RPR Protection Proposal

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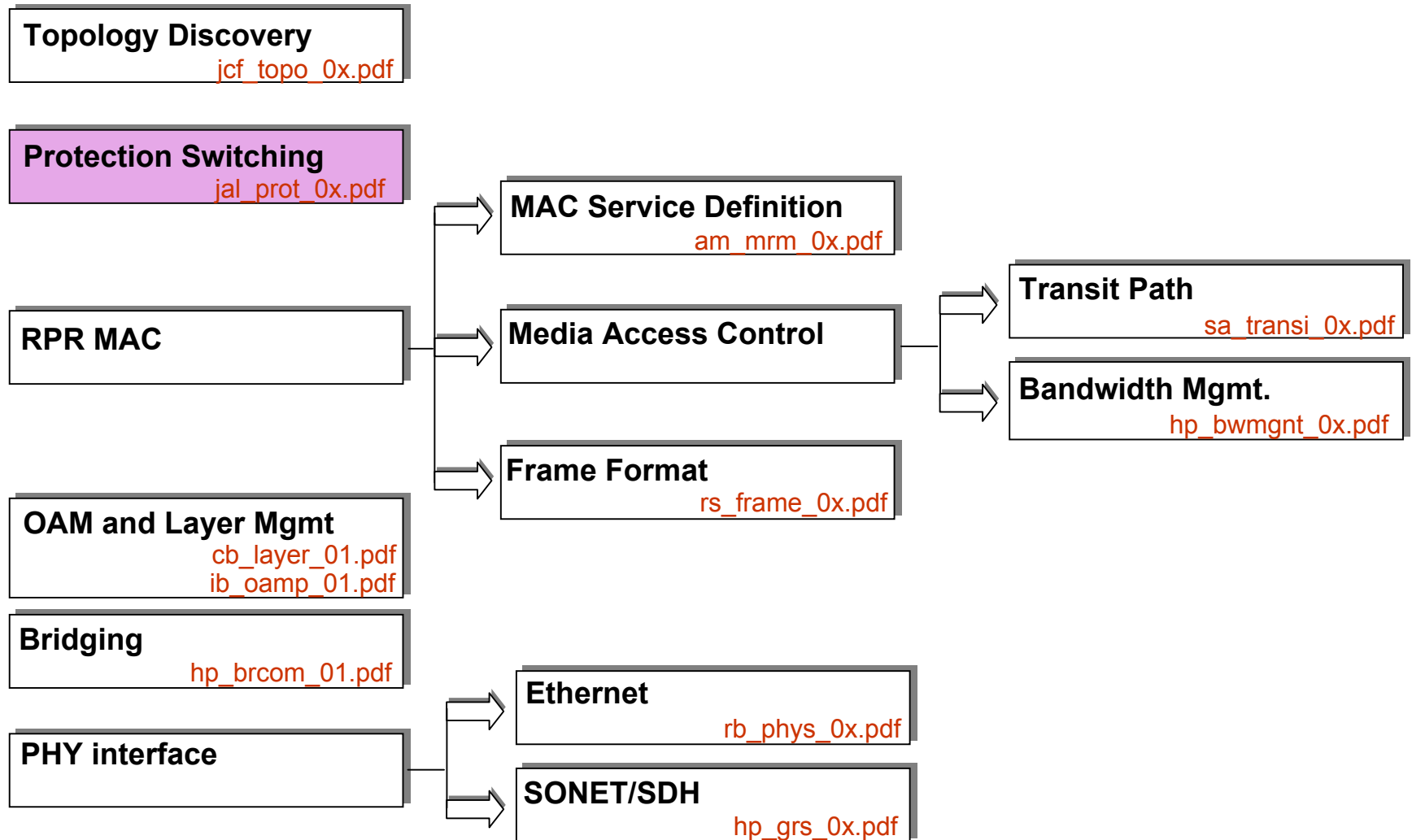
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Components of a complete RPR proposal

Topology Discovery
jcf_topo_0x.pdf

Protection Switching
jal_prot_0x.pdf

RPR MAC

MAC Service Definition
am_mrm_0x.pdf

Media Access Control

Transit Path
sa_transi_0x.pdf

Bandwidth Mgmt.
hp_bwmgnt_0x.pdf

Frame Format
rs_frame_0x.pdf

OAM and Layer Mgmt
cb_layer_01.pdf
ib_oamp_01.pdf

Bridging
hp_brcom_01.pdf

PHY interface

Ethernet
rb_phys_0x.pdf

SONET/SDH
hp_grs_0x.pdf

jal_prot_02

Goals

- Scalable from 1 to 100's of stations
- Quick dissemination of loss of connectivity information on the ring

- Tolerance of message loss
- Operation without any master station on the ring
- Operation independent of and in the absence of any management systems
- Operation with dynamic addition and removal of stations to/from the ring
- Minimal overhead

Overview

- Each station knows of a ring segment failure and steers ring traffic away from the failure within 50ms of the failure

- Ring protection is initiated by all stations that become directly aware of a failure via local detection or through broadcast announcement

jal_prot_02

Use Of Topology Image

- Each station uses its knowledge of the topology of the ring to know how and when to steer ring traffic away from a failure

Triggers

- Protection is triggered by reception of a Link_Status message indicating a downed link

- Link_Status messages are generated as a result of a local link failure or restoration as detected by
  - Physical Layer Triggers
    - SONET/SDH Triggers
    - Ethernet Triggers
  - Manual Triggers
  - Keep_Alive Triggers

Protection Hierarchy

- Protection hierarchy is used to handle multiple, concurrent events

    - FS, Force Switch - operator originated   (highest priority)

    - SF, Signal Fail (e.g LOS, LOF, EXBER, LOK (Loss Of Keep_Alive)) - automatically originated

    - SD, Signal Degrade - automatically originated

    - MS, Manual Switch - operator originated

    - WTR, Wait Time To Restore - automatically originated

   - NR, No Request present   (lowest priority)

Keep_Alive Control Message

- Provides a means of detecting link failure or station failure

- No data field

- Broadcast on each ringlet with TTL = 1

  – Removed by neighbor

jal_prot_02
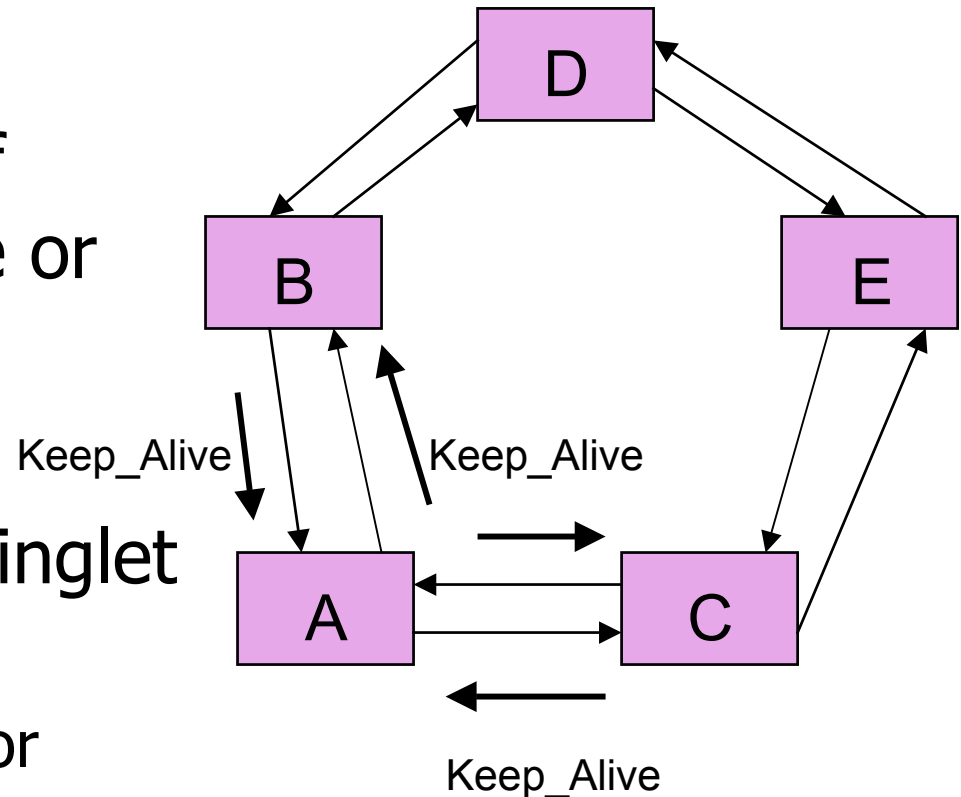
Link_Status Control Message

- Reports changes in neighbor link status
- Key fields
  - Ringlet ID
  - Neighbor link status
- Broadcast on each ringlet with TTL = Max_Ring_Size
  - Removed by source

Link_Status
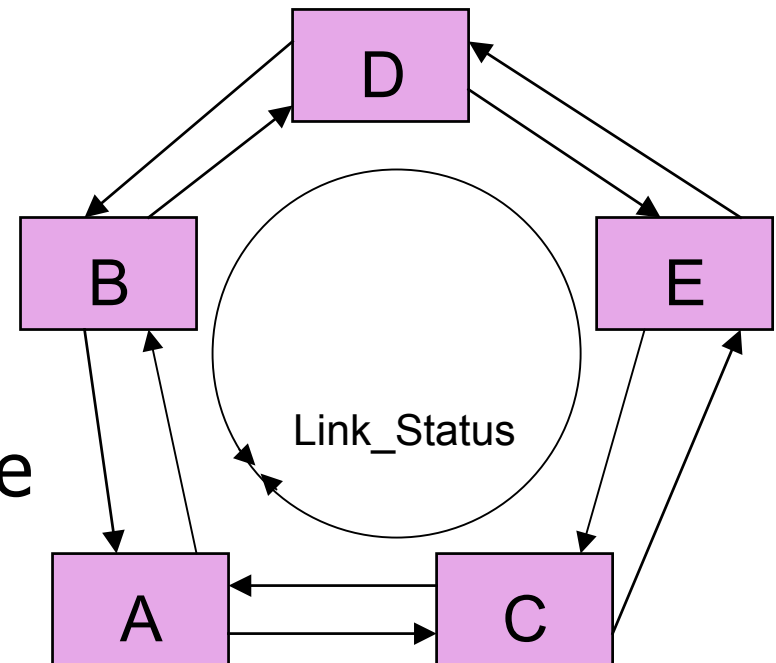
Unicast Protection

- If sourcing station can reach intended destination through normal route, then use normal route

- Otherwise, if packet is protected and it can reach intended destination through protection route, then use protection route

Multicast Protection

- If sourcing station can reach intended destination through normal route, then use normal route

- Else, if packet is protected and it can reach intended destination through protection route, then use protection route

- Otherwise, use both routes (2 counter-rotating ringlets)

- TTL is set to the distance to the failed link on each ringlet