IEEE 802.17 RPR Working Group Meeting Minutes

Interim Session, May 14 - 18, 2001

Radisson Hotel Universal Orlando, Orlando, FL

Reporter: B.J. Lee and Mannix O'Conner

Note: Attendance list is attached as an Appendix.
Note: All the presentations and the list of Motions on Objectives are available on the RPRWG Web:
http://www.ieee802.org/rprsg/public/presentations/may2001/index.html

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May 14, Monday

8:00am: 802.17 Administrative matters, Mike Takefman
8:10am: Agenda Scrub, Mike Takefman

> **Motion: 2001-05-14-01 (8:10am)**
>
> Approve the agenda as distributed via the Web.
>
> (M) Bob Love
> (S) Khaled Amer
>
> Approved by Acclamation.

8:15am: Approval of Last Meeting Minutes, Mike Takefman

- Motion numbering was imprecise and should be reviewed for consistency
- Harmen's presentation was misquoted

As a result, approval of the corrected minutes is postponed to later in the meeting.

8:20am: Introductions and Quorum Count, Mike Takefman
8:30am: Goals of the Meeting, Mike Takefman

8:35am: **Presentation - Performance Ad Hoc Summary Report, Khaled Amer, Amernet**

- Objectives and progress of the performance Ad Hoc group
- Charter and election of chair will be finalized this week
- Performance meetings on Tuesday & Weds, 7:00 – 10:00pm

8:45am: **Presentation - Bell Canada RPR Requirements, Paul Lebel, Bell Nexxia**

- Broadband and IP services now, GbE and IP-VPN services emerging
- Today's TLS (Transparent LAN Service)
  - . 10/100 Mbps customer access with fiber extensions and T1 and DSL
  - . pt2pt or multipoint, VLAN, QoS (i.e., UBR+/VBR+)
  - . More than 200 customers
  - . More than 3500 fiber accesses for 10/100 Mbps service
  - . 300 LAN switches deployed in central offices throughout Canada
- Drivers and requirements for GbE Ethernet MAN
  - . Need to introduce a new hierarchy for higher level aggregation
  - . Insufficient capacity of ATM

. Ethernet frames becoming the standard carriage vehicle for IP
. GbE connection directly to customers

- Gigabit Ethernet MAN using RPR
. Multiple rings can be expected in a large metro area
. Other services will use this infrastructure: IP-VPN, Internet access, Wholesale GbE via linkage to other networks

- RPR Requirements:

. Support for different service types and their attributes
L2 TLS
L3 IP-VPN, Internet access
. DWDM optics, scalable to multi-gigabit rates
. Support multiple customers, and customer separation
. Support SLAs
. QoS/CoS in tune with edge device capabilities
. Control over jitter and latency, since customer sites can be located via multiple rings
. Multicast, and lossless of the ring traffic
. Fairness within a ring, across multiple rings, scalable from Man to WAN
. OAM capability
. per customer statistics
. carrier grade: in-service software upgrade

- Carrier-grade Figabit Ethernet networks can be built using RPR
- Interworking with other networks is key for an attractive solution

Q: What do you mean by fairness across rings?
A: One customer may have large bandwidth on one network and small bandwidth on another and the system should be able to control this. Customers buy bandwidth to get into the cloud but we need capacity management so that the customer gets what they have contracted for without overloading the ring. Backpressure may be needed or another mechanism. Not sure about the exact definition of fairness yet.

Q: What is your transport and how do you maintain fairness.
A: We use Nortel IPT currently. A customer buys bandwidth going into the ring and we engineer the core to fit the sum of the bandwidth going to the point-to-point pairs between data centers. The bandwidth in the core is oversubscribed.

Q: What is the geographical definition of MAN and WAN?
A: Maybe 50km with 9 CO would be a standard Metro topology. The MAN is a city. The WAN would go over 200km or so.

Q: How do you tariff the bandwidth and do you do CES?
A: No, CES is via ATM infrastructure. With the TLS service today, there is a fixed monthly rate for the bandwidth, and port charges if you go across the ATM network. If it stays within MAN, it doesn't matter how many sites it goes to in the metro.

Q: In what domain was the service a success and what is your goal for the service you want to provide to the customer? Do you want LANs or Dynamically Configured Leased Lines?
A: It is successful because customers want it. There are operational and provisioning issues. A full mesh of PVCs is not ideal to build. Customers will buy point to point and point to multipoint VLANs. We have seen all situations.

Q: Is there a conflict between QoS and Loss-less service? QoS requires packet losses for certain traffic types.
A: QoS relates to access to the ring. Loss-less refers to on the ring.

Q: How much over-subscription is there in the network? Without over-subscription, what is the use of fairness?
A: You take the sum of the bandwidth subscribed and add it up. So there is really no over-subscription for now. Our ATM has over-subscription.

9:10am: **Presentation - Global Crossing RPR Requirements, Tony Lau**

- Data services in 50+ major metro cities worldwide
- Handles both legacy and data, including high margin value added services
- Ring based Metro network architecture
    - Max ring size of ~100km
    - Max per hop distance of up to 40km
    - Number of nodes < 15
- SONET for TDM, WDM for lambda services, RPR for Ethernet based services
- Metro networks remain at layer 1 and 2 for simplicity.
- Global Ethernet Services
    . High speed interconnects for services providers
    . TLS: point to point virtual private line
    . Multi point VLAN service: 802.1Q VLAN
- An SLA defines service reliability, responsiveness, and performance.
    . A customer may have more than one service, each with its own SLA
    . Performance SLA includes availability, bandwidth (CIR), delay, jitter (< 1ms)
        . delay: tight bound (<10ms in a RPR), loose, none
- Majority of data services are private lines or virtual circuit based.
- Global Crossing would like to offer customer traffic separation and security using FR PVC model, as opposed to the IP VPN model with no logical flow separation.
- RPR needs to offer robust FCAP features for success
- Enforcing SLA: a philosophy is not to admit traffic not conforming to traffic contract
- Implications for RPR
    . High service availability
        . per SLA protection, source steering
    . Bound latency (<10ms) and jitter (<1ms) within a ring
    . QoS per service per customer
        . Need also some sort of tagging to delineate individual customer
    . Guaranteed bandwidth: CIR like guarantee

Q: You want to stay at layer 2 and still have QoS. How many classes do you expect on the ring?
A: We would like to offer CBR like services. It is more than delay and jitter control. It is similar to ATM traffic classes.

Q: Per flow QoS translates to how many # of classes?
A: Not sure, but we are thinking into such directions.

Q: How do you measure per customer SLA?
A: For our packet services today we send out a packet as a statistical proxy for service quality, i.e., probe packet per customer's VC for delay and jitter SLA. We would like to have finer PM granularity.

Q: How much over-subscription do you tolerate on the network, and do you do it at the edge?
A: Most carriers won't tell you. For FR you may see 4:1 to 20:1 overbooking. Yes we do it at the edge.

Q: How many logical customers do you support on one port and how do you plan on tagging on them?
A: We prefer a standard tag. On the WAN we would likely map to MPLS. In the VLAN we may not control the number but we need some for operational objectives.

Q: Do you plan to implement RPR over SONET or Ethernet PHY?
A: Based on the timeline we will use the LAN PHY first. As a carrier we would prefer to see SONET-like capabilities as the WAN PHY becomes available.

Q: You implied that 50ms is for Platinum customers. Will you charge for it?
A: We charge for it in SONET today. We plan to charge for it in Ethernet and hope that it is lower cost for the service guarantee.

9:50am: **Presentation - RPR Usage: A Carriers' carrier perspective, Steve Plote, Looking Glass Networks**

- Metro ring sizes of 11km – 105km, with an average of 35km
- Mostly 2 node pt2pt rings for now, multi node rings emerging
- RPR has to become as cheap as Ethernet to show an advantage, if the main benefit of RPR is to be fiber gain.
- Focus on 10Gbe and above.
- Standardize on IEEE 802.1 MAC. Keep RPR implementations on layers above.

Q: Can you explain how your TDM architecture is defined.
A: We will do GbE only verses TDM or RPR.

Q: How do you calculate the fiber cost? This is important in your assumption.
A: It is not the lease cost. The cost includes dig, trenches, etc. We are carrier of carriers who owns fibers.

Q: Where are the core switches and what is your overall reliability?
A: The core switch is a single point of failure therefore we have a 4 9's reliability.

Q: Have you looked at a model with dual fiber routes to two core sites?
A: That would require two data centers and we would not do that design because it doubles all our operational costs.

10:10am: Break

10:30am: **Presentation - RPR Requirements: A CLEC perspective, Dave Milliron, Evolution Networks**

- Topology - multiple subtending rings up to 4 layers, and dual attachments on different rings.
- Ring Speeds - large rings with 1, 2.5 to 10G with WDM support, and small rings with 100 to 155Mbps due to fiber construction cost
- Transport media – must have mixed media and capacity on the same ring for the lowest cost per km, i.e.,

        . new fiber construction: 25k – 500K (km)
        . dark fiber lease: 4.4K – 10K (1 pair, 1Km)
        . microwave 55k (OC-3, 6.5km)
        . free space lasers 75k (1G, 1km)
- Mixed speeds on the same ring
    . possible limit to min/max speed ratio
- Ring bandwidth
    . allocation resolution of 64Kbps
    . over subscription limit of 8:1
- CoS - need 4 to 6 classes
    . bw sync, bw async, dedicated + burstable, BE, 1+1 protected paths
- Legacy transport
    . T1, T3, OC-3 circuit emulation
    . timing: CPE served by T1s are slave timed, timing insertion
    . equal or better than delivery over SONET
- Protection based on class of service
    . hitless return to original path, 99.999% availability
- Hooks for traffic flow monitoring, service creation, provisioning flexibility, performance monitoring
- Interoperability
    . multiple vendors per ring
    . common class of service support
    . min feature set guarantees basic interoperability
- Minimize optional features that limit basic interoperability
- Maximize flexibility so that vendors can implement unique solutions and carriers can create services

Q: How do you "optimize for all class types?"
A: The term "optimize" may be too strong. You cannot optimize for everything.

Q: The next generation of SDH chips will have Forward Error Correction to improve BER. What do you propose for RPR?
A: If the next gen of SONET PMD chips have this, then RPR is done.

Q: What do you mean by "we cannot serve minority interests?"
A: We need to make a unified standard.

Q: With ATM you said there was high overhead. But VoIP on ATM didn't have too much overhead.

Q: You want to have less than 50ms restoration, and a quasi mesh topology. Would you sacrifice 50ms restoration to have more granular restoration?
A: It depends on a lot of factors.

10:50am: **Presentation - Entertainment Video over RPR, Luis A. Rovira, Scientific Atlanta**

- Projected VoD (Video on Demand) traffic pre hub is about 2.6G, with typical 3 hubs/ring due to AM fiber
- CATV systems characteristics
    . Similar to carriers in wanting more administrative control, needing traffic engineering for deterministic routing
    . Different from carrier in that
        know what the content is
        don't want to be just a pipe
        huge emphasis on costs (5G pipe at consumer prices)
    . in CATV systems, efficiency is very important

- CATV prefers:
    . MPLS, enabling MPEG virtual circuits
    . CR-LDP, simple, traffic engineering, administrative control
    . DiffServ
    . Resilience, not spoiled on 50ms, 100ms might be fine
    . One byte node address
- CATV does not like:
    . Long headers
    . Mis-ordered packets during normal operation – tolerable during protection or recovery
    . SONET "quantizing"
    . RED on MPEG streams
    . Low bandwidth rings

Q: How about the MPLS efficiency?
A: A concern for sure, Martini ID on Circuit over L2 may be a help.

Q: Alternative solution may be to install more cheap disk drives at hubs, in hierarchical caching?
A: Right, but considering the amount of disk space (Terabits), it is still considered expensive.

Q: Why is RED bad, if it maintains smooth operation?
A: For entertainment video sent from HBO, for instance, it is intolerable. We cannot resend and it interrupts the video.

Q: What do you mean that MPLS is inefficient?
A: You can carry it on UDP and other protocols, but we don't want to add the extra overhead.

Q: Is this ring bandwidth shared or is it all video?
A: It may be beneficial to have best effort data that can be dropped in the event of congestion.

Q: Why is disk space not cheaper than the cost of fiber?
A: We are talking terabytes and petabytes. It is 4 gigabytes per movie.

Q: Can you have packets and video on the same network? How many packets can be outside the jitter limits?
A: Yes, but the exact limits are not known.

Q: If you over-commit, then RED is better than tail drop, but the video should be committed.
A: You are right. The video will not respond to RED and you don't want to drop video packets.

11:15am: **Presentation - RPR Service Analysis, Italo Busi, Alcatel**

- Focus on Ethernet Transparent Services and Internet Access
- Network operators can offer different kinds of services, e.g.,
    . Virtual Ethernet Leased Line
    . Virtual Ethernet Distributed Switch: multi-pt to multi-pt
- Requirements:
    . Per customer separation
    . The distributed switch "should" optionally interwork with CPE switches (e.g., Spanning Tree Protocol).
    . Per customer separation can be guaranteed by VLAN tagging in the virtual Ethernet distributed switching.

Q: Are you suggesting that the 802.3 MAC will interoperate with the 802.17 MAC without a bridge?
A: This is a requirement for the metro applications, because if you have a router it encapsulates the packet into IP and then the network does this. Otherwise, it must be translated to the known MAC address and this can cause issues of security and scalability. In principle, you don't want your network to have to know all the MAC addresses on the network.

Q: If the network provides transparent transport of the BPDU, then it is not necessary for the STP protocol to operate on the ring.
A: The customer switch should not be changes in any way.

Q: You mention about customer separation with VLAN tag. With such VLAN tagging, it may interfere with customer VLAN ids?
A: If your customer does not have a VLAN tag then you can use a VLAN header in the frame. But a VLAN for each customer is required and you can use their VLAN tag. The VLAN is transparent to the customer. With this design each customer needs a switch.
Comment: Instead of additional VLAN tagging, having a separate field in the RPR header will be a simpler solution.

11:40am: **Service Classes and RPR MAC Design, Harmen van As, Vienna University of Technology**

- Three traffic classes on the ring, with further QoS classes above MAC
- Today TCP dominates, but the trend will shift toward UDP traffic such as VoIP, multimedia applications with rate control instead of window based control
- No packet loss on the ring, rejections only at the ingress
- Fairness protocol:
    - . Each ring is controlled independently
    - . Each class is controlled independently
    - . has to be standardized, with respect to
        - . how to monitor links
        - . which commands
        - . formats of commands
        - . what fairness criteria
        - . determination of access rates per class
        - . recovery scenarios in case of failure
- Number of classes on the ring:
    - . Need to be standardized, with respect to
        - . max number of classes on ring
        - . mapping rules
        - . discovery of node types
- Store-and-forward and Cut-through modes interwork, and need not be standardized.
- Different transmission scheduling will interwork, and need not be standardized.

Q: How do you divide ring bandwidth among QoS classes, especially when different nodes support different number of classes?
A: I do not know the answer now.

Q: How do you divide ring bandwidth for independent service classes?
A: It is completely dynamic, but the higher priority traffic the more bandwidth.

Q: How do you handle independent classes when there are 2 classes in one queue?
A: I do not know now.

Q: How do you do preemption?
A: The PHY does the mapping.

Q: In a 32 node ring, they could all fragment a packet. They all could be fragmenting at once. Especially if they are going to one destination, how do you handle such event?
A: Reassembly of the preempted packet is done at the next node. You leave holes in the ring for this reassembly.

Q: You don't want to standardize the scheduling?
A: You must standardize the number of classes. But the methods of doing this may differ from vendor to vendor. This is only on the MAC. We will have a smaller number of classes as compared to DiffServ.

Q: How do you retransmit the preempted packet from the start.
A: That implies a lot of wasted bandwidth.

Q: If the preemption buffer is not standardized for packet scheduling, how will it work? How do we know that 2 vendors will interwork?
A: Companies must buy equipment from vendors that support their requirements.

Q: Access Delay is the problem you solve, but preemption gives complexity that is not efficient at lower data rates in particular.
A: Jumbo packets and voice on the same network almost dictate preemption. I am not thinking about carrier rings. There are areas that RPR can be used instead of Ethernet.

12:10pm: Break for Lunch

1:05pm: **RPR Deployment Requirements, Italo Busi, Alcatel**

- Presented analysis of deployment scenarios of RPR for established and greenfield operators. Requirements for such deployment scenarios are also presented.

1:20PM: **Simple Rings and WDM-Meshed Rings based on RPR, Harmen R. Van Vienna University of Technology**

- Presented WDM meshed networks on RPR ring topology with either electronic or optical bypass capabilities.

    - by-passing of nodes in optical domain
    - reduced congestion and smaller delays
    - high-throughput with minimal number of electronic components
    - reduced cost
    - operational flexibility
    - optical transparency in the Metro domain
    - regular or non-regular mesh topologies on 2,4, or 6-fiber resilient rings
    - scalability on same fiber base

- Requirements for RPR MAC protocol are discussed

Q: Why 802.17 should be concerned with optical bypassing? Are you proposing it as part of the RPR standard?
A: Yes. We should incorporate the optical bypassing in RPR to be more efficient and viable.

1:50pm: **Fairness Requirements, Harry Peng, Nortel Networks**

- Summarizes RPR requirements from various carrier presentations (e.g., Sprint, MCI, Bell South, Global Crossing, SBC, Bell Canada), and analyzes its implications on RPR scope.
    . Must limit the scope of application
    . Have to ask "Does the implementation meet customer requirements?"
    . Reduce operational cost
- Strawman Motion: RPR standard to focus on realistic ring size for TTM.
    . Max # of stations on a ring: 64 (max about 30)
    . Max ring circumference: 2000Km (<200km metro rings)
        - ring span: PHY dependent, optics cost, e.g., LX
    . Scalable ring speed with future PHY
- Strawman Motion: Fairness scheme supports multiple CoS and bandwidth guarantee.

Comment: Max circumference needs be up to 1000Km.
Q: Ring speed also contributes to "silicon cost" via buffer requirement. Buffer requirement needs be at add points or in the ring?
Comment: Silicon cost is only part of the overall system cost. Need to have solid relative cost analysis. More transit buffer may improve other performance such as ingress access delay and jitter.

2:15pm: **RPR Transit Buffer Schemes, Necdet Uzun and Pinar Yilmaz, Auroranetics**

- Presented simulation study results on two different transit buffer schemes.
    . single MTU cut-through scheme
    . dual-priority multiple MTU store-and-forward scheme

Q: You cannot draw definite conclusions on cut-through vs store-and-forward comparison using a single scenario. Fairness algorithm also contributes to the buffering delay.
Q: What kind of fairness algorithm is used in the simulation?
A: Proprietary.
Q: Silicon cost also includes pin count, power, etc, not just the memory size.
A: Current silicon technology can handle 40G line rate.
Q: How do you determine the transit buffer of 256KB to be sufficient? The required buffer size is also dependent on ring size and fairness algorithm, etc.
A: Our fairness mechanism guarantees no buffer overflow.
Q: Large transit buffer incurs large delay.
A: In dual priority scheme, high priority does not incur delay.

2:50pm: **Hardware Complexity of Store-and-Forward, Cut-Through, and Preemption, Wolfram Lemppenau, University of Applied Science of Bocholt**

- Discusses how store-and-forward, cut-through, and preemption mechanisms influence the hardware complexity.

Q: SPI would require a full SAR function on 4000 logic blocks.
A: The high speed SPI is a good candidate. We do not need it, and the mappers can handle the job.

3:15pm: Break

3:10pm: **SRP Store and Forward Performance Comparison with Cut-Through, Donghui Xie, Cisco**

- Presented simulation results comparing performance of store-and-forward and cut-through based on SRP and iPT implementations, respectively.

Q: Are we comparing apple to apple? Results seem counter-intuitive. Is there an explanation for the results?
A: Yes. The nodes closer to the destination has the advantage of being closer to the destination.

Q: iPT simulation results shown here were a year and half old. Your results compare fairness algorithm combined with transmit scheduling, instead of comparing store-and-forward vs cut-through. Need to compare with the updated iPT.
A: Comment acknowledged. This simulation results at least tells that store and forward does not necessarily perform worse than cut-through.

Q: You are comparing SRP and IPT, and the results show that SRP is better than IPT, not cut thru.
A: We don't want to get into the argument about the terminology.

Q: You are comparing SRP and IPT not cut-thru and store-and-forward. SRP only has backpressure and that is a crude method for controlling traffic. If you put a lot of traffic with many types, but don't control you use too many variables. Compare simple source traffic profiles first. You cannot compare full protocols and make conclusions about the MAC or even the protocol.
A: We should take the whole MAC into consideration when we do simulations.

Comment: We would like to see what VLSI can give us. We need to know if the design can be done in ASIC or the traffic must leave the chip because this has an impact on price.

Q: Your traffic model is ad hoc. However, in these scenarios it is impossible to make generalizations from ad hoc traffic models. What is MAC and what is system is difficult to tell, and you can't make conclusions about the low level implementations from this.
A: Some of the results support the conclusions I have reached.

4:00pm: **Delay Variation in Cut-through and Store & Forward Models, Leon Bruckman presented on behalf of Gal Mor, Corrigent**

- Presented simulation results comparing delay variation behaviours between store-and-forward and cut-through methods under various network conditions

Comment: The results do not compare store-and-forward vs cut-through.

It is a matter of design and implementation choice.
Q: This simulation makes no sense without your fairness algorithm.
A: We should define the requirements and let the vendors implement any way to meet this requirement.

Q: Can we mix Store-and-forward and Cut-Through on one ring?
A: It is unknown.

Q: Is there any correlation between the time of packet arrival on the ring in relation to local packet insertion?
A: Local packets are always lower priority. The nodes are independent of one another.

Q: Do you have one or more buffers on the ring?
A: It doesn't really have an impact on this type of simulations.

4:20pm: **RPR MAC Definition and Implementation, Sanjay Agrawal, Luminous**

- Presented a proposal of RPR MAC framework definition and hardware implementation.

Q: Are you relying on upper layers to control access to the MAC? Upper layers are being queued and looks like routing.
A: The MAC can propagate the BCN and this is traditional. This is not routing. No packets can be lost on the ring.

Q: Demarcation between Ethernet and RPR seems to disappear in this framework.
A: We should not try to differ for the sake of being different.
Comment: If you should allow line rate transmission from a node, then there is no need for MAC.
Q: According to the proposed framework, the distinct identity of 802.17 seems to disappear.
A: There are other mechanisms which are different from Ethernet, such as topology discovery and protection.

Q: You have defined some classes time-sensitive and some not. There are some types of time sensitive classes that will be taken out of the MAC and requeued?
A: All high priority cuts through but all others come out of the MAC and requeued. For other packet classes the chip can switch fast enough. The issue is provisioning. You should not over-commit data.

Q: Your MAC is too simple. Everything is above the MAC. You don't gain much because rescheduling and queueing must be done at wire speed. What do you gain? We need results to understand. You are mixing RPR with switches.
A: The simplest things survive. No solution will work under all traffic conditions. We need fundamental mechanisms. The best way you can arbitrate is to provide switching between add and pass. It just adds the functions needed for RPR functions.

Q: Can you comment why a node must be able to fill the pipe as a mandatory requirement. I can see simpler ways to handle traffic than moving all packets to SPIE 4 and the traffic shaper.
A: Ring can be 10 Gig while you are admitting 1 Gig traffic. The traffic shaper should handle the rate arbitration. An add node should be able to fill the ring pipe.

Q: This is not an 802.17, but rather a way to make rings out of Ethernet MACs. There is supposed to be a clear demarcation between 802.3 and 802.17. This special buffering technique will not even be standardized. It is not in our power to define what you suggest.
A: We shouldn't be different just to be different. There is topology discovery and other things.

Q: If you bury traffic shaping in the MAC, we can't police.
A: That should be done at the customer network. Once it is on the network you don't need to do more than that. It makes things more complicated.

Q: It is my belief that all 802s saturate but use less than 100% duty cycle. The shared access MAC is only to arbitrate for shared media.
A: The standard should not preclude different speeds. A given node should be able to admit traffic at full data rate.

Q: With respect to Ethernet MAC, what is your distinct identity vs 802.3 and the PAR we operate under.
A: We shouldn't be different just to be different from the 802.3

Q: With the memory and traffic manager, now there is 30Gig I/O traffic manager and this stuff is not free.
A: Yes.

4:50pm: **RPR MAC Data Transport and Buffering, Pankaj Jha, Cypress**

- Presented RPR MAC issues and network requirements including bandwidth allocation and CoS.
    . Different customers need different bandwidth sizes and guarantees.
    . RSVP, DiffServ or other L2/L3 CoS/QoS models should not be broken due to RPR. Any RPR with less than 8 priority levels will fail. But leave scheduling to the system.
    . Policing and shaping at every node
- At RPR, we should design MAC protocol, not a chip architecture.

Q: How can you prove the DiffServ will prevail? Why need 8 priority levels?
A: At least it needs to be configurable. Less than 8 will fail.

Q: Did you do any simulations to prove this?
A: No, but we should not do something that breaks the DiffServ model

Q: The task of a MAC is to control access to the ring among all the nodes. You should have priority for transit over local, because transit has already arbitrated to get on the ring
A: You are correct, if every node is behaving correctly.

Q: In this class based queueing model, there are burstable SLAs and one customer may take all the bandwidth of one class. The ones in the lower buckets will not get their committed rate.
A: Yes, people get starved, but you must look at the reservation you have been provided and honor your profile. If you are ahead in the burst profile, to do that is OK.

5:10pm: **Performance Issues and Requirements, Adisak Mekkittikul, Lantern**

- Discusses RPR related performance issues and requirements from a perspective of distributed switching context, including HOL (Head of Line) blocking and QoS. A case simulation study using SRP Opnet standard model is also presented.

Q: The traffic scenario under study does not seem to be realistic.
A: It may be. Need more investigation.
Comment: SRP-fa default parameters in RFC 2892 have been updated.

Q: What is your description of traffic engineering? It compares it to a switch. This is a switch problem, and we are defining a MAC.
A: The problem is media access whether the access is on to switch fabric or network.

Q: You are oversubscribing the ring. Why is one link efficient and one not.
A: There are two congestion points. Everyone must back off to the link bandwidth of the most congested link. It is 622/(n-2), where n is the number of nodes.

Q: There are other ways you could build the network, if you had the case where traffic was evenly distributed. We shouldn't optimize for pathological cases.
A: Traffic on the network changes. Non-uniform traffic patterns are possible in these networks.

Q: We will not have uniform traffic and you chose a case that makes SRP look really bad.
A: We used publicly available RFC and SRP documents, and we reran the scenario multiple times.

Q: Does this occur because the node doesn't understand where the traffic is going?
A: It is not an implementation issue, but rather a class of algorithm problem.

Q: This is one local fairness domain, however no one will do this in a real situation because no one would take this path.
A: You can do shortest path or least congested. All scenarios result from these two basic options.

Q: This could not be a fairness mechanism. You need 622 downstream. Your simulation is not correct. SRP uses backpressure and there is nothing to backpressure.
A: We invite others to simulate this experiment to validate this result.

5:45pm: **Performance Simulation of Nortel OPE-RPR Ring, Changcheng Huang, Carleton University**

- Presented simulation results on transient performance of OPE-RPR under raw traffic model, and steady-state performance of OPE-RPR under bursty traffic model.

Q: Traffic model needs to be realistic TCP-based to draw any definite conclusion?
A: Agreed. These results are first stage preliminary.

Q: The assumptions about burstiness are questionable. We would like to see your traffic models.
A: Next time I can bring all the results.

Q: Can you explain your results on utilization?
A: Instantaneous utilization is around 50%, but actual utilization is closer to 95%.

Q: You concentrated on Head of Line delays, but do you have results on end to end delay?
A: Yes, that is shown in the presentation

Q: It would good to see how jitter performs in this simulation.
A: We can show this.

Q: What was the combined offered throughput?
A: The total offered load was close to the actual ring capacity.

6:15pm: **Scaling the Worlds Largest Ethernet, Lewis H. Eatherton, Excite@home**

- Presented RPR scaling requirement from a Excite@home's perspective

  . Currently 3+ million users with Excite@home
  . 2nd largest ISP in traffic
  . 5+ million users EOY'01
  . streaming media set to explode
  . rapid growth of home networked appliances
  . metro/regional traffic grows

  . optical considerations
    - most ISPs are not optically astute
    - no mid span points (80Km)
    - Raman and solitons
    - geography and spares
    - sand is cheap
- QoS = Quantity of Service
- Scaling is Paramount!

Q: The optical bypass MAC architecture presented today is not purely academic.
A: Maybe for the long haul optical networks, but for metro, everything has to be simple. We cannot afford the triple R of the optical networks in our applications. 8x optical mux and let the layer 2-3 device to the 3xR. PMD is the problem on our fiber.

6:25pm: Administrative Announcement, Mike Takefman
- Terms and Definitions Ad Hoc group will meet again at 7:30pm

6:30pm: Adjourn for the day.

May 15, Tuesday

8:00am: Seating, Everyone
8:00am: Agenda Scrub, Mike Takefman

8:05am: **Preliminary Performance Results from a simple Java Model, Stein Gjessing, University of Oslo**

- The Java model is available at http://www.ifi.uio.no/~steing
- The model does not have flow control functionality yet.

8:25am: **Arbitration via Signalling, David James, Lara Networks**

- Presented an access arbitration method based on 3 arbitration classes.
  . distinct class-A and class-B/C paths
  . load dependent policing
- Memory size for class B/C transit traffic is not costly.
- Store-and-Forward and Cut-through can interoperate, and need not be standardized.

Q: Class B may need to be overbooked, so fairness needed?
A: If that is the case, it should be downgraded to class C.

Q: The mechanism is based on the local queue information, and it may cause global instability.
A: Unless the global information is readily available, the use of local information is necessary.

Q: Local queueing causes global provisioning issue, because you need to know what is happening around the whole ring.
A: If the upstream node has an empty fifo, then you pass through but if there is congestion, you insure that the congestion is caused to fill up at each point on the ring.

Q: The fifo B/C adds latency if there is no add traffic at that node.
A: No, it doesn't add latency.

8:55am: **Recommended Solution for a Flexible Protection Scheme, Leon Bruckman, Corrigent**

- Presented a proposal (SWIS: Selective Wrapping and Independent Steering) which combines advantages of both steering and wrapping protection schemes.

Q: Does this proposal solve "squelching?"
A: Squelching is not quite relevant in packet ring network.

Q: The source may want to know whether the specific marked packets (e.g., wrap or steer) were indeed marked or steered?
A: Interesting point to think about.

Q: Did you say that the source is marking which packet is wrapped?
A: Yes.

9:10am: **Weighted Fairness, Necdet Uzun, Auroranetics**

- Presented a weighted fairness algorithm with preliminary simulation results.

Q: Do you use TCP traffic sources?
A: Not for this result.

Comment: This scheme does not address the head of line blocking problem.
Comment: Protection levels and Packet QoS should be independent.

Q: What if the node is on two different domains?
A: It should default to the lowest domain bandwidth.

Q: Can you write this in something other than pseudo code?
A: Yes.

Q: Is it possible to have something that guarantees a minimum bw to each flow?
A: You can do this on the ingress to the node, so you will have a proportional share of the weighted node bandwidth.

Q: How will you avoid Head of Line blocking? Have you considered virtual node queueing?
A: That is not done in the MAC on the transit path, but can be done on the transmit path outside the MAC. If you have only a single queue you degrade to 58% performance, but this is not caused by head of line blocking.

Q: You tie protection to the type of service. All traffic need not be protected and it should be independent of the type of traffic CoS.
A: You can assign independent weights for protection events.

9:30am: **Proposal for Fairness Index, Khaled Amer, Amernet**

- Presented a fairness index proposed by George Varghese's paper in Sigcomm'95.

Q: What is the definition of flow?
A: It can be anything.
Q: This scheme only deals with global fairness. There is a bench marking scheme being proposed by Harmen Van As also handling local fairness.
A: Will be discussed in the performance Ad Hoc group.
Comment: The fairness index need to consider source/destination designation of the flow.

10:00am: Break

10:15am: **Objectives and Technology Choices, Ashwin Moranganti, Appian**

- Presented RPR objectives and scopes from Appian's perspective.
  - Keep it simple
  - Provide most flexibility in implementation by being independent of the buffering, scheduling, QoS and switching architectures (Vendors can differentiate in this space)
  - Use existing proposals like Diffserv and MPLS for packet classification and service differentiation

. Leverage existing Ethernet and SONET framers
. Deliver predictable performance (packet loss, latency, jitter, sub 50ms protection switching times)

- For most carriers, Bandwidth is reserved commodity, so fairness problem may not be that important. One algorithm for all problems is not a good idea.

Comment: It is important to keep it simple, but if you keep pushing everything out of the MAC, you may not be able to build a good system in the end.
Q: Provisioning in OAM&P should be part of 802.17?
A: Yes.

10:50am: **The Shunted Ring Fault Tolerant Network Physical Layer, Drew Glista, Naval Air Systems Command**

- Presented an optical layer protection schemes based on ring topology.

Q: Channel speed of implementation?
A: 1G.
Comment: Skipping a node through more than 40Km would be problematic due to optical power loss.

11:30am: **RPR and 802.1D Bridging Issues, Yong Kim, Broadcom**

- To be compatible with 802.1D transparent bridging, it may be that the unknown unicast flooding and other related capabilities are required.
- RPR node may be required to support large MAC address table to support transparent bridging.
- Also, discusses encapsulating bridging mechanism which can be made to work.

Comment: Larger TTL value may be needed also to include the addition of new nodes.
Q: For encapsulation bridging, what would be other required MAC functionalities?
A: Other than TTL expansion, none.

Q: What impact would the L2 bridging have on traffic engineering? If negative, is it worth spending time and effort to standardize RPR L2 bridging?
A: If the traffic engineering is so important, then L2 bridging is not adequate. I will take the question as an observation.

Q: Unknown unicast will break the spatial reuse for bridged traffic?
A: True for unknown address. Once the address is learned, spatial reuse resumes.

Comment from the Chair: We need to discuss more to find out how many of us would like to support L2 bridging in RPR mode, and whether the PAR needs to be changed.

11:40am: **Proposed Process for Evaluating Objectives, Bob Love, Vice Chair**

- Start with Objectives developed at March 2001 Plenary Meeting
  . Retain priorities developed there.
- Lump proposals into categories.
- Divide WG into Ad Hocs to scrub the language and make as much

agreement as possible. Then, come up with best wording, also the group can come up with two presentations, one PRO, one CON.
- We will review categories based on priority of highest objective in the list.
- After dealing with March 2001 Objectives, address motions stemming from this week's presentations.

Comment: Need to designate the owners for each category.
Comment: Some of the objectives have already been voted in March (22 of them), and have been deleted from this category list.
Comment: We need to include the prior voted items here.
Comment: We need to finalize the terms and definitions first.
Comment: How can we accommodate the wish to participate in more than one category?

Motion: 2001-05-15-01 (12:00pm)

That the movers and seconders in the current list of objectives be identified. All new proposed objectives shall be framed as motions.

(M) Nader Vijeh
(S) Kanaiya Vasani

(Y) 58 (N) 2 (A) 4

Passed.

Motion: 2001-05-15-02 (12:15pm)

That the existing objectives be grouped, and voted in order of priorities that were voted before.

(M) Necdet Uzun
(S) John Hawkins

(Y) 60 (N) 0 (A) 5

Passed.

12:30pm: Break for Lunch

1:25pm: **RPR MAC Model, Nader Vijeh, Lantern Communications**

- Discusses RPR bridging and bandwidth management model. Support of multiple rings via a single MAC is also discussed.
- Introduces the concept of VM (virtual Media) for customer separation and unknown destination broadcast domain, and discusses per-VM bandwidth management and protection.
- Discusses addressing options:
  - . requires extensions to 802.1?
  - . additional fields to indicate unknown DA and MC?
  - . re-encapsulation as an option?
  - . reuse Ethernet?

- MAC model needs to address transparent bridging.

Q: Extending the VM tag is reinventing the MPLS tags?
A: I am not making any assumptions beyond the MAC.

Q: Regarding the multi-ring MAC, link ID is necessary?
A: Ring ID can be used for that purpose.

Q: One packet per logical link in multi-ring MAC?
A: yes.

Q: How can we make RPR plug-and-play with VM?
A: It is not different from VLAN tag.

Q: Regarding the end-to-end VM support issue, it is believed that the VM support needs to be done at LLC layer?
A: In that case, the broadcast limiting issue still remains.

Q: How do you ensure packet reordering issue in multi-ring MAC?
A: Packet reordering only needs to be supported within each conversation, where the definition of conversation is described in 802.3ad link aggregation standard.

Q: Do you propose that queueing is outside the MAC?
A: Yes.

Q: Do you intend to include bypass channels without going to electronics from optics? Is there some kind of routing or will you do something in the transmission path.
A: Maybe it is outside in the physical layer.

Q: You favor 802.3 frame format because it is easier to carry the frame.
A: We have passed motions to be compatible with Ethernet Service Access Points.

Q: How do multiple rings connect together with media bridges?
A: From the logical view of the bridging, there is no media, because it is in the same device. If it goes outside the ring, you terminate the VM tag to be compatible with other 802 protocols.

Q: Can you create a bigger ring out of smaller rings?
A: Yes, these can be added as capacity grows.

2:00pm: **Mapping Disparate Service Models of RPR into a Single Standard, Steven Wood, Cisco**

Q: Do you have more specifics about how these various proposals would be integrated given your presentation?
A: We feel that a feedback and feedforward system will interoperate with negotiation.

Q: My concern is Head of Line blocking on ingress. If I am sending to two nodes at once for add traffic, I can get blocked from sending to node 2 because node 1 has traffic. Is this correct?
A: I will discuss it off line.

Q: How will you address the requirement for the MAC service interface?
A: No comment.

Q: Do you also foresee having nodes with more than 2 paths in the transit buffer?
A: We have two now, but if you need more, how many do you really need?

2:30pm: **RPR QoS Requirements – Understanding the issues of QoS related motions, Jeanne De Jaegher, Alcatel**

- Presented RPR QoS requirements and proposes related motions.
- What is the SLA a packet based metro Network should support?
  - . Delay and jitter guarantee
  - . Bandwidth
  - . Loss
  - . Protection
- L2 MAC should support class-based protection.
- The standard RPR MAC shall have multiple classes of service such as to be able to support delay and jitter, bandwidth and packet loss guarantees. The standard shall not associate these guarantees with the different classes.
- The actual scheduling for the different classes is an implementation choice, and should never become a requirement for the standard RPR MAC.
- The actual mechanism for congestion control is an implementation choice and should never become a requirement for the standard RPR MAC.

Comment: QoS related terminologies need to be refined in the Terms and Definitions Ad Hoc committee.

Q: How can you have interoperability without congestion control?
A: Yes, the signaling should be understood by all nodes. However, the probability of a ring with different vendors is nearly zero.

Q: If the scope of the standard is too narrow, we won't have a meaningful standard. How many CoS services do you recommend?
A: I would use the three priority bits from Ethernet.

Q: What procedure do you recommend for cleaning up the motions?
A: Maybe leaving the room when we are going to vote. If we mix implementations you will create a monster. We don't have a good view today. I feel it is going nowhere today.

Q: If we start with suggested implementations, we have a place to start.
A: We need a better place to start with a better group of motions.

Q: You don't have the right to suggest withdrawal of motions.
A: Maybe the better term is to defeat a motion.

Q: Protection is not the issue, availability is an issue.
A: Discussions with customers suggest that SLAs are important.

Q: We should be specifying the external behavior and performance of the MAC.
A: Yes.

2:50pm: **Optimizing Time-to-Market for RPR, Raj Sharma, Luminous Networks**

- Leverage existing work where possible
- Stay focused on defining what is new and unique
  - . forwarding rules between east and west
  - . topology discovery and protection switching
- Get off the QoS debate – it is a black hole!!
  - . put in hooks for both class & flow based bandwidth management schemes and move on
- Ensure a timely solution

- Reduce risk for RPR solution vendors, etc
- Proposal: RPR should adopt the Ethernet frame and define a shim layer for RPR.
    . Adopt the Ethernet frame format and use a new type value to indicate the presence of a shim layer for additional RPR header fields
    . use a new tag ID value in 802.1 to indicate RPR frame encapsulation
    . provide optional label in the protected RPR header

Comment: To be able to support RPR frames to go through Ethernet switches unmodified, you should do either, (1) extract native Ethernet frames, or (2) ask 802.3 to modify max frame size.

Q: You are proposing fields before you know what the control protocol would be?
A: The RPR shim needs to be defined. Source and Destination address are the only things I am suggesting.

Q: Have you thought about dropping the packet, if the packet is bad but keeping the header?
A: In a carrier network you may be required to consistently deliver errored frames.

Comment: If an RPR frame can go through Ethernet switches, you will not be able to transport the full range of Ethernet packets because you are increasing the packet length.

Q: Are we adding too much overhead by using UDP and IP for that?
A: We probably shouldn't use UDP and IP for that.

Q: What do you think of using GFP for RPR? This may limit the other protocols RPR can carry. GFP is independent of data rates and carries the control packets
A: If it is that generic, it should be able to deal with this.

3:30pm: Break

3:40pm: **RPR MAC Objectives based on Carrier Requirements, Kanaiya Vasani**

- Optimization for Ethernet Services
- Support for circuit emulation
- Ring size (MAN < 200Km, RAN < 1000Km)
- Payload preservation
- No packet loss on the ring under normal operating conditions
- Customer traffic separation and segregation
- QoS (service categories, customer SLAs)
- Efficiency
- Availability and protection
- FCAPS (Performance monitoring – statistics, SLAs)

Q: Should we talk about the packet loss rate, rather than < 50ms protection time?
A: It is indeed something we should talk about more.

Comment: Availability is more typical in SLAs, e.g., outage period a month.

4:10pm: Administrative Announcement, Mike Takefman

- Performance Ad Hoc meets at 7:00pm
- Terms and Definitions Ad Hoc meets this evening again

4:12pm: **RPR Requirements and Common Ground, Frederick Thepot, Dynarc**

- We don't do a standard for one customer or one product implementation.
- We should anticipate the market need in the future.
- We do not need to preclude
    . cut-through vs store-and-forward
    . steering vs wrapping
    . QoS vs CoS
- We need an evolving standard with room for expansion.
- We need to define a version 1.0 with optional modes.
- Need to build a list of metrics and answer the following:
    . frame format
    . fairness/bandwidth/QoS/traffic management
    . protection/resiliency/traffic engineering
    . operation/plug and play/auto topology
    . network management/service provisioning
- RPR frame format based on RPR Shim

4:45pm: **RPR over SONET/SDH, Harsh Kapoor, Appian Communications**

- Discusses goals and benefits of supporting RPR over SONET/SDH, and also presents a proposal.
    . use SONET/SDH path-layer mechanisms to provide ring protection
    . provide traditional SONET/SDH UPSR/SNCP functionality on the same ring simultaneously
    . supports extra traffic management mechanisms, including preemptible and non-preemptible mechanisms

Q: Interaction between RPR and BLSR will be much more complex?
A: Yes.
Q: If any SONET node is not RPR-aware, protection is broken in that segment?
A: Yes.

5:10pm: **Terminology and Definitions, Constantinos Bassias, Lantern**

- Presented various terms and definitions.

Comment: Add a picture. Some definitions are "circular."
Comment: Need a definition of MAC, besides the "802.17 MAC."

5:30pm: **Terms and Definitions, Harry Peng, Robin Olssen, Stuart Robinson, Ad Hoc Group**

- Presented various terms and definitions.
- Lists terms and definitions at 5 design levels in logical and physical concepts, i.e.,

    1. concept
    2. network
    3. ring
    4. station

5. MAC

Q: What is the process of adopting the terms and definitions?
A: Same as other motions.

Q: How do we ensure that the 802.17 terms does not collide with other IEEE terms?
A: Bob will bring the IEEE terms dictionary next time.

6:00pm: Adjourn for the day.

May 16, Wednesday

8:00am: Seating, Everyone
8:25am: Agenda Scrub, Mike Takefman
- Agenda approved without objection

8:25am: Reminders on Voting Rules & Member Roll Call, Mike Takefman

8:30am: Discussion of Voting on Terms and Definitions, Bob Sultan

- Overview of "Terms and definitions" document which was prepared by Ad Hoc group on Tuesday evening is presented, and comments are made.

Comment: For QoS and SLA section, we need to consult ATM references.
- Terms likely to be required in the voting of objectives are chosen for more discussions by show of hands.

10:15am: Break

10:30am: Administrative Clarification, Bob Love

- We will use the process defined on Monday for our voting. Quorum will be required for voting on any motion. If quorum is not present, any voting will be considered a straw poll.

10:45am: **Performance Committee Presentation, Khaled Amer, Amernet**

- Performance Ad Hoc meeting was held on May 5th from 7:00pm to 10:00pm to review the proposed charter. The charter proposal presentation can be viewed at the RPRWG Web.

- Objective of the Ad Hoc Committee is to define standard testing metrics so that all simulations are done similarly and the results of different proposals can be compared.

- The Performance Committee is not chartered to run simulations for the Working Group.

Q: How long will this take?
A: We have been working on this for months, and have Phase One done. Phase Two can begin soon. If November is the final cut off date for new proposals, then Phase Two will capture all the input from proposals throughout November.

Q: You are saying that the results of the simulations will be available to the Working Group. Can the simulations be used in a larger community beyond the Working Group?
A: Some sections can be private and password protected, and we can implement this process.

Q: Will the results from this group be a gating item for which proposal is finally accepted by the Working Group?
A: The working group will review the criteria and the various proposals will be simulated by the individual companies and presented to the Working Group. Ultimately the WG will decide what they feel is the best proposal which may or may not correlate to the exact results of the simulations. The committee will not steer the standard, but will help us understand the performance of the various proposals.

Comment: We would like to help the committee understand the results. I, Harmen Van As, offer to help interpret the results.

Motion: 2001-05-16-01 (10:55am)

To approve the formation of Performance Ad Hoc Committee.

(Y) 54 (N) 0 (A) 4

Passed.

11:15am: Missing owners of "Motions on Objectives" from March Plenary meeting are identified.

11:35am: Discussion of each "Motion on Objective" begins according to the category.

- For a complete list of motions and objectives, refer to "Motions/Objectives Spreadsheet for March/May" and "May Motion Objectives Continued" on RPRWG web.

Fairness Category: Motion #61 is changed to,

The RPR MAC shall support a weighted, dynamic bandwidth allocation mechanism (per virtual media).

Comment: This amendment is radically different from original motion.
Comment: What is virtual media? It has not been defined yet.

Amendment to Motion on Objective #61: 2001-05-16-02 (11:48pm)
(Assigned as Objective #61a)

Replace "(per virtual media)" with "(e.g., per-station, class, etc.)"

(M) Bob Love
(S) Necdet Uzun

(Y) 12 (N) 34 (A) 10

Quorum not present, and the motion is dropped as such.

Motion: 2001-05-16-03 (11:54pm)

Motion to postpone consideration of motions on objectives #60, 61, 32, 51 until tomorrow.

(M) Gunesh Aybay
(S) Necdet Uzun

Withdrawn.

12:00pm: Break for Lunch

1:15pm: Voting on Objectives motions resumed.

Amendment to Motion on Objective #61: 2001-05-16-04 (1:15pm)
(Number assignment Objective #61 remains.)

Replace #61 with "The 802.17 standard shall support dynamic, weighted bandwidth distribution." The objective #61 is then voted.

(M) Nader Vijeh
(S) Fredric Thepot

(Y) 54 (N) 1 (A) 10

Passed.

- Motion on Objective #60 is withdrawn.
- Motion on Objective #32 is withdrawn.
- Motion on Objective #51 is tabled.
- Motion on Objective #62 (fairness category) is discussed, and tabled for further consideration.

Comment: Let's not spend time and effort now to decide on exact value of minimum packet size.

- Motion on Objective #40 (Separation group) is discussed. Nader Vijeh took the motion and change the wording, followed by amendments.

Comment: Carrier's requirements are to support customer separation and to maintain customer VLAN.
Comment: Terms and Definitions currently uses "customer separation" which conflicts with "customer traffic separation." Resolution will be made by July Plenary meeting.

. The motion failed by 47/17/8 (73%), and the mover Nader Vijeh requested a roll-call. Recount result is 48/18/8 (72%) and the motion failed. (The roll call result is attached in the attendance list at the end of this minutes.)

- Objective #29 (Separation group) is tabled.
- Objective #57 (Separation group) is described by the original mover, and discussed. Motion failed.

2:45pm: Break

3:00pm: Voting on Objective Motions resumed.

- Objective #25 (fairness category) is withdrawn.
- Objective #6 (speed category) is described by the original mover, and discussed.

Q: RPR is targeted at carrier customers. Why low rate ring speed?
A: To increase the market size, low rate ring speed need to be defined.
    - The motion carried by 53/8/10.

- Objective #58 (speed group)is tabled. More implementation strategies and analysis will be presented for the vote in July Plenary meeting.
- Objective #12 (protection group) is described by the original mover, and discussed.

Q: Does it mean that there shall be no packet loss during normal operation?
A: Yes.

- Motion to table this motion until after the resolution of objective #13. Carried.
- Objective #13 (protection category) is described by the original mover, and discussed.
    . Friendly amendment results in rewording to "The 802.17 MAC shall not lose packets in transit during normal operation."

Comment: If RPR is considered as a shared medium, the packet should not disappear from the ring. If it is treated as a switching fabric, it is ok.
Comment: Non-committed traffic needs to be dropped under congestion, while the committed traffic should not. Why not change the wording to "no packet loss to a set of traffic classes?"
Comment: We are not building a LAN. In MAN or RAN, this requirement may be too difficult to satisfy.
Comment: From the carrier's OAM point of view, allowing the packet drop would cause difficulty in tracking such events.
Comment: You can allow over-subscription while not dropping the packet in the ring.
    - Motion failed

- Objective #12 (protection category) is described by the original mover, and discussed. The motion is motioned to be tabled, but did not reach the quorum. Recount occurred and passed to be tabled.
- Objective #37 is withdrawn.
- Objective #58 (Topology Category) is withdrawn.
. Objective #52 (Topology Category) is described by the original mover, and discussed.

Comment: Any shared medium protocol has inherent limitation with respect to bandwidth-delay product. This requirement may cause undue limitation on solution approaches within a reasonable time.
Comment: Although you may want to build large rings, you may not want to say this yet.
    - Motion to table the motion is passed by 43/21/6

- Objective #28 (Topology Category) is reworded by the original mover.
  . Unfriendly amendment by Nader Vijeh replaces "native (802.17)" with "transparent"
Comment: Based on Yong's bridging presentation, we would like to investigate more on the available options.

Comment: We may want to support the amendment in order to support the market need.
. Friendly amendment by Bob Sultan and Harry Peng:
"The 802.17 standard shall support 802.17 MAC bridging."

Comment: With the wording, we need to have approval for a new project for the bridging. The objective says 802.17 will not have bridging when RPR becomes a standard.
. The motion is withdrawn by the mover.

- Objective #49 (Topology Category) is described by the original mover, and discussed. The reason for the motion is not to limit the RPR hard-coded for only 2 rings.

Q: The number (N) could also be zero, to have a single ring?
A: Yes.

Comment: Change "ring" to "ringlets" to be consistent with Terms and Definitions.
Comment: Dual counter rotating ring is enough for the standard for now.

Q: From a silicon implementation point of view, it would be difficult to support multiple rings using a single MAC?
A: Why a single MAC?
. Friendly amendment, (where N=0,1,2,3,...)

Comment: Dual ring is a good starting point, but from scalability point of view, we should be able to allow multiple ring operation.
Comment: N+1 ring will complicate the MAC implementation. I do not think it is necessary.
Comment: If the link aggregation were to part of 802.3 standard, the 802.3 would have never succeeded.
Comment: Multi-ring is necessary for future scalability.
. Friendly amendment, "any number of ringlets"

Comment: This will make the standardization process longer and difficult.
Comment: As a service provider (Excite@Home), we did not see any other way to increase the network capacity other than building the multiple rings.
. Motion failed by 45/24/6 (65%)
. Roll call is requested by Lewis Eatherton, and Motion failed again. (The roll call result is attached in the attendance list at the end of this minutes.)

- Objective motion #39 (Performance Metric) is described by original mover, and discussed. A number of friendly amendments were made.
- Motion passed.
- Objective motion #59 is withdrawn.

5:10pm: Adjourn for the day.

May 17, Thursday

8:00am: Seating, Everyone
8:15am: Agenda Scrub, Mike Takefman
- Agenda approved unanimously

8:20am: **Presentation - T1X1 Liaison to IEEE RPRWG, George young, SBC**

- Gives an overview of GFP standard work in ANSI T1X1 and ITU-T, GFP tutorial, and presents the liaison letter from T1X1 chair Albert White to the RPRWG chair.

Q: Do you have preference as a service provider?
Q: T1X1 patent policy?
A: Both T1 and IEEE patent policies derive from ANSI patent policy.

9:20am: Approval of March Interim Meeting Minutes, Mike Takefman

Motion 2001-05-17-01 (9:20am)
Procedural (>50%)

To approve the meeting minutes of March Plenary meeting.

(M) John Hawkins
(S) Khaled Amer

(Y) 65 (N) 0 (A) 2

Passed.

9:25am: Confirmation of Performance Ad Hoc Committee Chair

Motion 2001-05-17-02 (9:25am)
Procedural (>50%)

The 802.17 WG to affirm Khaled Amer as the Chair of the Performance Ad Hoc Committee.

(M) Bob Love
(S) Bob Schiff

(Y) 61 (N) 0 (A) 7

Passed.

9:30am: Establishment of Ad Hoc for Terms and Definitions, Bob Love

- Proposes to form the Ad Hoc Committee for Terms and Definitions to prepare the draft, and to have the draft to be voted on by the next Plenary meeting in July.

Motion: 2001-05-17-03 (9:30am)

To establish the Ad Hoc Committee to generate a terms and definitions document for 802.17 to vote on in July Plenary meeting.

(M) Andrew Brown
(S) Costas Bassias

Approved by acclamation.

9:40am: September Interim Meeting Discussion, Bob Love
- Week of 9 – 15, in Ottawa or San Jose

10:00am: Collection of new Motions, Mike Takefman

10:05am: Break

10:45am: RPR Standard Documentation Process, Bob Love

- Presented a view on RPR standard documentation process.

11:00am: Voting on Objectives Motions, Bob Love

- Objective motion #35 is tabled.
- Objective motion #42 is withdrawn.
- Objective motion #54 is described by the original mover, and discussed.
  - Friendly amendment: The 802.17 standard shall not specify buffer sizes nor specify scheduling algorithms required by the upper layer.
  - The motion is split in two, i.e., #54, #54a

- Objective motion #54 is changed to:
  - "The 802.17 standard shall not specify buffer sizes in the MAC such that it limits what is required by the upper layers."
- Objective motion #54a is changed to:
  - "The 802.17 standard shall not alter scheduling required by the upper layer."
- Objectives #54 and #54a are withdrawn, after lengthy discussions.

- Objective motion #48 (Protection Category) is described by the original mover and discussed.

Comment: Let us not confuse the functional requirement and implementation mechanism. This motion does specify the implementation mechanism, not the objective.
Comment: This motion does not preclude other implementation mechanisms.
  - Friendly amendment to remove 50ms.
  - Unfriendly amendment to reword, add "and wrapping" after "source redirect" and fix the grammar" as Objective motion #48a.

- The voting of the motion #48a is postponed until after the lunch.
  - Motion #48 is automatically blocked by #48a.
- Objective motion #38 is tabled.
  - Friendly amendment is made for editorial change.
- Objective motion #56 is described by the original mover and discussed, and tabled by unanimous consent.

Q: Who is the "user"?
. Friendly amendment is made to reword "user" to "operator."
12:50pm: Break for Lunch

1:30pm: Voting on Objectives Motions continues on.

- Objective motion #36 (performance monitoring and statistics) is described and discussed. The mover withdrew this motion until after the term is clearly defined.

Comment: What is the meaning of "customer?" Let us first define the term "customer." Agree with the context though.
Comment: The meaning of "a specified set of customers" is a vague term.
Comment: A lot of carriers demand such per end customer performance monitoring and statistics gathering. In favour of this motion.
Comment: This capability is for the network operators, not for the end customers.
. Motion to table this motion was voted, but the vote count did not reach the Quorum.

- Objective #11 is described by the original mover, and discussed.
. Friendly amendment of adding "forwarding the transit traffic"
Comment: This amendment is a subset of the original intention.
Q: What is the meaning of "without explicit configuration?"
A: Plug and play connectivity initiation with some baseline defaults.

Comment: Plug and play should come into 2 stages; (1) first, pass through, and (2) start adding and forwarding packets. Note that the first stage does not require control traffic exchange.
Comment: The idea of this motion is that we do not have to tweak every knob at initialization.

- Motion to table the objective motion #11 failed.
- Objective motion #44 is postponed until later today.
- Objective motion #10 is withdrawn.
- Objective motion #43 is withdrawn.

- Objective motion #44 is reworded, and described by the original mover.
Q: What is the meaning of "optimal?"
Q: High utilization is translated to large delay and jitter?
A: Other objectives also address such concerns.

- Complete list of Objectives Motions and voting results are posted on the RPRWG Web.

5:30pm: **End of May Interim meeting.**
(Meeting on May 18, Friday, is cancelled.)

Appendix: Attendance List (Total: 128) with Roll Call Counts

#	(Attendees)		Roll Call Counts					
			Objective #40 (Customer Separation)			Objective #49 (Ringlet)		
			Yes	No	Ab.	Yes	No	Ab.
1	Sanjay K.	Agrawal	1			1		
2	Khaled	Amer	1			1		
3	Paul	Amsden	1			1		
4	Joaquin	Ariles						
5	Siamack	Ayandeh						
6	Gunes	Aybay	1				1	
7	Constantinos	Bassias	1			1		
8	Mark	Bordogna			1	1		
9	Martin	Brewer						
10	Andrew	Brown		1			1	
11	Leon	Bruckman		1		1		
12	Italo	Busi	1					1
13	Allen	Carriker		1			1	
14	Robert	Castellano						
15	James	Chan	1				1	
16	Brian	Cheng						
17	David	Cheon						
18	John	Chiang						
19	Perminder	Chohan		1			1	
20	Nigel	Cole						
21	Patrick	Conlon	1			1		
22	William	Dai			1	1		
23	Spencer	Dawkins	1				1	
24	Susan	Dodd						
25	Kevin	Dooley						
26	Jean-Lou	Dupont	1				1	
27	Lewis	Eatherton			1	1		
28	Jim	Ervin		1			1	
29	Jason	Fan						
30	Ron	Fang	1					1
31	Jonathon	Fellows						
32	Jingsong	Fu	1					1
33	Stein	Gjessing						

#	(Attendees)		Roll Call Counts					
			Objective #40 (Customer Separation)			Objective #49 (Ringlet)		
			Yes	No	Ab.	Yes	No	Ab.
34	Drew	Glista						
35	Omer	Goldfisher						
36	Aravind	Gopalan	1			1		
37	Martin	Green		1			1	
38	Ibrahim	Habib						
39	Stephen	Haddock	1			1		
40	John	Hawkins	1			1		
41	Brian	Holden						
42	Shawn	Holiday						
43	Victor	Hou						
44	Chang	Huang	1			1		
45	Wai-Chau	Hui	1					1
46	Jeanne De	Jaegher	1			1		
47	David	James						
48	Pankaj	Jha				1		
49	Bruce B	Johnson			1	1		
50	Hideyoki	Kamatomo						
51	Jim	Kao		1			1	
52	Harsh	Kapoor	1					
53	Vasan	Karighattam						
54	Yongbum	Kim						
55	Kenji	Kondo						
56	Kumar	Kovvali	1			1		
57	Miguel A.	Labrador				1		
58	Richard	Lacerte						
59	Paul	Lebel						
60	Byoung-Joon(BJ)	Lee	1				1	
61	Chuck	Lee	1			1		
62	John	Lemon	1			1		
63	Wolfram	Lemppenau		1		1		
64	Heng	Liao	1			1		
65	George	Lin						
66	Val	Liva						
67	Robert D.	Love	1			1		
68	Anh	Ly						

#	(Attendees)		Roll Call Counts					
			Objective #40 (Customer Separation)			Objective #49 (Ringlet)		
			Yes	No	Ab.	Yes	No	Ab.
69	Chris	Mangan						
70	James	Markevitch		1			1	
71	Vittorio	Mascolo						
72	Thomas	Meehan						
73	Adisak	Mekkittikul	1			1		
74	Sherri	Menefee	1			1		
75	Dave	Meyer			1		1	
76	David	Milliron						
77	Bahman	Moghadam						
78	Jim	Mollenauer	1			1		
79	Ashwin R.	Moranganti	1				1	
80	Masahiko	Mukai						
81	Jahangir D.	Nakra		1			1	
82	Paul	Nikolich						
83	Mannix	O'Connor	1			1		
84	Cel	Ololo						
85	Robin	Olssen	1			1		
86	Fredrick	Olsson						
87	Sushil	Pandhi	1				1	
88	Chip	Paryzek		1		1		
89	Harry	Peng	1			1		
90	Allan	Pepper	1			1		
91	Stevan	Plote	1			1		
92	Craig	Prunty		1			1	
93	Lei(Ray)	Qiu						
94	Vish	Ramamurti	1					1
95	Lars	Ramfelt	1			1		
96	Stuart	Robinson						
97	Luis	Rovira		1		1		
98	Blake	Russo						
99	Angshuman	Saha						
100	Ajay	Sahai	1				1	
101	Taylor	Salman						
102	Nirmal	Saxena						
103	Bob	Schiff	1			1		

#	(Attendees)		Roll Call Counts					
			Objective #40 (Customer Separation)			Objective #49 (Ringlet)		
			Yes	No	Ab.	Yes	No	Ab.
104	Lauren	Schlicht			1		1	
105	Bong-Jin	Seo						
106	Raj	Sharma	1			1		
107	Surender	Sharma						
108	Bob	Sultan	1				1	
109	Michael	Takefman		1			1	
110	Frederic	Thepot	1			1		
111	Geoffrey	Thompson						
112	Jeff	Timbs			1	1		
113	Henrik	Uhlemann	1			1		
114	Necdet	Uzun		1			1	
115	Harmen R.	Van As	1			1		
116	Kanaiya	Vasani	1			1		
117	Nader	Vijeh	1			1		
118	Jeff	Wabik						
119	Eko A.	Wibowo	1			1		
120	Steven	Wood			1		1	
121	Donghui	Xie			1		1	
122	Yiming	Yao						
123	George	Young	1			1		
124	Su-Hum	Yun						
125	Ray	Zeisz						
126	Reuven	Zeitak						
127	David	Zelig		1		1		
128	Igor	Zhovnirovsky			1	1		
Roll Call Totals			**48**	**18**	**8**	**46**	**24**	**5**

---------- End of Attendance List ----------