

# Objectives and Technology Choices

**IEEE 802.17 Resilient Packet Ring Working Group**

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# Agenda

- RPR Objectives & Scope
- Highlights of Appian's proposal
- Appian's Opinion on issues
  - Fairness and Ring access
  - Store & Forward and Cut-through
  - Protection switching
  - OAM&P

## Objectives and Scope

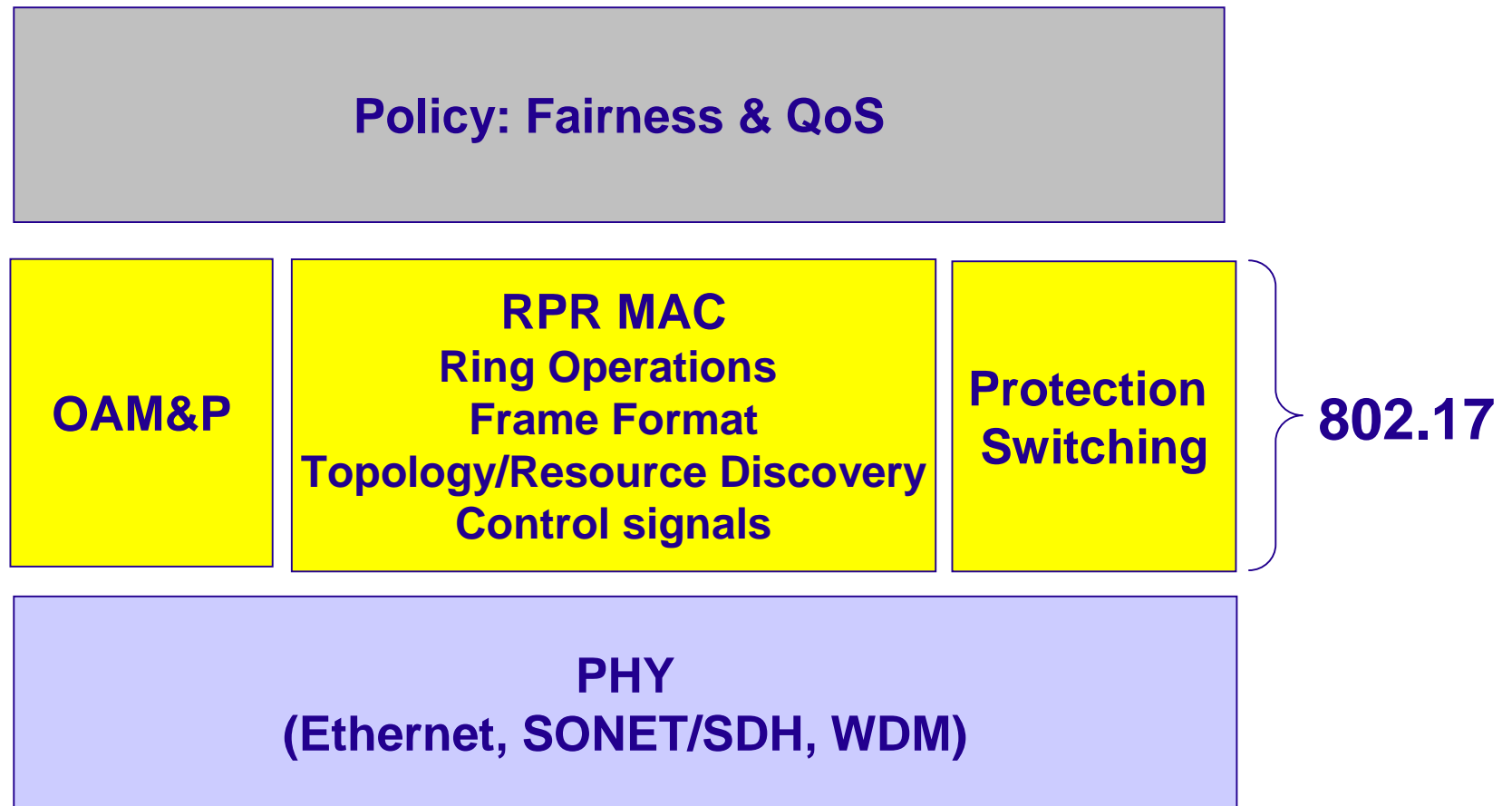
Address Service providers requirements for packet optimized resilient data networks

- Sub 50 msec protection switching
- Automatic topology discovery
- Spatial reuse of bandwidth
- Traffic Classification (Class of Service support)
- Various physical layers (Gigabit Ethernet, 10 Gig E, SONET/SDH, DWDM)
- Adhere to 802.1q standard
- Ease of configuration (Plug and Play)
- Interoperability
- OAM&P

## Highlights about Appian's RPR proposal

1. Keep it simple
2. Provide most flexibility in implementation by being independent of the buffering, scheduling, QOS and switching architectures (Vendors can differentiate in this space)
3. Use existing proposals like Diffserv and MPLS for packet classification and service differentiation
4. Leverage existing Ethernet and SONET framers
5. Deliver predictable performance (Packet loss, latency, jitter, sub 50 ms protection switching times)

# Simplify MAC



# Fairness & Ring Access

Keep fairness and Ring Access protocol out of the MAC;

One algorithm for all problems is not a good idea ----- **Keep it simple**

- Different services require different algorithms
  - Queuing and Scheduling
  - Token bucket schemes
  - Inter-node messages which implicitly/explicitly include rights to transmit packets
- Different algorithms are suited for different traffic characteristics
  - Metro
  - Access
- Different classification models need different fairness models
  - Per Customer
  - Per Service
  - Per Flow
- Different PHY choices might need different algorithms
  - 1GE, 10GE, SONET/SDH, DWDM

## Fairness & Ring Access - Example

- Different for Metro Core and Access rings
- In Metro Core, over 80% of the traffic is intra-ring
  - Traffic Changes are fairly minimal
  - Fairness Messaging algorithms are possible
- In access, almost 100% of the traffic is destined to one POP router
  - Traffic is very bursty
  - Fairness Messaging algorithms are deemed un-useful
  - System needs to react faster than the changes in traffic patterns which it is trying to control

# Store & Forward and Cut-Through

- Both proposals have merits and should be included
- Incoming packets are examined for “Class of Service” field and the MAC decides if it is a Cut-through or a Store & Forward type traffic
- Cut-through traffic uses a bypass path between the MACs and transits the node
- Other traffic is handled by the system and “Node-level” or “ring-level” fairness and scheduling algorithms are applied



# Fast Protection Switching

- Wrap if you CAN; steer if you MUST ----- Keep it simple
- Requirement from Service Providers
  - Priority 1 - Sub 50 msec restoration
  - Priority 2 - Minimize packet loss
  - Priority 3 - Minimize packet mis-ordering
- During single and dual fiber cuts, wrapping has lower data loss than steering (Auroranetics simulation)
- Wrapping is a proven concept in the SONET world (SONET-class)
  - Latency is a non issue in access rings which are typically <15 nodes and ~30 mile radius
  - Re-ordering can be minimized (or even avoided) by proper system implementation

## Why OAM&P is required

- Service Providers need OAM&P
- Inclusion of OAM&P reduces the operational expenses of running a network, especially as the network scales
- It is needed for customer support, trouble tracking, performance evaluation, configuration management, technical support
- It is tempting to equate OAM&P with “network management”, but it involves more than that
- T-carrier networks suffered because there were no standards and not enough support for OAM&P functions

## Components of OAM&P

- One of the most useful features of SONET is the presence of built-in standards for OAM&P
- The goal is not to duplicate all SONET OAM&P functionality, but only what is needed, for example:
  - Provisioning and Maintenance
  - BER Monitoring
  - Performance and Statistics Monitoring
  - Alarms
  - Trace - Connection verification
  - Loopbacks
- Include the above functionality in 802.17

# Questions?