IETF92-v6ops@Dallas
JPNE MAP-E Deployment

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Japan Network Enabler (JPNE)

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Agenda

1. [IPv6 Deployment Status in Japan](#)

2. IPv6 Deployment Status of JPNE

3. Our Experiences

IPv6 history in Japan at a glance

NTT-East/West Started IPv6

2001-2010

2011-

R&D › Dawn › Business

- Commercial or Trial Service by leading Companies

- NTT-East/West enabled IPv6 on Access NW(NGN).
- ISPs WITHOUT Access NW can start IPv6.
- ISPs WITH Access NW also started IPv6

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Japanese position (Observed by Akamai)

JPNE

- Country-base measurement.
- Japanese IPv6 rate is 5.5%.

as of
Feb.28.2015

Rank	IPv6 %	Country
1	31.9%	Belgium
2	14.5%	Germany
3	12.6%	United States of America
4	12.3%	Peru
5	10.9%	Luxembourg
6	8.6%	Switzerland
7	7.7%	Czech Republic
8	7.6%	Norway
9	7.5%	Greece
10	7.1%	Portugal

Home	Connectivity	Security	Trends	Resources	About
11	6.5%	Estonia
12	5.9%	Romania
13	5.5%	Japan
14	5.5%	Malaysia
15	4.8%	France
16	4.2%	Other Europe
17	4.0%	Ecuador
18	3.0%	Bosnia/Herzegovina
19	2.0%	Austria
20	1.6%	Nauru

state of Internet

http://www.stateoftheinternet.com/trends-visualizations-ipv6-adoption-ipv4-exhaustion-global-heat-map-network-country-growth-data.html

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IPv6 Network operator measurements

●Network(AS)-base measurement

Participating Network	ASN(s)	IPv6 deployment
Comcast	7015, 7016, 7725, 7922, 11025, 13367, 13385, 20214, 21508, 22258, 22909, 33287, 33489, 33490, 33491, 33650, 33657, 33666,	35.95%
ATT	6389, 7	38.14%
KDDI	2516	18.17%
Verizon Wireless	6167, 2	64.57%
Time Warner Cable	7843, 1	14.35%
Deutsche Telekom AG	3320	33.15%
Free	12322	35.33%
T-Mobile USA	21928	50.86%
Telenet	6848	56.35%
Liberty Global	5089, 6	8.10%

Show 10 entries   Search:

Showing 1 to 10 of 313 entries

First Previous 1 2 3 4 5 Next Last

Japanese:
No.3   KDDI
No.13 CTC
No.14 SoftBank BB
No.24 STNet
No.37 iTSCOM
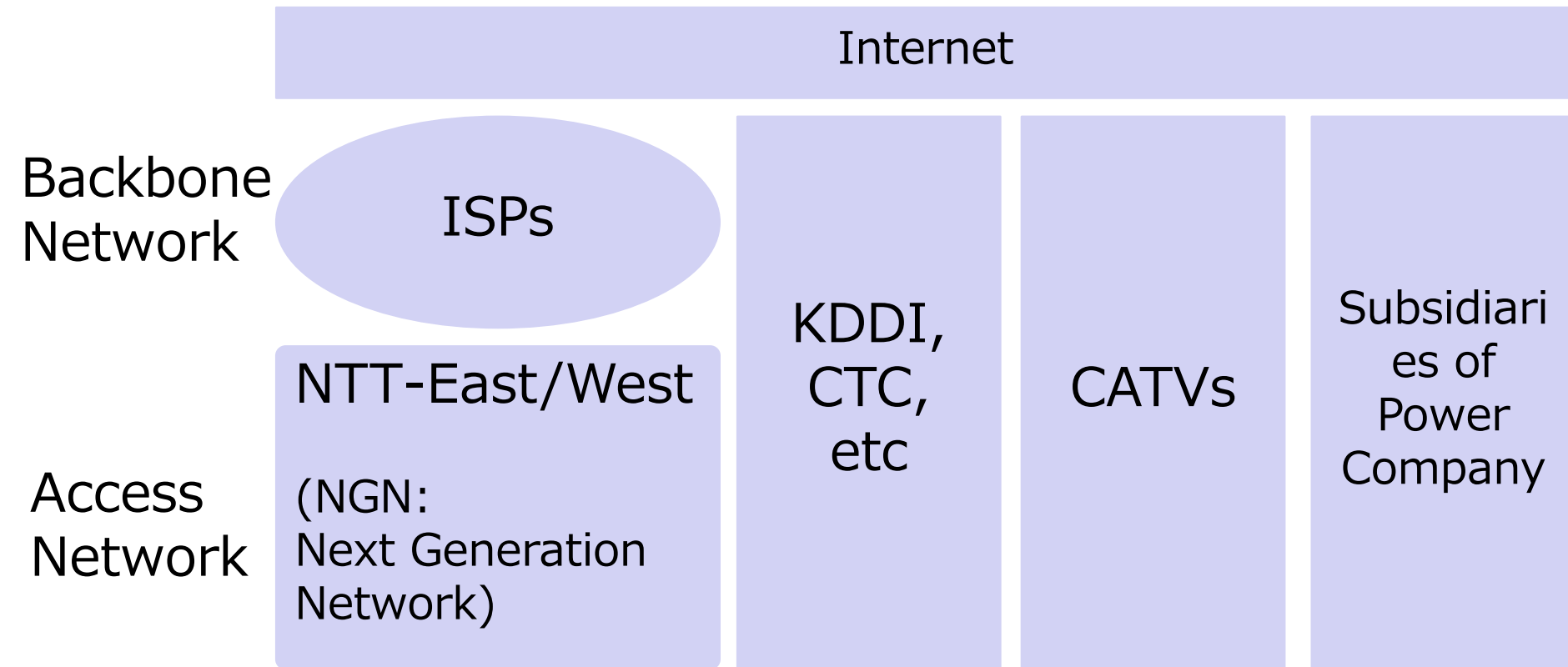
World IPv6 Launch
http://www.worldipv6launch.org/measurements/

(as of Feb. 28 2015)

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NW Providers in Japan

- Divided into Four.
- NTT-East/West with ISPs are the majority.

	Internet			
Backbone Network	ISPs			
	NTT-East/West (NGN: Next Generation Network)	KDDI, CTC, etc	CATVs	Subsidiaries of Power Company
Access Network				

Share of FTTH:
77%(East)65%(West)[*1]

IPv6 Deployment rate of NGN (NTT-East/West)

IPv6 User (K)

IPv6 Deployment

0.8%	1.4%	2.0%	2.5%	2.7%	3.2%	3.1%	3.9%	5.3%
67	121	182	235	287	357	426	613	854
'12.12	'13.03	'13.06	'13.09	'13.12	'14.03	'14.06	'14.09	'14.12

Number of NGN user — IPv6 Ratio

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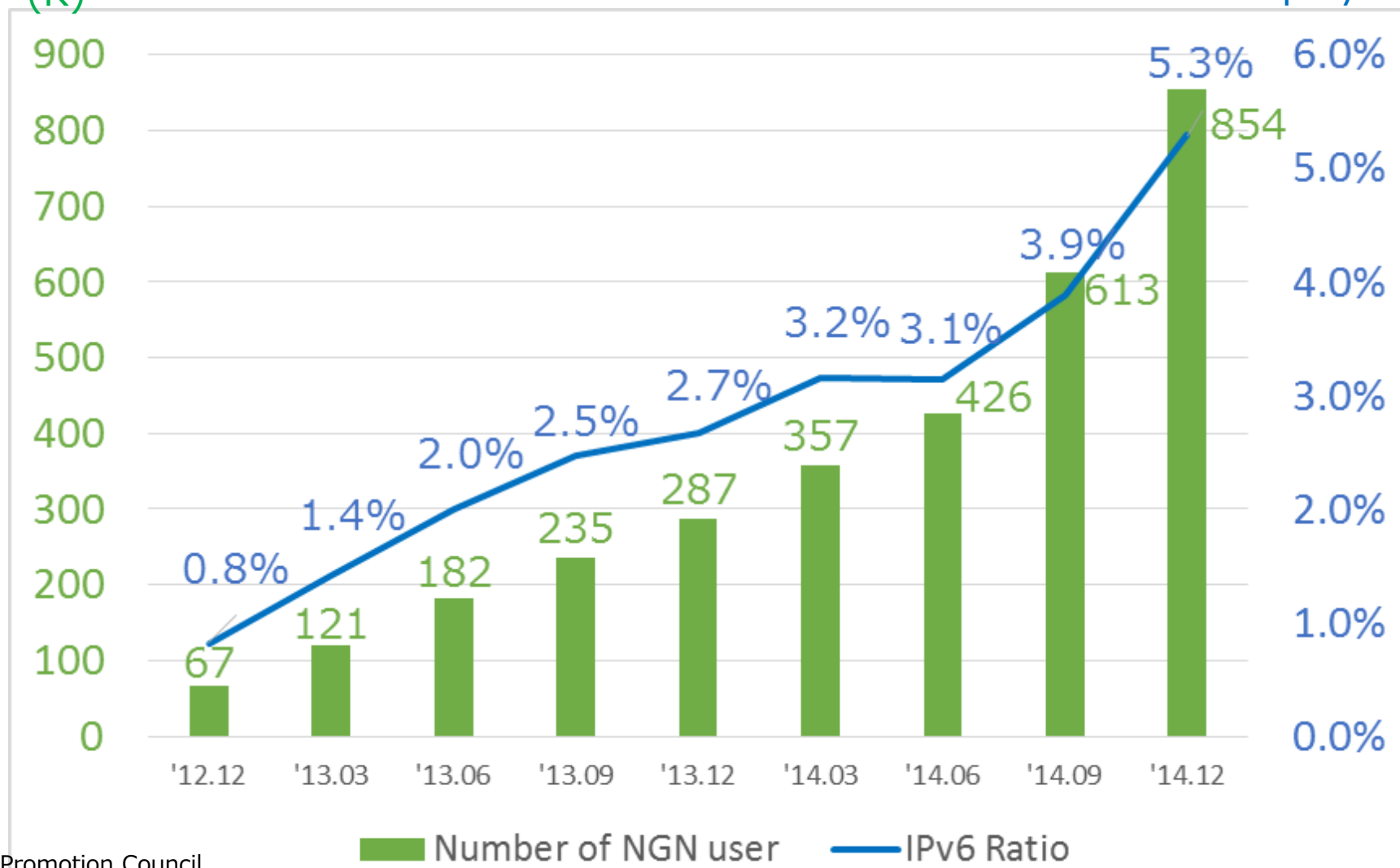
IPv6 Deployment rate of KDDI and CTC

IPv6 Deployment

Completed

KDDI (au Hikari)

CTC (Commufa Hikari)

KDDI values: 55%, 61%, 63%, 65%, 66%, 67%, 68%, 99%

CTC values: 24%, 29%, 36%, 40%, 44%, 48%, 53%, 58%, 64%

X-axis: '12.12, '13.03, '13.06, '13.09, '13.12, '14.03, '14.06, '14.09, '14.12

IPv6 Promotion Council
http://v6pc.jp/jp/spread/ipv6spread_03.phtml

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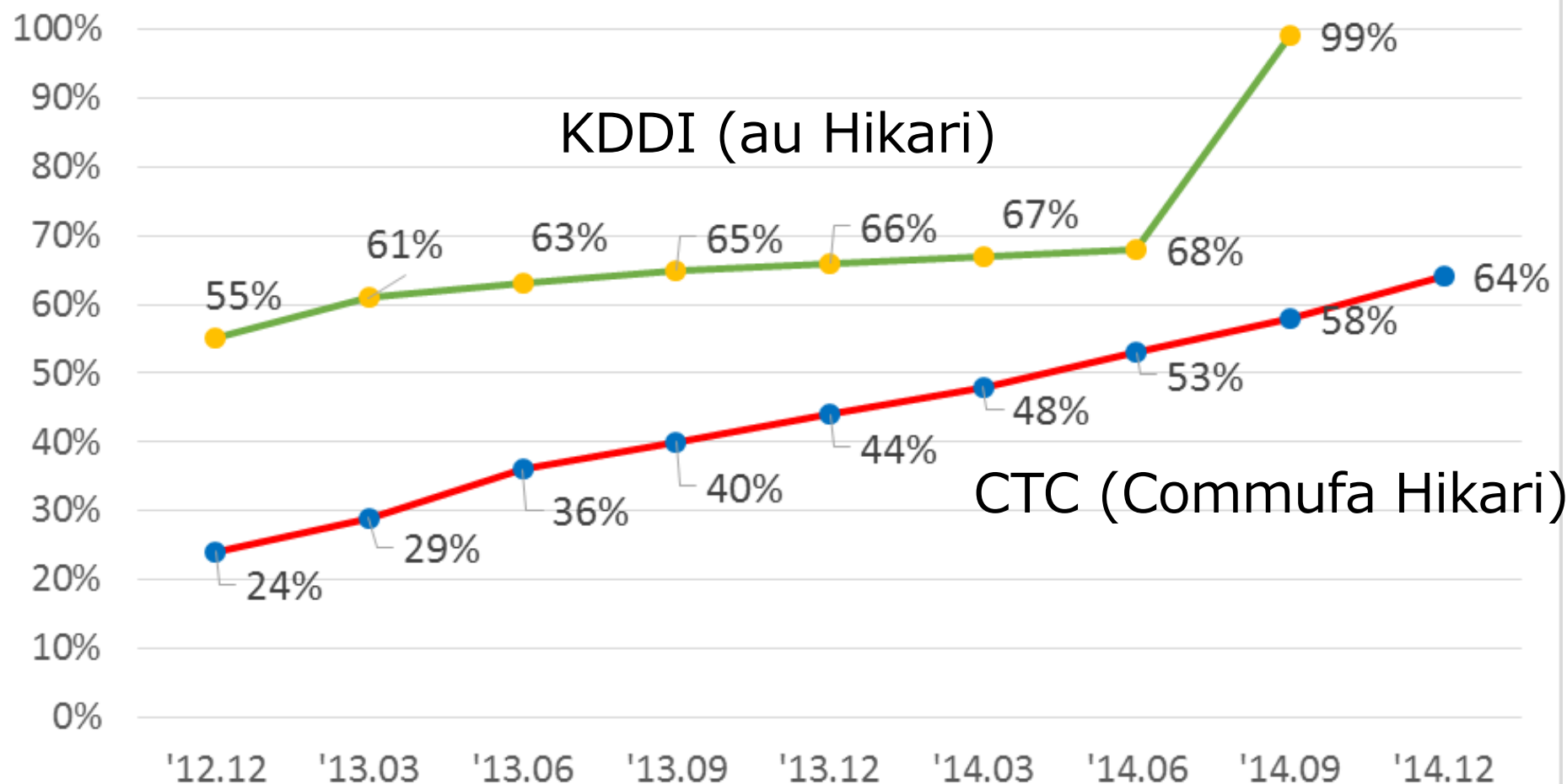
IPv6 Transition status in Japan

jpne

- Providers started Dual Stack.
- Different method depending on their present NW and strategy.

KDDI	JPNE	Multi-feed	BBIX	OCN so-net etc.	JPIX (Trial)
		NTT-East NEE-West			Any Provider

Dual Stack	MAP-E	DS-Lite	v6 + v4 Tunnel	v4/v6 on PPPoE	464XLAT

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JPNE
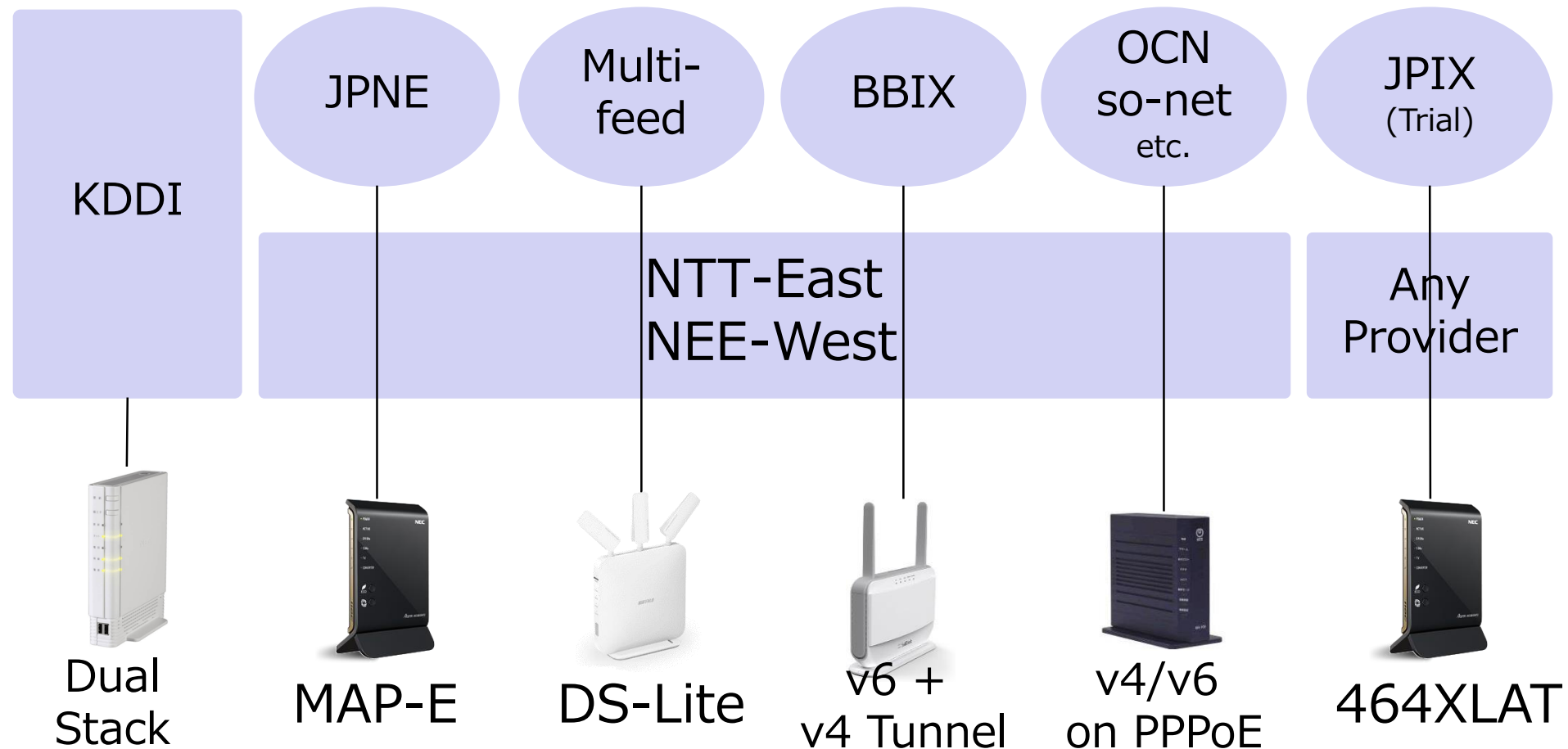
- ● Some Makers released IPv6 transition functions for Home/Enterprise Routers.

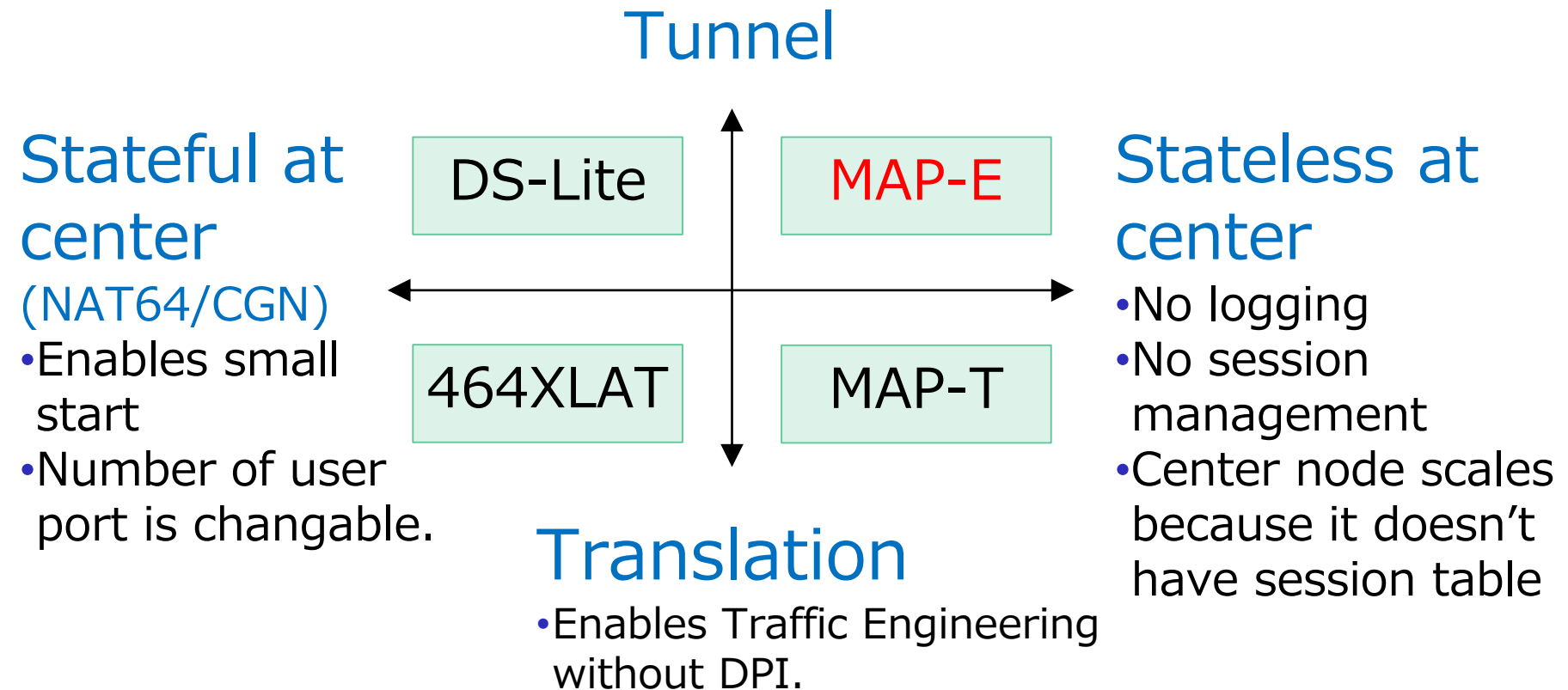| Maker/Company	Transition technology	Consumer /Enterprise	Released date or Date started to use transition function in JP	
NEC Platforms WG1810HP	MAP-E 464XLAT	Consumer	Feb. 2015 (not on sale yet)	
NEC Platforms RG-G200LV(*1)	DS-Lite	Consumer	Feb. 2015 (not on sale yet)	
Buffalo WXR-1900DHP	MAP-E DS-Lite	Consumer	Oct. 2014	
Huawei WS325	DS-Lite	Consumer	Oct. 2014	
Cisco 1812J	DS-Lite	Enterprise	Oct. 2014	
IIJ SEIL	DS-Lite	Enterprise	Oct. 2014	
YAMAHA NVR500	DS-Lite	So-Ho	Oct. 2014	
NTT-East/West	MAP-E(*2)	Consumer	Apr. 2013	

(*1) for export only   (*2)Home Router doesn't have MAP-E function, needed to use Flets JOINT

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Agenda

1. IPv6 Deployment Status in Japan
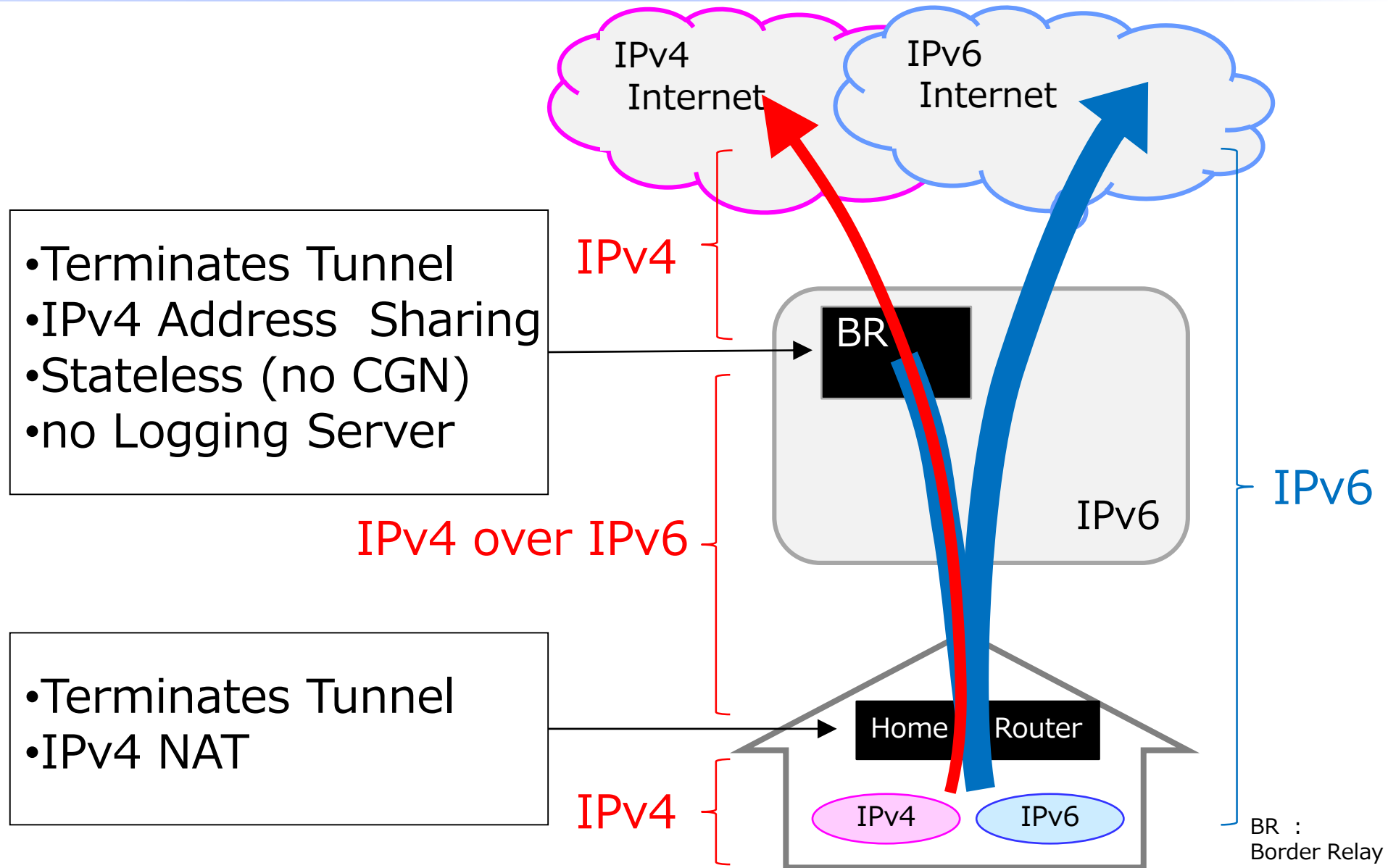
2. IPv6 Deployment Status of JPNE
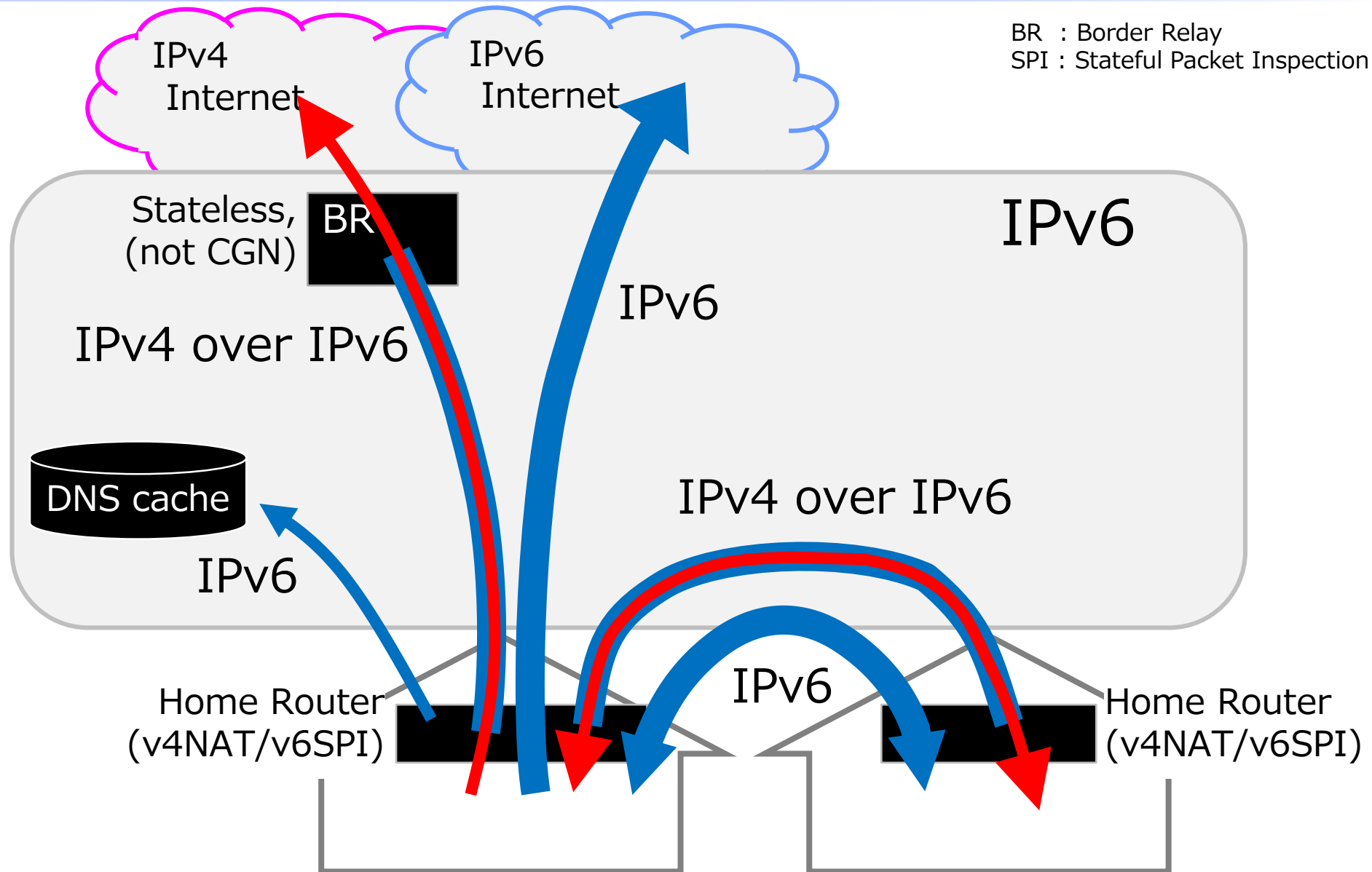
3. Our Experiences

Some ways of IPv6 Transition

Network operators can choose the best one according to their strategy.

Tunnel

Stateful at center
(NAT64/CGN)
- Enables small start
- Number of user port is changable.

DS-Lite

MAP-E

Stateless at center
- No logging
- No session management
- Center node scales because it doesn't have session table

464XLAT

MAP-T

Translation
- Enables Traffic Engineering without DPI.

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What is MAP-E ?

IPv4
Internet

IPv6
Internet

- Terminates Tunnel
- IPv4 Address Sharing
- Stateless (no CGN)
- no Logging Server

IPv4

BR

IPv6

IPv4 over IPv6

IPv6

- Terminates Tunnel
- IPv4 NAT

Home   Router

IPv4

IPv4   IPv6

BR :
Border Relay

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MAP-E in our Network

Why MAP-E for JPNE ?

- ✓ Easy Operation

  - no Logging (deferent from CGN)

  - no session management

  - Center node scales according to only traffic, not number of users.

- ✓ Easy Customer Support

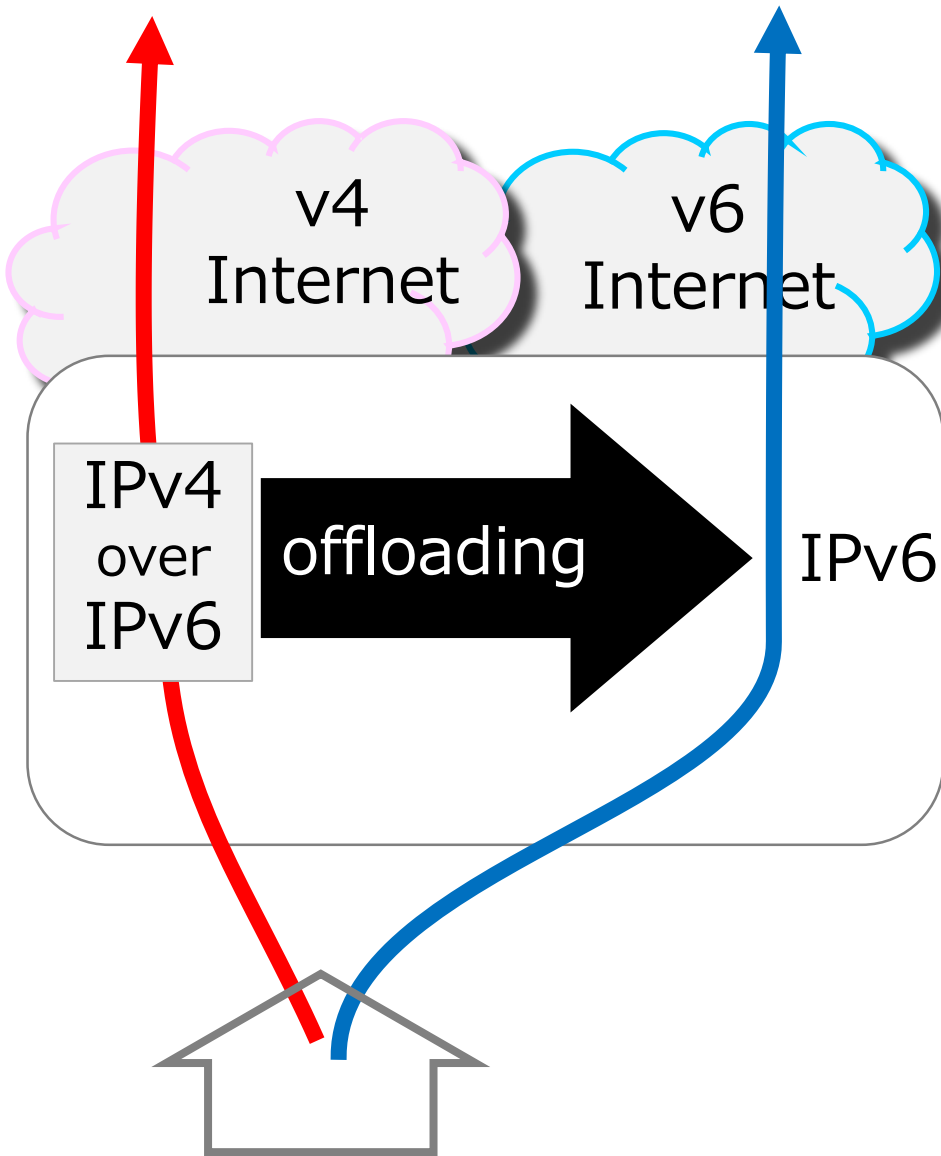 - no Configuration at Home Router

- ✓ Avoiding traffic from Center Node

  - Direct communication between users

✓ Users don't care MAP-E, IPv6, IPv4…

Like Air

Our Final Goal

v4
Internet

v6
Internet

IPv4
over
IPv6

offloading

IPv6

Final Goal

v4 Sunset

Steps

1. Overlaying IPv4 on IPv6.

Now

2. Offloading traffic to simple IPv6.

3. Removing overplayed IPv4.

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Agenda

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3. Our Experiences
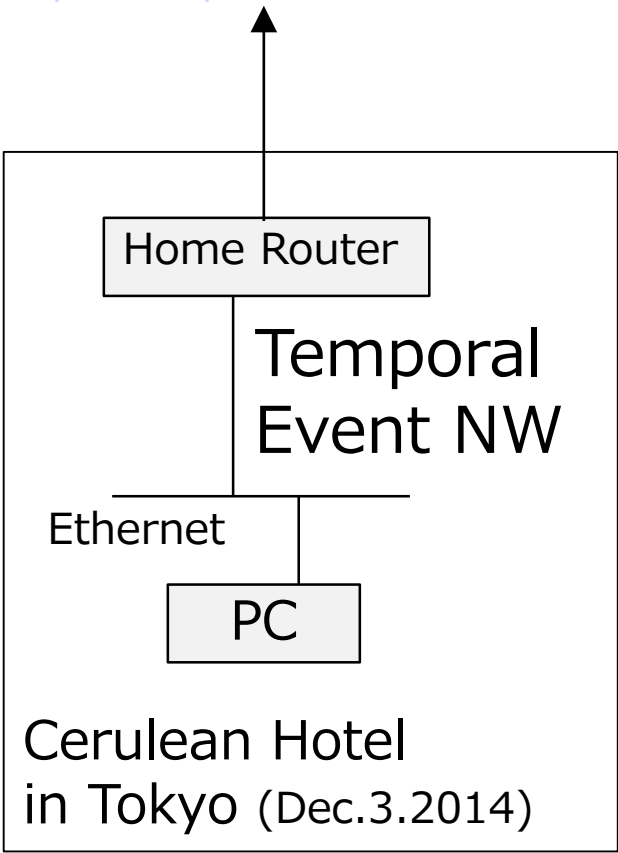
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Speed Test via Internet
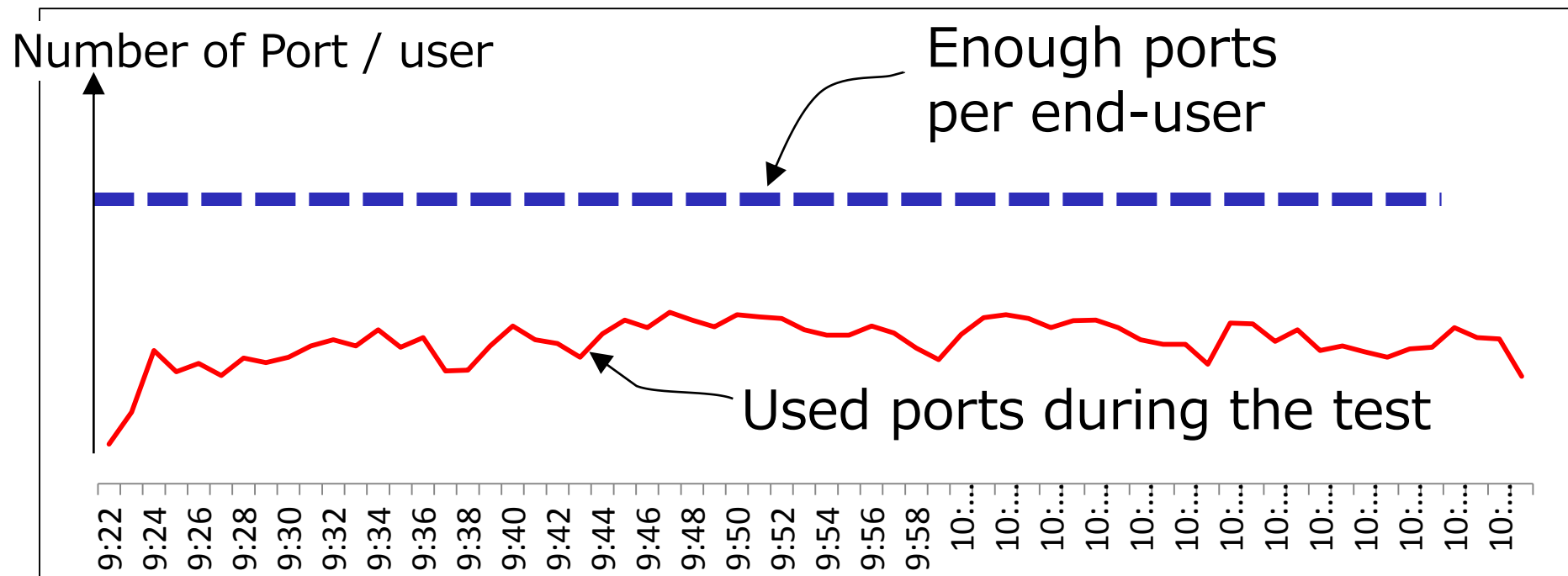
Speed Test Site

IPv6: IIJmio
https://speedtest6.iijmio.jp/
IPv4: Radish Network Speed Testing
http://netspeed.studio-radish.com/

NOT special environment.

Home Router

Temporal Event NW

Ethernet

PC

Cerulean Hotel
in Tokyo (Dec.3.2014)

(Mbps)

	down		
	1st	2nd	3rd
IPv4 (MAP-E)	800	799	814
	823	817	810
	820	818	807
Ave.	814	811	810
IPv6	814	768	814
	845	501	751
	860	748	792
Ave.	840	672	786

Enough Ports per user

- Number of port per user is fixed in MAP-E.

- We tried over-subscribing test before designing our MAP-E NW.

- We assigned enough ports per user.

Number of Port / user

Enough ports
per end-user

Used ports during the test

9:22 9:24 9:26 9:28 9:30 9:32 9:34 9:36 9:38 9:40 9:42 9:44 9:46 9:48 9:50 9:52 9:54 9:56 9:58 10:... 10:... 10:... 10:... 10:... 10:... 10:... 10:... 10:... 10:... 10:... 10:... 10:...

IPv6/IPv4 Trouble shooting

IPv4 Internet

IPv6 Internet

DNS(*)

Test1,2
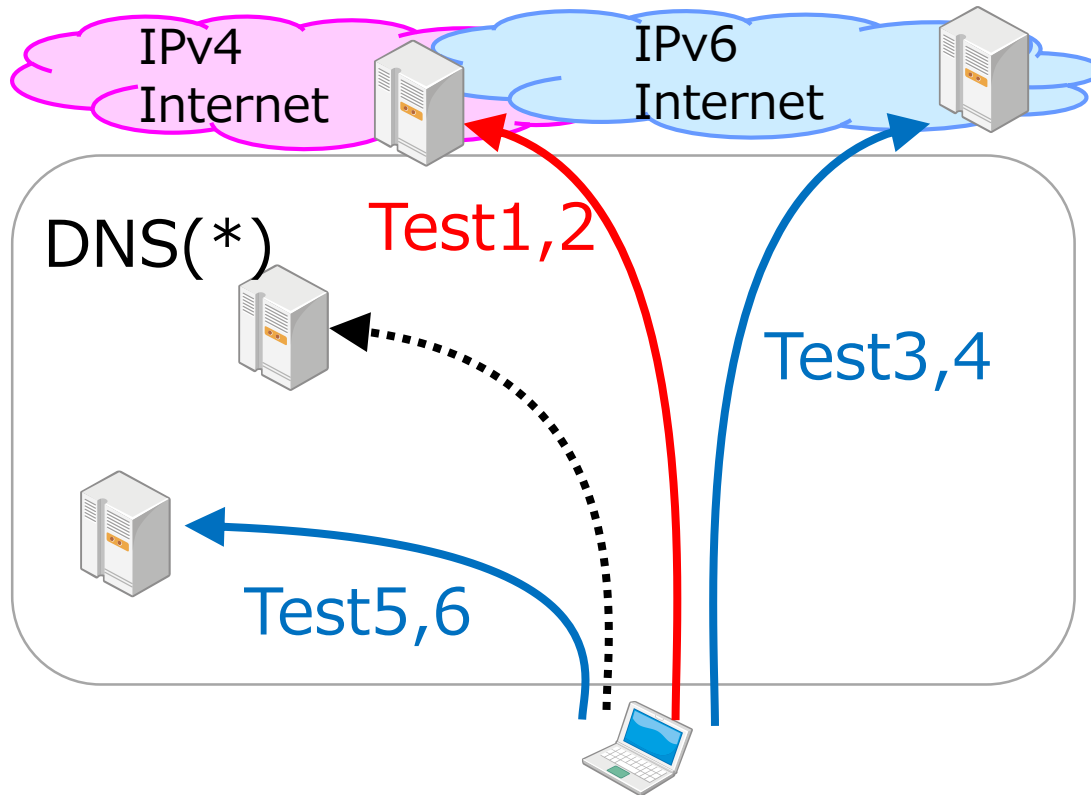
Test3,4

Test5,6

We simplified trouble shooting by tool.
(see next page)

Test 1 : IPv4 Internet IP reachability   v4
Test 2 : IPv4 Internet with Name resolution (*)
Test 3 : IPv6 Internet IP reachability   v6
Test 4 : IPv6 Internet with Name resolution (*)
Test 5 : IPv6 Backbone IP reachability   v6
Test 6 : IPv6 Backbone with Name resolution (*)

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IPv6/IPv4 Trouble Shoot Tool

IPv4/IPv6
Trouble shooting

Your are accessing
by IPv6

Start

Measuring

Test1

Test2

Test3

IPv4/IPv6接続判定ページ

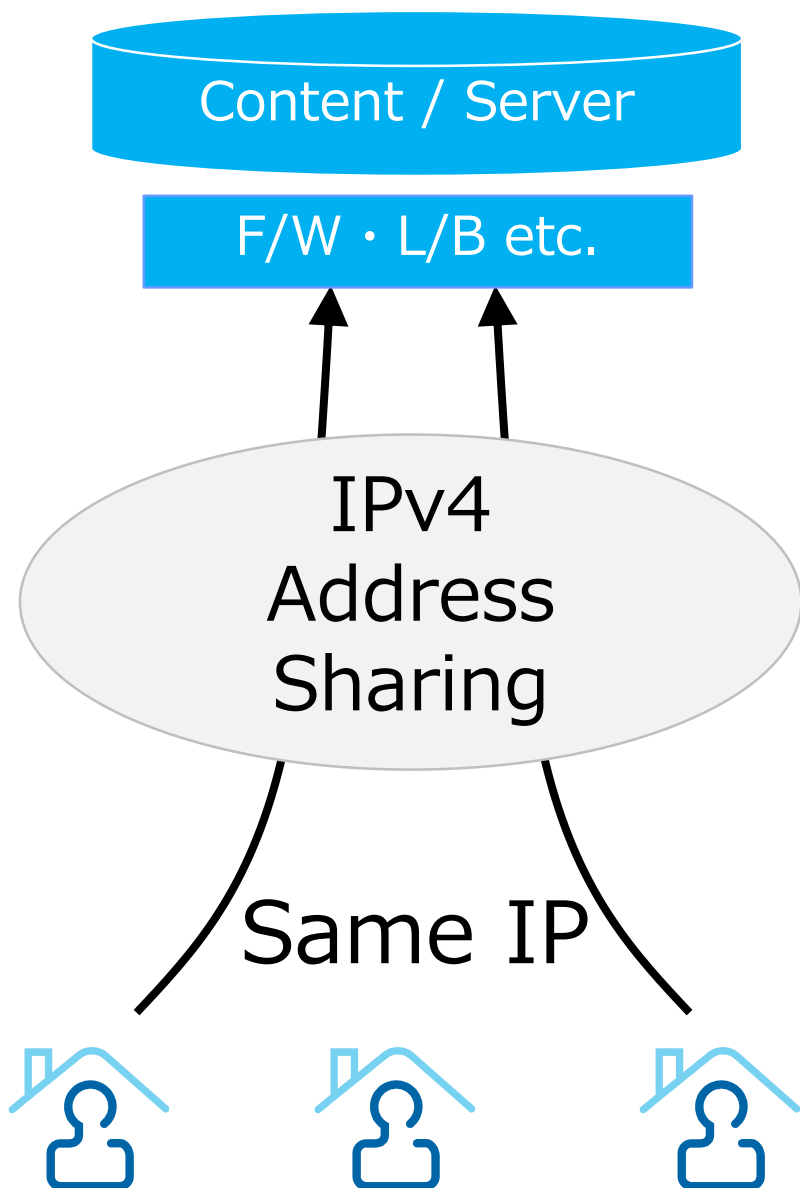IPv6 IPv6でアクセス中です。(240b:10:140:0:5505:b4c3:c441:b7a2)

判定開始

試験結果表示

測定中

接続試験状況表示

試験1: OK
IPv4インターネットアクセス(DNS利用無)

試験2: OK
IPv4インターネットアクセス

試験3: OK

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Abuse Issue
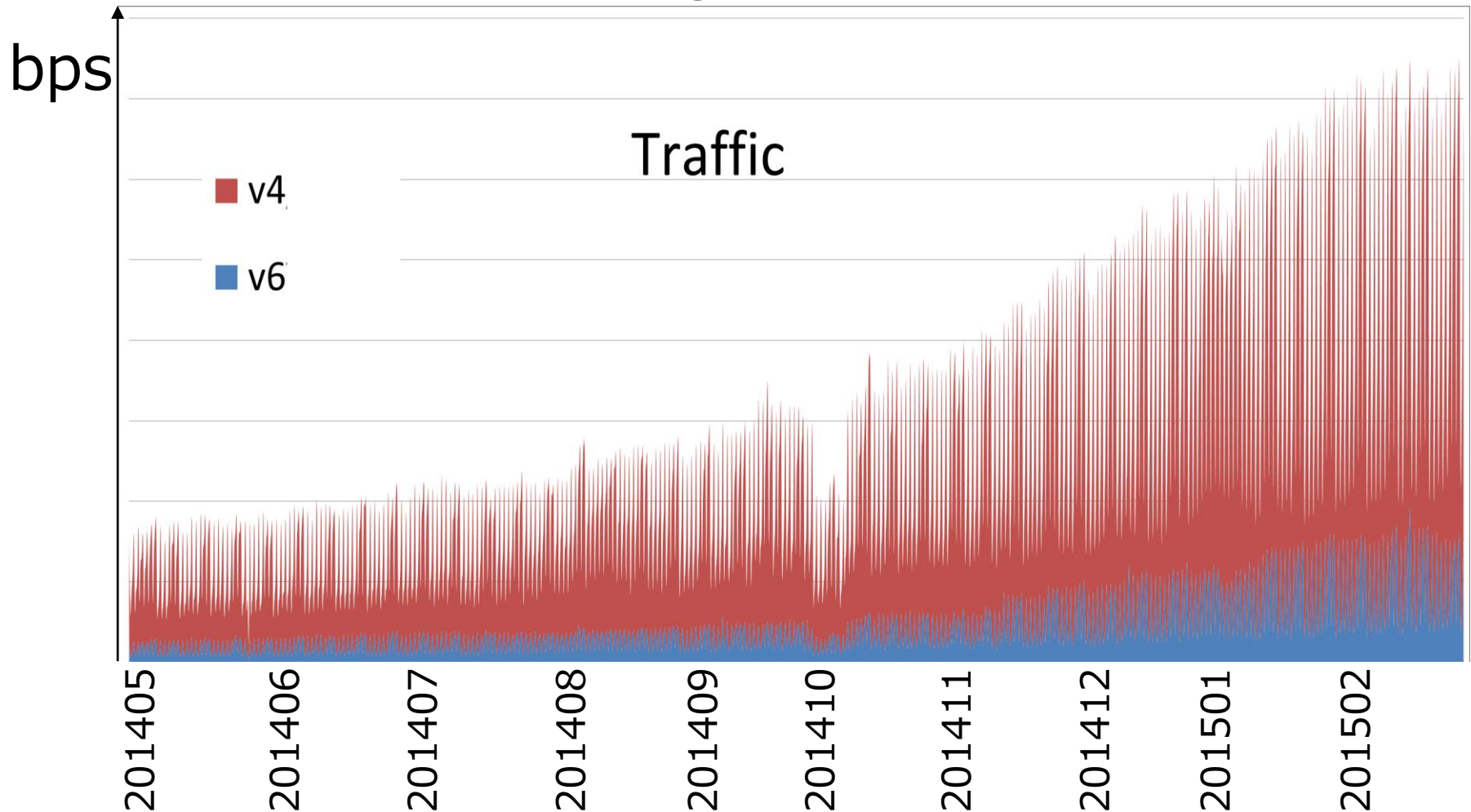
Content / Server

F/W・L/B etc.

IPv4
Address
Sharing

Same IP

Very important to do both.

(1)Taking Log of port number at Server, Firewall, etc.

(2)Off-loading traffic to IPv6 for increasing the possibility of identifing the sender.

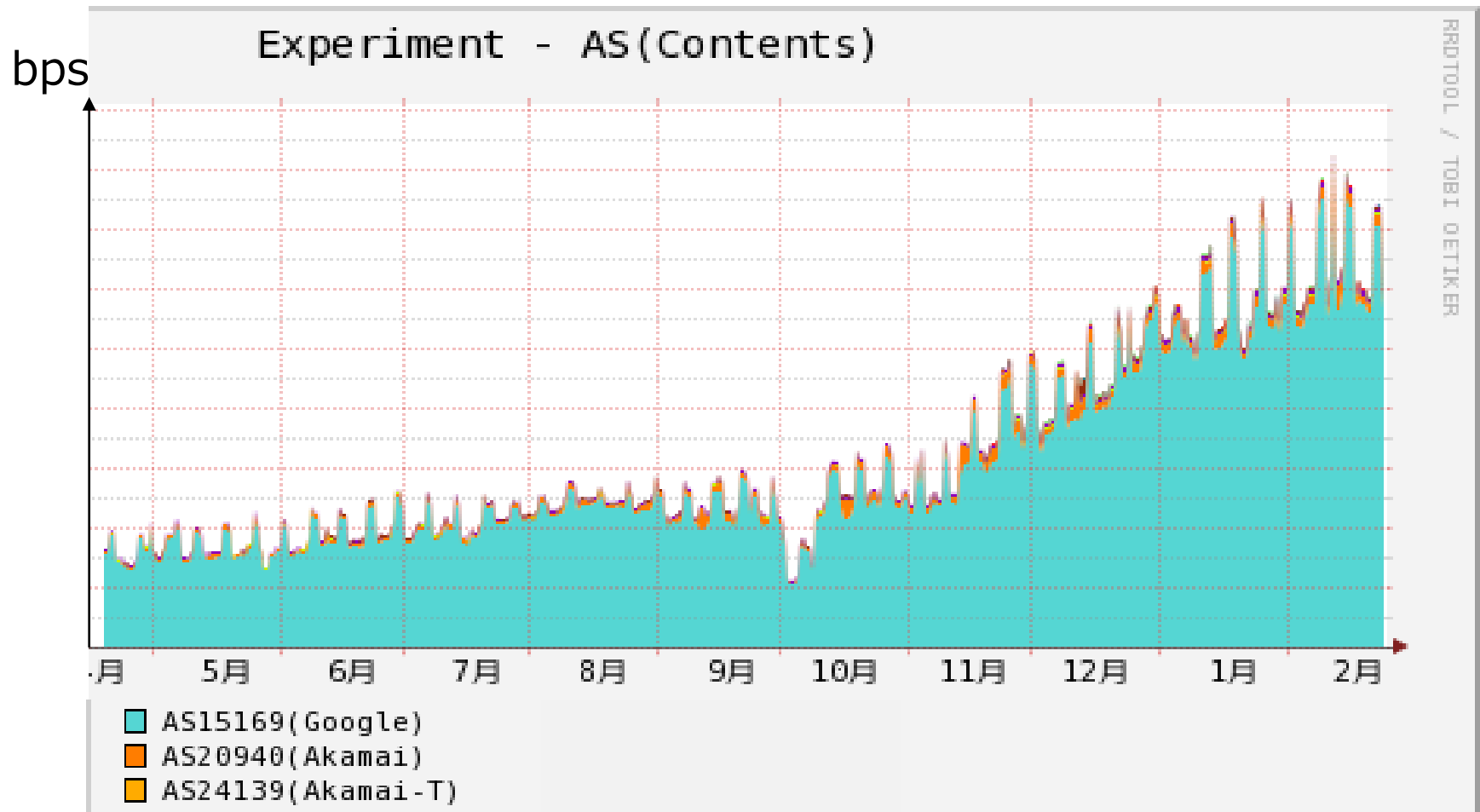240b::23

Traffic growth

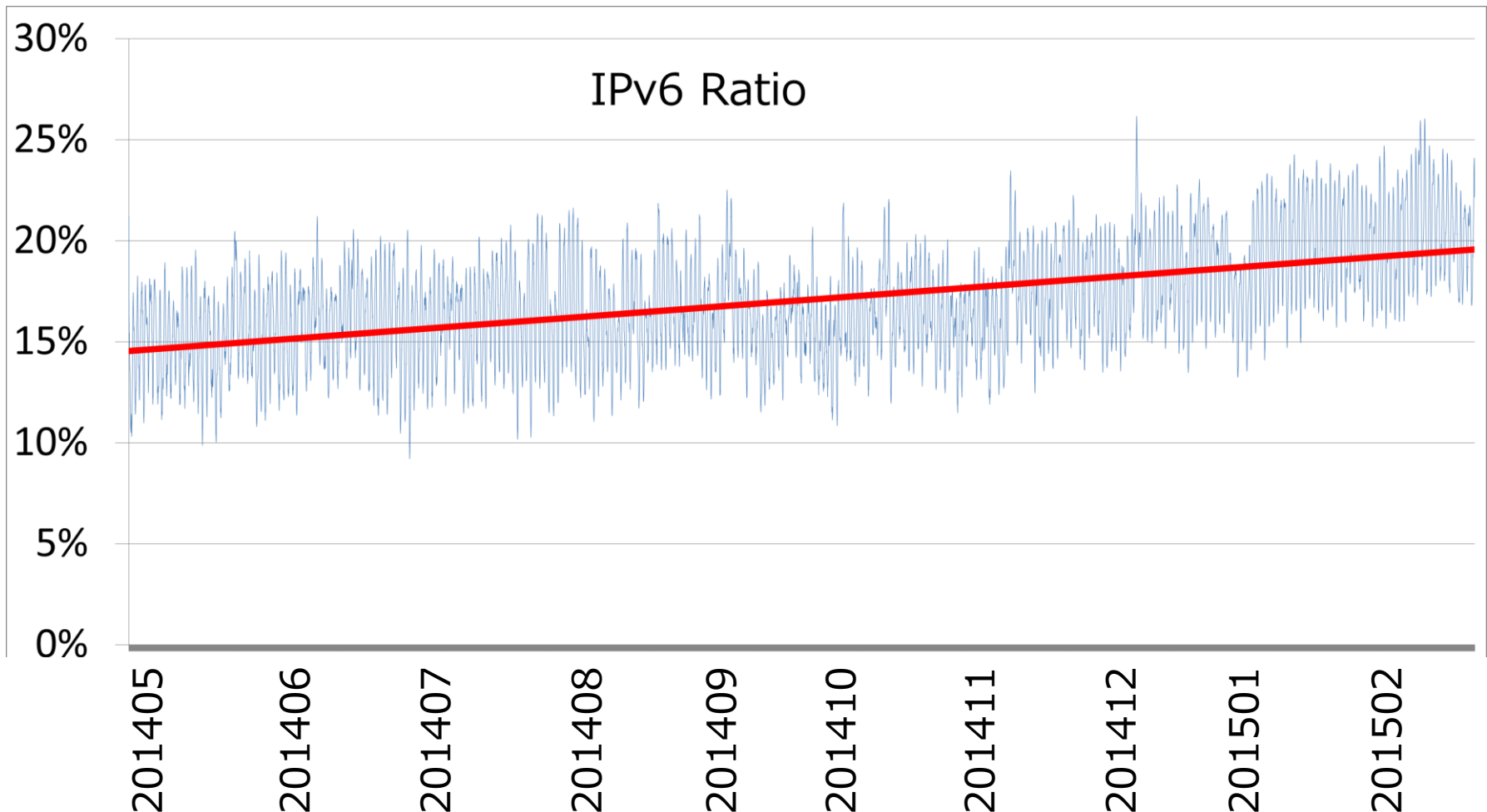- Traffic growth indicates number of MAP-E Users are increasing.

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Destination based traffic

- Most of IPv6 traffic is Google.

Experiment - AS(Contents)

bps

Legend:
- AS15169(Google)
- AS20940(Akamai)
- AS24139(Akamai-T)

X-axis: 5月, 6月, 7月, 8月, 9月, 10月, 11月, 12月, 1月, 2月

RRDTOOL / TOBI OETIKER

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IPv6 Traffic Ratio

- 20% of Internet traffic is IPv6.
- Gradually increasing.

Summary

- Japanese IPv6 users and traffic are increasing.

- Japanese NW providers have introduced variety of IPv6 transition technology.

- MAP-E is Stable, Easy operation, Easy Customer support, speed is fast enough.

- Important to take logging of port at Server, Firewall, Load Balancer, etc.

- One important thing is to offload traffic to IPv6.

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Japan Network Enabler Corporation

http://jpne.co.jp