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Supporting Industry Migration to IPv6

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NBN Co – Layer 2 Wholesale Service Provider

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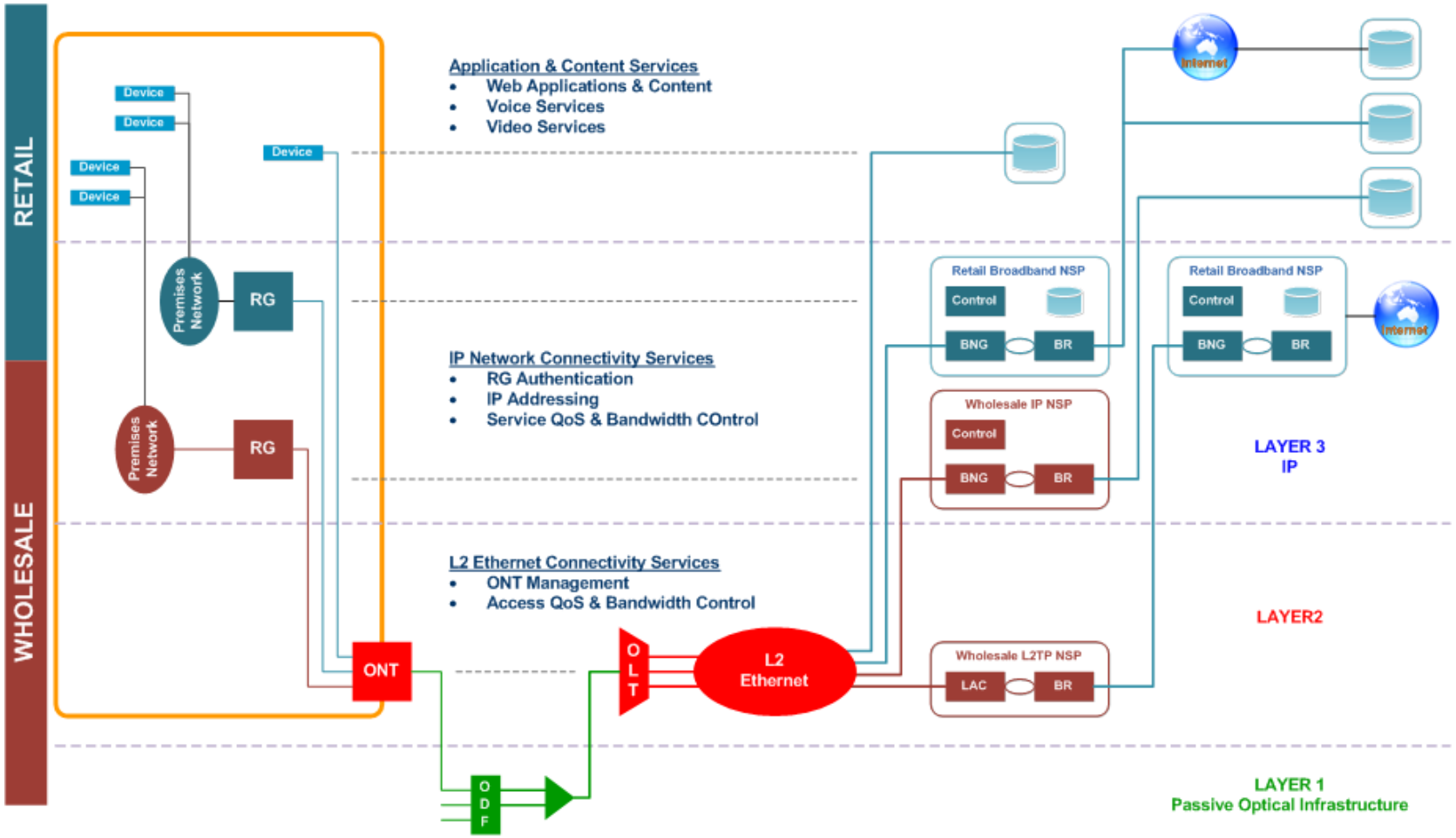

Communications Alliance – NBN Reference Architecture – Release 1 – Jan 2010

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NBN Co – Layer 2 Wholesale Service Provider

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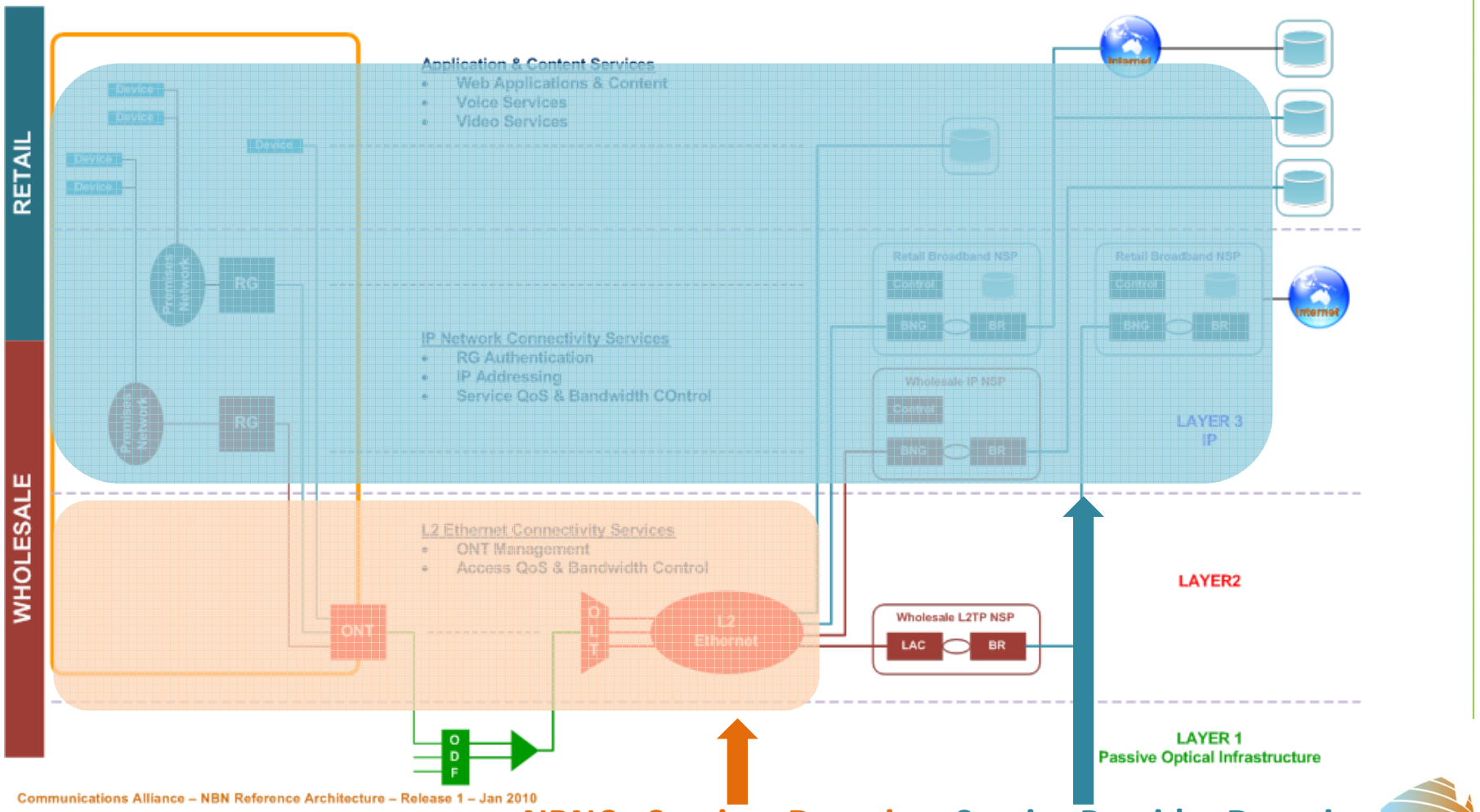

Communications Alliance – NBN Reference Architecture – Release 1 – Jan 2010

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NBN Co – Layer 2 Wholesale Service Provider

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NBN Co provides Ethernet-based Layer 2 services that...

- … do not allocate IP Addresses to Service Provider's CPE (Home Gateway, Routing Gateway, IP Phones, Set Top Box, etc.)
- … have the obligation to carry Service Provider's IP traffic in a deterministic manner
- … desire to be completely agnostic to higher-layer protocols
- … may be requested by Service Providers to participate in higher layer protocol exchange to establish and maintain an end-to-end circuit

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NBN Co's IP Touch Points

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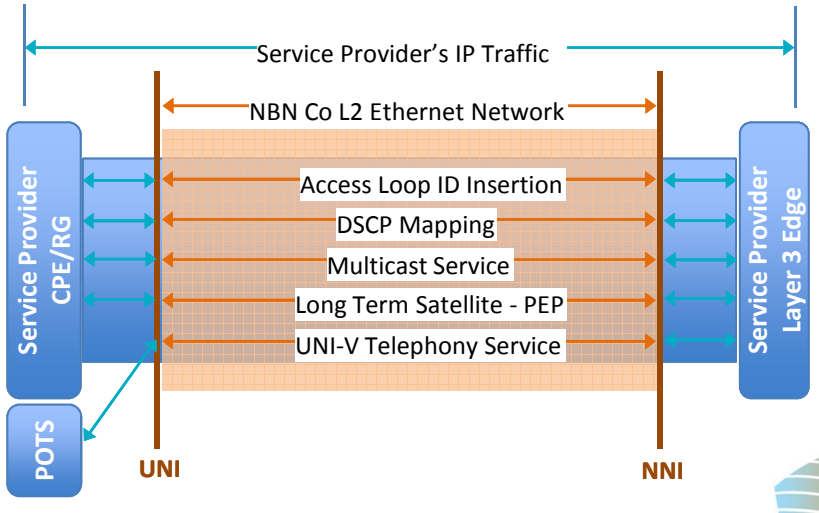
Product options where the Service Provider may request NBN Co to interact with their IP-Layer protocols*:

- **UNI-D Access Loop Identification Insertion** – enables Service Providers to provide authentication, authorisation and enhances trouble shooting tools for End-Users
- **DSCP Mapping** – allows Service Providers to integrate their end-to-end IP Quality of Service architecture with NBN Co's differentiated traffic classes to better support high quality End-User applications
- **Multicast** – designed to enable Service Providers to efficiently and cost-effectively deliver applications such as IPTV
- **UNI-V IP Telephony** – designed to provide telephony service in an IP based environment
- **Performance Enhancing Proxy (PEP)** – transparently allows Service Providers to overcome intrinsic bottlenecks presented by Satellite Access (Latency, Scheduling Delays and Capacity)



* Interim Satellite Services do not support IPv6

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Access Loop ID Insertion (UNI-D)

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IPv4

... Provides support for DHCP option 82 & PPPoE IA

... Insert DHCP option 82 and PPPoE IA fields in the upstream DHCP DISCOVER and PPP PADI message respectively

... Circuit ID reflects NBN Co's AVC Service ID

IPv6

... Introduces DHCPv6

... DHCPv6 option 18 provides Interface ID

Optional IP Attribute	Fibre Access	Fixed Wireless Access	Long-term Satellite Access
DHCPv6	Q4, 2012	Short-Term (CY 2013)	Mid-Term (CY 2014-2015)
DSCPv6	Mid-Term (CY 2014-2015)	Short-Term (CY 2013)	Mid-Term (CY 2014-2015)
IPv6 Multicast	Long-Term (CY 2016+)	- NA -	- NA -
UNI-V IPv6	Long-Term (CY 2016+)	-NA-	-NA-
PEP IPv6 Transparency	-NA-	-NA-	Mid-Term (CY 2014-2015)

NBN Co's Position

... Encapsulate DHCPv6 message received at UNI-D in DHCPv6 Relay-Forward message

... Option 18 (Interface-ID) set to AVC service ID (per RFC 3315)

... DHCPv6 Option 37 (Remote ID) not supported

... If end-user CPE sends DHCPv6 Relay Forward message it is carried transparently encapsulated as DHCPv6 Option 20 (Relay Message)

... PPPoE IA support in the NBN Co network is independent of IPv4 or IPv6 packets

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Differentiated Services Code Point (DSCP)

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IPv4

... Type of Service (TOS) field in IPv4 header defines Class of Service

... Classifying and managing network traffic establishing Quality of Service (QoS) on IP networks

IPv6

... Minor change: DSCP is defined in "Traffic Class Field" in the IPv6 header

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NBN Co's Position

... Provides Service Providers the ability to optionally integrate IP layer QoS (DSCP) architecture with NBN Co's Traffic Class through DSCP-Mapped UNI-D mapping mode

... DSCP-Mapped untagged ingress frames from Service Providers may be analysed by NBN Co to direct to Layer Traffic Class

... In the longer term NBN Co intends to support Service Providers' migration to IPv6 based QoS architecture primarily through 'Priority-Tagged' and 'Tagged' UNI-D traffic class mapping

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IPv6 Multicast

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IPv4

... Use of IGMP (Internet Group Multicast Protocol) to establish Multicast group membership

IPv6

... Use of MLD (Multicast Listener Device) a sub-protocol of ICMPv6 to manage Multicast group membership

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NBN Co's Position

... Current capability based on IEEE 802.3 Ethernet multicast addressing and operation, using IGMPv3 snooping for interaction with Service Providers' IPv4 multicast service

... Initial consultation with the industry suggests no-immediate push to adopt IPv6 multicast

... NBN Co investigating IPv6 multicast support through its Product Roadmap

... No time-frame established to support IPv6 multicast on the NBN Co network

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IPv6 UNI-V Telephony Service

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IPv4

... SIP Stack

... DHCP

... DNS

... ACS

... TR-069

IPv6

... IPv6 Equivalent

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NBN Co's Position

... Currently for IPv4, when using UNI-V, Service Provider utilises ATA port inbuilt in Fibre NTD, with integrated SIP capabilities for legacy telephone applications and migrations

... NBN Co investigating IPv6 UNI-V support through its Product Roadmap

... No time-frame established to support IPv6 UNI-V on the NBN Co network

... Service Providers' may operate their telephony services through UNI-V within a private IP domain, reducing their exposure to IPv4 address exhaustion

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IPv6 Performance Enhancing Proxies (PEP)

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IPv4

... TCP & HTTP acceleration

... Traffic class based predictive scheduling

... Traffic class based prioritisation

... Header & Payload compression

... Byte caching

IPv6

... IPv6 Equivalent

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NBN Co's Position

... In the mid-term, NBN Co plans to introduce Long-Term Satellite (LTS) services and gradually migrate Interim Satellite services

... Specifications for LTS dictate, emulate NBN Co's Fibre and Fixed Wireless Access

... LTS services will be fully compatible with IPv6 PEP functions at the commencement of services

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Summary

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- NBN Co recognises that Service Providers must consider adoption of IPv6 in a manner and timeframe that suits their business objectives
- NBN Co's network is being designed and built to support industry migration to IPv6 based network through the following:

Optional IP Attribute	Fibre Access	Fixed Wireless Access	Long-term Satellite Access
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– Maintaining a Layer 2 service construct that minimises interaction with Service Provider's Layer 3+ protocols, where possible, and

– Adopting IPv6 support within NBN Co's Layer 2 features in a timely and consultative manner

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Industry Consultation

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- NBN Co published its industry consultation paper titled “NBN Co IPv6 Discussion Paper” reflecting NBN Co’s position on 17 Sep 2012
- http://www.nbnco.com.au/getting-connected/service-providers/industry-consultation/ipv6-discussion-paper.html
- NBN Co welcomes feedback on this Discussion Paper, in particular:
  - Whether there is a need for NBN Co to offer optional ‘IP aware’ features
  - The anticipated timing of delivery of these optional IP attributes
  - Whether Service Provider’s anticipate any other optional IPv6 functionality required in the NBN to facilitate migration to IPv6
  - Timing for removal of DSCP functionality for prioritising Service Provider traffic

Please provide feedback via email to: feedback@nbnco.com.au with subject “IPv6 Discussion Paper - Feedback” by the 26 October 2012

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Questions

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