PBB-TE 1:1 Protection with Load Sharing

Ben Mack-Crane (tmackcrane@huawei.com)

Linda Dunbar (ldunbar@huawei.com)

Bob Sultan (bsultan@huawei.com)

ZhuSheng Deng (dengzhusheng@huawei.com)

1:1 Protection w/ Load Sharing

- **1:1 Protection**
  - **Protection Group**
    - **Working and Protect entities**
  - **Faults (W-SF, P-SF)**
  - **Admin Requests (LO, FS, MS)**
- **Load Sharing Impact**
  - **Traffic is distributed (BSIs mapped to TESIs)**
    - **all TESIs in Protection Group may be Working for some BSIs**
    - **for each Working TESI the rest may be Protecting**
  - **Faults identified by TESI (not by role)**
  - **Admin Requests by TESI (not by role)**
    - **LO: remove traffic from TESI (FS == LO-W)**
    - **MS: remove traffic from TESI if no faults present**
  - **Model allows Protection Group with more than two TESIs**
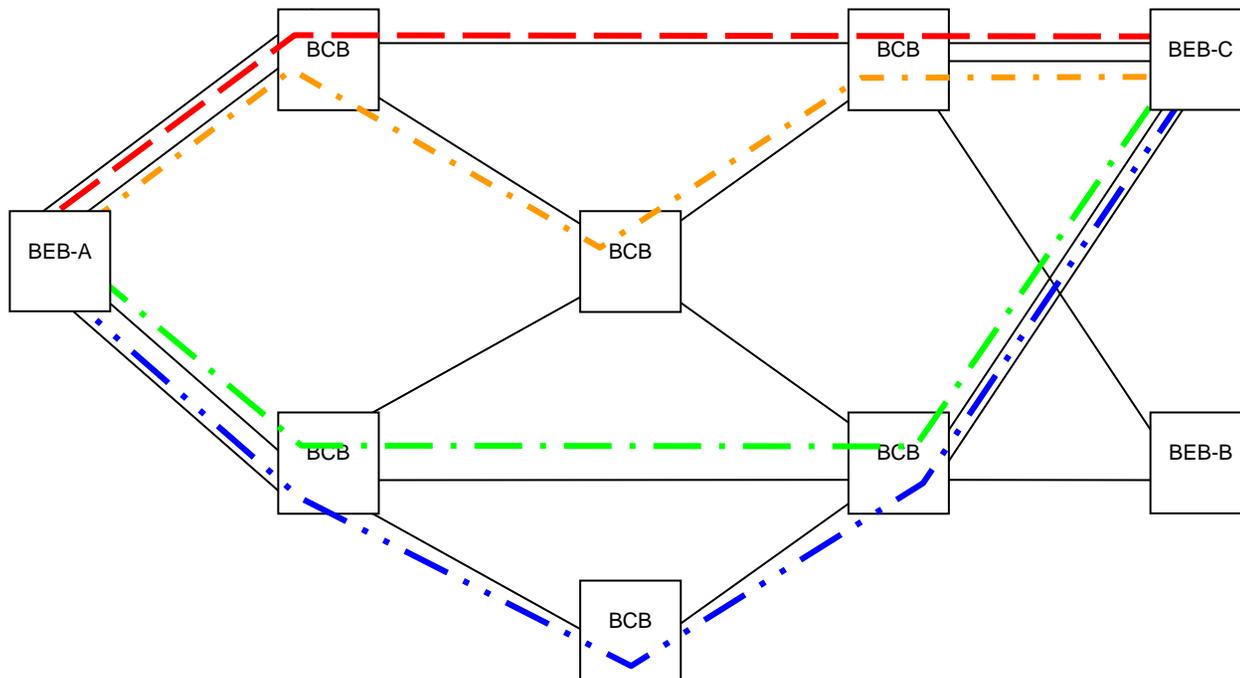
Load Sharing
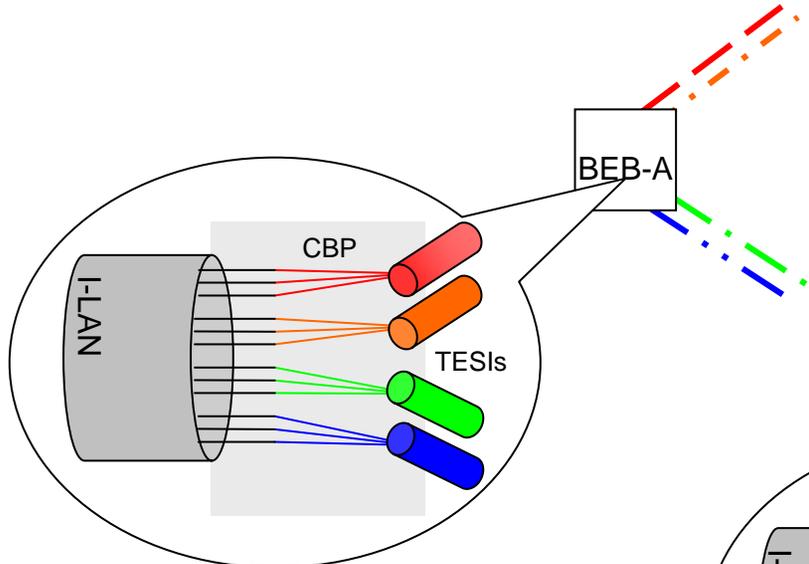
Working load is shared
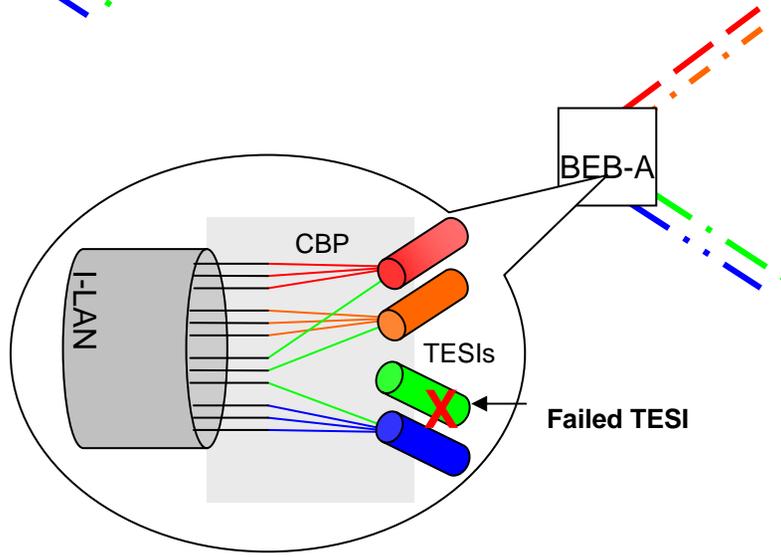
Protection load is shared

Traffic Engineering

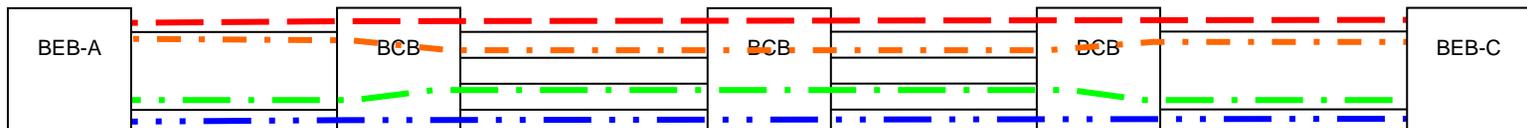**Traffic between edge bridges can be distributed to multiple routes**

- **control link loading**
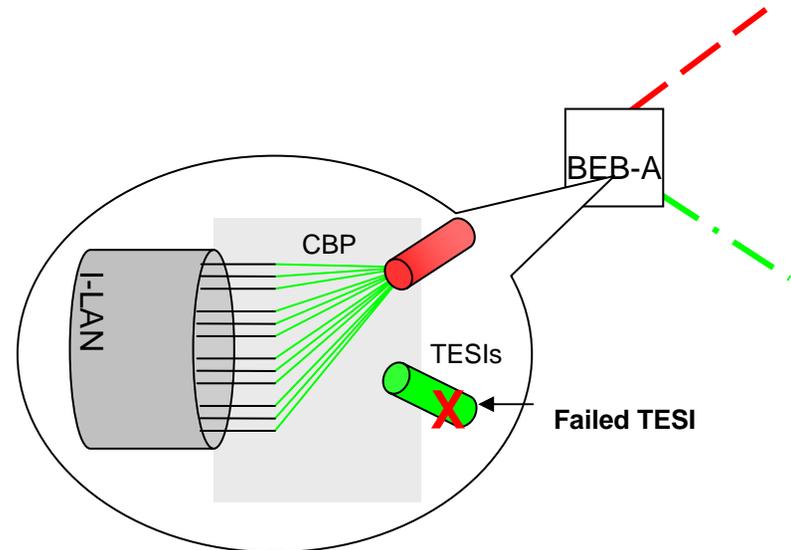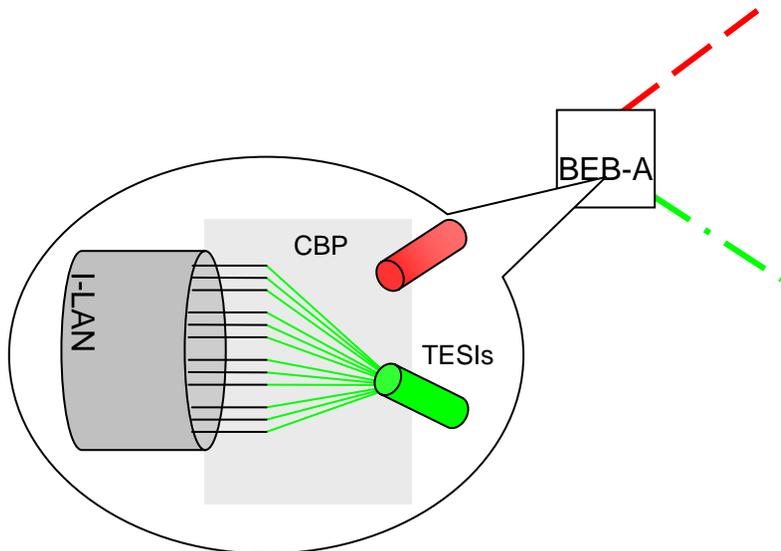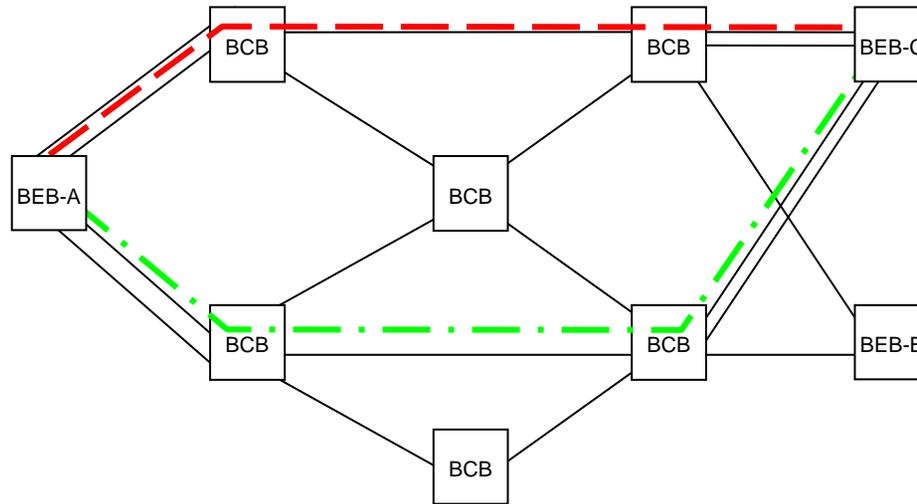- **make efficient use of available resources**

Parallel Links

Traffic distribution can be engineered across parallel links
- **– more deterministic than Link Aggregation hashing**
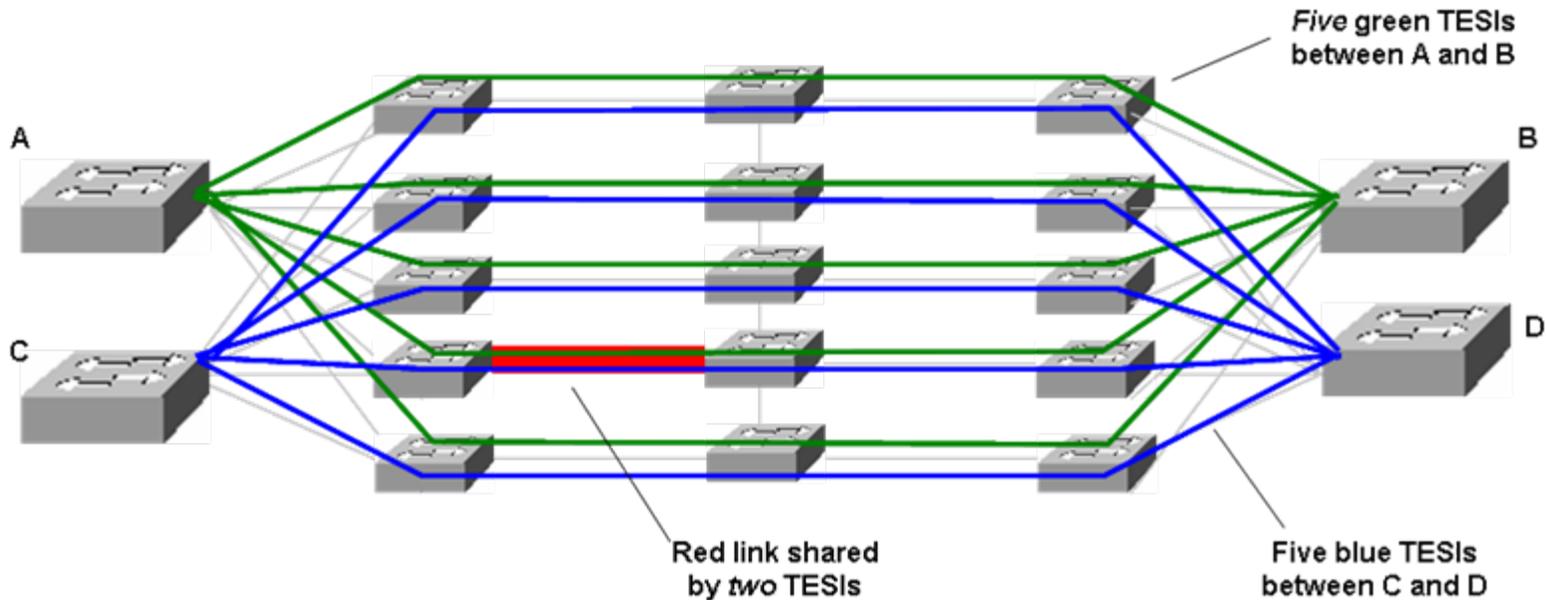
Conventional 1:1 Protection is a Subcase

Bandwidth Analysis (LS vs. Non-LS)

Capacity B required between each pair of BEBs

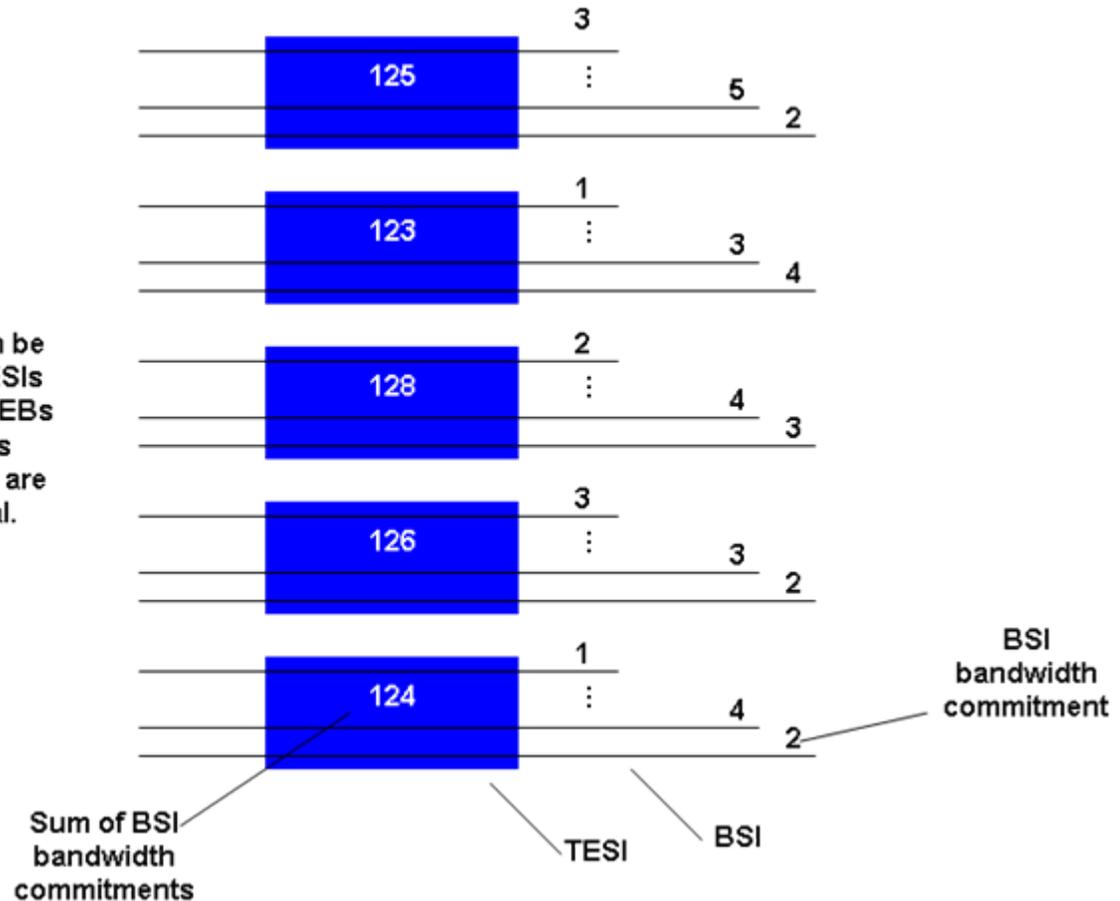**Each link can carry N TESIs of bandwidth B**

Each protection group has S TESIs (LS) or 2 TESIs (non-LS)

Five green TESIs between A and B

Red link shared by *two* TESIs

Five blue TESIs between C and D

Assume Roughly Even BSI Distribution

Bandwidth Calculation

- **Variables**
  - **S: The number of TESIs between a pair of BEBs (LS)**
  - **B: The total working bandwidth reserved between two BEBs**
  - **N: The number of TESIs sharing a link**

- **Load Sharing**
  - **Link carries bandwidth load of $(NB/S)*(1+(1/(S-1)))$**

- **Non Load Sharing**
  - **Link carries bandwidth load of $B*CEILING(2N/S)$**

- **Ratio of Non Load Sharing to Load Sharing**
  - **$B*CEILING(2N/S) / ((NB/S)*(1+(1/(S-1))))$**
  - **$CEILING(2N/S) / ((N/S)*(1+(1/(S-1))))$**
  - **$(S(CEILING(2N/S))) / (N(1+(1/(S-1))))$**

Bandwidth Gain

- **Ratio of NLS to LS minus 1 (as a percent)**
  - **(((S(CEILING(2N/S))) / (N(1+(1/(S-1)))) - 1)*100**
  - **0% means no advantage for load sharing (e.g., LS with two TESIs)**