

Network Operators (ISPs) Perspectives (Challenges and Progresses).

IPv6 at Sonatel

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agenda

- Facts and reasons for IPv6
- Challenges
- IPv6 at France Telecom Group
- Sonatel MPLS VPNv6 implementation
- IPv6 over the west african Orange inter AS VPN domain
- Sonatel ADSLv6 experimentation
- Sonatel Mobile v6 experimentation
- What's next?

Facts and reasons for IPv6...

- No IPv4 addresses available anymore (will happen sometimes between 2011 and 2012)
- The number of mobile devices and devices with embedded Internet stacks will grow by magnitudes over the following years (the ongoing use of IPv4 would create poorly interconnected islands of IP networks with limited mobility and security between them)
- IPv6 is MANDATORY for the 3GPP UMTS IMS (IP Multimedia Subsystem) in release 5
- IPv6 brings better support for security, quality of service and mobility
- IPv6 reduces OPEX of IP networks through better design and the auto configuration features

Facts and reasons for IPv6...

- IPv6 enables ubiquitous networks of the future providing always on-line, anytime and anywhere
- IPv6 enables ubiquitous/pervasive computing and with this a huge amount of new business opportunities and changes in existing business models
- IPv6 is considered as the backbone of the future information society
- (And last but not least) IPv6 is here, supported in all kinds of devices and ready to be used! And it will (soon) come and it's better to be prepared for it!

Challenges...

- Customers want to have guarantee on Sonatel's ability to move to IPv6
- Performance Issues (with current architectures..)
 - NAT impacts
- Next services to be deployed in current mobile architectures – identified issues?
 - M2M/FMC/Wifi-offload
- Roaming
 - On going studies
- Devices
 - roadmap of the main vendors (Nokia, Apple, etc.)

IPv6 at France Telecom Group

- In 2008, the "IPv6 program" is created and its mission : to develop and implement IPv6 Strategy in France Telecom Group in order to address the IPv4 addresses exhaustion
- **Commercial** offerings are already available

Open Transit Internet which offers IPv6 transit
(www.orange.com/wholesalesolutions)



Orange Business Services with VPN IPv6 offers available in 35 countries
(www.ipv6.orange-business.com)



- IPv6 deployment are on going or under studies in some countries:
 - Arménia, Belgium, **Cameroon**, Moldavia, Poland, Romania, **Senegal**, Slovaquie ...

Sonatel MPLS VPNv6 implementation

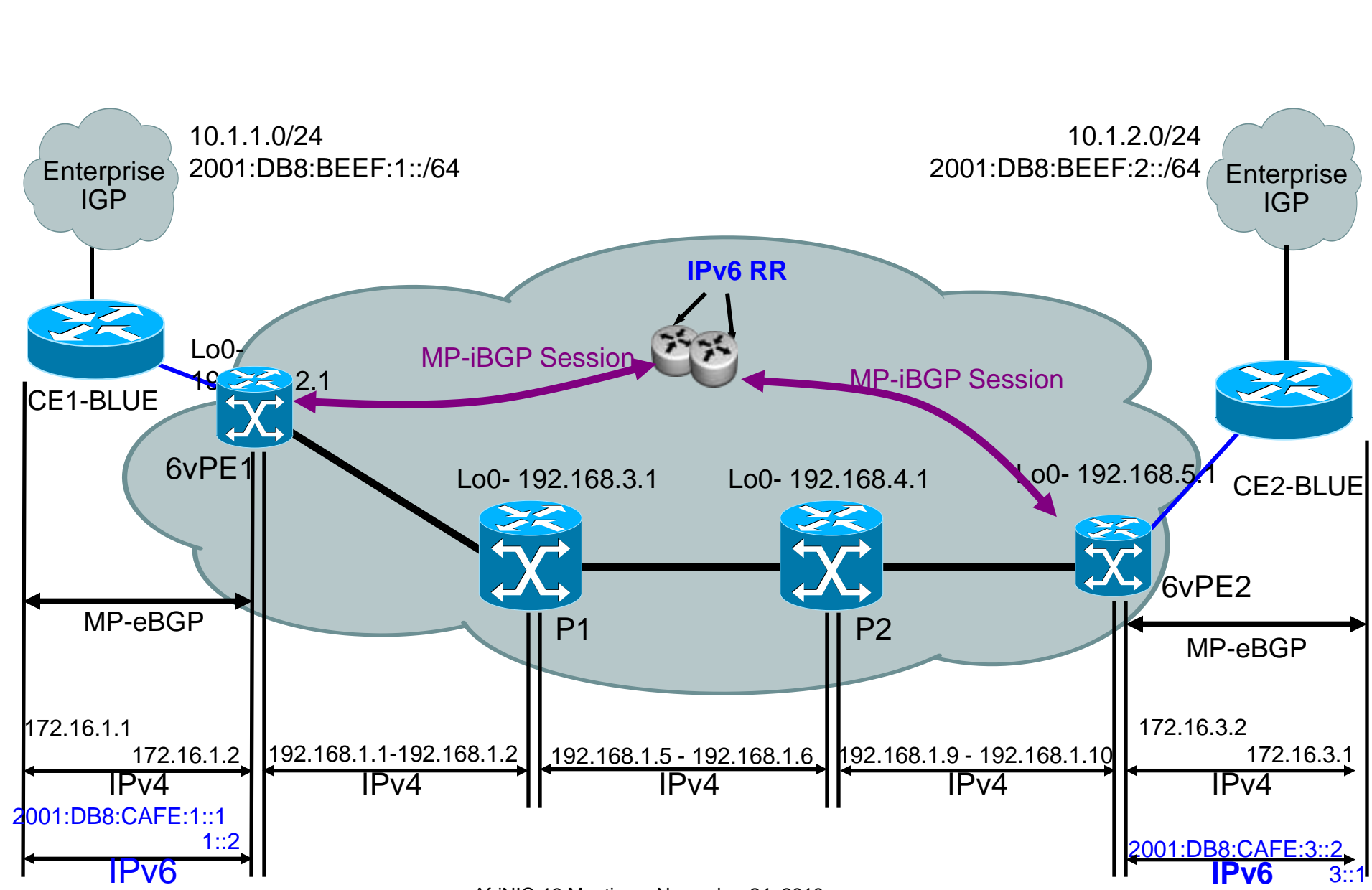
- Quick reminder on 6VPE technology
- IPv6 for IPVPN network design

6vPE a few words...

- “6vPE” is Cisco’s name for IPv6 L3VPN as defined in RFC 4659 (Sept. 2006)
- Equivalent of IPv4 BGP/MPLS L3VPN but for IPv6
- 6vPE will allow to carry IPv6 customer traffic without impacting our MPLS backbone that can stay IPv4
- 6vPE is to work along nicely with VPNv4
 - Having zero impact to **P routers & PE** routers without VPNv6 sites ;
 - Minimizing impact to PE routers with VPNv6 sites.

6vPE is for VPN IPv6 services over Sonatel

6VPE - example of addressing/routing



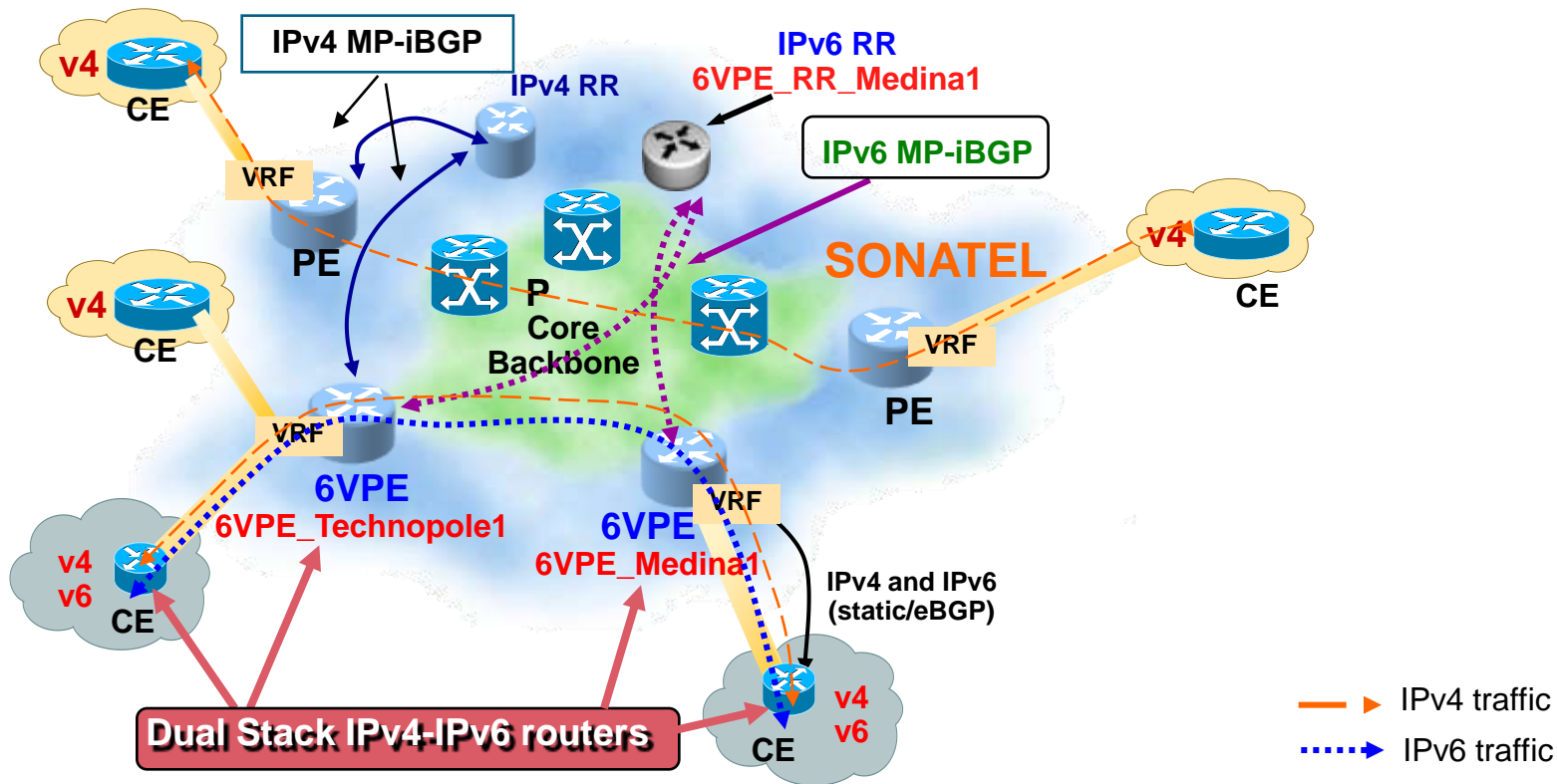
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Sonatel MPLS VPNv6 implementation

- Quick reminder on 6VPE techno
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IPv6 for IPVPN network design (1)

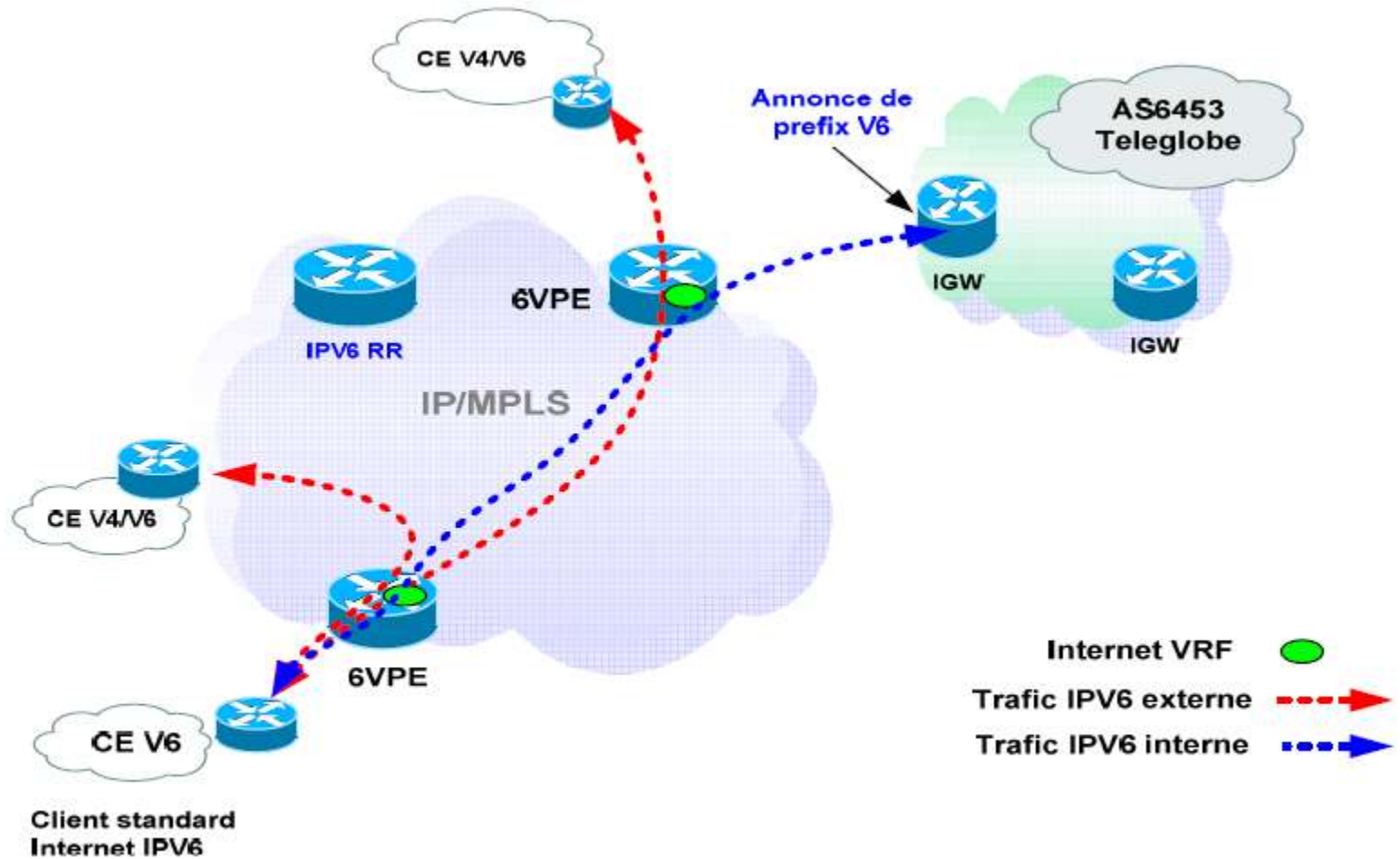


- To advertise IPv6-VPN routes, through a MPLS/VPN backbone, the 6vPE technology are used on the two Sonatel PE routers where CE dual stack is terminated
- With 6vPE feature, the IPv6-VPN traffic is MPLS switched through the Sonatel MPLS backbone in the same manner than IPv4-VPN traffic

IPv6 for IPVPN network design (2)

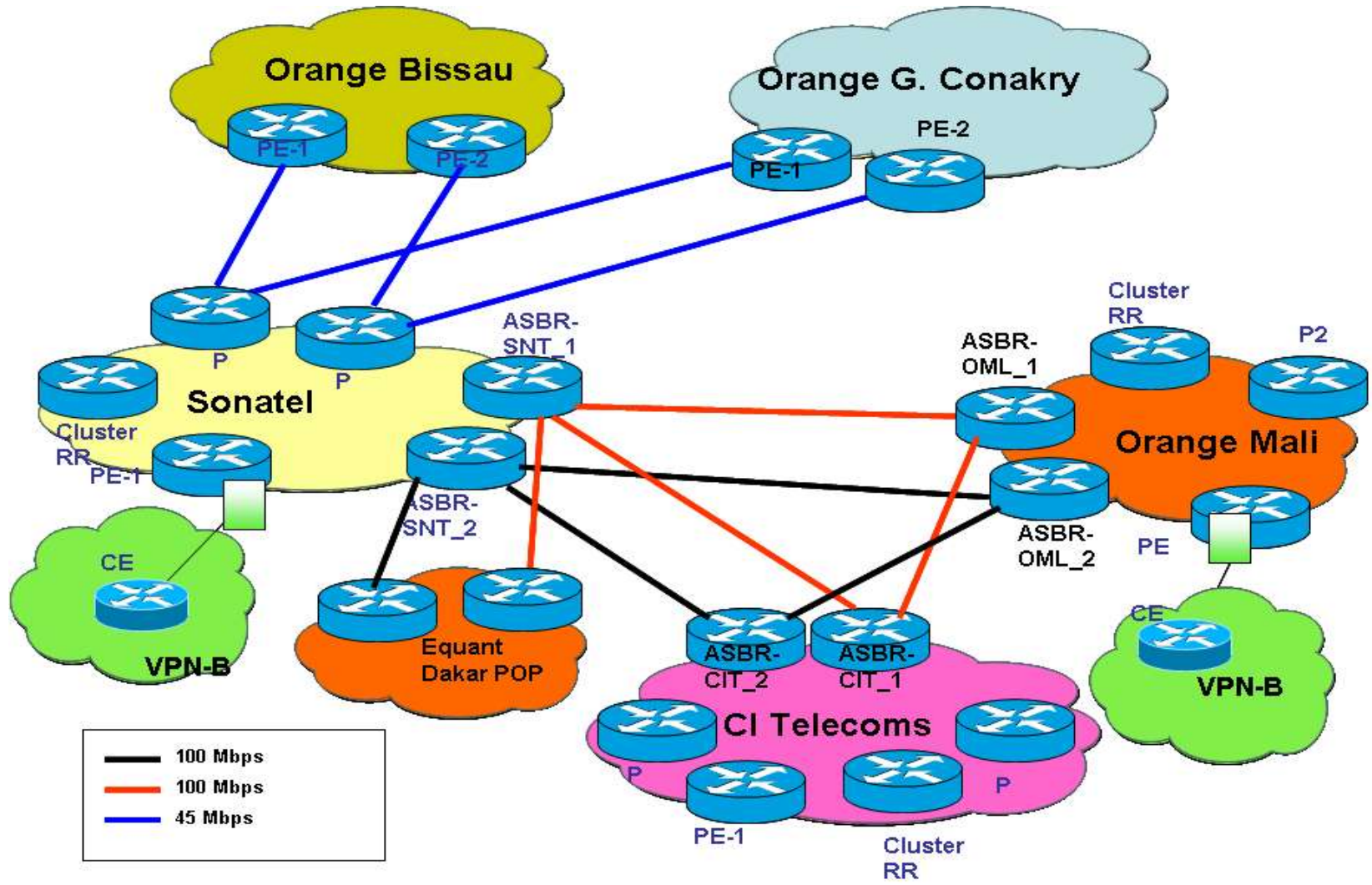
- Introduction of IPv6 for IPVPN on Sonatel networks required to support **6VPE** solutions :
 - **6VPE** feature is enabled on Sonatel PE connected to CE dual stack (IPv4/IPV6)
 - allow a mix of IPv4 and IPv6 traffic on same VRF routers :
 - **1 new dedicated RR (7206 VXR) supporting MP-IBGP** for IPV6 on Sonatel (Router_RRv6) is deployed for the EXP.
 - allow the advertisement of IPv6-VPN prefixes between PE routers
 - Support of **IPv6 static or eBGP routing protocol at the PE** (w 6VPE feature) level
 - allow the advertisement of IPv6 prefixes between PE and CE routers
 - Support of **“Marking/Queuing/WRED”** IPv4/IPv6 dual stack mechanisms
 - Allow the (IPv4 + IPv6) QoS service between PE and CE routers
 - By using “marking/queuing/WRED” IPv4/IPv6 dual stack mechanisms

IPv6 for IPVPN network design (3)



An Internet VRF is configured to carry the default route to each VPN IPv6/IPv4

IPv6 over the west african Orange Inter AS VPN domain... (1)



IPv6 over the west african Orange Inter AS VPN domain... (2)

How to provide IPv6 VPNs in multi-AS environment ?

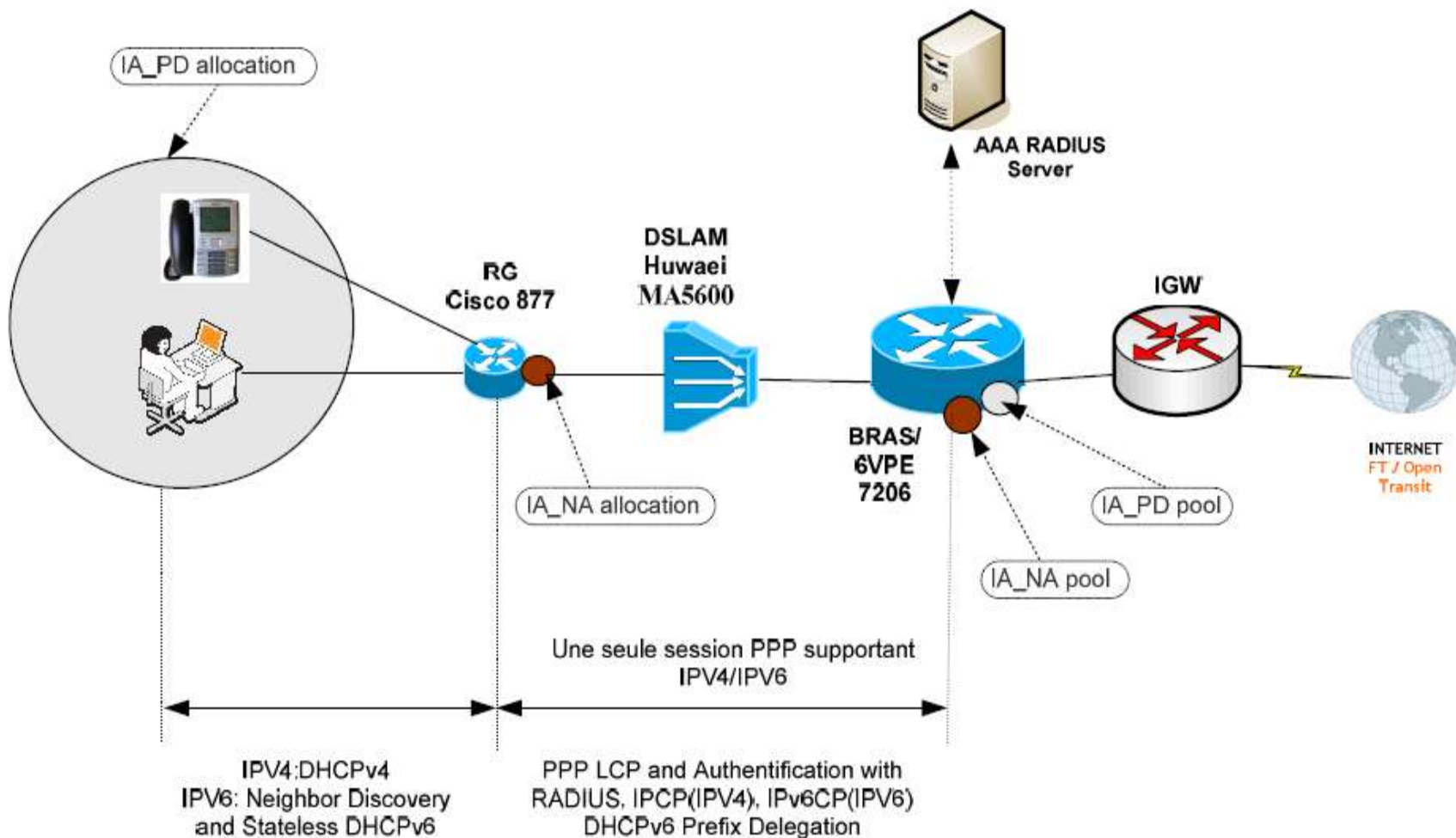
Like in IPv4 if both domains propose IPv6 VPNs !

How to deal with only-v4 VPNs and IPv6 connectivity ?

-Not a major concern until now

Our ASBR routers are Dual Stack IPv4/IPv6 capable ☺

Sonatel ADSLv6 experimentation (1/2)



Sonatel ADSLv6 experimentation (2/2)

The chosen solution is based on PPPoE running in dual-stack.

The PPPoE sessions initiated by the CPE will be terminated on a Cisco 7206VXR which will play the role of BRAS (Broadband Remote Access Server).

An IPv6 prefix /60 will be automatically assigned to each CPE in DHCPv6 thanks to delegation prefix context.

CPEs as RR (Requesting Router) will use DHCPv6 client function to initiate requests for allocation of IPv6 prefixes.

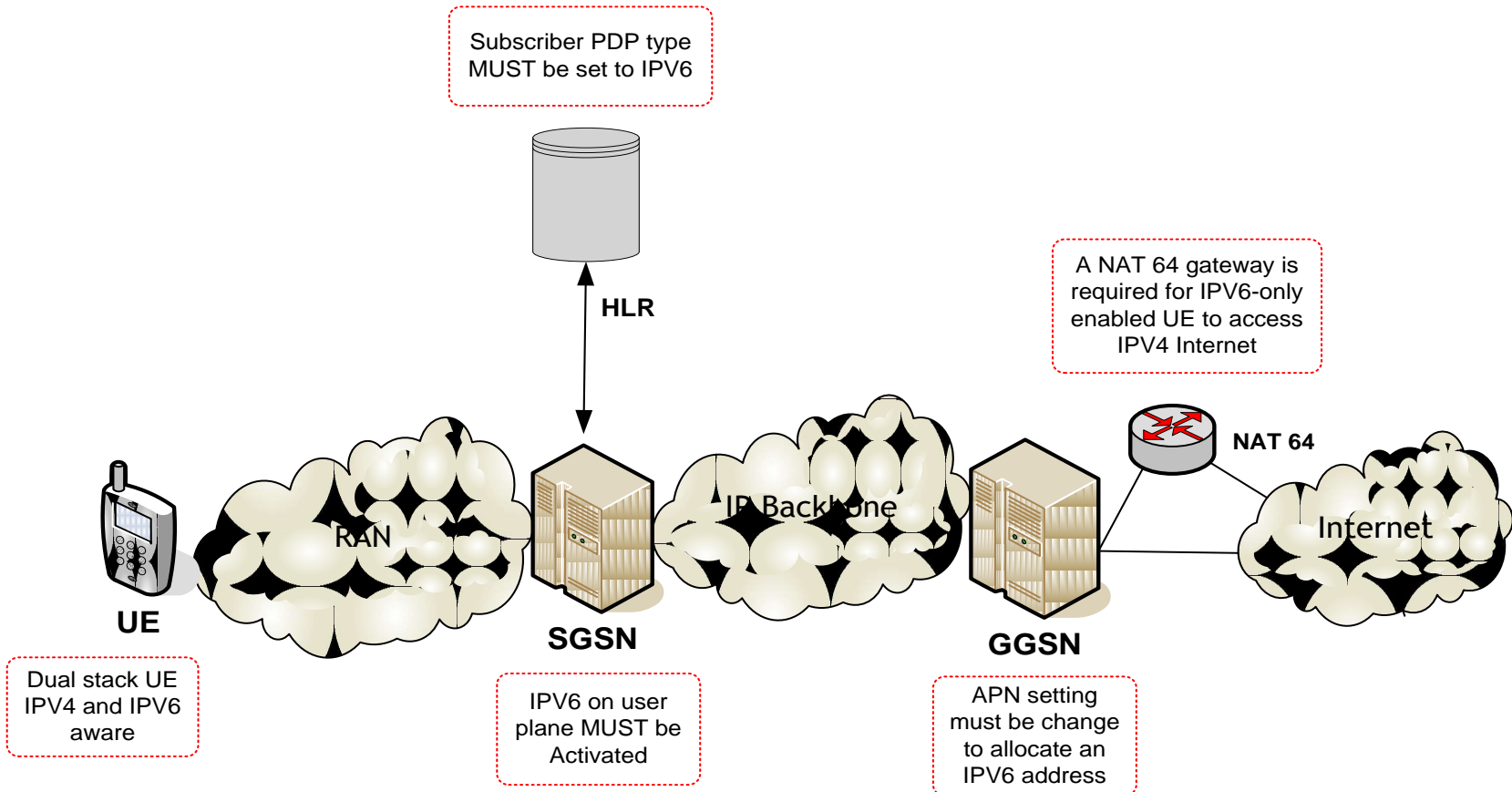
BRAS operating as DR (Delegating Router) has IPv6 prefixes pools manually configured.

The ADSL lines will be connected to the ADSL access network by Huawei MSAN (Multiservices Access Node) MA5600T configured on Bridge mode and which will support DHCP relay function in future release.

Sonatel Mobile v6 experimentation (1)

Planned in Q1 2011, with the following services

- Internet Access dual-stack IPV6 /IPV4
- Internet Access IPV6-Only



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Sonatel Mobile v6 experimentation (2)

Some prerequisites...

- Audit of the core mobile network infrastructure
- Ability to provision customers with the service IPV6
- Setting up a test environment at the PDN level
- Configuration of the type of PDP at the HLR level
- APNs Configuration with IPv6 parameters at the GGSN level
- Enable IPv6 on the GGSN user plane
- Provide mobile devices supporting IPv6 for the Friendly user test (eg Nokia 5230, Nokia 9500)
- Implement a translation mechanism NAT64 to access IPv4 sites with IPv6-only devices
- Securing IPv6 Internet access and core network GPRS

What's next ?

- Dual stack IPv4/IPv6 enabled in all CPE of our MPLS VPN customers !
- Support Sonatel's affiliate (Orange Mali, Orange Guinea Conakry and Orange Bissau in IPv6 deployment
- IPv6 over GIN (Global Internal Network) experimentation related to Windows 7 and Common AD which aims to be a global directory & authentication mechanism based on Active Directory. This application will be the cornerstone of future shared services in France Telecom Group
- Some pressure on the Devices Vendors
- ADSLv6 & Mobile v6 **only services** to some of our customers in 2011 !

thank you