IGMP/MLD Extension for Multicast Source Management

[draft-li-pim-igmp-mld-extension-source-management]

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Comparison with MSNIP

MSNIP
- ✓ Designed around the premise that you wanted to minimize sources when no receivers listening. Control the superfluous flow of data.
- ✓ Designed for SSM.
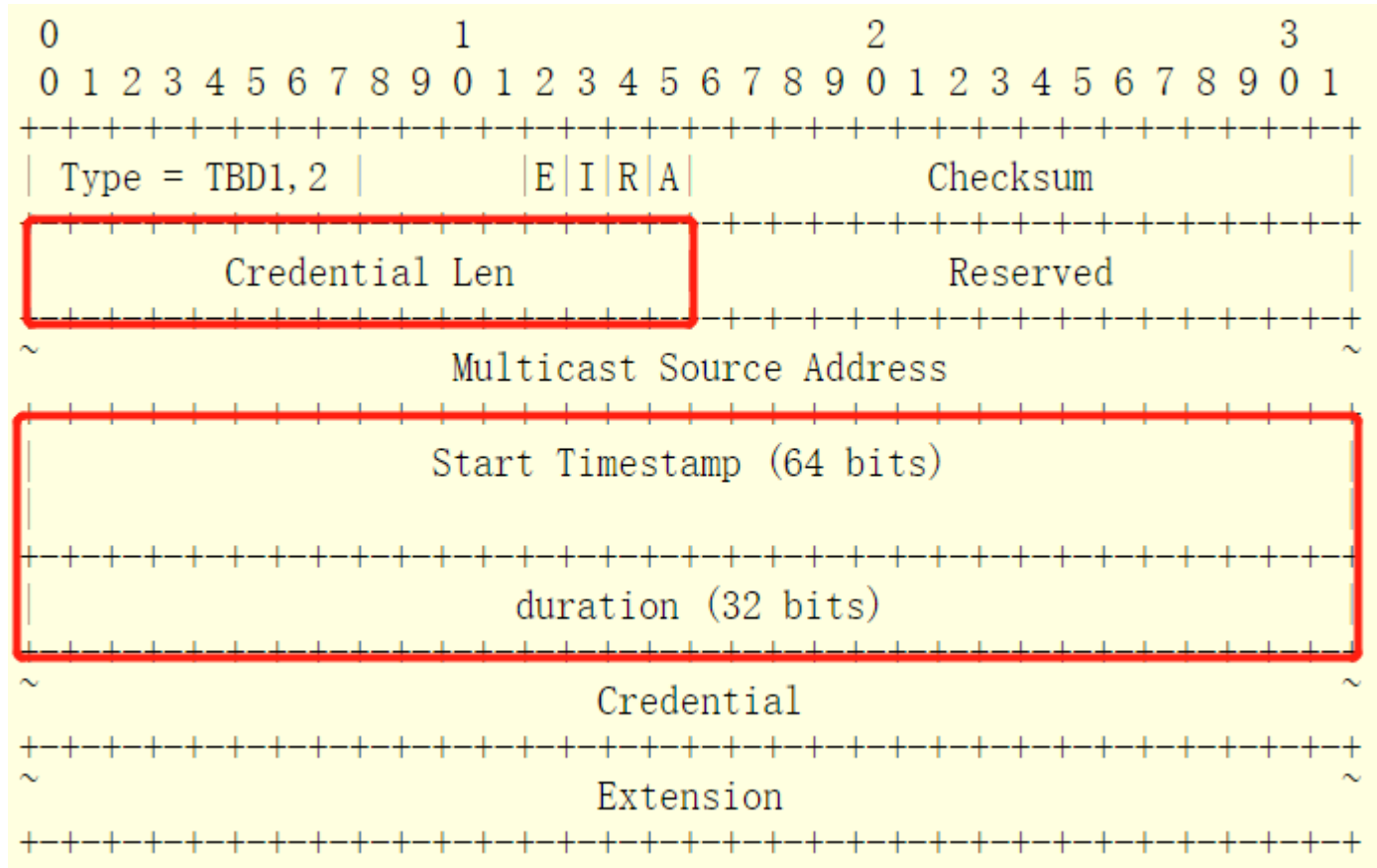- ✓ Focus primarily on data flow control.

This document:
- ✓ Aim at management of multicast sources and related services.
- ✓ Designed for SSM.
- ✓ Control of multicast source access can improve the security of multicast.
- ✓ Multicast source data transmission control is one of the capabilities.
- ✓ On this basis, other capabilities can be better extended to apply different scenarios, such as SDN scenario.

Update for Multicast Source Registration Process

Multicast Source Registration

✓ After first receiving the registration message or the credential is approved approved, the routers will trigger a timer and maintain the registration status for the source systems until the timer expires.

✓ The source systems need periodically send registration messages to the routers to inform the router that the multicast source is alive.

✓ The routers will refresh the timer of the registration status when receiving periodically sent registration messages or multicast data.

✓ The registration status will be released when the timer expires or the registration validity period expires.

Update for Multicast Source Registration Message

```
 0                   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 = TBD1,2 |             |E|I|R|A|             Checksum      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|          Credential Len                         Reserved       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                    Multicast Source Address                   ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Start Timestamp (64 bits)                    |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                    duration (32 bits)                         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                         Credential                            ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                         Extension                             ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

✓ Start Timestamp: indicates the start time when the multicast source can provide services for multicast groups. Before this time, router don't send Multicast Data Notification message to the source system.

✓ Duration: indicates the maximum duration that the multicast source can provide services for multicast groups in a valid registration request.

Update for Multicast Data Notification Message and Multicast Receiver Statistics Message

```
 0                   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 = TBD3, 4 |    Reserved   |C|           Checksum          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                   Multicast Group Address                    ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

```
 0                   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 = TBD5, 6 |    Reserved    |           Checksum           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                   Multicast Group Address                    ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                   Number of Receivers                        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
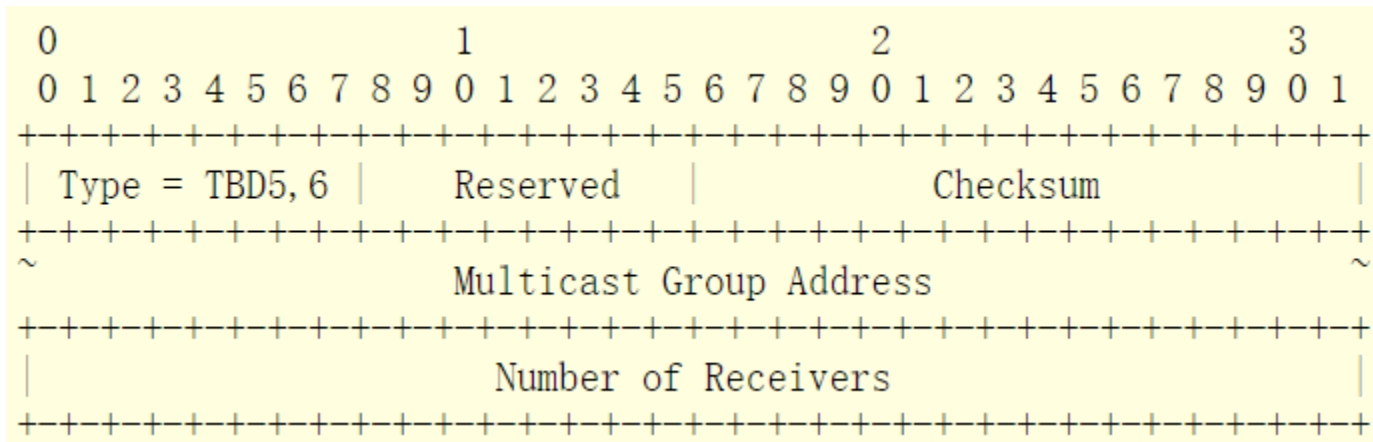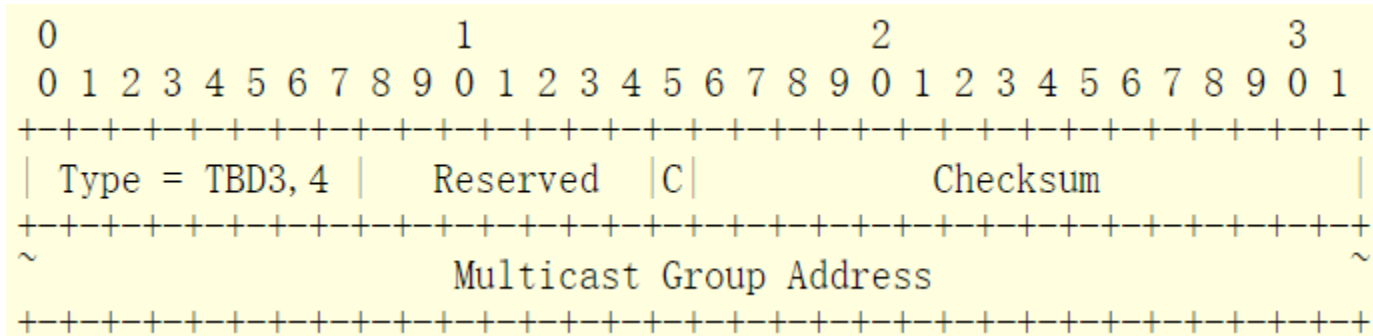
✓ The Address Type field are removed. If these messages are applied to IGMP messages, the corresponding addresses are IPV4 addresses. If these messages are applied to MLD messages, the corresponding addresses are IPV6 address.

Use case: Multicast Source Management for PCE based BIER

```
                              +----------------+
                    +------+   Controller    +------+
                    |       +--------^--------+       |
                    |                                 |
                    |                                 |
            S2  |  S3/7         +--------+            |   S6
                    |      --------+   R3   +--------     |
                    |      /        +--------+        \   |
                    |     /                            \  |
            +------+  S1/9  +--+  S11  +--+        +--+      +--+  S5 +--------+
            |Source|--------|R1+-------+R5+----------+R6+-----+R7|-----|Receiver|
            +------+ S4/8/10+--+       +--+        +--+      +--+      +--------+
                    |                                         |
                    |              +--+        +--+           |
                    +--------------+R2+--------+R4+-----------+
                                   +--+        +--+
```
Figure 4: Topology of multicast source management for PCE based BIER
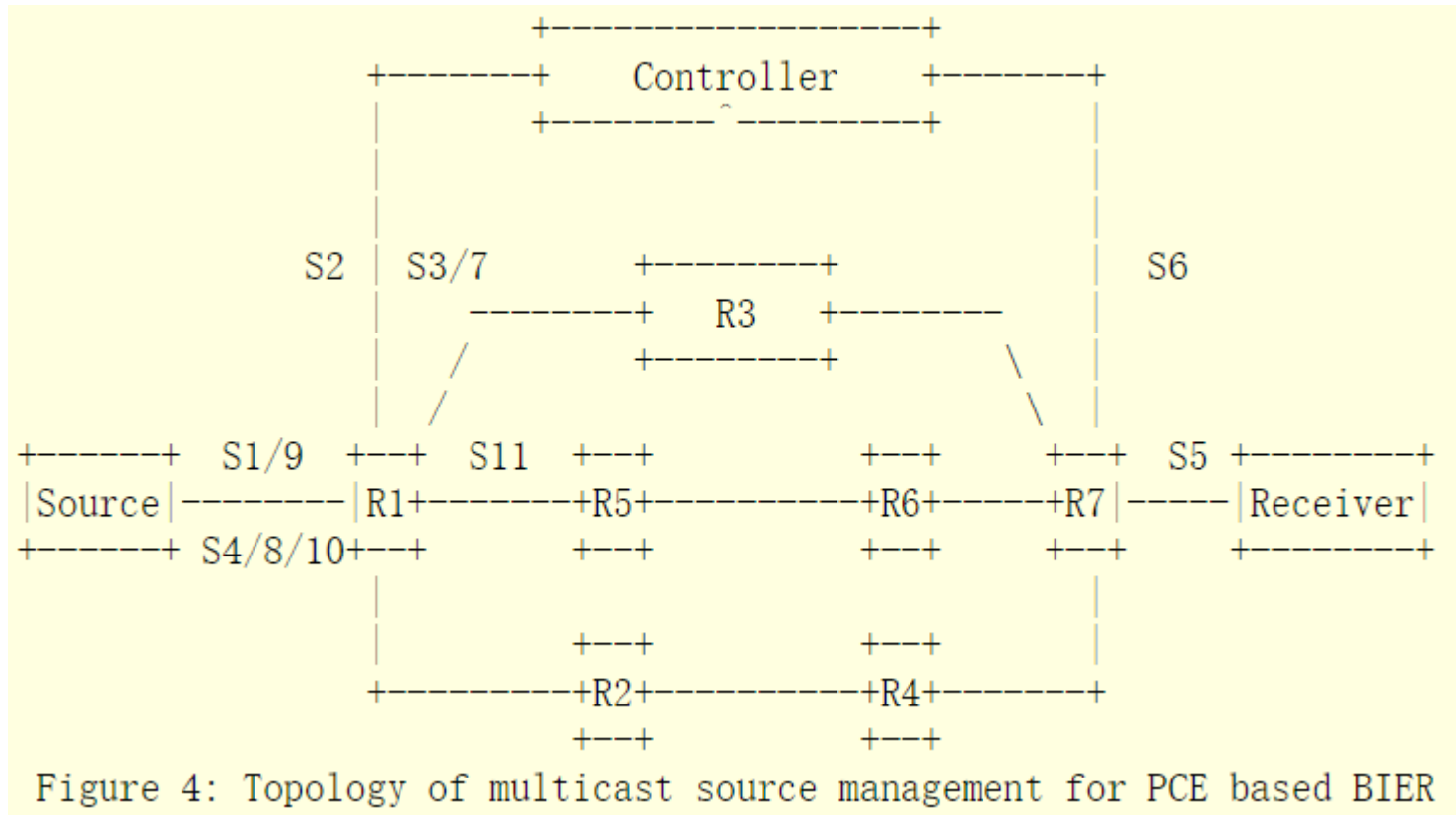
- ✓ Unified management of multicast information based on controller
- ✓ Source access authentication, Data transmission control, Receiver information management
- ✓ Improvement of multicast source's ability to perceive services.

Next Step

- Comments
- Extension for other use-cases

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