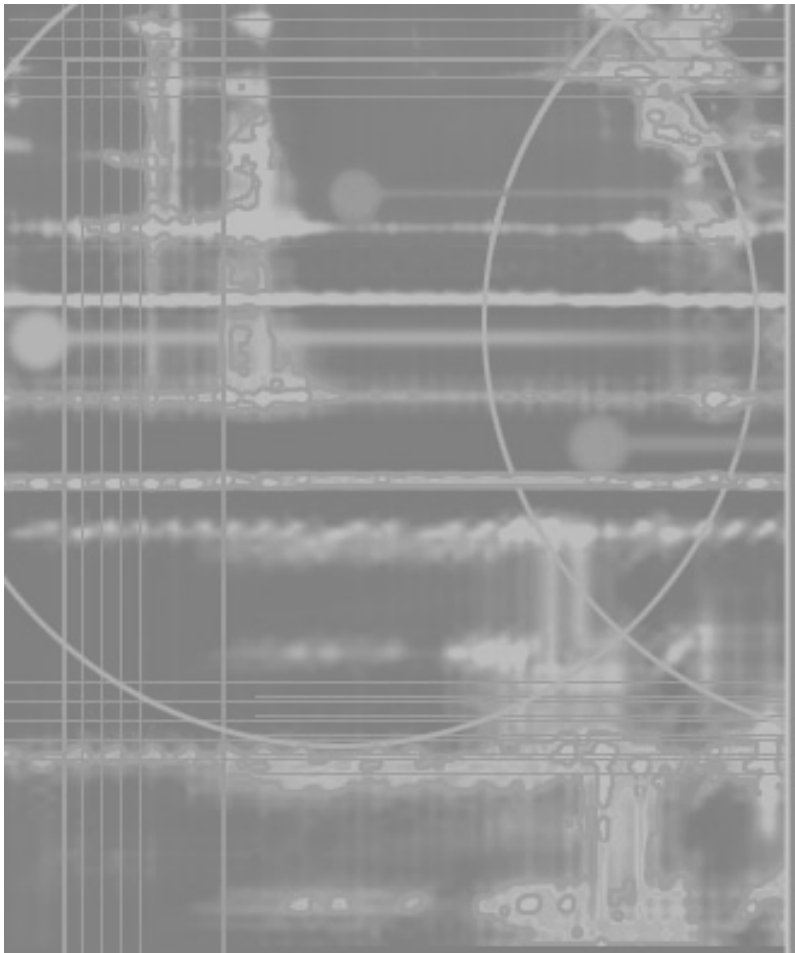


CYRAS

# Cyras RPR Overview and A Steering Protection Algorithm


***Jingsong Fu***

**jfu@cyras.com**


**March , 2001**

IEEE 802.17


# Outline

- Cyras RPR Overview
- Topology Discovery and L2 Protection
- Basic Frame Format

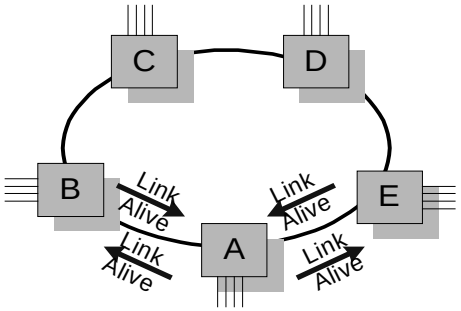
# RPR Overview (1)

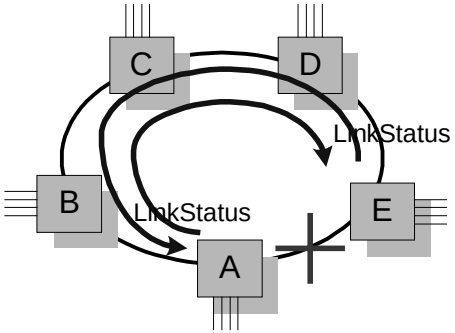
- RPR with SONET Phy
- Frame Delineation
  - A Shim layer between Phy and MAC
  - HDLC Vs. Simple Data Link (SDL) used by GFP
- Native L2/L3 packet over RPR
  - Hybrid frame aggregation, ethernet, ATM, IP, etc
- L2 Protection in < 50 millisecond
- Topology Discovery and Loop Prevention

# RPR Overview (2)

- Integration with MPLS to support SLA
  - Integration of LSP protection tunnels with L2 protection
  - Explicit route support by MAC layer (using L2 topology Information)
- Expandable Frame Format
  - supporting MPLS/LSP/Label
  - Easy to map ring QoS to support Integrated Service and DiffServ
- 802.1D/1Q/1p integration

# Topology Discovery




- Topology Discovery by Link State Algorithm
  - Control Messages
    - Link Alive Message
      - Periodically between Neighbor Nodes
      - Parameters: TTL=1, NodeMacAddress
    - Link Status Message
      - trigged by link status change and Broadcast to all nodes
      - Parameters: TTL=MaxNodeCount, Link ID <NodeMacAddress, NeighborMacAddress>, Link Status, etc.
  - Topology Calculation
    - Dijkstra

# L2 Protection

- Protection Switch
  - When – Topology is changed
  - Unicast frame is forwarded on *Shortest Path* with TTL= MaxRingNodeCount or MaxTtlValue(255)
  - Multicast frame is forwarded on both sides of the ring with TTL=E and TTL=W, E+W=MaxNodeCount
- Loop Prevention
  - TTL=0 or SourceMacAddress=NodeMacAddress
  - No need for frame wrapping or ring ID information

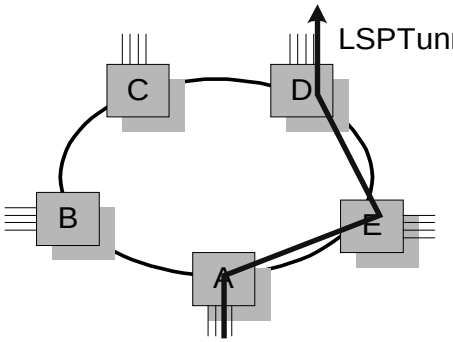
CYRAS

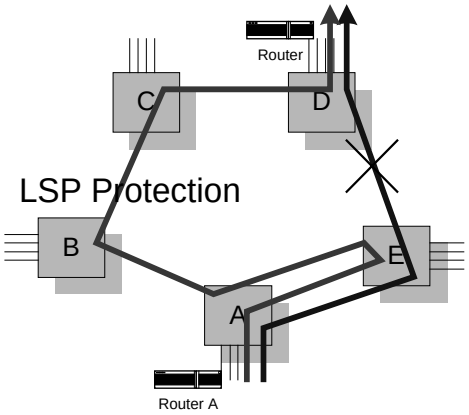
# Wrapping or Steering

- BLSR like
- More states for state machine
- Special cares on loop prevention
  - Wrapping
  - Ring ID for inner and outer ring
- No packet drop during PS
  - Added value during PS

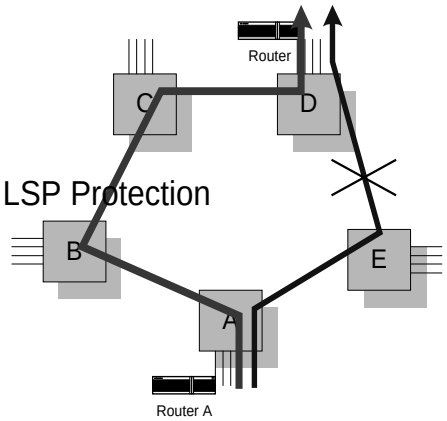
- UPSR like
- Easy to implement
- Simplified on Loop Prevention
- Easy to support LSP Protection Tunnel
- Essential for L2 protection
- Dropping packet < 50ms
- Have to switch within 50ms
  - Major challenge for ring size larger than 2000 kilometers (RTT is about 16 ms)

# LSP Protection Tunnel with L2 Protection



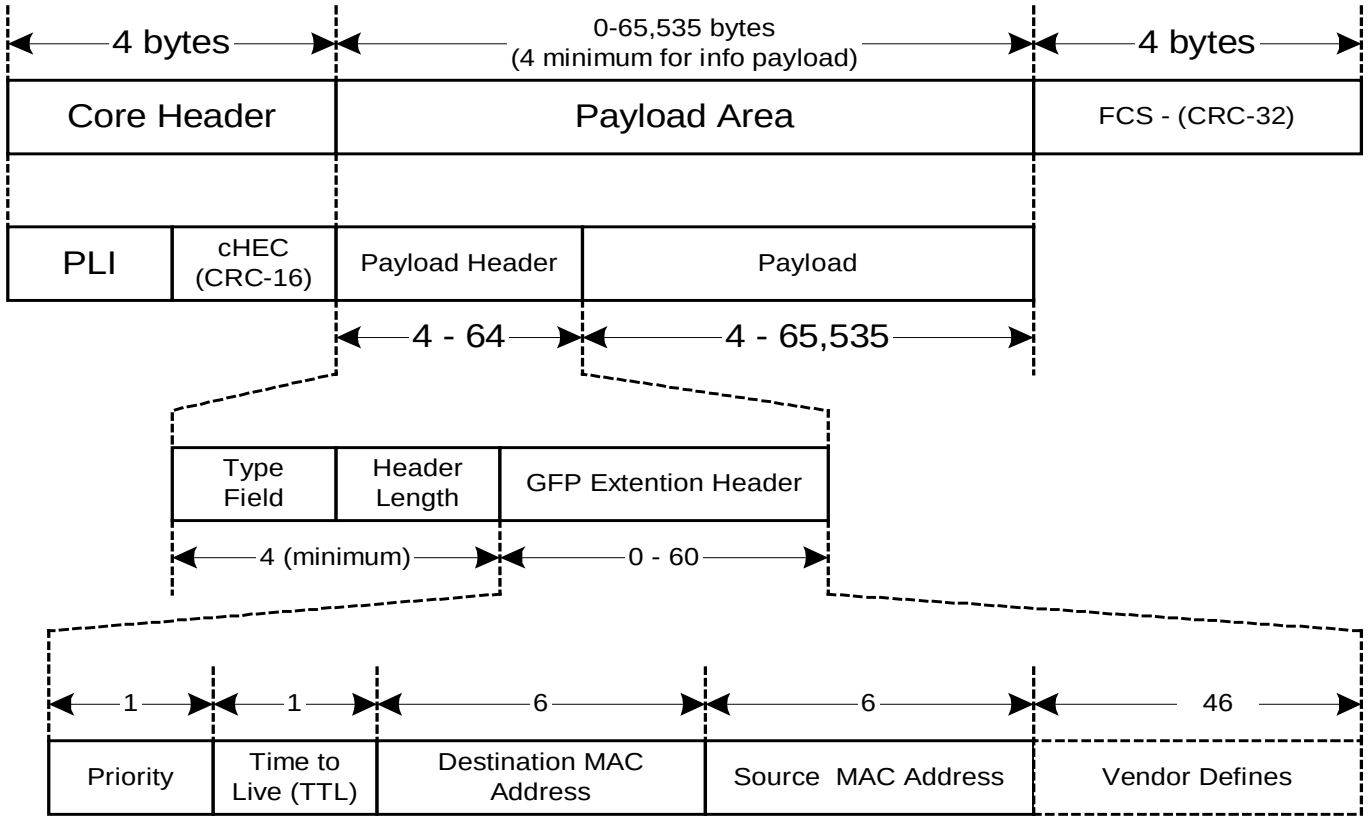

**LSP Protection by Wrapping**




**LSP Protection by Steering**

- LSP Tunnel A-E-D
- Wrapping Protection Tunnel A-E-A-B-C-D
- Steering Protection Tunnel A-B-C-D
- Steering is easy for bandwidth reservation
- Wrapping needs extra more bandwidth than steering

# Basic Frame Format




Based on T1X1 Generic Framing Procedure (GFP)