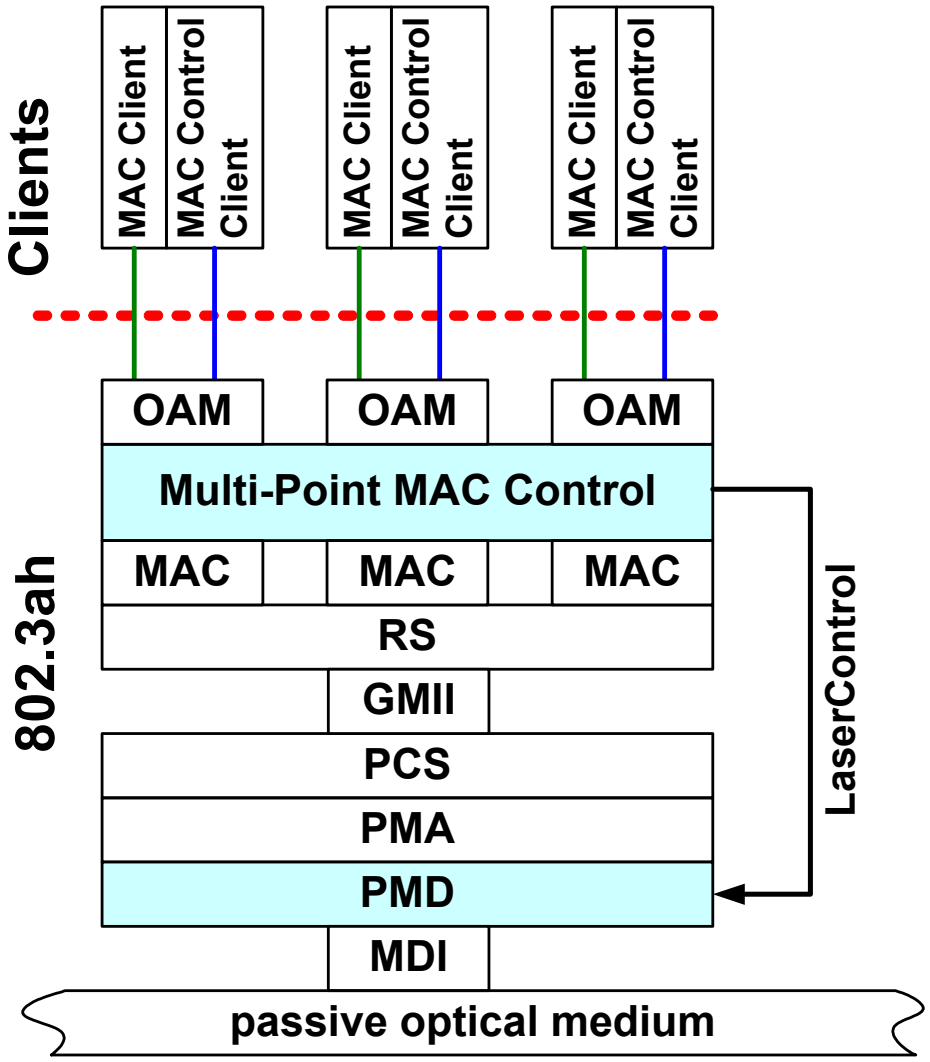
LaserControl Problem statement

- 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



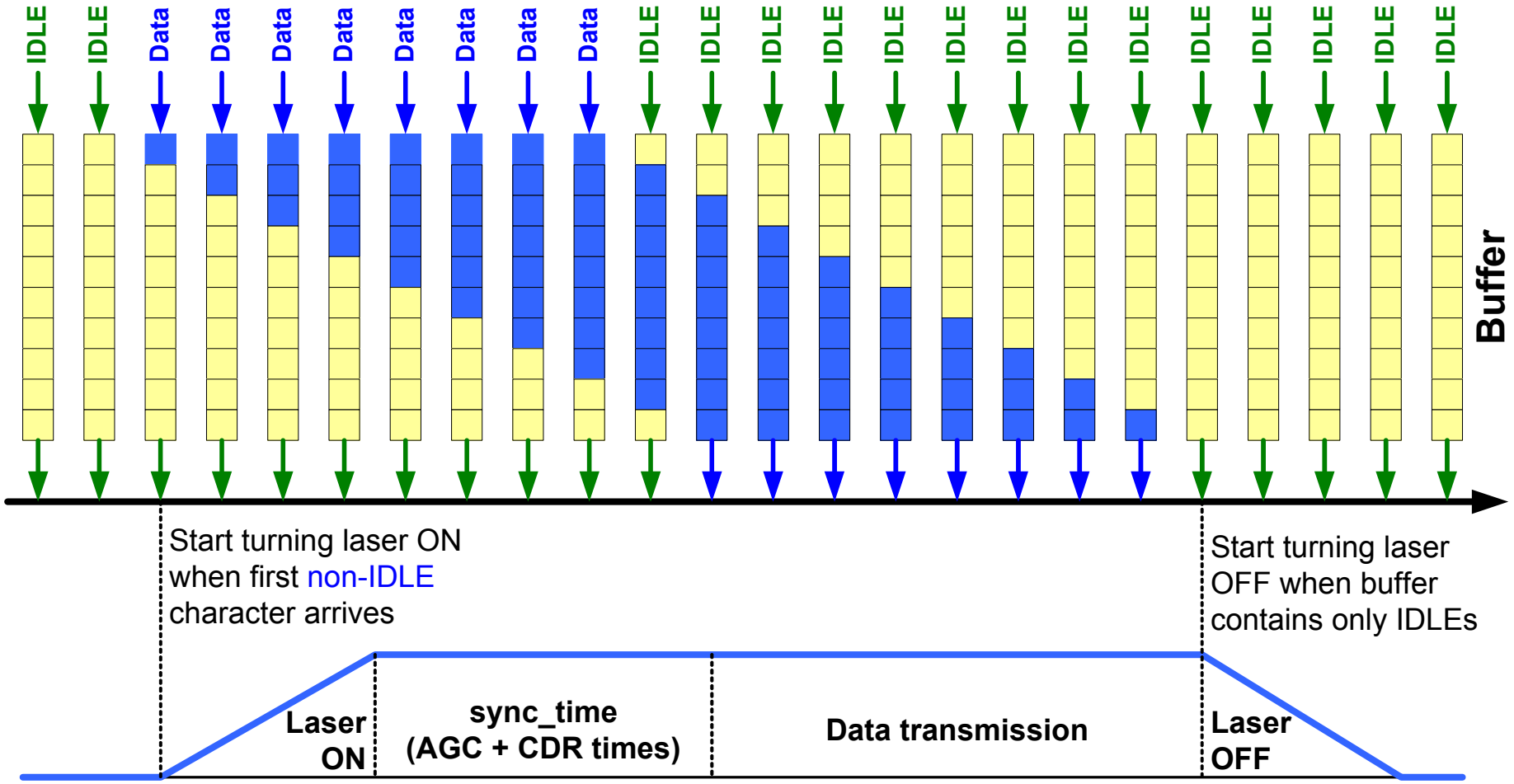
Proposed solution

- 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

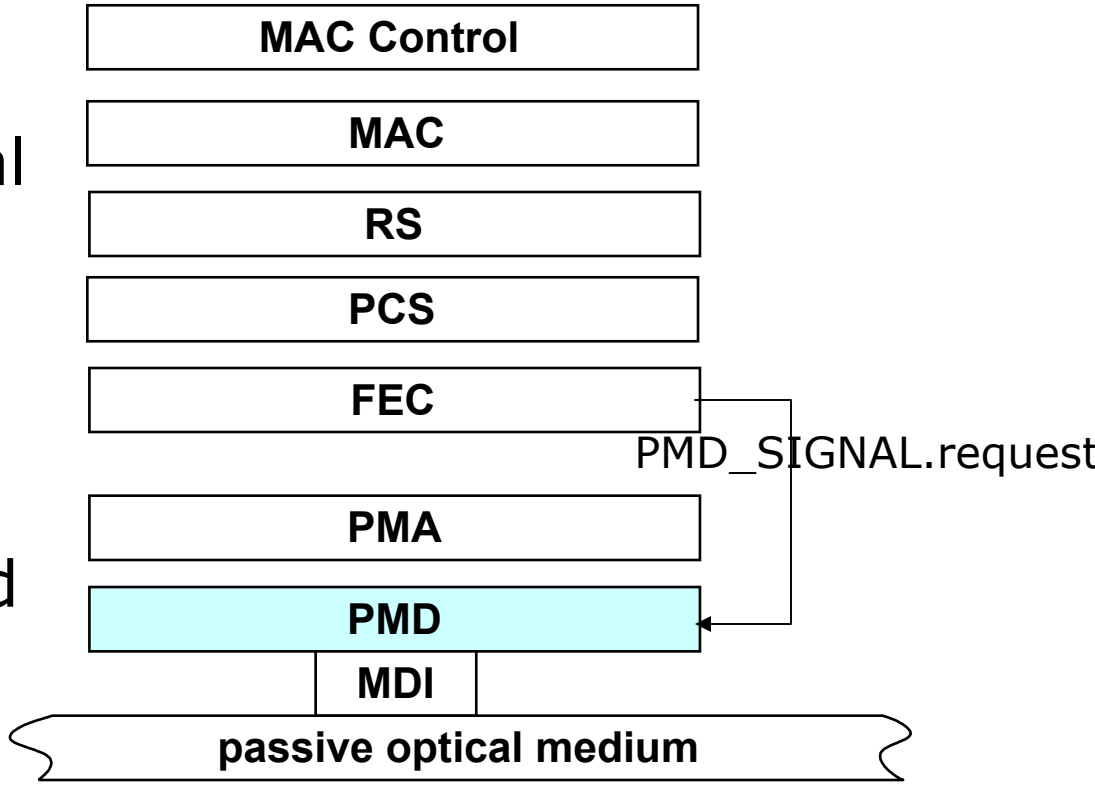
- Physical layer would contain a delay line (buffer, or prescient line) containing code-words to be transmitted.
- Assume initially the buffer is filled with IDLEs and the laser is turned off
- When first non-IDLE character arrives to the buffer, the PHY generates a signal to start the Laser_On process.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

Illustration of the approach



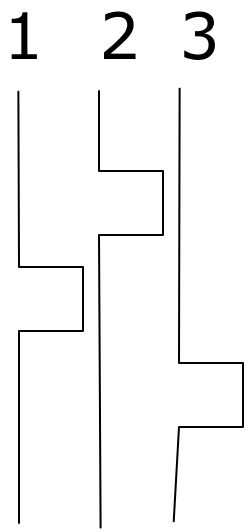
Solution

- 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

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



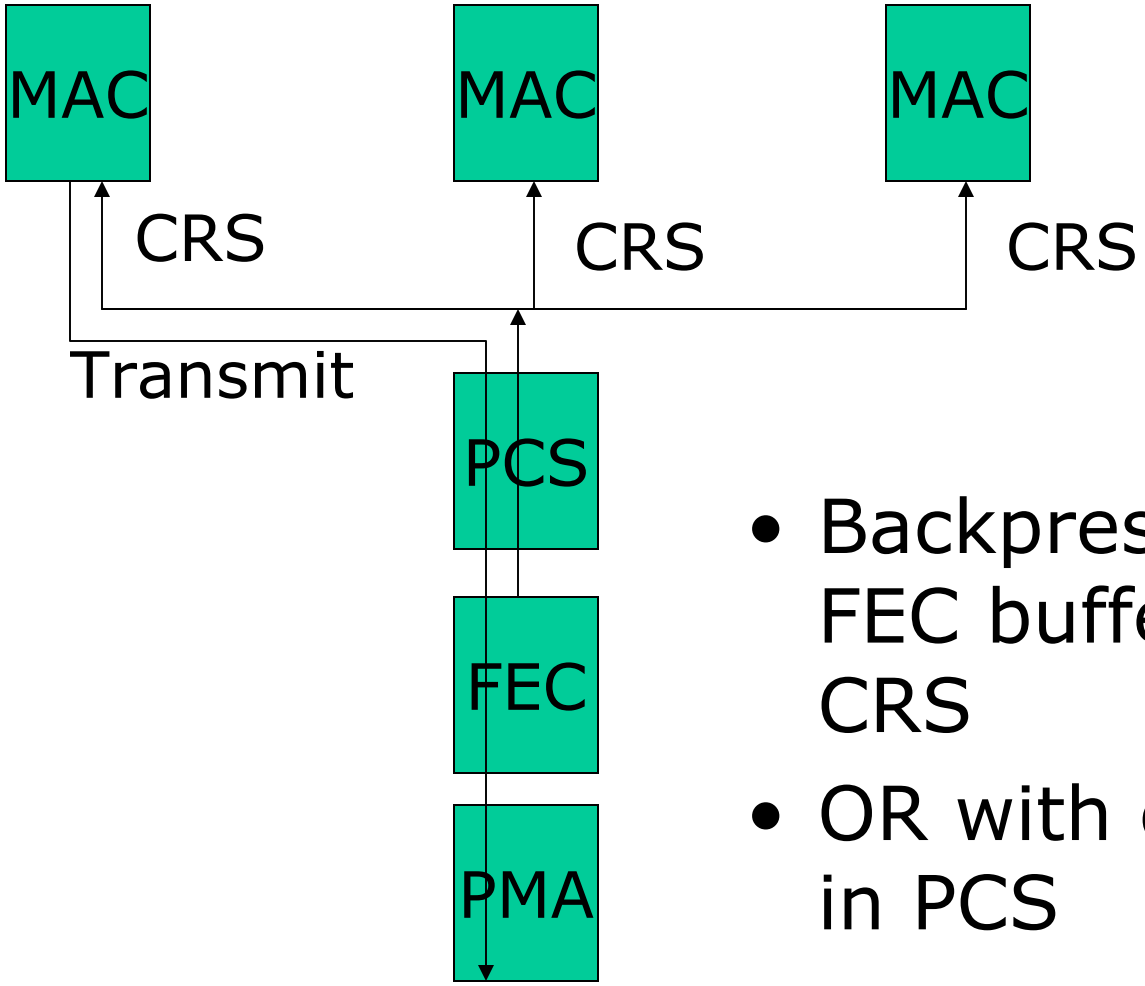
Overview

- 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

- 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

- 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