Loopback implementation in EPON
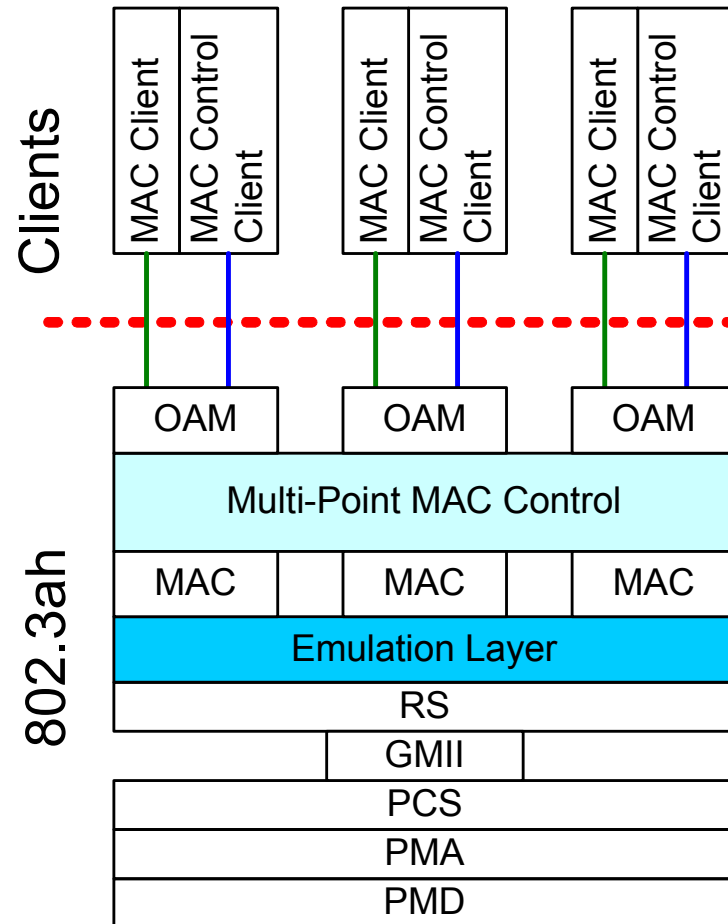
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What is it used for?

- Frame-based loopback is used to generate traffic from remote end

  - To measure Frame Error Rate (FER) in the return path (in absence of user's traffic)

  - To give a return traffic a specific characteristic (for example frame size distribution) in order to analyze performance

Location of OAM Sublayer

- OAM sublayer is located above MAC Control sublayer (above Multi-Point MAC Control sublayer in P2MP)

Clients

802.3ah

| MAC Client | MAC Control Client | | MAC Client | MAC Control Client | | MAC Client | MAC Control Client |

| OAM | | OAM | | OAM |

Multi-Point MAC Control

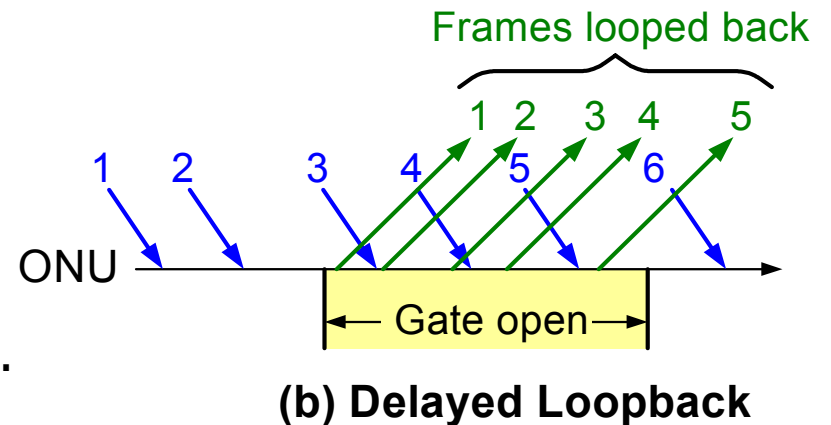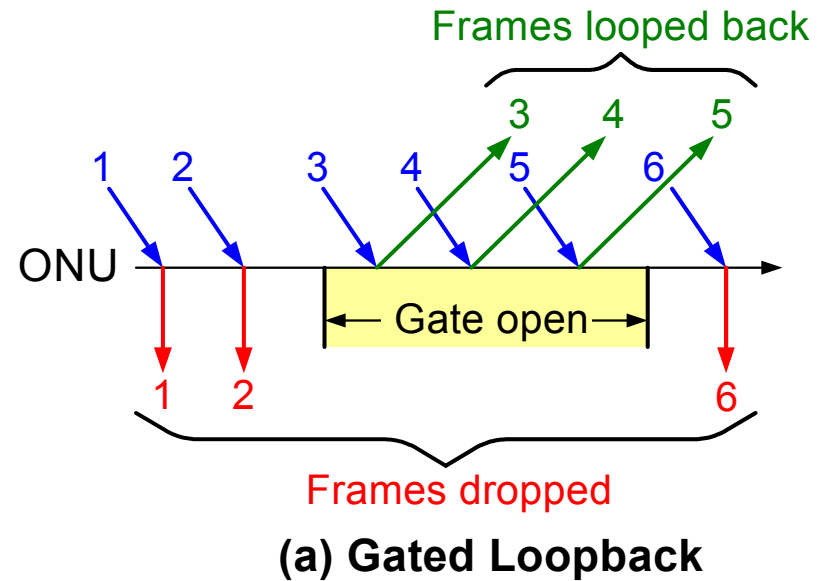| MAC | | MAC | | MAC |

Emulation Layer

RS

GMII

PCS

PMA

PMD

This figure shows P2MP layering model #4.

Issue 1: Gated vs. Delayed Loopback

ONU is not able to transmit continuously. Should OAM layer buffer the loopback frames between timeslots?

- **Gated Loopback:** OAM layer generates immediate MA_DATA.request for each MA_DATA.indication. If MA_DATA.request is not successful due to MPCP gate closed, frame is discarded in OAM layer

- **Delayed Loopback:** OAM layer buffers MA_DATA.indications until MPCP gate opens. Then it generates MA_DATA.request for each buffered MA_DATA.indication.

Frames looped back

3 4 5

1 2 3 4 5 6

ONU

← Gate open →

1 2 6

Frames dropped

(a) Gated Loopback

Frames looped back

1 2 3 4 5

1 2 3 4 5 6

ONU

← Gate open →

(b) Delayed Loopback

Issue 2: Granting loopbacked ONU

Loopback is done in OAM sublayer, but REPORTs are generated in MAC Control Client (above OAM sublayer).

- How ONU should request bandwidth while in loopback mode?

- Should OLT provision predefined slot size for loopbacked ONU?

  - In case of Delayed Loopback the slot size may be equal to the size of loopback buffer (+overhead).

  - In case of Gated Loopback the slot size can be a configuration parameter

- How MPCP (MAC Control Client) knows which device is in loopback mode?