

Why Emulation in MAC Control Layer

Jin Kim

Samsung

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Abstracts

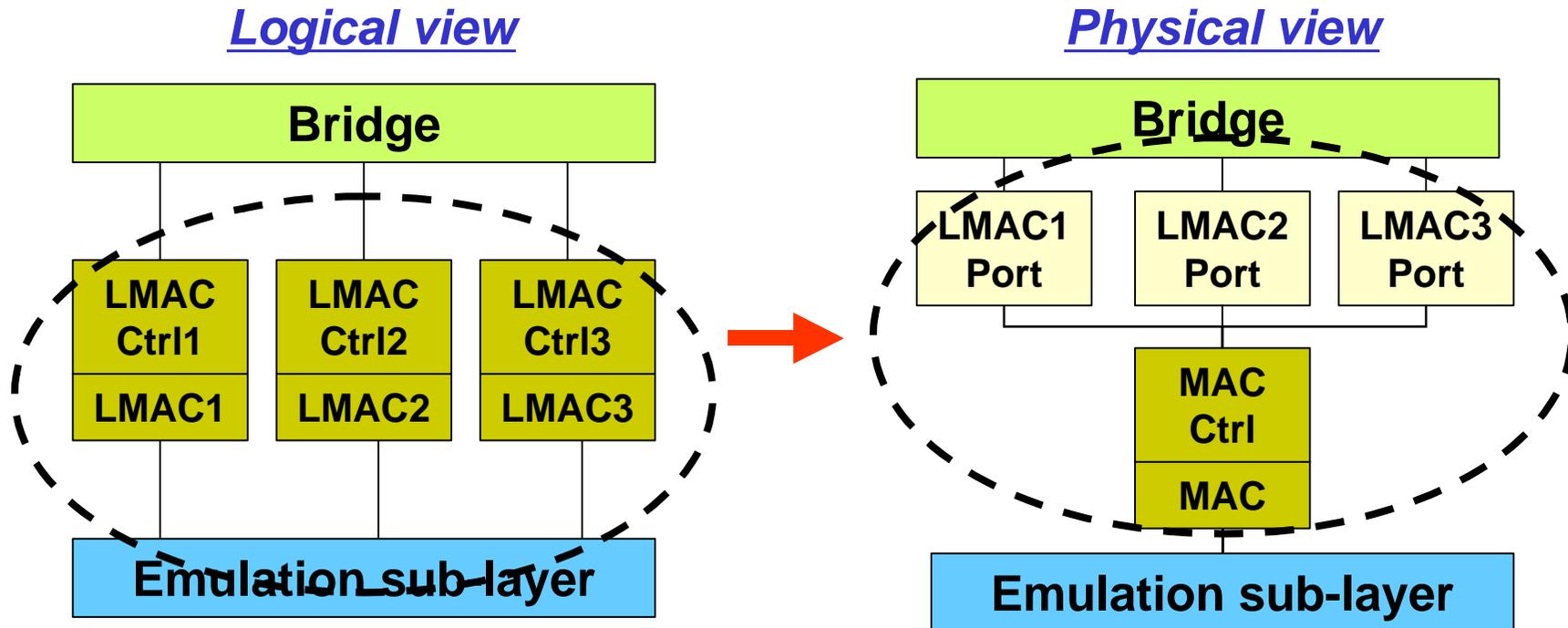
It seems like '2N+1 LMACs' architecture is misleading EFM into 2N+1 real MACs.

If 'm LMACs' means 'm physical MACs', then this is not P2MP. Besides, it will require 257 real MAC chips and 257x2 interfaces from MPCP allocation in OLT to support 16 ONUs and 8 LLIDs per ONU. And it cause scalability problem.

If 'm LMACs' means 'm logical MACs in one physical MAC', the concept 'm LMACs' operations are not well-defined, as there is only one MAC address assigned to one physical MAC and the process is TDMA based.

This presentation will try to show 2N+1 LMACs structure in the actual or physical point of view.

Logical & physical view of 2N+1 LMACs architecture

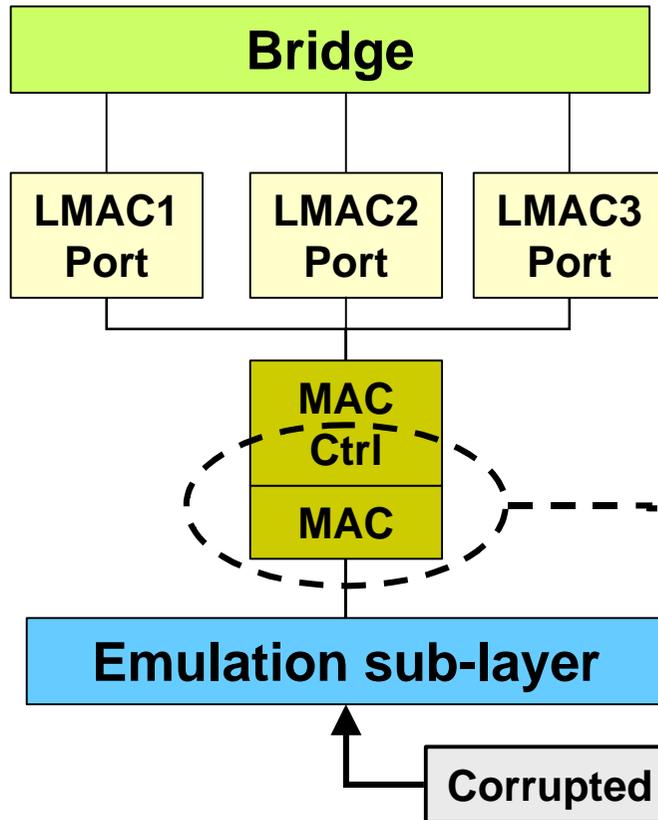


There is only one physical MAC in OLT.

OLT sends/receives Ethernet frames to/from ONUs using time domain method. And, each time slot can provide a different logical path to each ONU and can be identified by LLID.

The actual or physical location of emulation is above MAC layer.

Issues with FCS Error Counter



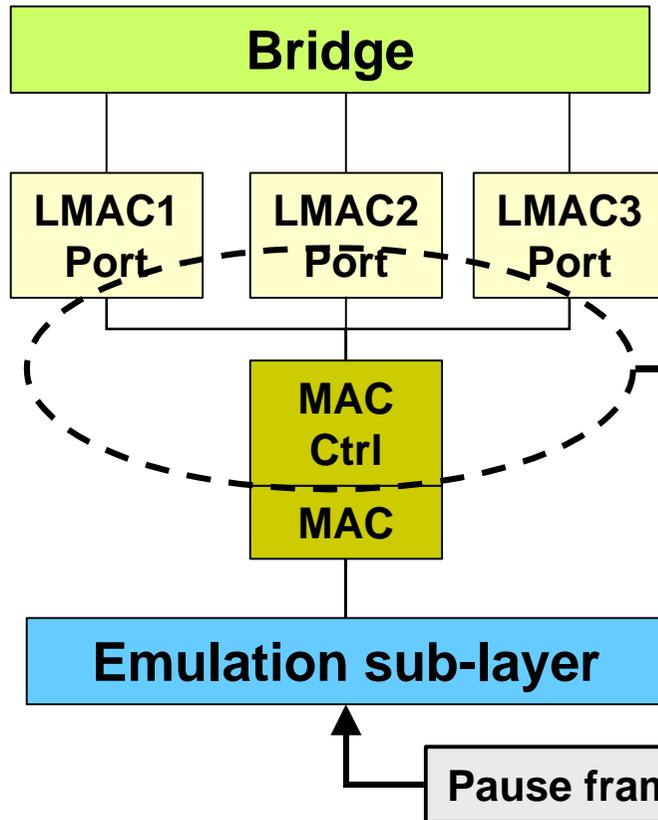
Question:

How can 'one physical MAC' increment the FCS error counter without knowing LLID or LMAC ID?

Even though 'one physical MAC' acts like LMACn, it needs a LLID or LMAC ID(n) to manage error counters.

EFM needs to specify how to increment error counters per LLID. It requires different EPON FCS error counters.

Issues with Pause message



Question:

How can 'one physical MAC' cease transmission per LLID?

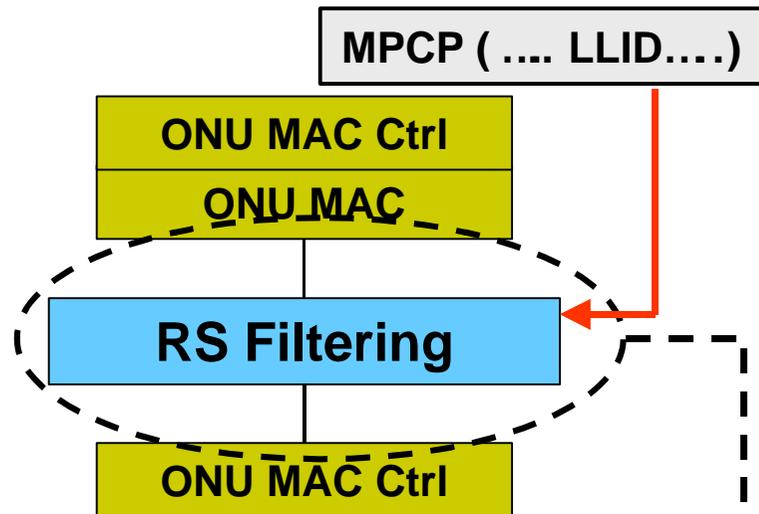
The current Pause message is defined for P2P, not P2MP.

One physical MAC needs to send a proper control to the corresponding LMACn port to pause transmission.

EFM needs to specify how to handle Pause message per LLID.

It requires different MPCP pause message to support Pause correctly.

Issues with RS filtering



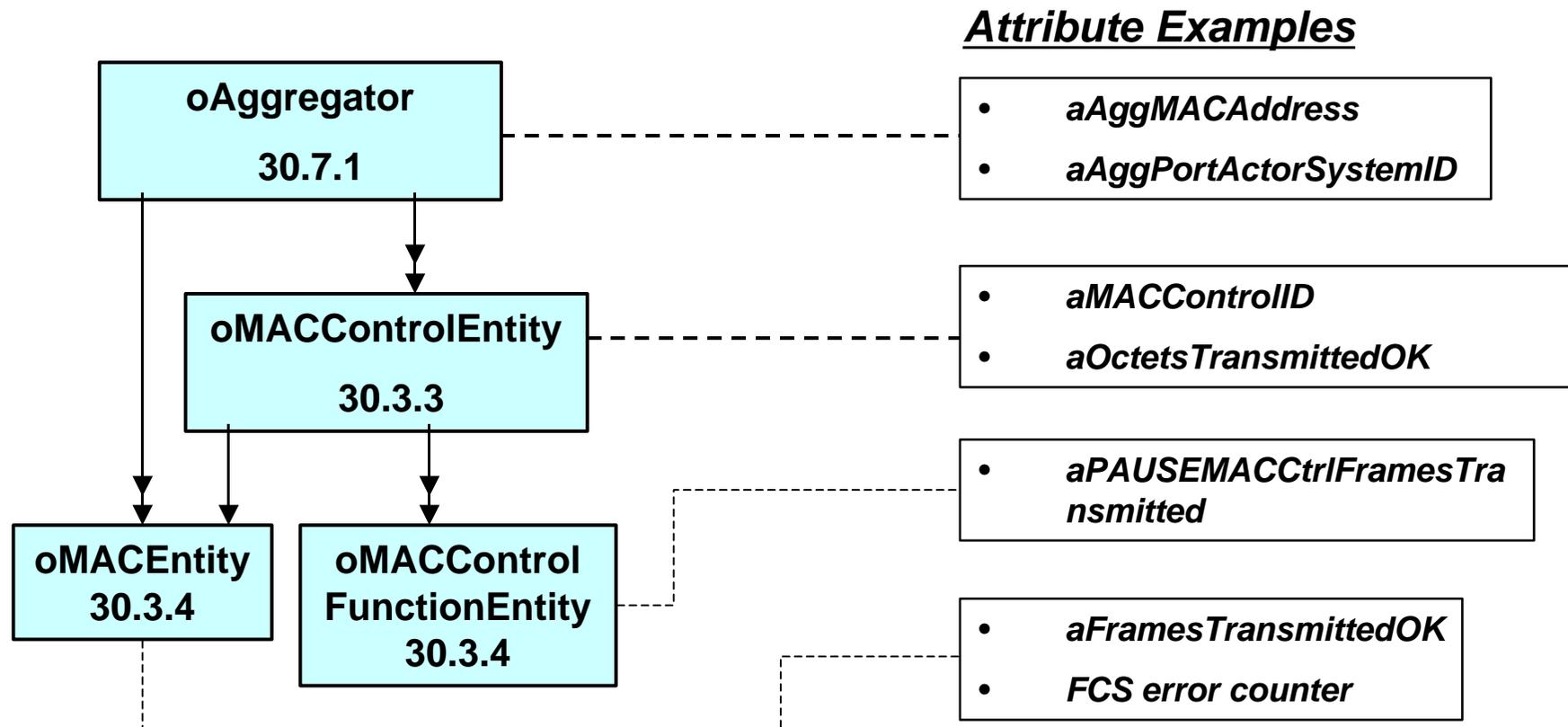
Question:

In case ONU receives one or a number of LLIDs (assigned by OLT) in MPCP message after auto discovery, how can ONU deliver to the RS layer these LLID info. without passing MAC?

ONU MAC control receives LLID info. and somehow this data has to be passed to RS for packet filtering.

Passing LLID info. from MAC control to RS will require 802.3 SPEC modifications.

Link Managements – Current Clause 30



Clause 30 does not have an object class for LMAC ID or LLID.

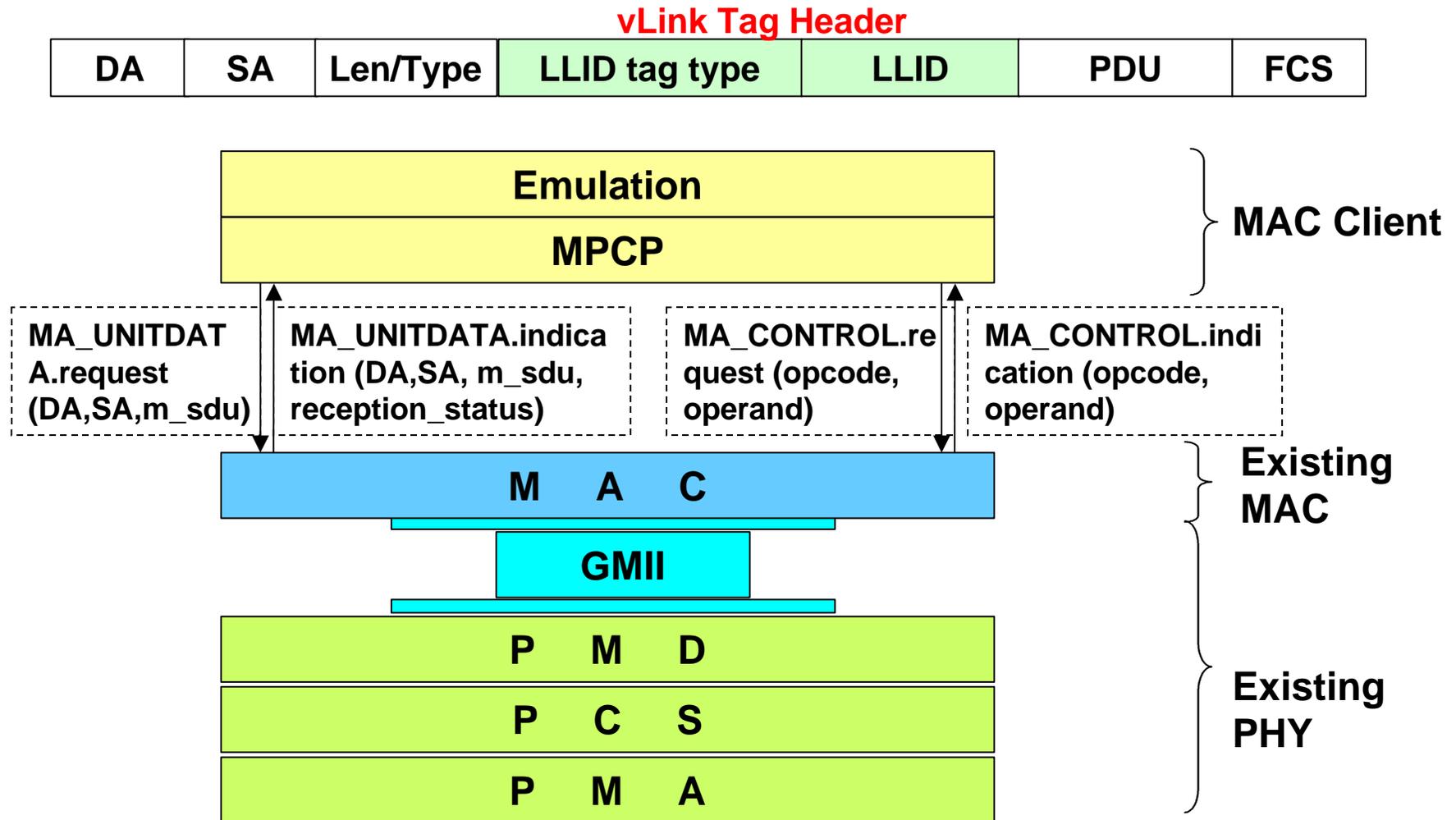
Link Managements – Clause 30 for EPON

- Maybe we can use oAggregator somehow to indicate different LLIDs, but this is not good idea since copper EFM needs this.
- The object class for EPON virtual links (ex, oLogicalLink) has to be added to Clause 30 in order to do link managements per LLID.
- P2MP also needs to add a new object classes and attributes to oMACControlEntity and oMACControlfunctionEntity for EPON MPCP functions.
- Since EPON Pause message must cease transmission per LLID or LMAC ID, EPON needs to specify another MPCP control message for Pause per LLID.

DA	SA	Length/type	Opcode	LLID	Pause_time	Reserved	FCS
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- The location of the emulation layer is not related to the link managements. Both RS and MAC control layer emulation methods requires new object classes and attributes for EPON link managements.

Proposed EPON Layering with vLink Tag



LLID tag is included in the m_sdu.

How it works?

- **The legacy MAC will pass LLID tag header inside Ethernet frame to EPON MAC client.**
- **Using legacy MAC control request and indication primitive, LLID can be passed to MAC client without 802.3 primitive modification.**
- **Using legacy MAC unit data request and indication primitive, LLID can be passed to MAC client without 802.3 primitive modification.**
- **Usually, invalid MAC frames are not passed on to the MAC control sub layer, but it is possible to pass invalid frames to MAC clients in a private manner with reception status. All error counters per LLID can be done using this method in the MAC client.**
- **MAC client can request and receive different MPCP messages by passing opcode and indication operand list. If EPON pause function is defined with new opcode, MAC client can cease transmission per LLID.**
- **In case of ONU, filtering has to be done in MAC client to be compliance with 802.3.**
- **MAC client will manage all necessary registers for EPON system and provide interface to Link managements.**

Summary

In order to be compliance with the current 802.3 SPEC, EPON sub track needs to address issues in this presentation.

LLID in frame and emulation in MAC control is the proper way for MPCP in order to deliver MPCP allocation info to the emulation layer

EFM needs to specify how to do link managements and MPCP function per LLID. Both RS and MAC control layer emulation methods requires new object classes and attributes for EPON link managements.

EPON needs specify another MPCP control message for 'Pause per LLID' .

Motion 1

Define MPCP Pause message to cease transmission per logical port or LLID.

Motion 2

Add necessary object classes and attributes for MPCP and EPON Link managements.