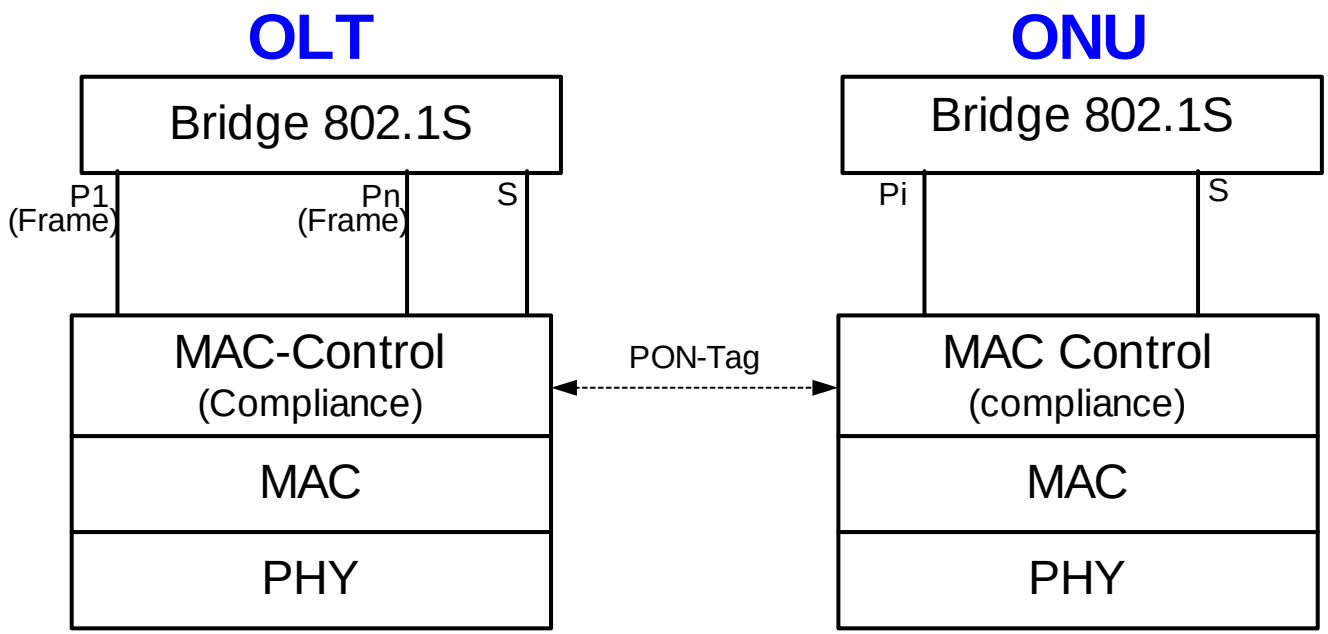
EPON Compliance Architecture

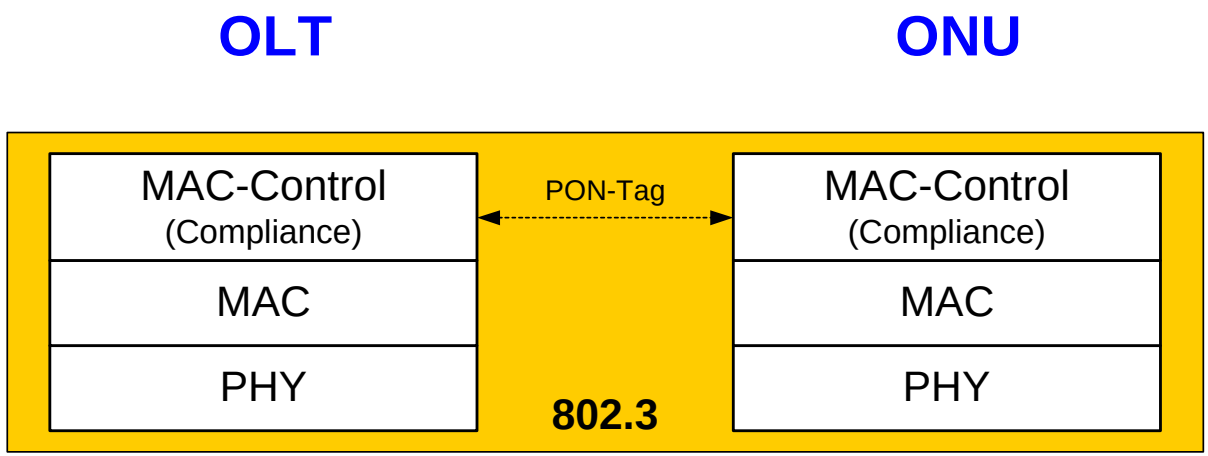
Why New Architecture?

- **Clean architecture that decouples MPCP and Compliance Layers**
  - MPCP arbitrates bandwidth between ONUs
  - Compliance (Mux/Demux) layer makes EPON compatible with 802 architecture and 802.1 bridging requirements
- **Easy to disable compliance layer for Layer 3 operation**
- **Concepts of P2P port and Shared ports identical to Hiroshi's proposal**

System Architecture



Protocol Layering

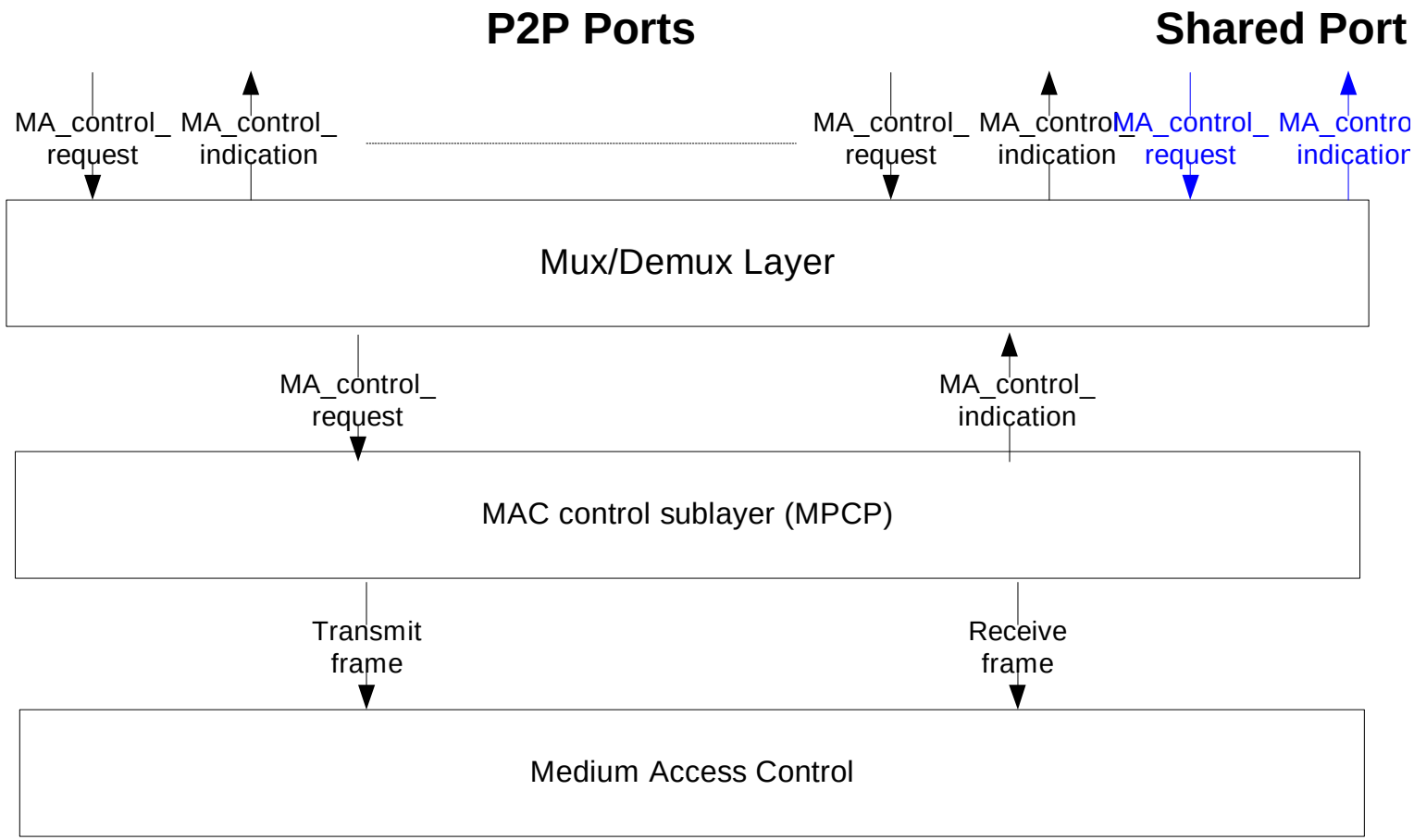


- **Compliance function:**
  - Responsible for adding and deleting the PON-tag
  - PON-tags exist only within the PON segment and are removed at the OLT and ONU
  - Manages the interface with the bridge according to compliance solution

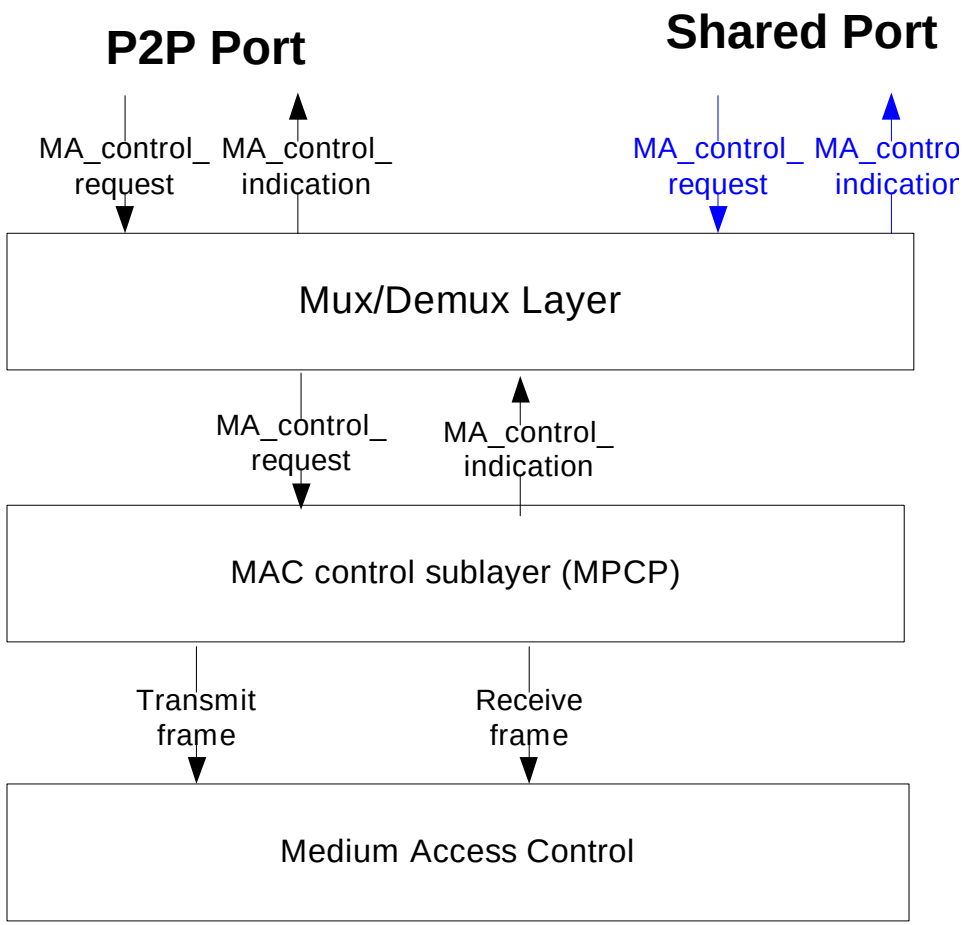
PON Tag

- **Tag is an identifier attached to every frame to identify uniquely an ONU**
  - Shared port/ P2P port
  - ONU ID
- **The tag needs to be available with the frame in the Mux/Demux layer**
  - Option 1: Carry the tag in the preamble and modify the service primitives to preserve the tag
  - Option 2: Use tagging similar to VLAN tag.
    - Does not overlap with VLAN tag because the PON tag is inserted by the Mux/Demux layer at source and removed by Mux/Demux layer at destination
  - Option 3: Any other suggestions?

OLT Layering



ONU Layering



System Specification

- **In the upstream every frame carries a tag which uniquely identifies the ONU**

- **OLT-bridge interface**
  - One port for each ONU virtual P2P link: P1, P2, …. Pn
  - One additional port for virtual shared link: S (i.e. used by all ONUs)

- **ONU-bridge interface**
  - One port virtual P2P link: Pk
  - One port for virtual shared link: S

ONU Operation

- **Frame transmission:**
  - Mux/Demux Layer prepends the Pon_Tag and hands frame to MPCP layer
- **Frame reception**
  - MAC-control deliver the frames based on Pon_Tag:
    - If (port=Shared and ID != ONU_ID) or (port=P2P and ID=ONU_ID)
      - Accept frame: deliver the frame to appropriate bridge port based on mode bit and ID
    - Else discard frame
  - Mux/Demux layer deletes the Pon_Tag

OLT Operation

- **OLT frame reception**
  - Frames in shared link are
    - Buffered for reflecting back to downstream (Tag is preserved)
    - passed to bridge through Shared port
  - Frames in P2P link are
    - passed to the bridge through the P2P port indicated by ID
  - Mux/Demux layer deletes the PON Tag
- **OLT frame transmission**
  - Mux/Demux Layer prepends the Pon_Tag and hands the frame to MPCP layer

Key Concepts

- **MPCP operation is independent of Compliance solution**
- **An ONU can have any combination of P2P and shared ports**
- **MPCP bandwidth is allocated to a particular ONU**
  - Shared or P2P frames can be carried in a single grant
- **All frame buffering and scheduling is above MAC Layer**
- **Easy to disable compliance for Layer 3 operation**
- **Bridge interface identical to Hiroshi's proposal**
- **No filtering based on MAC address or learning of MAC addresses**

Open issues

- **Best method to preserve the Tag till the Mux/Demux layer ?**