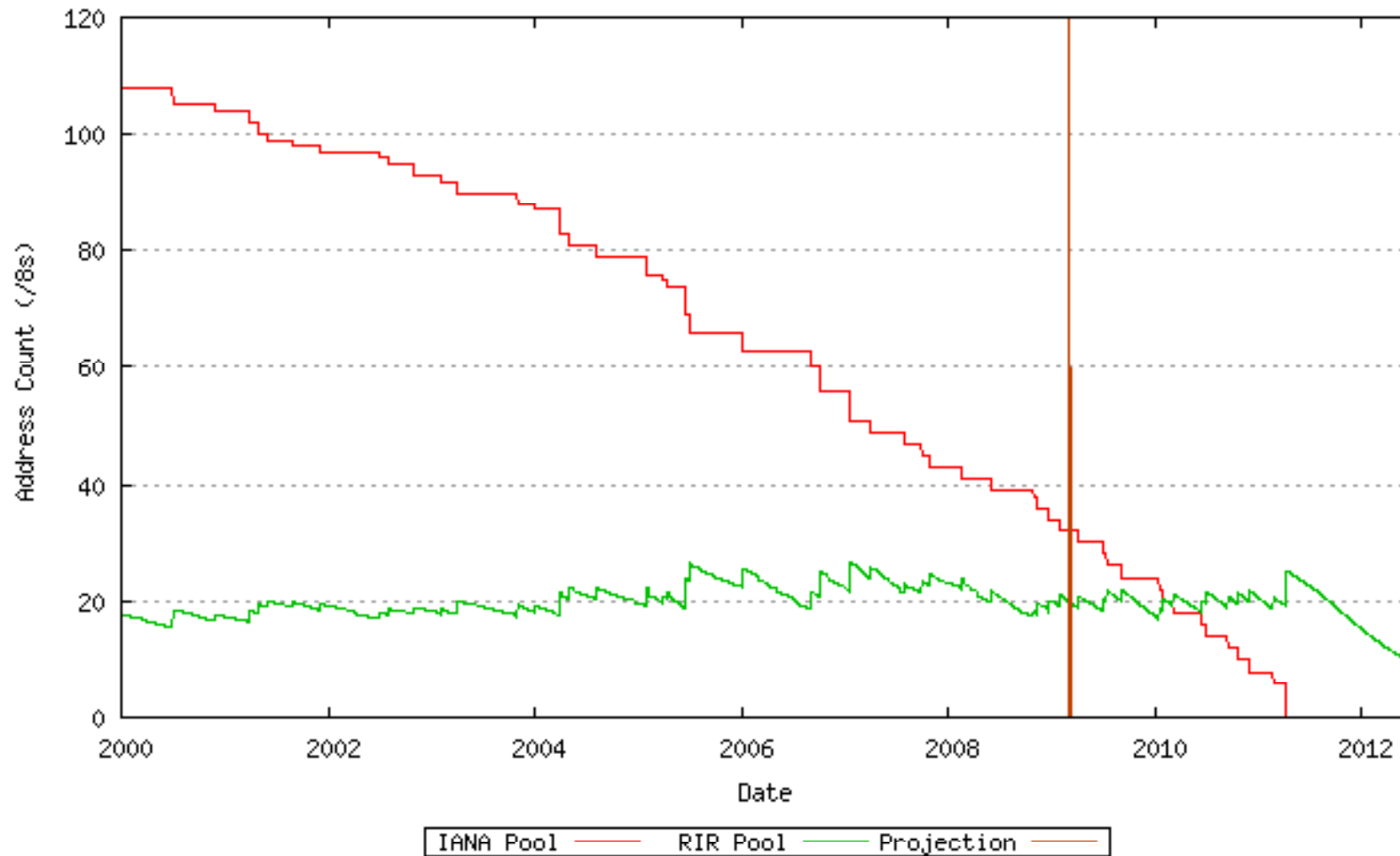
IPv4 address space depletion



Geoff Huston
APNIC
Sept. 2007

Marrakech - Formation IPv6 -Avril 2009

IPv4 address space depletion



<http://www.potaroo.net/tools/ipv4/index.html>

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 ?"

By Apr. 10th 2009 resources exhaustion are projected

- IANA pool : Jun. 2011
- RIRs pool : Oct. 2012
- Data from : <http://www.potaroo.net/tools/ipv4/index.html>



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Questions ...