# Introduction to Resilient Packet Rings

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# History

- March/00: RPR Tutorial and call for interest
- May & July: Vendors and Users present
- August: Agreed on PAR & 5 Criteria and Understanding standards process;
- October: Submit PAR and 5 Criteria to IEEE SEC
- November: Won Support from other WGs and unanimous approval by IEEE to form 802.17 working group
- January/01 1st WG preliminary meeting, straw man timeline
- March Agree upon goals, objectives, timeline and election of officers

# Information

- Information: http://grouper.ieee.org/groups/802/rprsg
- Alliance formed: http://www.rpralliance.org
- Email Reflector: majordomo@ieee.org
  - "subscribe stds-802-rprsg *your_email*"
- IETF Working group: IPoRPR; Email Reflector: iporpr-request@cisco.com
  - "subscribe iporpr"

# RPR features

- Variable length Packet switched multi-node rings
  - Nodes on Ring have 802 Address
  - Header has 802 type DA and SA
  - Destination strips unicast packets (Spatial Reuse)
  - Drop and continue for broadcast and multicast
  - Source node strips broadcast packets
  - Time-To-Live field to prevent packets circulating forever.
  - Class of Service indication in header to support multiple traffic priorities on ring

# RPR Features (cont'd)

- Dual Counter Rotating rings
  - Nodes have more than one choice to reach another node
  - Both rings carry working traffic
  - No circuit based reserved protection BW
- Master-less ring
  - Every Node can discover layer 2 topology independently – Plug and Play

# RPR Features (cont'd)

- Resiliency
  - Achieve sub 50 msec protection
  - Wrapped or source re-route
- Media independent: leverage use of Ethernet PHY or SONET PHY
- Distributed BW and congestion management control

# 5 Criteria

- Broad Market Potential
  - many companies working in this area
  - MAN market growing to $13B by 2004 (RHK)
- Compatibility with 802 Architecture
  - RPRSG members researched requirements and determined no impediments exist (802.1D/f/Q)

# 5 Criteria (cont)

- Distinct Identity
  - Met with WG members of 802.1 and 802.3
    - could the same job be done with Ethernet Switches and simple extensions to existing protocols?
  - Concern from 802.3 about confusion in the marketplace caused by re-use of Ethernet PHYs
    - Pledged not to say that RPR is a variant of Ethernet

# 5 Criteria (cont)

- Technical Feasibility
  - Several vendors have products on similar paradigm
- Economic Feasibility
  - Solutions shipping today based on cost-effective rationale

# Why is RPR needed?

- SONET does not cut it
  - good resiliency features but
  - static bandwidth allocations are inefficient for data packet transfer
  - higher cost solution
    - dedicated protection bandwidth is wasteful
    - extra equipment to purchase
    - provisioning of service (OAM) is “slow”

# Why are RPRs needed

- Ethernet does not cut it
  - spanning tree does not allow a ring topology
    - since the majority of fiber in metropolitan areas are in rings some packets must take the long path
    - spanning tree reconvergence is slow
      - rapid reconvergent spanning tree may improve situation
  - no bandwidth allocation for nodes on the ring
    - performance of the ring is dependant on design of the switch

# Bridging vs. Routing

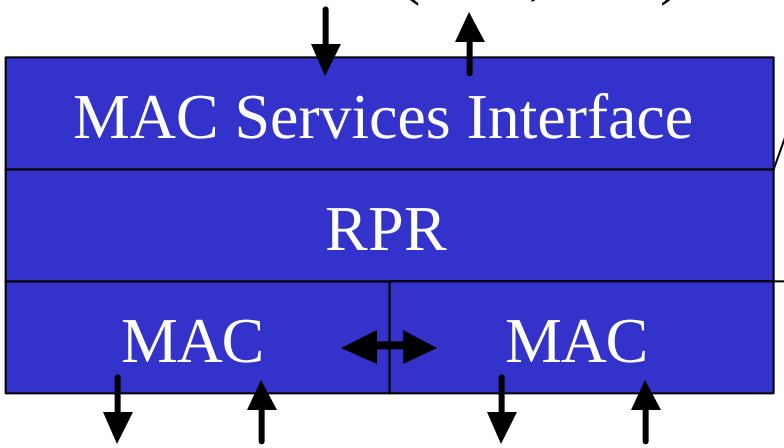
- IEEE 802 requires that any 802 standard implement 802.1D bridging and & 802.1Q VLANs
- Members of RPRSG expect to see both bridging and routing used in networks deploying the 802.17 standard
- A working relationship with IETF IPoPTR will provide input to the WG to insure that requirements for routed systems will be taken into account

# RPR MAC Model

SndPkt(pkt,COS,direction)

RcvPkt(pkt,COS,direction)

ProtectionState(cmd,state)




SndPkt(pkt)
RcvPkt(pkt)
LinkState(state)

SndPkt(pkt)
RcvPkt(pkt)
LinkState(state)

Determine packet direction
(addr, protection state)
Queue packet based on COS
Fairness Algorithm
Protection Mechanism
Topology Discovery

CRC Gen/Chk
Address Recognition /pkt fwd