

# Compliance Layering Baseline Proposal

**Bob Gaglianella**

**Ajay Gummalla**

**David Horne**

**John Limb**

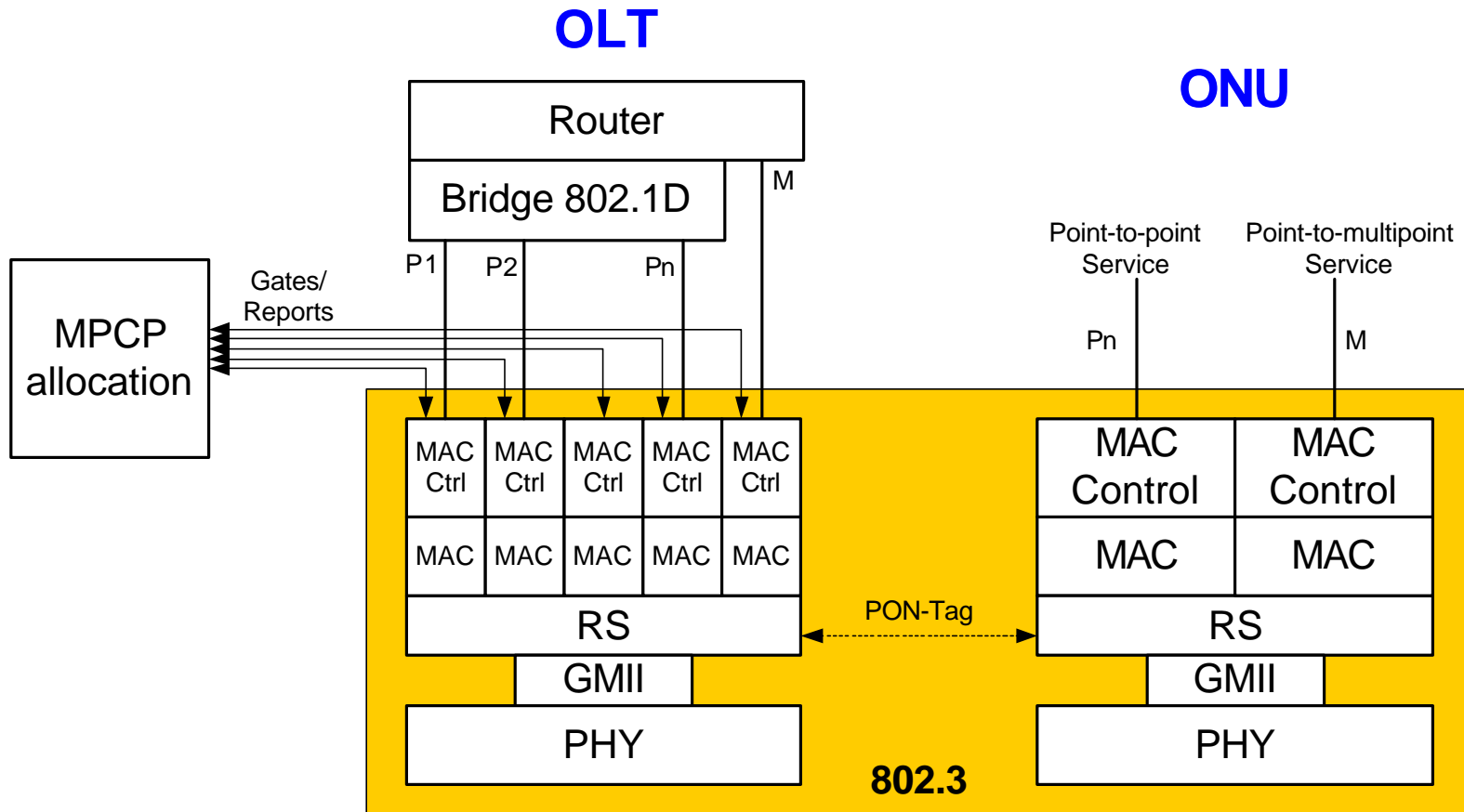
**Dolors Sala**

# Multiplexing Function

---

- **Multiplexing function**
  - Multiplexes frames coming from several bridge ports to a single service interface
- **A tag is carried within the preamble of each frame**
- **Two layering solutions are proposed**
  - Reconciliation sublayer multiplexing
  - MAC-control layer
- **RS multiplexing has too many issues pending to be resolved**
  - Too early to be approved as baseline
- **Propose to specify multiplexing function at MAC-control**

# RS Multiplexing : Architecture



Pi: Point-to-point link to ONUi  
M: Point-to-multipoint link

# RS Multiplexing: Properties

---

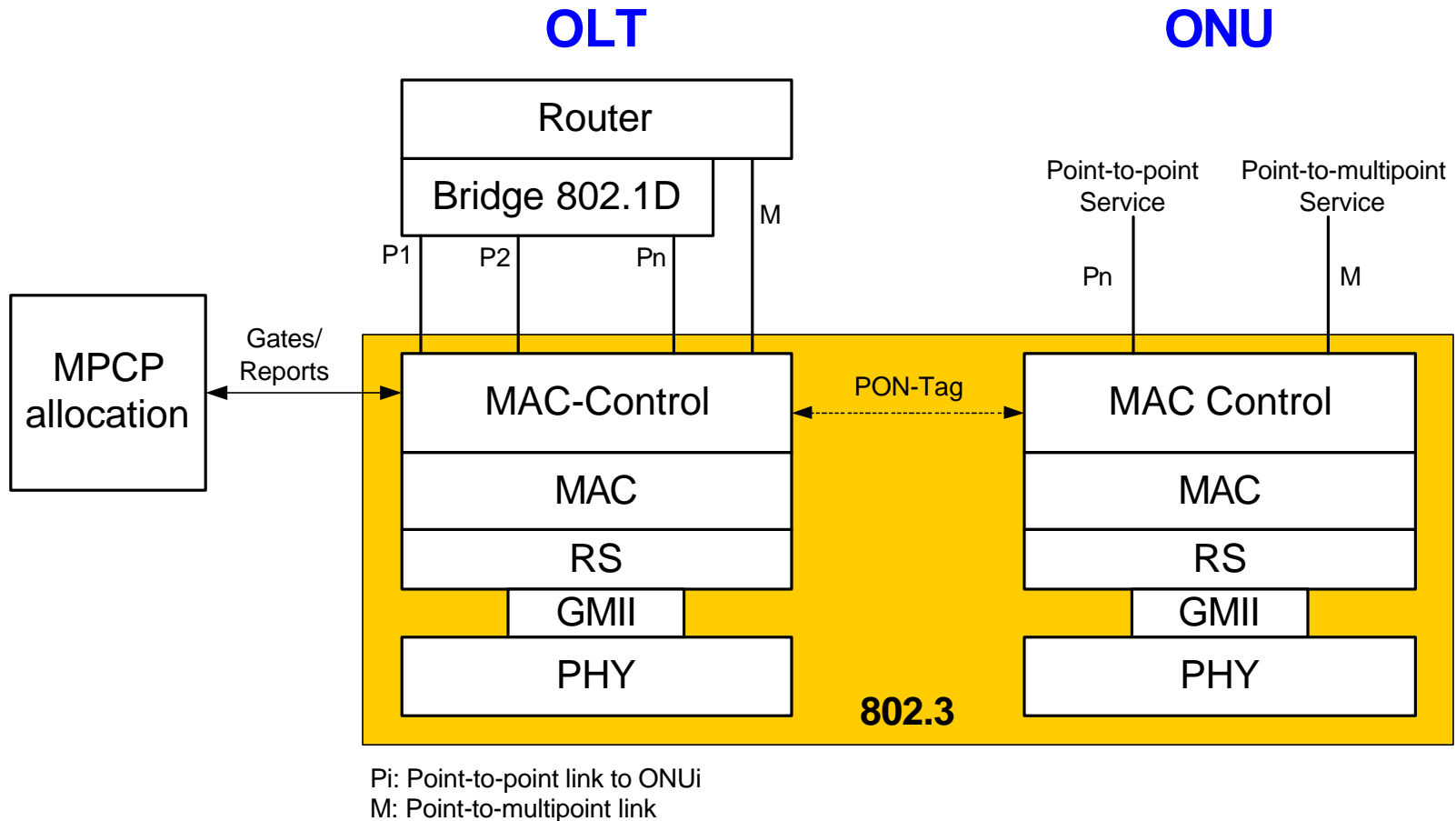
- **RS multiples vMACs**
- **Tag exchange is at the RS layer**
  - MAC and MAC-control do not need to be aware of tag
  - Requires virtual-MACs (vMACs)
- **Multiplexing of frames occurs at the RS layer**
  - Each MAC may offer one frame for transmission to RS layer
  - Frame can suffer variable delay at this stage
  - RS cannot distinguish between data and control frames
    - How to guarantee priority for control frames over data frames?
  - **Need modification of interface to account for these two issues**
- **Several MAC-control entities**
  - Grants are assigned to each individual vMAC and not per ONU basis
    - ONU vMACs operate in separate burst transmissions (more upstream overhead)
    - Grants to same ONU but different vMAC cannot be sent in a single gate message (more downstream overhead)

# RS Multiplexing: Service Interface

---

- **Need to guarantee constant delay across MAC**
  - Define a backpressure mechanism to stop frames at MAC-control
- **Need to guarantee priority of MAC-control frames over data frames**
  - RS needs to know type of frame offered at each vMAC to give priority to the vMAC offering a control frame
- **The extension of interface to address these issues is elaborate**
  - Description still in progress
  - Involves flow control across interface

# MAC-Control Multiplexing: Architecture

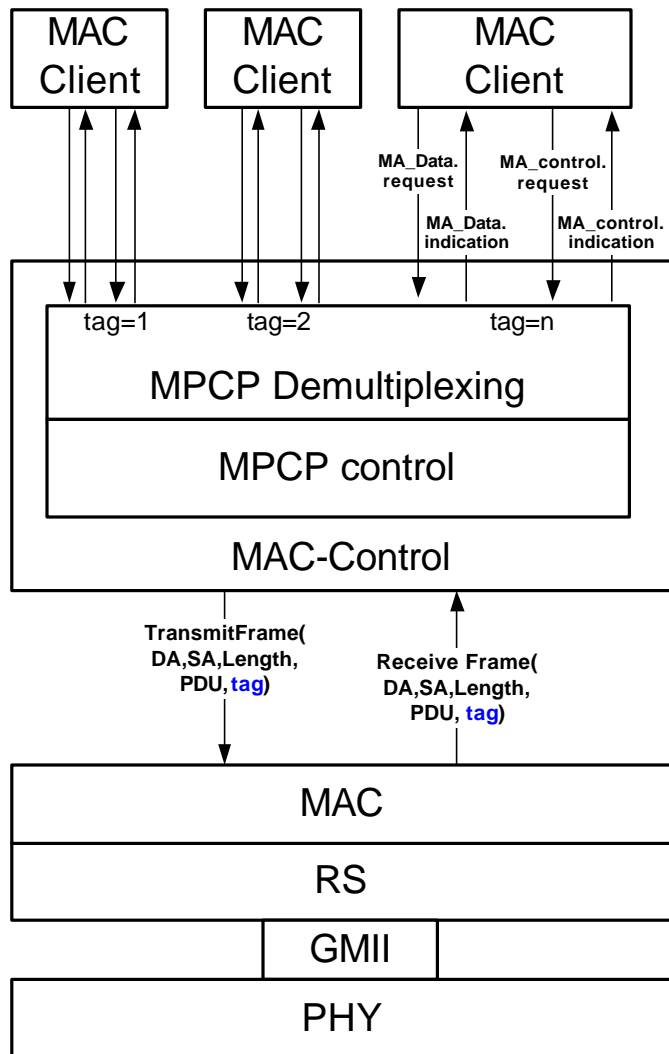


# MAC-Control Multiplexing : Properties

---

- **MAC-control multiplexes frames**
- **Tag reaches the MAC-control layer**
  - Need to augment service interface to pass the tag to/from the reconciliation layer
  - RS layer inserts/deletes the tag from the preamble
- **Multiplexing of frames occurs at MAC-control layer**
  - Easy to give priority to MAC-control frames over data frames
- **Single MAC-control entity**
  - Enables global view of the system which is required for arbitration between ONUs at the OLT
  - Granting and reporting can be done on per ONU basis
  - A single burst can contain frames from multiple virtual links in the same ONU

# MAC-control Multiplexing: High Layer Service Interface



- **MACclient-MACcontrol interface uses standard interface**
- **MAC-control can interface several MAC clients**
  - Use one interface for each vport
  - MA\_Data.indication
    - Tag is used by Multiplexing function to decide the vport to send the frame
  - MA\_Data.request
    - A different tag value is attached depending on receiving vport interface
- **Extended MAC-MACcontrol interface**
  - Pass additional field containing tag
- **RS-MAC interface described next**
  - Uses standard interface



# MAC Control Multiplexing : Low Layer Service Interface

---

- **MAC transparently passes the tag from/to RS using standard interface**
- **Frame reception**
  - RS passes the tag in two specific bytes of the preamble
  - MAC passes the tag to MAC-control
    - MAC collects these two bytes and passes it together with the frame
- **Frame transmission**
  - MAC replaces 2 bytes in the preamble with tag from MAC-control
  - RS adds CRC in the preamble before transmission
- **Properties**
  - Frames are delivered and transmitted to the MAC layer one at a time
    - No more than one frame below MAC-control at a given time
    - No conflicts between data and control frames below MAC (as current Ethernet operation)

# Summary

---

- **RS multiplexing introduces architecture issues**
  - Variable delay across the MAC layer and below
  - Additional flow control could solve it
  - Scheduling and prioritization required in RS layer
  - This is a significant change from current MAC interface operation
- **A simple solution is available: MAC-control multiplexing**
  - It is simple to pass the tag up
  - Maintains existing frame flow across the MAC
  - Extension of the service interface specification is “minimal”
  - Allows a single burst transmission for both P2P and P2MP service
  - Avoids virtual MACs
- **Overall architecture is simplified**