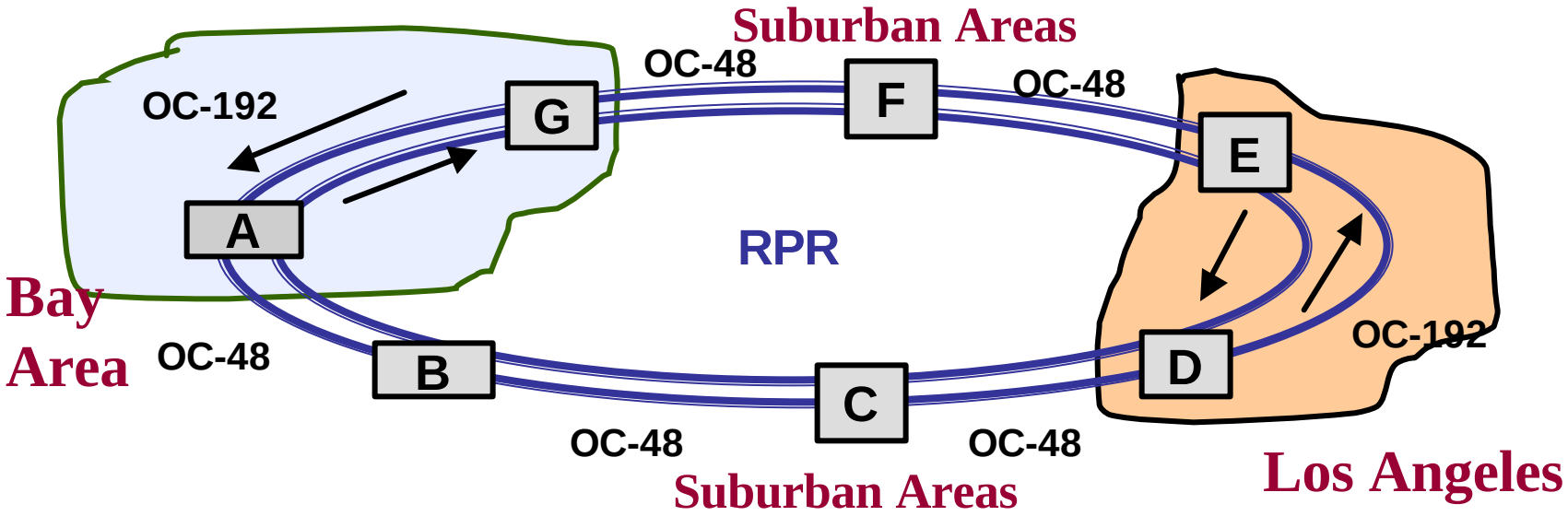
RPR

Different Span Bandwidth Issues

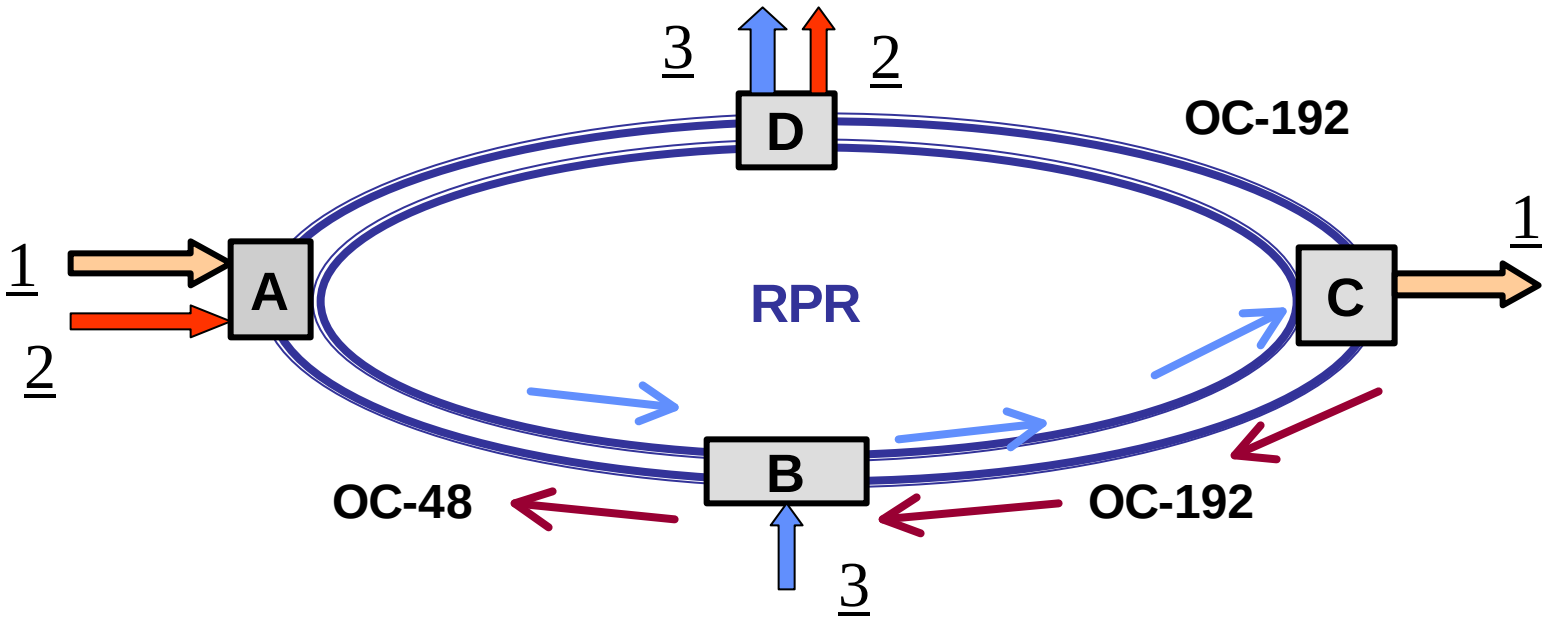
Pankaj K Jha
Cypress Semiconductor
pkj@cypress.com

Different Rates on RPR Spans



- Traditional SONET/SDH TDM networks require ALL nodes to be upgraded to move to a higher speed.
- All Nodes upgrade Expensive & Time Consuming
- With packet rings, it should be possible to upgrade a section while keeping older nodes intact, with no impact to rest of the ring.

Different Span Bandwidths

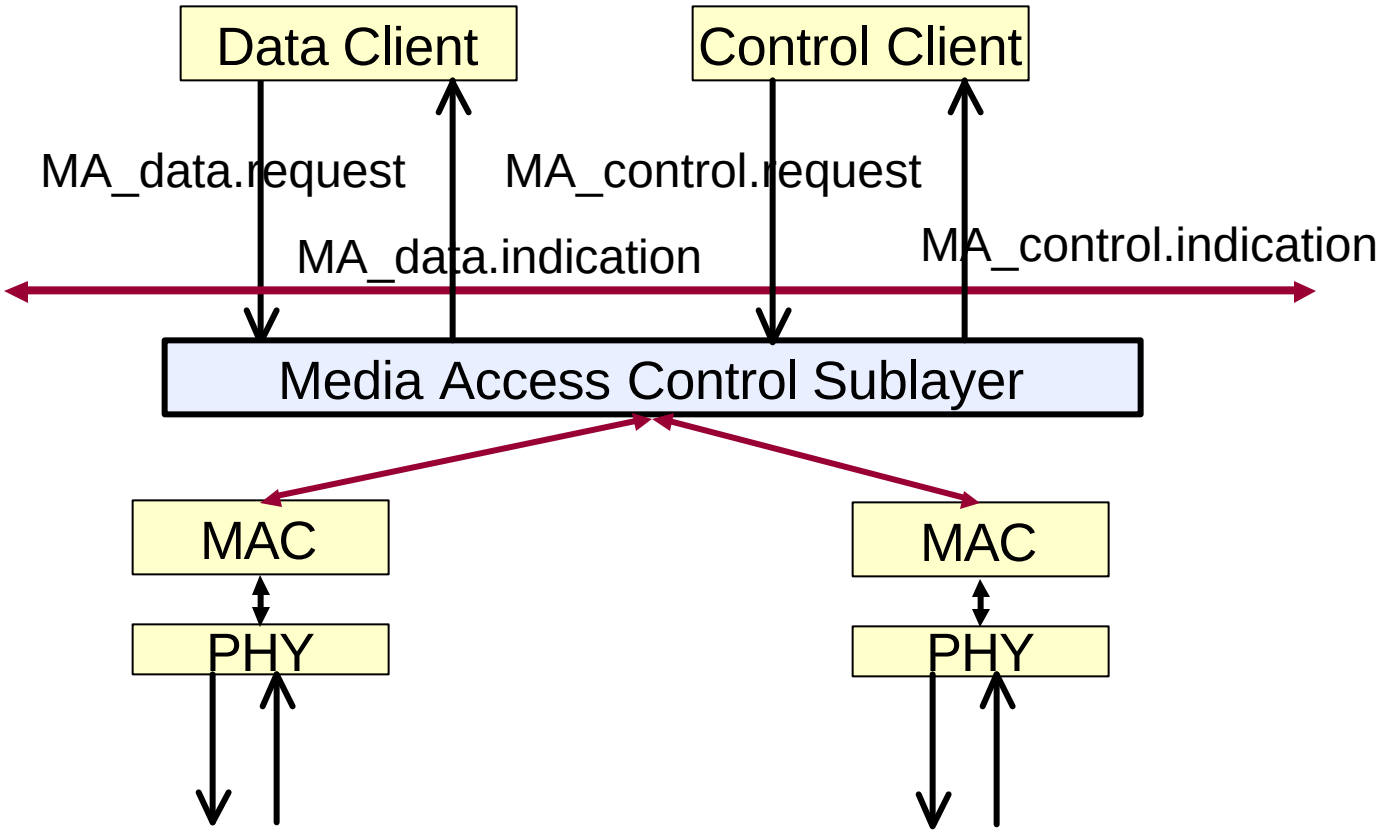


- Nodes are upgraded only where needed
- MAC receives packet bytes on Rx on one link
- MAC sends packet on Tx in same/opposite direction
- Rate adaptation takes care of any rate differences

RPR MAC Model

- A MAC Sub-layer provides a unified interface to MAC client
- Individual (logical) MACs handle Tx/Rx links.
- Lower part of MAC sub-layer manages different MACs.
- MAC clients need only one interface regardless of number of MACs below the sub-layer.
- Ring/Mesh Topology, and Link Rates are hidden by MAC sub-layer
- Rx rate on a port MAY be different from Tx rate
- Link costs reflect link speeds so appropriate paths are chosen by nodes for different packets

RPR MAC Model

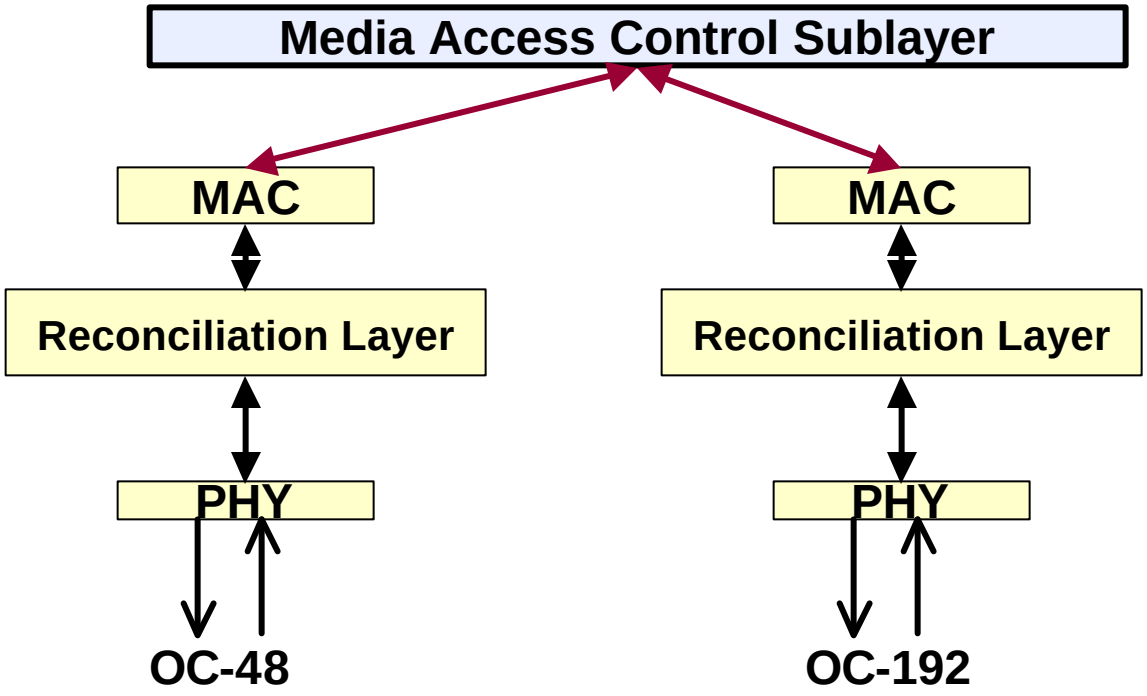


- **A unified MAC interface to MAC clients.**
- **Network interfaces transparent to MAC clients**

Different Span Bandwidth

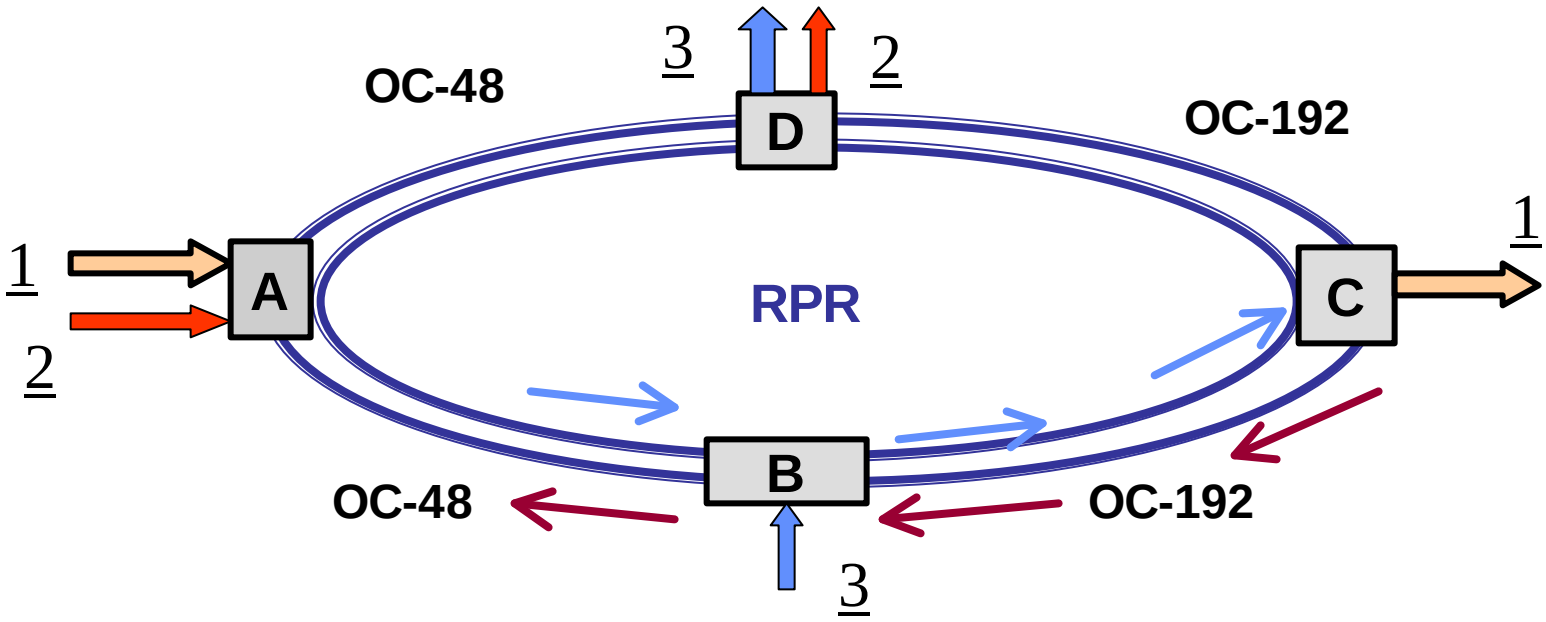
- Only ports on directly adjacent nodes be of same speed
- A packet is Rx by MAC in memory/FIFO
- MAC takes packets from memory/FIFO and sends on Tx
- Rx rate on a port MAY be different from Tx rate, since the two are essentially unrelated
- Link costs reflect link speeds so appropriate paths are chosen by nodes for different packets

Independent MAC Operations



- Independent MAC/PHY links
- Once received by MAC, packets can be sent to any other MAC/PHY
- Network interfaces transparent to MAC clients

Different Span Bandwidths



- Most packets across B, C, D occupy OC-192 links
- Same is true for A, B, and D nodes for OC-48
- In case of fault, high-priority traffic goes over slower links
- Low-priority packets MAY get dropped

Conclusion

- For different span bandwidths, all we need to allow different rates on different MACs below MAC sub-layer
- Opaque nature of RPR networks (O-E-O) could easily support multiple rate spans
- This feature allows customers same flexibility they have with LAN (mixes of 100M/1G/10G in different network segments)
- Flexible upgrade path for providers and subscribers