

# **MPCP Baseline Proposal Architecture and Layering Model (II)**

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# Summary and Status

- ❑ **This presentation builds on last meeting's Baseline Architecture and Layering Proposal (sala\_1\_0302.pdf). Modified version based on voting is referred here as Arch-I**
- ❑ **This presentation is referred as Arch-II**
- ❑ **Pending issues from previous meeting:**
  - Specify laser control signal
  - Decide layering of multiplexing function
- ❑ **Additional issue:**
  - Update external interface description to incorporate the recent compliance discussion and solutions

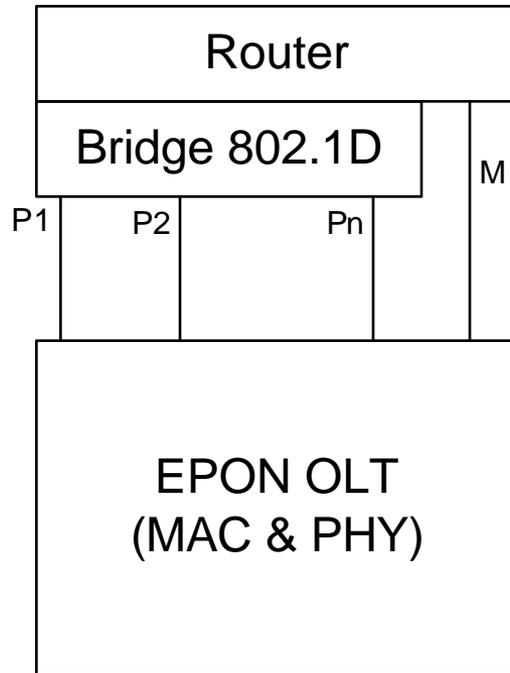
# Overview of This Presentation (Arch-II)

- ❑ **External Interface**
- ❑ **ONU Laser Control Signal**
- ❑ **Multiplexing Function**

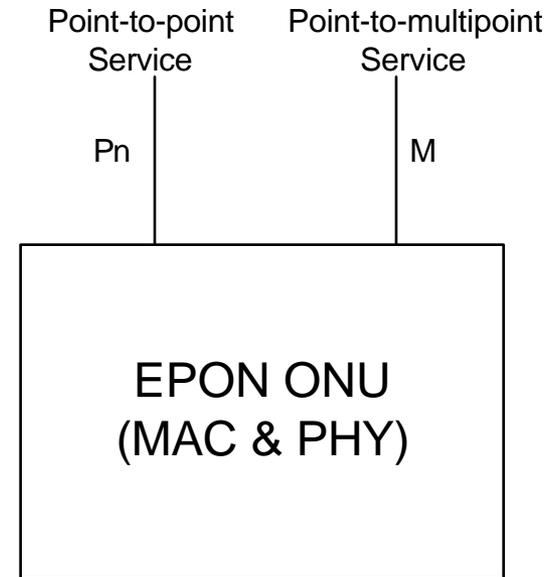
# External Interface

# Current External Interface

## OLT



## ONU



Pi: Point-to-point link to ONU<sub>i</sub>  
M: Point-to-multipoint link

# Current External Interface: Details

- ❑ **Compliance is achieved with P2P emulation**
- ❑ **Single copy broadcast (SCB) is achieved with a special port**
  - This port supports a “native” mode of operation with a point-to-point upstream and a point-to-multipoint downstream
  - This port cannot be attached to a bridge because it is not compliant with 802.1
- ❑ **A port is defined for either P2P or P2MP service but not for both**
  - A P2P port can only receive frames with mode bit set to P2P
  - A P2MP port can only receive frames with mode bit set to SCB
- ❑ **An enhanced architecture allows to support both services in a logical link (i.e. ONU port interface)**

# Enhanced Architecture

- **An enhanced OLT architecture can incorporate an interface layer (ULSLE\*) between 802.3ah and 802.1 to combine the SCB and P2P service under a single standard bridge**
  - The ULSLE layer adds the functionality required to the SCB service to operate as a shared LAN
  - It can define a P2P service on a shared LAN
- **System architecture is described next**
- **ULSLE definition is given in separate presentations**

\* ULSLE: Upper Layer Shared Layer Emulation

# Enhanced Architecture Specification

- ❑ **A Logical Link is established between OLT and ONU. A link is identified with a Logical Link ID (LLID)**
- ❑ **An LLID supports both P2P and SCB service**
  - It receives all P2P frames send to this LLID and all SCB frames generated by any other LLIDs
- ❑ **A well known Universal-LLID is specified for ONU registration and broadcast operation in general**
- ❑ **Additional logical links are established during registration**
  - How many LLIDs are needed is still under discussion
- ❑ **The definition of multicast LLIDs is under discussion**
- ❑ **The ULSLE is the OLT function that defines and manages LLIDs**

# Enhanced Architecture Specification

- ❑ **The ULSLE design defines service capabilities and efficiency of the system**
- ❑ **IEEE 802.1 is considering the specification of ULSLE**
- ❑ **This layer includes functions to:**
  - Improve system efficiency by better combining P2P and SCB modes
  - Support of shared LAN emulation
  - Support multicast services (definition still under discussion)
- ❑ **The target is to design the ULSLE as an optional layer that enhances the 802.3ah capabilities if implemented**
- ❑ **All ONUs must be interoperable with basic OLT and enhanced OLT implementations**
  - ONU specification needs to be modified

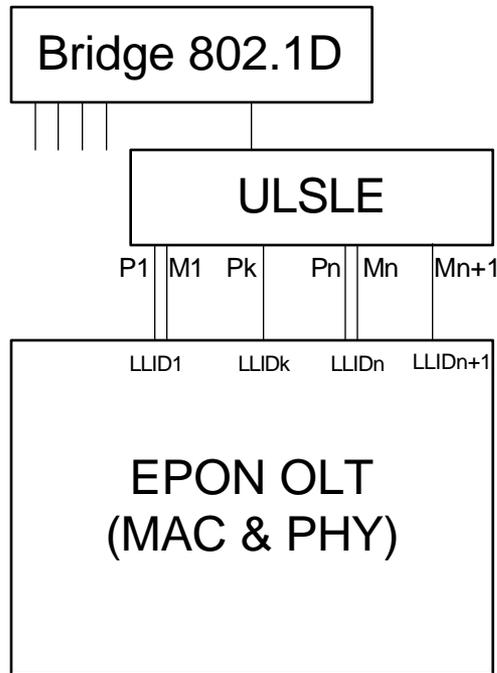
# ONU Operation

- ❑ **PON-Tag definition: (Mode bit, LLID)\***
- ❑ **Upstream**
  - Send frame with a Pon-Tag with the corresponding LLID and mode-bit not used on the upstream
- ❑ **Downstream**
  - If mode-bit in Pon-Tag is P2P and LLID is in ONU
    - Accept frame
  - If mode-bit in Pon-Tag is SCB and LLID is not in ONU
    - Accept frame
  - All other frames are discarded
  - Accepted frames are forwarded to the corresponding LLID port

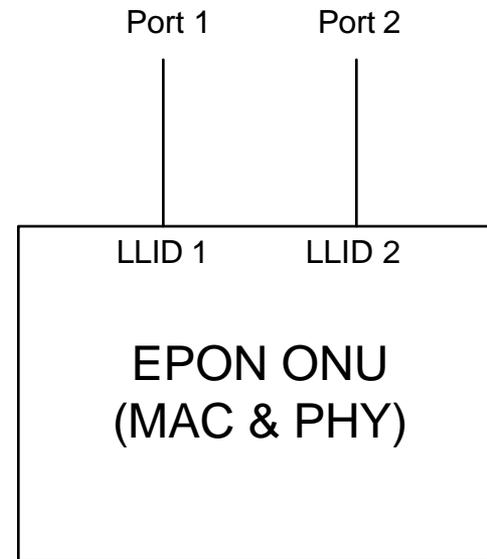
\* Specification can be extended based on ongoing multicast discussion

# Enhanced Interface Architecture: Example

**OLT**



**ONU**



Pi: Point-to-point link to ONU<sub>i</sub>  
M: Point-to-multipoint link  
LLID: Logical Link ID

# External Interface: Compliance Summary

- ❑ **P2P emulation is defined with a LLID between a single logical port ONU and OLT**
- ❑ **Single copy broadcast (SCB) can be achieved with a special logical port**
  - This logical port supports a “native” mode of operation with a point-to-point upstream and a point-to-multipoint downstream
  - This logical port cannot be attached to a standard bridge because it is not compliant with 802.1
- ❑ **Shared emulation is defined as a combination of SCB (i.e. 802.3ah) and ULSLE (i.e. 802.1)**
- ❑ **Compliance can be achieved by either:**
  - Implementing P2P LAN emulation or
  - Shared LAN emulation (this option requires the implementation of a 802 compliant ULSLE layer)
- ❑ **802 Compliance is mandatory for any LLID attached to a standard bridge**

# ONU Laser Control Signal

# ONU Laser Control

- ❑ **Three options to specify this signal:**
  1. Modify all layer interface from MAC-control to PMD to incorporate this additional signal
    - Requires modifications in all intermediate layers even though they are not participants
  2. Use the management interface to communicate between non-adjacent layers
    - It is not an appropriate solution because management is not real-time.
  3. Define a real time signal that goes directly from MAC-control to PMD
    - How to specify it?
- ❑ **Option 3 was voted last meeting as the preferred option.**
- ❑ **Details on how to specify it is described next.**

# Similar Variable: “Transmitting” MAC

- **Clause 4.3.3 (Page 76, 802.3 v2000):**

**“The overall event of data being transmitted is signaled to the Physical Layer by way of the variable transmitting:**

- var transmitting: Boolean;

**Before sending the first bit of a frame, the MAC sublayer sets transmitting to true, to inform the Physical Media Access that a stream of bits will be presented via the TransmitBit operation. After the last bit of the frame has been presented, the MAC sublayer sets transmitting to false to indicate the end of the frame.”**

- **Properties of this variable**

- Direct real time signal between adjacent layers (MAC-PHY)

- **Borrow this definition for laser control signal specification**

# Laser Control Specification: Option 3 (a)

- Define direct real time variable from MAC-control to PMD using the “transmitting” variable as guideline:

“The overall event of having the channel available for transmission is signaled from the MAC-Control to the PMD by way of the variable `Allowed_Tx`:

- `var Allowed_Tx : Boolean;`

When grant becomes active, the MAC-Control sublayer sets `Allowed_Tx` to true, to inform the PMD to turn on the laser. At the end of the grant, the MAC-Control sublayer sets `Allowed_Tx` to false to indicate the PMD to turn off the laser.”

- Properties:
  - Simple specification
  - Potential layering violation since signal goes between to non-adjacent layers

# Laser Control Specification: Option 3 (b)

- **Specify sub-variables of option 1 for each adjacent layer:**
  - MCTRL\_Allowed\_Tx: variable from MAC-Control to MAC
  - MAC\_Allowed\_Tx: variable from MAC to PCS
  - PCS\_Allowed\_Tx: variable from PCS to PMA
  - PMA\_Allowed\_Tx: variable from PMA to PMD
- **Properties:**
  - Propagates the direct signal across adjacent layers by defining a local “copy” of the variable at each intermediate layer
  - Simple specification
  - No layer violation
  - However, Is this needed?

# Multiplexing Function Layer

In another presentation

# Summary

(Modifications from previous version in red)

## □ Important **architecture and layering decisions**

- “Native” port that cannot be attached to bridge for single-copy broadcast (**SCB**) service
- To attach **SCB** port to a standard bridge requires the **ULSLE** as specified by 802.1
- A logical link between **ONU** and **OLT** can support both **P2P** service and **P2MP** service (controlled by **OLT** and depending on implementation)
- **MPCP** at **MAC-control** layer
- **MPCP** allocation a separate block with **MAC-control** interface
- Protocol timing at **MAC-control**
- Laser control signal direct from **MAC-control** to **PHY** **taking the MAC “transmitting” variable as a guideline**

# Summary

- **Pending discussion**
  - Layer of Multiplexing function
  - Multicast Support
  - Number of LLIDs per ONU
- **Additional presentations give more details**

# Baseline Updates

- ❑ **Replace slides 8-9 from Arch-I for slides 5-12 in here**
- ❑ **Add slides 14-16 or 17 after slide 15 in Arch-I**
- ❑ **Modify summary**