

MPCP: Messages Format

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Message Definition

- **Five messages are defined**
 - GATE (OLT → ONU)
 - REPORT (ONU → OLT)
 - REGISTER (OLT → ONU)
 - REGISTER_REQUEST (ONU → OLT)
 - REGISTER_ACK (ONU → OLT)
- **REGISTER, REGISTER_REQUEST and REGISTER_ACK shall be used only during discovery process**

Message Encapsulation Limitation

- ❑ **Content limit when using a 64 bytes MAC control packet is:**

$$64 - 6(\text{DA}) - 6(\text{SA}) - 2(\text{Ethertype}) - 2(\text{MAC control opcode}) - 4(\text{FCS}) = 44$$

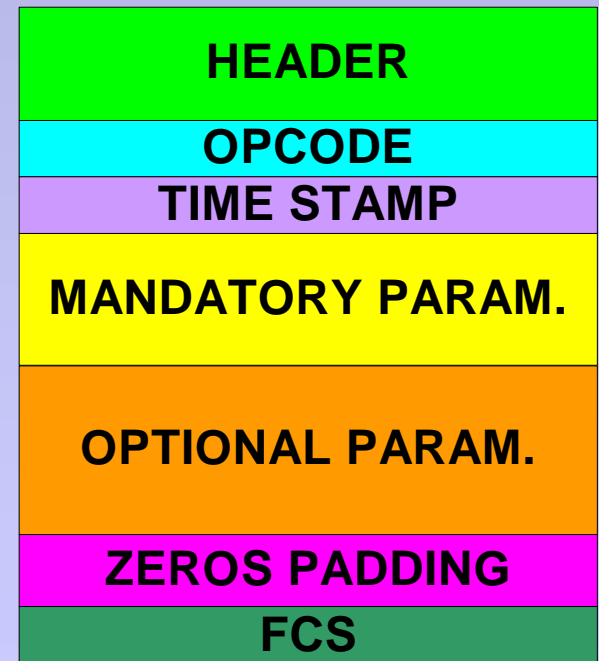
- ❑ **44 bytes might not be enough**

Message Encapsulation Options

- ❑ **MAC control: Using the same Ethertype, adding new opcodes**
- ❑ **MAC control: Using a new Ethertype, adding a message length field**
- ❑ **MAC control: Define an additional packet length (128). Length selection (64 or 128) is based on opcode.**
- ❑ **Follow slow protocol format Annex as a guide, but without the "slow" constraint**

Frame Structure

- ❑ Opcode field is used to distinguish message types
- ❑ A timestamp is prepended to all messages
- ❑ All messages have fixed mandatory parameters
- ❑ Optional parameters might follow for some messages



Why Define Optional Parameters?

- ❑ **Basic operation MUST NOT require optional parameters**
- ❑ **However, vendors would like to introduce differentiation by adding proprietary parameters**
- ❑ **Type-Length-Value (TLV) encoding is suggested to prevent chaos**

Type of Optional Parameters

- **Two groups of parameters exist**
 - Optional fields: These parameters are known to all vendors, though their usage is optional
 - Vendor extensions: Parameters which have private interpretation
- **A group is identified by MSB of type field**

TLV Format

TYPE [1BYTE] MSB = 0
LSB = 0: OLT originating
LSB = 1: ONU originating

LENGTH [1BYTE]
Number of bytes

VALUE
[LENGTH BYTES]

TYPE [1BYTE] MSB = 1
LSB = 0: OLT originating
LSB = 1: ONU originating

VENDOR IDENTIFICATION
[3BYTE]
Organizationally Unique
Identifier (OUI)

LENGTH [1BYTE]
Number of bytes

VALUE
[LENGTH BYTES]

Time Stamp Field

- ❑ All messages contain a 32-bit time stamp field
- ❑ Clock resolution is 2 bytes
- ❑ The time stamp is the value of PON clock at the moment MAC control passed the frame to the MAC
- ❑ ONU must update its local PON clock when receiving any valid message
- ❑ OLT can measure RTT based on time stamp field in valid messages

GATE Message

Mandatory fields:

- **Number of grants [8 bits]**
 - MSB is grant type (0 – regular / 1 – discovery)
- **A sequence of grants, each composed from**
 - Grant start [32 bits]
 - Time when laser should be turned on
 - Grant length [16 bits]
 - Time when laser should be turned off

GATE Message (cont.)

Optional fields:

- ❑ OLT capabilities (allowed only for discovery grant)

Vendor extensions:

- ❑ OLT capabilities (allowed only for discovery grant)
- ❑ Steady state parameters

REPORT message

Mandatory fields:

- ❑ A reported element contains the number of bytes requested per 802.1 priority queue
- ❑ A bit mask specifies the queues reported
- ❑ Vendor extensions may be added

REQUEST BIT MASK [1BYTE]

Bit #n is 0: No request from queue #n

Bit #n is 1: Queue #n request exists

REQUEST #0[4BYTE]

Number of bytes requested for queue #n

.....

REQUEST #X[4BYTE]

Number of bytes requested for queue #m

REGISTER_REQUEST Message

Mandatory fields:

- ❑ Number of shared media MACs [8 bits]
- ❑ Number of P2PE MACs [8 bits]
- ❑ Echo of understood OLT capabilities
 - Originating indication of TLV remains OLT

Optional fields:

- ❑ ONU capabilities

Vendor extensions:

- ❑ ONU capabilities

REGISTER Message

Mandatory fields:

- ❑ Number of shared media MACs assigned [8 bits]
- ❑ Shared media PHY ID value [16 bits]
- ❑ Number of P2P MACs assigned [8 bits]
- ❑ List of P2P PHY IDs [Each value is 16 bits]
- ❑ Echo of understood ONU capabilities
 - Originating indication of TLV remains ONU

- ❑ Vendor extensions may be added

REGISTER_ACK Message

Mandatory fields:

- ❑ Number of registered shared media MACs [8 bits]
- ❑ Registered shared media PHY ID value [16 bits]
- ❑ Number of registered P2P MACs [8 bits]
- ❑ List of registered P2P PHY IDs [Each value is 16 bits]

- ❑ Vendor extensions may be added

Summary

- ❑ **A simple but flexible message format is presented**
- ❑ **Interoperability is guaranteed when using only mandatory fields**
- ❑ **Differentiation is enabled by adding vendor specific fields**