Ring/Mesh Network Configurations

Pankaj K Jha
Cypress Semiconductor
pkj@cypress.com

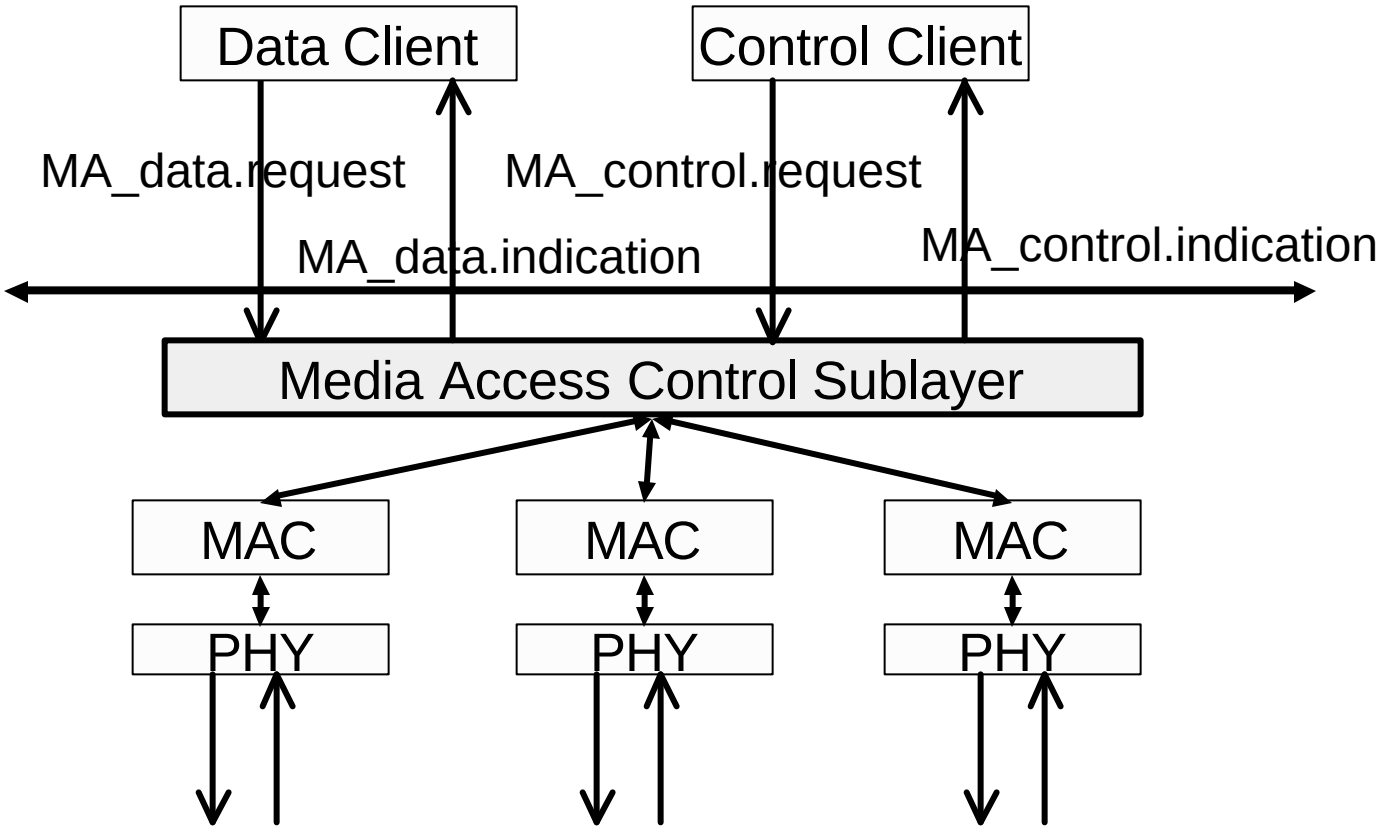
RPR Network Configurations

- One or more RPRs connected by common node(s) and point-to-point links
- Any Combinations of Ring and Mesh Networks
- Network Topology and Packet Routes determined at L2 Layer

Ring/Mesh mapping in MAC

- RPR Node manages Network Topology through simple port mapping at MAC
- Once L2 Topology is determined, Nodes perform minimal lookups on ports.
- Data Transfers based on simple <In Port, Out Port> Switching.
- Fault recovery and restoration in any Topology

RPR MAC Model



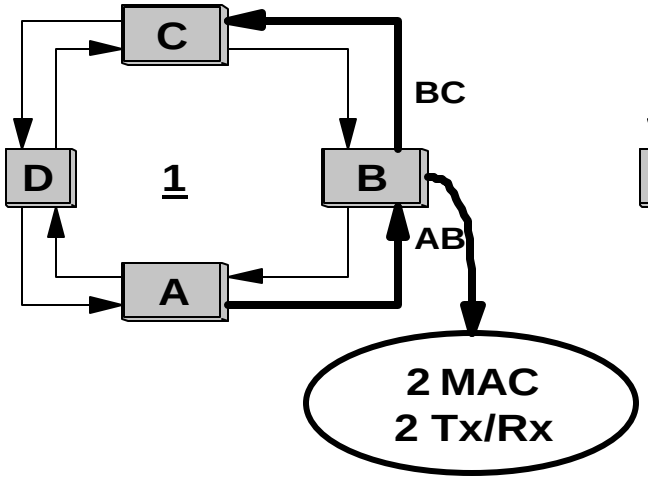
- **A unified MAC interface to MAC clients.**
- **Network interfaces transparent to MAC clients**

RPR MAC Model

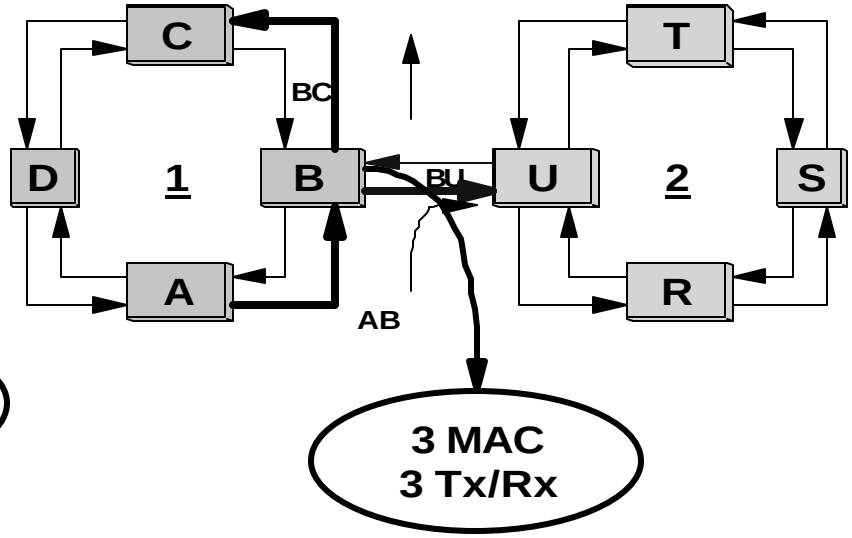
- A MAC Sub-layer provides a unified interface to MAC client
- Individual MACs handle Tx/Rx links.
- Lower part of MAC sub-layer manages different MACs.
- MAC clients need only one interface regardless of number of MACs below the sub-layer.
- Ring/Mesh Topology is hidden by MAC sub-layer
- Topology discovery concludes shortest paths for reaching a destination node

Ring/Mesh Networks

An RPR RING



HYBRID NETWORK



- Networks are built by associating MACs and Ports
- L2 Topology Discovery and Port Associations can allow any mix of Ring and Mesh Networks
- Once Associations are made, a simple “CAM” function takes packets from network to network.

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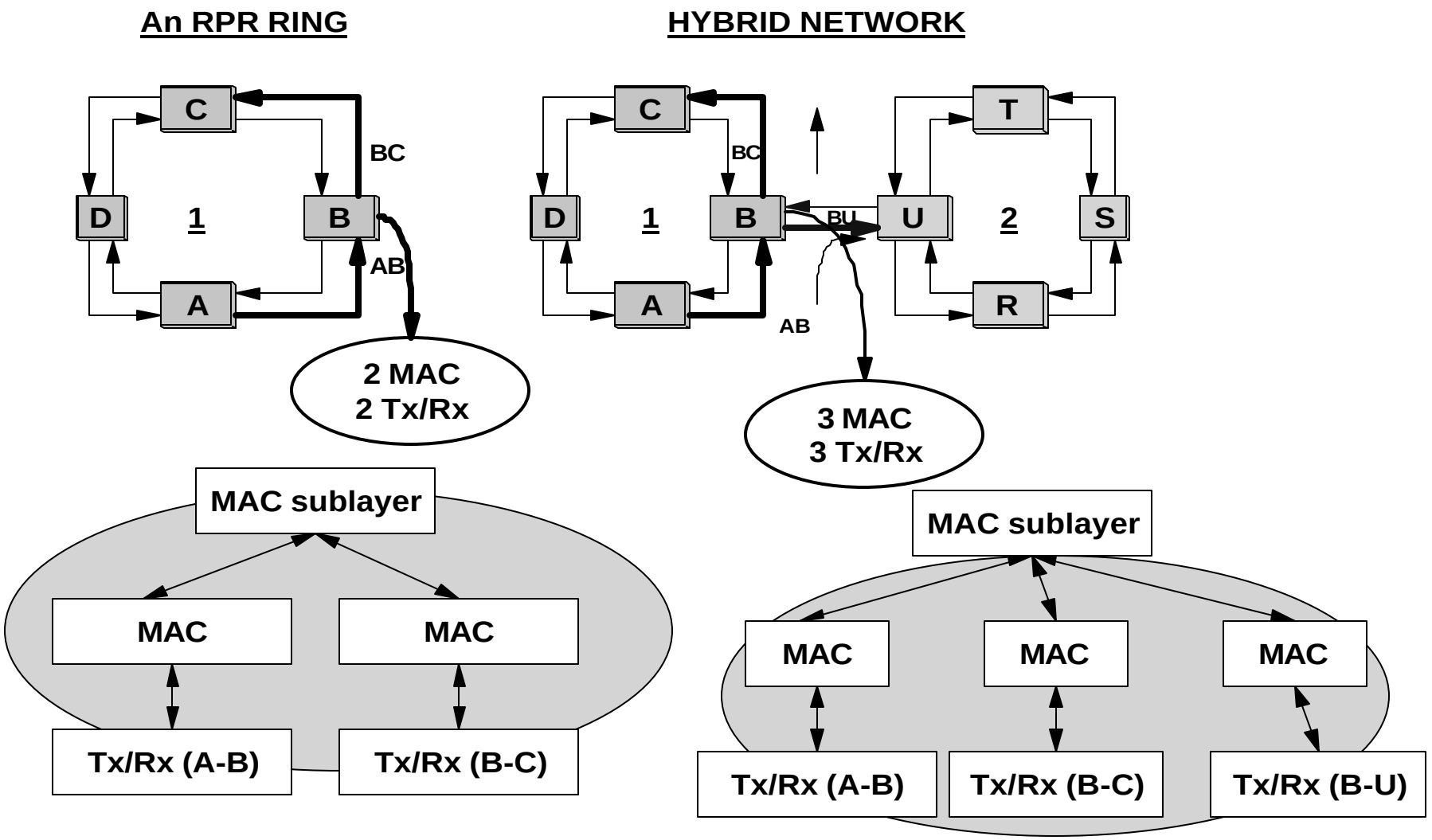
Ring/Mesh Networks



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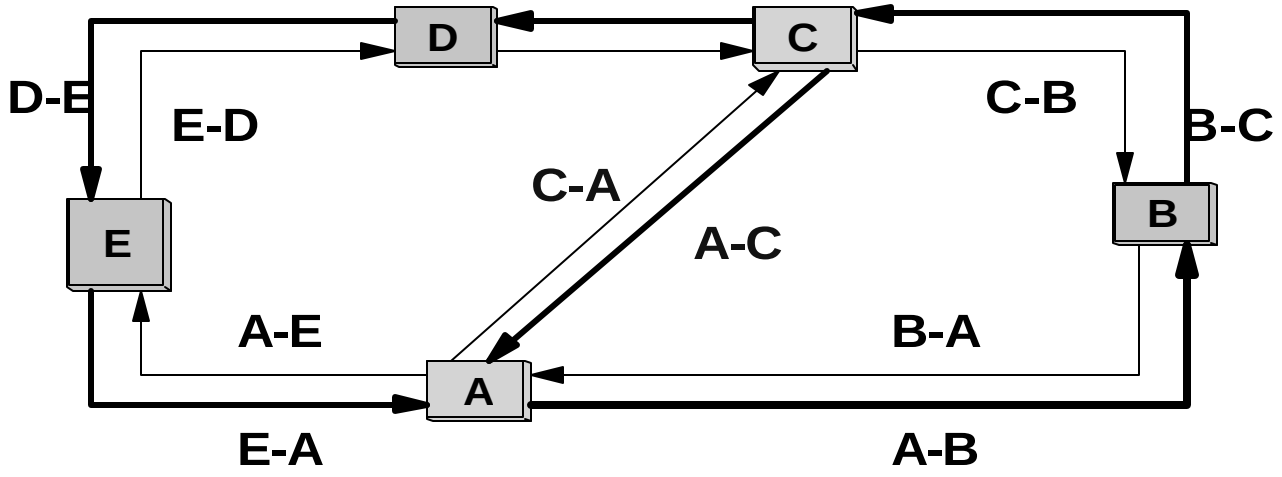
Ring/Mesh Network Associations

- L2 Topology Discovery Control Packets are used to map network.
- Path costs are determined, according to Topology, User-assigned values, and Link Rates
- RPR MAC builds an Internal <In Port, Out Port> association for Data Packet Flow
- Shortest paths across rings, or ring/mesh for any pair of nodes can be determined using L2 means.
- Similarly, Protection Paths for each of the Links are determined.
- In case of Failure, Packets follow Protection Routes

Ring/Mesh Data Path

- At each Node, Lookup “CAM” Tables are simple and based on Destination MAC Address (Shortest Path to the Destination, as determined by L2 Topology)
- Data Paths are fast and simple at any node
- <Source MAC, Destination MAC> provide endpoints for data transport.
- Data Path can carry multiple types of data
- Protection can be provided for any type of data over any link.

Example of a Hybrid Network



- Nodes A, C have three links associated with them
- Nodes B, D, and E have two links
- Every node knows Topology and switching lookup on all the links
- Shortest path determination can take a packet on any of the links.
- Protection for any ring-mesh combination.

Conclusion

- Proper L2 Topology Discovery can help create Multi-port Network Associations at any Node
- This allows creation of any mix of Ring and Mesh Network without undue Complexity at a Node
- <Source MAC, Destination MAC> provide endpoints for data transport.
- Protection Switching beyond just Ring-based