RPR Proposal

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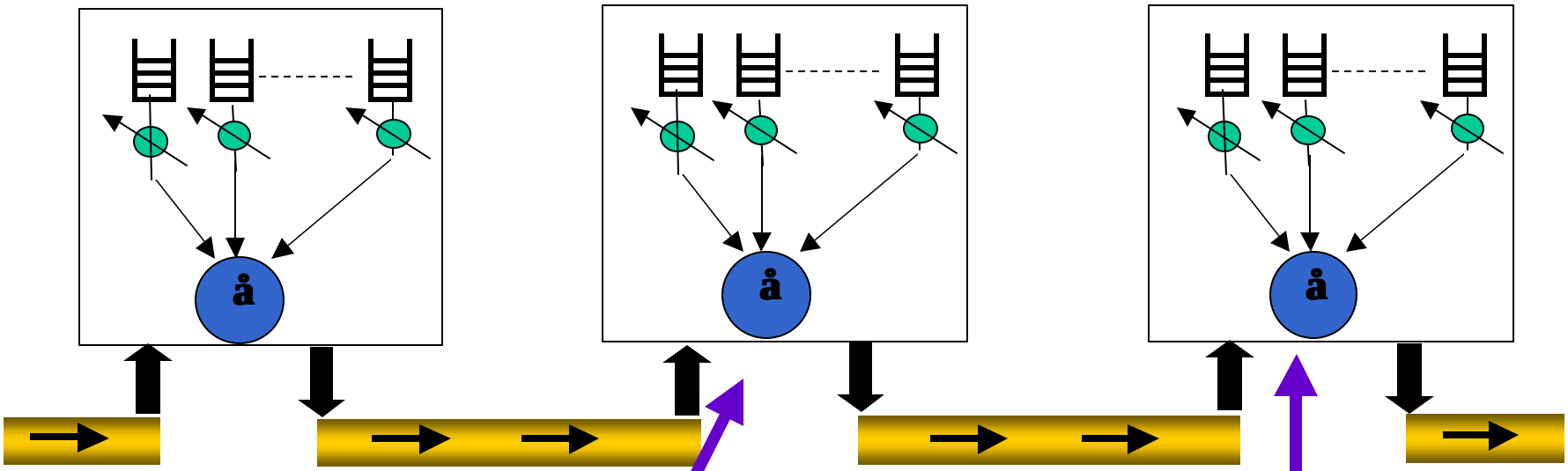
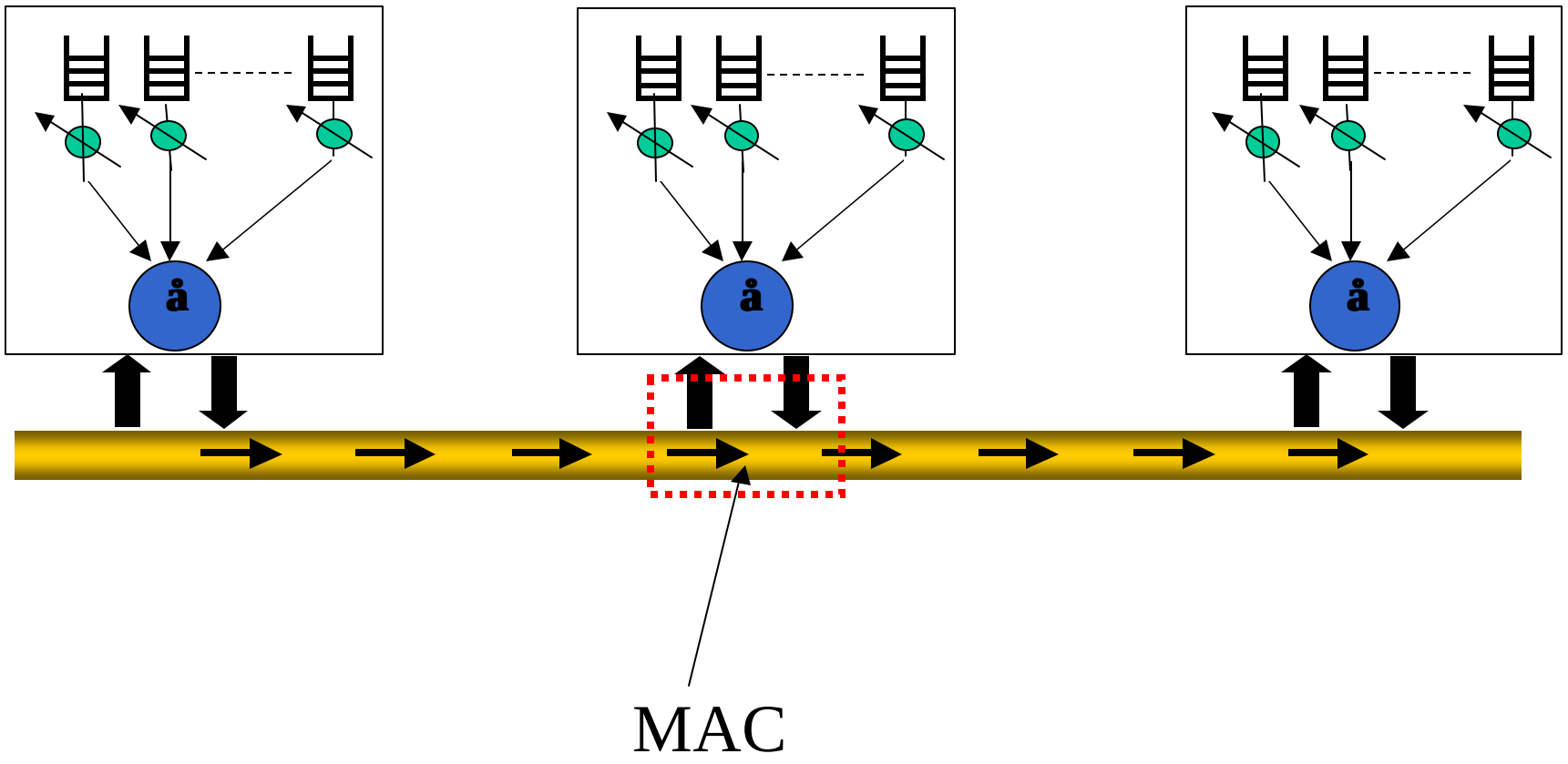
Fundamental Characteristics of 802.17

- Any current RPR implementation != 802.17
- Shared media architecture
- Fair access
- Active dynamic bandwidth management
- Bandwidth-aware MAC
- Maximize throughput on all links
- Support for multiple rings
- Steering-based protection scheme

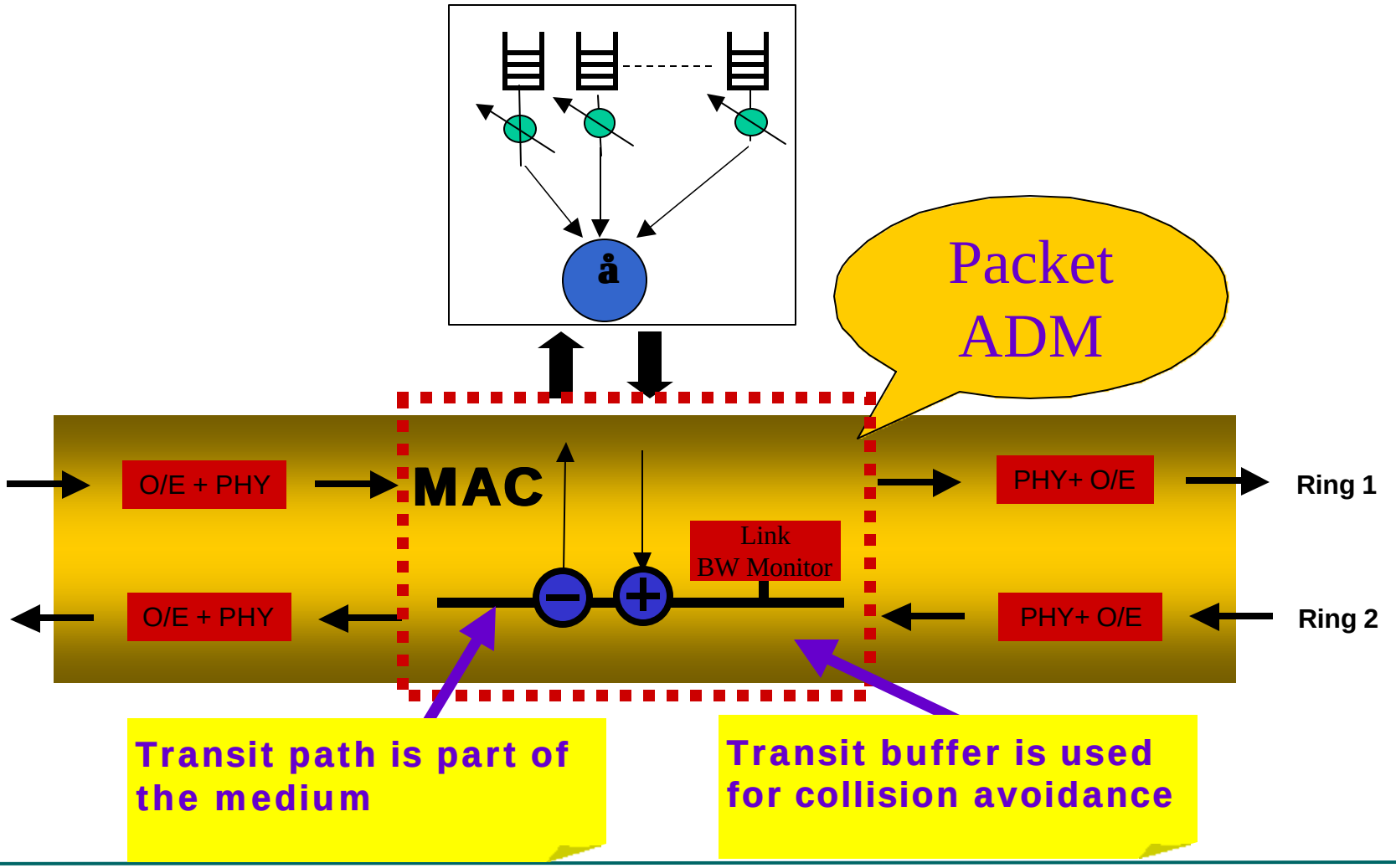
Packet switch architecture



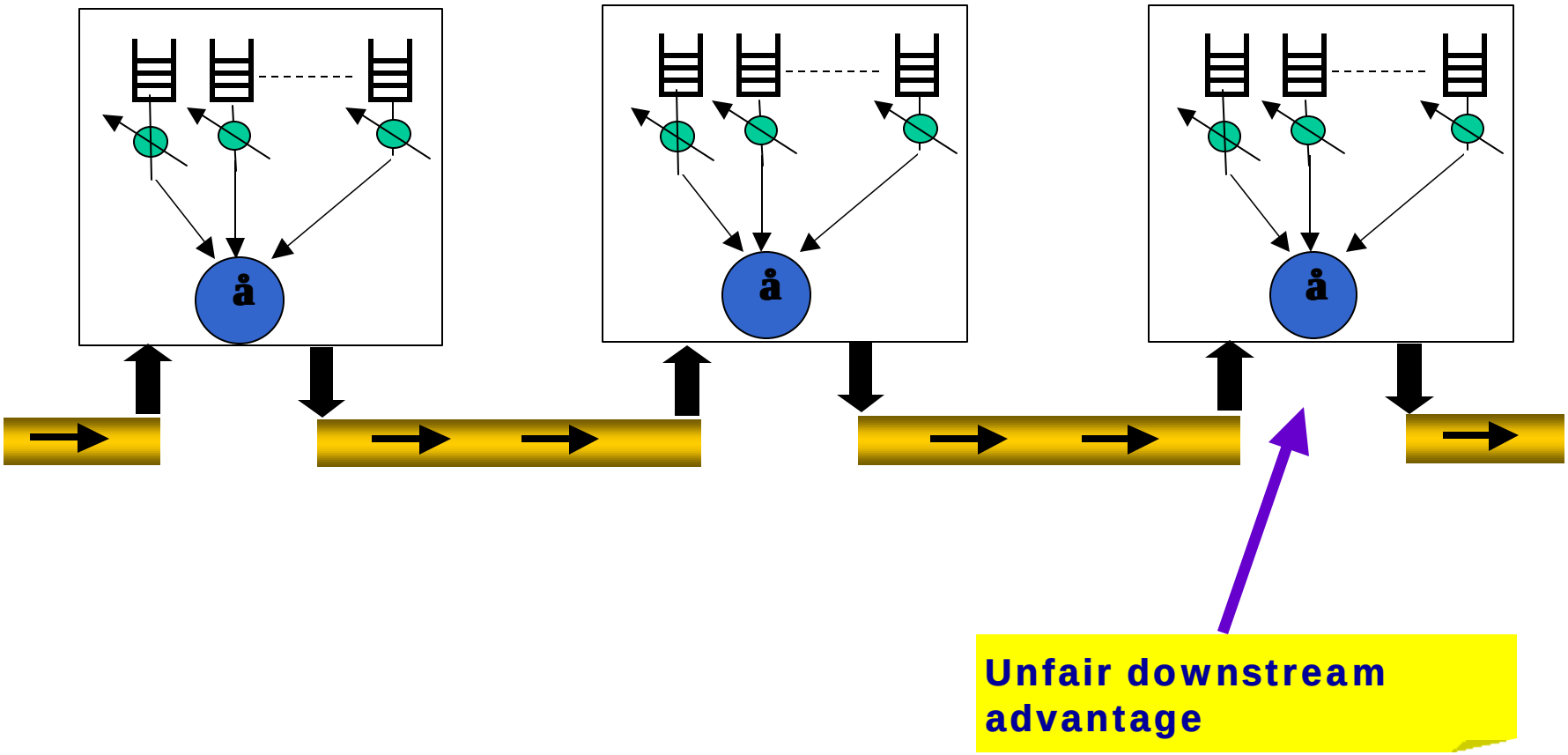
RPR MAC architecture



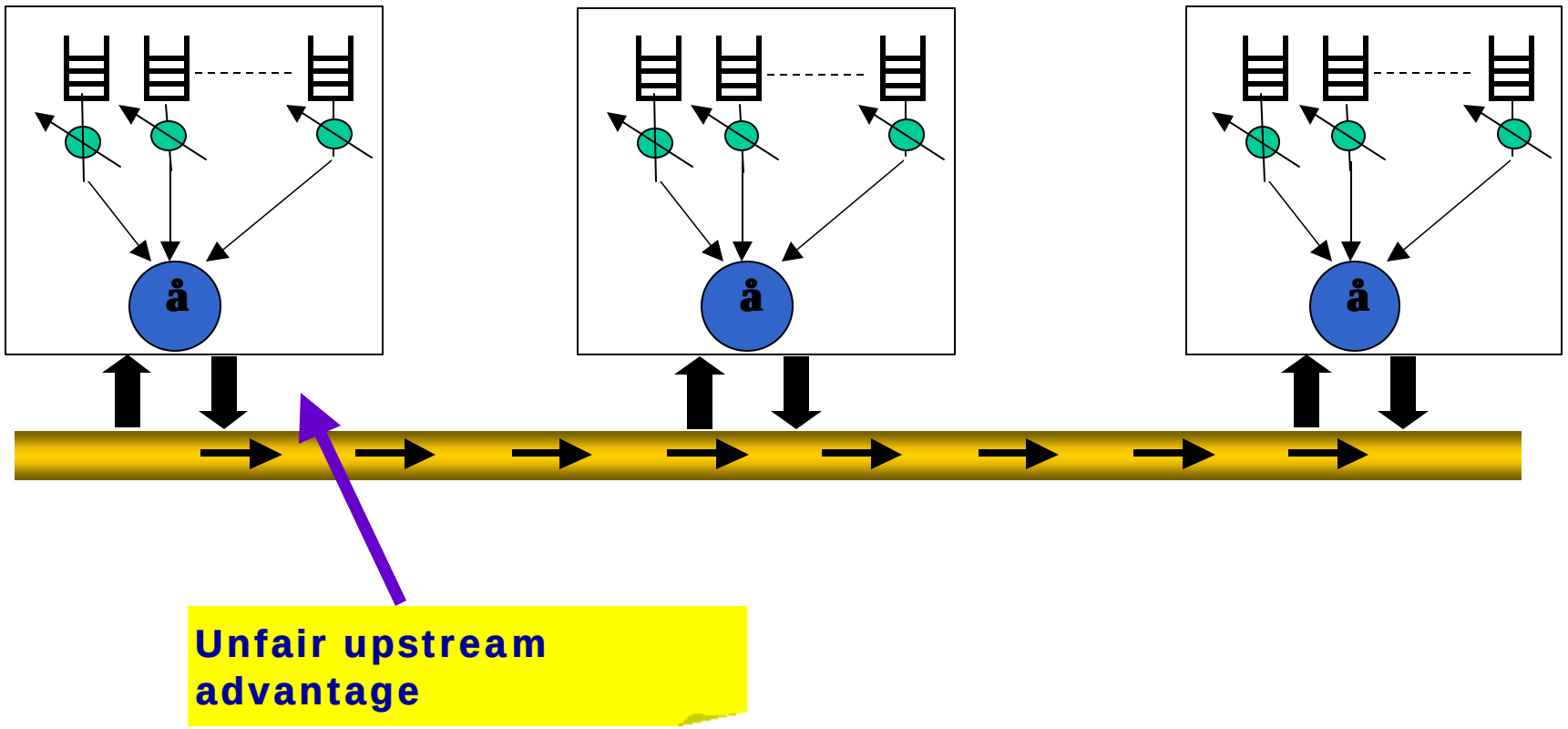
The RPR MAC


Packet
ADM
O/E + PHY
MAC
PHY+ O/E
Ring 1
Link
BW Monitor
O/E + PHY
PHY+ O/E
Ring 2
Transit path is part of the medium
Transit buffer is used for collision avoidance

Fairness: Packet switches are not fair



Fairness: Packet ADMs can be unfair too



Fairness

Service received by a subscriber is independent of the subscriber's location on the ring

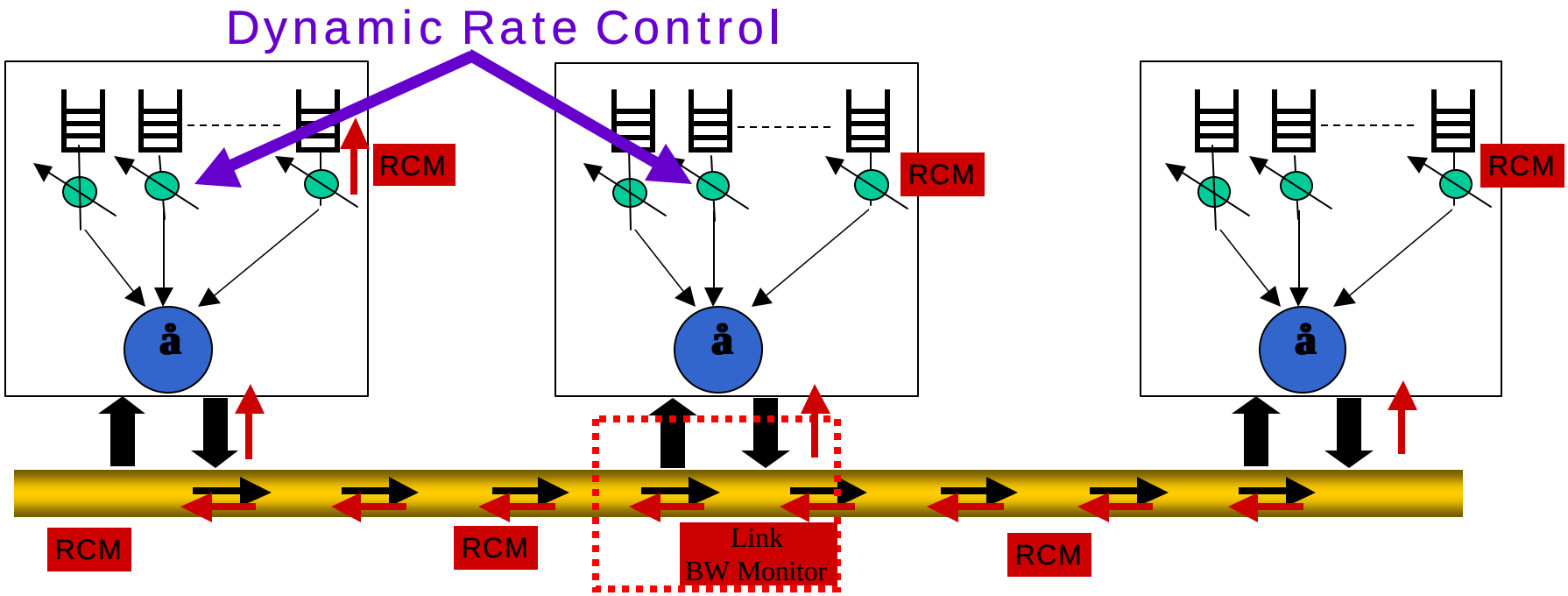
- Fairness != Equality
- Fairness = weighted allocation of resources

Active Bandwidth Management

Dynamic flow control is essential for maximum network utilization in shared network environments

- Closed loop feedback scheme
- Fairness algorithm is an integral component of bandwidth management scheme
- Network performance limited by robustness, responsiveness and precision of flow control

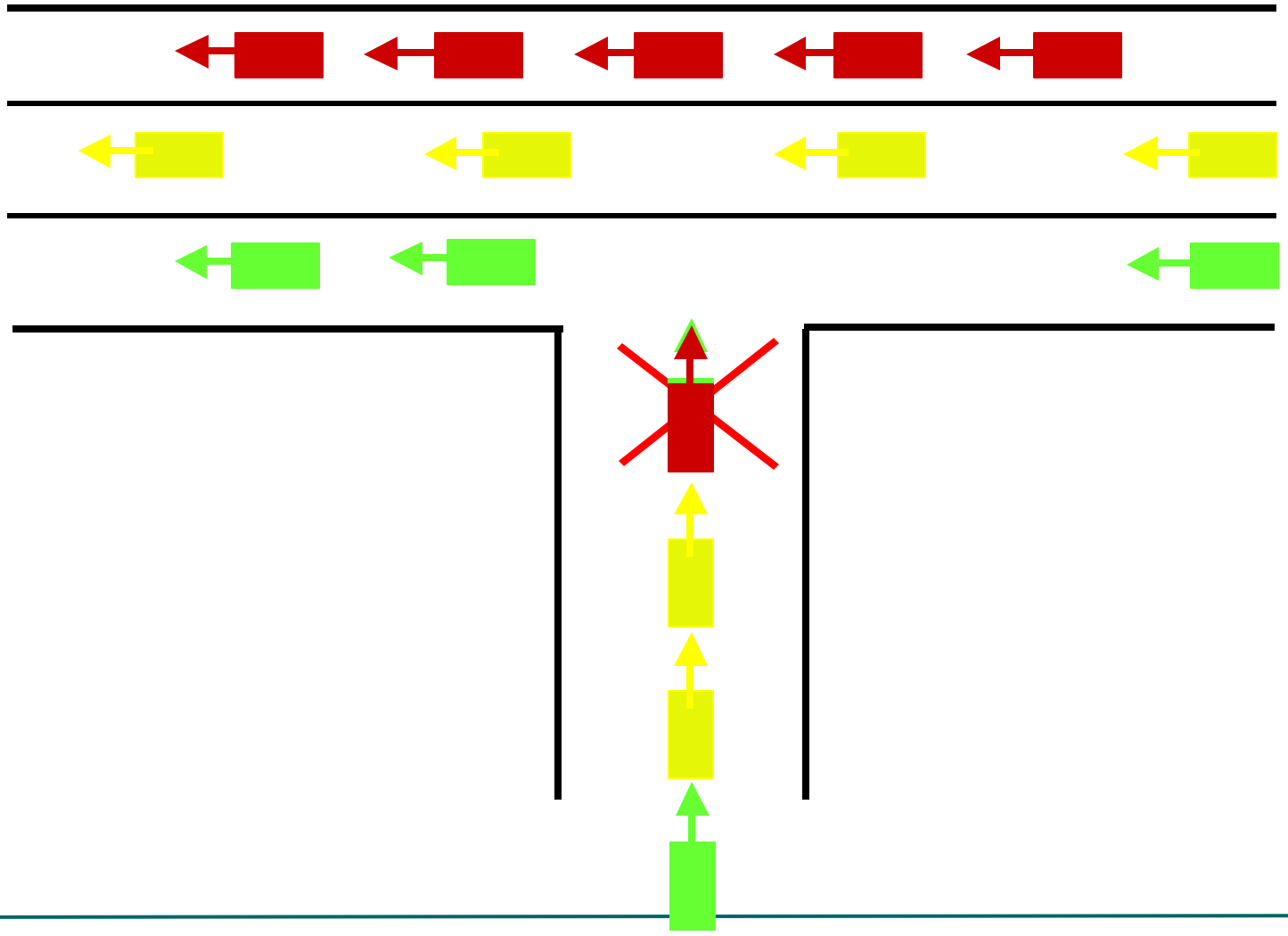
Bandwidth-aware MAC



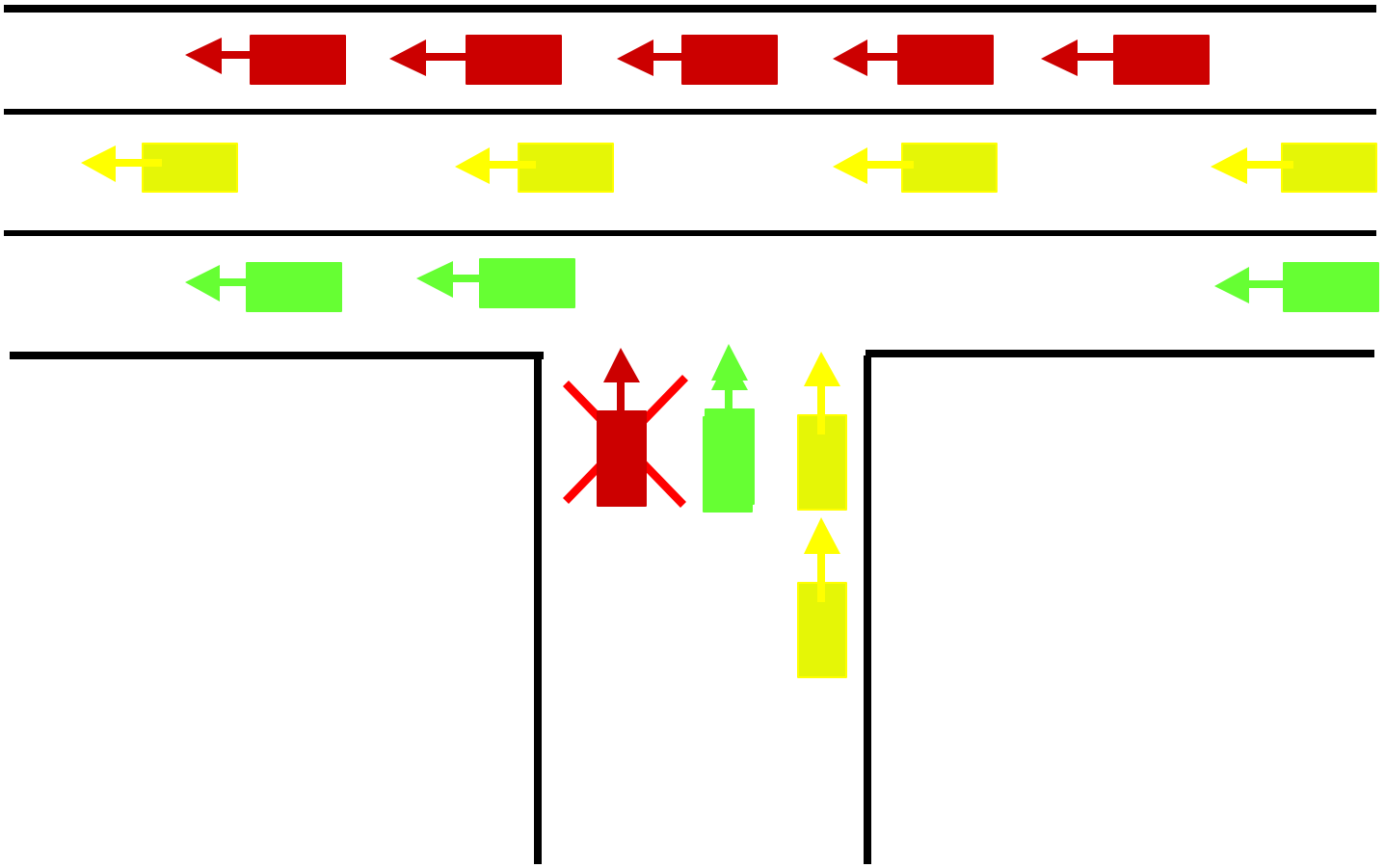
Maximize throughput on all links

Traffic over un-congested links should not be throttled because of congestion happening on unrelated links

Head of line (HOL) blocking

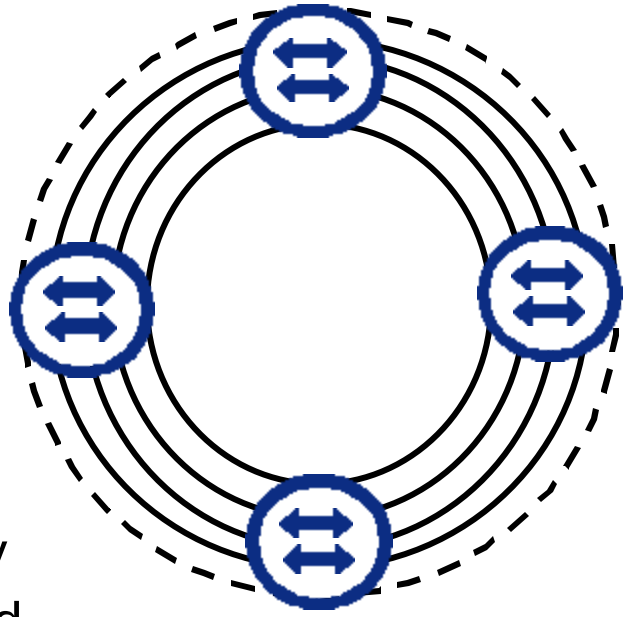


Throttle sources affected by congestion



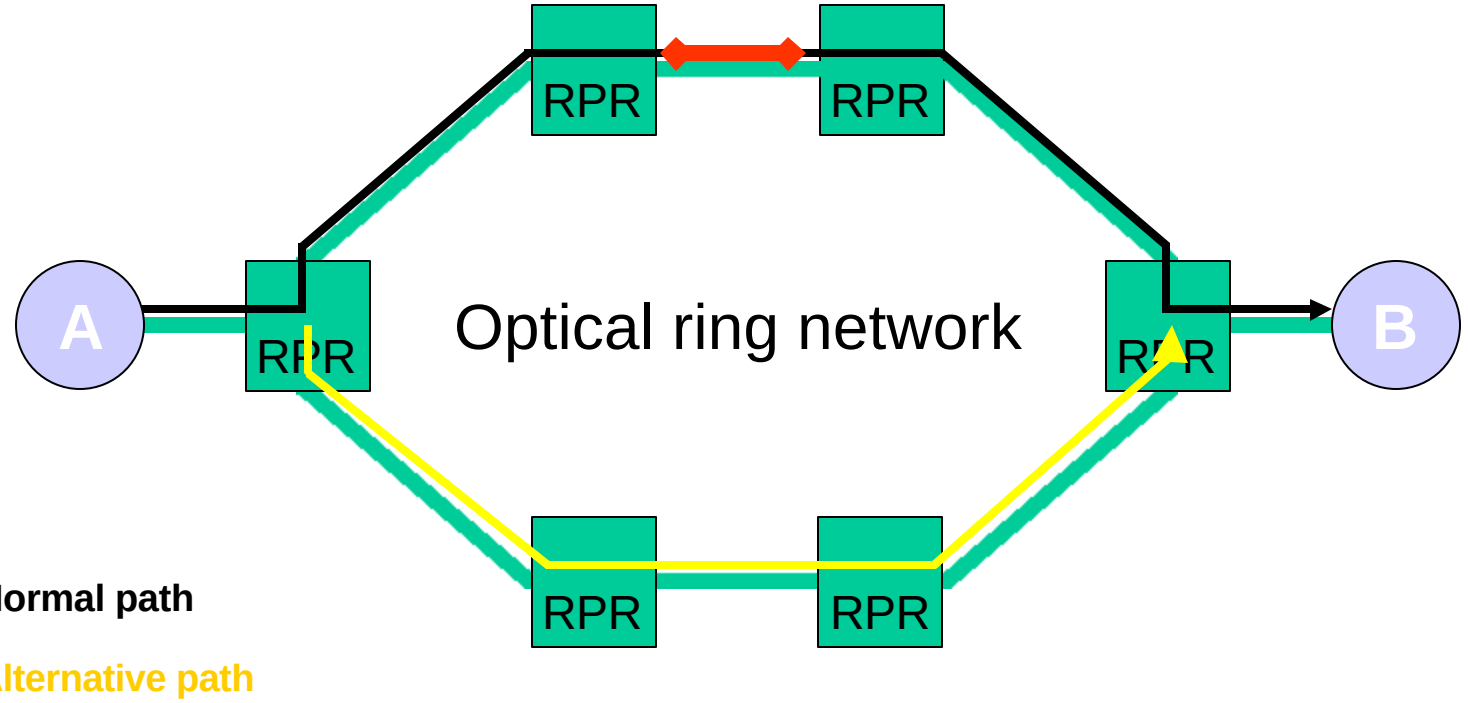
Multi-rings Scalability

- Problems:
  - Limited transmission capacity on fibers
  - High speed optics expensive
    - costly to scale by increasing link speed
  - Linear increase
    - One ring at a time
- Conclusion:
  - Scale by adding multiple rings
- Benefits
  - Each additional ring increases the capacity
  - Cheaper to add ring than to increase speed
  - Individual rings can be operated at different speed
  - One logical Mac--several physical
    - the rings are managed as one aggregated link



Steering Ring Protection

- Optimal performance after failure
- Sub-50ms service restoration



Conclusions: RPR fundamentals

- Any current RPR implementation != 802.17
- Shared medium architecture
  - Transit path is part of the medium
  - Transit buffer is used for collision avoidance
- Active bandwidth management is required to provide fair access of ring capacity to stations
- Dynamic bandwidth management to avoid unused (wasted) capacity
- Bandwidth-aware MAC
  - Awareness of available capacity on links of the ring
- Maximize throughput on all links
- Option to support multiple rings
- Steering-based protection scheme