

IPv6 deployment cases

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IPv4 Address Exhaustion

- more users and devices, but not enough IPv4
- Remaining IPv4 Address Space Drops Below 5%
 - as of 18/Oct/2010
 - <http://www.nro.net/media/remaining-ipv4-address-below-5.html>

One Internet

- it's one of the greatest value of the internet
 - people connected
- keep connected
 - even “Before and After IPv4 Address Exhaustion”
- And we believe our customers need IPv6 to connect each other

myself and IJ network

- myself
 - senior engineer at IJ
 - IPv4 and IPv6 network, DNS, security and so on
 - APOPS co-chair, APNIC IPv6 Tech sig chair
- IJ
 - pure IP network
 - IJ/AS2497 maintains its IP backbone in Japan and United States.

IIJ's IPv6 services

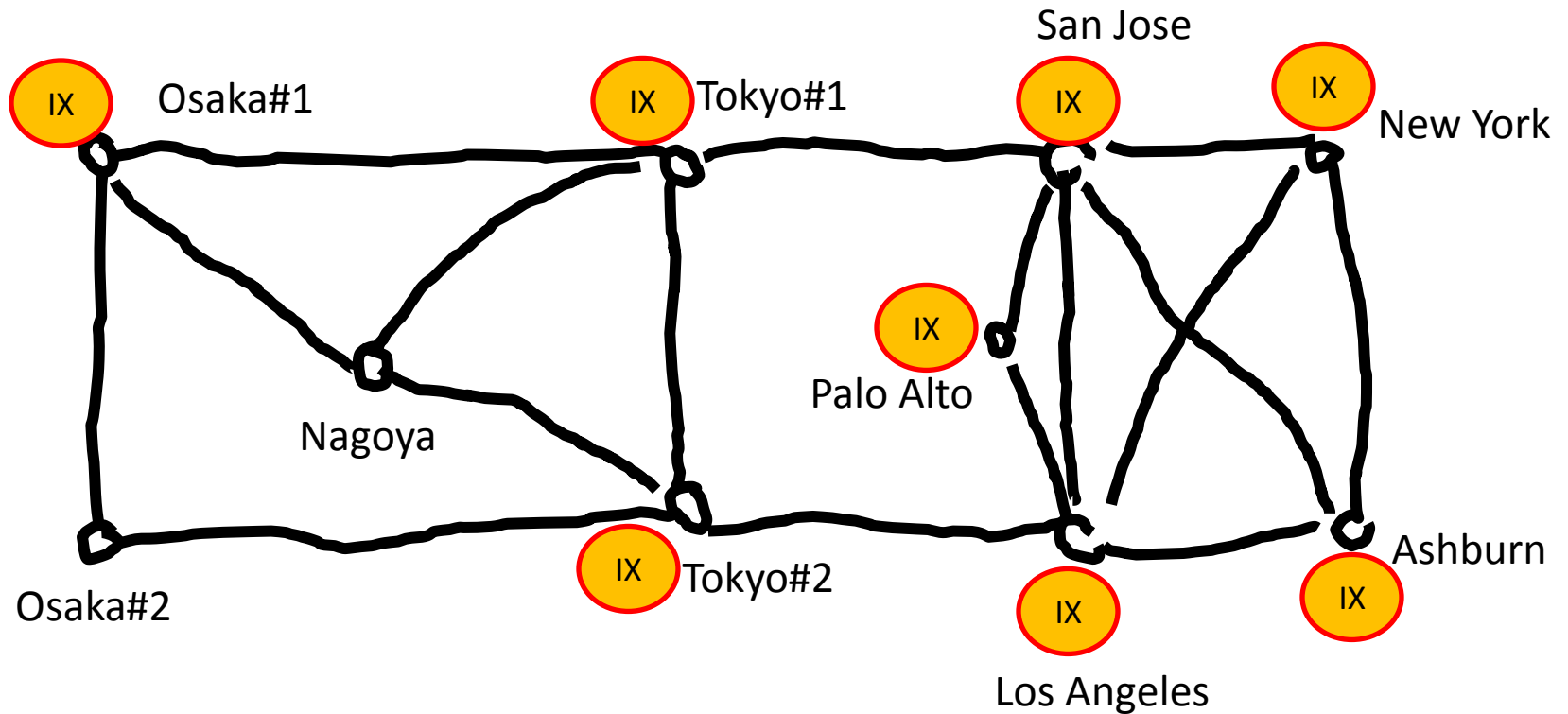
- 1st stage (1999-)
 - connectivity
 - including cache dns
- 2nd stage
 - applications
 - web, mail, dns, ntp
- 3rd stage (now)
 - expanding services

business model for connectivity

- IJ sells bandwidth
 - Customers can select protocol(s) which should be forwarded on the link
 - IPv4 only
 - IPv4/IPv6 dual stack
 - IPv6 only
 - Or, customer can ask IPv6 over IPv4 tunnel for free.

brief backbone topology

- dual stack as possible



routing protocols

IPv4

- OSPFv2
 - mostly area 0
 - md5 authentication
- BGP4
 - peer through ipv4
 - route-reflector
 - md5 authentication

IPv6

- OSPFv3
 - area 0 only
 - ipsec authentication
- BGP4+
 - peer through ipv6 global
 - route-reflector (same as IPv4)
 - md5 authentication

OSPFv3 link cost

- We set the same link cost value as IPv4's.
 - The network topology is almost same.
 - working fine 😊
- When we were using RIPng as IGP (we had no choice at that time 😞), these were so much trouble.

addressing

- /128 for loopback interfaces
- /64 for links
 - /127 is used on several inter-router links
- static /48 for customer sites
 - still considering the size
 - possible sizes are: /48, /52, /56, /60, /64
- dynamic /64 for dynamic tunnel users
 - via PPTP tunnel

IPv6 experiences

- can clear away fear for IPv6
 - it works!
- can improve awareness of IPv6
 - production level services
- can convince your customers
 - how we did, problems we met, solutions we did

iiij.ad.jp DNS

iiij.ad.jp.	IN	NS	dns0.iiij.ad.jp.
iiij.ad.jp.	IN	NS	dns1.iiij.ad.jp.
dns0.iiij.ad.jp.	IN	A	210.138.174.16
dns0.iiij.ad.jp.	IN	AAAA	2001:240:bb41:8002::1:16
dns1.iiij.ad.jp.	IN	A	210.138.175.5
dns1.iiij.ad.jp.	IN	AAAA	2001:240:bb4c:8000::1:5

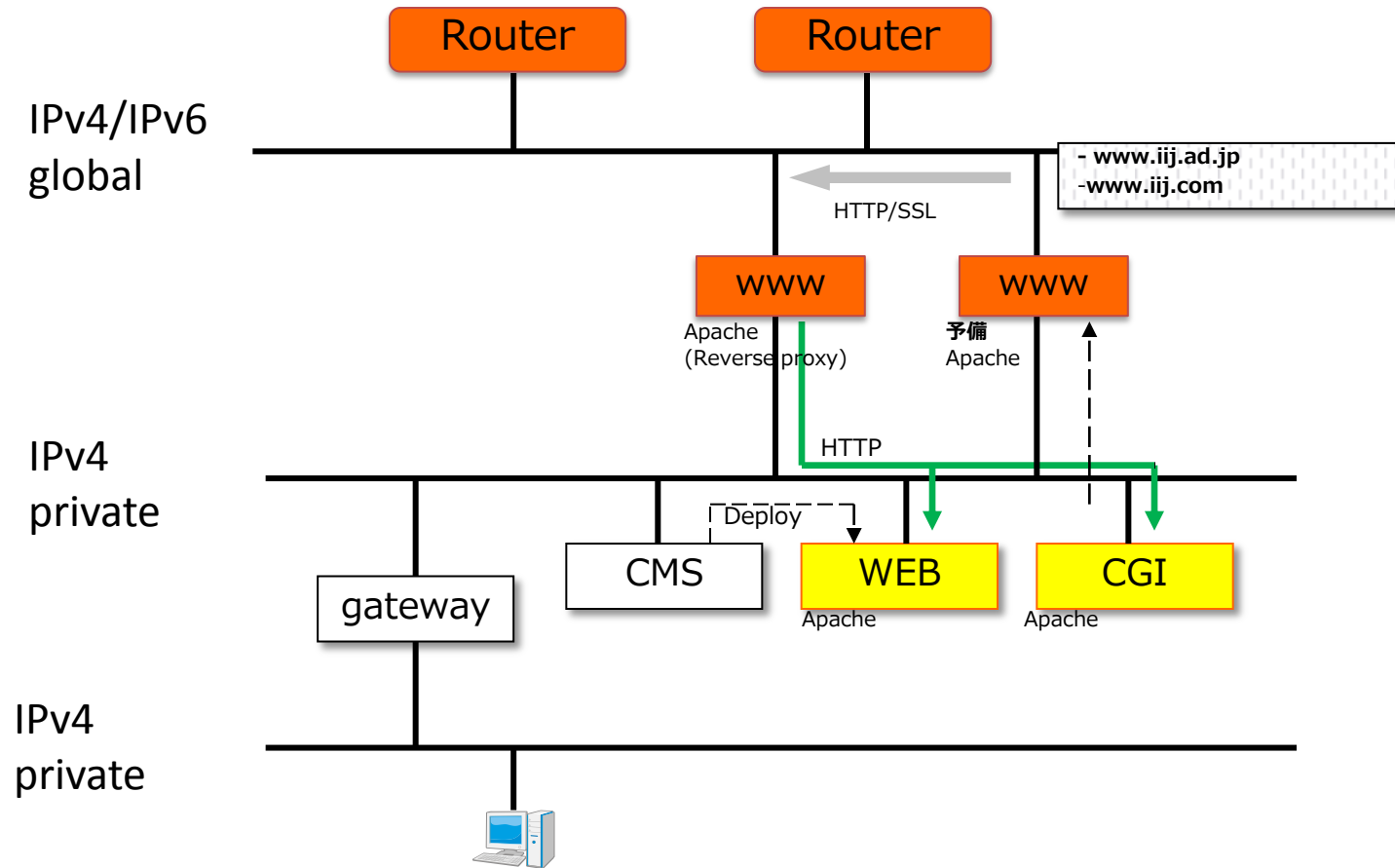
ij.ad.jp SMTP

ij.ad.jp.	IN	MX 10	omgi.ij.ad.jp.
omgi.ij.ad.jp.	IN	A	202.232.30.70
omgi.ij.ad.jp.	IN	A	202.232.30.144
omgi.ij.ad.jp.	IN	AAAA	2001:240:11e:6300::1:70
omgi.ij.ad.jp.	IN	AAAA	2001:240:11e:6000::1:144

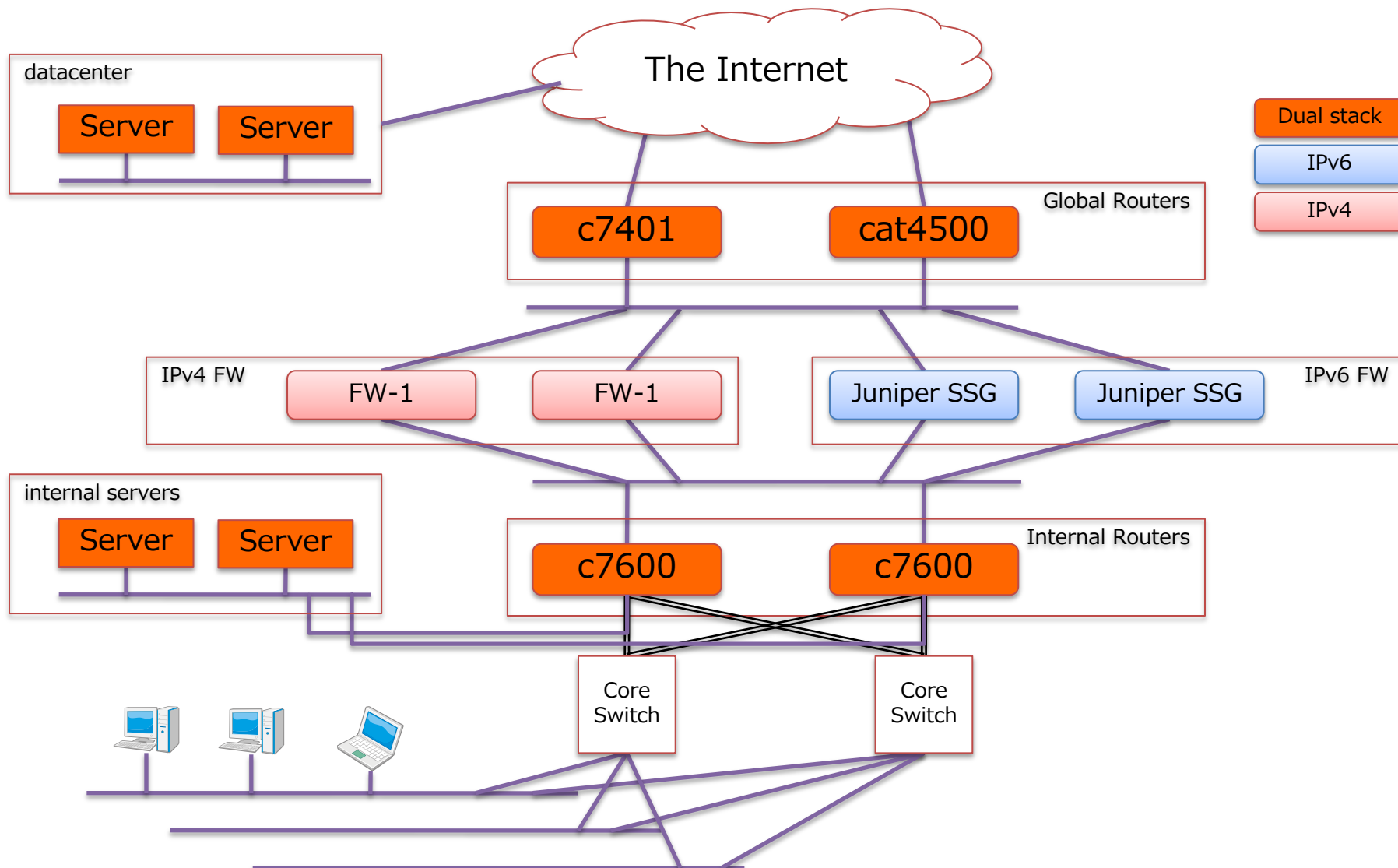
iiij.ad.jp WEB

www.iiij.ad.jp.	IN	A	210.130.137.80
www.iiij.ad.jp.	IN	AAAA	2001:240:bb42:b000::1:80
www-v4.iiij.ad.jp.	IN	A	210.130.137.80
www-v6.iiij.ad.jp.	IN	AAAA	2001:240:bb42:b000::1:80

iiij.ad.jp WEB



IJ office



demands for IPv6 services

- power users
- huge enterprises
- governments
- ISPs
- contents providers

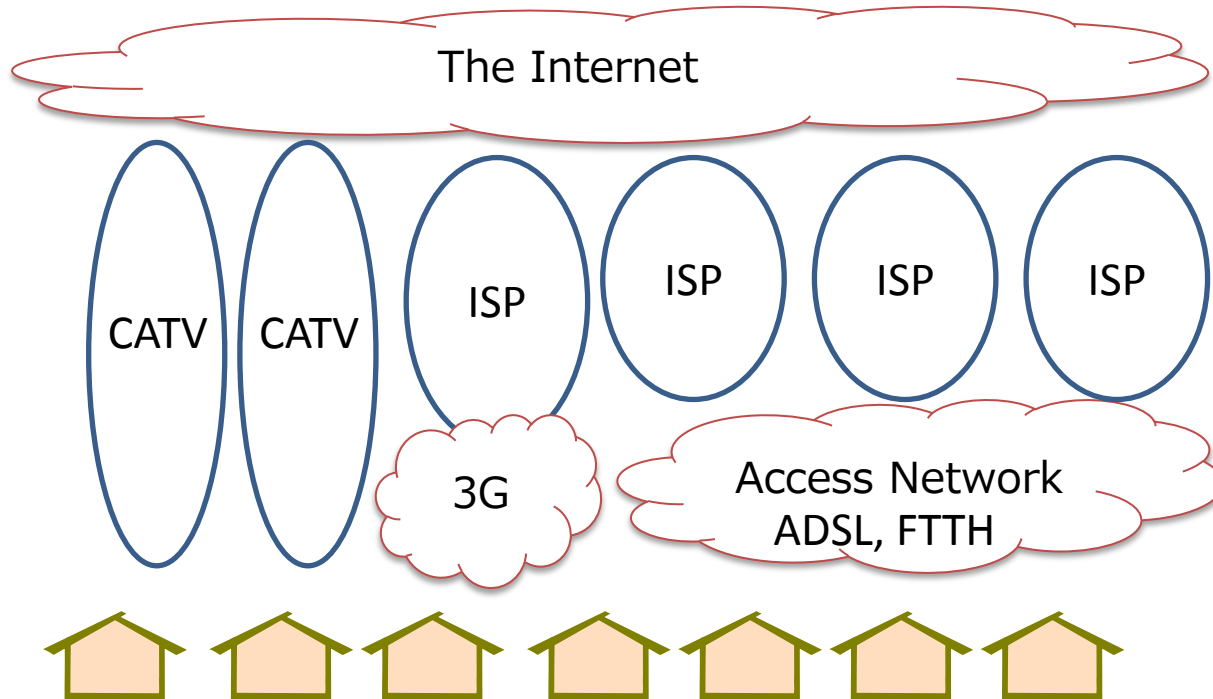
demands for IPv6 information

- System Integrators
- ISPs
- vendors
 - home gateways
 - network equipments
- academies

publication

- IJ publishes IPv6 deployment status of its services on www site.
 - <http://www.ij.ad.jp/service/IPv6schedule/>
- This helps our customers to plan their IPv6 deployment.

consumer service in japan



The Access Network

- NTT's NGN is the biggest in Japan.
 - FLET's service
- It will support IPv6 Internet services about Apr/2011 😊
 - ISP can start IPv6 services for consumers

A CATV group established Docsis lab



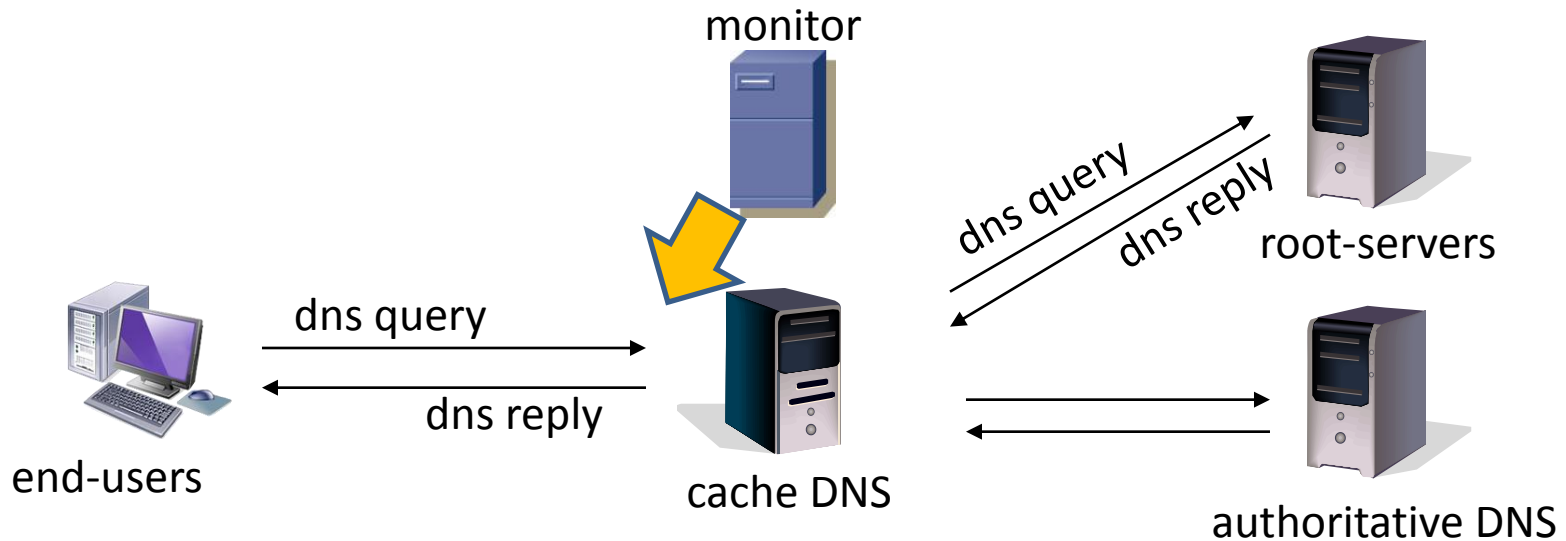
Asia Pacific region

- Asia Pacific IPv6 Task Force
 - <http://www.ap-ipv6tf.org/>

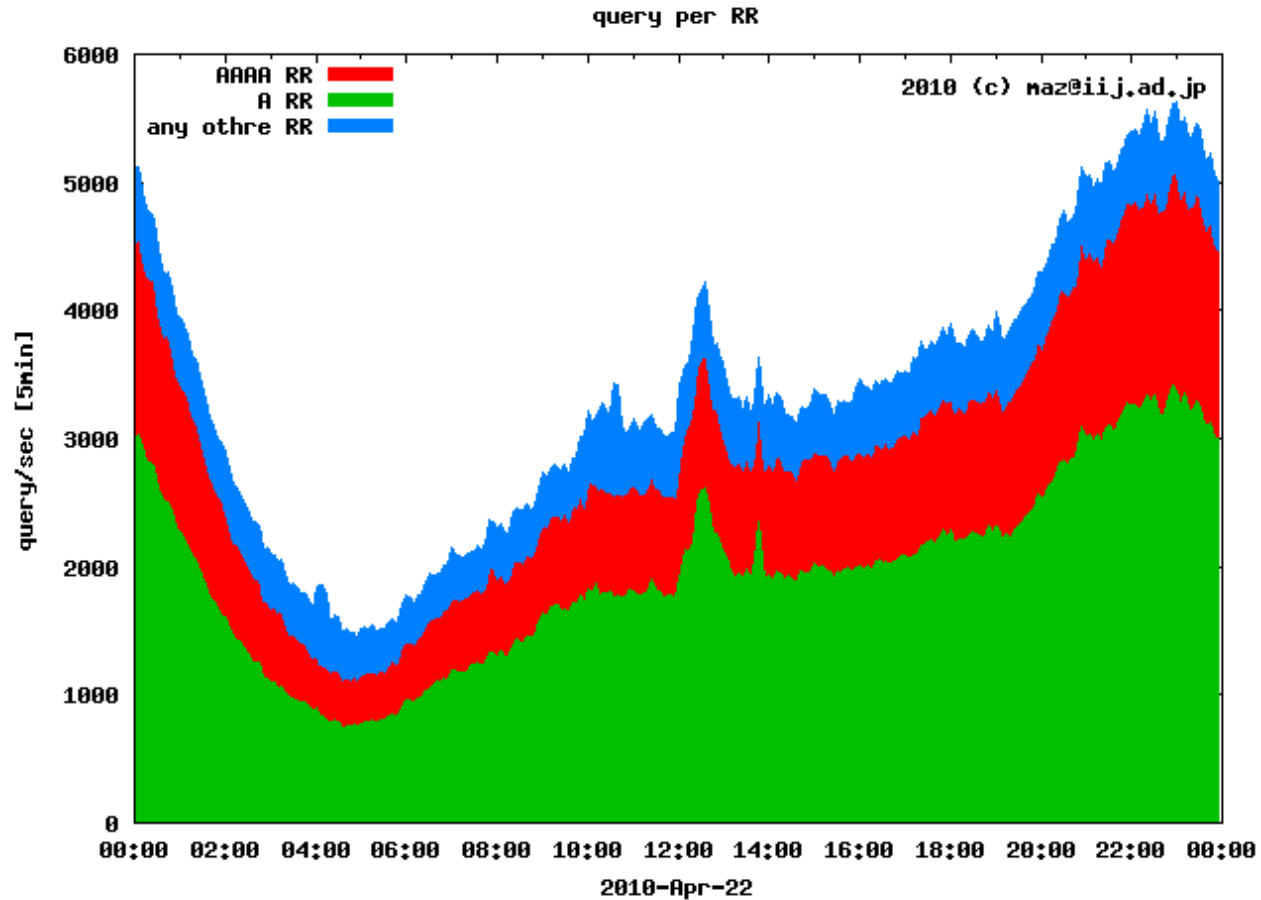


end-user environments analysis

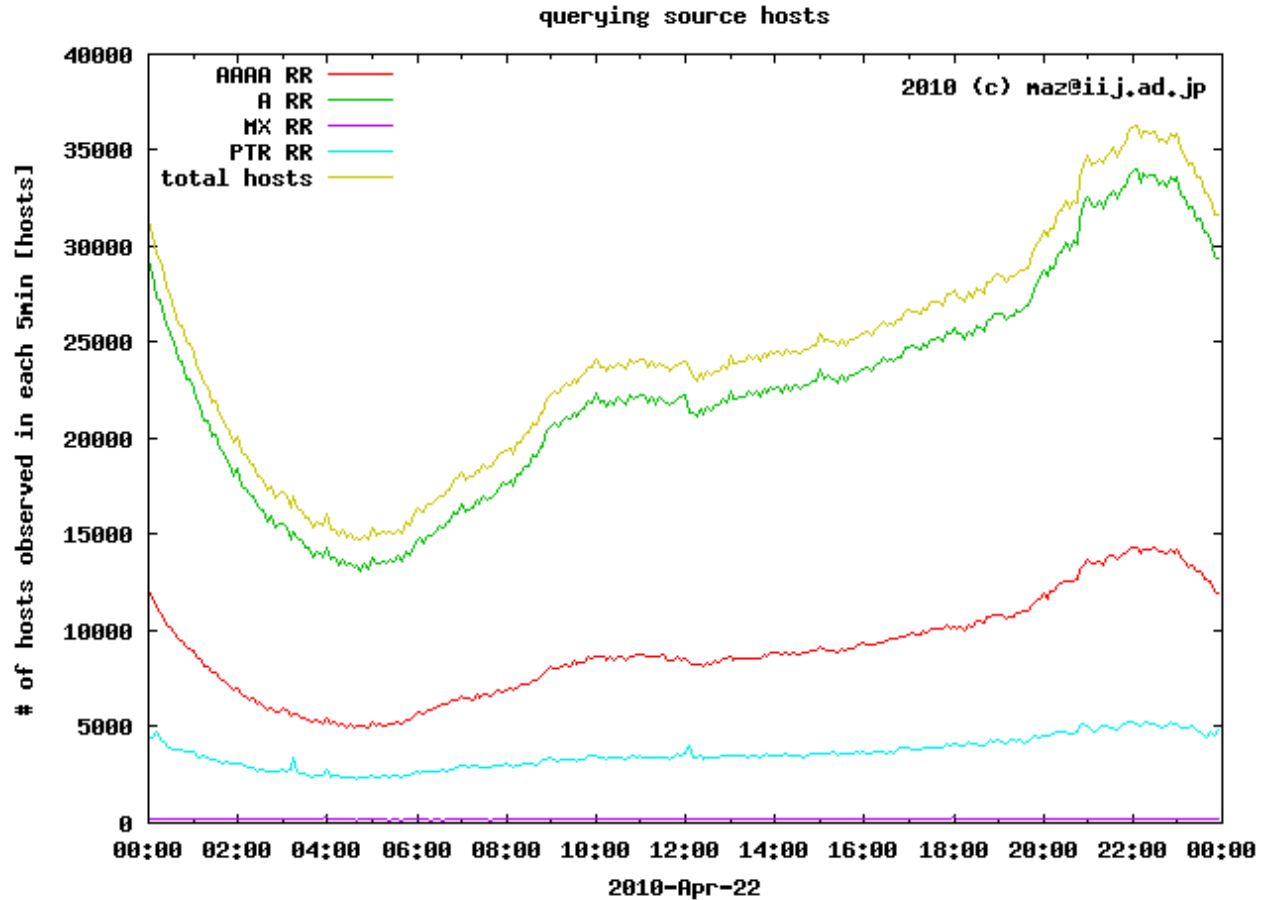
- We gathered data from our cache DNS
 - AAAA query rate



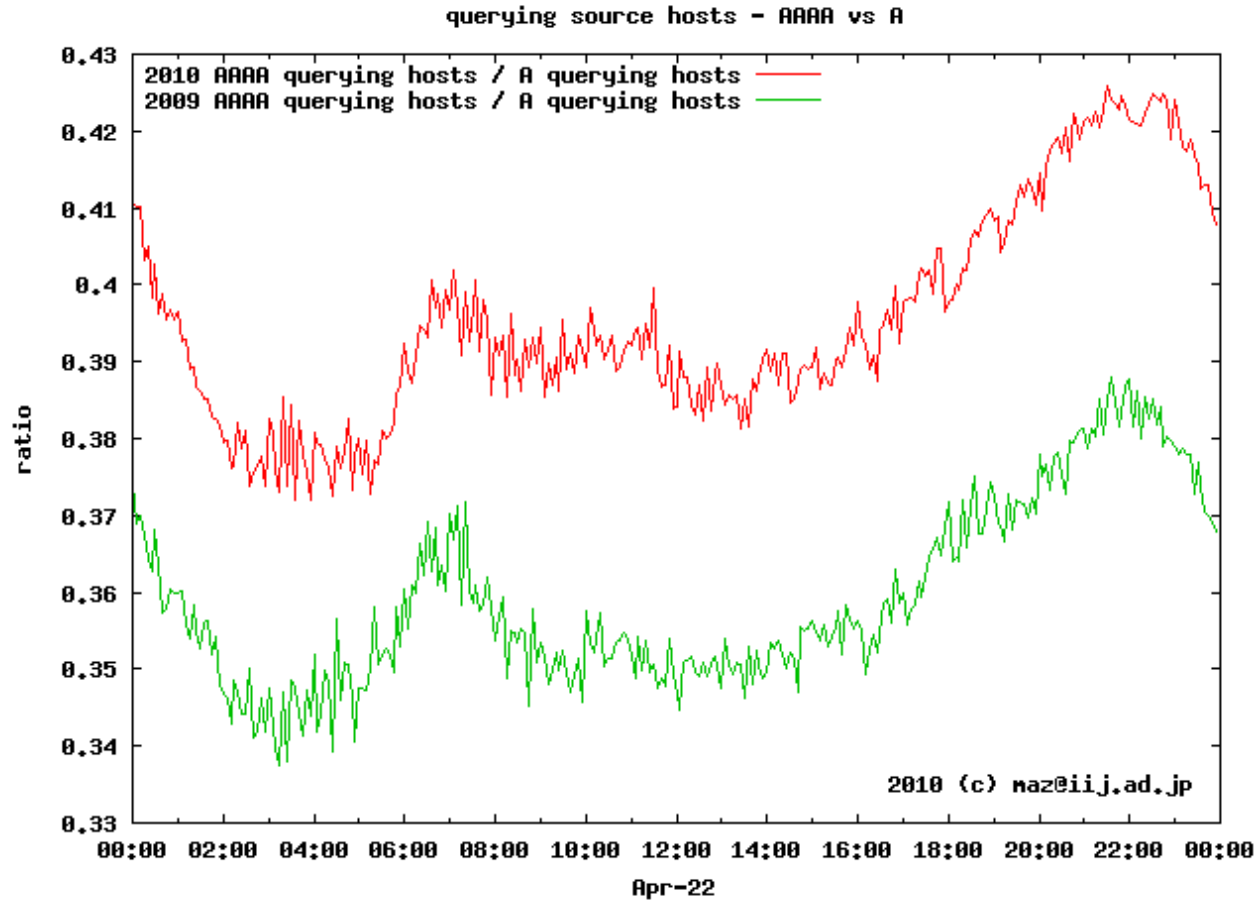
stacked query/sec graph



observed querying end-hosts



ratio of AAAA capable source



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