Functionality of ResE MAC

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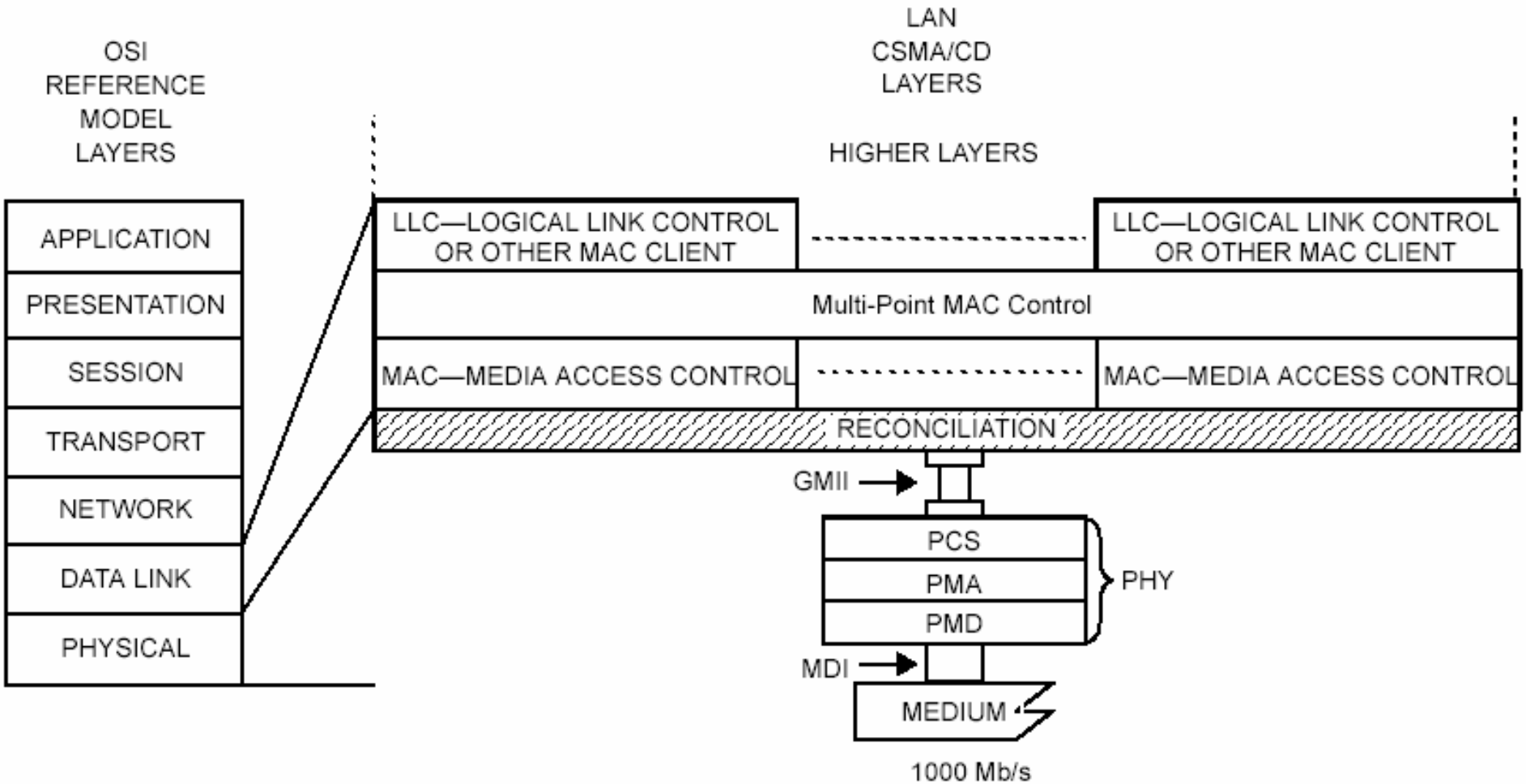
EPON recap

- EPON was defined in 802.3ah – published in 802.3-2004
  - MPCP described in clause 64
  - RS extensions described in clause 65
  - Uses full-duplex MAC defined in annex 4A
- Functionality contained in EPON is
  - Clock synchronization (unidirectional)
  - Entity detection and registration
  - Packet destination identification
  - Transmission control

EPON layering



Suggestion overview

- LLID is allocated per stream
  - Each stream has dedicated service interface
  - Allocated through all bridges between talker and listener
  - Link is bidirectional
  - Stream is identified by stream ID in each packet preamble (EPON LLID concept)
    - No change to Ethernet packet format
  - Link between bridges can include several allocated streams
  - Token bucket is used to control RS selection

Network timing

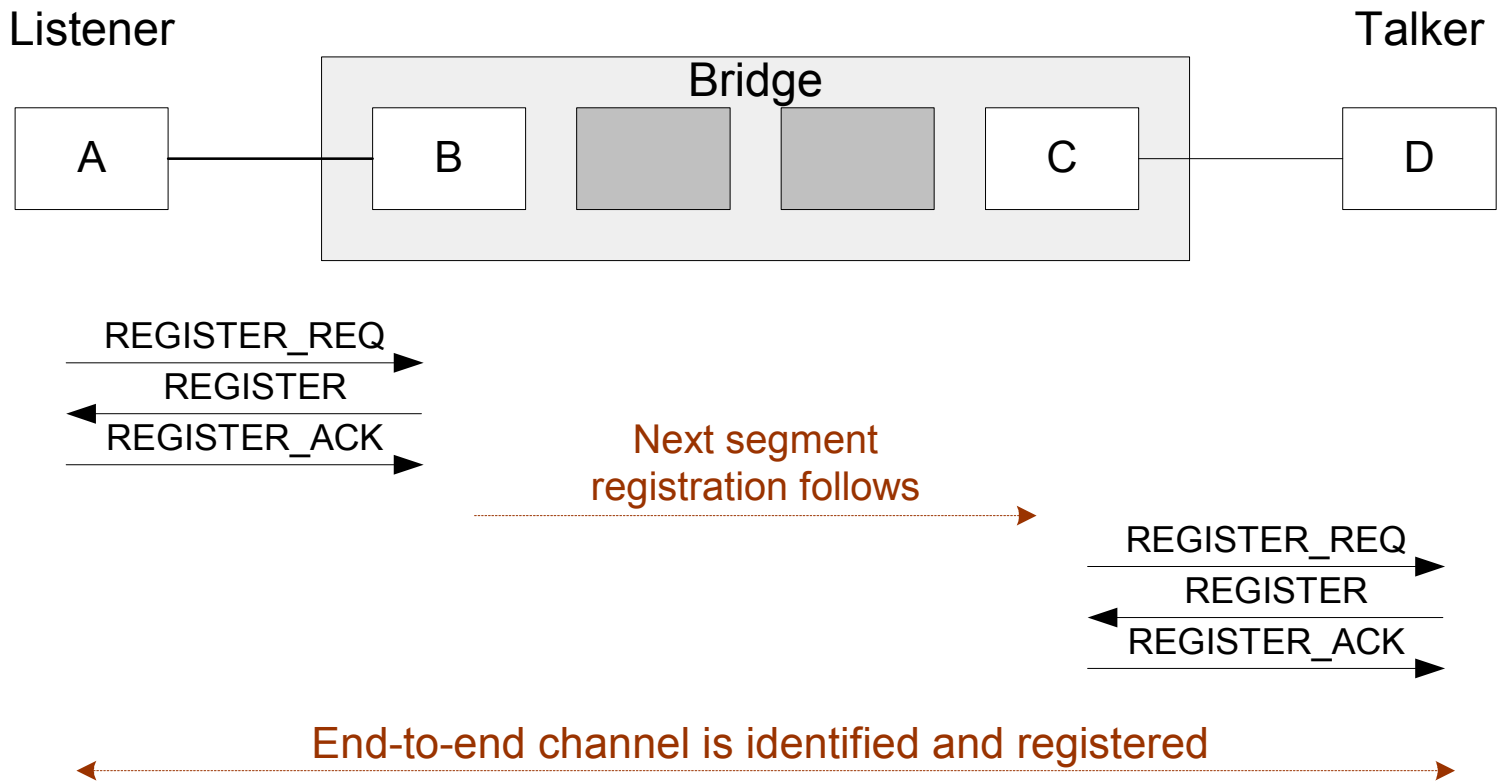
- No requirement for network time synchronization
  - Clocks of different network entities may drift
- No notion of a cycle

- Presentation time is solved by upper layer

ResE channel establishment

- ResE channel creation begins following admission control completion
  - The listener starts by requesting to be registered by the following MAC
  - The above is repeated by each segment until reaching the talker
- Channel tear-down should be propagated in the network in case of disconnection
- MPCP registration protocol is used as is
  - Discovery grant should be omitted

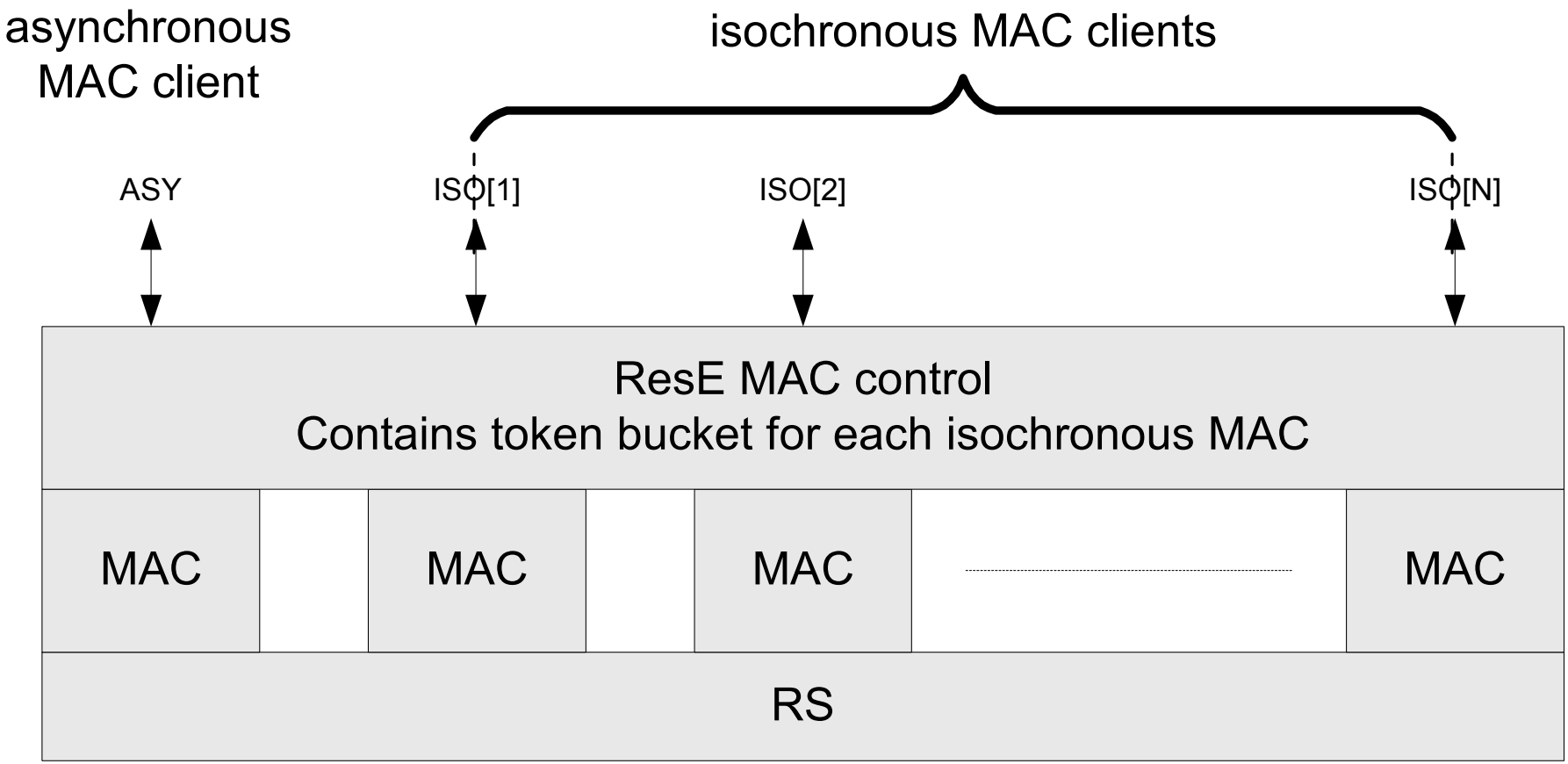
ResE channel establishment illustration



Stream identification by admission control

- The suggested admission control scheme contains a parameter of required bandwidth
- Adding LLID parameter to admission control process will assist in identifying the stream end-to-end

Suggested layering



Transmission control – isochronous

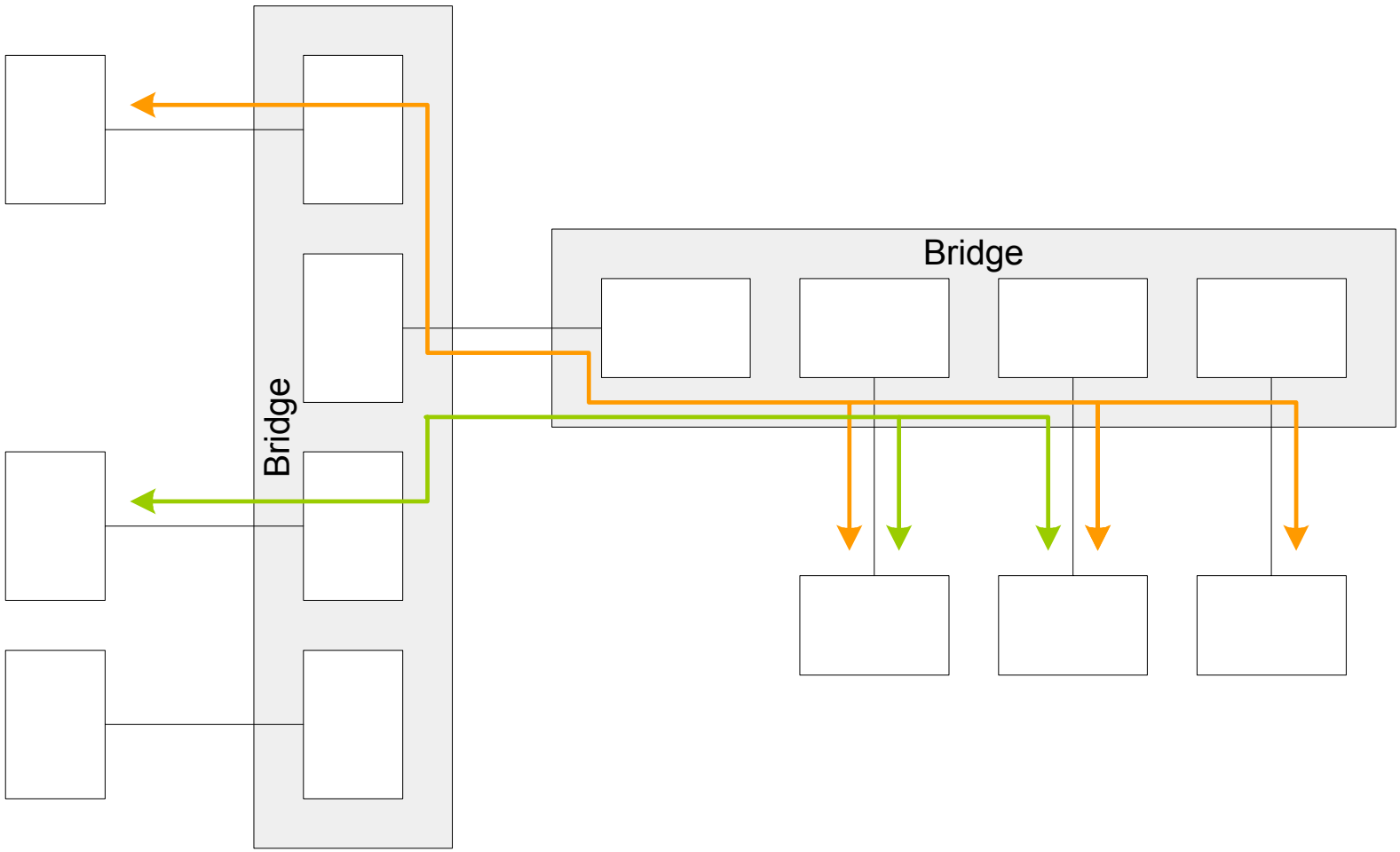
- A dedicated logical MAC is added for each stream
- Token bucket is placed in MAC control controlling stream rate
  - Bucket limit and change rate are specified
  - For simplicity, bucket could be updated once in a while (125uS)
- MAC control commands RS source selection
  - Packet pending at service interface
  - Bucket value qualifies pending packet
- Isochronous MAC complies only with flow control containing its LLID

Transmission control – asynchronous

- A dedicated logical MAC is reserved for asynchronous transmission
- MAC control commands RS source selection
  - Packet pending at service interface
  - No isochronous MAC is allowed to transmit
- Asynchronous MAC complies with flow control

- No packet preemption

Network view



Token bucket and clock drift

- Allowed drift in Ethernet is ±50ppm
- Faster running clock is supported by token bucket limit
- Slower running clock is supported by setting the change rate to be 1.0001 * desired rate

What remained from EPON?

- LLID in preamble (channel identification)
- Ability to define multiple logical MAC instances in a single physical MAC
- Ability to gate the MAC transmission using RS
- Registration scheme

What should be added?

- Token bucket in MAC control controlling RS layer

Summary

- Main properties
  - Dedicated service interface per stream
  - Bandwidth allocation and control for each stream at any bridge
  - No network timing synchronization
  - No changes in 802.1
- Estimated amount of work
  - Adding two clauses
    - MAC control modifications (very limited)
    - RS extensions (even fewer changes)