2011-3:Better IPv6 Allocation for ISPs

Advisory Council Shepherds:
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Problem Statement

- Current minimum ISP allocation is a /32.
- Unintended consequence of making X-Small ISPs (by IPv4 footprint) into Small ISPs with attendant fee increases.
- Making minimum allocation a /36 while maintaining /32 as default allocation could save X-Small ISPs significant money.

Draft Policy Outline

- Delete section 2.9
- Replace section 2.10
- Add 2.12-2.14
- Replace 6.5.1 through 6.5.4
- Add to 6.5.7

Draft Policy Text

Amend section 2 as follows: Delete section 2.9 (Obsolete) Replace section 2.10 with the following: 2.10 The term End Site shall mean a single structure or service delivery address, or, in the case of a multi-tenant structure, a single tenant within said structure (a single customer location). Add the following: 2.12 When applied to IPv6 policies, the term serving site shall mean a location where an ISP terminates or aggregates customer connections, including, but not limited to, Points of Presence (POPs), Datacenters, Central or Local switching office or regional or local combinations thereof. 2.13 When applied to IPv6 policies, the term "provider assignment unit" shall mean the prefix of the smallest block a given ISP assigns to end sites (recommended /48). 2.14 The term utilized shall have the following definitions when applied to IPv6 policies: (i) A provider assignment unit shall be considered fully utilized when it is assigned to an end-site. (ii) Larger blocks shall have their utilization defined by dividing the number of provider assignment units assigned from the containing block by the total number of provider assignment units. This ratio will often be expressed as a percentage (e.g. a/t*100, for a /36 3072/4096 * 100 = 75% utilization)Replace sections 6.5.1 through 6.5.3 with the following:

6.5.1 Terminology (a) The terms ISP and LIR are used interchangeably in this document and any use of either term shall be construed to include both meanings. (b) The term nibble boundary shall mean a network mask which aligns on a 4-bit boundary (in slash notation, /n, where n is evenly divisible by 4, allowing unit quantities of X such that 2^n=X where n is evenly divisible by 4, such as 16, 256, 4096, etc.) 6.5.2 Initial Allocations to LIRs

6.5.2.1 Size (a) All allocations shall be made on nibble boundaries. (b) In no case shall an LIR receive smaller than a /32 unless they specifically request a /36. (c) The maximum allowable allocation shall be the smallest nibble-boundary aligned block that can provide an equally sized nibble-boundary aligned block to each of the requesters serving sites large enough to satisfy the needs of the requesters largest single serving site using no more than 75% of the available addresses. This calculation can be summarized as /N where N = 48-(X+Y) and X is a multiple of 4 greater than 4/3*serving sites and Y is a multiple of 4 greater than 4/3*end sites served by largest serving site. (d) For purposes of the calculation in (c), an end site which can justify more than a /48 under the end-user assignment criteria in 6.5.8 shall count as the appropriate number of /48s that would be assigned under that policy. (e) For purposes of the calculation in (c), an LIR which has subordinate LIRs shall make such allocations according to the same policies and criteria as ARIN. In such a case, the prefixes necessary for such an allocation should be treated as fully utilized in determining the block sizing for the parent LIR. (f) An LIR is not required to design or deploy their network according to this structure. It is strictly a mechanism to determine the largest IP address block to which the LIR is entitled. 6.5.2.2 Qualifications

An organization qualifies for an allocation under this policy if they meet any of the following criteria: (a) Have a previously justified IPv4 ISP allocation from ARIN or one of its predecessor registries or can qualify for an IPv4 ISP allocation under current criteria. (b) Are currently multihomed for IPv6 or will immediately become multihomed for IPv6 using a valid assigned global AS number. In either case, they will be making reassignments from allocation(s) under this policy to other organizations. (c) Provide ARIN a reasonable technical justification indicating why an allocation is necessary. Justification must include the intended purposes for the allocation and describe the network infrastructure the allocation will be used to support. Justification must also include a plan detailing anticipated assignments to other organizations or customers for one, two and five year periods, with a minimum of 50 assignments within 5 years. 6.5.3 Subsequent Allocations to LIRs (a) Where possible ARIN will make subsequent allocations by expanding the existing allocation. (b) An LIR which can show utilization of 75% or more of their total address space, or more than 90% of any serving site shall be entitled to a subsequent allocation. (c) If ARIN can not expand one or more existing allocations, ARIN shall make a new allocation based on the initial allocation criteria above. The LIR is encouraged, but not required to renumber into the new allocation over time and return any allocations no longer in use.Replace section 6.5.4 with the following 6.5.4 Assignments to end users shall be governed by the same practices adopted by the community in section 6.5.8 except that the requirements in 6.5.8.1 do not apply.Add the following to 6.5.7 LIRs which received an allocation under previous policies which is smaller than what they are entitled to under this policy may receive a new initial allocation under this policy provided that they agree to renumber into that new allocation and return their prior allocation(s) within 5 years. If possible, ARIN will simply expand their existing allocation rather than requiring renumber and return

JUST KIDDING!!!

But you probably want to follow along in the NRPM:

https://www.arin.net/policy/nrpm.html

Since we are talking about replacing certain chunks of the NRPM without actually showing those sections here.

Draft Policy Text

Delete section 2.9 (Obsolete)

~~The HD-Ratio is a way of measuring the efficiency of address assignment (RFC 3194). It is an adaptation of the H-Ratio originally defined in RFC 1715 and is expressed as follows:~~

~~HD = Log (number of allocated objects) / Log (maximum number of allocatable objects)~~

~~where (in the case of this document) the objects are IPv6 site addresses (/56s) assigned from an IPv6 prefix of a given size.~~

Draft Policy Text

Replace section 2.10 with the following:

2.10 The term End Site shall mean a single structure or service delivery address, or, in the case of a multi-tenant structure, a single tenant within said structure (a single customer location).

Draft Policy Text

Add the following:

2.12 When applied to IPv6 policies, the term serving site shall mean a location where an ISP terminates or aggregates customer connections, including, but, not limited to Points of Presence (POPs), Datacenters, Central or Local switching office or regional or local combinations thereof.

Draft Policy Text

Add the following:

2.13 When applied to IPv6 policies, the term "provider assignment unit" shall mean the prefix of the smallest block a given ISP assigns to end sites (recommended /48).

Draft Policy Text

Add the following:

2.14 The term utilized shall have the following definitions when applied to IPv6 policies:

(i) A provider assignment unit shall be considered fully utilized when it is assigned to an end-site.

(ii) Larger blocks shall have their utilization defined by dividing the number of provider assignment units assigned from the containing block by the total number of provider assignment units. This ratio will often be expressed as a percentage (e.g. a/t*100, for a /36 3072/4096 * 100 = 75% utilization)

Draft Policy Text

Replace sections 6.5.1 through 6.5.3 with the following:

Draft Policy Text

6.5.1 Terminology

(a) The terms ISP and LIR are used interchangeably in this document and any use of either term shall be construed to include both meanings.

(b) The term nibble boundary shall mean a network mask which aligns on a 4-bit boundary (in slash notation, /n, where n is evenly divisible by 4, allowing unit quantities of X such that 2^n=X where n is evenly divisible by 4, such as 16, 256, 4096, etc.)

Draft Policy Text

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Draft Policy Text

6.5.2.1 Size (cont'd)

(d) For purposes of the calculation in (c), an end site which can justify more than a /48 under the end-user assignment criteria in 6.5.8 shall count as the appropriate number of /48s that would be assigned under that policy.

(e) For purposes of the calculation in (c), an LIR which has subordinate LIRs shall make such allocations according to the same policies and criteria as ARIN. In such a case, the prefixes necessary for such an allocation should be treated as fully utilized in determining the block sizing for the parent LIR.

(f) An LIR is not required to design or deploy their network according to this structure. It is strictly a mechanism to determine the largest IP address block to which the LIR is entitled.

Draft Policy Text

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An organization qualifies for an allocation under this policy if they meet any of the following criteria:

(a) Have a previously justified IPv4 ISP allocation from ARIN or one of its predecessor registries or can qualify for an IPv4 ISP allocation under current criteria.

(b) Are currently multihomed for IPv6 or will immediately become multihomed for IPv6 using a valid assigned global AS number.

In either case, they will be making reassignments from allocation(s) under this policy to other organizations.

Draft Policy Text

6.5.2.2 Qualifications (cont'd)

(c) Provide ARIN a reasonable technical justification indicating why an allocation is necessary. Justification must include the intended purposes for the allocation and describe the network infrastructure the allocation will be used to support. Justification must also include a plan detailing anticipated assignments to other organizations or customers for one, two and five year periods, with a minimum of 50 assignments within 5 years.

Draft Policy Text

6.5.3 Subsequent Allocations to LIRs

(a) Where possible ARIN will make subsequent allocations by expanding the existing allocation.

(b) An LIR which can show utilization of 75% or more of their total address space, or more than 90% of any serving site shall be entitled to a subsequent allocation.

(c) If ARIN can not expand one or more existing allocations, ARIN shall make a new allocation based on the initial allocation criteria above. The LIR is encouraged, but not required to renumber into the new allocation over time and return any allocations no longer in use.

Draft Policy Text

Replace section 6.5.4 with the following:

6.5.4 Assignments to end users shall be governed by the same practices adopted by the community in section 6.5.8 except that the requirements in 6.5.8.1 do not apply.

Draft Policy Text

Add the following to 6.5.7

LIRs which received an allocation under previous policies which is smaller than what they are entitled to under this policy may receive a new initial allocation under this policy provided that they agree to renumber into that new allocation and return their prior allocation(s) within 5 years. If possible, ARIN will simply expand their existing allocation rather than requiring renumber and return.

Pros

- Common misconception that all ISPs get a /32 leads to squeezing customers into /56, /60, or /128.
- Allowing a range of addresses fixes this misconception
- Codifies nybble-aligned allocations

Pros

- Clear ability to delegate up to a /48 as a basic minimum
- 5-year planning horizon, oversized subsequent allocations means better aggregation
- Simplified address planning
- HD ratio not well-understood – replace with something simpler

Cons

- Increased IPv6 prefix consumption
- This policy may waste as much as approximately 0.4% of available IPv6 space over the next 50 years.
- Runout is surely imminent!

Staff Assessment

- This policy will lower the current minimum allocation size from a /32 to a /36 as it allows ISPs to request a /36". It should be noted that this policy still allows any ISP to receive at least a /32.

Errata

- Restore PAU into the calculation in 6.5.2.1(c)This is necessary to avoid a situation where an LIR allocates/60s to their customer but gets an ARIN allocation based on thatnumber of /48s. This was always the intent, but, in the multipleedits to make 6.5.2.1 comprehensible, it got lost.

Errata (cont'd)

- 6.5.3.1 is from policy that was enacted after this draft was originallywritten. It was never the intent of this proposal to override that policy.This change would preserve that language (2010-14).

Errata (cont'd)

- 6.5.4.1 Restores verbiage allowing ISPs to allocate to their internalinfrastructure. I think spelling this out is mostly a no-op but will makethe policy clearer. I do not believe this changes the intent or scopeof the policy in any meaningful way.

Errata (cont'd)

- Delete section 6.9. The language in 6.9 would conflict with thereplacement language in this policy. The failure to delete 6.9 wasan oversight during the development of this policy and this changedoes not change the intent or effect of this policy.

Discussion?