

**RBR (?P1796?)
Meeting/Conf call
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Current status

- **Study group authorized by MSC January, 2004**
- **PAR submitted to IEEE by MSC April, 2004**
- **Scope:**
 - Resilient backplane ring (RBR) is a backplane interconnect based on the dual-ring resilient topology of resilient packet ring (RPR) and the 802 MAC addressing structure. RBR includes features appropriate for the low-latency backplane environment: destination-based flow control, low-power short-haul PHY, backplane-to-backplane links, transport of IEEE-1394 isochronous data, and support of IEEE-1596 memory-update operations.
- **Purpose:**
 - The purpose of this project is to leverage the benefits of network-compatible resilient interconnects within the low-latency backplane environment.

RBR motivation

- **Merged backplanes, for low \$\$**
 - **computer & network services**
 - **point-to-point connectivity**
- **RPR topology is “native” point-to-point, but**
 - **optimized for metro applications**
- **IEEE 1394/1596 have backplane services, but**
 - **network addressing model desired**
 - **refinements from lessons of the past**

Historical overview

- **Resilient backplane ring (RPR) P802.17**
 - Full-duplex ring topology
 - Class of service
- **Scalable coherent interface (SCI) IEEE Std 1596**
 - Memory mapped transactions
 - Destination-based flow control
- **High-speed serial bus (IEEE Std 1394)**
 - Clock synchronization
 - Isochronous traffic
 - Admission control (1394.1)

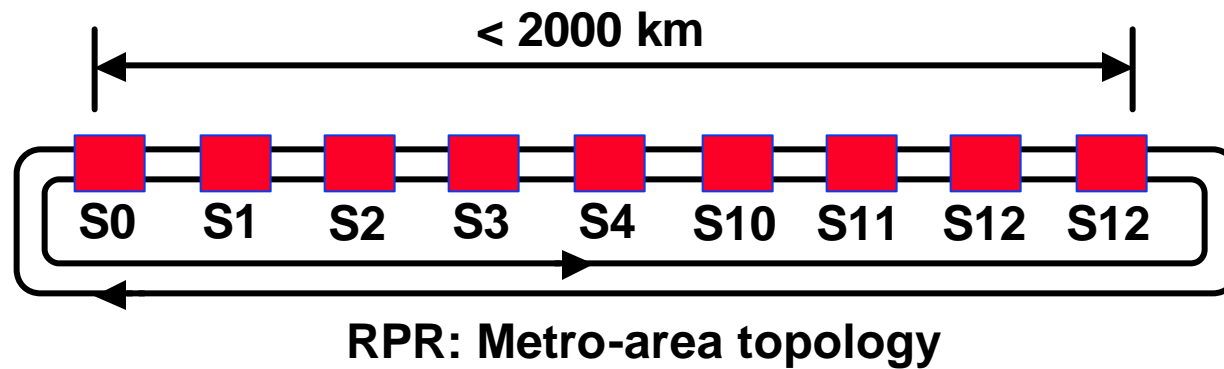
Other related technologies

- Infiniband
- HyperTransport
- PCI-express
- Rapid I/O
- Others?
 - Fiber-channel, serial ATA, serial SCSI, FDDI

RPR precedents

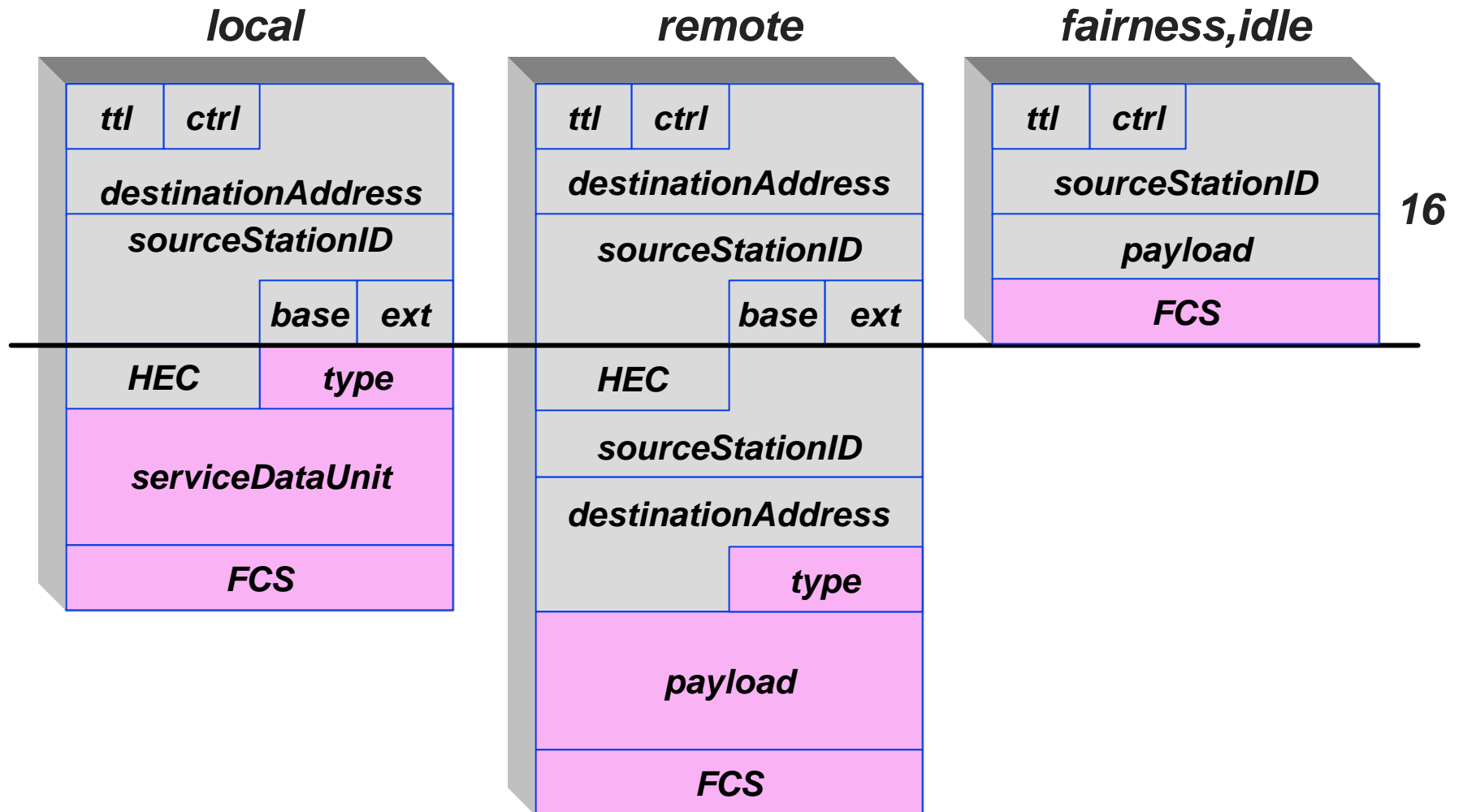
- **Point-to-point, because**
 - **Fiber rings are dominant in the MAN**
 - **Destination stripping for spatial reuse**
- **Resilient to link faults**
- **Service classes**
 - **ClassA: TDM like services**
 - **ClassB: prioritized delivery**
 - **ClassC: weighted fairness**
- **Some congestion management**

RPR topologies

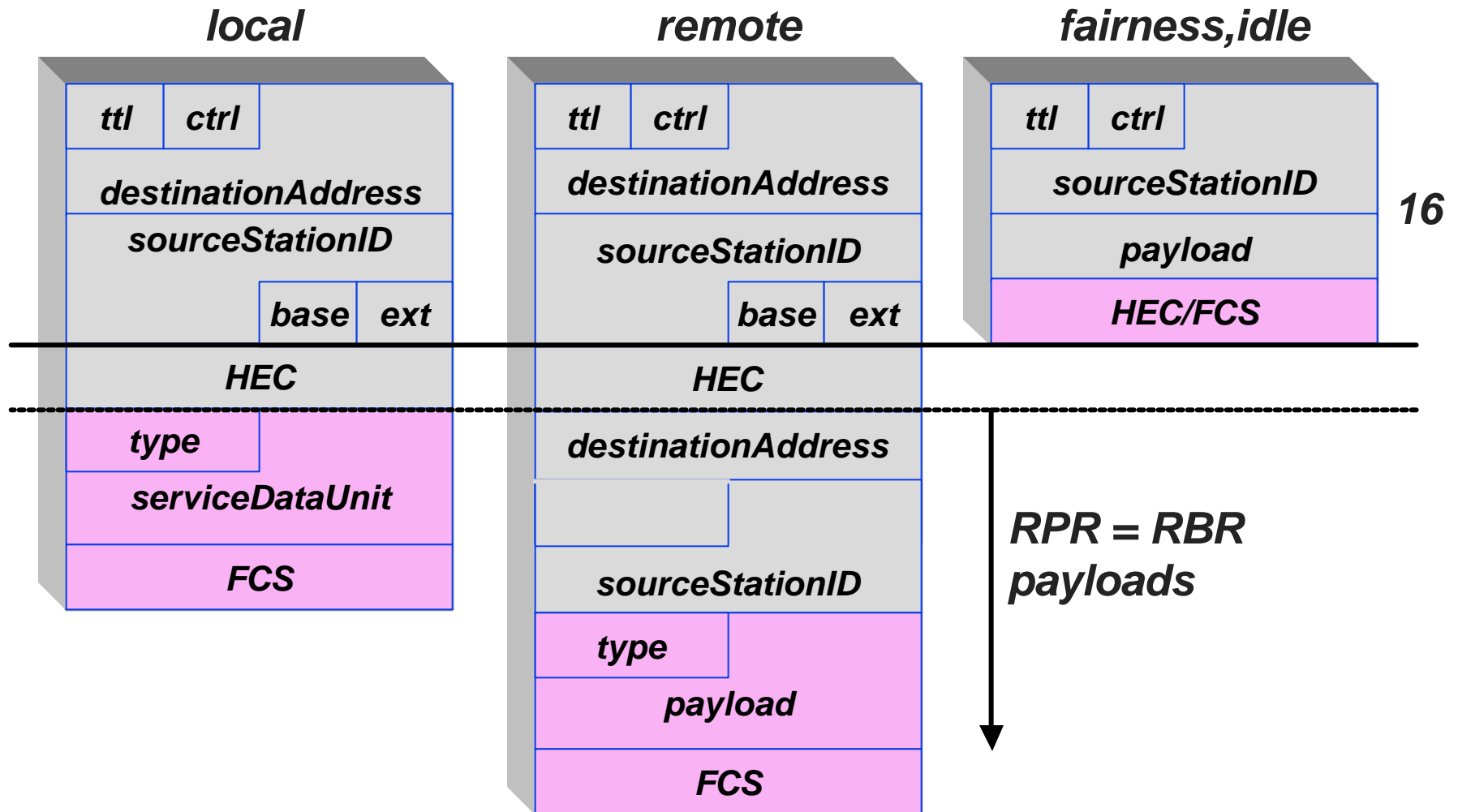


SONET environment applications
Duplex counter-rotating rings with spatial reuse
IEEE 802 frames, with ring-routing supplements
Several product-in-field constraints

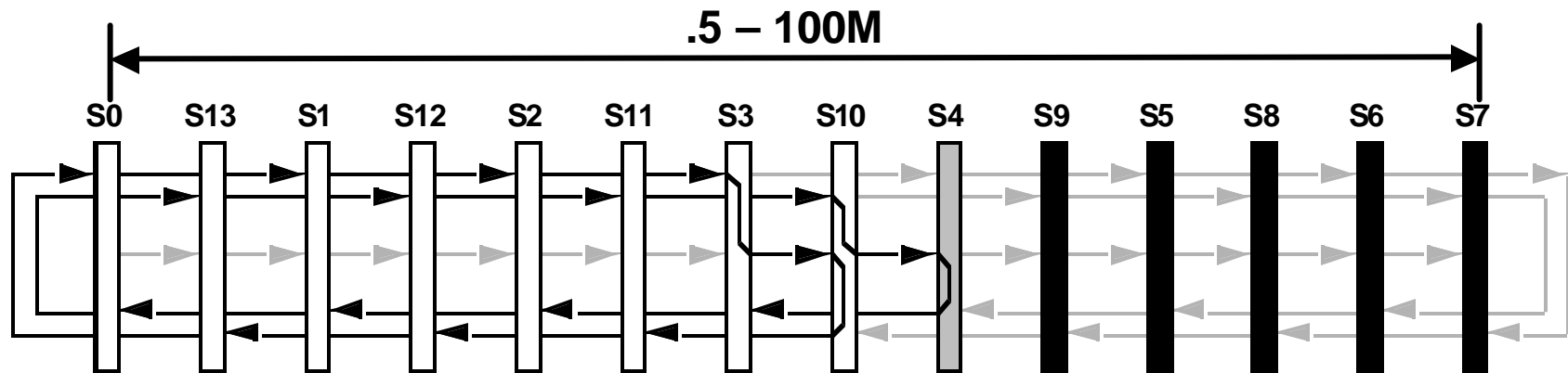
RPR format summary



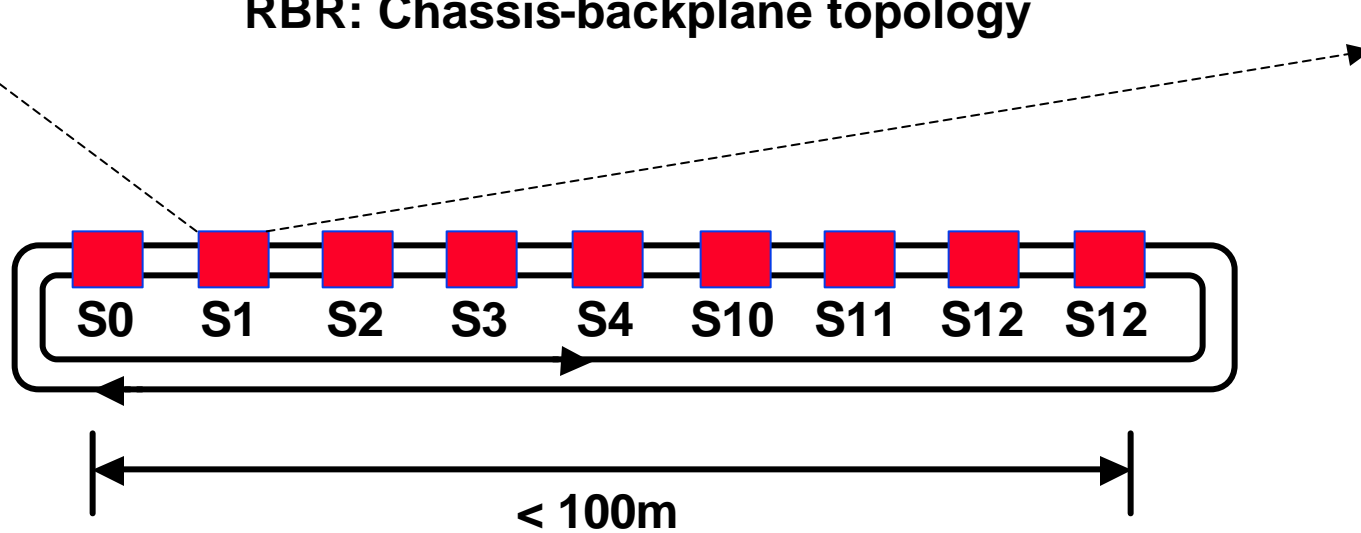
RBR format summary



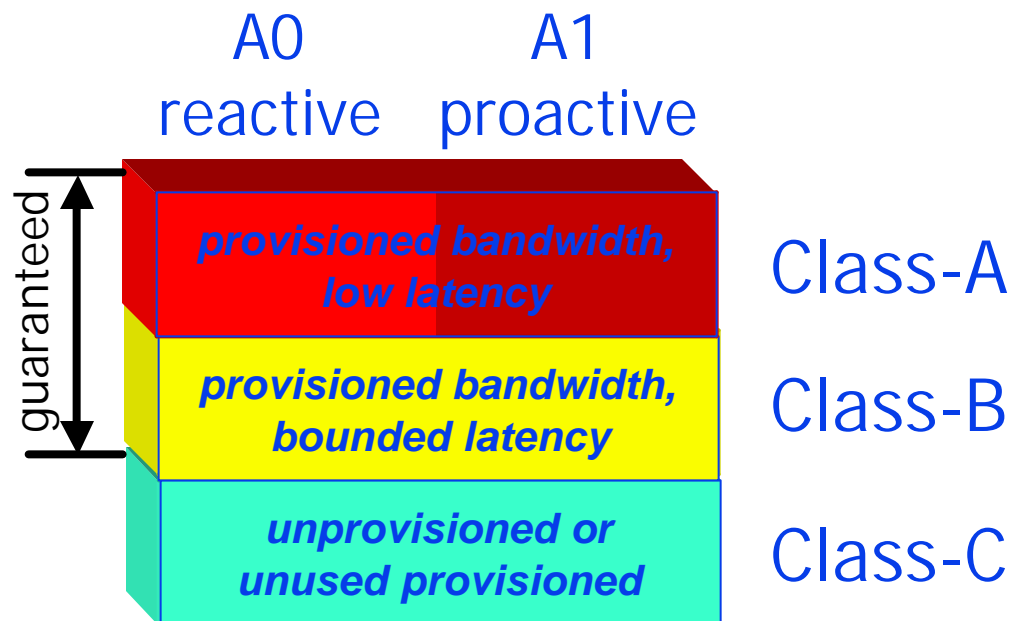
RBR topologies



RBR: Chassis-backplane topology



Arbitration classes



1394 Serial bus precedents

- **Isochronous has priority.**
- **Nodes allocate isochronous bandwidth**
 - **local: shared register**
 - **remote: path setup messages**
- **Isochronous BW is limited to one's allocation**
 - **transmissions are once-per-125ms**
 - **bandwidth includes header overhead**

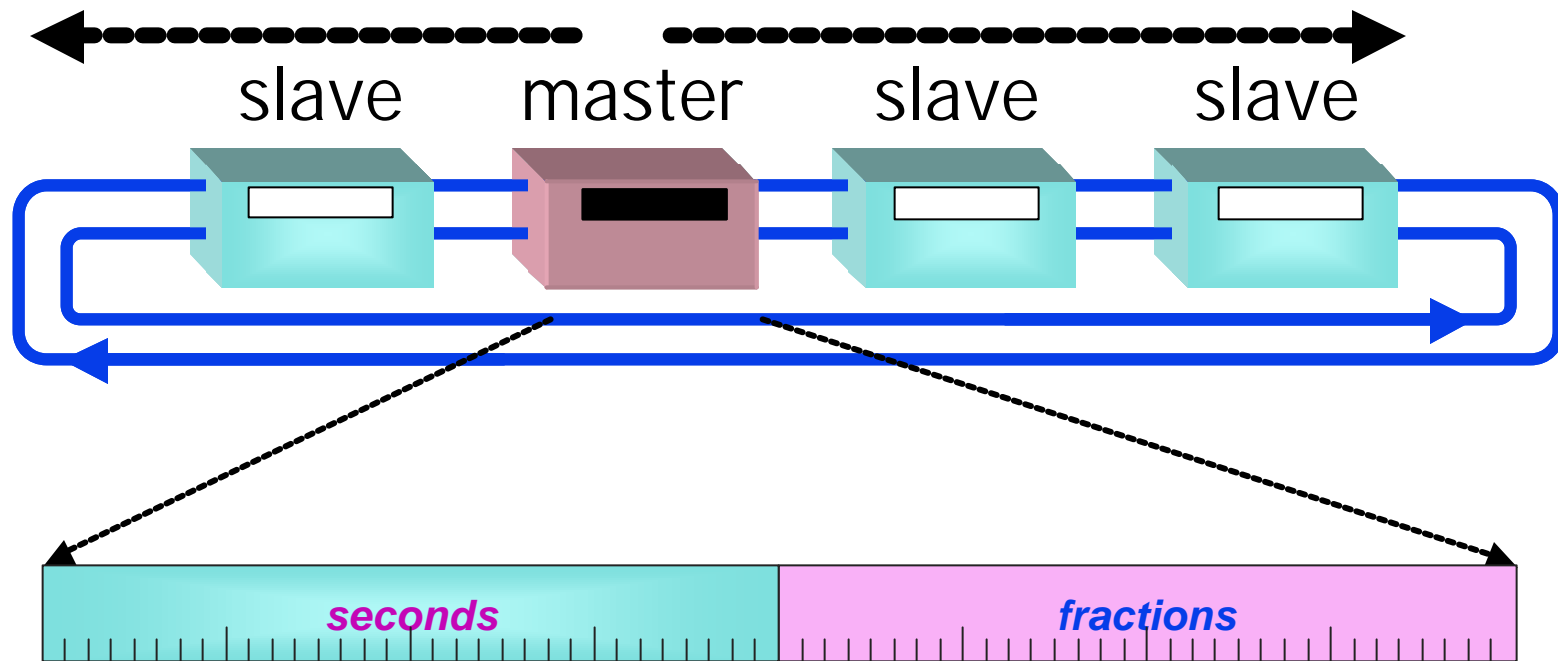
1596 SCI precedents

- **Hardwired transactions**
 - **primitives: read, write, swap**
 - **request/response deadlock concerns**
 - **coherence: directory based is feasible**
- **Congestion management**
 - **busy status, with local retries**
 - **fairness is the difficult issue**

RBR distinctions

- **WG development process**
 - **Straw men proposals (more than slideware)**
- **RBR is within smaller “boxes”**
 - **Reaction times are much smaller**
 - **Destination-congestion: “retry” becomes practical**
 - **Low-powered transceivers are a must**
- **RBR plug-and-play vs RPR single-vendor acquisitions**
 - **Elimination of most configurable “knobs”**
 - **Negotiated real-time bandwidths**
 - **Specified time-of-day synchronization**

Time-of-day synchronization (not bit-clock synchronization)



RBR (an RPR derivative)

- Leveraged RPR values
 - Ethernet frames with true QOS delivery
 - Ring efficiency and resiliency
- RPR revisions, as required
 - Real bandwidth guarantees (ala 1394-firewire)
 - Less options: rate shapers, fairness, CRCs
 - Less obscurity: scattered counters and shapers
- RPR extensions, as required
 - Destination-asserted flow control
 - Hard-coded memory-access commands
 - Accurate time-of-day synchronization (w/o GPS)
 - Distinct backplane PHYs (leveraged from 802?)