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LISP Generic Protocol Extension
draft-lewis-lisp-gpe-01.txt

Abstract

This draft describes a mechanism for adding generalized multi-protocol support to the Locator/ID Separation Protocol (LISP) [RFC6830]. Protocol identification is carried in the LISP header and is used to describe the encapsulated payload.

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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This Internet-Draft will expire on April 4, 2014.

Table of Contents

1. Introduction

LISP [RFC6830] defines an encapsulation format that carries IPv4 or IPv6 (henceforth referred to as IP) packets in a LISP header and outer UDP/IP transport. The LISP header does not specify the protocol being encapsulated and therefore is currently limited to encapsulating only IP packet payloads. Other protocols, most notably VXLAN [VXLAN] (which defines a similar header format to LISP), are used to encapsulate L2 protocols such as Ethernet. LISP [RFC6830] can be extended to indicate the inner protocol, enabling the encapsulation of Ethernet, IP or any other desired protocol all the while ensuring compatibility with existing LISP [RFC6830] deployments.

This document describes extending LISP ([RFC6830]) to support additional payload types beyond IP packets. To support this capability, two elements of the existing LISP header are modified.

1. A flag bit is allocated, and set in the LISP header.

2. A 16 bit Protocol Type field is present in the LISP header.

These changes allow for the LISP header to support many different types of payloads. Backward compatibility with existing LISP tunnel routers is discussed in section 4.

2. LISP Header

As described in the introduction, the LISP header has no protocol identifier that indicates the type of payload being carried by LISP. Because of this, LISP is limited to an IP payload.

The LISP header contains flags (some defined, some reserved), a Nonce/Map-version field and an instance ID/Locator-status-bit field. The flags provide flexibility to define how the reserved bits can be used to change the definition of the LISP header.

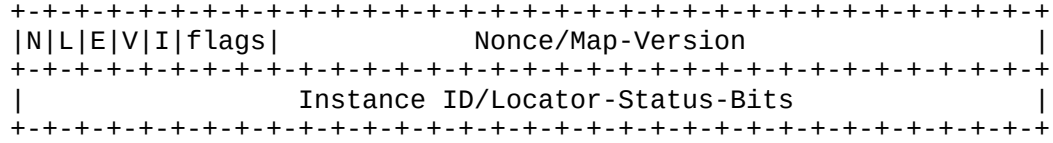

Figure 1: LISP Header

3. Generic Protocol Extension for LISP (LISP-gpe)

3.1. LISP-gpe Header

This draft defines two changes to the LISP header in order to support multi-protocol encapsulation.

P Bit: Flag bit 5 is defined as the P bit. The P bit MUST be set to 1 to indicate the presence of the 16 bit protocol type field in the lower 16 bits of the first word.

P = 0 indicates that the payload MUST conform to LISP as defined in [RFC6830].

Flag bit 5 was chosen as the P bit because this flag bit is currently unallocated in LISP [RFC6830].

Protocol Type Field: The lower 16 bits of the first word are used to carry a protocol type. This protocol type field contains the protocol, as defined in in [RFC1700] and in [ETYPES], of the encapsulated payload packet.

LISP [RFC6830] uses the lower 16 bits of the first word for either a nonce, an echo-nonce ([RFC6830]) or to support map-versioning ([RFC6834]). These are all optional capabilities that are indicated by setting the N, E, and the V bit respectively.

To maintain the desired data plane compatibility, when the P bit is set, the N, E, and V bits MUST be set to zero.

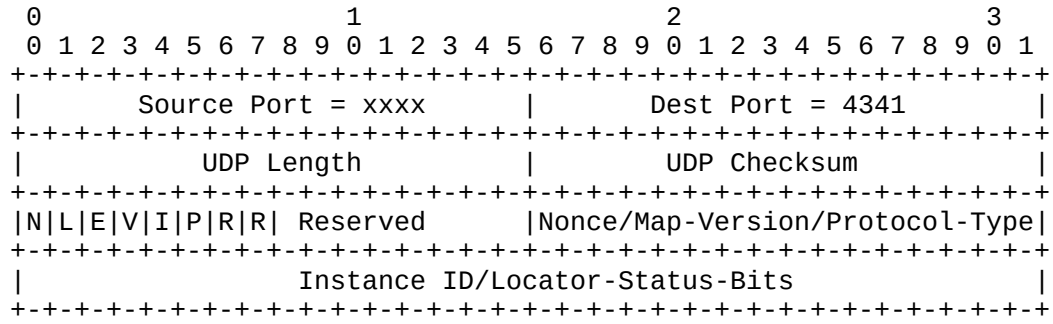

Figure 2: UDP + LISP-gpe

4. Backward Compatibility

An undefined (in RFC6830) flag bit, 5, was selected to ensure compatibility with existing LISP [RFC6830] deployments.

Similarly, using P = 0 to indicate that the format of the header and payload conforms to [RFC6830] ensures compatibility with existing LISP hardware forwarding platforms.

4.1. LISP-gpe Routers to (legacy) LISP Routers

A LISP-gpe router MUST not encapsulate non-IP packets to a LISP router. A method for determining the capabilities of a LISP router (gpe or "legacy") is out of the scope of this draft.

When encapsulating IP packets to a LISP router the P bit SHOULD be set to 1 and the UDP port MUST be set to 4341. The Protocol Type field SHOULD be 0x800 or 0x86DD. The (legacy) LISP router will ignore the P bit and the protocol type field. The (legacy) LISP router will treat the packet as a LISP packet and inspect the first nibble of the payload to determine the IP version.

When the P bit is set, the N, E, and V bits MUST be set to zero. The receiving (legacy) LISP router will ignore N, E and V bits, when the P bit is set.

4.2. (legacy) LISP Routers to LISP-gpe Routers

When a LISP-gpe router receives a packet from a (legacy) LISP router, the P bit MUST not be set and the UDP port MUST be 4341. The payload MUST be IP, and the LISP-gpe router will inspect the first nibble of the payload to determine IP version.

4.3. Type of Service

When a LISP-gpe router performs Ethernet encapsulation, the inner 802.1Q [IEEE8021Q] priority code point (PCP) field MAY be mapped from the encapsulated frame to the Type of Service field in the outer IPv4 header, or in the case of IPv6 the ’Traffic Class’ field.

4.4. VLAN Identifier (VID)

When a LISP-gpe router performs Ethernet encapsulation, the inner header 802.1Q [IEEE8021Q] VLAN Identifier (VID) MAY be mapped to, or used to determine the LISP Instance ID field.

5. LISP-gpe Examples

This section provides two examples of IP protocols, and one example of Ethernet encapsulated LISP-gpe using the generic extension described in this document.

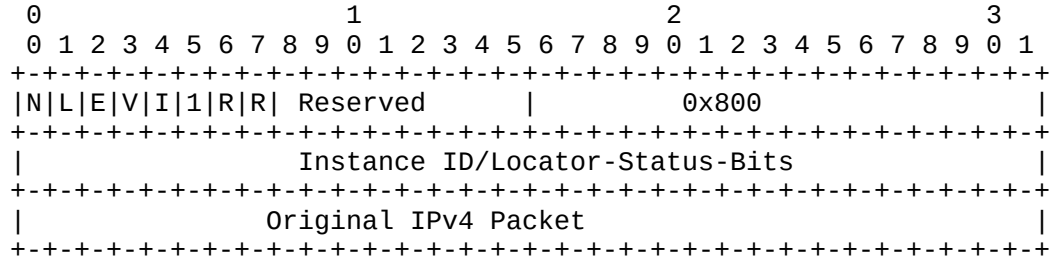

Figure 3: IPv4 and LISP-gpe

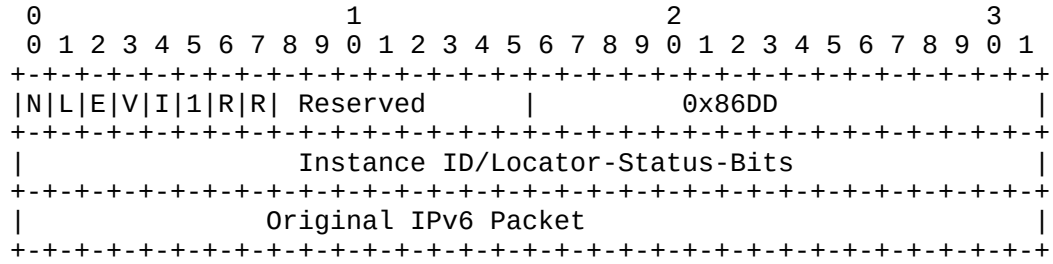

Figure 4: IPv6 and LISP-gpe

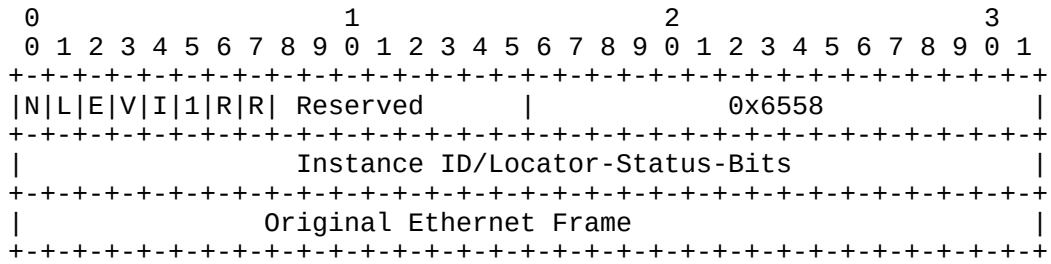

Figure 5: Ethernet and LISP-gpe

6. Security Considerations

LISP-gpe security considerations are similar to the LISP security considerations documented at length in LISP [RFC6830]. With LISP-gpe, issues such as dataplane spoofing, flooding, and traffic redirection are dependent on the particular protocol payload encapsulated.

7. Acknowledgments

A special thank you goes to Dino Farinacci for his guidance and detailed review.

8. IANA Considerations

This document creates no new requirements on IANA namespaces [RFC5226].

9. References

9.1. Normative References

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9.2. Informative References

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[RFC6834] Iannone, L., Saucez, D., and O. Bonaventure, "Locator/ID Separation Protocol (LISP) Map-Versioning", RFC 6834, January 2013.

[VXLAN] Dutt, D., Mahalingam, M., Duda, K., Agarwal, P., Kreeger, L., Sridhar, T., Bursell, M., and C. Wright, "VXLAN: A Framework for Overlaying Virtualized Layer 2 Networks over Layer 3 Networks", 2013.

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