

MPCP Extensions for EPOC

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- A lot of discussion on the architecture of EPoC in relation to the functions of OLT, CLT and CNU
- Decisions from the task force on requirements and features will drive the MPCP extension requirements
- The following proposed MPCP extensions are to provide the capability for EPoC to support the features/requirements discussed so far

MPCP Overview

- GATE / REPORT
 - for DBA BW allocation request BW from OLT (REPORT)
 - assign BW to ONUs (GATE)
- REGISTER_REQ / REGISTER / REGISTER_ACK
 - ONU auto-discovery
 - LLID assignment
- All MPCP messages are time stamped
 - RTT measurement
 - ONU time reference
- Unique Opcode for each message type
- 64-byte length (MAC Control Packet) with 40-byte message content

Types of MPCP Extensions

Types of MPCP extensions *	Mechanism	Potential Impact	Consideration in this proposal
New message for EPOC	Use new OPCODE	Possibly done by existing EPON equipment	New messages via new OPCODE ensures that old MPCP messages continue to work in the same way for existing EPON OLT/ONU
Adding new field(s) to existing EPON MPCP messages	Use padding region in the message content body	Possibly done by existing EPON equipment	Padding regions are ignored by existing EPON OLT/ONU, so new fields do not corrupt or interfere with existing fields
Modify existing field(s) to existing EPON MPCP messages	Change the field length and/or sequence	Not feasible due to backward compatibility with EPON standards and equipments	Not recommended existing EPON OLT/ONU devices will not interpret the newly defined fields correctly
Assign different semantics to existing field(s) of the EPON MPCP messages	Different interpretation of same field for EPON and EPOC	Possibly done by existing EPON equipment	Interpretation of the different semantics based on "context"; can cause IOP issue if equipment is not "context-aware"

* From li_01a_0712.pdf

MPCP Extension #1 : Discovery GATE

- **Motivation:** Allow OLT to advertise its capabilities

(b)

Destination Address	6
Source Address	6
Length/Type = 0x8808	2
Opcode = 0x0002	2
Timestamp	4
Number of grants/Flags	1
Grant #1 Start time	4
Grant #1 Length	2
Sync Time	2
Discovery Information	2
Pad/Reserved	29
FCS	4

Table 77-3—GATE MPCPDU discovery information fields

Bit	Flag field	Values
0	OLT is 1G upstream capable	0 – OLT does not support 1 Gb/s reception 1 – OLT supports 1 Gb/s reception
1	OLT is 10G upstream capable	0 – OLT does not support 10 Gb/s reception 1 – OLT supports 10 Gb/s reception
2–3	Reserved	Ignored on reception
4	OLT is opening 1G discovery window	0 – OLT cannot receive 1 Gb/s data in this window 1 – OLT can receive 1 Gb/s data in this window
5	OLT is opening 10G discovery window	0 – OLT cannot receive 10 Gb/s data in this window 1 – OLT can receive 10 Gb/s data in this window
6–15	Reserved	Ignored on reception

- Bit [2:3] :
 - 00 => OLT is not EPOC capable
 - 01 => OLT is EPOC capable, supports FDD only
 - 10 => OLT is EPOC capable, supports TDD only
 - 11 => OLT is EPOC capable, supports both TDD/FDD
- Bit [8:11] :
 - 4-bit “rate profile” to support 16 profiles for EPoC

Profile Table

- **Profile Table:**
 - Similar to profiles used in DSL
 - 4-bit, 16 profiles
 - Example:

Profile	US/DS Rate	US/DS Frequency	Power	Flags
0000				
0001				
...				
1111				

- Exact profiles to be further defined by 802.3bn TF
- Definition can be expanded via increasing the bit-width

MPCP Extension #2 : EPoC REGISTER-REQ

- **Motivation:** Allow CNU to advertise its capabilities

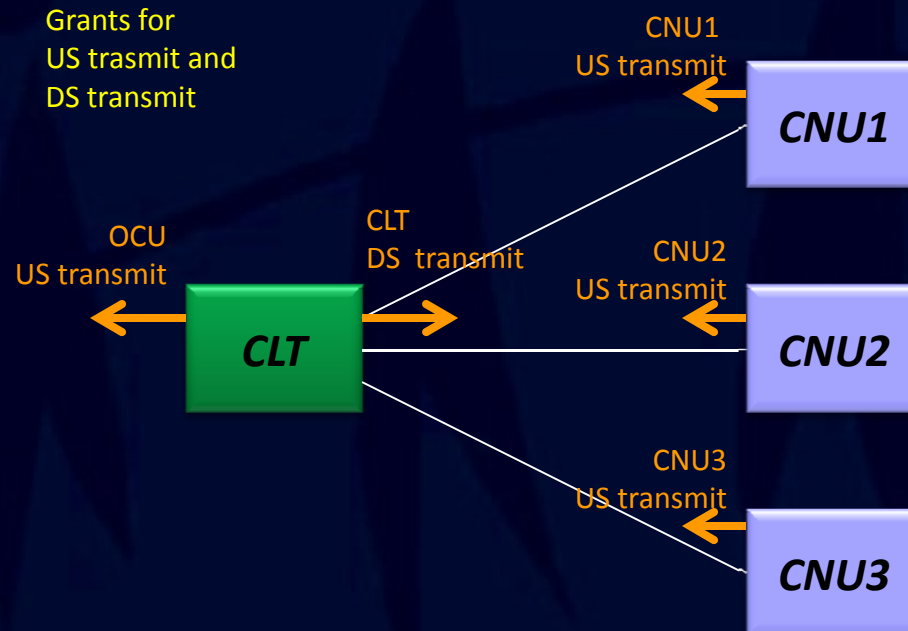
Table 77-6—REGISTER_REQ MPCPDU Discovery Information Fields

Bit	Flag field	Values
0	ONU is 1G upstream capable	0 – ONU transmitter is not capable of 1 Gb/s 1 – ONU transmitter is capable of 1 Gb/s
1	ONU is 10G upstream capable	0 – ONU transmitter is not capable of 10 Gb/s 1 – ONU transmitter is capable of 10 Gb/s
2–3	Reserved	Ignored on reception
4	1G registration attempt	0 – 1 Gb/s registration is not attempted 1 – 1 Gb/s registration is attempted
5	10G registration attempt	0 – 10 Gb/s registration is not attempted 1 – 10 Gb/s registration is attempted
6–15	Reserved	Ignored on reception

- Bit [2:3] : EPoC Capability
 - 00 => ONU/CNU is not EPoC capable
 - 01 => ONU/CNU is EPoC capable, supports FDD only
 - 10 => ONU/CNU is EPoC capable, supports TDD only
 - 11 => ONU/CNU is EPoC capable, supports both TDD/FDD
- Bit [6:7] : MPCP Client Type
 - 00 => CNU Type
 - 01 => OCU Type
 - 10, 11 => Reserved
- Bit [8:11] :
 - 4-bit “rate profile” to support 16 profiles for EPoC

MPCP Extension #3 : Downstream GATE

- **Motivation:** Assigns a grant window for CLT to transmit downstream to the CNU's in TDD mode



MPCP Extension #3 : Downstream GATE

- Downstream GATE
- New OPCODE = 00-07
- For CLTs that require a Downstream GATE

Destination Address	6
Source Address	6
Length/Type = 88-08	2
OPCODE = 00-07	2
Timestamp	4
Number of Grants	1
Grant #1 Start	4
Grant #1 Length	2
...	...
FCS	4

MPCP Extension #4 : UPDATE

- **Motivation:** For CNUs to asynchronously or periodically update critical information to OLT
- New OPCODE = FF-FD
- Flexible definition for different message types
- Used when OAM messages are too slow
- *Example:*
 - CNU Transmit Power
 - CNU SNR changes
 - Etc.
- Similar to EXTENSION message (OPCODE=FF-FE) in 802.3av, but with time-stamp added

Destination Address	6
Source Address	6
Length/Type = 88-08	2
OPCODE = FF-FD	2
Timestamp	4
Message Type	1
Length of Message	1
Message Data / padding	38
FCS	4

Thank You