

Resilient Packet Ring protocol for Metropole networks

The rapidly increasing volume of data traffic in metro networks is challenging the capacity limits of existing transport infrastructures based on circuit-oriented technologies like SONET and ATM. Packet based transport technology is considered by many to be the only alternative for scaling metro networks to meet this demand. Gigabit Ethernet till recently is only the first step in the evolution of packet based transport in the MAN. Ethernet is well suited for point to point and mesh network topologies, but difficult to be deploy in ring configurations and as a shared media that need media access control mechanisms to manage access across multiple users. Most of the existing fiber plant in metro area is in ring form, because the incumbent transport technology SONET is typically deployed over fiber rings there is a great need for a new technology that can fully exploit fiber rings while retaining all the advantages of a packet-based transport mechanism like Ethernet. The emerging solution for most metro data transport applications is the RPR technology. Resilient Packet Ring (RPR) is a MAC Protocol that operates at the layer 2 of the OSI Protocol stack . It is designed for ring based topology networks. RPR can run over either SONET or Ethernet, and therefore enables service Providers to build more scalable and efficient Metro networks.

By creating a MAC protocol for ring networks, RPR attempts to find a fundamental solution to the metro bottleneck problem. RPR has several characteristics that make it an ideal platform for the delivery of data services in metro networks.

1. RPR is only a new layer 2 MAC protocol which has the advantage of leaving layer 1 open. Hence RPR will be compatible with Ethernet, SONET and DWDM physical layer standards.
2. RPR devices act as packet Add Drop Multiplex devices connected to a shared medium. The MAC entity on each node performs three functions insertion of subscriber traffic on the node, removal of subscriber traffic from the node and direct transfer of transit traffic from one Network link to another.
3. RPR MAC rings have a natural resiliency advantage, can initiate a ring wrap at the node surrounding the cut or steer the packet by causing sending node to redirect the packets.
4. RPR MAC rings have an inherent advantage for implementing fairness algorithms to regulate bandwidth usage.
5. RPR MAC rings make broadcast and multicast traffic easier, since this is achieved by sending only one copy around the ring.
6. An RPR system offers a very simplified service model, because the ring functions as a shared medium and all the nodes on the ring share bandwidth on the packet ring.

Incumbent transport technology like SONET never offered features like efficient support for ring topology and fast recovery from fiber cuts and link failures. Packet ring technology also provide data efficiency, simplicity and cost advantages that are typical to Ethernet. In addition RPR solves problems such as fairness and congestion control that have not been addressed by earlier technologies. In a Network with dynamically changing traffic patterns, the only way to optimise network Utilisation without discarding traffic is to have a feedback Mechanism built into the Network.

The feedback Mechanism informs the traffic sources of the capacity available on the Network, so that the sources can adjust the rate at which they inject traffic into the Network. The MAC Entity on each node monitors the Utilisation on its immediate link and makes that information available to all nodes on the ring. Each node can either send in more Data or throttle back its traffic.