ARIN IPv6 WG

Thomas Narten
WG Chair
narten@us.ibm.com
October 29, 2001

Agenda

- Background/Status (narten)
- Discussions at APNIC (arano)
- Discussions at RIPE (kessens)
- IPv6 Micro-assignments (narten)
- IPv6 Proposed Policy (narten)
- Wrap-up/Next steps (narten)

Background

- APNIC, ARIN, RIPE have been discussing IPv6 policies “individually” for last few years
- APNIC/RIPE desire closer policy coordination
- Goal is single global IPv6 addressing policies
  - If differences needed, understand why, discuss with other RIRs, be part of global uniform policy
- New Mailing list:
  - global-v6@lists.apnic.net (postings)
  - http://www.apnic.net/net_comm/lists/ (to subscribe)
  - http://www.apnic.net/mailing-lists/global-v6 (archives)

WG Proposal

- ARIN policies w.r.t. IPv6 should closely match those of other RIRs
- Differences must be discussed with other RIRs
- IPv6 discussions to be held on the global-v6 mailing list
- Desirable to have uniform, global policies

BOT Policy Decision on /48s

- Ratified during August 15 meeting
- “ARIN will allocate IPv6 addresses according to the recommendation of the IAB/IESG. This policy will be regularly reviewed and modified subject to operational experience.”
- APNIC, ARIN, RIPE are now all using the /48 recommendation

BOT Policy Decision on Bootstrap Phase

- Ratified during August 15, 2001 meeting
- “The ARIN Board of Trustees suspends the pending suspension of the IPv6 bootstrap phase pending further discussion by the Board in conjunction with the other Regional Internet Registries.”
- APNIC, ARIN, RIPE continue to use existing bootstrap policy pending adoption of new policy

Policy Proposal: IPv6 Micro-Assignments

- Extend IPv4 microallocation policy to IPv6
- Policy would apply to:
  - public exchange points
  - gTLDs, ccTLDs, RIRs, and ICANN
- Note: not routable; useful for global reachability?
- Request for address via other policies allowed
- Some list discussion:
  - Why not use site-local addresses?
  - What is benefit, if address is not routable? (e.g., for gTLDs?)

IPv6 Micro-Assignments (cont.)

- RIPE will give /48 addresses for IXs.
- APNIC agreed to multiple /64s
- Proposal for ARIN:
  - Grant micro-assignments for exchanges
  - Either /64 or /48s are fine?
  - Only grant for exchanges, not other uses

Open Discussion

- Based on Anne Lord's posting to global-v6 mailing list on October 25, 2001

Basic Principal

- 5 goals of address policy: uniqueness, registration, aggregation, conservation, fairness
- In IPv4, all should be kept in balance
- In IPv6, higher priority in aggregation, lower in conservation

Initial Allocation Criteria

- Organization needs to fulfill the subsequent allocation criteria applied to /36 level.

Initial Allocation Size

- Option 1 (APNIC consensus) Shorter prefix of either:
  - Slow start
  - The fixed /32 as default, or
  - Evaluation of existing IPv4 infrastructure by RIR if larger space necessary (ie. more can be allocated if a need can be demonstrated).
- Option 2 (Dave Pratt proposal):
  - /28
  - Note: /35 is not acceptable since it is not practical by operational point of view.
- Keeping 4-bit boundary is highly preferable by RIPE community, but it is just preferable and

Subsequent Allocation Criteria

- Option 1 (APNIC consensus):
  - Subsequent allocation is allowed when a certain HD-Ratio utilization level is reached. The value of HD-Ratio to apply may be between 0.8-0.85, which requires the further detailed study to fix it.
- Option 2 (Dave Pratt proposal):
  - Simple 10% utilization (HD-Ratio is complicated, and 10% is about a mean value when taking HD-Ratio of 0.8.)
- Note: APNIC community and RIPE community agree to relax the criteria from the current criteria of 80% utilization.

Subsequent Allocation Size

- Option 1 (APNIC consensus): Shorter prefix of either;
  - Previous (n-1)th allocation size minus 1 as default (any organization can obtain, at least, one bit shorter prefix if it satisfies with the HD-Ratio criteria), or
  - Evaluation of two-year demands submitted to RIR if larger space necessary
- Option 2 (Dave Pratt proposal): between 2 and 5 bits so as to raise the request to the next 4-bit boundary
- Note: Keeping 4-bit boundary is highly preferable by RIPE community, but it is just preferable and not critical by APNIC community.

Sub-Allocation: LIR to ISP

- LIRs can decide the allocation criteria and size for their customer ISPs but they must report sum of all /48s to RIR when they make a subsequent allocation application for evaluation based on the subsequent allocation criteria.

Assignment To Site/End-users

- Depending on situations, LIRs assign /48, /64, or /128 to end-users.
- RIR/NIR must not concern what size is assigned, because it is within the IETF's technical boundary.
- If end-user uses up their /48 space and needs an additional /48, the end-user is able to request another. However, the request will be processed at the RIR/NIR level, not by LIR.

Definition of “Site”

- A “site” is identified as ISP-connection basis, i.e., every end-user is eligible to get a /48 when they make an IPv6 connection with ISP regardless of organization, location, etc.
- HD-Ratio is measured by the number of “sites” with /48 address.

Assignment To Infrastructure

- ISPs can assign up to /48 per PoP, which is regarded as just one assignment.

Database registration

- Every site (/48 address prefix) should be registered in database.
- Privacy concern should be taken care, e.g., Admin-contact and Tech-contact are substituted by ISP contacts.

Next Steps

- Follow-up discussions on global-v6 list
- Produce revised proposal:
  - Includes more detail
  - Clearly identifies where there is agreement
  - Indicates issues under discussion

Proposal of new IPv6 Address Policy

- Asia Pacific Consensus -

10/29/2001

Takashi Arano

JPNIC / Asia Global Crossing /

IPv6 Promotion Council of Japan

Asia Pacific Consensus

- There were two independent proposals presented at the APNIC open policy meeting in Aug. 2001.
  - One from RIRs
  - One from JPNIC and Japanese community
- These two proposals were merged into one
- The merged proposal got consensus there and will be presented today.

Background

- Several ISPs in Japan have already started IPv6 commercial services and many in Japan and other Asian countries will follow.
  - One serves more than 100 paying customers.
- Current “Provisional IPv6 Policy” is too vague for them to allocate and assign address to ISPs and end users.
- We have to develop more clear and complete address policy ASAP, at least for Asia Pacific region.

Basic Idea

- Follows idea of traditional IPv4 address policy
  - Slow start, concept of address lease, etc.
  - 5 Goals
    - Uniqueness
    - Registration
    - Aggregation
    - Conservation
    - Fairness
      - Mutually conflicted goals should be balanced
- Main difference in IPv6
  - Lower priority on conservation
  - More priority on aggregation

Simple Study with Figures

Some rough estimation to share an idea about what IPv6 address space is like.

The number of ISPs which can get independent blocks

- Allocating 2000::/3 (FP=001) to
  - Assuming HD-Ratio = 0.8
  - Case 1
    - Under 6.5K customer ISP(/32) : 540M ISPs
  - Case 2
    - 50M customer ISP(/16): 4096+
    - 600K customer ISP(/24): 1M +
    - Under 6.5K customer ISP(/32): 130M
- Probably allocating even /3 seems to be enough for the number of independent Internet connectivity business sectors.

The number of external routes

- Case 2 means that we will have 130M routes
  - When will we encounter such situation?
  - Will can future routers handle such a number of routes?
  - No one knows…..
- Since each AS holder announces at least one route, it would be better to allocate as less blocks as possible per an AS holder.
  - 10K AS times (average) 2.0 prefixes/AS = 20K prefixes
  - 100K AS times (average) 3.0 prefixes/AS = 300K prefixes
- Notes: punching holes of /48 etc would heavily affect the number of external routes, if happened

IPv6 Policy in this proposal

- We will examine main points in the Provisional Policy.
  - Philosophy of IP address policy
  - IPv6 operation experience in AP region
  - Real bottom-up proposal
- Items in the Proposal
  - Initial allocation
  - Subsequent allocation
  - LIR-to-ISP allocation
  - Assignment
  - DB registration

Initial Allocation Criteria

- Current Provisional criteria
  - 3 peering, ….etc.
- Proposed criteria
  - Justification of /36
    - At HD-Ratio 0.8 (= 18.9% of /36), this is 776 sites.
- Discussion
  - Entry barrier should be lowered.

Initial allocation size

- Current Provisional policy
  - /35 out of reserved /29
- Proposed policy
  - S0=Shorter(eval(v4infra), /32)
- Discussion
  - It will be reasonable to take IPv4's experience into account for solving the dilemma between preventing fragmentation and saving addresses.
  - /35 is too small for ISP which will start real services. It can only serves 8192 customers, while /29 is too big.
  - /35 prevents aggregation in internal routes.
  - /29 will be reserved for existing sTLA?

Subsequent Allocation

- Current Provisional policy
  - Criteria: 80%
  - Size: Not defined
- Proposed Criteria
  - HD Ratio = 0.80-0.85
  - Based on the number of “sites” with /48
- Proposed Size
  - Sn = shorter(Sn-1-1, eval2(2-year-req))
- Discussion
  - 80% causes address fragmentation in IGP.

LIR-to-ISP

No requirements

LIR can decide the criteria and the size,

But they must report sum of all /48s to RIR when they come back to RIR in evaluation of normal HD-ratio.

Assignment(I)

- Which should be assigned, /48, /64, /128?
  - It's within the IETF boundary.
  - Upper layer's registries must not concern which size LIRs/ISPs assign to end-users.
- Multiple /48s
  - If end users use up /48 and need more, they can request an additional /48 with justification.
  - This request will be processed in the RIR/NIR level.

Assignment(II)

- Definition of "site"
  - ISP-connection basis, i.e. every end user can get a /48 when they get an IPv6 connection from ISP, regardless of organization, location, etc.
  - Discussion
    - Organization basis is not practical.
    - ISP-connection basis is easy to operate, under the condition conservation is less important.
- Assignment to Infrastructure
  - Basically up to /48 per a PoP (regarded as just one assignment)
  - Office use can be regarded separately.

DB Registration

- Every /48 should be registered.
- Privacy concerns should be covered
  - Ex: Admin-c and tech-c of home residential users can be substituted by ISP contacts.
- Details: TBD

Miscellaneous

- Effective for at most 3 years
- The policy will be reviewed and revised whenever necessary.