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Transparent Interconnection of Lots of Links (TRILL)
Support of the Link Layer Discover Protocol (LLDP)
<[draft-eastlake-trill-lldp-01.txt](#)>

Abstract

RBridges are devices that implement the IETF TRILL (Transparent Interconnection of Lots of Links, [RFC 6325](#)) protocol. The Link Layer Discovery Protocol (LLDP, IEEE Std 802.1AB) is a one-way, unacknowledged protocol for the announcement of a station's capabilities to its peers. The set of peers that receive these frames and the scoping of the frame is primarily determined by the destination MAC address of the LLDP frame. This document specifies a Nearest-RBridge MAC address and other details of TRILL support of LLDP. It updates [RFC 6325](#).

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LLDP Support in TRILL

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1. Introduction

The Link Layer Discovery Protocol (LLDP [[802.1AB](#)]) is a one-way, unacknowledged protocol for the announcement of a station's capabilities to its peers. The set of peers that receive these frames and the scoping of the frame is primarily determined by the destination address of the LLDP frame. This document specifies TRILL (Transparent Interconnection of Lots of Links, [[RFC6325](#)] [[RFC6327](#)]) support of LLDP. Such support is optional. This document updates [[RFC6325](#)].

Clause 7.1 of the IEEE [[802.1AB](#)] Standard provides that LLDP may be used with any unicast or group (multi-destination) destination address. This document specifies the Nearest-RBridge MAC destination address.

1.1 Terminology and Acronyms

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](#)].

The following are used in this document:

IEEE - Institute for Electronic and Electrical Engineers
(www.ieee.org)

LLDP - Link Layer Discovery Protocol [[802.1AB](#)]

LLDPDU - LLDP Data Unit [[802.1AB](#)]

MAC - Media Access Control [[802](#)]

RBridge - Routing Bridge [[RFC6325](#)]

TPMR - Two Port MAC Relay [[802.1Q](#)]

TRILL - Transparent Interconnection of Lots of Links [[RFC6325](#)]

[2](#). LLDP on RBridge Ports

LLDP [[802.1AB](#)] is explicitly specified to be usable with "Any group MAC address" and "Any individual MAC address" as the destination address. That standard also documents specific destination MAC addresses with different scope for propagation across various bridge types specified by IEEE 802.1 such as:

- o Nearest Customer Bridge: Propagation stops at the nearest Customer Bridge; i.e. such frames would pass through Provider Bridges and Two-port MAC Relays (TPMRs) [[802.1Q](#)]. (01-80-C2-00-00-00)
- o Nearest Non-TPMR Bridge: Propagation stops at the nearest Customer or Provider Bridge, but not at a TPMR. (01-80-C2-00-00-03)
- o Nearest Bridge: Propagation stops at the nearest bridge of any type, including a TPMR. (01-80-C2-00-00-02)

Note that the devices that stop the propagation of LLDP frames are the only devices that process them; other devices forward them as if they were regular data frames.

A new Nearest-RBridge multicast MAC address (see [Section 4](#)) is used

as a destination MAC address with LLDPUs to send them to neighbor R Bridges. There may in the future be other uses of the Nearest-R Bridge multicast MAC address; in such applications, the EtherType of those frames would be different than the LLDP EtherType (0x88CC).

[2.1](#) Use on Ethernet Ports

LLDPUs sent with the Nearest-R Bridge multicast address out an R Bridge Ethernet port are not encapsulated with a TRILL Header and are sent natively. Intervening bridges, if any, will be transparent to frames using this multicast address.

LLDPUs using the Nearest-R Bridge MAC destination address may be transmitted as permitted by [\[802.1AB\]](#) by an R Bridge on any of its Ethernet ports regardless of the state of any adjacencies [\[IS-IS\]](#) [\[RFC6327\]](#) on that port.

LLDPUs may also be sent by an R Bridge on Ethernet ports with the IEEE 802.1 provided destination MAC addresses listed above or other appropriate destination MAC addresses if other scopes are desired.

[2.2](#) Use on Other R Bridge Ports

If an R Bridge port is a port on which an LLDPDU cannot be transmitted in native form, for example, a PPP TRILL port [\[RFC6361\]](#), the Nearest-R Bridge destination MAC multicast address is still used but the LLDPDU appears inside a TRILL Data frame as specified in [Section 3](#). The payload EtherType is the LLDP EtherType (0x88CC) with the subsequent portion of the frame following normal LLDP rules. This technique can be used to send an LLDPDU out any non-Ethernet R Bridge port to R Bridges that are one hop away.

To assure that any required link initialization has occurred, TRILL Data frames containing LLDPUs MUST NOT be transmitted out an R Bridge port unless there is at least one adjacency [\[IS-IS\]](#) [\[RFC6327\]](#) on that port in a state other than Down. The rate of transmission of such

frames is governed by the same rules as native LLDPDUs [[802.1AB](#)].

An LLDPDU received in a TRILL Data frame must pass the tests in [Section 3.2](#) before being passed on to LLDP to be acted on.

[3.](#) Nearest-RBridge as Inner.MacDA

The Nearest-RBridge multicast MAC address is not intended to be forwarded by an Rbridge, and as a result the scope of a frame with this address as the MAC destination address would be all immediately adjacent RBridge neighbors on a link. The following sub-sections specify TRILL Data frame transmission and receipt where the

Inner.MacDA is Nearest-RBridge.

[3.1](#) Transmission

When the Inner.MacDA of a TRILL Data frame is the Nearest-RBridge multicast MAC, then the following apply. Different uses of this MAC address are distinguished by the payload EtherType, for example 0x88CC for LLDP.

1. The originating RBridge MUST set the Inner.MacSA to a MAC address unique within the campus owned by that originating RBridge. This MAY be the same Inner.MacSA used for ESADI [[ESADIdraft](#)] and/or RBridge Channel [[Channel](#)] frames.
2. The Inner.VLAN defaults to 0x001 and is ignored on receipt unless otherwise specified.
3. TRILL Header fields MUST be set as follows:
 - 3.a the hop count is initialized to the maximum value (0x3F),
 - 3.b the M bit is set to zero,
 - 3.c the ingress nickname is a nickname owned by the originating RBridge,
 - 3.d the egress nickname is set to Any-RBridge. RBridges supporting the Nearest-RBridge MAC address MUST recognize the Any-RBridge egress nickname.
4. The link header/trailer are set as for a multi-destination TRILL Data frame [[RFC6325](#)].

[3.2](#) Receipt

When a TRILL Data frame with an Inner.MacDA of Nearest-RBridge is egressed at an RBridge, it MUST be discarded unless it passes the following TRILL Header tests:

1. The M bit is zero and the egress nickname is Any-RBridge.
2. The hop count confirms that it came from an immediate neighbor [[RFC5082](#)]; that is, the hop count is 0x3F before decrement or 0x3E if tested after decrement.

If not discarded, it is assumed to be directed to the egress RBridge itself and is handled as appropriate for the payload protocol.

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4. Change in [RFC 6325](#)

A change in the behavior mandated by [\[RFC6325\]](#) is required to support the optional features specified in this document, as follows:

An RBridge conformant to [\[RFC6325\]](#) will discard an Ethernet frame that it receives whose Outer MAC destination address is the Nearest-RBridge multicast address. To support LLDP to that address as described in [Section 2.1](#) above, an RBridge must accept such frames and process them appropriately depending on their protocol type if the RBridge implements that protocol. For example, if the EtherType is the LLDP EtherType and LLDP is implemented at the receiving RBridge, it would be processed as an LLDPDU.

5. IANA Considerations

IANA is requested to allocate a new TRILL multicast address [01-80-C2-00-00-44 suggested] for use as the Nearest-RBridge address and add this to the TRILL Multicast Addresses sub-registry.

6. Security Considerations

This document specifies how to send LLDPDUs between adjacent R Bridges. These techniques increase the span of the "link" over which LLDP can operate. This increased span may require use of additional security measures depending on the uses to which LLDP is put. If sensitive information is being transported, then appropriate link security should be used, depending on the link type, such as IEEE [\[802.1AE\]](#) for Ethernet links.

Should an RBridge that does not understand the Any-RBridge egress nickname accept a frame with Outer.MacDA of All-R Bridges but with the M bit zero in the TRILL Header it will simply discard the frame as having a reserved egress nickname value.

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Normative References

- [802.1AB] - IEEE 802.1, "IEEE Standard for Local and metropolitan area networks / Station and Media Access Control Connectivity Discovery", IEEE Std 802.1AB-2009, 17 September 2009.
- [IS-IS] - ISO/IEC 10589:2002, Second Edition, "Intermediate System to Intermediate System Intra-Domain Routing Exchange Protocol for use in Conjunction with the Protocol for Providing the Connectionless-mode Network Service (ISO 8473)", 2002.
- [RFC2119] - Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC5082] - Gill, V., Heasley, J., Meyer, D., Savola, P., Ed., and C. Pignataro, "The Generalized TTL Security Mechanism (GTSM)", [RFC 5082](#),
- [RFC6325] - Perlman, R., D. Eastlake, D. Dutt, S. Gai, A. Ghanwani, "Routing Bridges (RBridges): Base Protocol Specification", [RFC 6325](#), July 2011.
- [RFC6327] - Eastlake 3rd, D., Perlman, R., Ghanwani, A., Dutt, D., and V. Manral, "Routing Bridges (RBridges): Adjacency", [RFC 6327](#), July 2011.
- [ESADIdraft] - H. Zhai, F. Hu, R. Perlman, D. Eastlake, [draft-ietf-trill-esadi](#), work in progress.

Informative References

- [802] - IEEE 802, "IEEE Standard for Local and metropolitan area

networks: Overview and Architecture", IEEE Std 802-2001, 8 March 2002.

[802.1AE] - IEEE 802.1, "IEEE Standard for Local and metropolitan area networks / Media Access Control (MAC) Security", IEEE Std 802.1AE-2006, 18 August 2006.

[802.1Q] - IEEE 802.1, "IEEE Standard for Local and metropolitan area networks / Virtual Bridged Local Area Networks", IEEE Std 802.1Q-2011, 31 August 2011.

[RFC6361] - Carlson, J. and D. Eastlake 3rd, "PPP Transparent Interconnection of Lots of Links (TRILL) Protocol Control Protocol", [RFC 6361](#), August 2011.

[Channel] - D. Eastlake, V. Manral, L. Yizhou, S. Aldrin, D. Ward,

D. Eastlake

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[draft-ietf-trill-rbridge-channel](#), work in progress.

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