Confronting the IPv4 Address Exhaustion

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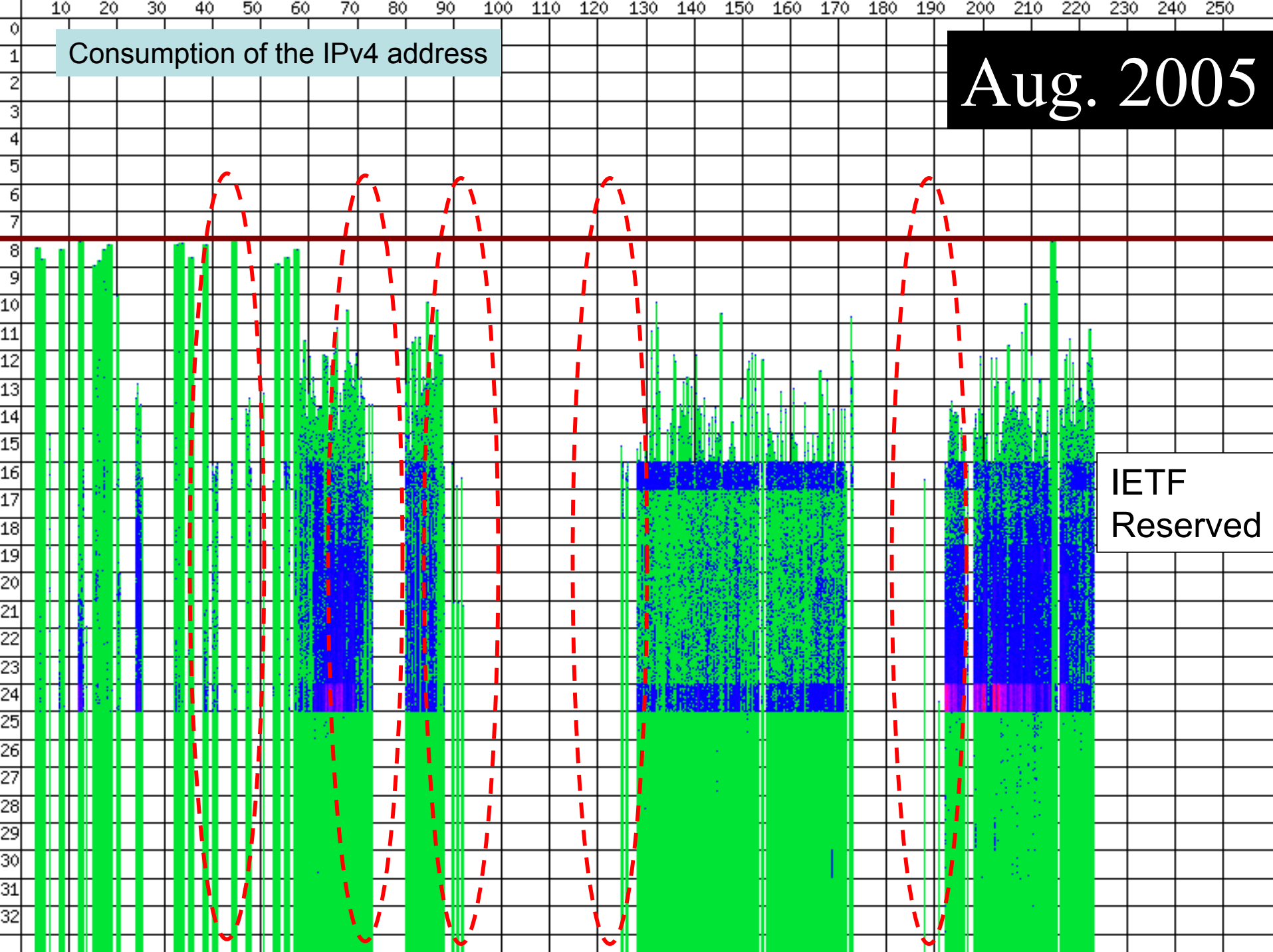
NTT Communications

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At the beginning …

- Almost Internet users and services are on IPv4 Internet now
- However new comers will not be able to obtain IPv4 address any longer near future
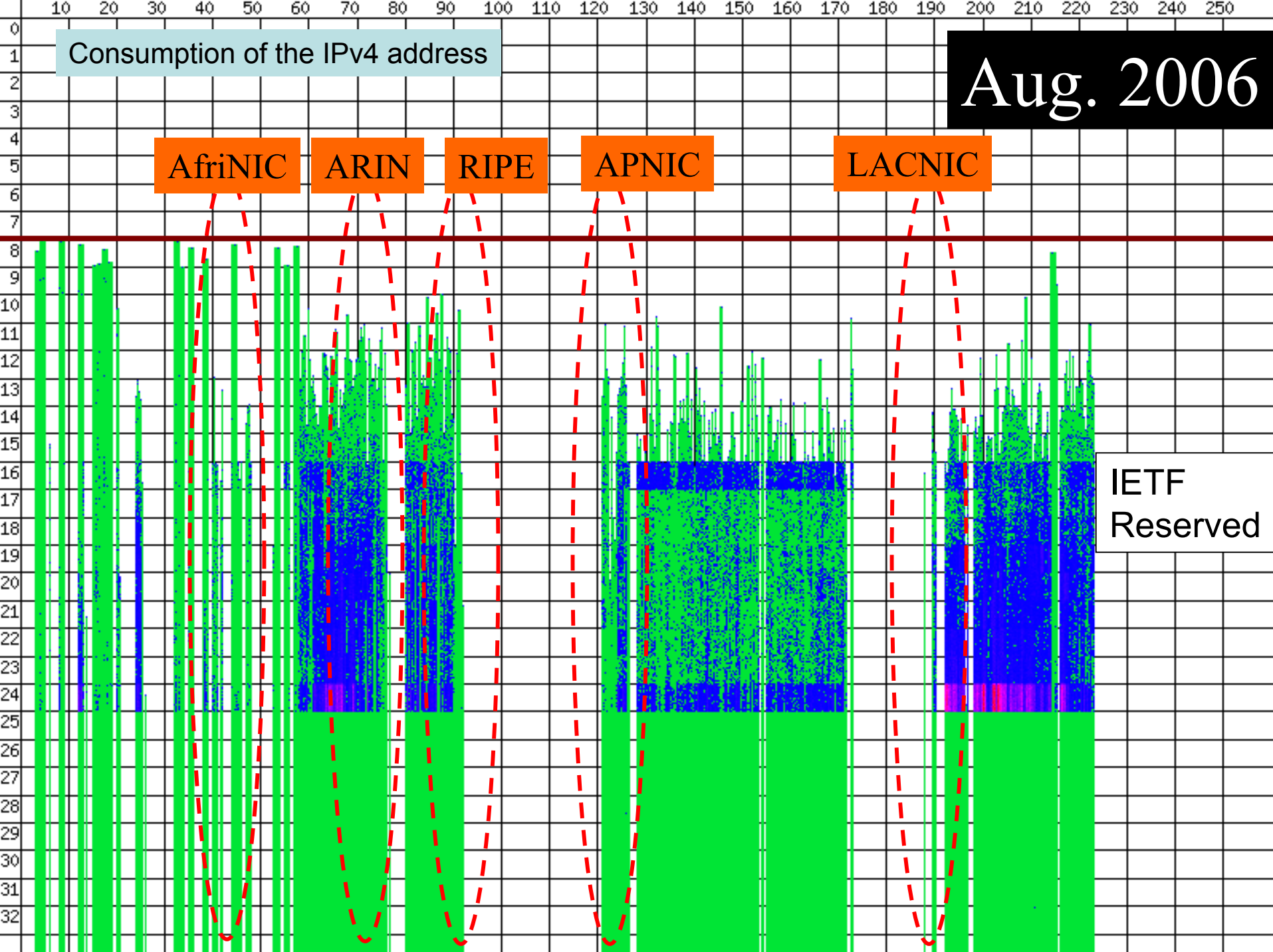- We should realize this fact

Is it really running out? When?

Consumption of the IPv4 address

Aug. 2005

IETF Reserved

Consumption of the IPv4 address

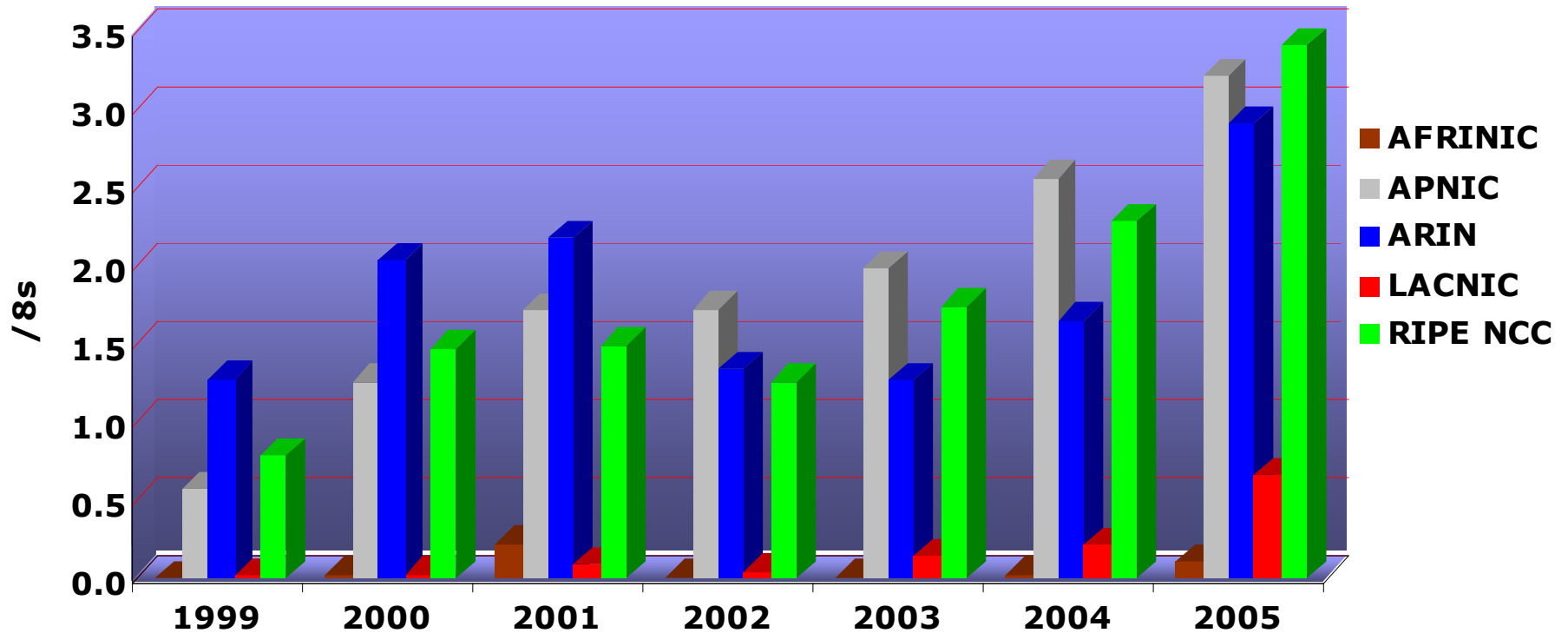Aug. 2006

AfriNIC   ARIN   RIPE   APNIC   LACNIC

IETF Reserved

Is it really running out? When?

Annual consumption at Registries

Increasing /8 *10 in 2005

Two forecasts of the exhaustion

- **2012** to **2013**, by Geoff Huston of APNIC
  - Report in December 2005
  - Dynamic lifetime estimation system http://ipv4.potaroo.net/
  - Recent forecast : **2011(IANA)** and **2012(RIR)**

Home   BGP Reports   CIDR Reports   IPv4 Reports

IPv4 Address Report

This report was last updated on 05-Sep-2006 09:06 UTC + 10.

Projected IANA Unallocated Address Pool Exhaustion: 07-Apr-2011

Projected RIR Unallocated Address Pool Exhaustion: 23-Jul-2012

- **2009** to **2016**, by Tony Hain of Cisco
  - Report in November 2005
  - http://www.cisco.com/application/pdf/en/us/guest/about/about/c644/ccmigration_09186a00805320df.pdf
  - Recent forecast : **2011(RIR)**
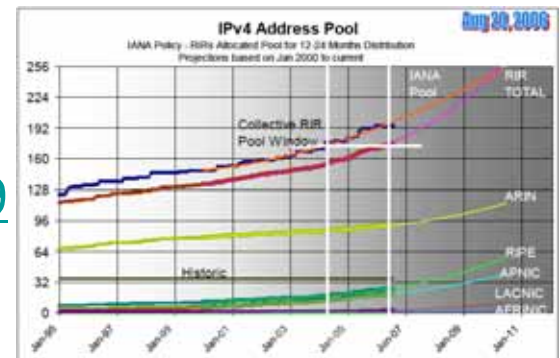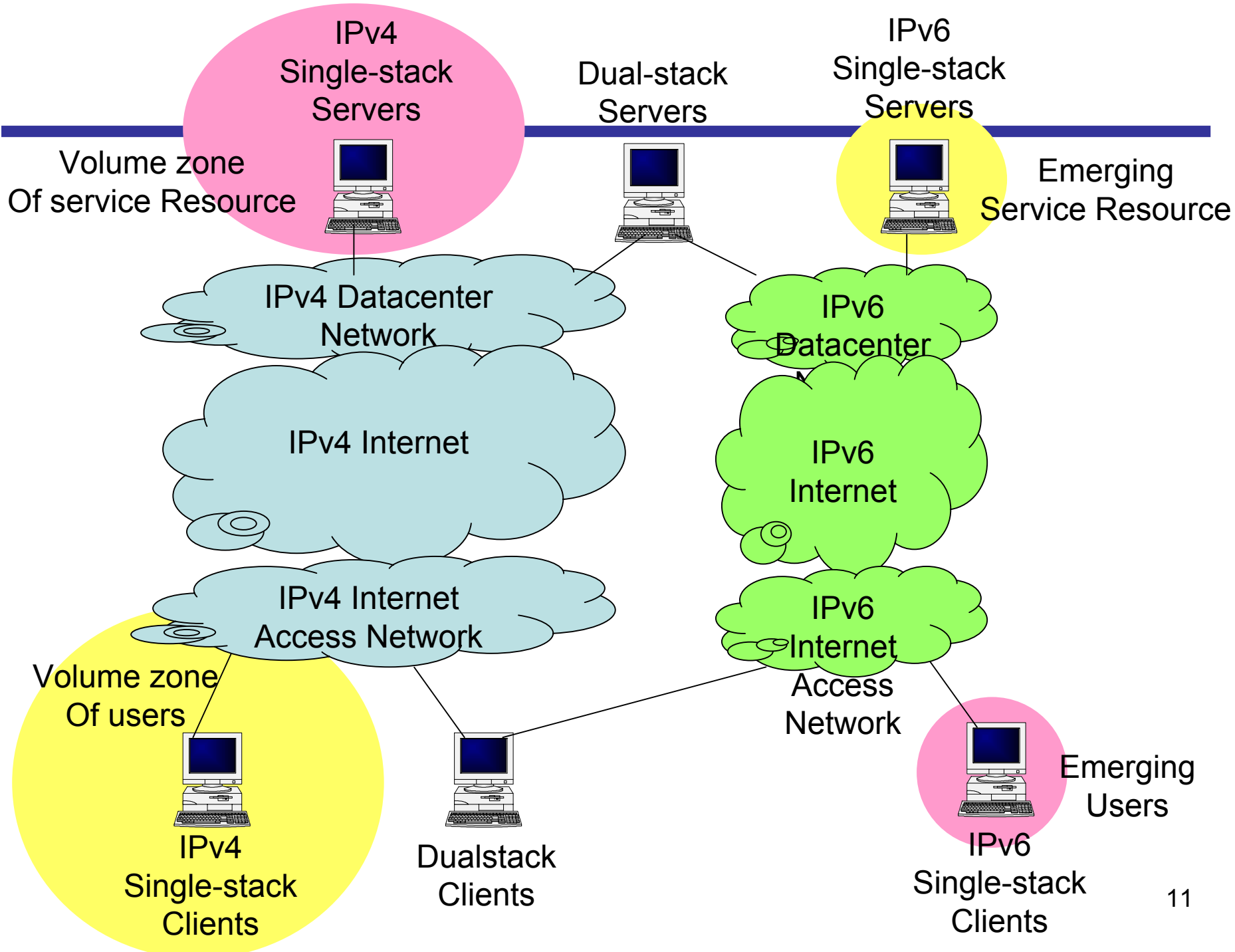
JPNIC Expert Team released a report

- *"Analysis and Recommendations on the Exhaustion of IPv4 Address Space"*
  - By the Team of 9 network operations experts
  - Released on **April 3, 2006**
  - The English version was finally released on **July 31, 2006**
    - http://www.nic.ad.jp/en/topics/2006/20060731-01.html
    - You can find the link from the top http://www.nic.ad.jp/en/
  - Dose not focus on the day of IPv4 address exhaustion
    - Offers various recommendations

A part of recommendations on this report

- ## For Registries(ICANN/IANA/RIR/NIR)
  - Each registry involved with IP address space should share a consistent policy throughout the world

- ## For ISP
  - Should prepare to provide connectivity with IPv6 when or before IPv4 address space is exhausted

- ## For IP technology developers (vendors, etc)
  - Should be aware of the exhaustion of IPv4 address space and take more effort to develop and refine their IPv6 technology

Who will be in trouble ?

IPv4 Single-stack Servers

Dual-stack Servers

IPv6 Single-stack Servers

Volume zone Of service Resource

Emerging Service Resource

IPv4 Datacenter Network

IPv6 Datacenter

IPv4 Internet

IPv6 Internet

IPv4 Internet Access Network

IPv6 Internet Access Network

Volume zone Of users

IPv4 Single-stack Clients

Dualstack Clients

Emerging Users

IPv6 Single-stack Clients

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Who will be in trouble? (client)

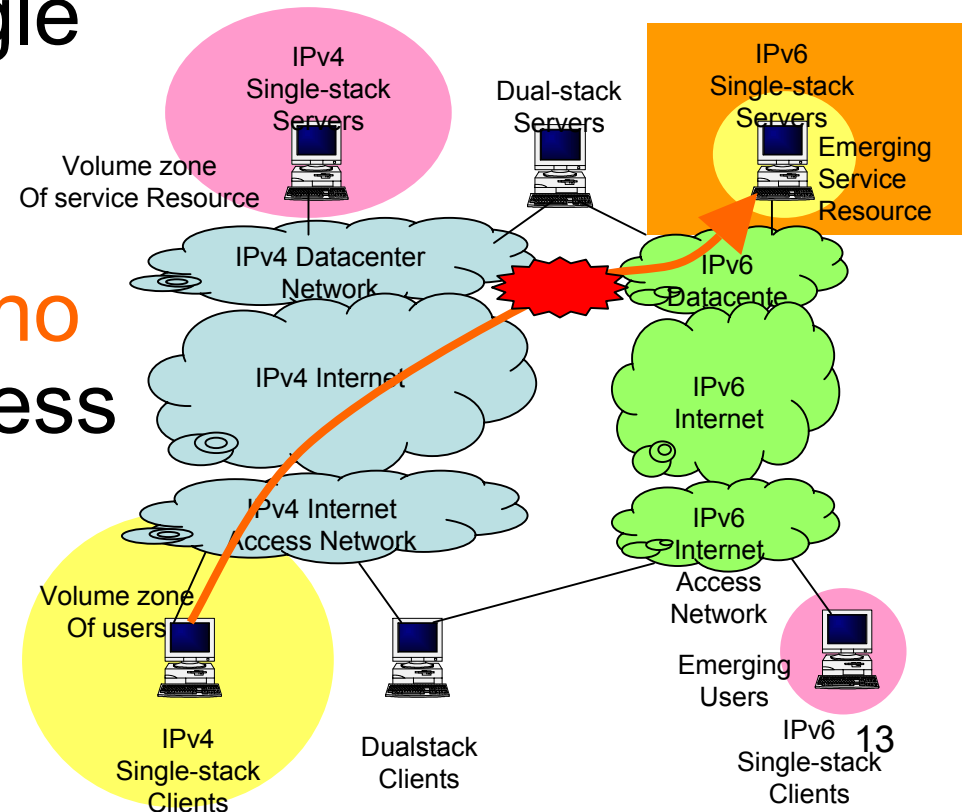- New Internet users (client side) can use only the IPv6 Internet

- and cannot access to the IPv4 single stack servers that have a wealth of information and services

- the convenience of the Internet for users is provided by that servers

- so new Internet users will not be able to enjoy the convenience of the Internet

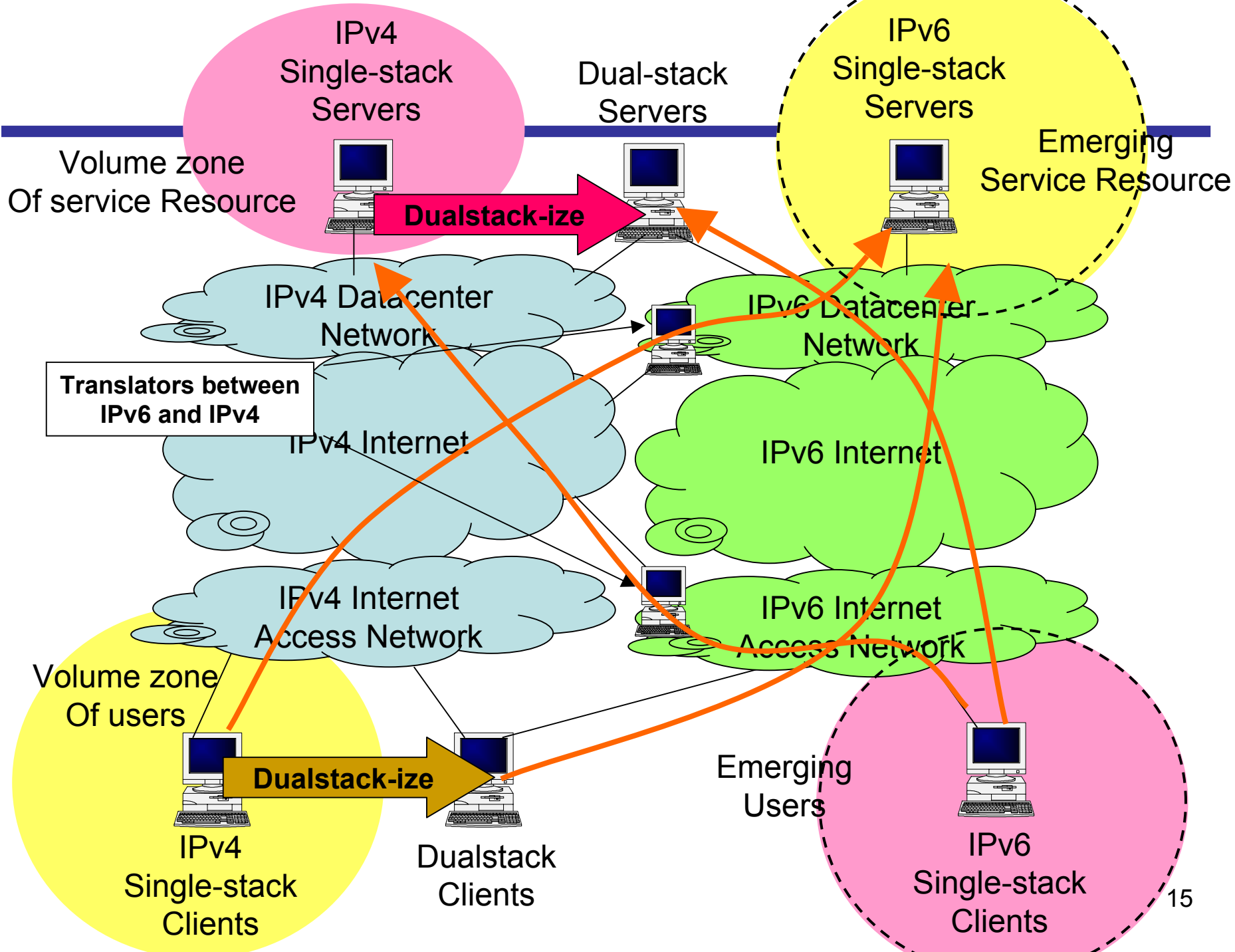- In other words, users will not connect to an Internet that does not offer any convenience
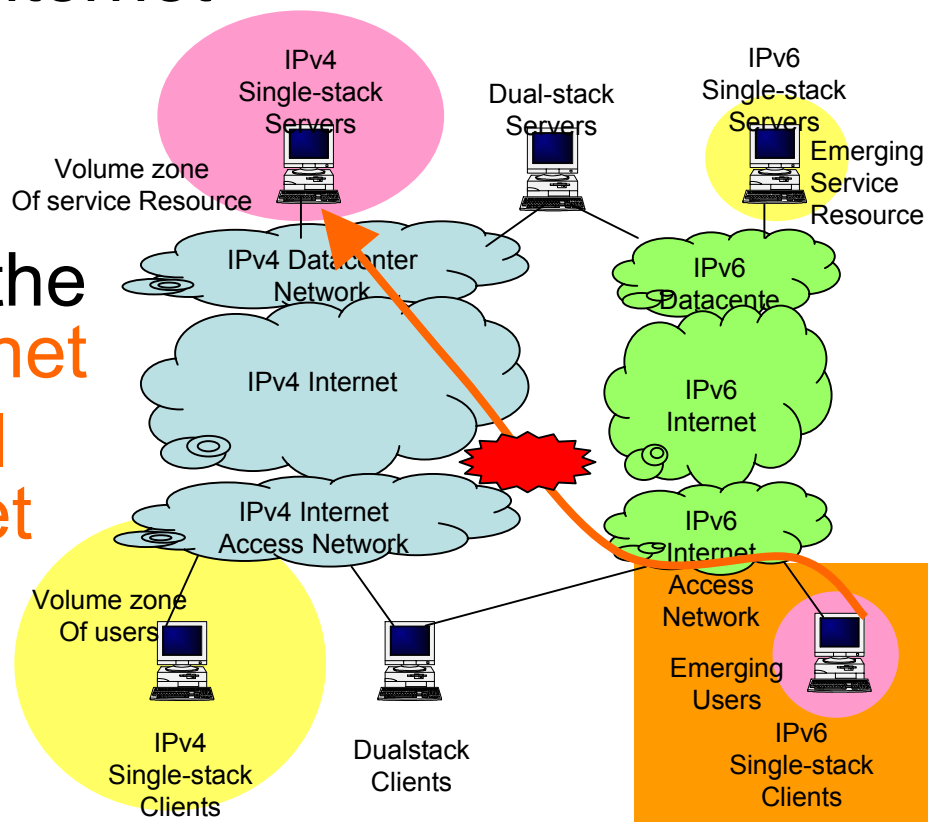
Who will be in trouble? (server)

- New service providers (server side) can use only the IPv6 Internet

- and cannot provide services for users of IPv4 single stacks that form a volume zone

- Consequently it has no importance for business

- and their business will not develop

IPv4
Single-stack
Servers

Dual-stack
Servers

IPv6
Single-stack
Servers

Emerging
Service
Resource

Volume zone
Of service Resource

IPv4 Datacenter
Network

IPv6
Datacente

IPv4 Internet

IPv6
Internet

IPv4 Internet
Access Network

IPv6
Internet
Access
Network

Volume zone
Of users

IPv4
Single-stack
Clients

Dualstack
Clients

Emerging
Users

IPv6
Single-stack
Clients

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A possible scenario
for the transition to IPv6 Internet

IPv4
Single-stack
Servers

Dual-stack
Servers

IPv6
Single-stack
Servers

Emerging
Service Resource

Volume zone
Of service Resource

Dualstack-ize

IPv4 Datacenter
Network

IPv6 Datacenter
Network

**Translators between
IPv6 and IPv4**

IPv4 Internet

IPv6 Internet

IPv4 Internet
Access Network

IPv6 Internet
Access Network

Volume zone
Of users

Dualstack-ize

Emerging
Users

IPv4
Single-stack
Clients

Dualstack
Clients

IPv6
Single-stack
Clients

Conclusion

Don't get into panic but get prepared

- Are you aware of the exhaustion?
  - It will come in several years (== depreciation term) .
  - You need to get ready by then
- ISP operators and Venders need to realize, be confident and take action
  - Need more precise information
  - JPNIC will keep on providing refined information
- It's a pure problem of the Internet Operations
  - Coordination and Collaboration will be the key

Thank you !

Again, the report is available at
http://www.nic.ad.jp/en/topics/2006/20060731-01.html

You can find the link from Top page of JPNIC Web
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