

PON PMD Negotiation Tutorial

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Parameter Negotiation

- Exchange of critical parameters for PMD function
 - Performed during discovery process
 - Receiver characteristics broadcast from OLT
 - Transmitter characteristics broadcast from ONU
- Mechanism in place as of Draft 0.9

Discovery Process

- Discovery consists of the following message exchange:
 - OLT→ONU GATE indicating Discovery
 - ONU→OLT REGISTER_REQ alerting of ONU existence
 - OLT→ONU REGISTER acknowledging ONU
 - ONU→OLT REGISTER_ACK acknowledging OLT
- The REGISTER_REQ message is sent in a contention zone, all other messages are non-contentious

Discovery GATE

- In order to correctly decode an ONU's transmission, the OLT requires M codewords for receiver synchronization prior to correct reception of data.
- M is composed of:
 - N codewords required for AGC settling
 - L codewords required for CDR locking
- The OLT broadcasts the values N , L at each discovery GATE

GATE Message Structure

- AGC Settling Time and CDR Lock Time fields are used for exchange

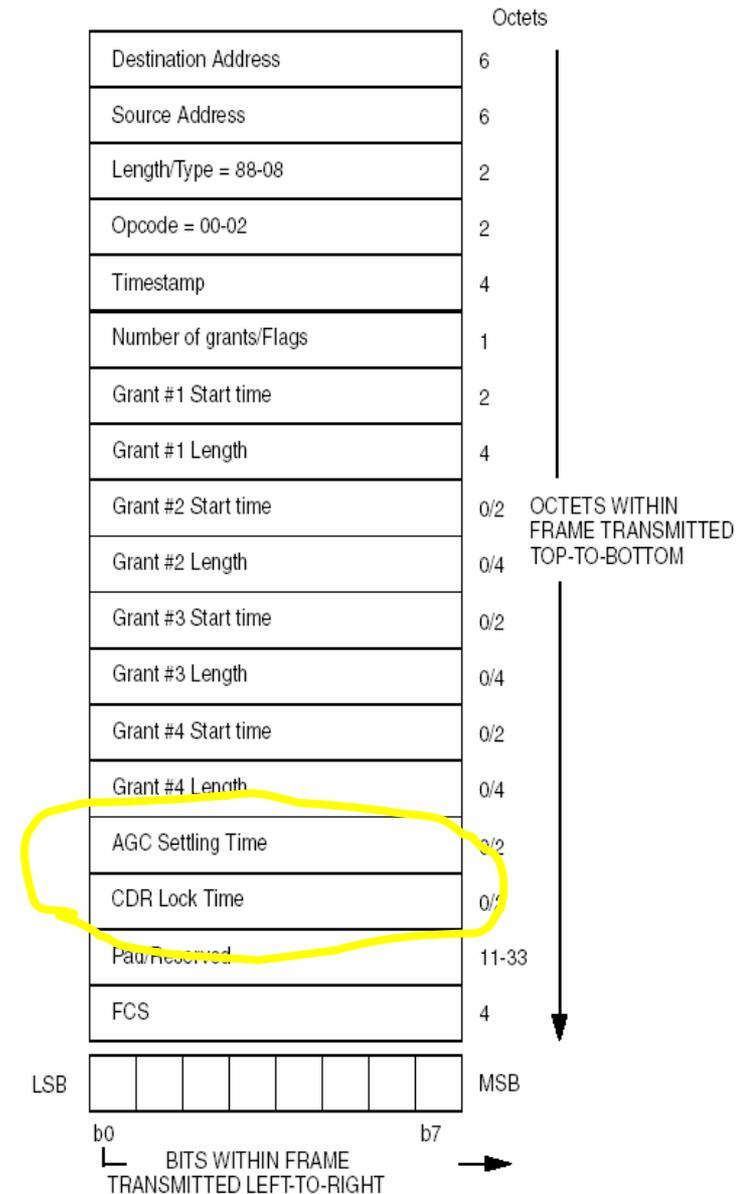


Figure 56-24—GATE MPCPDU

Registration Request

- The first opportunity to hear from the ONU is when it requests registration.
- Following this request a private channel is established for the ONU.
- In order to correctly allocate channel OLT requires to understand the ONU's overhead
- The ONU transfers the required parameters:
 - Laser On Delay
 - Laser Off Delay

REGISTER_REQ Message Structure

- Values are negotiated using time quanta (TQ)
- Each TQ is 16 bit times long
- 1 TQ = 16 nano seconds

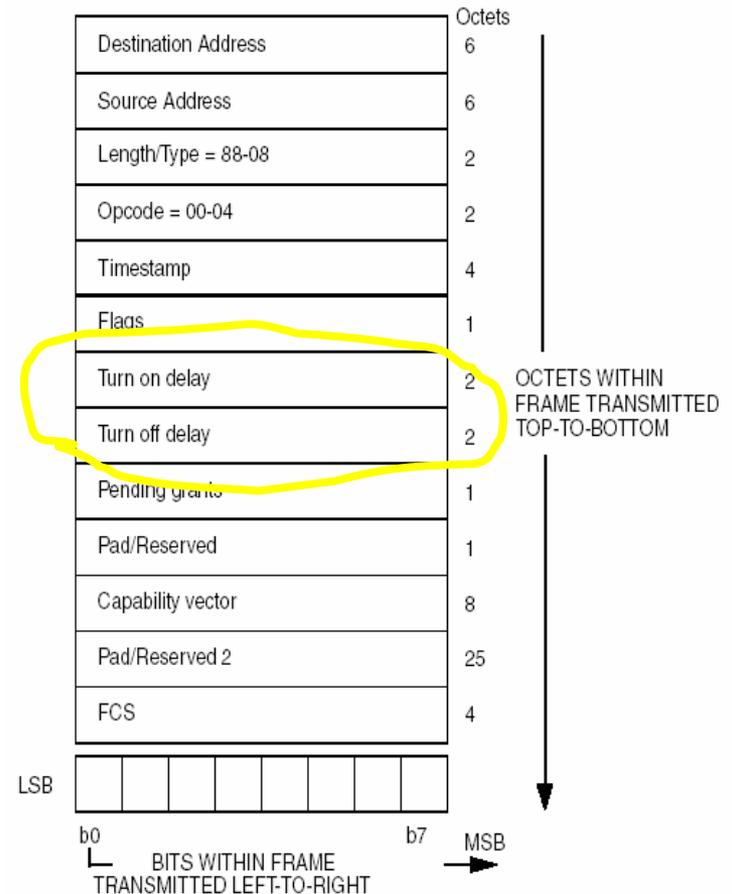


Figure 56-26—REGISTER_REQ MPCPDU

Registration

- The private channel is assigned using the REGISTER message.
- Parameters for the private channels can be set by the OLT at this time.
- Paradigm of handshake through echoing is used during registration process.

REGISTER Message Structure

- AGC Settling time and CDR Lock time set by OLT.
- Laser turn on delay and turn off delay echoed by ONU for handshake.

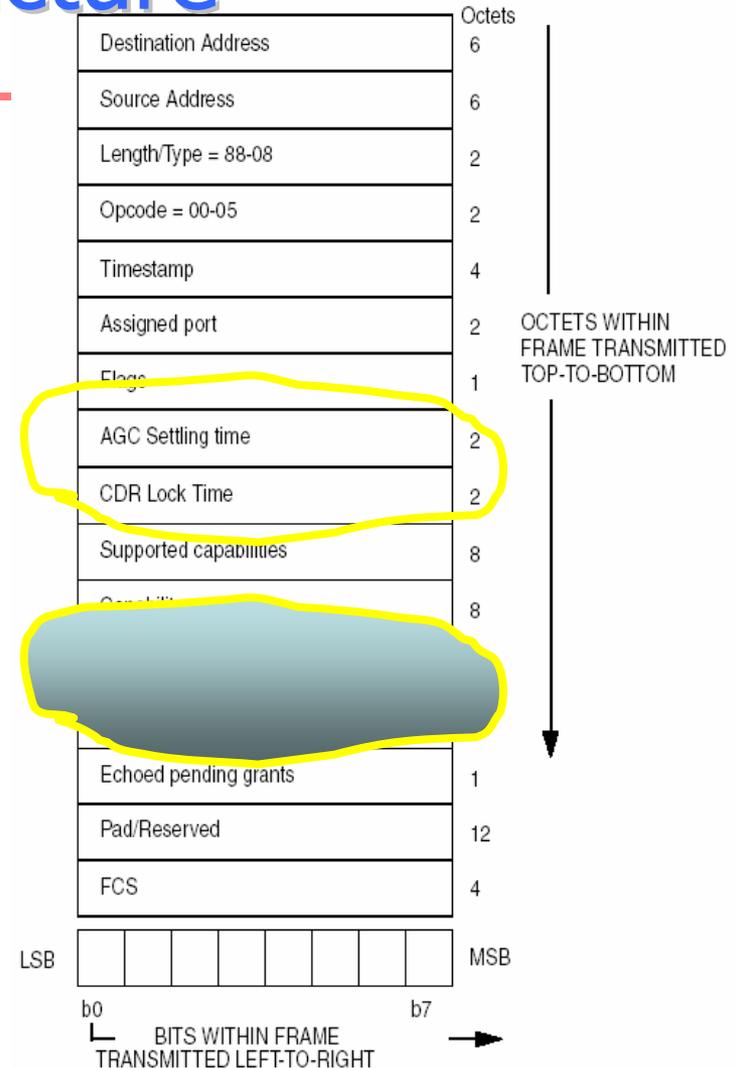


Figure 56-27—REGISTER MPCPDU

REGISTER_ACK Message Structure

- REGISTER_ACK message is the last message in the discovery exchange.
- Final echo of OLT parameters is performed in this message.

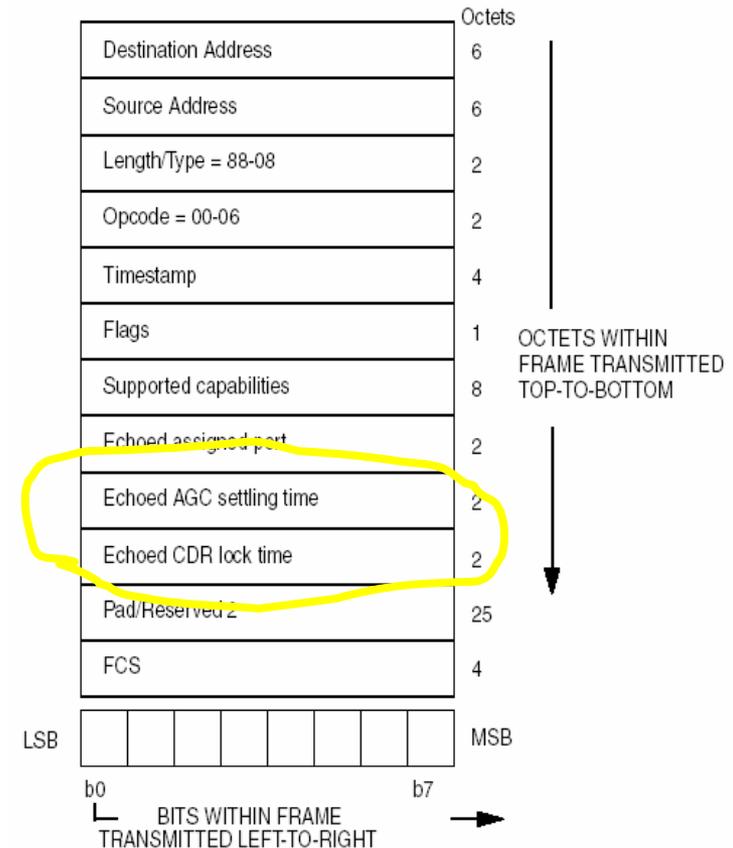
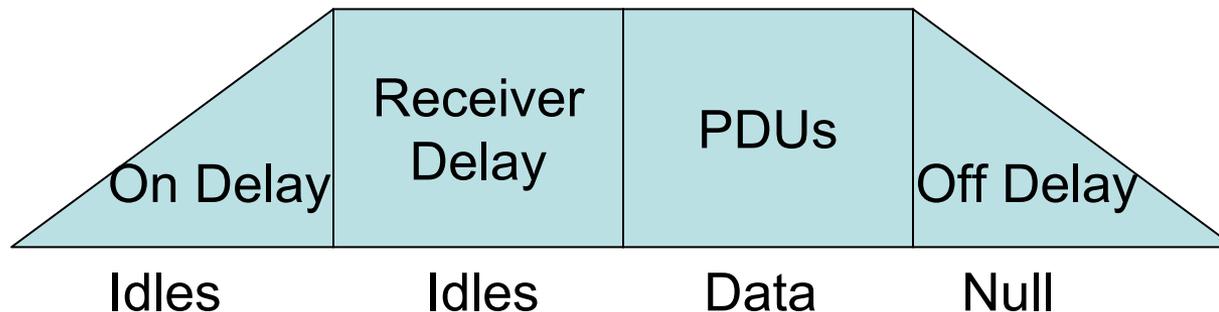


Figure 56-28—REGISTER_ACK MPCPDU

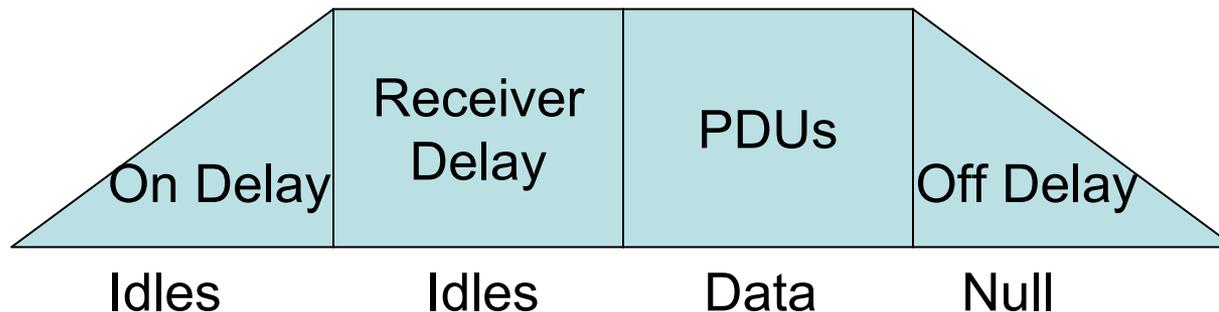
ONU Processing

- The ONU uses the OLT values to transmit Idle codes prior to valid data.
- So far from ONU's perspective AGC settling time and CDR lock time are summed and used as a combined value



OLT Processing

- Start of grant is point in time where ONU **turns on** the laser.
- End of grant is point in time where ONU laser is **completely off**.
- OLT must compensate for this when sending grant, otherwise PDU (utilized bandwidth) is affected.



ONU Processing 2

- ONU is network preserving.
- When grant **does not make sense**, ONU ignores it.
- The laser on, laser off and receiver delays are accounted for at the ONU's grant processing state machine.
- When the **net grant** is of negative size the ONU will ignore it (silent discard).

Summary

- The negotiation abilities of MPCP allow for the concurrent use of many PMD types in a single network.
- Protocol layer does not recognize PMD classes, each variable is accounted for separately.

Do you need more parameters?
Let the protocol guys know!