Update on RBS and related work

BIER WG IETF116

Toerless Eckert, Futurewei USA (tte@cs.fau.de)
Michael Menth <menth@uni-tuebingen.de, <steffen.lindner@uni-tuebingen.de>, Thomas Stüber <thomas.stueber@uni-tuebingen.de>, Xuesong Geng, <gengxuesong@huawei.com>, Xiuli Zheng, <zhengxiuli@huawei.com>, Rui Meng, <mengrui@huawei.com>, <lifengkai@huawei.com>
ENOUPDRAFTDATE – WHY?

Too much related work
  Raised issues also require more work

Feedback Ijsbrand Wijnands
  Mismatch of assumed bitstring length by sender and processing RBS router leads to misparsing of whole RBS address structure

Simple answer:
  Include bitstringlength into structure – but prefer not to do it, as it is too expensive.

Complex answer (TBD): Control Plane to the rescue
  Old expired draft: draft-eckert-teas-bier-te-framework
  BIER-TE and RBS could/should share a lot of control plane aspects.
  Current thinking is to update this document for IETF117
  Seems to be useful for ongoing interest in BIER-TE related drafts as well.
More feedback/discuss

TonyP: “scratchpad” considerations

ETF114 presentation made argument: Multicast is beneficial on the wire, however large the header gets:
   Even if header is 1kbyte large to e.g.: 50 receivers, it would save overall bits on wires
   Increasing MTU may be required, but not an issue e.g.: in Data-Center, Metro,...

Latest RBS version does employ “SRH” approach: 2 pointers in header point to part of address structure that router needs to parse. These get updated hop by hop (as in SRH the remaining-segments field).

   Every router only needs to examine small part of RBS address structure – its own local bitstring
      But last routers bitstrings deep in packet.
      Increases cost of “scratchpad” router forwarding plane needs to read

Better supported with “pop” header approach – as in MPLS
   Every router would remove top of RBS address structure
      But not worked out “ideal” header. MPLS needs to look until bottom of stack. We would not want to do that (very long).
      Instead would want to have fixed Top-Of-Stack components (e.g.: BIER header), and then the RBS structure which is handled like an MPLS stack (head popped on every how).
      Original RBS (-00) had this approach

This choice (rewrite pointers vs. Pop head) is independent of other design aspects. Opinions welcome.
   Likely write both options into next rev. Of draft until we can agree if/that one single option is best.
Related work

• University Tübingen with long history of BIER work
  • Including presentations about BIER implementation for P4 to IETF

• Ongoing research paper “Efficiency of BIER Multicast in Large Networks”
  At scale, e.g: when multiple SI/SD are required
  To be published soon, hopefully presentation at IETF117/IETF118

• Start investigate what/how to implement for P4
  P4 is Frenemy: no better validation option for research / open source reference development. Even if it may not be equally relevant for industry deployments.
    Also note P4 routers for Metro space though...
    Closed Source vendor HW implementation yes, but...

Also no better reference platform to use in research deployments even when wanting to develop applications against BIER model (BIER/BIER-TE/RBS...)
    Which is another big gap: Application developers are not aware enough. And we do not have a sufficient set of software for them to experiment (compared to e.g.: BSD IP Multicast + Deerings DVMRP daemon in 1990).
**Overview**

Different concepts for efficient BIER-TE exist
- Differ in encoding and complexity of the mechanism

<table>
<thead>
<tr>
<th>Name</th>
<th>Short Description</th>
<th>Status</th>
<th>Complexity</th>
<th>P4 / Tofino Implementable</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIER-TE</td>
<td>Original BIER-TE</td>
<td>• Implemented on BMv2</td>
<td>Low</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ongoing implementation on Tofino</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIER-TE with local/global segments</td>
<td>&quot;Header Stack&quot; as in MPLS / SR</td>
<td>• First prototype exists for Tofino</td>
<td>Middle</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>• Processed stacks are removed</td>
<td>• Investigated in Master thesis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• First stack contains all required information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Local XOR global addresses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIER-TE with mixed segments</td>
<td>Same as BIER-TE with segments, but local and global addresses can be mixed</td>
<td>• Not yet investigated</td>
<td>High/Very High</td>
<td>Maybe</td>
</tr>
<tr>
<td></td>
<td>• Local, global addresses and BitStrings can be mixed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;RBS Light&quot;</td>
<td>RBS with header alignment to facilitate parsing</td>
<td>• Theoretic concept exists</td>
<td>High</td>
<td>Probably</td>
</tr>
<tr>
<td>(Original) RBS</td>
<td>Original RBS</td>
<td>• Discussed</td>
<td>Very High</td>
<td>Unlikely</td>
</tr>
</tbody>
</table>