Bridge Model for ECMP Operation

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Frame Format

PBB I-tag Format

| PCP (3b) | DEI (1b) | UCA (1b) | Res1 (1b) | Res2 (2b) | I-SID (24b) |

ECMP Tag Format

| PCP (3b) | DEI (1b) | UCA (1b) | Res1 (1b) | TTL (6b) | Service-ID/Flow-ID (20b) |
Service-ID/Flow-ID

- In order to avoid deep packet inspection in the core bridges, the concept of flow ID is introduced:
  - The ingress BEB derives a 20-bit hash index from the five tuple representing a flow (C-MAC SA/DA, IP SA/DA, UDP port, etc.)
  - The ingress BEB derives a flow ID by modulating this hash index on top of the E-SID (e.g., by simply XORing E-SID with hash index)
  - The flow ID is used by all the BCBs for ECMP selection
  - On the egress PE, demodulation is performed by XORing hash index once again with the flow-ID thus retrieving E-SID

- **NOTE:** The use of homogenous ECMP algorithm (per B-VID) enables the egress PE of demodulating flow-ID and retrieving E-SID (another advantage of having homogenous ECMP)
ECMP Operation w/ only E-tag - Optional
Pros/Cons

- **Pros**
  - Most efficient and compact encapsulation
  - 6-bit TTL accommodates both SP and DC applications
  - It is based on 802.1ah frame format that many vendors and providers are familiar with
  - Use of flow ID avoids any deep packet inspection in the BCBs
  - ECMP frames can optionally be sent w/o B-tag resulting in the most efficient encapsulation

- **Cons**
  - Reduces the Service ID field to 20 bits (but this doesn’t create any inter-op issue as we will see)
Modified Baggy Pants Diagram for only TTL processing at BCB

**EM_UNITDATA.indication** (• destination_address, • source_address, • mac_service_DU, • priority, • drop_eligible, • vlan_identifier, • flow_identifier, • TTL, etc.)

**EM_UNITDATA.request** (• destination_address, • source_address, • mac_service_DU, • priority, • drop_eligible, • vlan_identifier, • flow_identifier, • TTL, etc.)

**M_UNITDATA.indication** (• destination_address, • source_address, • mac_service_DU, • priority, • drop_eligible, etc.)

**M_UNITDATA.request** (• destination_address, • source_address, • mac_service_DU, • priority, • drop_eligible, etc.)

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**M_UNITDATA.request** (• destination_address, • source_address, • mac_service_DU, • priority, • drop_eligible, etc.)
New Clause

- If next tag (after B-tag/S-tag) is E-tag, then extract TTL and flow_identifier and perform the following functions
- Use the flow_identifier in the MAC relay to select among ECMPs
- Use TTL to perform loop mitigation as follow:
  - Upon receiving TTL, if zero then discard the frame; otherwise, decrement TTL and process the frame
  - After decrementing TTL, if TTL==0 and UCA==0, then perform OAM processing
  - When setting TTL for unicast frames, it should be set to more than the min. required to accommodate re-forwarding during failure scenarios
  - When setting TTL for multicast frames, it should be set to the longest branch in the multicast tree plus a delta
Baggy Pants Diagram for OAM operation at BEB

MAC Relay (Clause 8)

- EISS Multiplex Entity (6.17)

  - Customer Backbone Port Functions (6.11)
    - Flow ID Multiplex Entity (new clause)
    - Flow ID Multiplex Entity (new clause)

  - Modulation / Demodulation Function (new clause)

  - Service Instance Multiplex Entity (6.18)
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