

# ARCHITECTING THE NETWORK FOR THE MOBILE IPV6 TRANSITION

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### AGENDA

- > The State of Standards IPv6 & Transition in Mobile
- > Three Views of the Mobile Environment
- > The Network infrastructure View
- > The UE / Bearer Plane View
- > The Applications View
- > Current Case Study



# STATE OF STANDARDS: $\mathcal{F}$ & IETF DOCUMENTS

- 3GPP TR 23.975 IPv6 Migration Guidelines
- RFC 4215 Analysis on IPv6 Transition in (3GPP) networks 2005
- RFC 6146 Stateful NAT64
- draft-ietf-behave-dns64-11
  - draft-ietf-softwire-gateway-init-ds-lite-03
  - draft-ietf-v6ops-v6-in-mobile-networks-05
  - draft-tsou-v6ops-mobile-transition-guide-00
    - draft-zhou-v6ops-mobile-use-cases-00



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**Norks in Progress** 

#### THREE VIEWS OF THE TRANSITION: Network, UE, Apps







# **IPV6 TRANSITION THE NETWORK VIEW**

# THREE VIEWS OF THE TRANSITION (NETWORK, UE, Apps)

#### **Network Stage 1:**

- CGN NAT44 to handle immediate IPv4 exhaustion issues
- IP Core 6PE-MPLS or GRE implementation of Gi 6rd to reach IPv6 Internet



#### (NETWORK, UE, Apps)

#### Network Stage 2:

- IPv6 Backhaul, IPv6 Packet Core
- Migrate IP Core to IPv6 or DUAL STACK to complete network migration
- If IPv6 Add "Gi DSlite via MPLS PE or GRE tunnels to reach IPv4 world



# **IPV6 TRANSITION THE UE VIEW**

#### THREE VIEWS OF THE TRANSITION (Network, UE, Apps) HSPA+ R.6/R.7 ENVIRONMENT

#### **3GPP HSPA+ Releases 6 and 7:**

- Dual Stack in the UE requires separate PDPc's
- Cons: Per bearer lic costs, extra load on SGSNs, GGSNs & NodeBs





### (Network, UE, Apps) HSPA+ R.8 ENVIRONMENT

**3GPP HSPA+ Release 8 + moving towards IPv6 only Handsets:** 

- IPv6 only bearer for smartphones.
- Dual Stack bearer for Dongles & tethering, and or premium IPv4 only apps on handsets
- Load split NAT44 to NAT64 CGN for supported traffic and native IPv6 traffic takes direct path
- Pros: Single bearer lic cost, reduced load on SGSNs, GGSNs & NodeBs
- Pros: IPv6 for control and heavy push type traffic (i.e Apple notifications)
- Pros: IPv6 allows for increased IN and logging disambiguaty reduces load on NEs



### THREE VIEWS OF THE TRANSITION (Network, UE, Apps) LTE ENVIRONMENT

#### 3GPP LTE Release 8 + move to IPv6 for majority of users:

- UE default and primary bearer(s) should be IPv6
- Dual Stack Single bearer supported for Dongles and Tethering to PC's
- CGN NAT64 and DNS64 added to split load for supported apps
- Pros: IPv6 for control and heavy push type traffic (i.e Apple notifications)
- Pros: IPv6 allows for increased IN and logging disambiguaty reduces load for Analytics on NE's





# **IPV6 TRANSITION APPLICATIONS VIEW**

#### (Network, UE, APPS)





#### (Network, UE, APPS)

#### Handset & OTT Apps moving slowly to IPv6

- 60-70% of apps will work on NAT64 DNS64 until OTT is Majority Dual Stacked (est. 2-5yrs)
- Legacy Apps with Ipv4 literals, IM, Skype/Gtalk, and many p2p, ptpp apps do not understand the IPv6 stack in the UE
- IPv6 native support in UE's is very limited today! (good news UE upgrade cycle is rapid and mandate for IPv6 is here so poor UE selection for IPv6 is a short term issue!)





# **IPV6 ONLY UE TRIALS - FEEDBACK**

### T-MOBILE USA IPV6 ONLY UE TRIAL - FEEDBACK



#### T-Mobile, China Mobile and others trialing right now!

- T-Mobile used only 1 handset model Nokia N800
- Statically changed APNs to move UE's to IPv6 only PGW/GGSNs used NAT/DNS64 translators
- Users had no issues with IPv4 WEB / YouTube, and IPv6 native content
- Major complaint was broken IM and Skype applications.
- Attempted N800 specific bump in the stack NAT46 implementation to fix IM, Skype, Gtalk, and p2p issues limited success but high OPEX support calls

Recommendation: Wait on IPv6 only UE deployments or offer Premium IPv4 bearers as up charged service



