PSD MNA with BIER over MPLS

August 10, 2023
Bit-Indexed Explicit Replication

• Multicast without creating per-flow state in transit BIER nodes.
  - As a result, if PSD MNA follows the BIER header, it will be replicated according to information encoded in the BitString field.

• Techniques used include:
  - The ingress BIER router (BFIR) prepends the payload packet with the BIER header.
  - The BIER header includes a bit string in which each bit represents exactly one egress BIER router (BFER).
BIER Header

| 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 |
| --- | --- | --- | --- |
| BIFT-id | TC | 1 | TTL |

<table>
<thead>
<tr>
<th>0 1 0 1</th>
<th>Version</th>
<th>BSL</th>
<th>Entropy</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>OAM</th>
<th>Rsv</th>
<th>RSVP</th>
<th>Proto</th>
<th>BFIR-id</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>0 1 0 1</th>
<th>Bit String (first 32 bits)</th>
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</table>

<table>
<thead>
<tr>
<th>~</th>
<th>Bit String (last 32 bits)</th>
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</table>

BIFT-id field represents a particular Bit Index Forwarding Table (BIFT). A BIFT corresponds to a particular combination of Sub-domain, Bit String Length, and a Set Identifier. At the same time, the field contains BIER-MPLS label that is locally unique.
Important Rules of BIER over MPLS

- The first four octets of the BIER encapsulation header are also the last four octets of the MPLS header.
- As a result, PHP MUST NOT be applied to a BIER-MPLS label.
- When a BFR receives an MPLS packet and the next label to be processed is one of the BFR’s BIER-MPLS labels, it will assume that the remainder of the BIER header immediately follows the stack.
- 6-bit "Next Protocol" field identifies the type of the packet or frame immediately following the BIER header.
- IANA created "BIER Next Protocol Identifiers“ registry:
  0 - Reserved
  1 - MPLS packet with downstream-assigned label at top of stack
  2 - MPLS packet with upstream-assigned label at top of stack
  3 - Ethernet frame
  4 – IPv4 packet
  5 – OAM packet, e.g., BIER ping
  6 - I Pv6 packet
  63 - Reserved
BIER-MPLS and PS MNA

• It appears that PS MNA cannot precede the BIER header
• A PS MNA block may follow the BIER Header
Some Ideas for PS MNA in BIER

• **Option 1:**
  - Use distinctive BIER Next Protocol Identifier value for PS MNA
  - In PS MNA header, include the Next Protocol field that identifies the type of payload according to IANA’s BIER Next Protocol Identifier registry

• **Option 2:**
  - Do not set S in BIER-MPLS LSE
  - Bump up Version in the BIER header
  - Set Proto in the new BIER header to 0
Questions?

Thank you!