Motivation For Changes to Package A (and DPoE) Multicast

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Portland, OR

Curtis Knittle, CableLabs

History of Multicast

- Leveraged (S+C) double tagging requirement for IP HSD
  - Unique S-tag and C-tag added to all frames ingressing a port configured for IP HSD
  - DPoE System (OLT) receives Join message, knew corresponding ONU port because of unique (S+C) tag combo
- Steps to configure multicast forwarding on ONU

1) Multicast LLID (mLLID) registered on ONU – this informs ONU to add the mLLID value to its LLID filter table; frames arriving with mLLID will be consumed for further processing
   - DPoE System (OLT) → *Multicast Registration* → ONU
   - ONU → *Multicast Response* → DPoE System (OLT)
2) IP Multicast group forwarding rules established on ONU – establishes forwarding rules based on IP multicast group addresses
   - DPoE System (OLT) → *IP Multicast Control* → ONU
     - » Parameter list: Action, mLLID, IP SA (optional), IP DA, NumPorts, Port Numbers
   - ONU → *IP Multicast Control Response* → DPoE System (OLT)

History of Multicast (cont.)

- Based on four concepts:
  - mLLID registration (as before):
    - add mLLID to the ONU LLID filter table
  - Fields used to forward frames:
    - Which fields are used by ONU to forward multicast frames
  - Static forwarding rules:
    - Nail up multicast forwarding to specific ports
  - Dynamic forwarding rules:
    - Configure forwarding based on received multicast IGMP or MLD messages

And then…

We eliminated the double-tagging requirement

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Knowledge of UNI port became a challenge

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And there were other problems

Problems Motivating A Change

1) Fields used for frame replication and forwarding on ONU using *IPMC Forwarding Rule Configuration (0xD7/0x0505)* are set for entire ONU
   - Forwarding of every stream is based on same set of fields
   - E.g., we may want to use IP DA only for some groups, and SSM for others
   - This is very restrictive

2) Limited capabilities for ONU to multicast non-IP traffic. While not currently used, do we want to preclude multicast forwarding based on VLANs, for example?
   - Also, limited field classification

Problems Motivating A Change

3) L2 DA and L2 SA are not explicitly provided in *IP Multicast Config* messages, nor do the specs indicate how they are derived from IP DA or IP SA.
   - SIEPON says: "If L2 address fields are used, the L2 addresses are derived from the L3 IP addresses using the standard address mapping rules for IP multicast addresses, defined in IETF RFC 1112"

4) Egress queue for multicast frame is not specified in *IP Multicast Control* messages, nor is there normative language about in which queue to place a multicast frame.

5) No clear statement about how to use IPv6 or IPv4 addresses from *IP Multicast Config* eOAM messages:
   - *IPMC Forwarding Rule Configuration* should clearly say whether to use IPv4 or IPv6

Problems Motivating A Change

6) The LLID is optional for use on multicast forwarding decisions. If the LLID is not specified, why do we use a set of forwarding rules different from unicast forwarding rules? In other words, we have defined a separate and distinct way to configure rules for multicast forwarding, different from the way we've defined rules for unicast forwarding.
   - It is likely the *IP Multicast Config* messages are converted to forwarding rules and stored in the same forwarding table as the unicast forwarding rules anyway

7) If *Multicast Registration* message is received, but *IP Multicast Config* message is not, should multicast frames received on mLLID be processed using same forwarding rules as unicast frames?

Problems Motivating A Change

8) Does a received *IPMC Forwarding Rule Configuration* clear all existing multicast forwarding rules previously set? Spec doesn't describe behavior if multiple *IPMC Forwarding Rule Configuration* messages are received.
   - What benefit does the *IPMC Forwarding Rule Configuration* message provide?
   - If we required nonzero fields in *IP Multicast Config* message to indicate which fields are to be used for multicast forwarding, could we get rid of *IPMC Forwarding Rule Configuration* message altogether?
     - May need to add L2 fields to these messages to explicitly indicate use of L2 DA or L2 SA for classification
     - Doesn't solve other issues, however.
9) Not clear regarding ordering of IPMC Forwarding Rule Configuration and IP Static/Dynamic Multicast Config messages.

All of these problems are solved with the new solution

Thank you!