

IPv6 Transition Strategies and Deployment Planning.

CITC Task force 15th Meeting

May 2014



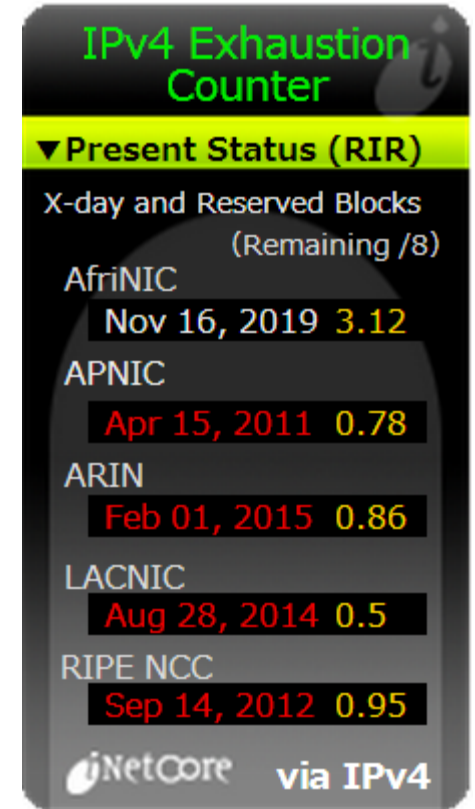
- IPv6 Transition Strategies
- IPv6 Deployment Planning
- Summary Of IPv6 Status



Is IPv4 really running out?

❖ Yes!

- IANA IPv4 free pool run out on 3rd February 2011
- RIR IPv4 free pool will run out soon after
- www.potaroo.net/tools/ipv4/
- inetcore.com/project/ipv4ec/index_en.html
- ipv6.he.net/statistics/



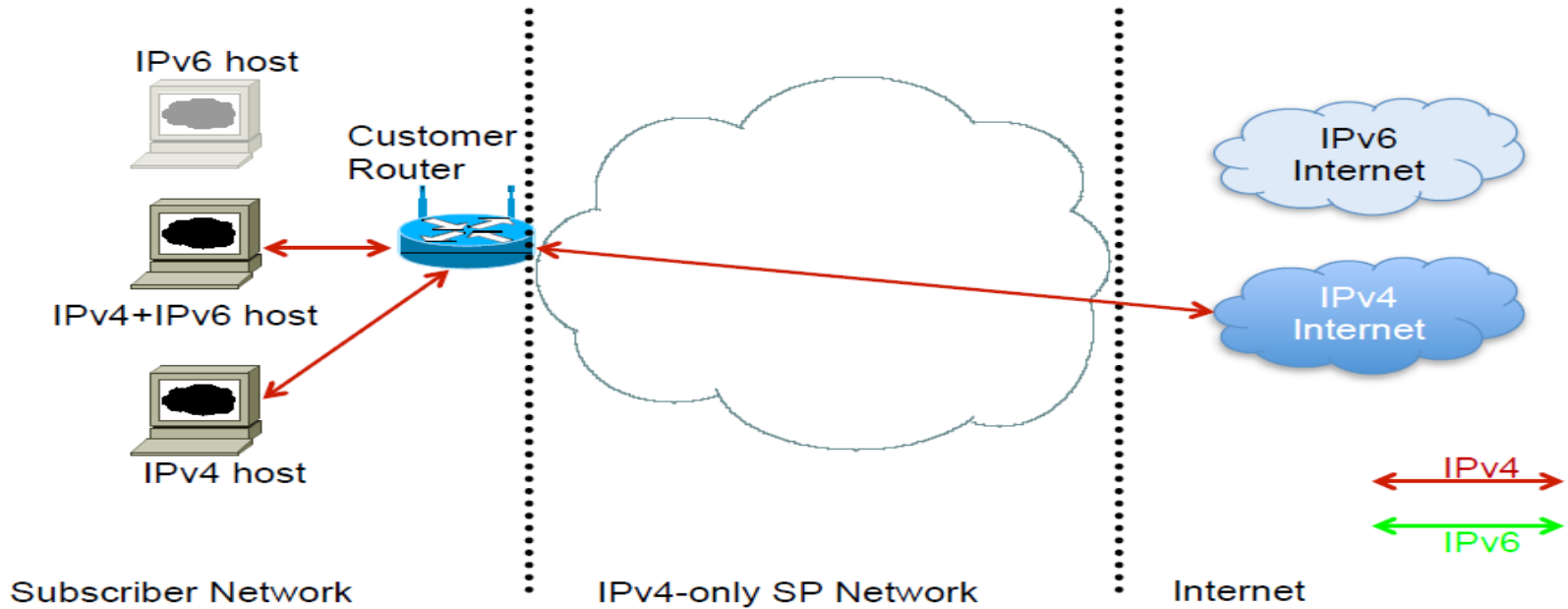
Strategies Available for Service Providers

- ❖ Stay with IPv4 only
 - Wait and see what competitors do
 - Business not growing, so don't care what happens

- ❖ Extend life of IPv4
 - Force customers to NAT
 - Buy IPv4 address space on the marketplace

- ❖ Deploy IPv6
 - Dual-stack infrastructure
 - IPv6 and NATed IPv4 for customers
 - 6rd (Rapid Deploy) with IPv4 for customers
 - Other combinations of IPv6, IPv4 and NAT





The situation for many SPs today:

No IPv6 for subscribers

IPv4 scaling lasts as long as IPv4 addresses are available

Advantages

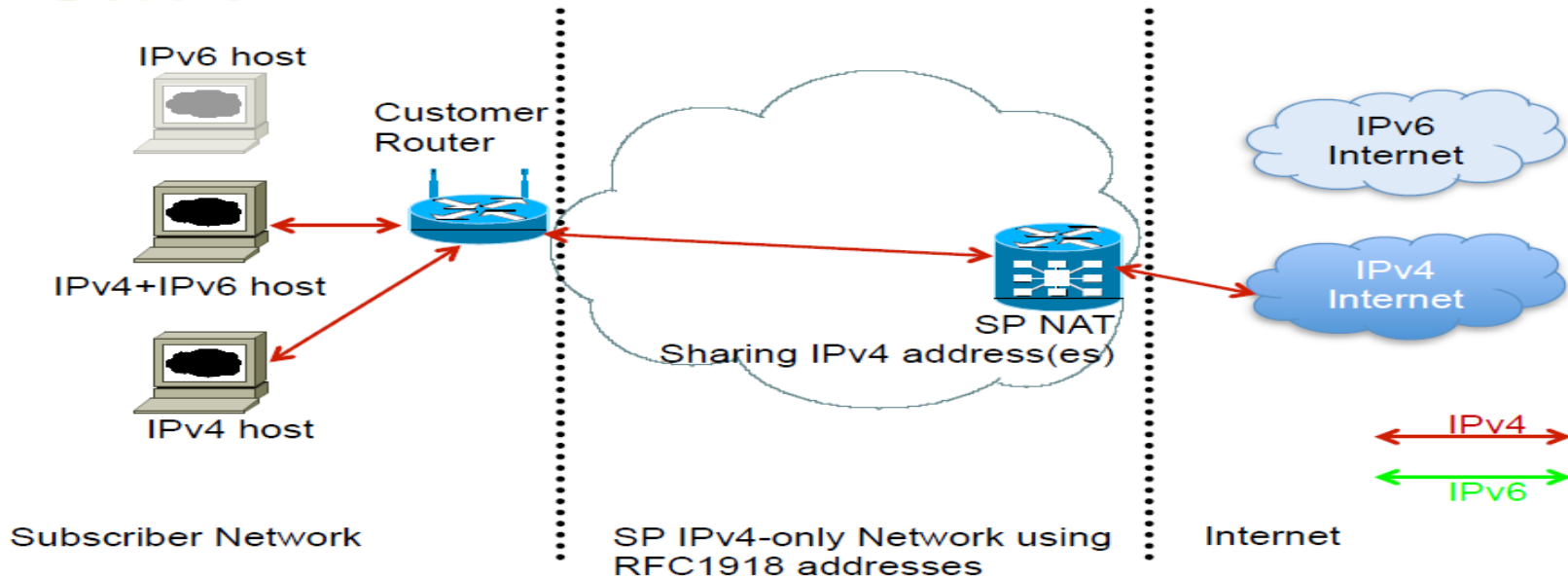
- Easiest and most cost effective short term strategy

Disadvantages

- Limited to IPv4 address availability (RIRs or marketplace)
- No access to IPv6
- Strategy will have to be reconsidered once IPv4 address space is no longer available



Extend life of IPv4



- SP introduces NAT in core when IPv4 addresses run out

Advantages

ISPs can reclaim global IPv4 addresses from their customers, replacing with non-routable private addresses and NAT Allows continued IPv4 subscriber growth

Disadvantages

- No access to IPv6
- SP needs a large NAT device in the aggregation or core layers
- Double NAT highly likely (customer NAT as well as SP NAT)
- Sharing IPv4 addresses could have behavioral, security and liability implications
- Tracking association of port/address and subscriber, not to mention Lawful Intercept issues, are still under study ☹️



➤ Native IP Backbone

Routers are the infrastructure

Customer connections connect to the native backbone

VPN services provided using GRE, IPSEC, IPinIP etc

Providing IPv6 for customers means upgrading the native infrastructure to dual-stack

❖ **Dual Stack**

Dual Stack Network W/O SP NAT

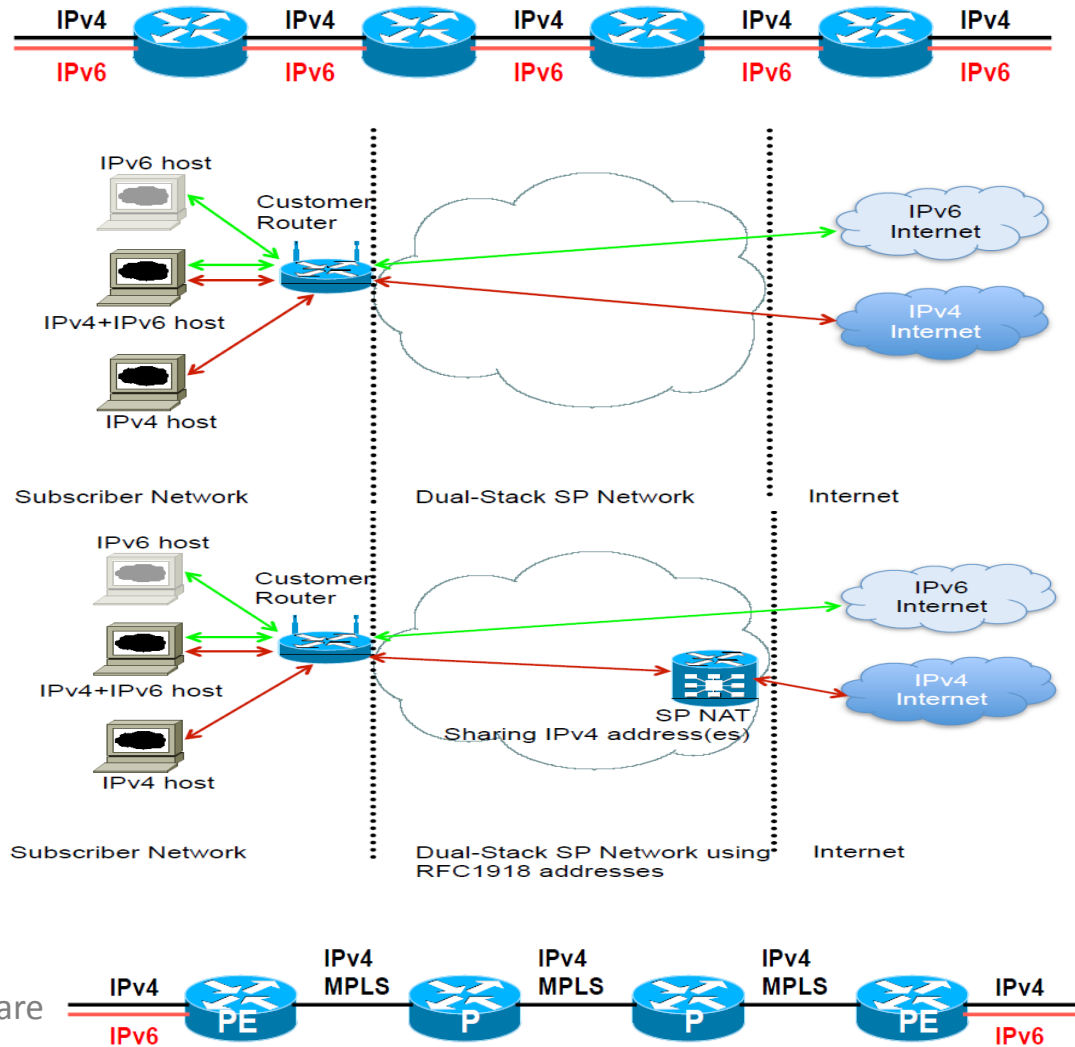
- IPv6 being available all the way to the customer
- Sufficient IPv4 address space for the customer and SP core

✓ *Dual-Stack with SP NAT*

- SP core and customer has to use IPv4 NAT due to v4 shortage.

➤ MPLS Backbone (Routers are the infrastructure)

- Public and Private network access provided within the MPLS cloud.
- The core network does NOT need to be IPv6 aware
IPv6 access provided by 6PE or 6VPE.
- Provider Edge routers need dual stack capability

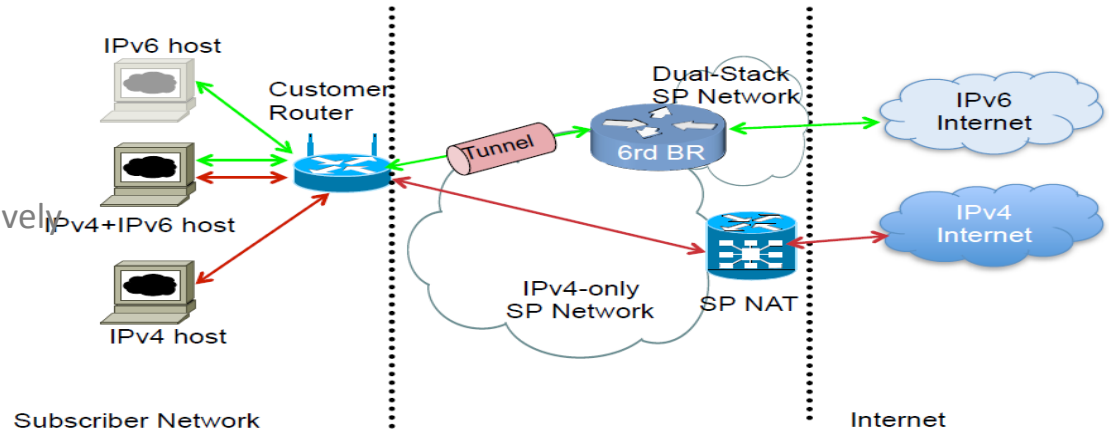


Deploy IPv6 (Continue)

➤ 6rd (Rapid Deploy)

Used where ISP infrastructure to customer is not IPv6 capable (eg IPv4-only BRAS)

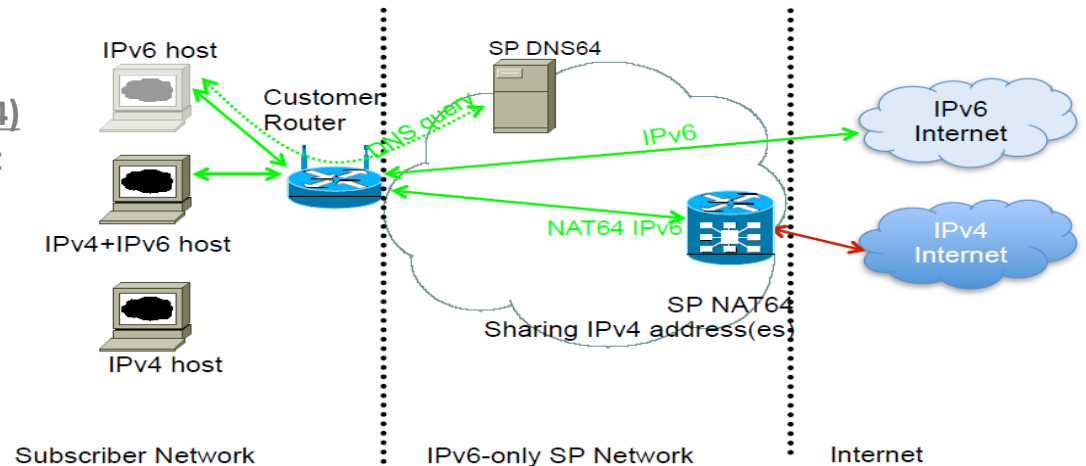
- Customer has IPv4 Internet access either natively or via NAT



➤ State full Address Family Translation (NAT64)

Service Provider deploys IPv6-only infrastructure:

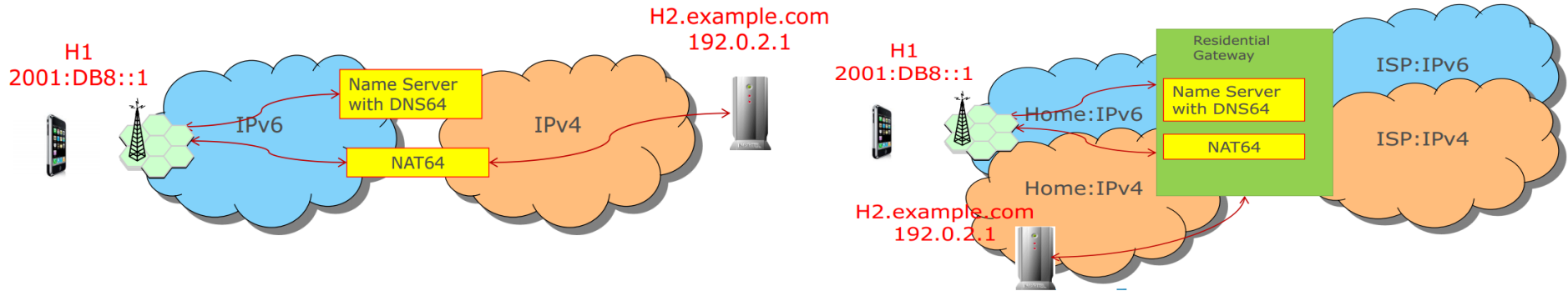
- Only IPv6 is available to the consumer
- IPv4 Internet available via Address Family Translation on SP NAT device



Deploy IPv6 (Continue)

➤ Where does AFT make sense

- Many mobile networks intend to support NAT64, so mobile clients do not have to run dual stack (which uses up battery life too quickly).
- Some home network services are not ready to migrate fully to IPv6, and may need a special gateway inside the home to support remote access by IPv6-only mobile clients. ISPs may choose to support this function inside the residential gateways they supply. Or not.



➤ planning considerations which any network operator needs to be aware of prior to deploying IPv6

1. Network Audit

What can run IPv6 today, and what needs to be upgraded (SW & HW) ?

In Zain Situation , we did upgrade for USN , PCRF , CG, U2000, ...etc.

- Analyze each location/PoP
- Document
 - Router or any other L3 device
 - RAM (installed and used)
 - FLASH memory
 - Software release versions
- Sanity check
 - Check existing connectivity
 - Remove unused configuration
 - Shutdown and clean up unused interfaces

2. Network Optimization

Is the IPv4 network the best it can be?

3. Getting IPv6 address space

4. Address Planning

5. Deploying IPv6

6. Managing and Monitoring the Network

7. Network is done, now let's connect paying customers...



- ① Upgrade PCRF Completed.
- ② Upgrade CGN NE40 Completed
- ③ Upgrade U2000 Completed.
- ④ IT: S-CDRs upgrade from R6 to R9 Completed.
- ⑤ IN: IN will be ready in June 2014.
- ⑥ HLR/HSS: Ready to support IPv6.
- ⑦ Plan to be ready on Q3 2014.

