IETF 94 Yokohama:
IPv6 Design Choices

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Purpose

- Describe some basic IPv6 design options (routing focused).

- Assumes reader has working knowledge of IPv4 network design practices.

Summary of Changes from -08 to -09

1. Added paragraph to intro saying Enterprise situation in scope.

2. Added note saying roughly "If using PA space internally, Enterprise will have difficulties multi-homing or changing providers". *Proposing major revision in this area for next version*.

3. Added summary of results of survey of operators on which IGPs they use in dual-stack networks.

4. Added paragraph saying that, though ULAs and RFC 1918 are technically different, they are used by operators in the same way.

Change #1: Enterprise Coverage (1 of 2)

- In March/April 2015, scope was expanded to include consideration of Enterprise design issues.
  - Prompted by some emails to the WG mailing list.
  - As a result, (a) added consideration of EIGRP in the IGP Choice section, and (b) consideration of the enterprise situation in the Address Choice section, amongst other changes.
- At the Prague IETF in July, a suggestion (at the mic) that Enterprise coverage would be better handled in a separate document.
- After consideration, authors not taking that approach.
  - Continuing to include Enterprise text in this document.
  - Not going into great detail on the Enterprise situation, but will cover major differences.

Change #1: Enterprise Coverage (2 of 2)

- -09 version adds a paragraph in Introduction saying that Enterprise situation is included.

- Email about authors' decision sent to mailing list -- **no response**.

- If the WG prefers, we can remove Enterprise coverage from doc.
  - Work on a possible "Enterprise-focused" doc will be left to others.

Change #2: Addrs for Enterprises (1 of 2)

- Discussion, first at mic in Prague, then recently on mailing list, on choices an Enterprise has for using v6 address space.

- -09 doc has text saying roughly "If using PA space internally, Enterprise will have difficulties multi-homing or changing providers".

- Lots of discussion on mailing list.

- Propose to add text describing the three options and their pros and cons.

Change #2: Addrs for Enterprises (2 of 2)

Assumption: Enterprise uses some form of perimeter security (firewalls, SBCs,…)

#	Choice	Multi-home	Easy to change prov	Comments
1	Use PI space internally	Y	Y	Pro: No app impact beyond perimeter traversal. Con: Must qualify for PI. Must apply and pay annual fee. Con: Adds /48 to default-free table.
2	Use PA + ULA space internally	Difficult today. Better in future?	Difficult if PA addrs get hardcoded; otherwise easy.	Pro: No app impact beyond perimeter traversal. Con: Cheap, new concept for smaller enterprises. Note: Use of ULA space optional.
3	Use ULA space internally and NPT66 on borders	Y	Y	Con: Some app impact beyond perimeter traversal, but not as bad as NAT44. Pro: Similar to IPv4 situation

Change #3: Survey (1 of 2)

- In May & June, informal survey of operators on IGP combinations deployed today in production dual-stack networks.
  - Asked for responses on various mailing lists: v6ops, NANOG, RIPE, Cluenet ipv6-ops.
  - Received details about 28 different networks.
  - Different sizes: small enterprises to large T1 providers.
- Summarized the responses in a table in the IGP Choices section.
- One unexpected stat was that a number of networks running IS-IS dual-stack in <u>single topology</u> mode.
  - Partly due to equipment limitations

Change #3: Survey (2 of 2)

IGP for IPv4	IGP for IPv6	# of Production Deployments
OSPFv2	OSPFv3	8
OSPFv2	IS-IS	3
OSPFv2	EIGRP	--
OSPFv3	OSPFv3	--
OSPFv3	IS-IS	--
OSPFv3	EIGRP	--
IS-IS	OSPFv3	2
IS-IS	IS-IS	12 *
IS-IS	EIGRP	--
EIGRP	OSPFv3	1 (small)
EIGRP	IS-IS	--
EIGRP	EIGRP	2

* 6 = Single Topology, 4 = Multi-topology, 2 = unknown

Change #4: "Private" addresses

- In Prague, some concerns (at mic) raised over use of word "Private" to refer to both RFC 1918 and ULA addresses.

  - Comments about "they work differently!"

- Authors' position: "Yes, there are differences, but operators use them in the same way".

- Added text saying this to "Address Choice" section.

Update after morning discussion

- Authors propose to rewrite section 2.1.
  - Remove IPv4 discussion (including the word "private") and just focus on IPv6.
  - Incorporate comments received this morning around NAT66/NPT66 and ULA.
- Authors propose to NOT expand the survey discussion to discuss trends
  - Out of scope. May put in separate document.
  - Will put in sentence saying "some of these are interim states"

Moving Forward

- Jan Zorg and Tim Chown have done a review of -09.

- Will take their feedback, plus feedback today, and create -10.

- Will ask a few key critics to review -10.

- Will judge readiness for WGLC after those reviews.