



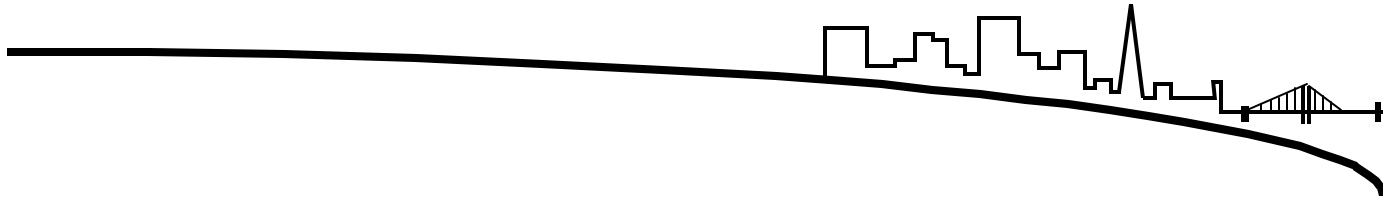
MPCP – Messaging Frame Formats

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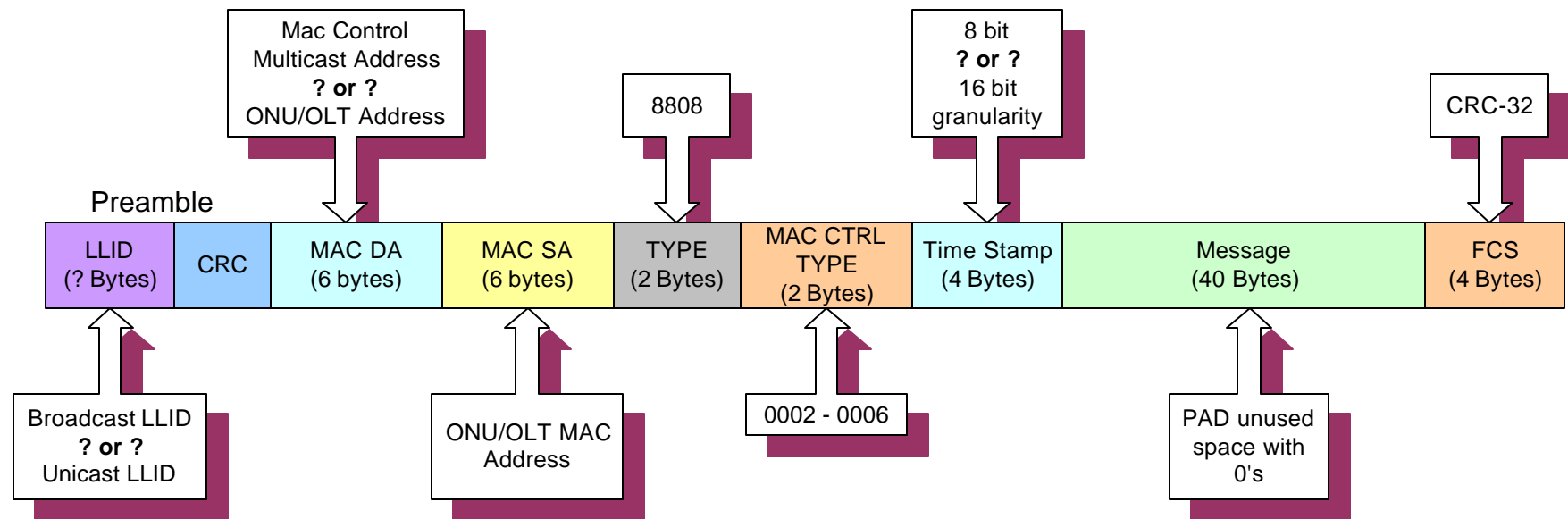
Overview



- ✓ Review All Messages
 - GATE, REPORT, REGISTER_REQUEST, REGISTER, REGISTER_ACK

- ✓ Review state of each message
 - Consensus – generally agreed summary and passed in baseline proposals.
 - Open Issues – Issues directly related to messaging in which decisions need to be made.
 - Pending Issues – Issues related to other subjects which require their input such as physical layer, timing, discovery,...

General Frame Structure



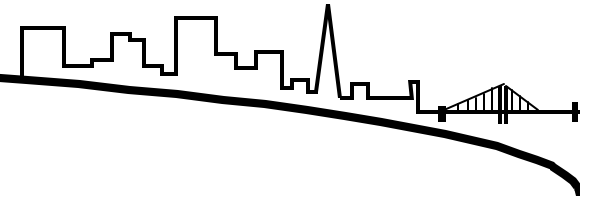
- Consensus

- Mac Control Frames – Ethertype 0x8808, 64 bytes, ...
- Embedded Time Stamp field – 32 bits

General Frame Structure – continued

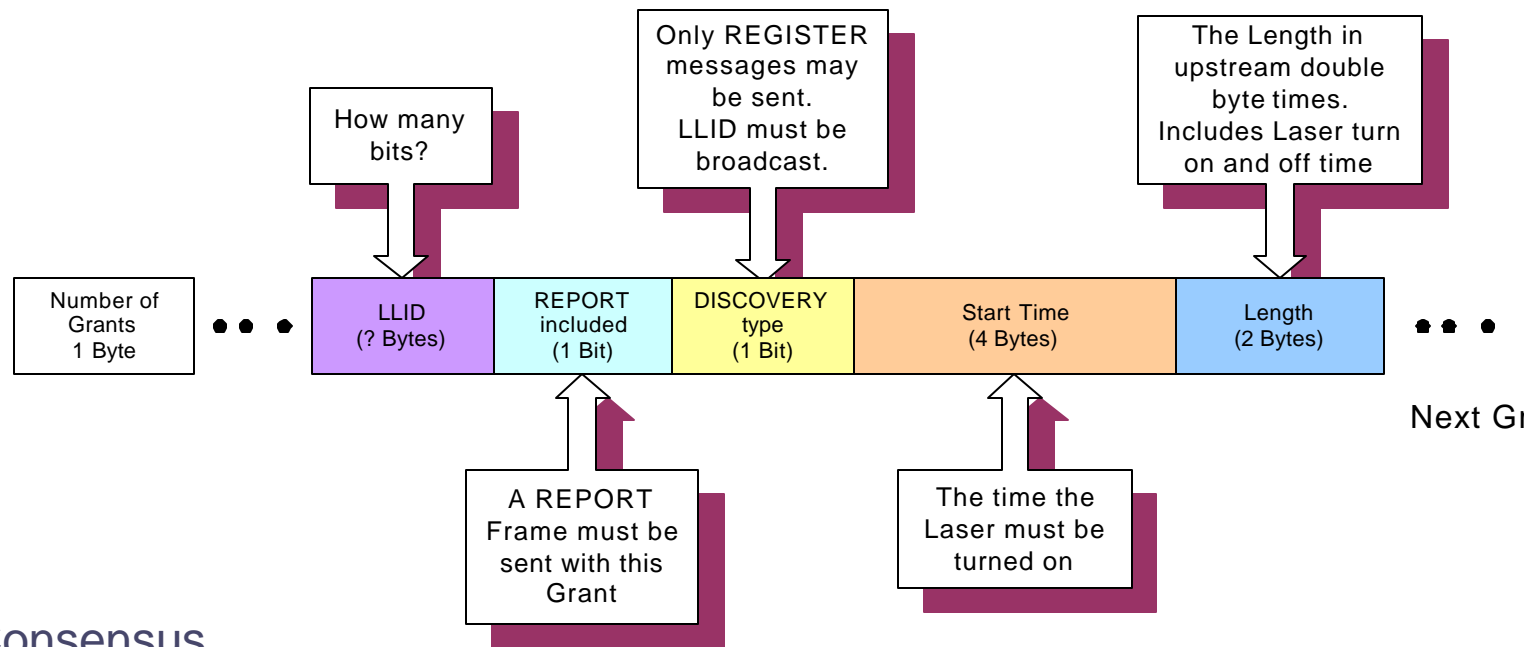
- Open Issues
 - Addressing
 - Is the DA the ONU's address, or Multicast DA of Mac Control?
 - Is the LLID broadcast or unicast?
 - Options
 - Broadcast LLID, ONU DA
 - Only messages to ONU need to be processed
 - Unicast LLID, Multicast DA
 - Multicast DA guaranteed not to be forwarded
 - Only messages to ONU need to be processed
 - Broadcast LLID, Multicast DA
 - Multicast DA guaranteed not to be forwarded
 - All ONUs receive message
 - Multicast allows more frequent time stamp updates
 - Grants identified by LLID in message
 - REGISTER message requires embedded ONU Mac address (no LLIDs assigned yet)

General Frame Structure – continued



- Open Issues - continued
 - Why is Time Stamp 16 bit granularity when Frame Lengths are in 8 bit values? 2^{32} leaves enough time to use 8 bit or even 1 bit granularity.
 - Why do we need ~1 minute ($2^{32} \times 16$ -bit) resolution?
 - More granularity may allow finer tuning of clocks
 - Frame lengths are in bytes, why not time stamps?
 - Does the PCS require 16-bit grant lengths?
- Pending Issues
 - Any other Frames required? I.e. PHY calibration

GATE Message



✓ Consensus

- GATE messages contains multiple Grants in the upstream
- GATE messages contain the Grant Start Time, Grant Length, Grant LLID, REPORT included, and DISCOVERY type for each Grant
- REPORT frames may be granted with a field in the GATE message
- Grant Length must include Laser turn on time.

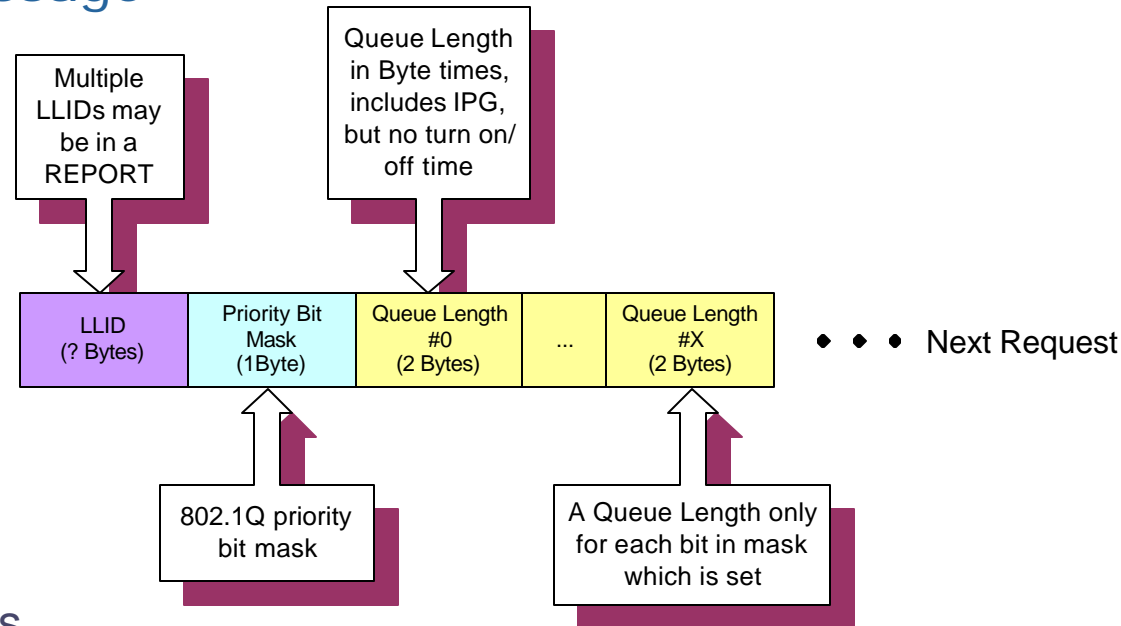
GATE Message - continued

✓ Open Issues

- Do grants come in chronological order for an ONU?
- Can grants for one LLID on an ONU be used for another LLID on the same ONU?
- Can a GATE contain Grants for multiple ONUs?
- Is there a maximum of outstanding grants per ONU/ LLID? (1, 32, 512?)
- Repetitive Granting?

✓ Pending Issues

REPORT Message



✓ Consensus

- REPORT frames pass queue status from ONU to OLT
- REPORT must be sent periodically for ranging.
- REPORT frames may be sent during any grant time, but must be sent during grants with a REPORT included.
- Requests include IPG. OLT will compute compensation for Laser turn-on/off times.
- REPORT frame may include multiple LLID requests

REPORT Message - continued

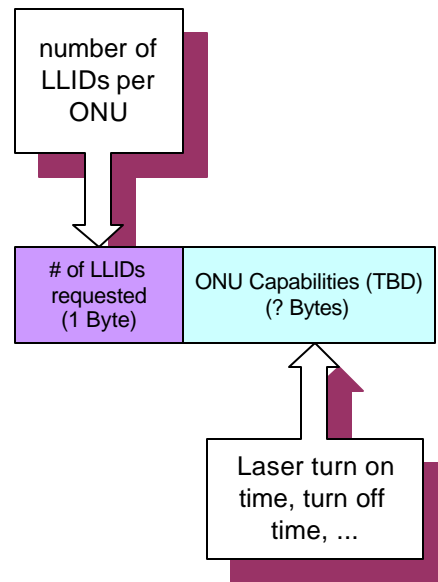
✓ Open Issues

- Can Requests be broken into multiple Grants? Are frame boundaries reported? How?
- Requests send the absolute queue length? (not incremental queue length) or can be sent multiple times to indicate frame boundaries?

✓ Pending Issues

- Optional fields?

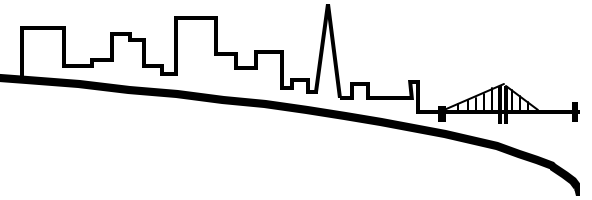
REGISTER_REQUEST Message



✓ Consensus

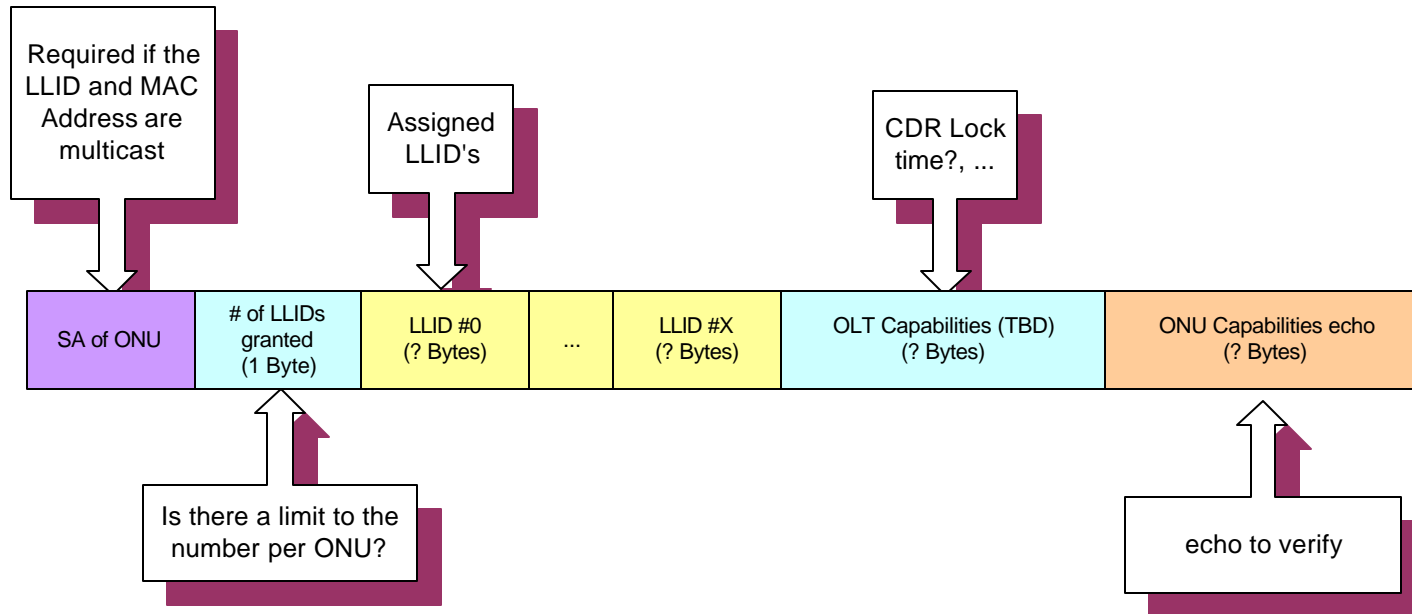
- Sent in response to Discovery grant
- Request LLIDs
- Sends ONU Capabilities

REGISTER_REQUEST Message - continued



- ✓ Open Issues
- ✓ Pending Issues
 - Method of collision resolution (see Discovery ...)
 - What PHY parameters need to be passed? I.e. Laser turn on, ...
 - How are LLIDs assigned?

REGISTER Message



✓ Consensus

- Sent by OLT to ONU to acknowledge registration
- Assigns LLIDs
- OLT Capabilities sent
- ONU Capabilities echoed

REGISTER Message - continued

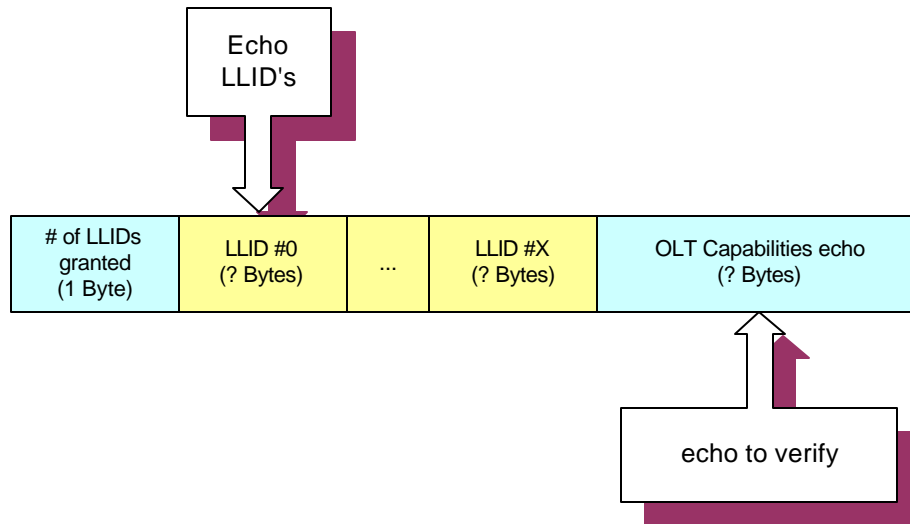
✓ Open Issues

- Is the SA of the ONU required in message? (pending broadcast/multicast DA/LLID discussion)

✓ Pending Issues

- How are discrepancies in echoed capabilities handled? (Discovery)
- How are limited number of LLIDs handled? I.e. Requested more than available. (Discovery)
- How are LLIDs assigned?
- What PHY parameters need to be passed? I.e. Laser turn on, ...
- Will this message exceed 64 byte frame? Do we really need to echo for confirmation

REGISTER_ACK Message



- ✓ Consensus
 - Acknowledges Register Message
 - Echoes OLT parameters
- ✓ Open Issues
- ✓ Pending Issues