Spatial Reuse Protocol: A Ring Based LAN / MAN / WAN MAC Protocol

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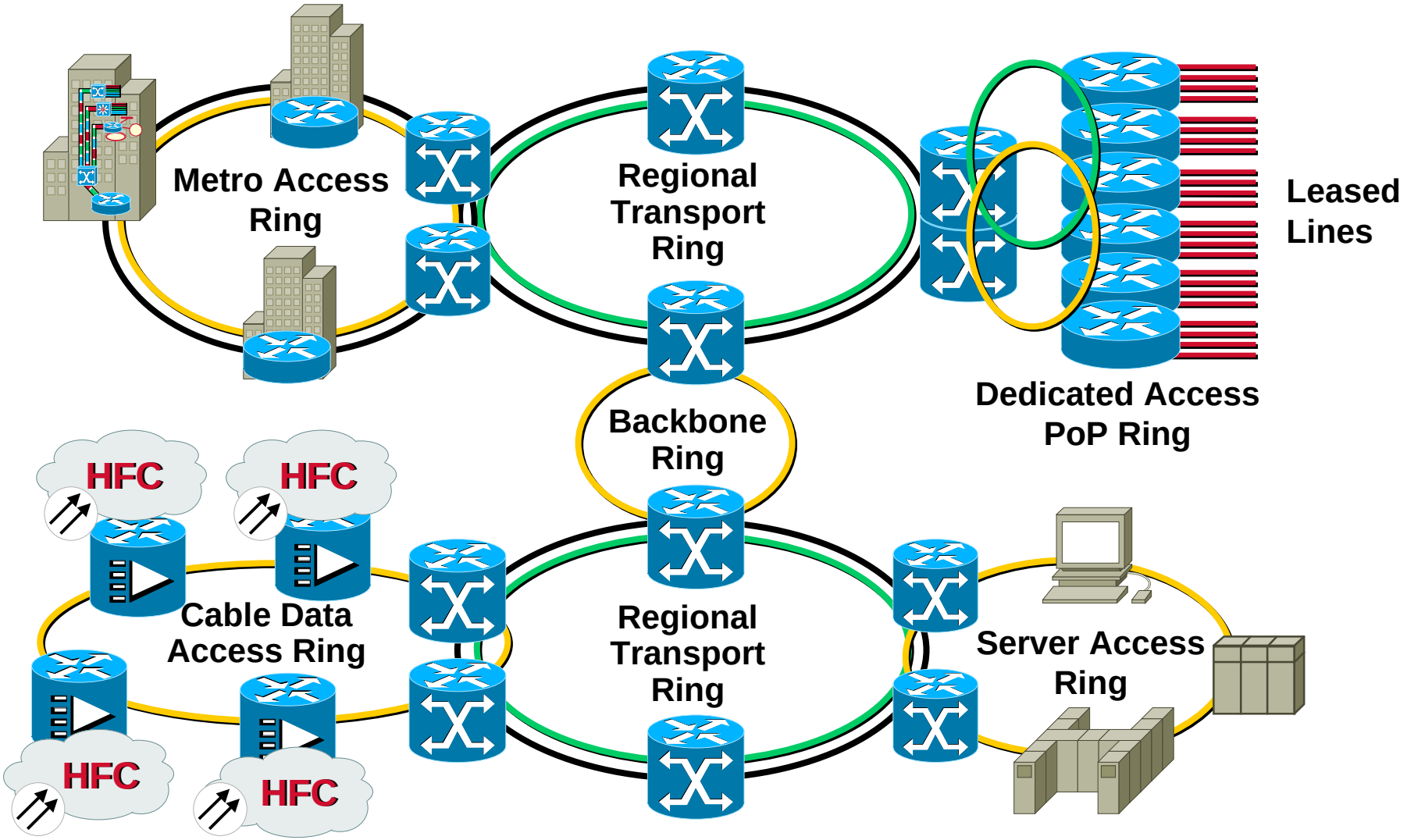
SRP Goals

- **Improve economics via layer elimination and BW multiplication**
- **Provide fast protection and restoration**
- **Enable Plug and Play operation**
- **Support LAN, MAN and WAN applications**

SRP Applications



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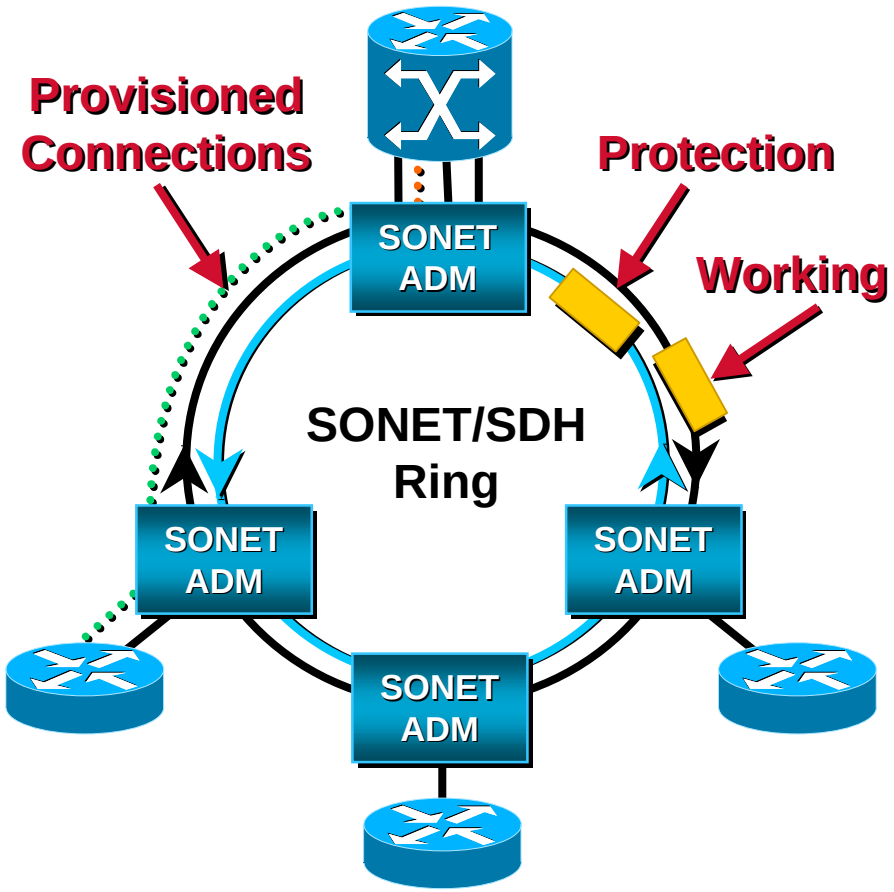
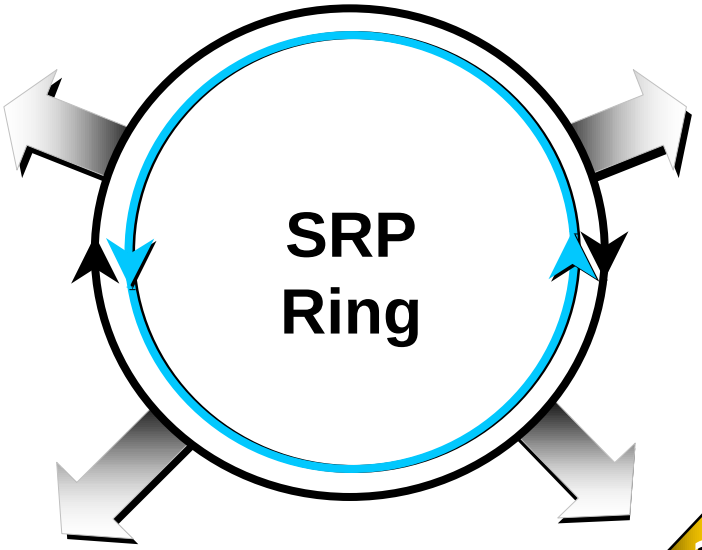
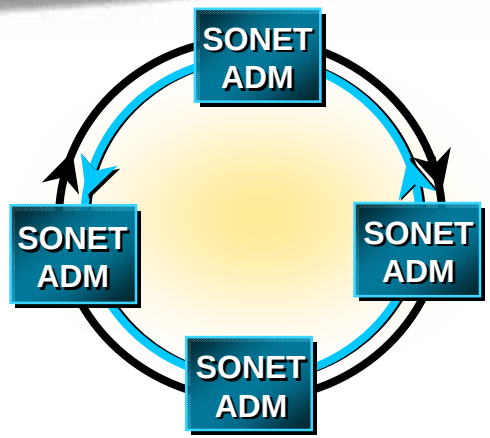
SONET/SDH-Based TDM Transport

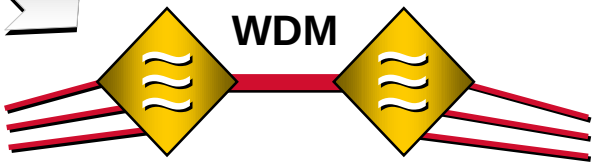
- **Accepted transport architecture**
- **Performance monitoring and self-healing**
- **Expensive and inefficient for packets**
  - **Multiple equipment layers**
  - **Bandwidth inefficiency**



Transport Flexibility and Evolution

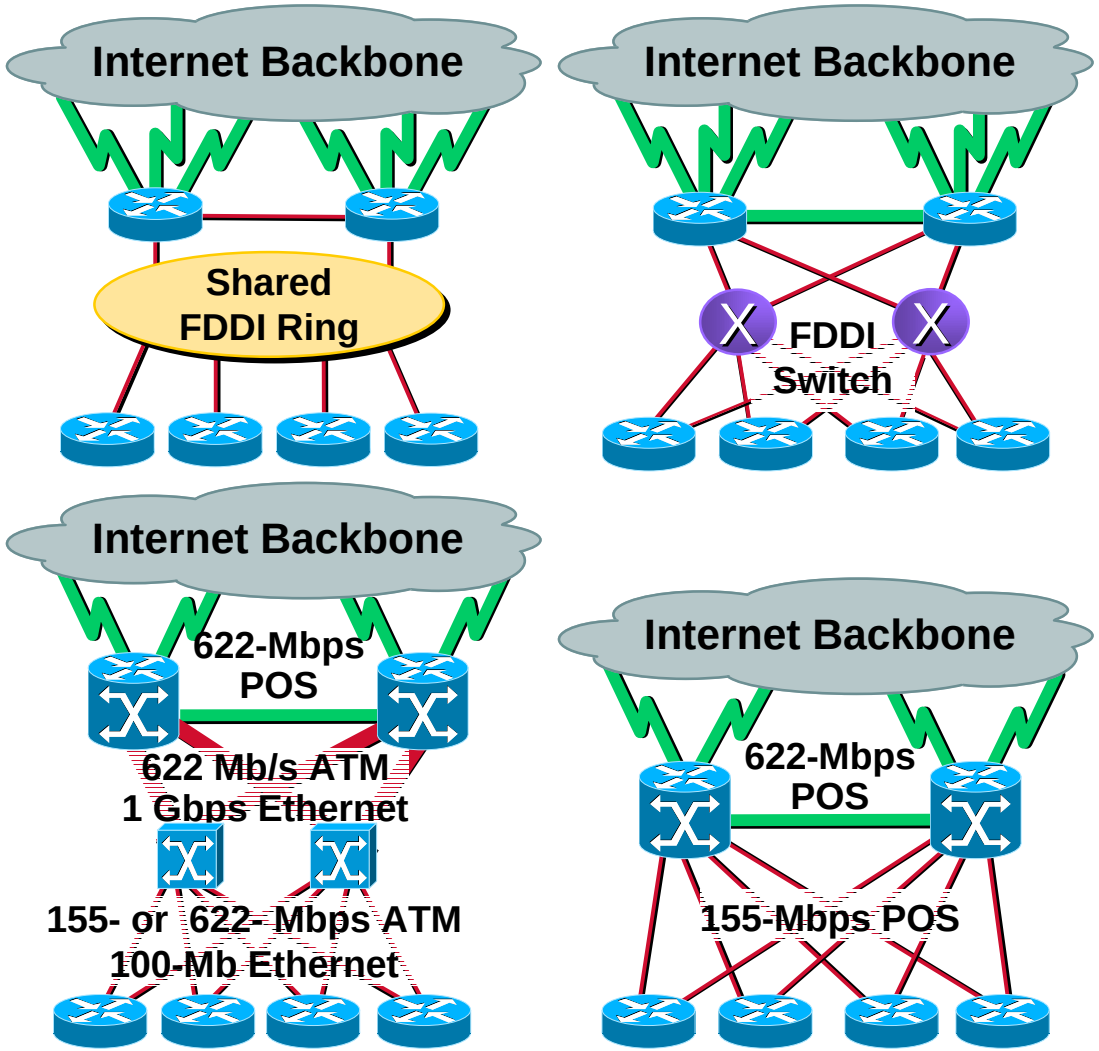






- Runs over dark fiber, SONET, or WDM
- Enables transport “mix and match”
- Provides efficient evolution path for existing networks
- Provides optimized transport for greenfield builds

Previous Intra-POP Connectivity Options



- **Existing topologies**
  - FDDI ring
  - Switched FDDI
  - ATM or Fast Ethernet
  - Point-to-point POS
- **Issues**
  - BW limits
  - Complex load balance
  - Multiple boxes
  - Port counts

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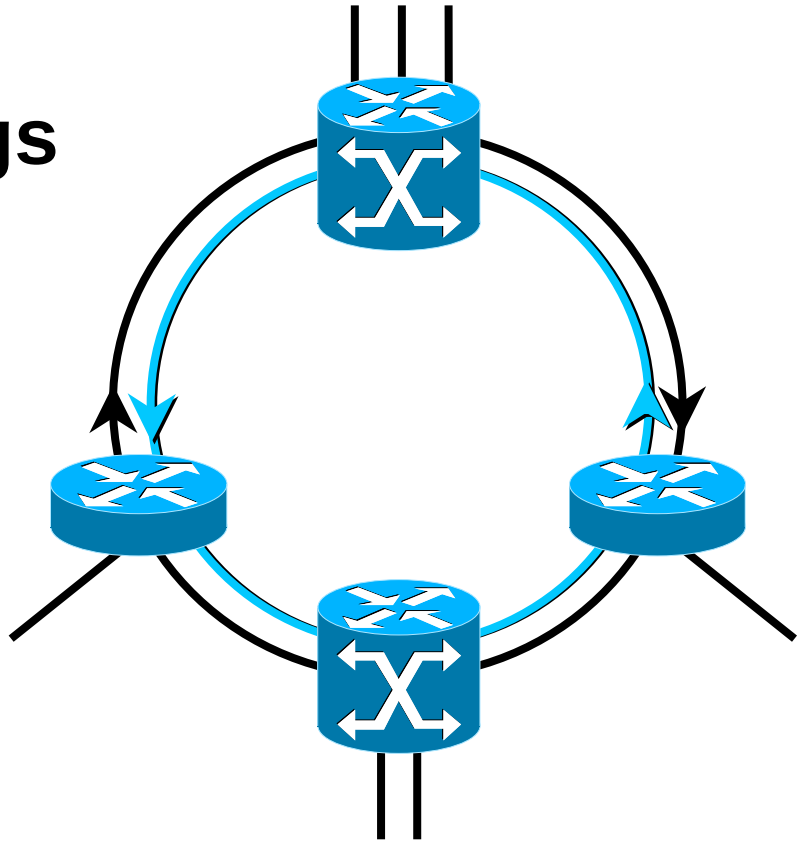
SRP Overview

- **Maximize BW efficiency**

  dual counter rotating rings
  destination stripping
  statistical muxing of BFP

- **Extend IP functionality over MAN & WAN**

- **Minimize provisioning and configuration**



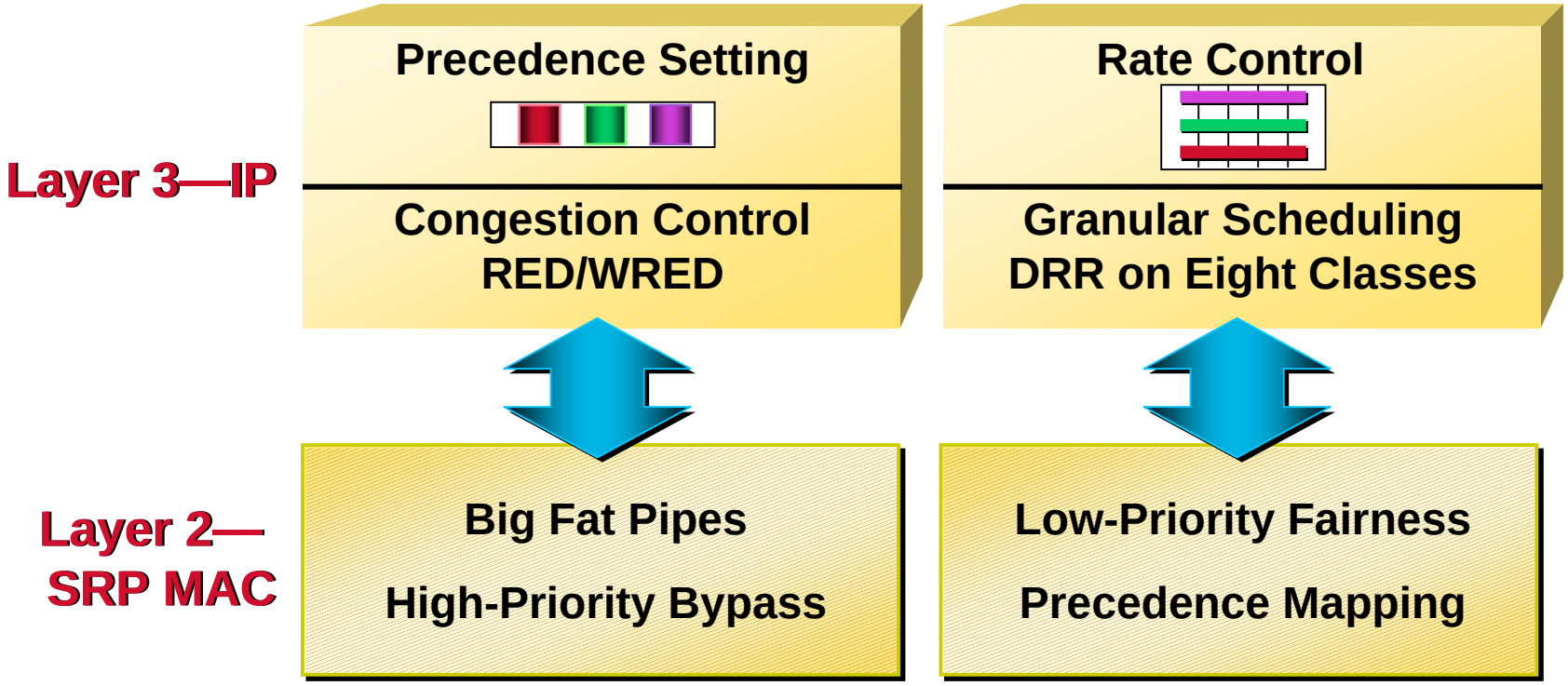
SRP Overview

- **Multicast support**
- **2 Traffic priorities on ring**

  High priority traffic has low latency path around ring

  SRP fairness algorithm (SRP-fa) controls access to ring BW for low priority traffic
- **8 priority levels for Tx and Rx queueing**

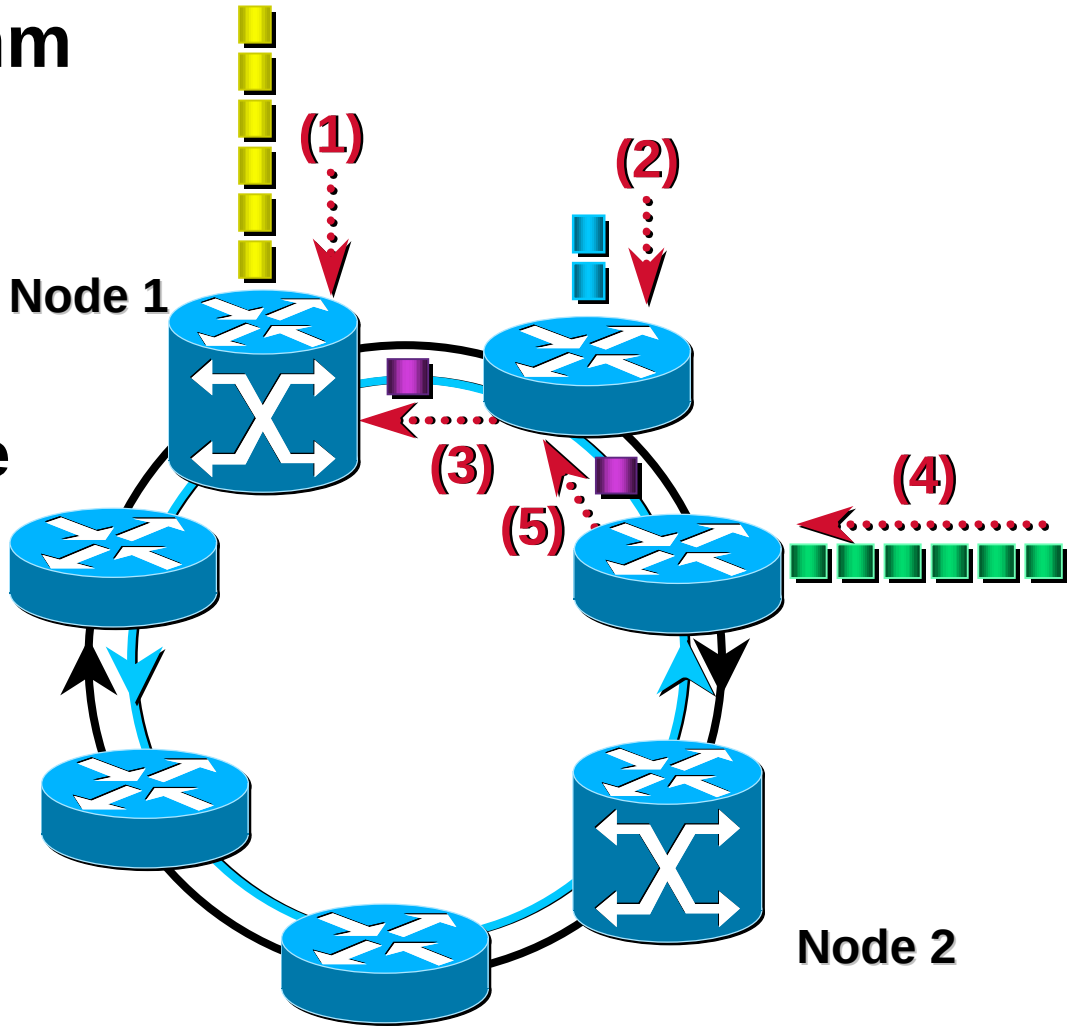
SRP Cooperates with Layer 3 CoS to Extend Functionality



- Layer 3 provides rich functionality and granular controls
- MAC provides speed and simplicity
- Enables low delay/jitter for voice and video packets

SRP Overview

- **SRP fairness algorithm**
  - **Distributed algorithm**
  - **Propagates and uses MAC usage info**
  - **Source and forward rate controls**
  - **Rapid adaptation and convergence**



SRP Overview

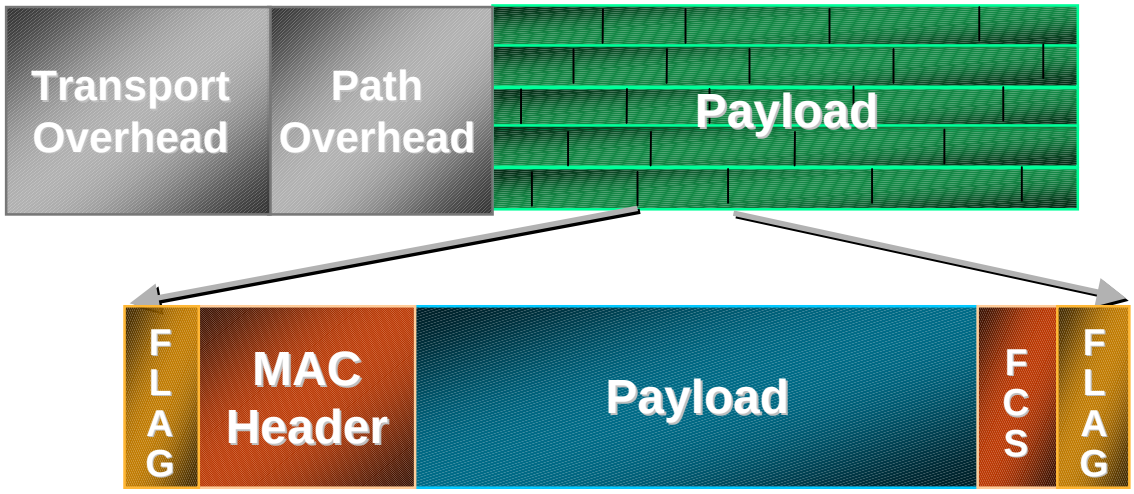
- **Scalable: Bit-rate; Circumference of ring; Up to 128 nodes**
- **Intelligent Protection Switching (IPS)**

  Survivability in the event of single fiber / node failure, or signal degradation
- **Media independent protocol**

  Initial implementation uses SONET/SDH framing

SRP Packet

- **SRP is a media independent MAC layer protocol**
- **The initial implementations utilizes Byte Synchronous HDLC within SONET/SDH framing (OC-12c, OC-48c, OC-192c)**
- **Allows transport via: Dark Fiber; SONET/SDH; WDM**



Comparison with DQDB

- **No segmentation and reassembly**
  - **complete packets stored and forwarded**
- **Distributed fairness without master nodes**
- **Protection switching without master**
- **High priority traffic for delay sensitive applications**
  - **No support for isochronous traffic**

Comparison with FDDI

- **Greater than 2x bandwidth improvement**
  - **both rings carry traffic**
  - **Destination stripping allows spatial reuse**
- **No token to pass**
- **FDDI-2 supported isochronous traffic & master node**
  - **not generally implemented**

Summary

- **Scalable packet ring technology**

  Bit-rate; Number of Nodes; Ring Circumference

- **High bandwidth efficiency**
- **Cost effectiveness**
- **Distributed fault tolerance**
- **LAN, MAN and WAN applications**