Distribution of TRILL Link-State using BGP

draft-hao-idr-ls-trill-01

Weiguo Hao

Donald Eastlake

Huawei

July 2015   Prague

Motivation

```
                       +-------------+
                       |     SDN     |
              ---------|  Controller |--------
              |        +-------------+        |
              |                               |
            + +                             + +
             +              +-----------+     +
                            |           |
             +--------+     |IP Network |     +--------+
             |        |     |           |     |        |
  +---+ +---+|        | +----+       +----+   |        |+---+ +---+
  |ES1|-|RB1|-| Area 1 |-|BRB1|       |BRB2|-| Area 2 |-|RB2|-|ES2|
  +---+ +---+|        | +----+       +----+   |        |+---+ +---+
             |        |     |           |     |        |
             +--------+     +-----------+     +--------+

       |<----TRILL ------>|<IP tunnel>|<-----TRILL ----->|
```
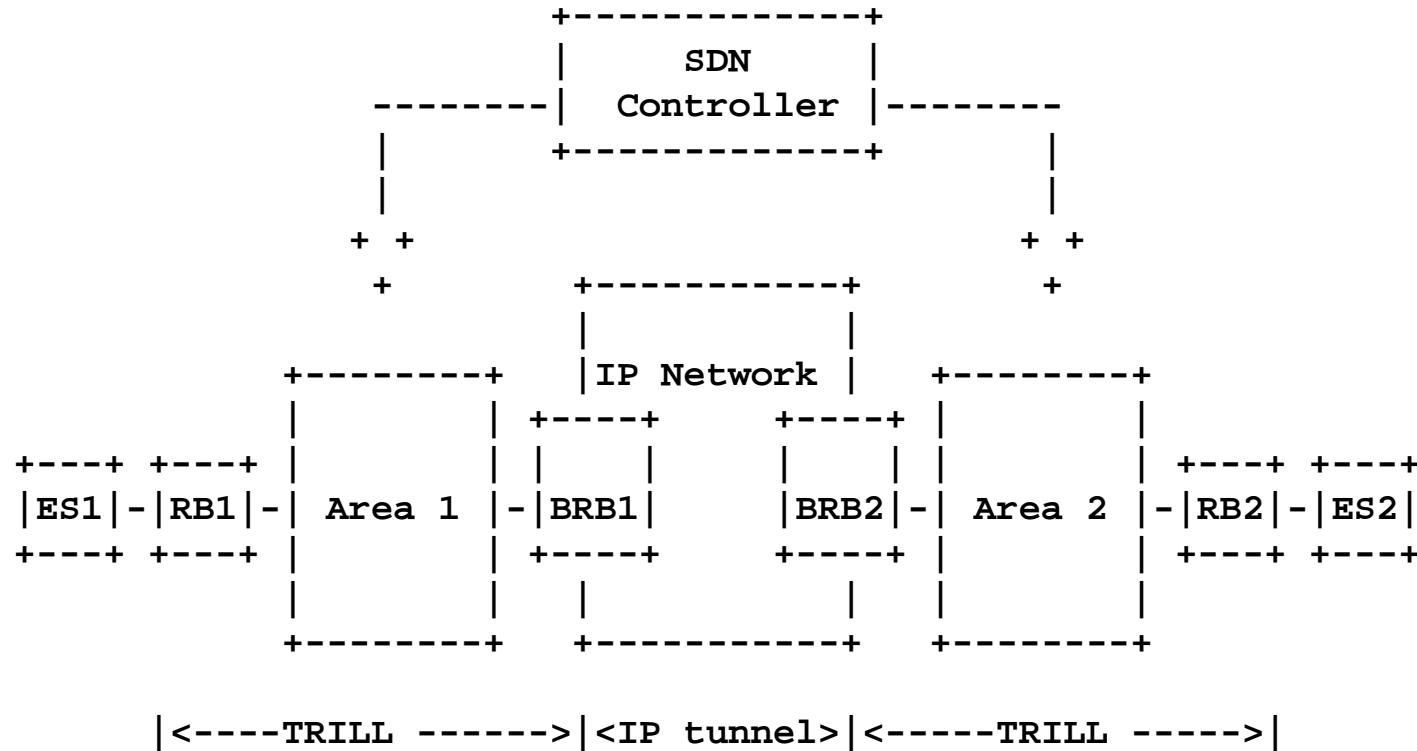
1. End-to-end topology visibility on the SDN controller
2. MAC address reachability information synchronization across multiple TRILL domains

Extension of BGP Link state is proposed to support TRILL link-state and MAC address reachability information distribution.

New Protocol-ID for TRILL

To differentiate the TRILL protocol from layer 3 IGP protocol, a new TRILL Protocol-ID is defined.

```
+-------------+----------------------------------+
| Protocol-ID | NLRI information source protocol |
+-------------+----------------------------------+
| 1           | IS-IS Level 1                    |
| 2           | IS-IS Level 2                    |
| 3           | OSPFv2                           |
| 4           | Direct                           |
| 5           | Static configuration             |
| 6           | OSPFv3                           |
| TBD         | TRILL                            |
+-------------+----------------------------------+
```

New NLRI Type: MAC Reachability NLRI

```
+------+----------------------------+
| Type | NLRI Type                  |
+------+----------------------------+
| 1    | Node NLRI                  |
| 2    | Link NLRI                  |
| 3    | IPv4 Topology Prefix NLRI  |
| 4    | IPv6 Topology Prefix NLRI  |
| TBD  | MAC Reachability NLRI      |
+------+----------------------------+

                  1                   2                   3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+
|  Protocol-ID  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Identifier                                                  |
|  (64 bits)                                                   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
// Local Node Descriptor (variable) //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
// MAC Address Descriptors (variable) //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

The MAC Reachability NLRI format

MAC Address Descriptors

```
+-+-+-+-+-+-+-+-+
| Type= MAC-RI  |                         (1 byte)
+-+-+-+-+-+-+-+-+
|    Length     |                         (1 byte)
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...+-+-+-+-+-+-+-+
|V|F|   RESV     |              Data Label          | (4 bytes)
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                         MAC (1)      (6 bytes)                 |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      ...............                           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                         MAC (N)      (6 bytes)                 |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-...+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

MAC-Reachability TLV format
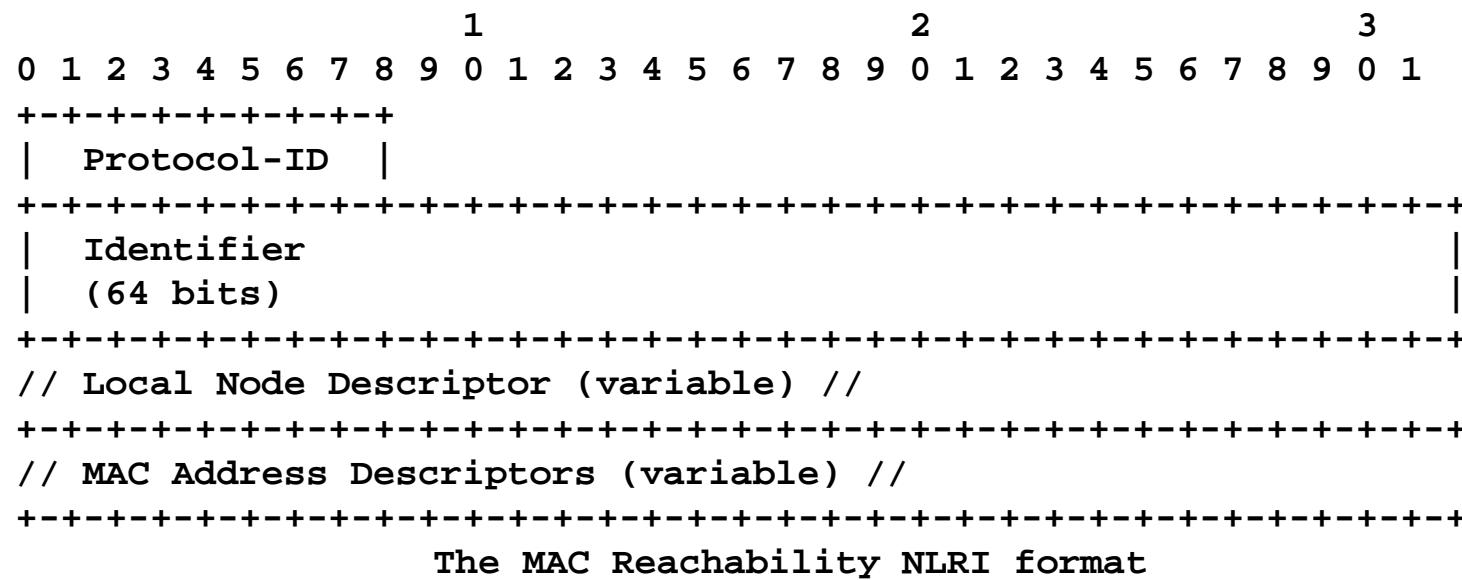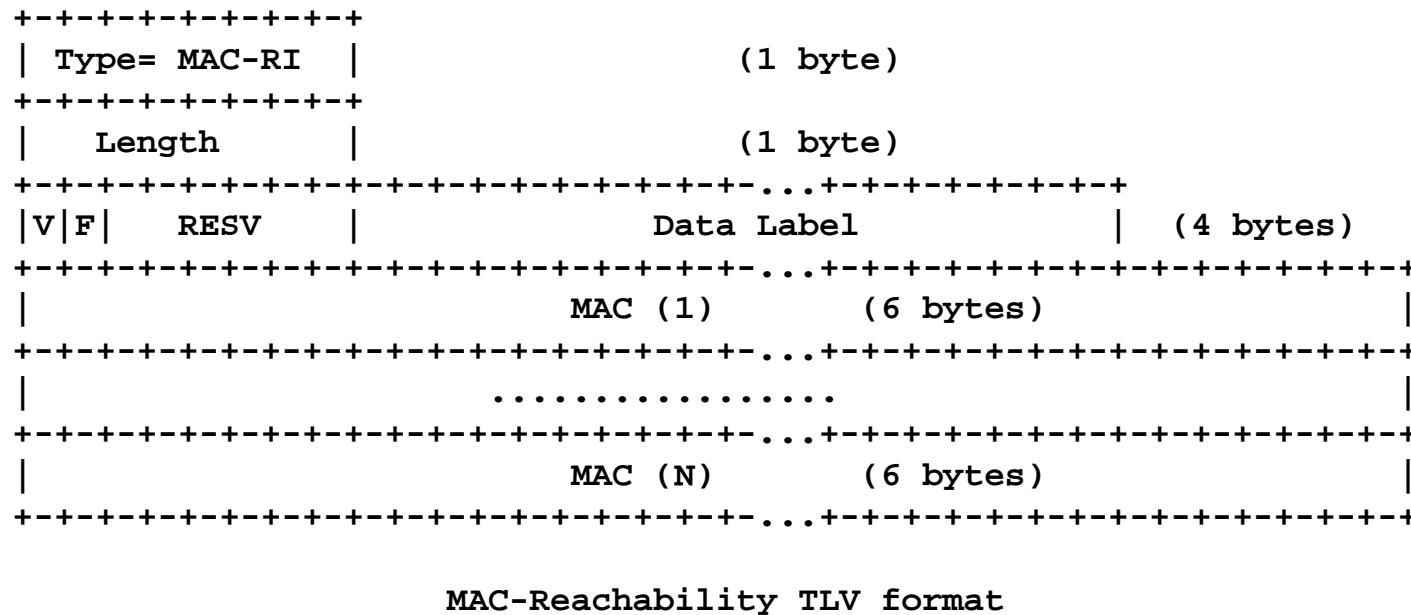
V: VLAN
F: Fine Grained Label

Opaque Node Attribute TLV

The Opaque Node Attribute TLV could be used as the envelope to transparently carry TRILL specific information.

```
Descriptions          IS-IS TLV/Sub-TLV
------------------------------------
TRILL-VER              22/13
NICKNAME               22/6
TREES                  22/7
TREE-RT-IDs            22/8
TREE-USE-IDs           22/9
INT-VLAN               22/10
VLAN-GROUP             22/14
INT-LABEL              22/15
RBCHANNELS             22/16
AFFINITY               22/17
LABEL-GROUP            22/18
GMAC-ADDR              142/1
GIP-ADDR               142/2
GIPV6-ADDR             142/3
GLMAC-ADDR             142/4
GLIP-ADDR              142/5
GLIPV6-ADDR            142/6
        TRILL TLVs/Sub-TLVs
```

Router Capability
MT-Capability
Group Address (GADDR) TLV

Link Attribute TLVs

```
+----------+---------------+--------------+-----------------+
| TLV Code | Description   | IS-IS TLV    | Defined in:     |
| Point    |               | /Sub-TLV     |                 |
+----------+---------------+--------------+-----------------+
| TBD      | Link MTU      |    22/28     | [RFC7176]/2.4   |
+----------+---------------+--------------+-----------------+
```

Link Attribute TLVs

Node Attribute TLVs: Node Flag Bits TLV
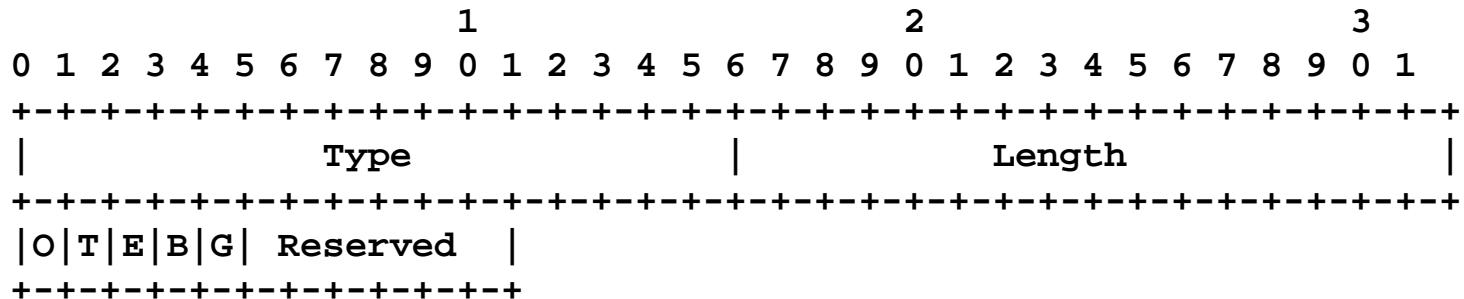
```
                    1                   2                   3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|             Type              |            Length             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|O|T|E|B|G| Reserved  |
+-+-+-+-+-+-+-+-+-+-+-+

Node Flag Bits TLV format



The bits are defined as follows:
+----------+----------------------------+-----------+
| Bit      |        Description          | Reference |
+----------+----------------------------+-----------+
| 'G'      | Layer 3 Gateway Bit         | [RFC7176] |
| Reserved | Reserved for future use     |           |
+----------+----------------------------+-----------+

Node Flag Bits Definitions
```

Next Step

- Seek some comments and feedbacks
- WG adoption?