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L. Iannone
Telecom ParisTech
D. Lewis
Cisco Systems, Inc.
D. Meyer
Brocade
V. Fuller

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LISP EID Block
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Abstract

This is a direction to IANA to allocate a /32 IPv6 prefix for use with the Locator/ID Separation Protocol (LISP). The prefix will be used for local intra-domain routing and global endpoint identification, by sites deploying LISP as EID (Endpoint IDentifier) addressing space.

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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1. Introduction

This document directs the IANA to allocate a /32 IPv6 prefix for use with the Locator/ID Separation Protocol (LISP - [RFC6830]), LISP Map Server ([RFC6833]), LISP Alternative Topology (LISP+ALT - [RFC6836]) (or other) mapping systems, and LISP Interworking ([RFC6832]).

This block will be used as global Endpoint IDentifier (EID) space.

2. Definition of Terms

The present document does not introduce any new term with respect to the set of LISP Specifications ([RFC6830], [RFC6831], [RFC6832], [RFC6833], [RFC6834], [RFC6835], [RFC6836], [RFC6837]), but assumes that the reader is familiar with the LISP terminology. [I-D.ietf-lisp-introduction] provides an introduction to the LISP technology, including its terminology.

3. Rationale and Intent

Discussion within the LISP Working Group led to identify several scenarios in which the existence of a LISP specific address block brings technical benefits. Hereafter the most relevant scenarios are described:

Early LISP destination detection: With the current specifications, there is no direct way to detect whether or not a certain destination is in a LISP domain or not without performing a LISP mapping lookup. For instance, if an ITR is sending to all types of destinations (i.e., non-LISP destinations, LISP destinations not in the IPv6 EID block, and LISP destinations in the IPv6 EID block) the only way to understand whether or not to encapsulate the traffic is to perform a cache lookup and, in case of a LISP Cache miss, send a Map-Request to the mapping system. In the meanwhile (waiting the Map-Reply), packets may be dropped in order to avoid excessive buffering.

Avoid penalizing non-LISP traffic: In certain circumstances it might be desirable to configure a router using LISP features to natively forward all packets that have not a destination address in the block, hence, no lookup whatsoever is performed and packets destined to non-LISP sites are not penalized in any manner.

Traffic Engineering: In some deployment scenarios it might be desirable to apply different traffic engineering policies for LISP and non-LISP traffic. A LISP specific EID block would allow improved traffic engineering capabilities with respect to LISP vs. non-LISP traffic. In particular, LISP traffic might be identified without having to use DPI techniques in order to parse the encapsulated packet, performing instead a simple inspection of the outer header is sufficient.

Transition Mechanism: The existence of a LISP specific EID block may prove useful in transition scenarios. A non-LISP domain would ask for an allocation in the LISP EID block and use it to deploy LISP in its network. Such allocation will not be announced in the BGP routing infrastructure (cf., Section 4). This approach will allow non-LISP domains to avoid fragmenting their already allocated non-LISP addressing space, which may lead to BGP routing table inflation since it may (rightfully) be announced in the BGP routing infrastructure.

Limit the impact on BGP routing infrastructure: As described in the previous scenario, LISP adopters will avoid fragmenting their addressing space, since fragmentation would negatively impact the BGP routing infrastructure. Adopters will use addressing space from the EID block, which might be announced in large aggregates and in a tightly controlled manner only by proxy xTRs.

Is worth mentioning that new use cases can arise in the future, due to new and unforeseen scenarios.

Furthermore, the use of a dedicated address block will give a tighter control, especially filtering, over the traffic in the initial experimental phase, while facilitating its large-scale deployment.

[RFC3692] considers assigning experimental and testing numbers useful, and the request of a reserved IPv6 prefix is a perfect match of such practice. The present document follows the guidelines provided in [RFC3692], with one exception. [RFC3692] suggests the use of values similar to those called "Private Use" in [RFC5226], which by definition are not unique. One of the purposes of the present request to IANA is to guarantee uniqueness to the EID block. The lack thereof would result in a lack of real utility of a reserved IPv6 prefix.

4. Expected use

Sites planning to deploy LISP may request a prefix in the IPv6 EID

block. Such prefixes will be used for routing and endpoint identification inside the site requesting it. Mappings related to such prefix, or part of it, will be made available through the mapping system in use and registered to one or more Map Server(s).

The EID block must be used for LISP experimentation and must not be advertised in the form of more specific route advertisements in the non-LISP inter-domain routing environment. Interworking between the EID block sub-prefixes and the non-LISP Internet is done according to [RFC6832] and [RFC7215].

As the LISP adoption progresses, the EID block may potentially have a reduced impact on the BGP routing infrastructure, compared to the case of having the same number of adopters using global unicast space allocated by RIRs ([MobiArch2007]). From a short-term perspective, the EID block offers potentially large aggregation capabilities since it is announced by PxTRs possibly concentrating several contiguous prefixes. This trend should continue with even lower impact from a long-term perspective, since more aggressive aggregation can be used, potentially leading at using few PxTRs announcing the whole EID block ([FIABook2010]).

The EID block will be used only at configuration level, it is recommended not to hard-code in any way the IPv6 EID block in the router hardware. This allows avoiding locking out sites that may want to switch to LISP while keeping their own IPv6 prefix, which is not in the IPv6 EID block. Furthermore, in the case of a future permanent allocation, the allocated prefix may differ from the experimental temporary prefix allocated during the experimentation phase.

With the exception of PITR case (described in Section 8) prefixes out of the EID block must not be announced in the BGP routing infrastructure.

5. Block Dimension

The working group reached consensus on an initial allocation of a /32 prefix. The reason of such consensus is manifold:

- The working group agreed that /32 prefix is sufficiently large to cover initial allocation and requests for prefixes in the EID space in the next few years for very large-scale experimentation and deployment.

- As a comparison, it is worth mentioning that the current LISP Beta Network ([BETA]) is using a /32 prefix, with more than 250 sites

using a /48 sub prefix. Hence, a /32 prefix appears sufficiently large to allow the current deployment to scale up and be open for interoperation with independent deployments using EIDs in the new /32 prefix.

- o A /32 prefix is sufficiently large to allow deployment of independent (commercial) LISP enabled networks by third parties, but may as well boost LISP experimentation and deployment.

- o The use of a /32 prefix is in line with previous similar prefix allocation for tunneling protocols ([RFC3056]).

6. 3+3 Allocation Plan

This document requests IANA to initially assign a /32 prefix out of the IPv6 addressing space for use as EID in LISP (Locator/ID Separation Protocol).

IANA allocates the requested address space by MMMM/YYYY0 for a duration of 3 (three) initial years (through MMMM/YYYY3), with an option to extend this period by 3 (three) more years (until MMMM/YYYY6). By the end of the first period, the IETF will provide a decision on whether to transform the prefix in a permanent assignment or to put it back in the free pool (see Section 7 for more information).

[RFC Editor: please replace MMMM and all its occurrences in the document with the month of publication as RFC.]

[RFC Editor: please replace YYYY0 and all its occurrences in the document with the year of publication as RFC.]

[RFC Editor: please replace YYYY3 and all its occurrences in the document with the year of publication as RFC plus 3 years, e.g., if published in 2016 then put 2019.]

[RFC Editor: please replace YYYY6 and all its occurrences in the document with the year of publication as RFC plus 6 years, e.g., if published in 2016 then put 2022.]

In the first case, i.e., if the IETF decides to transform the block in a permanent allocation, the EID block allocation period will be extended for three years (until MMMM/YYYY6) so to give time to the IETF to define the final size of the EID block and create a transition plan. The transition of the EID block into a permanent allocation has the potential to pose policy issues (as recognized in [RFC2860], section 4.3) and hence discussion with the IANA, the RIR

communities, and the IETF community will be necessary to determine appropriate policy for permanent EID block allocation and management. Note as well that the final permanent allocation may differ from the initial experimental assignment, hence, it is recommended not to hard-code in any way the experimental EID block on LISP-capable devices.

In the latter case, i.e., if the IETF decides to stop the EID block experimental use, by MMMM/YYYY3 all temporary prefix allocations in such address range must expire and be released, so that the entire /32 is returned to the free pool.

The allocation and management of the EID block for the initial 3 years period (and the optional 3 more years) is detailed in [I-D.ietf-lisp-eid-block-mgmnt].

7. Allocation Lifetime

If no explicit action is carried out by the end of the experiment (by MMMM/YYYY3) it is automatically considered that there was no sufficient interest in having a permanent allocation and the address block will be returned to the free pool.

Otherwise, if the LISP Working Group recognizes that there is value in having a permanent allocation then explicit action is needed.

In order to trigger the process for a permanent allocation a document is required. Such document has to articulate the rationale why a permanent allocation would be beneficial. More specifically, the document has to detail the experience gained during experimentation and all of the technical benefits provided by the use of a LISP specific prefix. Such technical benefits are expected to lay in the scenarios described in Section 3, however, new unforeseen benefits may appear during experimentation. The description should be sufficiently articulate so to allow to provide an estimation of what should be the size of the permanent allocation. Note however that, as explained in Section 6, it is up to IANA to decide which address block will be used as permanent allocation and that such block may be different from the temporary experimental allocation.

8. Routing Considerations

In order to provide connectivity between the Legacy Internet and LISP sites, PITRs announcing large aggregates (ideally one single large aggregate) of the IPv6 EID block could be deployed. By doing so, PITRs will attract traffic destined to LISP sites in order to

encapsulate and forward it toward the specific destination LISP site. Routers in the Legacy Internet must treat announcements of prefixes from the IPv6 EID block as normal announcements, applying best current practice for traffic engineering and security.

Even in a LISP site, not all routers need to run LISP elements. In particular, routers that are not at the border of the local domain, used only for intra-domain routing, do not need to provide any specific LISP functionality but must be able to route traffic using addresses in the IPv6 EID block.

For the above-mentioned reasons, routers that do not run any LISP element, must not include any special handling code or hardware for addresses in the IPv6 EID block. In particular, it is recommended that the default router configuration does not handle such addresses in any special way. Doing differently could prevent communication between the Legacy Internet and LISP sites or even break local intra-domain connectivity.

9. Security Considerations

This document does not introduce new security threats in the LISP architecture nor in the legacy Internet architecture.

10. IANA Considerations

This document instructs the IANA to assign a /32 IPv6 prefix for use as the global LISP EID space using a hierarchical allocation as outlined in [RFC5226] and summarized in Table 1.

This document does not specify any specific value for the requested address block but suggests that should come from the 2000::/3 Global Unicast Space. IANA is not requested to issue an AS0 ROA (Route Origin Attestation [RFC6491]), since the Global EID Space will be used for routing purposes.

Attribute	Value
Address Block	2001:5::/32
Name	EID Space for LISP
RFC	[This Document]
Allocation Date	2015
Termination Date	MMMM/YYYY3 [1]
Source	True [2]
Destination	True
Forwardable	True
Global	True
Reserved-by-protocol	True [3]

[1] According to the 3+3 Plan outlined in this document termination date can be postponed to MMMM/YYYY6. [2] Can be used as a multicast source as well. [3] To be used as EID space by LISP [RFC6830] enabled routers.

Table 1: Global EID Space

[IANA: Please update the Termination Date and footnote [1] in the Special-Purpose Address Registry when the I-D is published as RFC.]

The reserved address space is requested for a period of time of three initial years starting in MMMM/YYYY0 (until MMMM/YYYY3), with an option to extend it by three years (until MMMM/YYYY6) up on decision of the IETF (see Section 6 and Section 7). Following the policies outlined in [RFC5226], upon IETF Review, by MMMM/YYYY3 decision should be made on whether to have a permanent EID block assignment. If no explicit action is taken or if the IETF review outcome will be that is not worth to have a reserved prefix as global EID space, the whole /32 will be taken out from the IPv6 Special Purpose Address Registry and put back in the free pool managed by IANA.

Allocation and management of the Global EID Space is detailed in a different document. Nevertheless, all prefix allocations out of this space must be temporary and no allocation must go beyond MMMM/YYYY3 unless the IETF Review decides for a permanent Global EID Space assignment.

11. Acknowledgments

Special thanks to Roque Gagliano for his suggestions and pointers. Thanks to Alvaro Retana, Deborah Brungard, Ron Bonica, Damien Saucez, David Conrad, Scott Bradner, John Curran, Paul Wilson, Geoff Huston,

Wes George, Arturo Servin, Sander Steffann, Brian Carpenter, Roger Jorgensen, Terry Manderson, Brian Haberman, Adrian Farrel, Job Snijders, Marla Azinger, Chris Morrow, and Peter Schoenmaker, for their insightful comments. Thanks as well to all participants to the fruitful discussions on the IETF mailing list.

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Appendix A. Document Change Log

[RFC Editor: Please remove this section on publication as RFC]

Version 13 Posted MMMM 2016.

- Changed I-D type from "Informational" to "Experimental" as requested by A. Retana during IESG review.
- Dropped the appendix "LISP Terminology"; replaced by pointer to the LISP Introduction document.
- Added Section 7 to clarify the process after the 3 years experimental allocation.
- Modified the dates, introducing variables, so to allow RFC Editor to easily update dates by publication as RFC.

Version 12 Posted May 2015.

- Fixed typos and references as suggested by the Gen-ART and OPS-DIR review.

Version 11 Posted April 2015.

- In Section 4, deleted contradictory text on EID prefix advertisement in non-LISP inter-domain routing environments.

- In Section 3 deleted the "Avoid excessive strech" bullet, because confusing.
- Deleted last bullet of the list in Section 3 because retundant w.r.t. global content of the document.

Version 10 Posted January 2015.

- Keep alive version

Version 09 Posted July 2014.

- Few Editorial modifications as requested by D. Saucez, as shepherd, during the write up of the document.
- Allocation date postponed to beginning 2015, as suggested by D. Saucez.

Version 08 Posted January 2014.

- Modified Section 4 as suggested by G. Houston.

Version 07 Posted November 2013.

- Modified the document so to request a /32 allocation, as for the consensus reached during IETF 88th.

Version 06 Posted October 2013.

- Clarified the rationale and intent of the EID block request with respect to [RFC3692], as suggested by S. Bradner and J. Curran.
- Extended Section 3 by adding the transion scenario (as suggested by J. Curran) and the TE scenario. The other scenarios have been also edited.
- Section 6 has been re-written to introduce the 3+3 allocation plan as suggested by B. Haberman and discussed during 86th IETF.
- Section 10 has also been updated to the 3+3 years allocation plan.
- Moved Section 11 at the end of the document.
- Changed the original Definition of terms to an appendix.

Version 05 Posted September 2013.

- No changes.

Version 04 Posted February 2013.

- Added Table 1 as requested by IANA.

- Transformed the prefix request in a temporary request as suggested by various comments during IETF Last Call.

- Added discussion about short/long term impact on BGP in Section 4 as requested by B. Carpenter.

Version 03 Posted November 2012.

- General review of Section 5 as requested by T. Manderson and B. Haberman.

- Dropped RFC 2119 Notation, as requested by A. Farrel and B. Haberman.

- Changed "IETF Consensus" to "IETF Review" as pointed out by Roque Gagliano.

- Changed every occurrence of "Map-Server" and "Map-Resolver" with "Map Server" and "Map Resolver" to make the document consistent with [RFC6833]. Thanks to Job Snijders for pointing out the issue.

Version 02 Posted April 2012.

- Fixed typos, nits, references.

- Deleted reference to IANA allocation policies.

Version 01 Posted October 2011.

- Added Section 5.

Version 00 Posted July 2011.

- Updated section "IANA Considerations"

- Added section "Rationale and Intent" explaining why the EID block allocation is useful.

- Added section "Expected Use" explaining how sites can request and use a prefix in the IPv6 EID Block.

- Added section "Action Plan" suggesting IANA to avoid allocating address space adjacent the allocated EID block in order to accommodate future EID space requests.
- Added section "Routing Consideration" describing how routers not running LISP deal with the requested address block.
- Added the present section to keep track of changes.
- Rename of draft-meyer-lisp-eid-block-02.txt.

Authors' Addresses

Luigi Iannone
Telecom ParisTech

Email: ggx@gigix.net

Darrel Lewis
Cisco Systems, Inc.

Email: darlewis@cisco.com

David Meyer
Brocade

Email: dmm@1-4-5.net

Vince Fuller

Email: vaf@vaf.net