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**Multiple Topology Routing Extensions for Transparent Interconnection  
of Lots of Links (TRILL)  
draft-manral-isis-trill-multi-topo-04.txt**

**Abstract**

This document describes optional extensions to the TRILL protocol's use of IS-IS (Intermediate System to Intermediate Systems). These extensions support multiple topologies (MT) within the same TRILL campus and protocol instance of IS-IS.

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## **1. Introduction**

Maintaining Multiple Topologies (MT) in an Rbridge campus requires extensions to the base TRILL protocol use of IS-IS [[ISIStrill](#)]. These extensions change the packet encoding on the wire. This document describes such extensions so that multiple topologies can be supported as described in [[RFC5120](#)].

## **2. Terminology**

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](#)].

IS-IS: Intermediate-System to Intermediate-System

LSP: Link State Protocol Data Unit (PDU)

Rbridge: Routing Bridge

SPF: Shortest Path First Algorithm

TRILL: Transparent Interconnection with Lots of Links

TLV: Type, Length and Value



### 3. TLV Enhancements for Multiple Topology

Currently the Router Capability TLV is specified in [RFC4971]. For TRILL, many sub-TLV's are specified as being carried in the Router Capability TLV which carries information only for a single Topology.

The following extensions are required to TRILL use of IS-IS to support multi-topology:

1. The Nicknames sub-TLV, Trees sub-TLV, Tree Identifiers sub-TLV, Trees Used Identifiers sub-TLV, and VLAN Group sub-TLV, MAY be encapsulated in the MT-CAP TLV (TLV #144) [ISISieee].
2. The Multi-Topology TLV [RFC5120] MAY be advertized in the TRILL LAN Hellos and RBridge LSPs. It will contain topology identifiers for one or more topologies in which the Rbridge is participating. An RBridge is considered MT aware as long as it advertises at least one MT TLV in its LSP.
3. The MTU sub-TLV [ISIStrill] MAY occur in the MT ISN TLV #222 [RFC5120] as well as in the Extended IS Reachability TLV #22.
4. The Topology Mapping (TOPO-MAP) sub-TLV, which occurs within a Router Capabilities TLV (TLV #242) for MT Aware RBridges [trill-mt] is specified below. This sub-TLV may occur more than once in the same or in multiple Router Capabilities TLVs.

```

+-+--+--+--+--+--+
|Type = TOPO-MAP|      (1 byte)
+-+--+--+--+--+--+
|  Length      |      (1 byte)
+-+--+--+--+--+--+
|   RESV   |TAS|      (1 byte)
+-+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
|R| ABR |      Topology 1      | (2 bytes)
+-+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
|R| ABR |      Topology 2      | (2 bytes)
+-+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
| . . .
+-+--+--+--+--+--+--+--+--+--+--+--+--+--+--+
|R| ABR |      Topology N      | (2 bytes)
+-+--+--+--+--+--+--+--+--+--+--+--+--+--+--+

```

- o Type: Router Capability sub-TLV Type, set to TBD (TOPO-MAP).
- o Length: 1 + 2\*n where n is the number of topology to topology mapping entries.
- o RESV: Five reserved bits, must be sent as zero and ignored

on receipt.



- o TAS: Topology Abbreviation Size as specified in [[trill-mt](#)].
- o R: Reserved bit. must be sent as zero and ignored on receipt.
- o ABR, Topology: Each 2-byte mapping entries specifies that ABR is the abbreviation for the 12-bit topology number given.

#### **4. Multi-Topology Changes to Appointed Forwarders**

The TRILL IS-IS DRB election protocol is a bit different from Layer-3 IS-IS as described in [[RFCadj](#)]. The DRB corresponds to the DIS (Designated Intermediate System) and is responsible for specifying the Designated VLAN for communication between the RBridges on the Link [[RFCtrill](#)]. As in [[RFC5120](#)], there is only one DRB on a link.

However, the DRB also handles all native frames being ingressed from or egressed to the link, as it chooses, or may appoint other RBridges on the link Appointed Forwarder [[RFCaf](#)] for one or more VLANs. Appointed Forwarders are per topology. The appointed forwarder sub-TLV is already a part of the MT-PORT-CAP TLV, which is Multi-Topology Aware.



## **5. Security Considerations**

The extensions to TRILL use of IS-IS specified herein add no new Security Considerations beyond those already present with multi-topology IS-IS and TRILL. See [[RFC5120](#)] for IS-IS multi-topology security considerations. See [[RFCtrill](#)] for TRILL base protocol security considerations.

## **6. IANA Considerations**

IANA is requested to update the subregistry of the IS-IS TLV Code points Registry which shows permitted occurrence of sub-TLVs within TLVs #22, #141, and #222 to show that the MTU sub-TLV is permitted in TLV #222 as well as in TLV #22.

IANA is requested to assign sub-TLV numbers within the MT-CAP TLV (TLV #144) [[ISISieee](#)] for the Nicknames sub-TLV, Trees sub-TLV, Tree Identifiers sub-TLV, Trees Used Identifiers sub-TLV, and VLAN Group sub-TLV [[ISIStrill](#)]. Noting that there is no conflict between the numbers of these sub-TLVs within the Router Capabilities TLV #242 and with any other number so far assigned within the MT-CAP TLV, it is requested that these sub-TLVs be assigned the same number within the MT-CAP TLV as they have within the Router Capabilities TLV #242.

IANA is request to assign a sub-TLV number within the Router Capabilities TLV (TV #242) for the TOPO-MAP sub-TLV.

## **7. Acknowledgements**

The authors would like to thank Meenakshi Kaushik and Dinesh Dutta.



## 8. References

Normative and informative references for this document are given below.

### 8.1 Normative References

- [RFC2119] - Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
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- [RFC5120] - Przygienda, T., Shen, N., and N. Sheth, "M-ISIS: Multi Topology (MT) Routing in Intermediate System to Intermediate Systems (IS-ISs)", [RFC 5120](#), February 2008.
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- [RFCadj] - D. Eastlake, R. Perlman, A. Ghanwani, D. Dutt, V. Manral, "RBrigdes: Adjacency", [draft-ietf-trill-adj](#), work in progress.
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- [trill-mt] - Perlman, R., D. Eastlake, M. Zhang, A. Banerjee, V. Manral, "RBrigdes: Multiple Topology TRILL", [draft-eastlake-trill-rbridge-multi-topo-00.txt](#), work in progress.

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None.



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