Native RPR Bridging[1]

A.1 Introduction

Typical RPR networks require interconnections between RPR rings to provide practical benefits. This is because as traffic travels beyond the geography covered by a single ring it needs to be passed on to other networks or rings. If the next network is an RPR ring then some means of ring interconnection becomes necessary. Ring interconnection can be achieved in several ways. One method is to interconnect the rings using an external 802.1d bridge or use a Layer 3 device. Another method is to connect the RPR rings natively without requiring any protocol conversion. Devices that can provide ring interconnection without protocol conversion are termed as native RPR bridges. Such an interconnection allows a network administrator to setup and operate a RPR network at layer 2.

A practical downside of using an external device like an 802.1d transparent bridge is that such a device would have to operate on a very large space of MAC addresses. This would be especially for applications that involve 802.17 stations to be directly connected to a large number of other 802 LANs (ERPR-IS based service). A native RPR Bridge will operate only in the 802.17 address space and can preserve properties like resiliency and spatial reuse within an individual ring as a packet traverses the RPR network.

Supporting native bridging requires implementation of an optional sublayer between the 802.17 MAC and an 802.1d transparent bridge working on 802.17 address space working together. The sublayer is termed as Native Bridge RPR Re-encapsulation Internal Services Sublayer (RPR-RE-ISS)[2]. The intent of the RPR-RE-ISS is to hide some details of the 802.17 rings from the 802.1d bridge. An 802.1d compatible transparent bridge can continue to function over 802.17 by using the services of the RPR-RE-ISS sublayer in the 802.17 entity can function like it would function with other MAC protocols like 802.3. The two RPR rings being interconnected will appear to the 802.1d transparent bridge as the two ports being bridged.

For all the benefits of RPR rings like spatial reuse to be preserved, requires that the rings themselves be arranged hierarchically. In case, the rings themselves are interconnected such that there are loops, spanning tree algorithm can remove loops. However, no guarantees can be made about optimal spatial use of bandwidth across the interconnected rings. Native bridging allows RPR rings to preserve properties like spatial reuse and resiliency across a layer 2 network. It needs to be recognized that service provider networks require resiliency within and between RPR bridge stations in addition to the fiber level failures. However, these are deemed to be beyond the scope of this standard.

The RPR-RE-ISS sublayer learns information about the next hop to a remote ring attached station. It then re-encapsulates the RPR frame to the next hop within the ring. An 802.17 MAC instance, limits its topology knowledge to stations on the local ring. It can, however, transport the re-encapsulated frame to its local egress on the local ring efficiently. As a result of this operation frames destined to stations off the local ring can be directed to the egress station on the ring in an efficient manner that preserves spatial reuse.

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[1] Comments to ajay.sahai@fnc.fujitsu.com or post to the 802.17 working group reflector.

[2] ERPR-IS layer will use the services of the RPR-RE-ISS in an 802.17 station. The 802.1d layer will be needed instead of the ERPR-IS at native RPR bridges.

This sublayer interacts with one instance of an 802.17 MAC. This implies that this sublayer is implemented at both, the station providing the bridging functionality and the source/destination stations on the ring.

A.2 Operations of the RPR-RE-ISS

A.2.2 Frames to the 802.17 from higher layers like 802.1d or ERPR-ISS

?? No operation if the 802.17 destination station is on local ring. Frame is presented to the 802.17 MAC.

?? Frame is re-encapsulated to be sent to the next hop station on the local ring as a regular 802.17 frame. This requires query of an RPR-RE-ISS maintained local database entry. This is done to determine the next hop station for a remote 802.17 station. The next hop station is the egress on the ring for the station to which the higher layer intends to forward the frame.

A.2.3 Frames from the 802.17 to higher layers like 802.1d or ERPR-ISS

?? Database is updated if the two source addresses on an incoming re-encapsulated frame do not match. The outer source address is the egress point on the local ring to the remote station.

?? The re-encapsulation is stripped and the original 802.17 frame is presented to higher layer

A.2.4 Aging database entries learnt by RPR-RE-ISS

?? Identical to 802.1d procedures.