Contribution targets:

Editor's Note (to be removed prior to publication): Action item for Glen come up with a new way to show MPCP and CCP for Figure 144-3. This will be submitted as comment against next version of a draft.

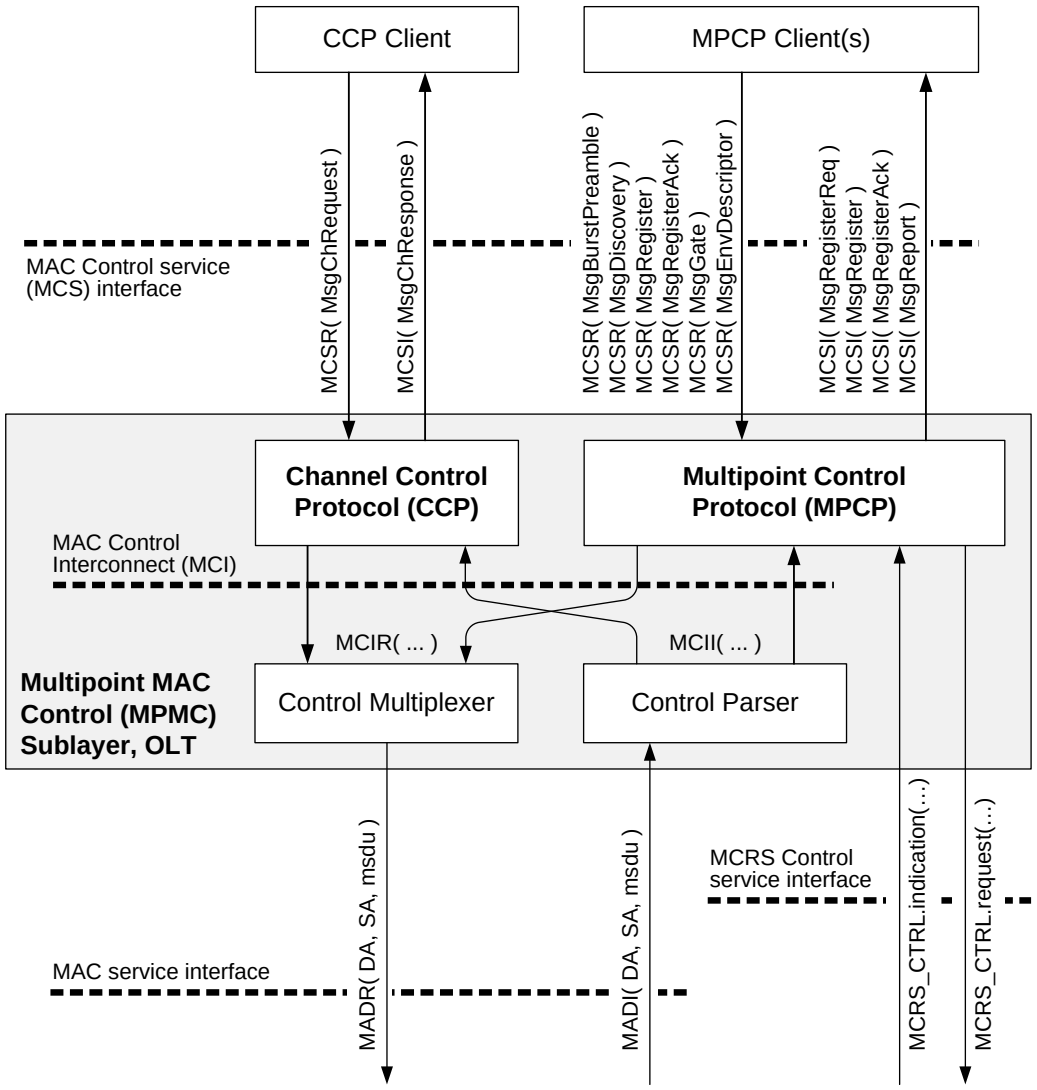
Editor's Note (to be removed prior to publication): Action item for Glen come up with a new way to show MPCP and CCP for Figure 144-4. This will be submitted as comment against next version of a draft.

Action Items 26 and 27:

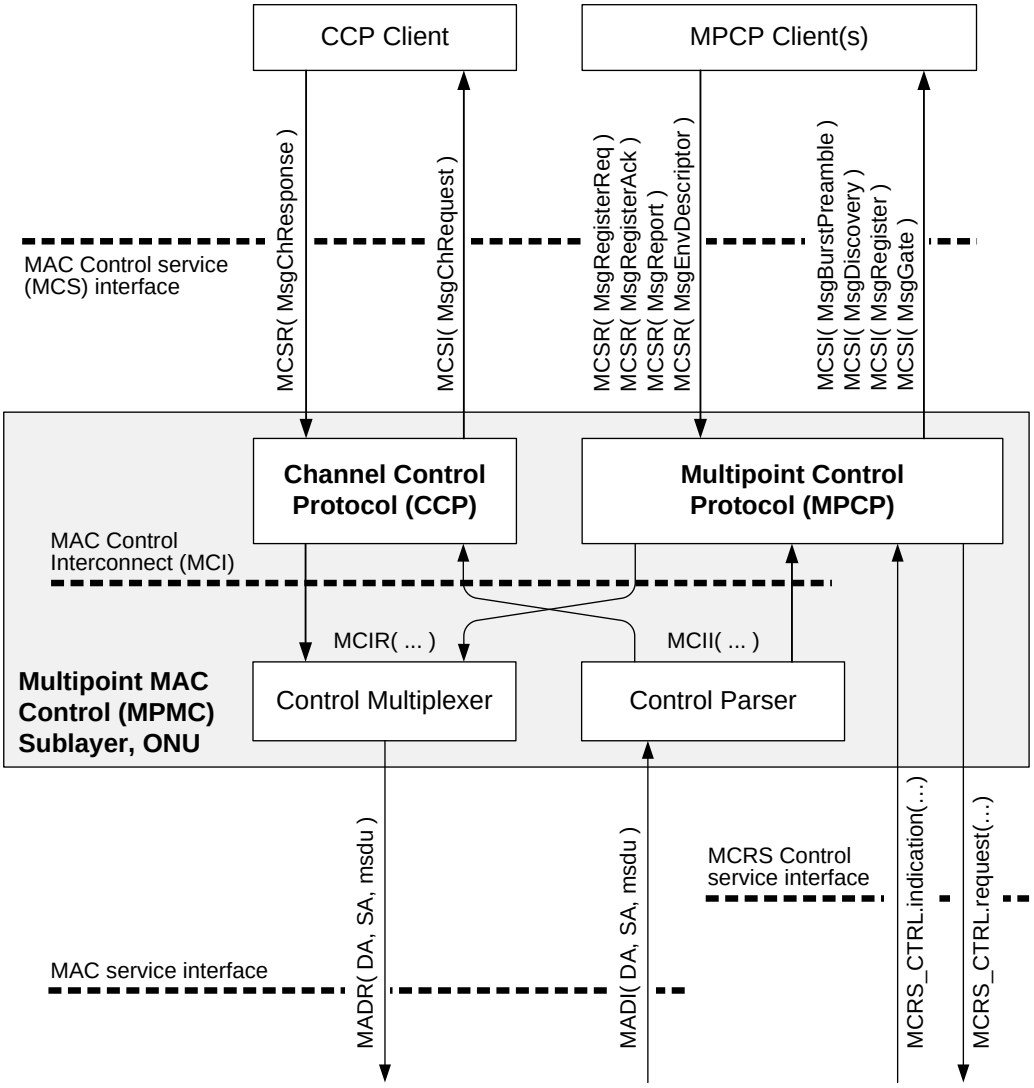
26	Principles of MPCP	144.3.1	144	31	Glen
27	Delay variability	144.3.1.2	147	46	Glen and Duane

---

1) Replace figure 144-3 with the following block diagram:



2) Replace figure 144-4 with the following block diagram:



3) Renumber the existing subclause 144.3.1.2 into 144.3.3 and update "TBD" as shown below.
Insert new text into subclause 144.3.1.
Insert new subclauses 144.3.1.2 and 144.3.2.

144.3 Multipoint Control Protocol (MPCP)

144.3.1 Principles of Multipoint Control Protocol

In a TDM-based PON, the access to the shared physical medium needs to be arbitrated (see 144.1.1.1). To main purpose of the Multipoint Control Protocol (MPCP) described in this subclause is to arbitrate transmissions in Nx25G-EPON. To achieve this goal, MPCP includes processes that measure range (i.e., round-trip propagation

time) and maintain time synchronization between the OLT and ONUs (see 144.3.1.1) and processes that allow the OLT to assign transmission windows to individual logical links (see 144.3.1.2).

144.3.1.1 Ranging Measurement and Time Synchronization

<use existing 144.3.1.1 text as is>

144.3.1.2 Granting access to the PON media by the OLT

To allow ONUs' access to the PON media, the OLT issues GATE MPCPDUs (144.3.4.1). A GATE MPCPDU contains a transmission start time (*StartTime* field) and transmission allowances (*EnvAlloc[i]* field) for up to seven LLIDs. The OLT may grant more than seven LLIDs by issuing multiple GATE MPCPDUs with the same *StartTime* value.

A GATE MPCPDU may be transmitted on any downstream channel and it may allocate upstream transmission windows on any or all upstream channels. An ONU ignores all the transmission allocations for the upstream channels that are not enabled in that ONU.

The ONU processes the GATE MPCPDUs in the order they are received and generates the upstream envelopes following the order of *EnvAlloc[i]* fields in each GATE MPCPDU. Therefore, it is possible for an LLID to be allocated multiple disjoint envelopes within the same grant.

144.3.2 MPCP block diagram

Figure 144–x illustrates a functional block diagram of the Multipoint Control Protocol (MPCP) for the OLT. The MPCP in the OLT includes the following processes:

- GATE Generation Process (see 144.3.6.7)
- Discovery Initiation Process (see 144.3.5.6)
- Registration Completion Process (see 144.3.5.7)
- Envelope Commitment Process (see 144.3.6.9)
- Envelope Activation Process (see 144.3.6.11).

In the OLT, as separate instance of GATE Generation Process and a separate instance of Registration Completion Process is created for each registered ONU (PLID, see 144.3.2).

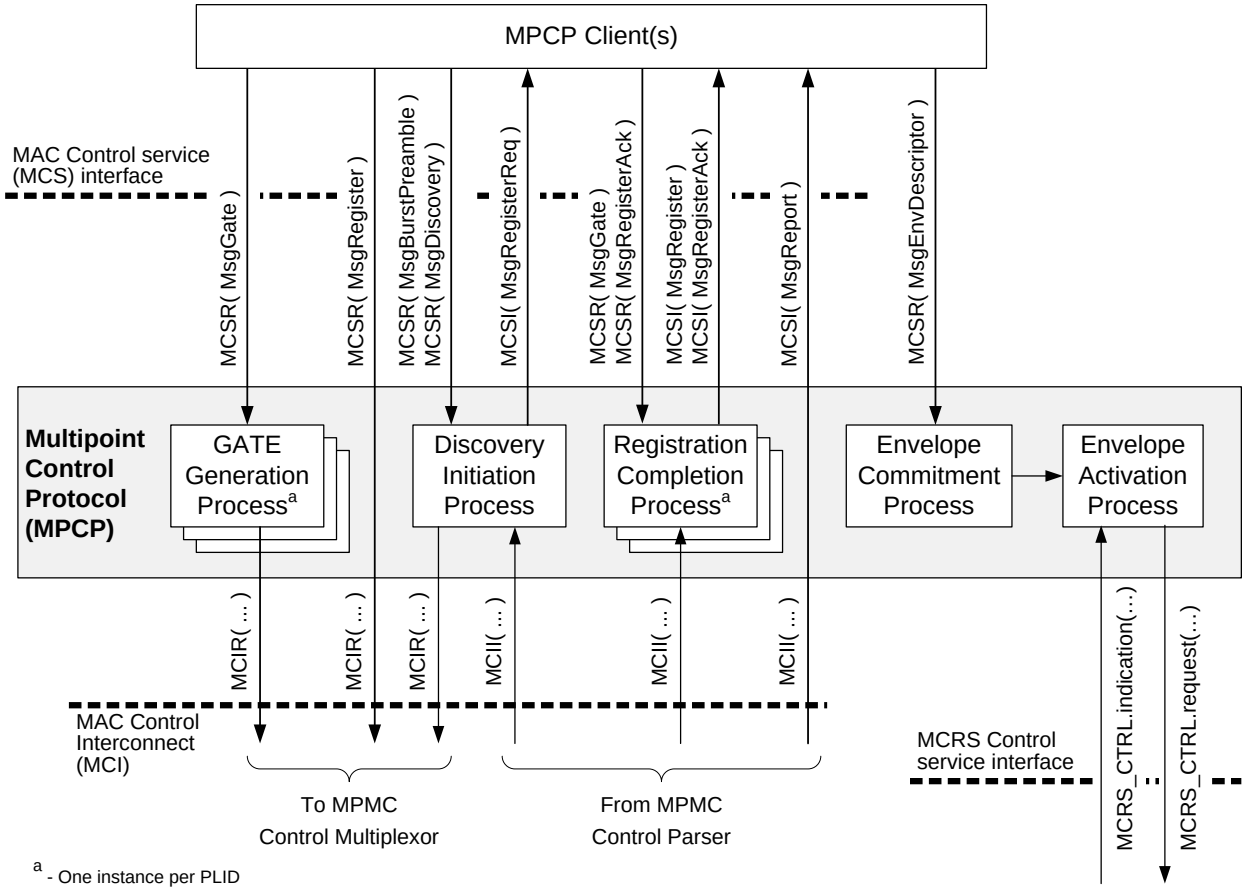


Figure 144-x – OLT Multipoint Control Protocol (MPCP) functional block diagram

Figure 144–y illustrates a functional block diagram of the Multipoint Control Protocol (MPCP) for the ONU. The MPCP in the ONU includes the following processes:

- ONU Registration Process (see 144.3.5.8)
- GATE Reception Process (see 144.3.6.8)
- Envelope Commitment Process (see 144.3.6.10)
- Envelope Activation Process (see 144.3.6.11).

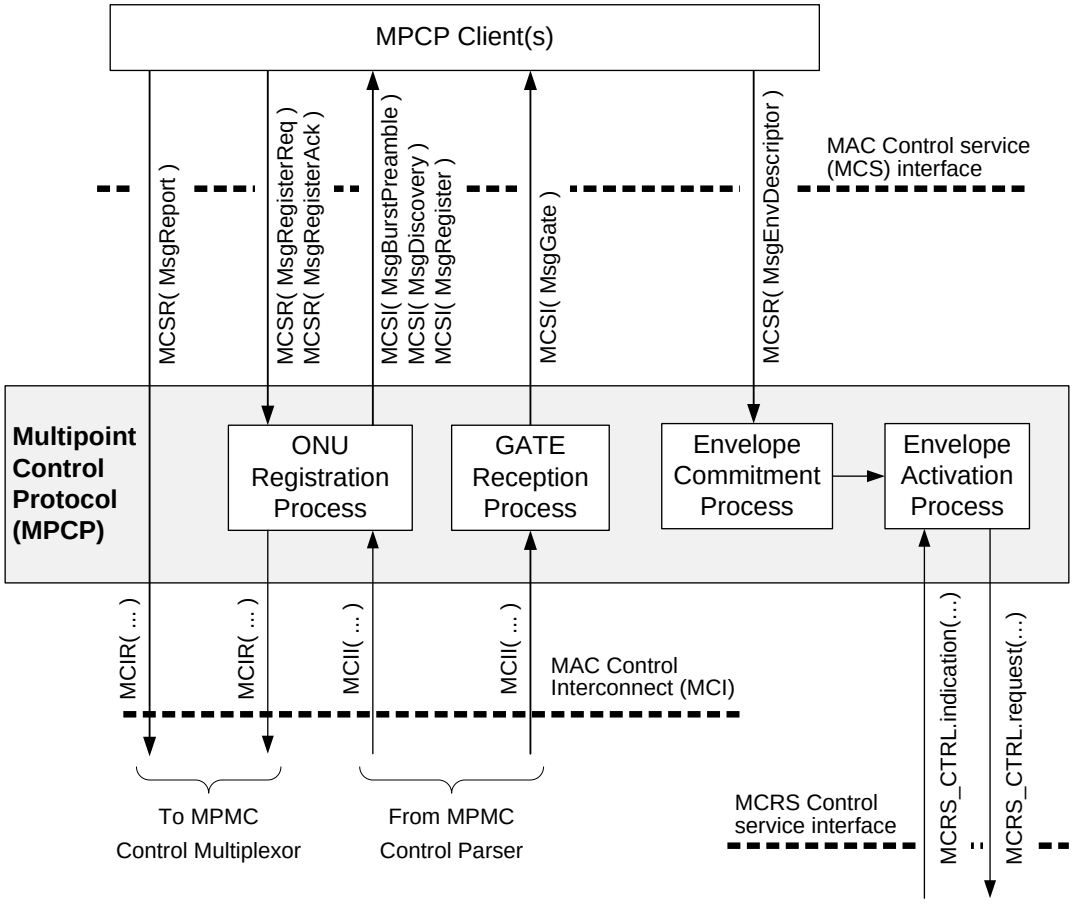


Figure 144-y – ONU Multipoint Control Protocol (MPCP) functional block diagram

144.3.3 Delay variability requirements

The MPCP protocol relies on strict timing based on distribution of timestamps. A compliant implementation needs to guarantee a constant delay through the MAC and PHY in order to maintain the correctness of the timestamping mechanism. The actual delay is implementation dependent; however, a complying implementation shall maintain a delay variation of no more than ~~<TBD EQs>~~0.5 EQT through the MAC.

4) Renumber the existing subclause 144.4.1 into 144.4.2. Insert the following new section 144.4.1:

144.4.1 CCP block diagram

Figure 144–u illustrates a functional block diagram of the Channel Control Protocol (CCP) for the OLT. The CCP in the OLT includes the CC_REQUEST Generation Process state diagram (see 144.4.3.6).

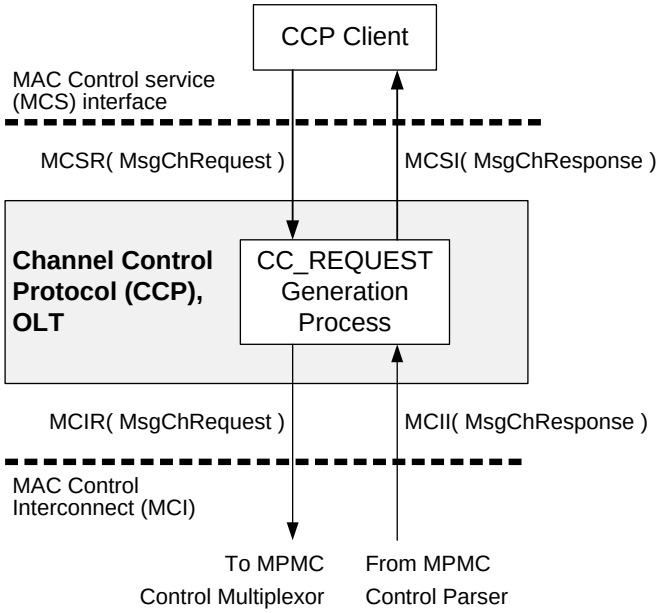


Figure 144-u – OLT Channel Control Protocol (CCP) functional block diagram

Figure 144–v illustrates a functional block diagram of the Channel Control Protocol (CCP) for the ONU. The CCP in the ONU includes the CC_REQUEST Reception Process state diagram (see 144.4.3.7).

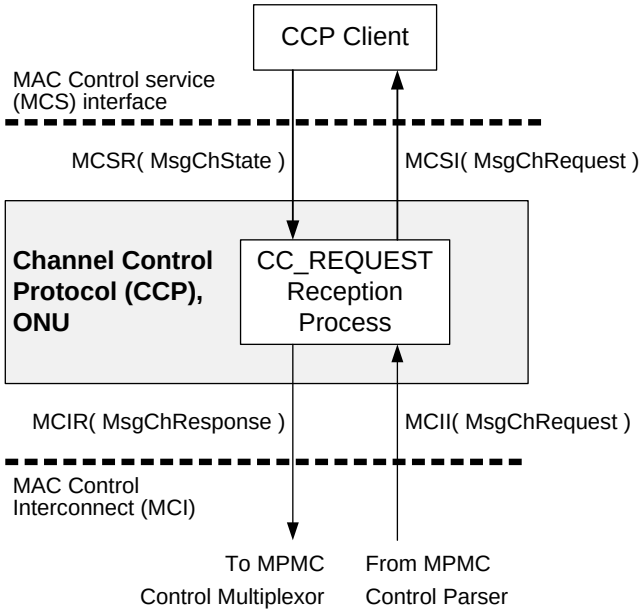


Figure 144-v – ONU Channel Control Protocol (CCP) functional block diagram

5) **Split subclause 144.4.3.6 into two subclauses:**

144.4.3.6 CC_REQUEST Generation Process state diagram

The CCP in the OLT shall implement multiple instances of the CC_REQUEST Generation Process state diagram shown in Figure 144–29, where each instance is associated with a registered MLID.

<Figure 144-29 as is>

Figure 144-29 – CC_REQUEST Generation Process state diagram

144.4.3.7 CC_REQUEST Reception Process state diagram

The CCP in the ONU shall implement the CC_REQUEST Reception Process state diagram, as shown in Figure 144–30.

<Figure 144-30 as is>

Figure 144-29 – CC_REQUEST Reception Process state diagram