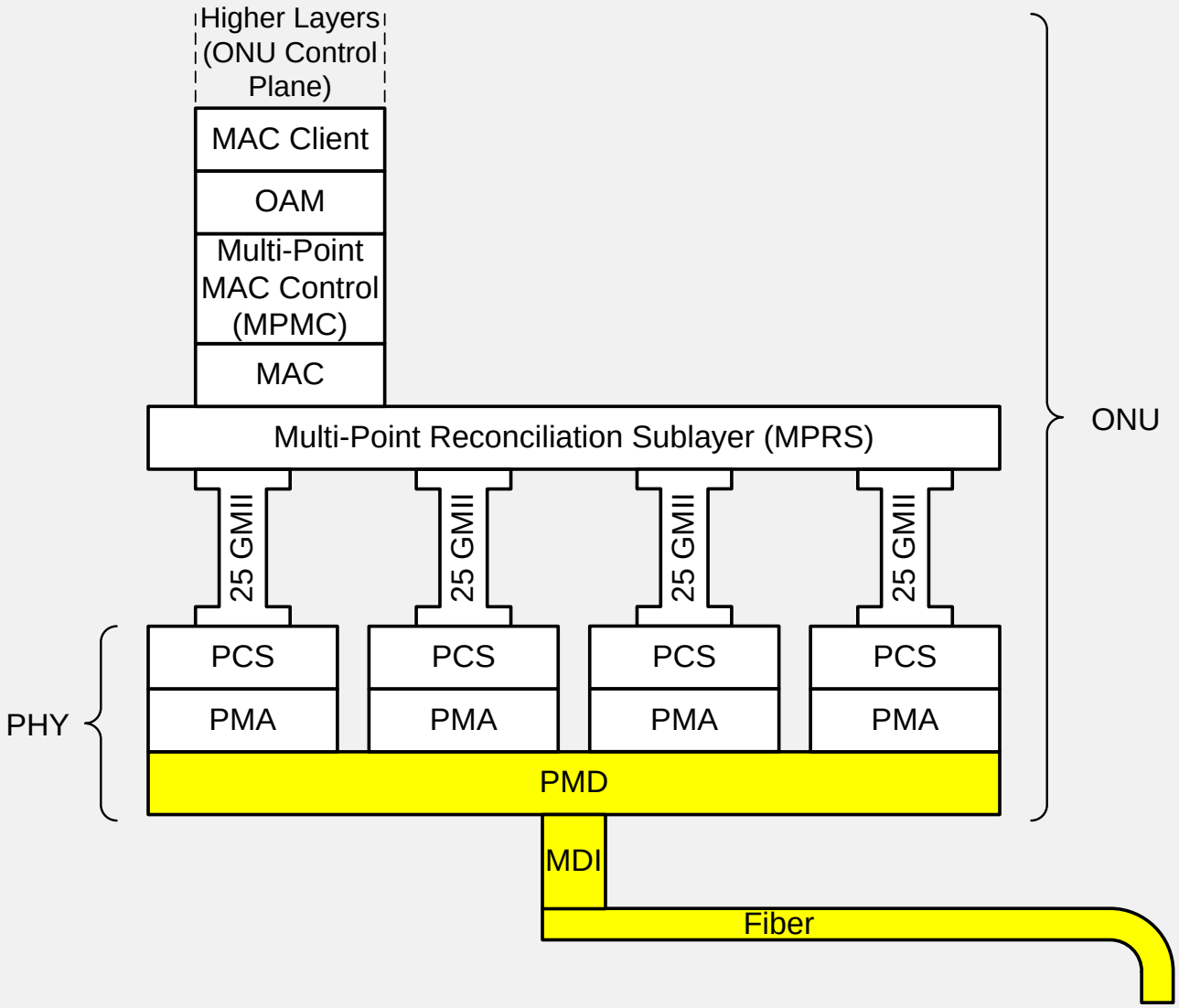
Arguments for keeping 4 channels at MPRS/PCS

Glen Kramer, Broadcom

Pragmatic Reasons

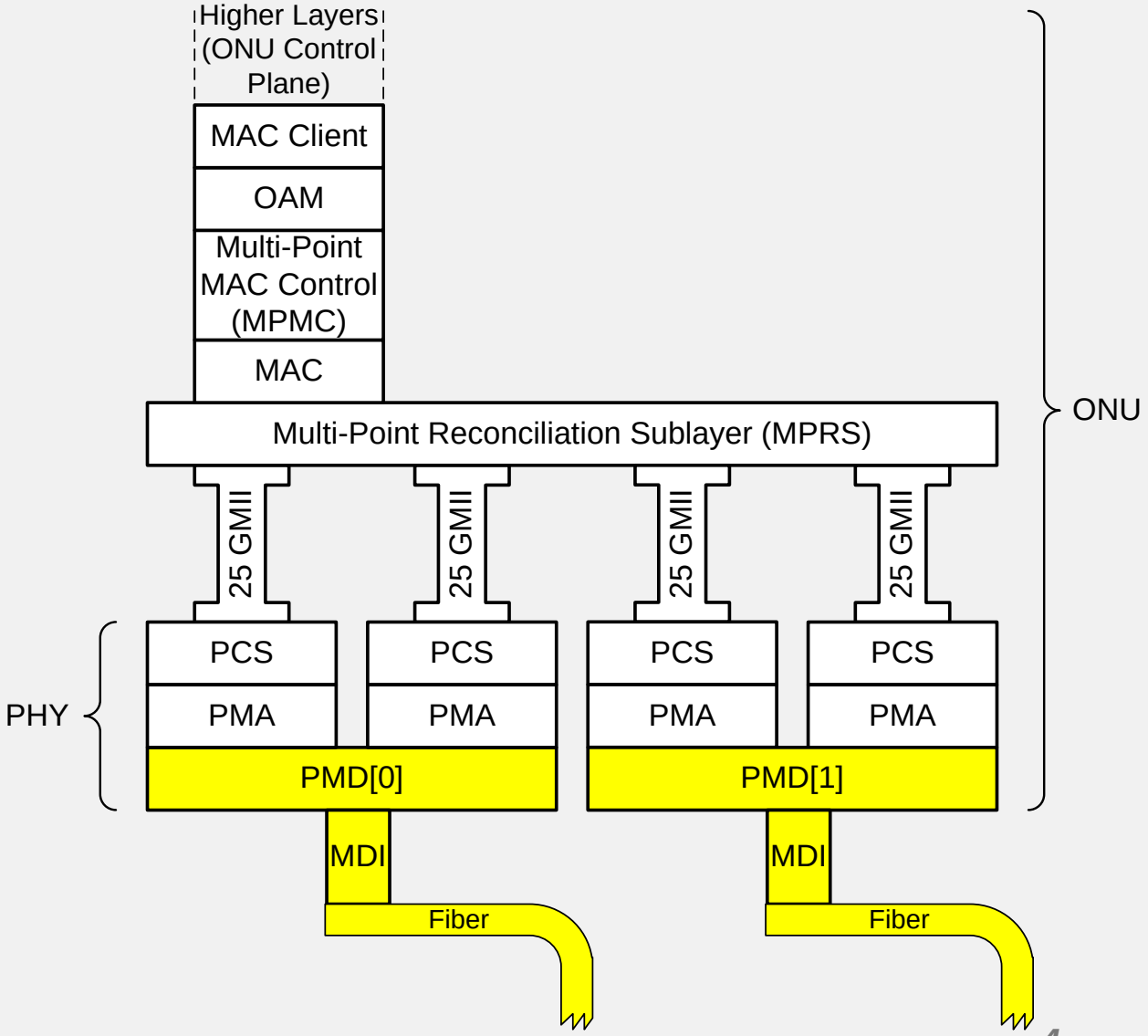
- All State Diagrams and variable definitions in MPRS assume a maximum of 4 channels. The actual number of channels is an implementation choice.
  - Just like the standard assumed a maximum number of LLIDs being 32K (in .3av or .3ah), but no vendor ever supported that many.
- Restricting the number of channels in MPCP/MPRS specifications is an extra work that is not necessary.
- There is no harm to allowing more digital channels than PMD can use.

Current ONU Layering Diagram



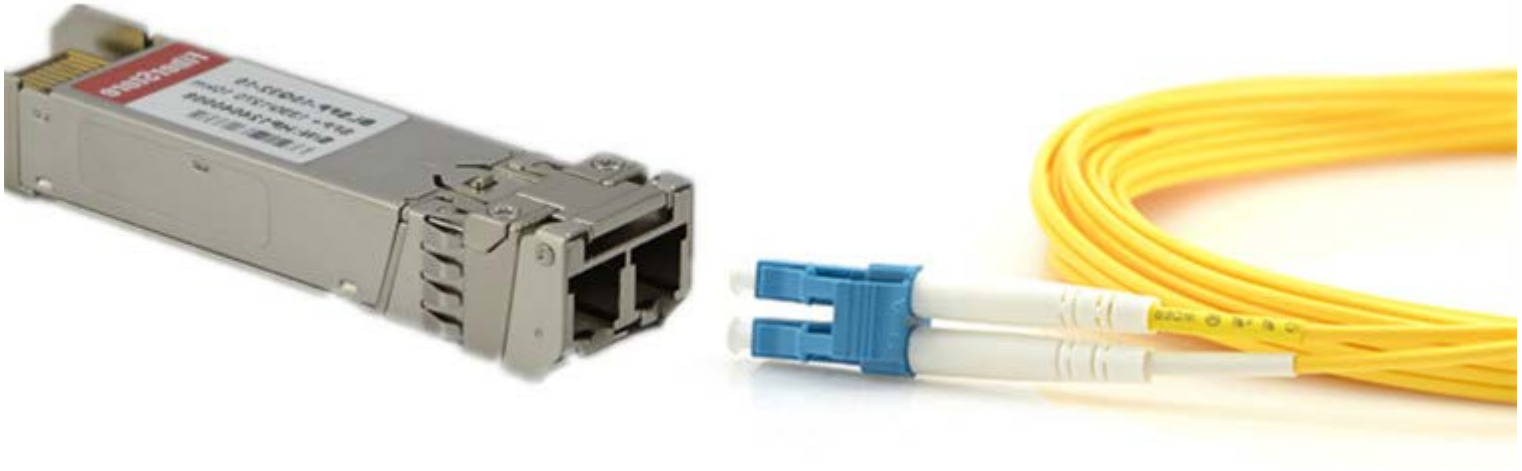
New ONU Layering Diagram

- 4 MPRS/PCS channels connect to two separate PMDs, two channels to each PMD.
- Both PMDs are identical.



Optical Modules

- Two PMDs can be in either two separate cages or a single-cage dual-fiber module

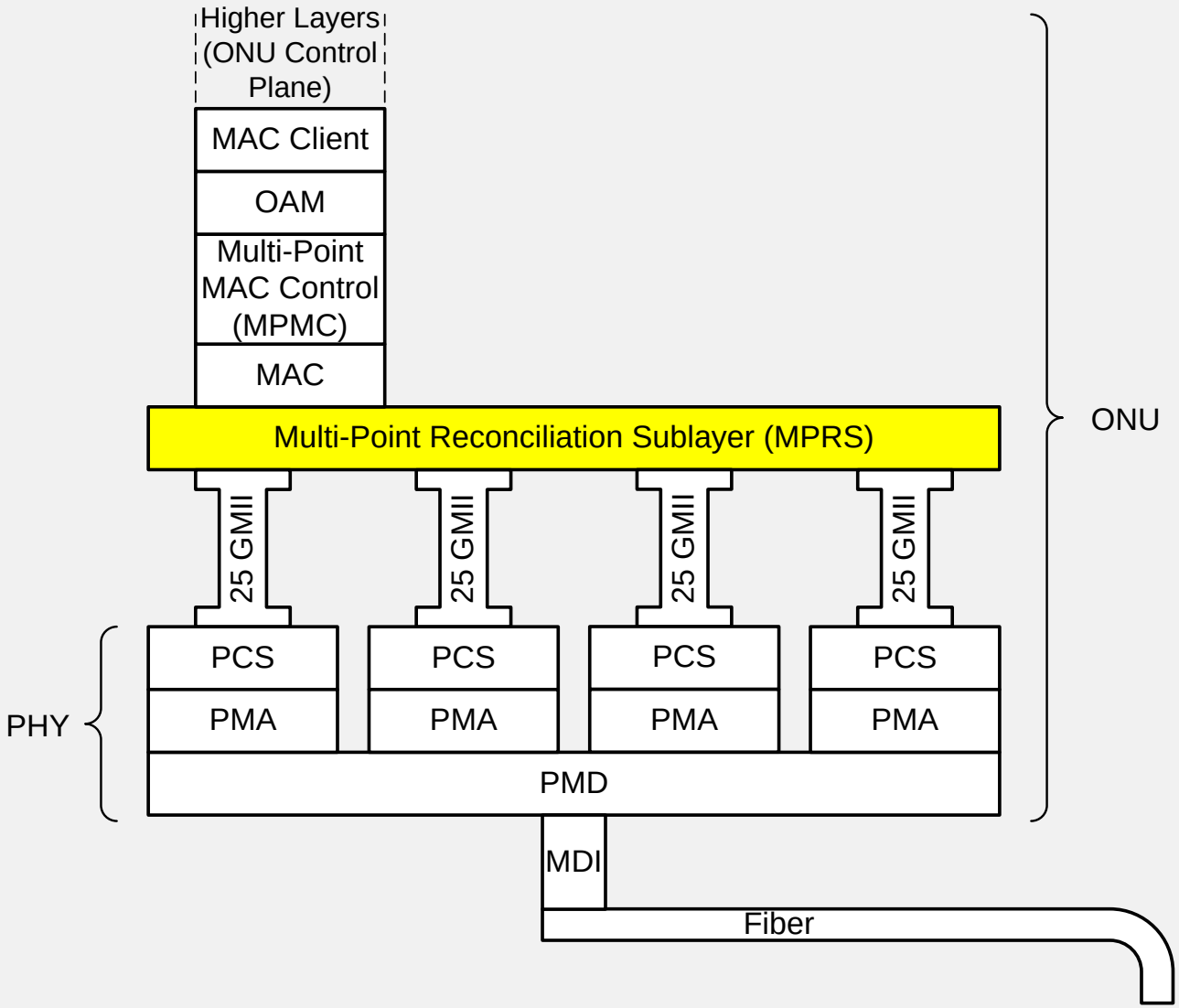


ODN delay constraints

- To support 100Gb/s, a two-fiber solution should have delay delta within ~80 ns (16 m). Generally, that means that both fiber strands are in the same cable.
- But what is the operator doesn't track in which cables the fiber strands are?
- ONUs already have all the machinery to be smart about this.
  - Before registering, the ONU waits for the Discovery GATE and sets the local clock to the timestamp in the GATE. It registers on the specified channel (say the Rx and Tx channels are connected to PMD[0])
  - After the registration, it continues to monitor the Discovery GATEs received on the channels that belong to the other PMD (PMD[1]).
  - When it sees a Discovery GATE on one of these channels, it compares the Timestamp with its own running local clock.
    - If |LocalTime – timestamp| < 32, go to slide 7.
    - Else go to slide 8

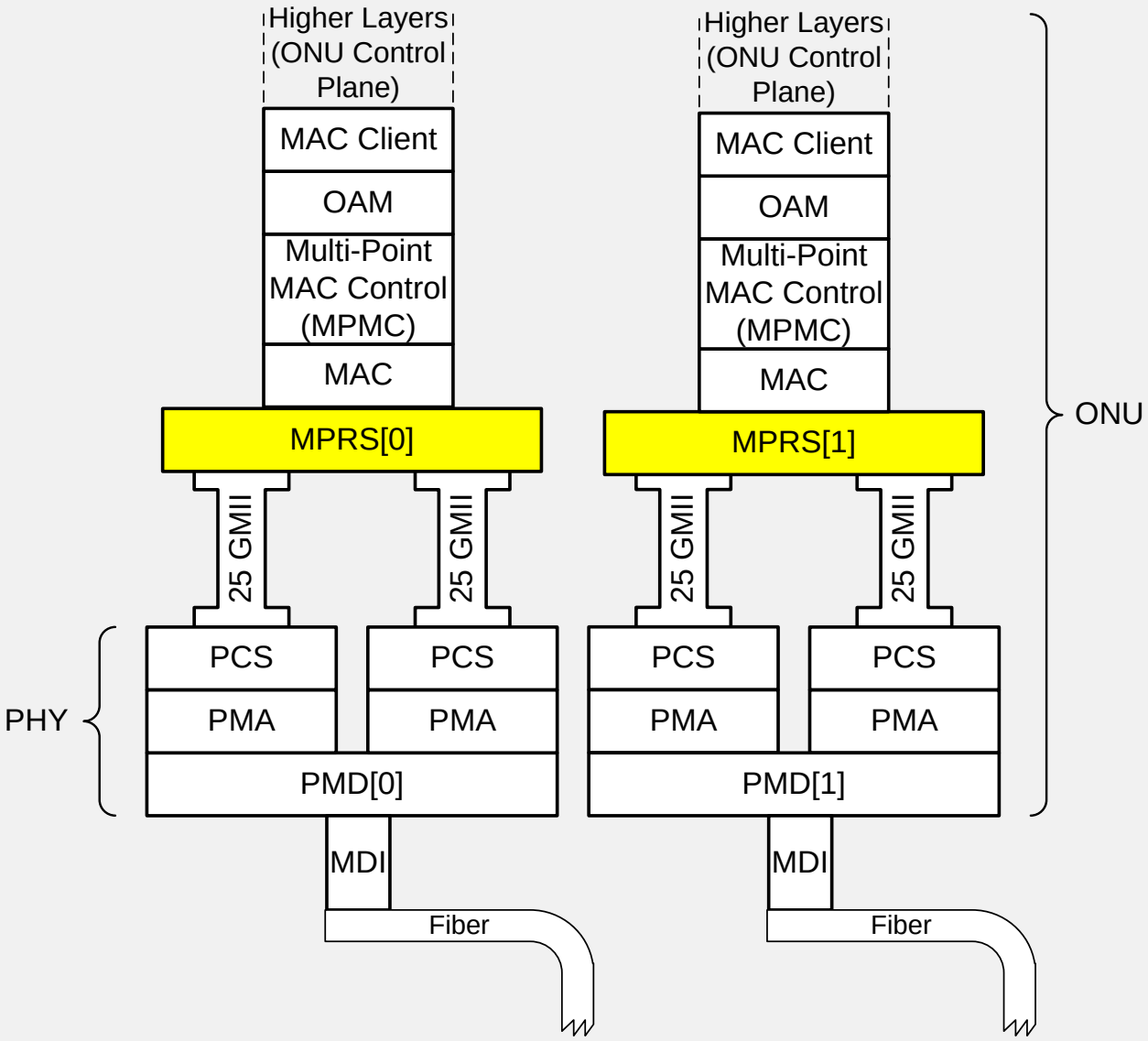
Delay Delta < 32 EQ

- MPRS spans 4 channels
- The ONU can support 100Gb/s MAC data rate



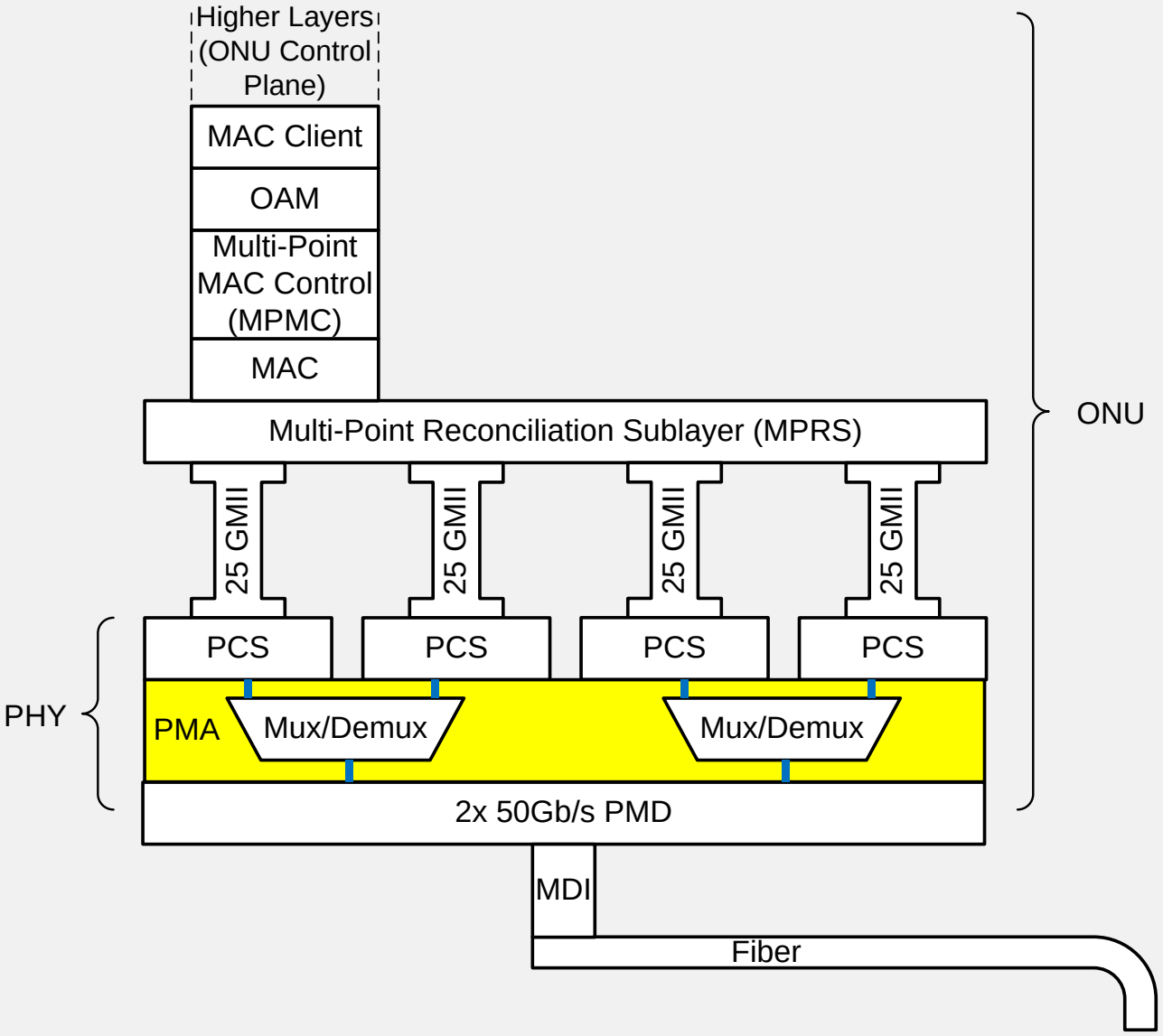
Delay Delta >= 32 EQ

- If the delay difference is greater than 32 EQ times, the ONU splits MPRS into two halves, each supporting two channels.
- It registers again in response to the second Discovery GATE received on PMD[1].
- The ONU becomes a typical dual-homed ONU



Future 50Gb/s over single λ

- 4-channel MPRS can support 2x50G PMD by multiplexing two MPRS channels into a single wavelength.
- Mux/Demux function belongs in PMA
- The MPRS/PCS digital part (FEC, scrambling, transcoding) still would operate on 25G channels



Two 25G channels into 50Gb/s λ

- Unit of multiplexing can be one 257b block.
- This will allow each FEC encoder/decoder to run at lower rate.
- This may help with burst errors, as they would be spread across two separate codewords.