



**kpn**

# IPv6 @ KPN

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# IPv4 Address Exhaustion, IPv6

Jun 13, 2007 12:35 ET

## IPv4 Address Depletion Imminent

ARIN Board Chairman to Recommend Migration to IPv6 at Burton Group Catalyst Conference North America

SALT LAKE CITY, UT--(Marketwire - June 13, 2007) - Burton Group, an IT research firm for technologies, announces board chairman of the American Registry for Internet Numbers (ARIN) will recommend migration to IPv6 at the Burton Group Catalyst Conference to encourage enterprise IT organizations move toward IPv6 migration.

To date, ARIN has performed technical coordination with other RIRs to ensure IPv4 address migration. In a recent press release, ARIN states, "With only 19% of IPv4 addresses available, that migration is critical."

"This issue addresses enterprise IP addresses."

The Internet unique IP addresses are running low. The Internet is running out of IPv4 addresses.

At Burton Group Catalyst Conference North America, ARIN Board Chairman will recommend migration to IPv6 at the Burton Group Catalyst Conference to encourage enterprise IT organizations move toward IPv6 migration.

### Networking

May 25, 2007

### IPv4 Addresses Expected to Run Out by 2011

By Andy Patrizio

Once again, the alarm bells are ringing. The Internet is running low. The Internet is running out of IPv4 addresses.

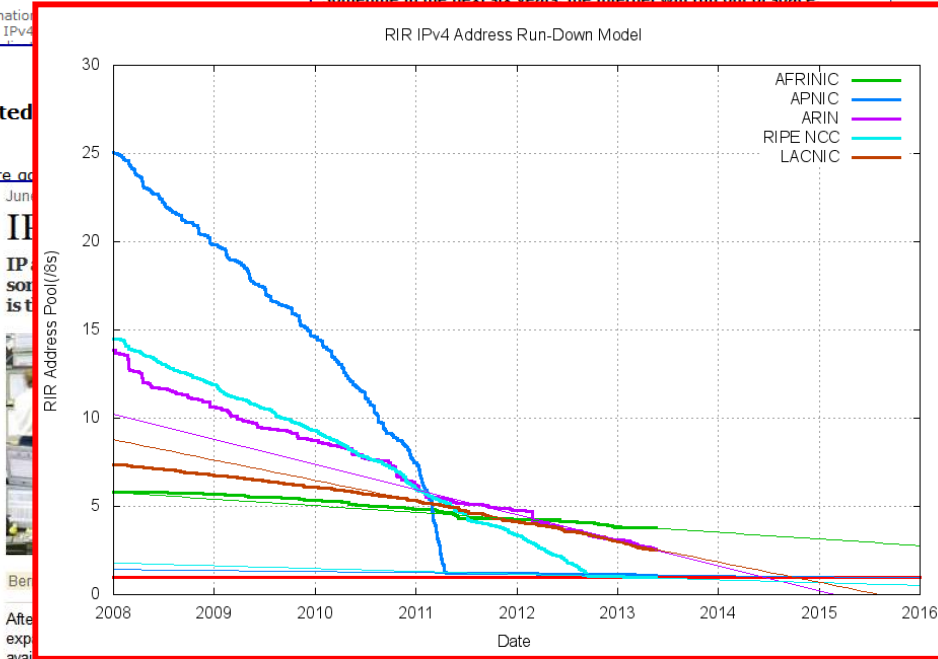
The IPv4 Address Report lists that IPv4 addresses will be exhausted by 2011, 2010 or December 2, 2010.

The Internet Assigned Numbers Authority (IANA) does not have a collection of regional bodies. December 2, 2010 prediction.

Regardless of whether it's April or May, now the American Registry for Internet Numbers (ARIN) is promoting a rapid migration to IPv6. While 68 percent of IPv4 addresses are still available, while 68 percent could mean. There are 4.3 billion IPv4 addresses.

There have been efforts to conserve IPv4 addresses by using duplicate IPv4 addresses, but this only prolonged the inevitable.

Sam Masud, principal analyst at Burton Group, says that the new war on IPv4 is a fact based on the rapidly increasing pace at which blocks of addresses are being allocated, according to Curran.



This city poses unique development issues. You need to be assigned an ID number - Internet Protocol address - before you can enter or communicate with the locals. As in real life, if you want to build a permanent location for your home or business, you need a fixed address so neighbours can find your website.

He said that 68% of all available IPv4 addresses are gone and only 19% are available. The remaining 13% fall into a strange category of being unavailable, which means blocks of addresses that belong to a large company, a university or an ISP and are not used.

Agencies such as ARIN encourage the owners of these addresses to return them to the pool -- he pointed out that Stanford University, for example, recently did just that with its excess addresses -- but internet governing bodies can only request; they have no power to take back those unused addresses.

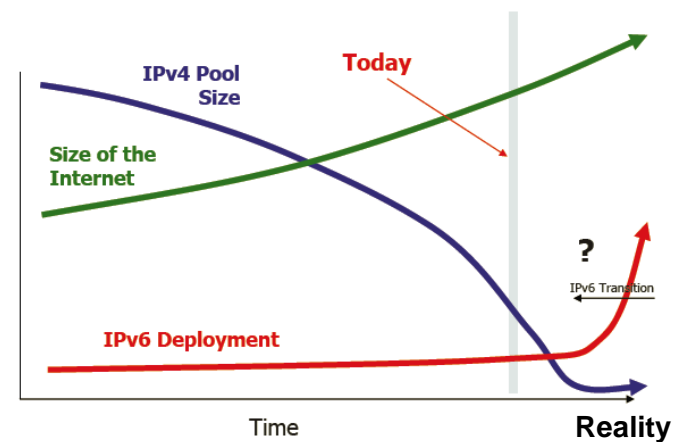
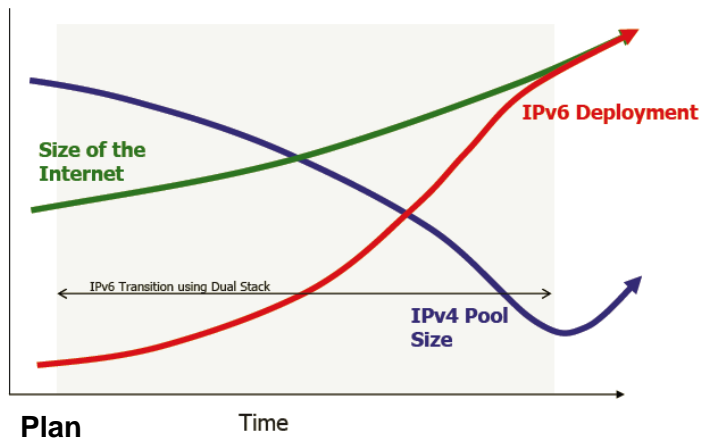
- » E-Mail
- » Print
- » Discuss

### Community on Migration to IPv6

addresses are allocated continues to accelerate.

# IPv4 Address Exhaustion, IPv6?

- **IPv4 exhaustion expected since '80-s/'90-s, IPv6 developed to replace**
  - IPv4 address: 32 bits (dotted decimal: 172.16.254.1)
  - IPv6 address: 128 bits (Hexadecimal: 2001:0DB8:AC10:FE01:0000:0000:0000:0000)
- **IPv6 transition as planned did not happen**
  - IPv4 life-time extended: CIDR, NAT, .. → IPv6 urgency decreased
- **IPv4-IPv6 transition now involves more than just IPv6**



# IPv6 Strategy, Continuity of Internet Services

## IP(v6) strategy

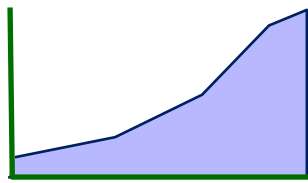
### ***Continuity of Internet (IP) Services***

*Ability to provide IP services to all customers at any point in time*

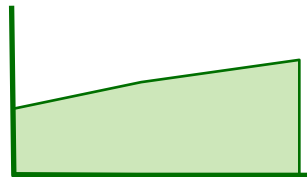
- **IPv6 is a 'corner-stone' technology for continuity of Internet services**
  - Long-term solution for scalability of the Internet (services)
  - However, in itself, not a solution to current IPv4 address scarcity
- **Solutions in IPv4 space are the other 'corner-stone'**
  - In a broad sense: ranging from technology, to processes and service re-definition
  - However, in general, with unfavourable scaling properties

# IPv6 Strategy, Continuity of Internet Services

- **Continuity of IP services: Business, Consumer, Mobile**
  - *And the Internet*



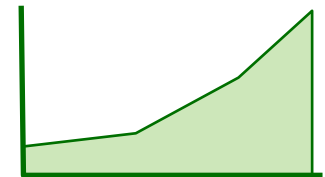
Internet (high growth)



Business (growth)



Consumer (stable market)



Mobile (high growth)

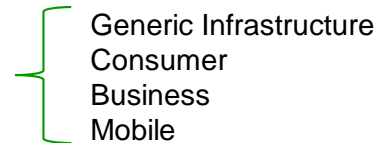
- **Introduction of IPv6 for relevant services (*fit with demand and Internet supply*)**

1. Internet access services

2. Internet related services (VAS)

3. Other IP services

4. Other IP networks

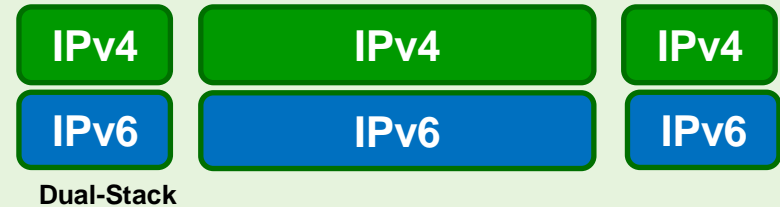


- **Extending IPv4 life-time for short/medium-term growth**

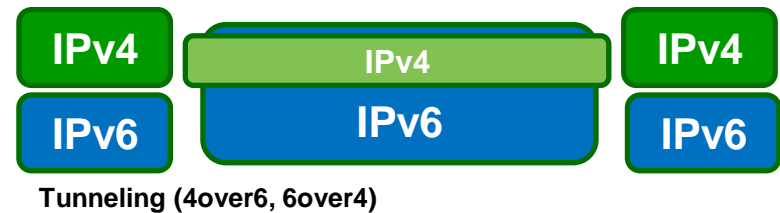
- Reduce use of IPv4 addresses
  - Less IP addresses, share IP addresses (CGNAT)
- Optimise utilisation within IPv4 address plan

# IPv6 Strategy, Dual-Stack

- **Preferred method: Dual-Stack**
  - Native IPv4 and IPv6 services
  - No interim transitioning solutions
  - Flexibility IPv4 exit



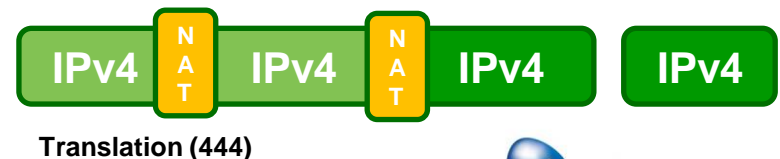
- **Avoid if not required: Interim solutions**
  - Myriad of solutions: ?!?
  - Cost of development and maintenance
    - Must scale with traffic demand
    - Shift from IPv4 → IPv6 expected
  - Double transitioning
    - Current → Interim → Target



- **To extend IPv4: CG-NAT**

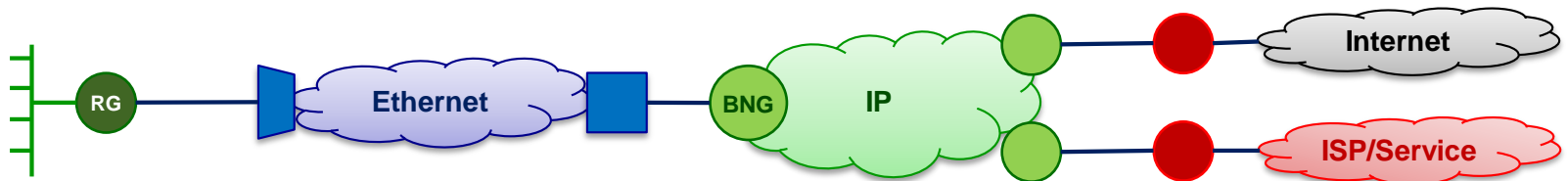
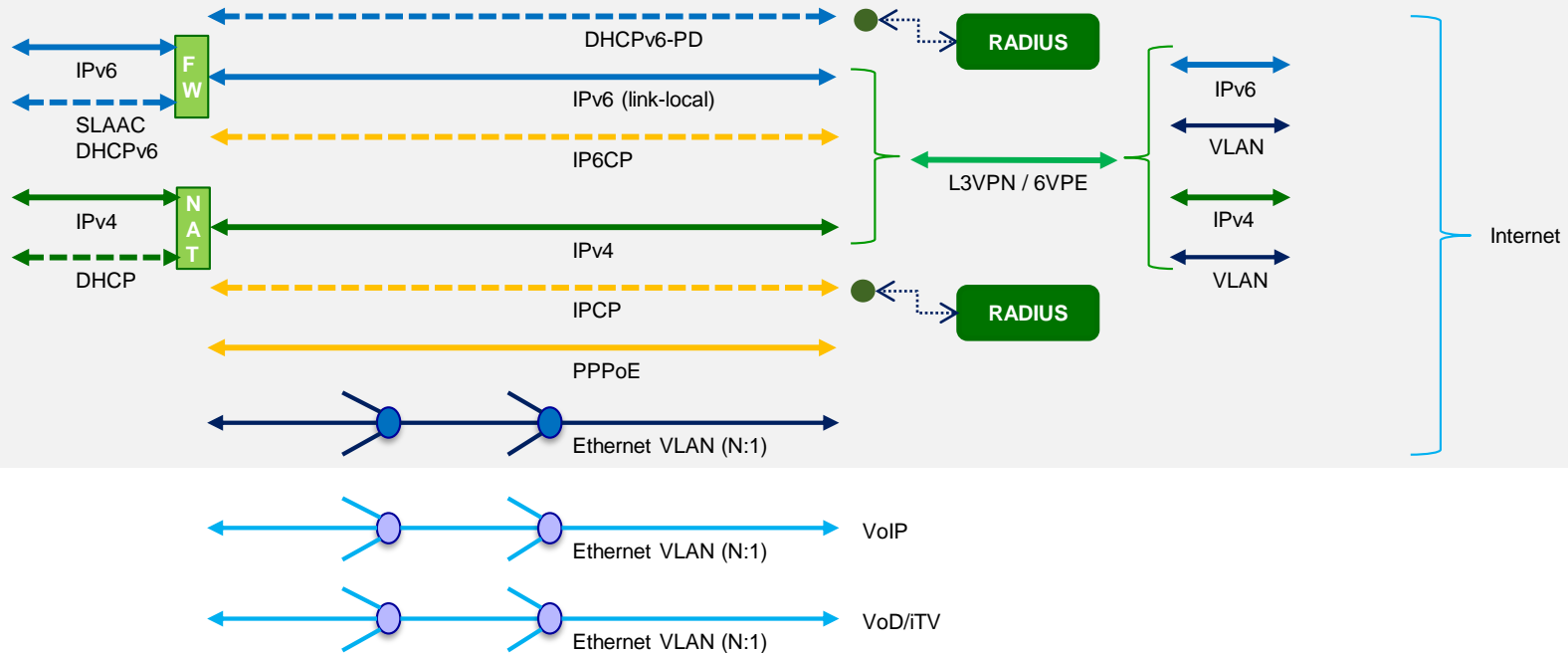
- Number of variations

**Minimise: IPv6 reduces CGNAT scaling for IPv4!**



# IPv6 Strategy, Dual-Stack

## Overview of Fixed Broadband Architecture





# IPv6 Strategy, Dual-Stack

## *Overview of Fixed Broadband Architecture*

- **Consumer broadband access architecture: multi-VLAN model for 3play**
  - Internet (PPP), Voice (PPP), VoD/TV (DHCP); All N:1 VLANs
- **IPv6 introduced for Internet service**
  - Other services may follow in later stage
- **IPv6 architecture: dual-stack over single PPP(oE)/VLAN**
  - /48 per subscriber (one size for consumer and business)
    - Assigned from RADIUS, dynamic on large-timescales (and moving on customer side)
  - DHCPv6-PD delegate prefix and DNS (based on RADIUS information)
  - CPE – BNG link unnumbered (/64 from delegated prefix assigned to CPE)
    - Disable IPv6 auto-configuration option where possible.
  - SLAAC and DHCPv6 (DNS) used on the CPE LAN
    - RFC6106 (IPv6 RA Options for DNS Configuration) if supported
- **IPv6 CPE architecture**
  - Follows specifications of RFC6204 (Basic Requirements for CE Routers)
  - Firewall used for IPv6 (security)

# IPv6 Strategy, Approach to IPv6 Introduction

## Strategy

- IPv6 Programme
- Determine IP(v6) strategy / Define IPv6 architecture
- Technology selection, relevant services / networks, incl. IPv6 in technology investments

## Impact

- Impact of IPv6 determined: on network, IT .. but also processes, organisation, etc
- Both macroscopic (company-wide) and microscopic (e.g. equipment specific, during development)

## Develop

- IPv6 combined with LCM, natural replacements, and other developments to reduce IPv6 costs
- No more IPv4-only developments
- Introduction of IPv6 in legacy systems avoided, focus on target architecture

## Introduce

- Starting with controlled deployment and pilots before general availability / large scale introduction
- IPv6 introduction via “Push” and “Pull” mechanisms
- Mostly “push”: will be part of standard Internet offering – but no IPv6 driven technology replacements, “pull” for business.

# IPv6 Strategy, Approach to IPv6 Introduction

## Current Status

- **IPv6 time-line**

- ... – 2009: IPv6 experiments
- 2009 – 2013: IPv6 programme, scope:
  - Generic infrastructure
  - Volume business/residential serv.
  - Value business serv.
- 2014 – ... : IPv6 c'td roll-out

[www.kpn.com](http://www.kpn.com)

### Hoe ver is KPN met de IPv6 uitrol?

Momenteel zijn wij gestart met een gefaseerde introductie van IPv6. XS4ALL en Zakelijke dienstverlening Internationaal zijn al gereed. Vanaf het tweede kwartaal 2013 zal ook het Ondernemers pakket Internet & Bellen met IPv6 worden geleverd. Eind 2013 zullen alle zakelijke diensten van KPN een volwaardig IPv6 aanbod hebben. Naar verwachting wordt vanaf 2014 IPv6 voor consumenten uitgerold.

Alle diensten blijven op IPv4 gewoon werken. Met deze aanpak kunnen we de continuïteit voor een betrouwbare dienstverlening in de overgang naar het nieuwe IPv6 internetprotocol blijven garanderen.

- **IPv6 implementation**

- IPv6 capability developed + implemented for generic IP infrastructure
  - Carries most IP services
  - Examples: BNG, IP transport, RG (ready), DNS, abuse, IP address mgmt
  - IPv6 combined with technology renewal and roll-out new architecture
- IPv6 (dual-stack) Internet access for business to be introduced in 2013
  - Small business and Large Enterprise (demand)

# Thank you for your attention