BIER
Bit Indexed Explicit Replication Traffic Engineering

draft-eckert-bier-te-arch-05
draft-eckert-bier-te-frr-03

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Toerless Eckert, tte+ietf@cs.fau.de

Gregory Cauchie, GCAUCHIE@bouyguestelecom.fr

Wolfgang Braun, wolfgang.braun@uni-tuebingen.de

Michael Menth, menth@uni-tuebingen.de

BIER-TE arch/frr status

- WG chairs did suggest not to ask for adoption last year
  - WG full with more urgent short term work
  - Authors busy too -> drafts expired in 2016
- Revived draft-eckert-bier-te-arch-05
  - Unchanged from -04.
  - Authors think all open questions had been cleared in before
- Revived draft-eckert-bier-te-frr-02
  - Major changes: Included WG feedback from 2016

draft-eckert-bier-te-arch-05

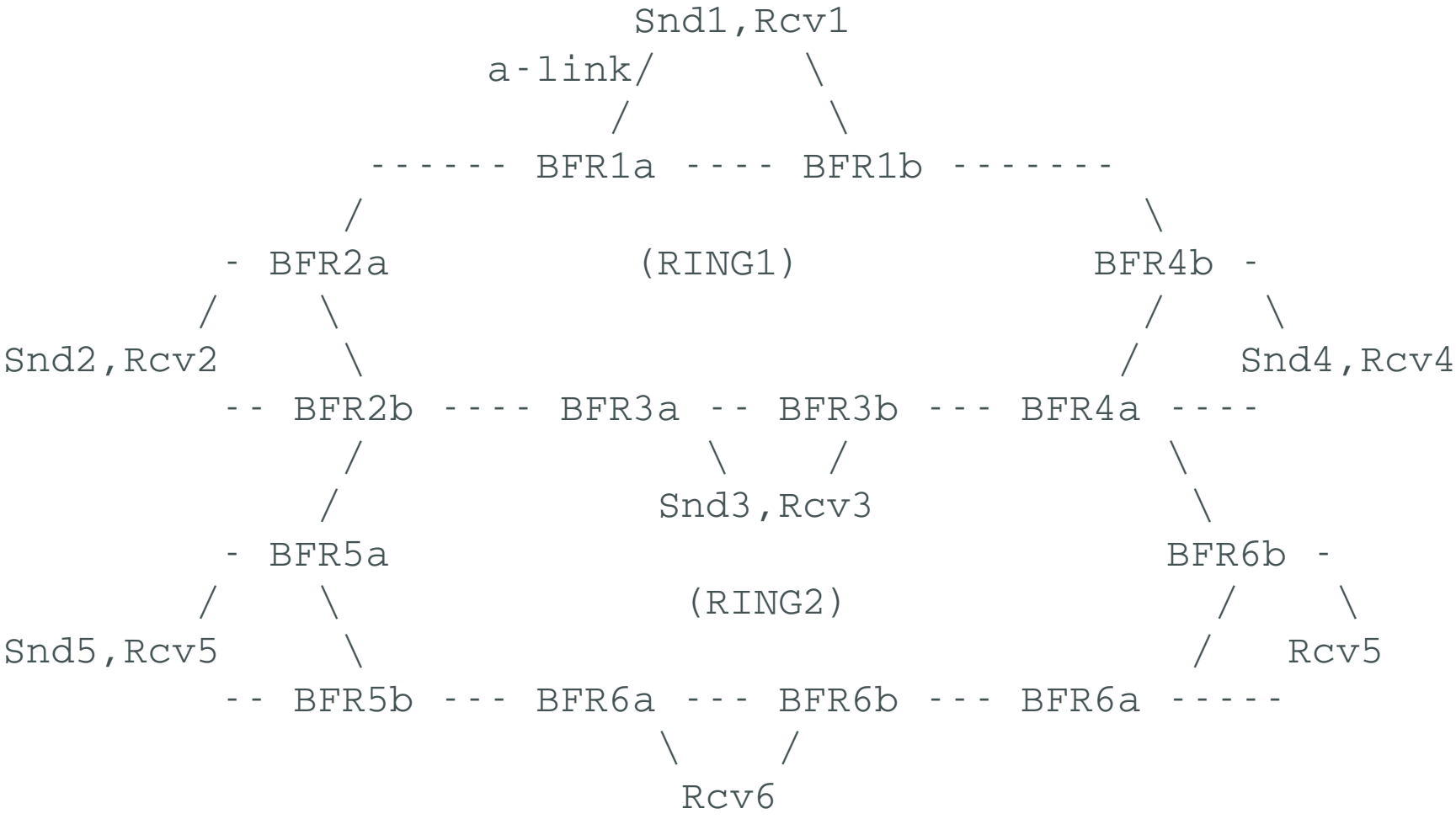
- Variant of BIER machinery to allow path engineered trees
- Bits can not only indicate receivers (BFER) but also transit hops
- Forwarding rules do not consider all bits (as receivers, like in BIER), but only bits of adjacencies
  - That's how packet can be steered hop-by-hop through network
- Forwarding rules for BIER-TE easily added to BIER forwarding engines (forwarding chips)
  - If we had a BIER-TE RFC *hint* *hint*
- Calculating minimum number of transit links to assign bits to, calculating bitstrings for paths…
  - Great job for a BIER-TE PCE – not simple. Bier-te-arch outlines a wide range of details.
- Couple of different semantics for bits to minimize number bits needed

draft-eckert-bier-te-frr-02

- Feedback: do we need FRR, is this the only option ? Its kinda complex…
- Can we include all options for BIER-TE resilience
- Draft now considers key options:

1. 1+1 Path diversity – “live-live”
   - Duplicate transmission of packets across diverse paths
   - No new protocol/technology required, just appropriate engineered path config (from PCE, BIER-TE controller).
   - Key requirement: engineered paths – aka: requires BIER-TE (not just BIER).
     - (BIER would need to be combined with multi-topology IGP or “MRT” options)

draft-eckert-bier-te-frr-02



draft-eckert-bier-te-frr-02

2. 1:1 path protection
   - Same BIER-TE setup as for 1:1 path diversity
   - Send only one copy. - bitset for one tree (eg: tree A)
   - Some (TBD) failure signaling (popular today: streaming ops telemetry)
   - Trigger switching bitset to tree B
   - Key BIER/BIER-TE feature to enable this option:
     - Ability to switch set of paths/receivers via simple bitmap switch in sender
       No signaling in the network required

3. 1:1 link protection
   - With existing mechanisms:
   - Use RSVP-TE backup tunnel, or SR backup tunnel, no new BIER-TE work
   - Would equally apply to BIER

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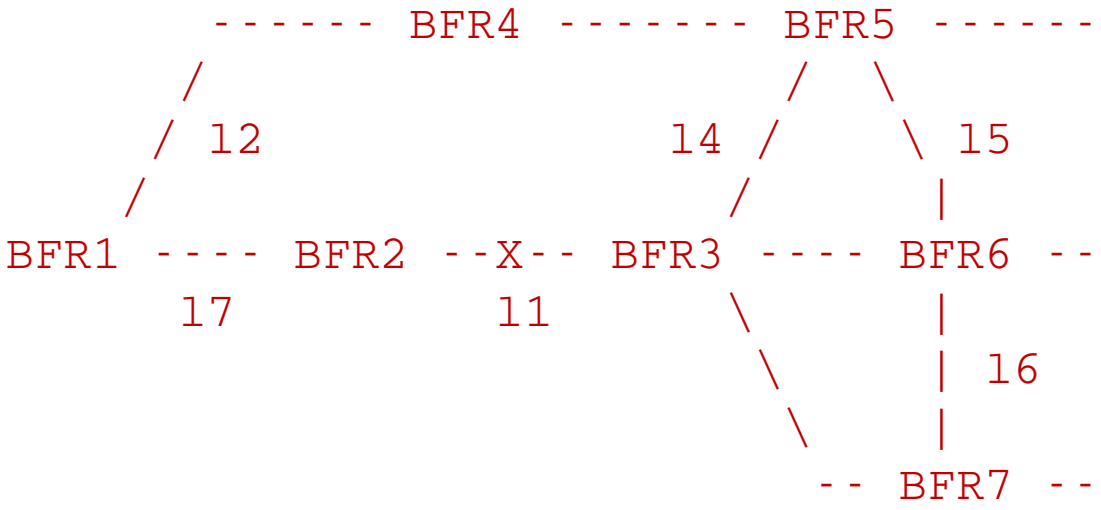
4. 1:1 node protection

- With existing mechanisms: (RSVP-TE / SR)
- Known issue: 1 p2p backup tunnel for each next-nex-hop

  Inefficient
- Can build p2mp RSVP-TE/P2MP backup trees … complex



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5. Node protection with BIER-TE in BIER-TE encap

- Backup BIER-TE tree reaching all next-nexthops
- On each egress of multipoint backup tunnel, reset bitmask required so only bits remain that are valid paths from next-nexthop to receivers

6. Native link/node protection with BIER-TE

- Achieve almost the same as 6. without the need for encap/decap
- Will also not replicate to next-next-hops not interested in this tree.
- Fairly complex additional forwarding plane logic
- When FRR condition encountered:
  - Modify bitmask for preprogrammed set of bits (next-nexthop): delete bits (existing subtree), add bits (backup subtree)
- Does not always work in all topologies – sometimes would need 5 (or have duplicates).

Summary

- P4 research prototype demonstrated @ IEEE/IFIP-NOMS
- https://atlas.informatik.uni-tuebingen.de/~menth/papers/Menth17a.pdf
  https://atlas.informatik.uni-tuebingen.de/~menth/papers/Menth17b.pdf
- Asking for working group adoption

  Note: Had working group adoption call once, 2015 ? For BIER-TE arch, had one opposing, fixed issues back then.
- Would like to enable chip vendors consider to bring in BIER-TE forwarding rules

  Valuable for path engineering, but also for high availability (eg: 1:1 cases, traffic engineered backup trees). Also considered in other WGs.
- BIER-TE FRR draft now meant to be comprehensive

  Happy to add/discuss options we may have missed

  BIER(-TE) FRR ?

  Native BIER-TE FRR not pitched as only option anymore

  Feedback from chip designers would be interesting

Questions ?

Improved recovery

will get you a new glass when yours breaks.