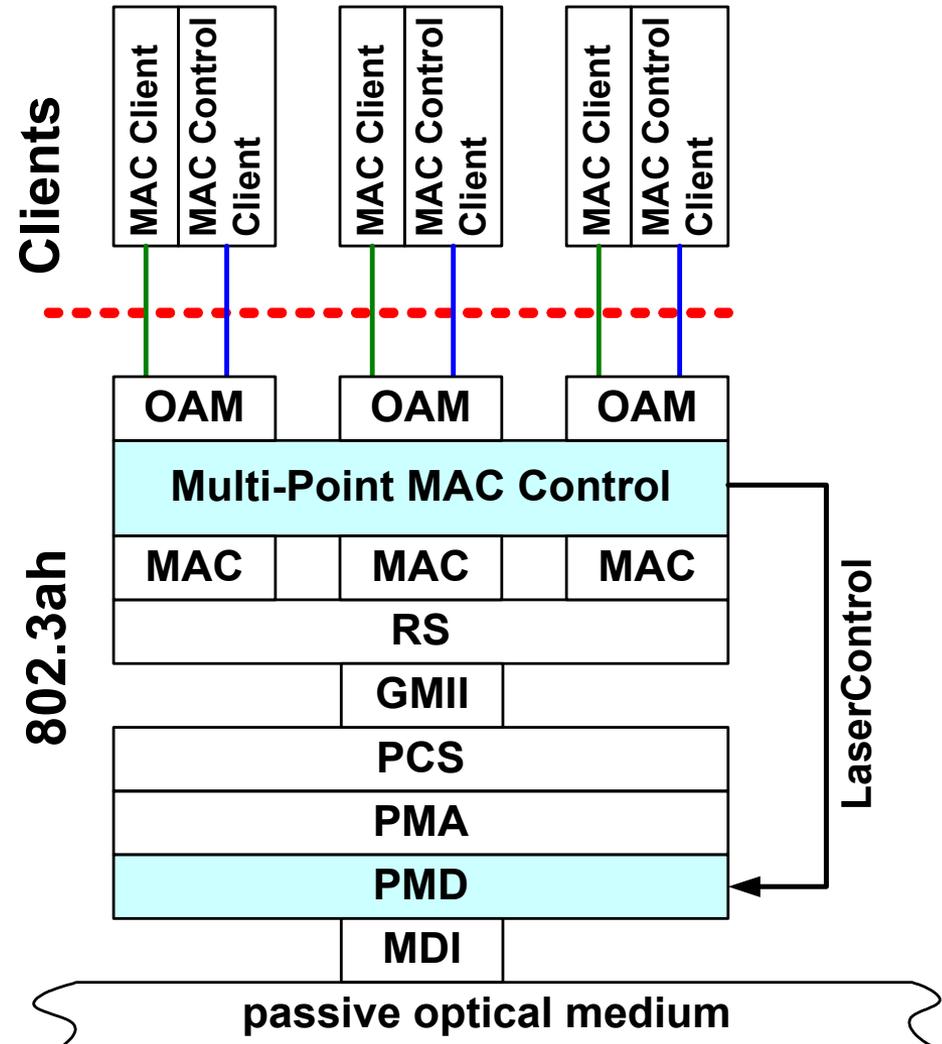


# LaserControl Problem statement

- Current ONU layering model requires **LaserControl** signal to go from MAC Control sublayer to PMD sublayer
- This signal jumps over **MAC, RS, GMII, PCS, and PMA** sub-layers
- **It is a layering violation**



# Proposed solution

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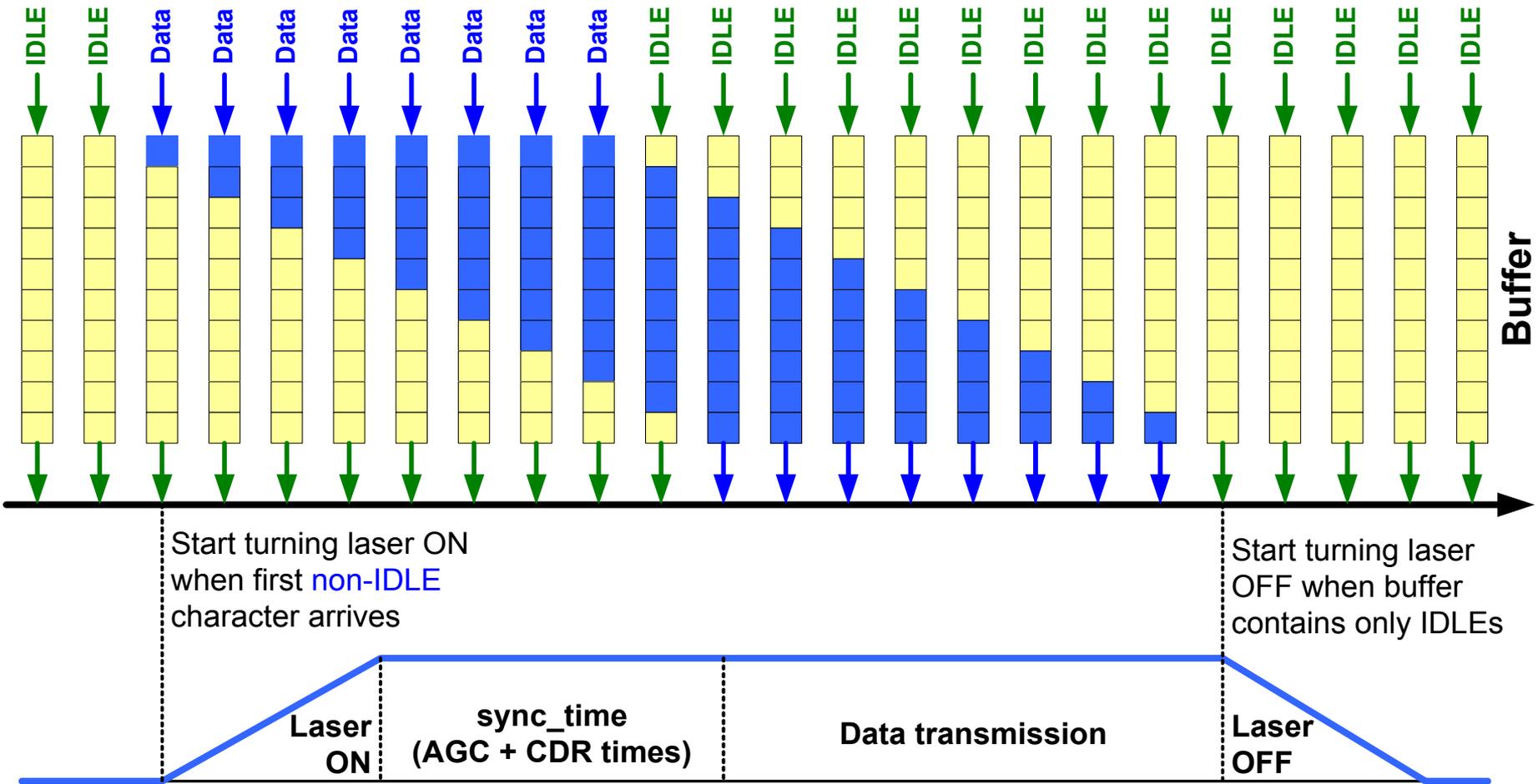
- PHY can be modified to autonomously determine times to turn laser on and to turn laser off
- LaserControl line between MAC Control and PMD is not necessary

# Implementation

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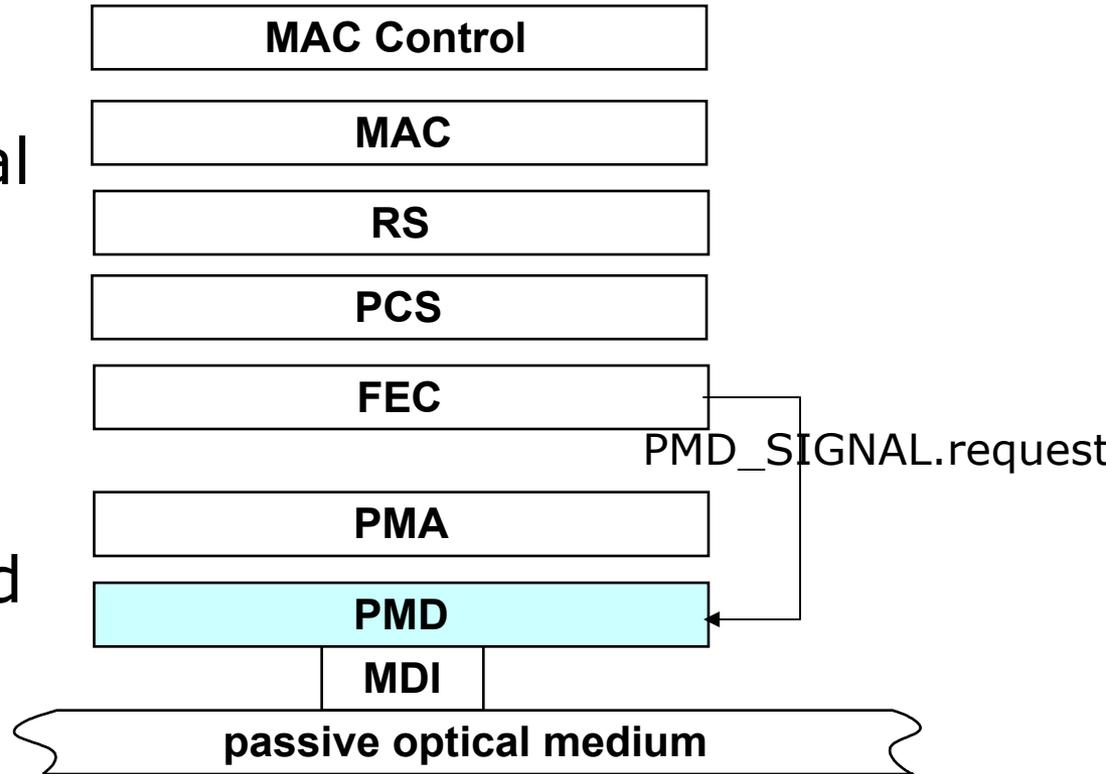
- Physical layer would contain a delay line (buffer, or prescient line) containing code-words to be transmitted.
- Assume initially the buffer is filled with IDLEs and the laser is turned off
- When first non-IDLE character arrives to the buffer, the PHY generates a signal to start the Laser\_On process.
- When buffer becomes empty (i.e., contains only IDLEs), the PHY generates signal to start Laser\_Off process.

# Illustration of the approach



# Solution

- Layering model satisfied
- LaserControl signal to go from FEC sublayer to PMD sublayer
- This signal propagates around PMA (like SD)
- Layering satisfied

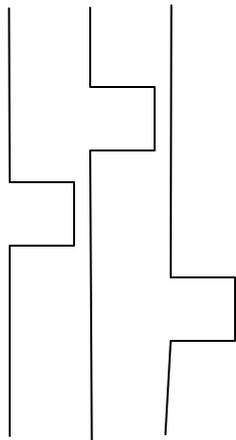


# Implementing IPG Stretch Function

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- Clause 4 changes required for IFSSStretch mechanism for rate adaptation used in FEC
- Transmission from MACs may violate minimal IPG requirement when switching transmitters

1 2 3

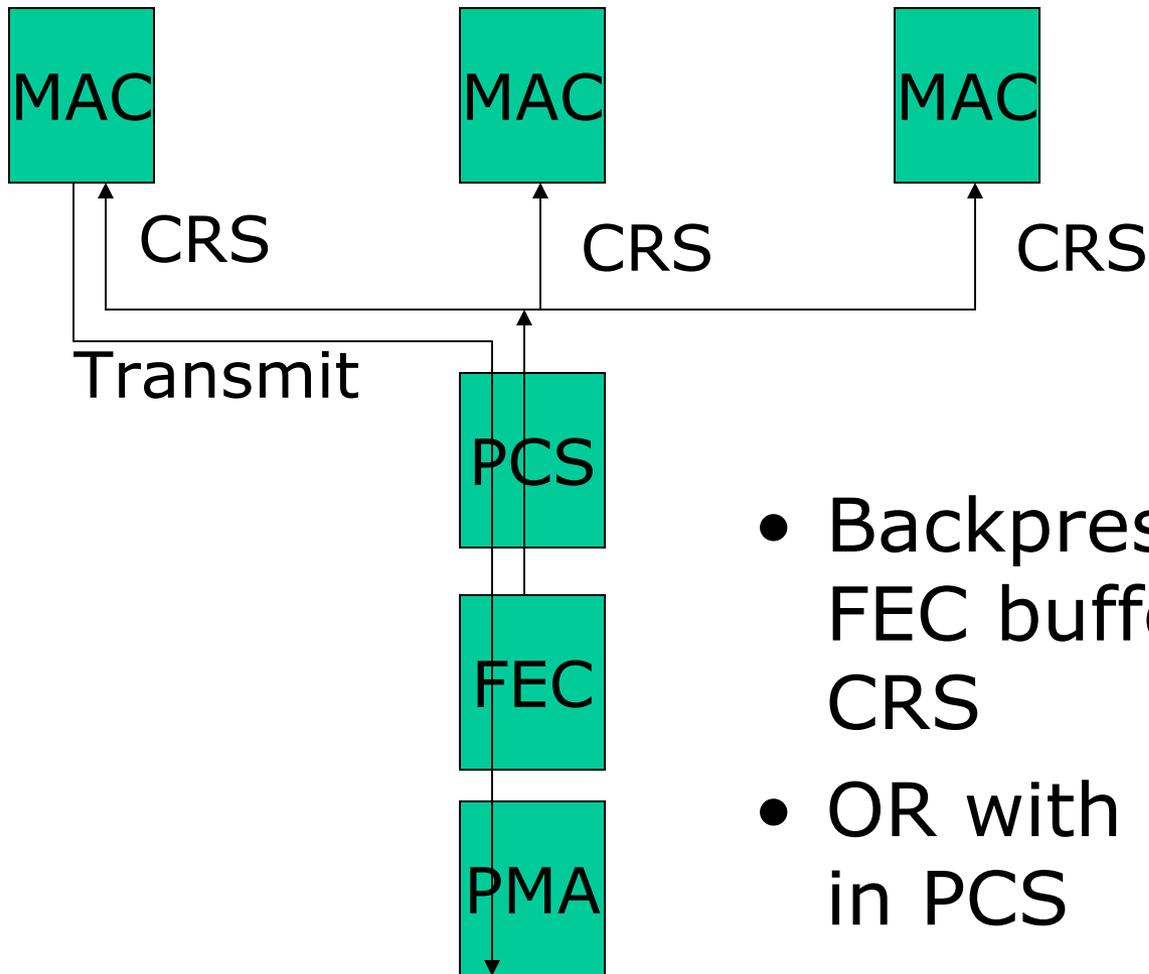


# Overview

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- Operate MACs in half-duplex
- Use CRS to signal 'busy'
- Rate adaptation achieved with signaling of FEC transmit buffer not-empty status
- FEC buffer size is set according to maximal transmission burst size
- Same solution as Clause 61

# Location



- Backpressure from FEC buffer activates CRS
- OR with existing CRS in PCS

# Summary

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- Solution of LaserControl layering
- Solution of IPG enforcement
  
- No need for IFSStretch in Clause 4
  
- MAC preserved
- Physical layer activation now performed in PHY

# Text Modifications

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- Remove Clause 4 changes
- Remove laser control references in clause 64
- Clause 65:
- In octet-buffer define location of pointer so we can correctly generate compensation for propagation delay through PMA.
- RS:
  - Add COL wire to 0
  - Add CRS as CRS+TX\_EN
- PCS:
  - Add CRS as PCS\_CRS+FEC\_SIGNAL.indication
- FEC Diagrams:
  - To Figure 65-5 add upstream arrow for buffer not empty, and downward arrow for laser control.
  - Figure 65-6 also add arrows from parity-octets buffer.
- Add paragraph describing parity-octets buffer with description of pointers and signals generated as a result.
  - Buffer size based on PMA/PMD parameters.
- In octet-buffer define location of pointer so we can correctly generate compensation for propagation delay through PMA.
- Two signals mapped to buffer pointers:
  - PMD\_SIGNAL for laser control
  - FEC\_SIGNAL for CRS