



# **BIER Fast Reroute draft-merling-bier-frr-00**

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*<http://kn.inf.uni-tuebingen.de>*



## ▶ Problem statement

- BIFT entries derived from forwarding entries in routing underlay
  - Failed component may disconnect BIER subtree; **BIER traffic delivered again:**
    - **After FRR in routing underlay**
    - **After reconvergence of routing underlay**
    - **After BIFT entries are reconfigured**
- Link failures may be protected by lower-layer technology
  - E.g., MPLS w/ MPLS-FRR; counterexample: simple Ethernet deployment
- Node failures cannot be protected by lower-layer technology
  - Failed node replicates traffic

## ▶ BIER-FRR

- BFR detects unreachable NH (with BFD)
  - BFR becomes point of local repair (PLR)
  - PLR takes actions for link or node protection
  - **Affected BIER traffic delivered as soon as routing underlay works again**
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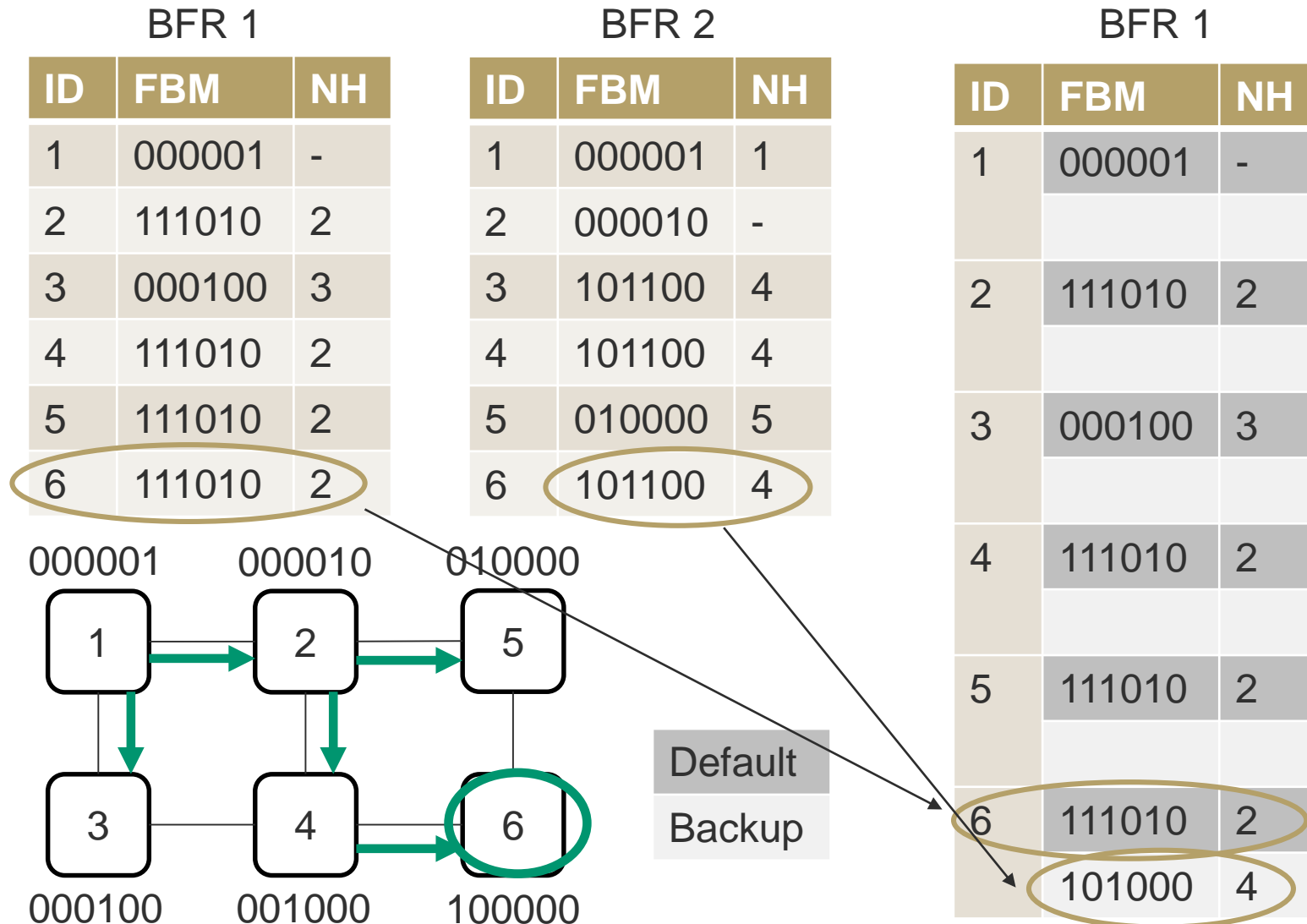


- ▶ Protects only against link failures
  
- ▶ PLR tunnels BIER pkts through routing underlay to NH
  - BIER pkts arrive as soon as routing underlay delivers pkts again
    - Works with IP-FRR
  - Tunneling deviates BIER pkts to other interface



- ▶ Protects against link and node failures
- ▶ If primary NH not reachable, PLR uses
  - **Backup F-BM**
    - PLR applies backup F-BM to BIER pkts before transmission to avoid duplicates
  - **Backup NH**
    - PLR tunnels BIER pkts through routing underlay to backup NHs to bypass the failed component
- ▶ BIFT backup entries (extension required)
  - BFER = primary NH
    - Backup NH = primary NH, F-BM with only that primary NH
  - Other BFERs
    - Backup NH = NNH, F-BM contains all BFERs in subtree of PLR through primary NH and NNH

# BIER-FRR: Backup Entries



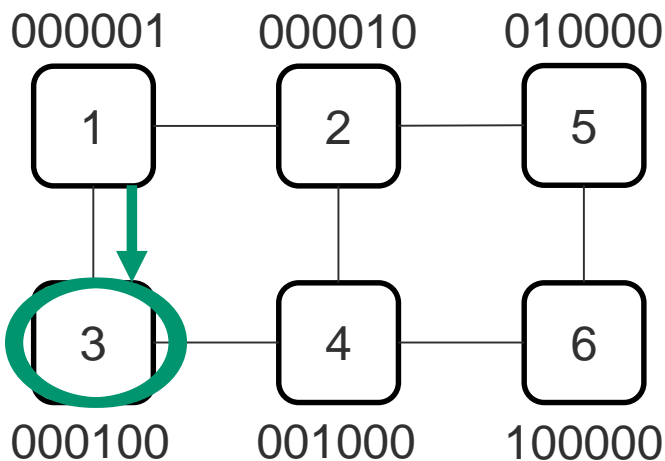
# BIER-FRR: Backup Entries

BFR 1

ID	FBM	NH
1	000001	-
2	111010	2
3	000100	3
4	111010	2
5	111010	2
6	111010	2

BFR 1

ID	FBM	NH
1	000001	-
	-	-
2	111010	2
	000010	2
3	000100	3
	000100	3
4	111010	2
	101100	4
5	111010	2
	010000	5
6	111010	2
	101100	4



Default  
Backup



- ▶ BIER-FRR with link protection
  - Protects against single link failures
  - Tunnels BIER pkts through routing underlay to NH
  - No header modifications
  
- ▶ BIER-FRR with node protection
  - Protects against single link and single node failures
  - Tunnels BIER pkts through routing underlay to NH or NNHs
  - Header modifications necessary to avoid duplicates
  - BIFT extension required for backup F-BMs and backup NHs
  
- ▶ Working prototype exists based on P4 technology