

IPv6 Progress Status

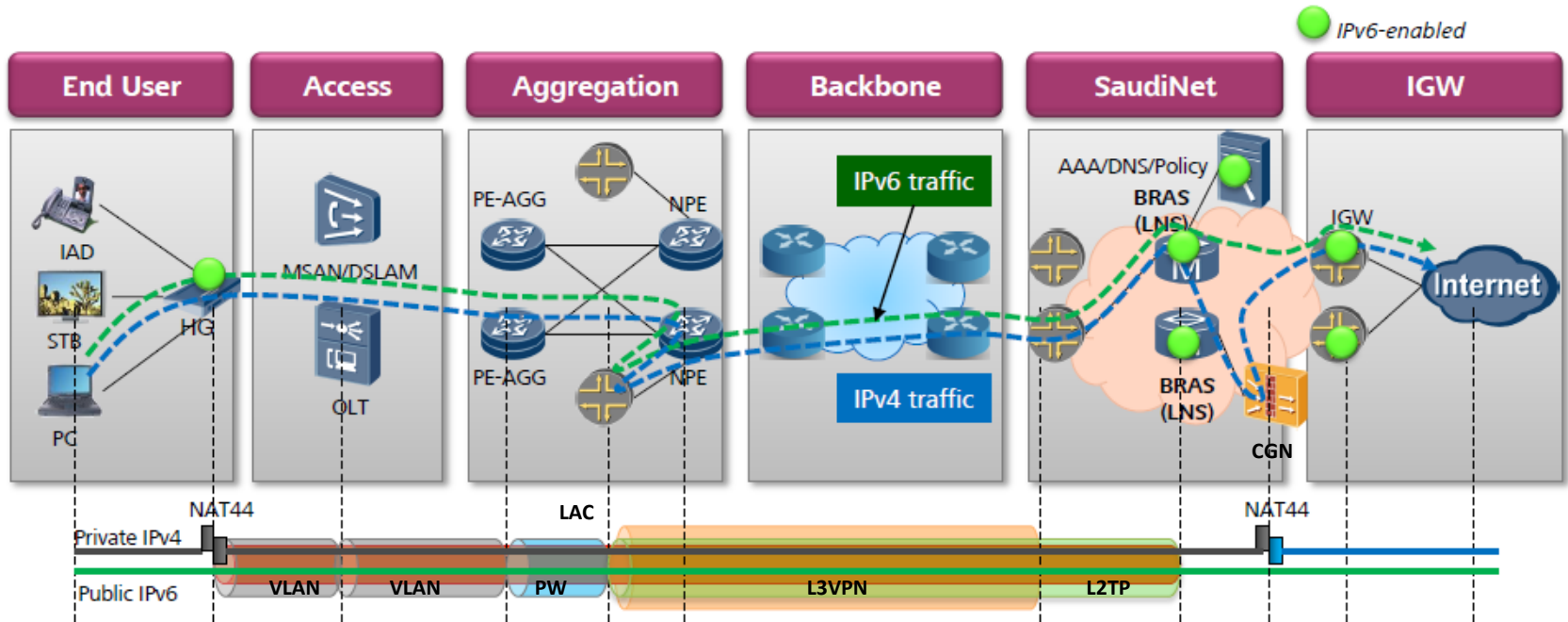
IPv6 Task Force Meeting 14
7th November 2013

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Service-by-service Approach

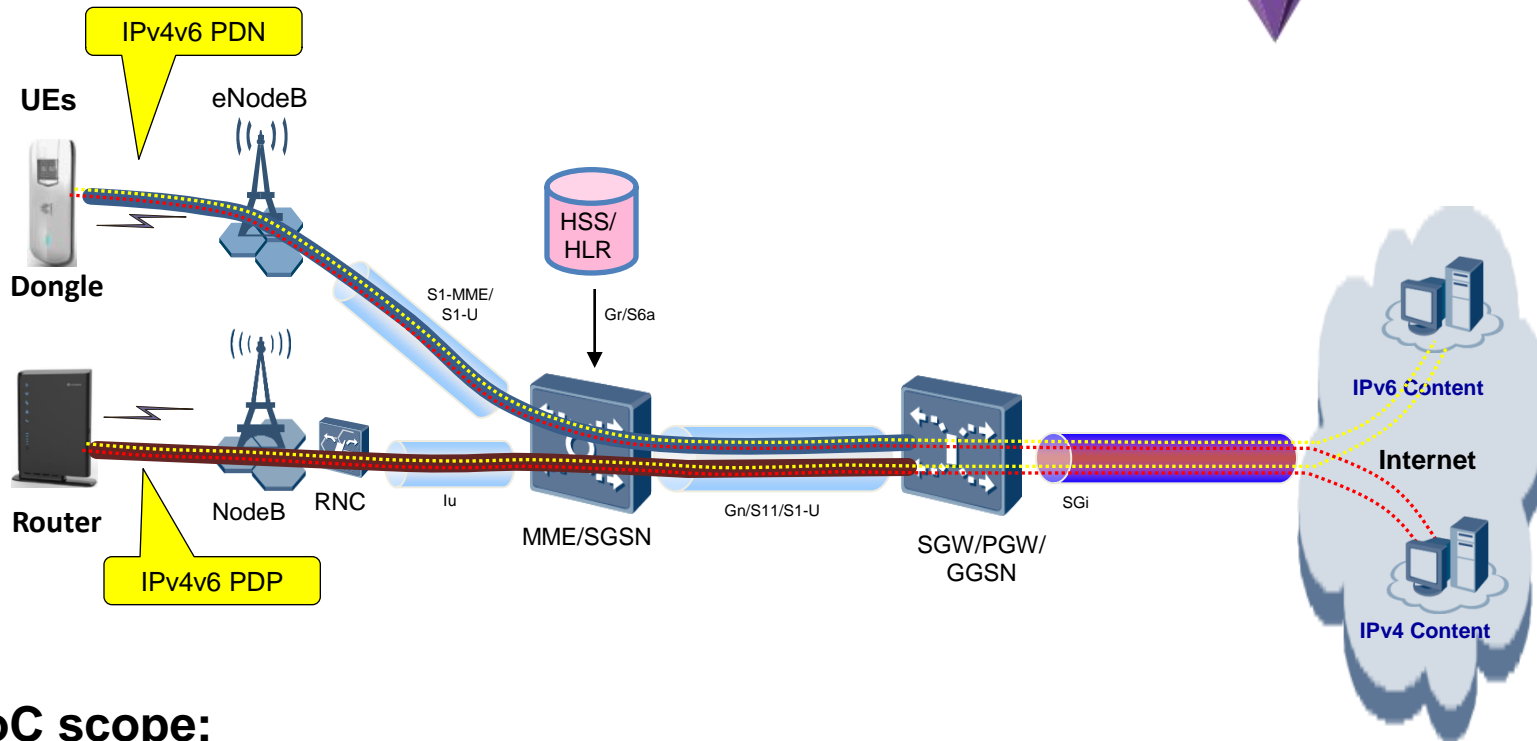
- Services impacted by IPv4 exhaustion to adopt IPv6 first (e.g. HSI for fixed and mobile)
- Customers demand for IPv6 connectivity (e.g. L3-VPNs, DIA, International Peering)
- Wall-gardened services on private IPv4 (e.g. IPTV, VoIP, Mobile VAS) – needs business case

STC (Dual-Stack + CGN) Fixed HSI Model



- Dual-stack PPP session tunnelled from HG (DSL modem/ONT) to BRAS
- CGN to be added on onset of IPv4 depletion

LTE/3G Dual-stack PoC Topology



PoC scope:

- Single vendor topology
- Validated dual-Stack PDN connection support on STC PS core and UEs
- Validated dual-Stack PDP context support on STC PS core and UEs
- Validated UE Cell Reselection between LTE and UMTS networks

Key Issues with dual-stack on mobile



The following are some of the key issues that could limit the rollout of dual-stack services on mobile networks in the near term:

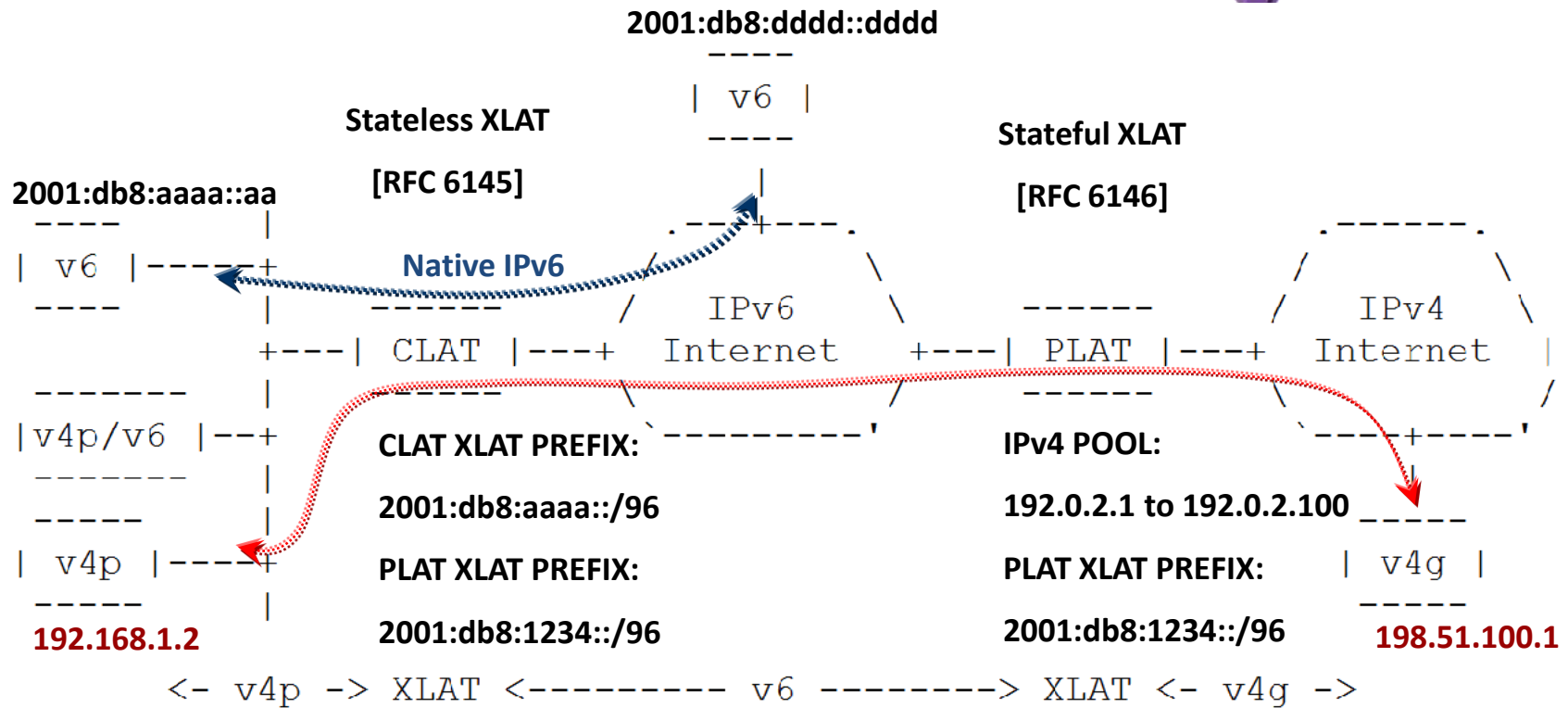
- IPv4v6 PDP type for 3G was not defined by 3GPP till R9:
 - Currently it is not commonly supported on mobile networks & UEs – dual-stack rollout dictated by vendor roadmaps
 - Handovers (network-initiated) not supported
 - Roaming likely to fail for dual-stack users – visited network may not recognize this IPv4v6 PDP type in user profile

Dual-stack Roaming Issues

<https://tools.ietf.org/html/draft-chen-v6ops-ipv6-roaming-analysis-02>

| UE Request | Visited Network Capability | Home routed | Local Breakout |
|---------------------------|----------------------------|----------------|----------------|
| Dual stack | IPv4-only | Failure case 1 | Failure case 1 |
| Dual stack | IPv4-only/IPv6-only | Failure case 1 | Failure case 2 |
| Dual stack | IPv6-only | Failure case 1 | Failure case 3 |
| IPv6-only | IPv4-only | OK | Failure case 4 |
| IPv6-only with 464xlat | Dual stack | OK | Failure case 5 |
| IPv6-only with 464xlat | IPv6-only | OK | OK |
| IPv4-only | Dual stack | OK | OK |

464 XLAT (RFC 6877)



| | | |
|-----------------|------------------------------|-----------------|
| IPv4 SRC | IPv6 SRC | IPv4 SRC |
| 192.168.1.2 | 2001:db8:aaaa::192.168.1.2* | 192.0.2.1 |
| IPv4 DST | IPv6 DST | IPv4 DST |
| 198.51.100.1 | 2001:db8:1111:198.51.100.1 * | 198.51.100.1 |

- From RFC 6877: “..[464XLAT] is not fit for IPv4 peer-to-peer communication or inbound IPv4 connections”
- From Forums: IPSec VPNs don't work with 464XLAT
- CGN issues apply:
 - Scalability
 - Lawful Intercept
 - Logging
 - Other shared-address issues (e.g. blacklisting, geo-location, etc.)

Summary Of IPv6 Status

| IPv6-Enabled Service | Status | Remarks |
|-----------------------|----------------------|---|
| International Transit | Launched | <ul style="list-style-type: none">• Some live customers |
| DIA | Launched | <ul style="list-style-type: none">• Some live customers |
| HSI (DSL) | Under Implementation | <ul style="list-style-type: none">• Planned launch Q1/2014 |
| HSI (FTTH) | Pilot | <ul style="list-style-type: none">• Planned launch Q2/2014 |
| HSI (Mobile) | PoC trials | <ul style="list-style-type: none">• Dual-stack PDN/PDP PoC testing on-going• 4G4XLAT & MAP-E under study |
| L3-VPN | Under Implementation | <ul style="list-style-type: none">• Planned launch Q4/2014 |

Thanks

07-Nov-13