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D. Dukes
Cisco Systems
J. Arango
Microsoft
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LISP Colored Engineered Underlays
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Abstract

This document defines a LISP control plane extension that associates a locator record with a color value that can be used to select an engineered underlay path to the corresponding RLOC.

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Table of Contents

1.	Introduction	2
2.	Requirements Notation	3
3.	Color LCAF	3
4.	IANA Considerations	4
5.	Security Considerations	4
6.	References	4
6.1.	Informative References	4
6.2.	Normative References	4
	Authors' Addresses	5

[1.](#) Introduction

LISP [[RFC6830](#)] provides reachability to overlay addresses called Endpoint Identifiers (EIDs) via one or more underlay addresses called Routing Locators (RLOCs). For each destination RLOC, it may be desirable for the control plane to select one of potentially multiple underlay paths.

For traffic traversing an Ingress Transit Router (ITR) to an Egress Transit Router (ETR), the ITR may be able to reach a particular ETR RLOC through multiple underlay paths available via one or more locally connected service providers. Furthermore, the ITR may be able to select which of these paths per provider to use, for example different paths may have unique bandwidth and latency metrics making them more or less suitable for traffic destined to some EIDs. When the ITR requests and obtains an EID mapping, it needs to know how to choose an underlay path for each remote RLOC. If the ETR can provide a hint in terms of an opaque color attribute for each RLOC the EID maps to, then the ITR would be able to select a policy matching that <RLOC,color> tuple to satisfy the needs of the application or endpoint associated with this particular EID.

One expected use of the <RLOC,color> tuple is to select a Segment Routing policy as defined in [[I-D.filsfils-spring-segment-routing-policy](#)].

This draft specifies an LCAF type [[RFC8060](#)] that encodes the color for each RLOC in an EID mapping record. The ITR MAY use the color to determine the underlay path to reach the EID via the corresponding RLOC.

A locator record now has an RLOC and color, and both fields are part of the comparison to determine if two locator records are the same.

The definition of how the color is chosen or configured at the ETR, or how policies are distributed and configured at the ITR is outside the scope of this document.

2. Requirements Notation

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [\[RFC2119\]](#).

3. Color LCAF

When a color is stored in the LISP Mapping Database System for selection of an appropriate policy to reach an EID via a destination RLOC it MAY be encoded in a LISP Canonical Address.

```

+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|      AFI = LCAF (16887)      |      Rsvd1      |      Flags      |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|  Type = TBD  |C|0|  Rsvd2  |      Length      |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                                     Color ...      |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|                                     ... Color      |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|      AFI      |      Address      |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

```

CO Flags: The CO Flags are as defined in [\[I-D.filsfils-spring-segment-routing-policy\]](#) and have the following impact on how the subsequent Color is interpreted. 00 is their default value.

When 00, the traffic destined to EID is preferably steered onto a valid policy <RLOC, C> where RLOC is the IPv4/6 destination RLOC address and C is a color value, else it is steered on the shortest path to the RLOC.

When 01, the traffic destined to EID is preferably steered onto a valid policy <RLOC, C> else onto a valid policy (null endpoint, C) else on the shortest path to the RLOC.

When 10, the traffic destined to EID is preferably steered onto a valid policy <RLOC, C> else onto a valid policy (null endpoint, C) else on any valid SR-TE policy <any endpoint, C> else on the IGP path to the RLOC.

The null endpoint is 0.0.0.0 for IPv4 and ::0 for IPv6 (all bits set to 0).

Color: A 64-bit color value.

AFI: The address family of the locator. Valid values are 1 for IPv4 and 2 for IPv6.

Address: The address of the locator.

The Color Canonical Address Type can be used to encode RLOC addresses.

Usage: This encoding can be used in RLOC records in Map-Requests, Map-Replies, Map-Registers, and Map-Notify messages. When LISP-DDT [I-D.ietf-lisp-ddt] is used as the mapping system mechanism, extended EIDs are used in Map-Referral messages.

4. IANA Considerations

An assignment is requested from IANA "LISP LCAF Type" registry for the "Color LCAF", value is TBD.

5. Security Considerations

The Color LCAF may indirectly indicate association of the type of service offered by some subsets of endpoints to ITRs that was not previously disclosed to the ITR.

6. References

6.1. Informative References

[I-D.filsfils-spring-segment-routing-policy]
Filsfils, C., Sivabalan, S., Raza, K., Liste, J., Clad, F., Hegde, S., Lin, S., bogdanov@google.com, b., Horneffer, M., Steinberg, D., Decraene, B., and S. Litkowski, "Segment Routing Policy for Traffic Engineering", [draft-filsfils-spring-segment-routing-policy-03](#) (work in progress), October 2017.

6.2. Normative References

[I-D.ietf-lisp-ddt]
Fuller, V., Lewis, D., Ermagan, V., Jain, A., and A. Smirnov, "LISP Delegated Database Tree", [draft-ietf-lisp-ddt-09](#) (work in progress), January 2017.

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/info/rfc2119>>.
- [RFC6830] Farinacci, D., Fuller, V., Meyer, D., and D. Lewis, "The Locator/ID Separation Protocol (LISP)", [RFC 6830](#), DOI 10.17487/RFC6830, January 2013, <<https://www.rfc-editor.org/info/rfc6830>>.
- [RFC8060] Farinacci, D., Meyer, D., and J. Snijders, "LISP Canonical Address Format (LCAF)", [RFC 8060](#), DOI 10.17487/RFC8060, February 2017, <<https://www.rfc-editor.org/info/rfc8060>>.

Authors' Addresses

Darren Dukes
Cisco Systems
Canada

Email: ddukes@cisco.com

Jesus Arango
Microsoft
USA

Email: gearango@microsoft.com

