BIER-TE-ARCH
IETF105 Prague

draft-ietf-bier-te-arch-03
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Since IETF104

• Entered WGLC after IETF104
• Authors reviewed text.
  • No technical changes
  • But hard to understand document because of circular dependencies
  • And missing explanation of relationship between traffic engineering and
    • Native and/or overlay topologies
• Solution: Add more introductory text to resolve those issues

• Rev’ed to draft-ietf-bier-te-arch-03
Overview

Abstract improved

• This memo introduces *per-packet stateless strict and loose path engineered replication and forwarding* for Bit Index Explicit Replication packets ([RFC8279]). This is called BIER-TE.
  • ...(more improvements)... pls. Re-read

1.1 New section: Basic Examples

• One topology, full set of bits, explaining different packets
  • “native” – adjacencies are L2 (forward_connected)
  • “overlay” – adjacencies are remote (forward_routed)

2. Layering

• Add topology and explains in 3 sentences how topology comes into play.

8. Comparison with Segment Routing

• Extended: if you want to think of bits as segments, what does it mean ?
  • Hopefully instructive to users of SR
“Native” BIER-TE example

BIER-TE Bit Index Forwarding Tables (BIFT):

BFR1:  p1  -> local_decap
       p2  -> forward_connected to BFR2
BFR2:  p1  -> forward_connected to BFR1
       p5  -> forward_connected to BFR3
       p8  -> forward_connected to BFR4
BFR3:  p3  -> forward_connected to BFR2
       p7  -> forward_connected to BFR5
       p13 -> local_decap
BFR4:  p4  -> forward_connected to BFR2
       p10 -> forward_connected to BFR5
       p14 -> local_decap
BFR5:  p6  -> forward_connected to BFR3
       p9  -> forward_connected to BFR4
       p12 -> forward_connected to BFR6
BFR6:  p11 -> forward_connected to BFR5
       p12 -> local_decap
"Overlay" BIER-TE example

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>p1</td>
<td>forward_routed to BFR3</td>
</tr>
<tr>
<td>p2</td>
<td>forward_routed to BFR4</td>
</tr>
<tr>
<td>p3</td>
<td>local_decap</td>
</tr>
<tr>
<td>p4</td>
<td>local_decap</td>
</tr>
<tr>
<td>p5</td>
<td>forward_routed to BFR6</td>
</tr>
<tr>
<td>p6</td>
<td>forward_routed to BFR6</td>
</tr>
<tr>
<td>p7</td>
<td>local_decap</td>
</tr>
<tr>
<td>p8</td>
<td>forward_routed to BFR3</td>
</tr>
</tbody>
</table>

Rtr2/Rtr5 do not speak BIER-TE
During bring-up or modifications of the network topology, the controller discovers the network topology and creates the BIER-TE topology from it: determine which adjacencies are required/desired and assign BitPositions to them. Then it signals the resulting of BitPositions and their adjacencies to each BFR to set up their BIER-TE BIFTs.
BIER-TE Topology in the architecture

• **BIER-TE BitPosition (BP)** can be understood as the BIER-TE equivalent of "forwarding segments" in SR, but they have a different scope than SR forwarding segments. Whereas forwarding segments in SR are global or local, BPs in BIER-TE have a scope that is the group of BFR(s) that have adjacencies for this BP in their BIFT. This can be called "adjacency" scoped forwarding segments.

• Adjacency scope could be global, but then every BFR would need an adjacency for this BP, for example a forward_routed adjacency with encapsulation to the global SR SID of the destination. Such a BP would always result in ingres replication though. The first BFR encountering this BP would directly replicate to it. **Only by using non-global adjacency scope for BPs can traffic be steered and replicated on non-ingres BFR.**

• **SR can naturally be combined with BIER-TE and help to optimize it.** For example, instead of defining BitPositions for non-replicating hops, it is equally possible to use segment routing encapsulations (eg: MPLS label stacks) for the encapsulation of "forward_routed" adjacencies.

• Note that BIER itself can also be seen to be similar to SR. **BIER BPs act as global destination Node-SIDs** and the BIER bitstring is simply a highly optimized mechanism to indicate multiple such SIDS and let the network take care of effectively replicating the packet hop-by-hop to each destination Node-SID. What BIER does not allow is to indicate intermediate hops, or terms of SR the ability to indicate a sequence of SID to reach the destination. This is what BIER-TE and its adjacency scoped BP enables.
THE END