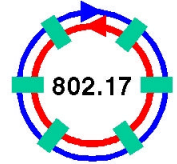




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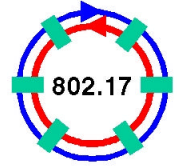
The Importance of Link Aggregation to RPR

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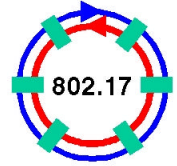


Why we need this

- Scalability
- Flexibility
 - size rings with more granularity
- Upgrade path



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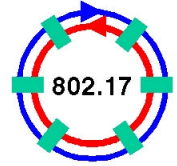


Scalability

- Physics of fiber has its limits
 - just making fatter pipes will not scale
 - need to aggregate bandwidth of WDM channels or parallel fibers
- Silicon has physics limits as well
- We want this technology to scale to higher speeds in the future- 10Gb, 40 Gb, 100 Gb...



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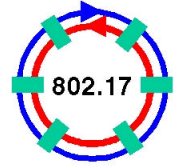


Flexibility

- Ability to size rings to the actual bandwidth needs without jumping to the next higher “standard” transport
 - If you need a 3 Gb ring, why build a 10 Gb ring?



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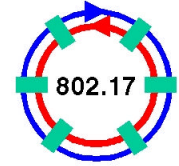


Upgrade paths

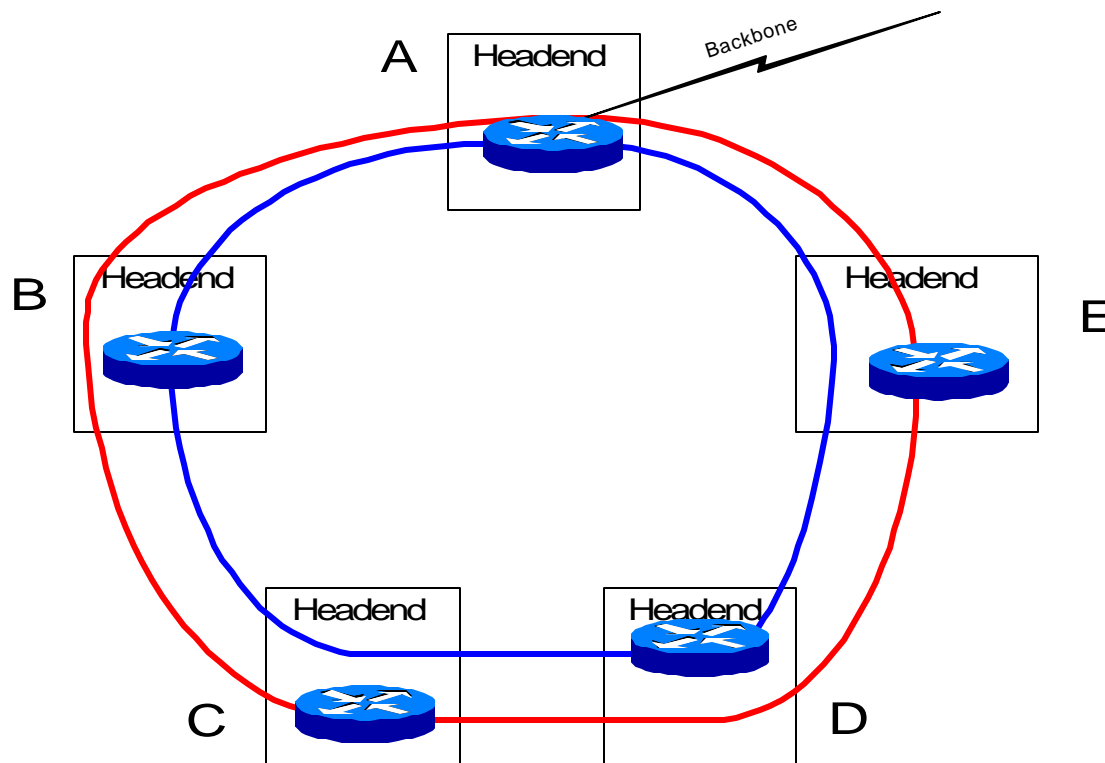
- Add bandwidth incrementally without forklift upgrades.
- Use RPR technology to replace today's routing (layer 3) technology



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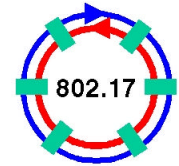


Why not “skip” rings?

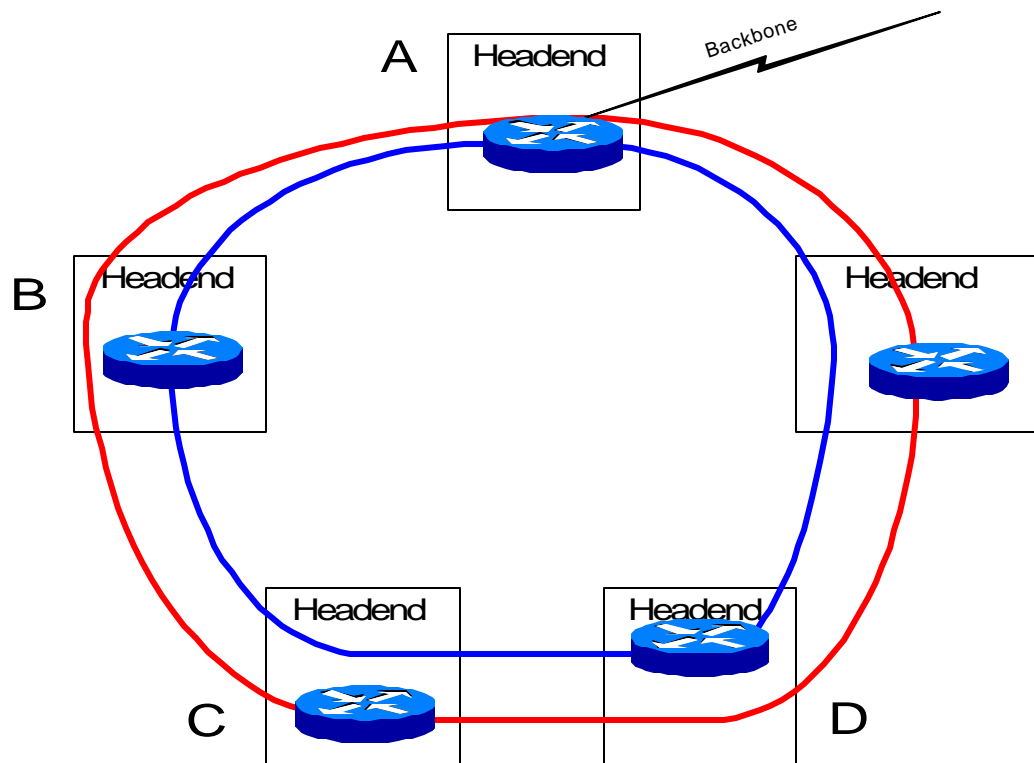




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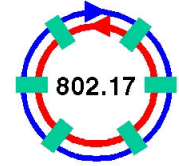


Why not “skip” rings?

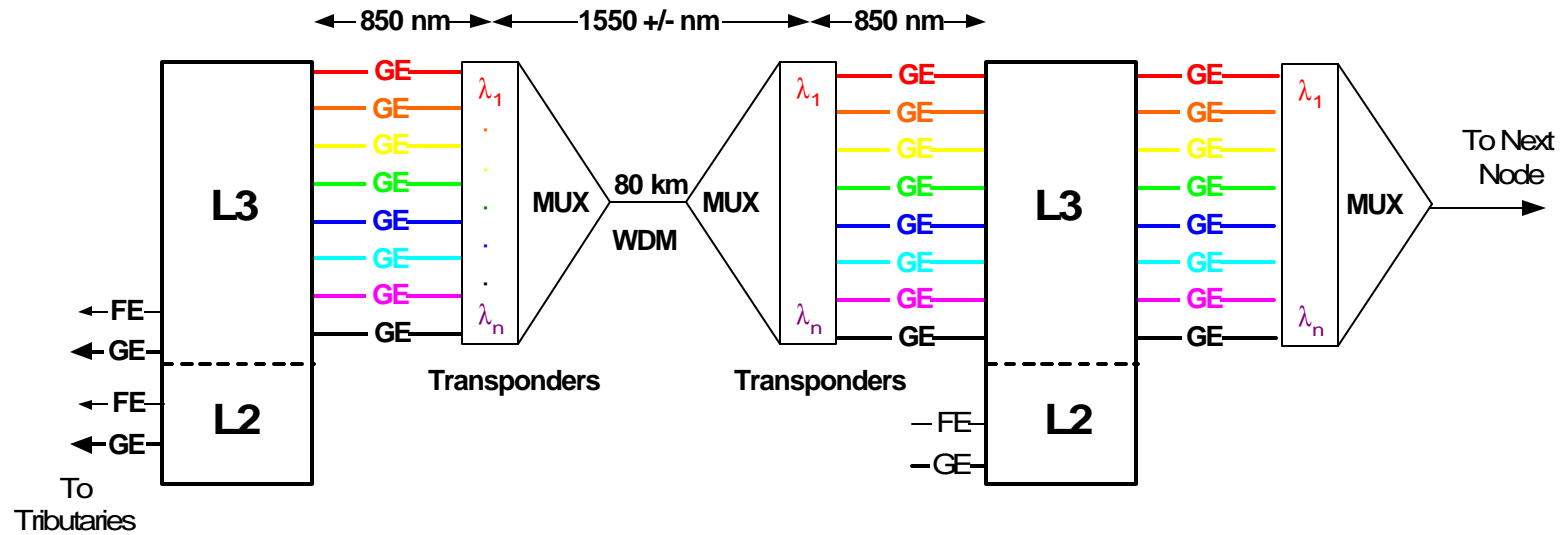


E

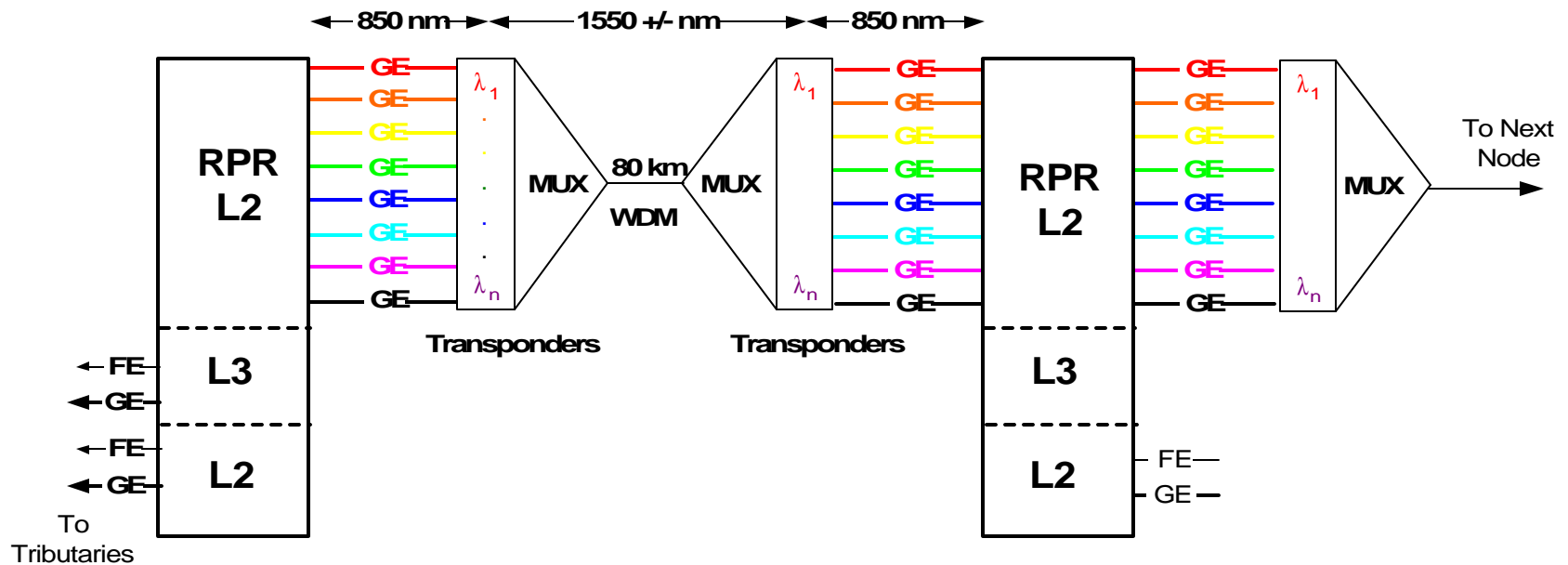
Difficult to operate
Logical “hub and spoke”
Optical cost and complexity



Multiple links today



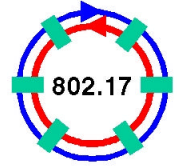
Upgrade to RPR



Benefits: fairness, fast convergence, and less complexity



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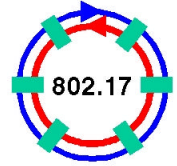


Issues

- Disparate link sizes
 - packets can arrive out of sequence
 - maybe not essential (see 802.3ad)
- Auto configuration
 - not needed for set-up, but needed for failures



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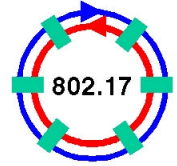


More Issues

- Non-homogenous rings
 - ex. Temporarily due to a link failure or upgrade
- How to implement
 - above or below the MAC



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Why we need this NOW

This has implications for, and needs to be developed in conjunction with:

- The MAC
- Congestion avoidance mechanisms
- Steering mechanisms

Service providers will want this in first phase installation.