



OAM in RPR

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Components of a complete RPR proposal

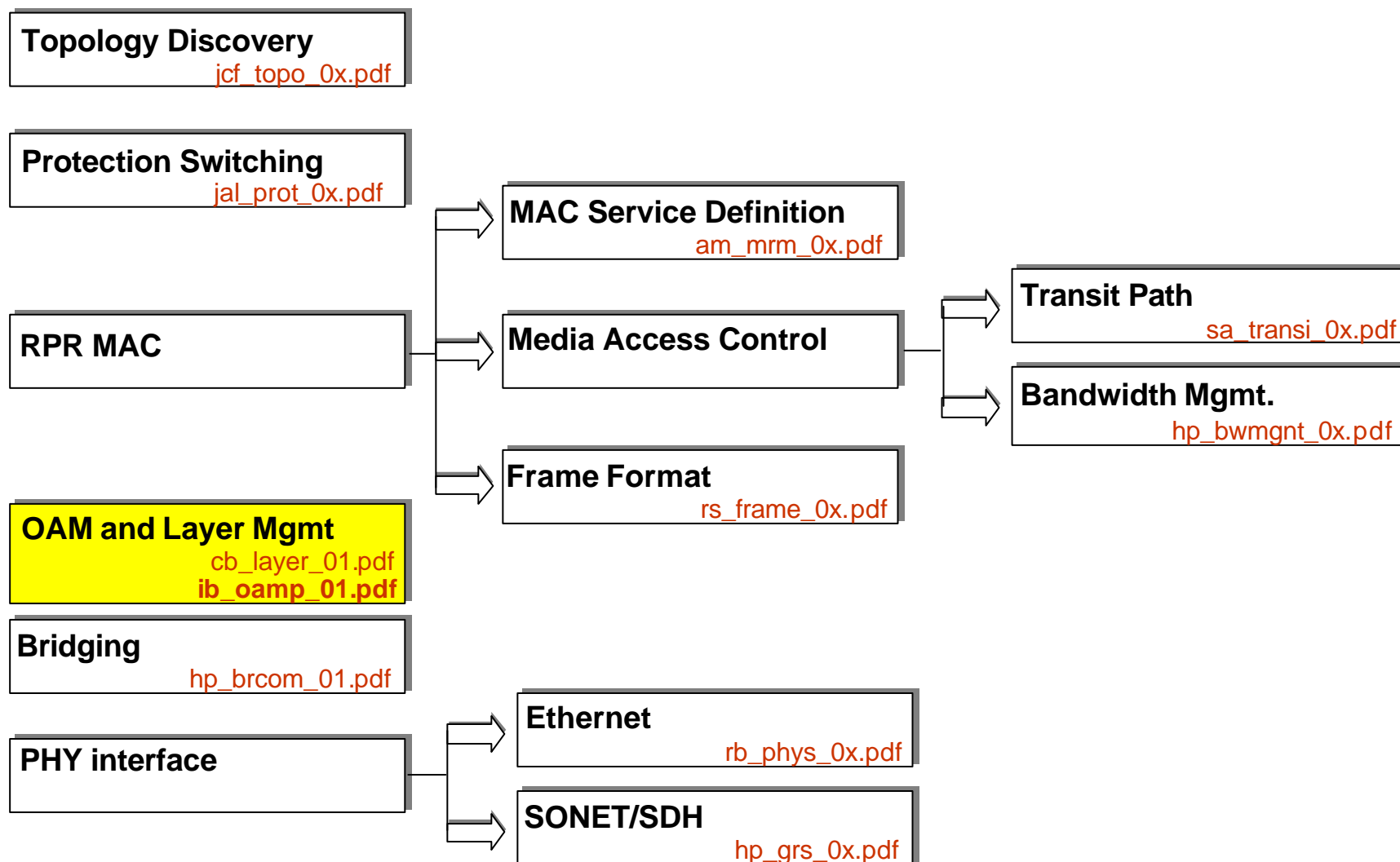




Table of Contents



- ◆ Introduction

- ◆ OAM RPR Ping description
- ◆ RPR Ping messages definition

- ◆ Conclusion



Introduction



Scope of the presentation



- ◆ Define some OAM mechanism that can help operators in fault management of RPR networks
- ◆ Clarify the motivation for an OAM RPR Ping mechanism
- ◆ Describe the OAM RPR Ping mechanism
- ◆ Define the set of messages we need to support this feature



OAM RPR Ping description



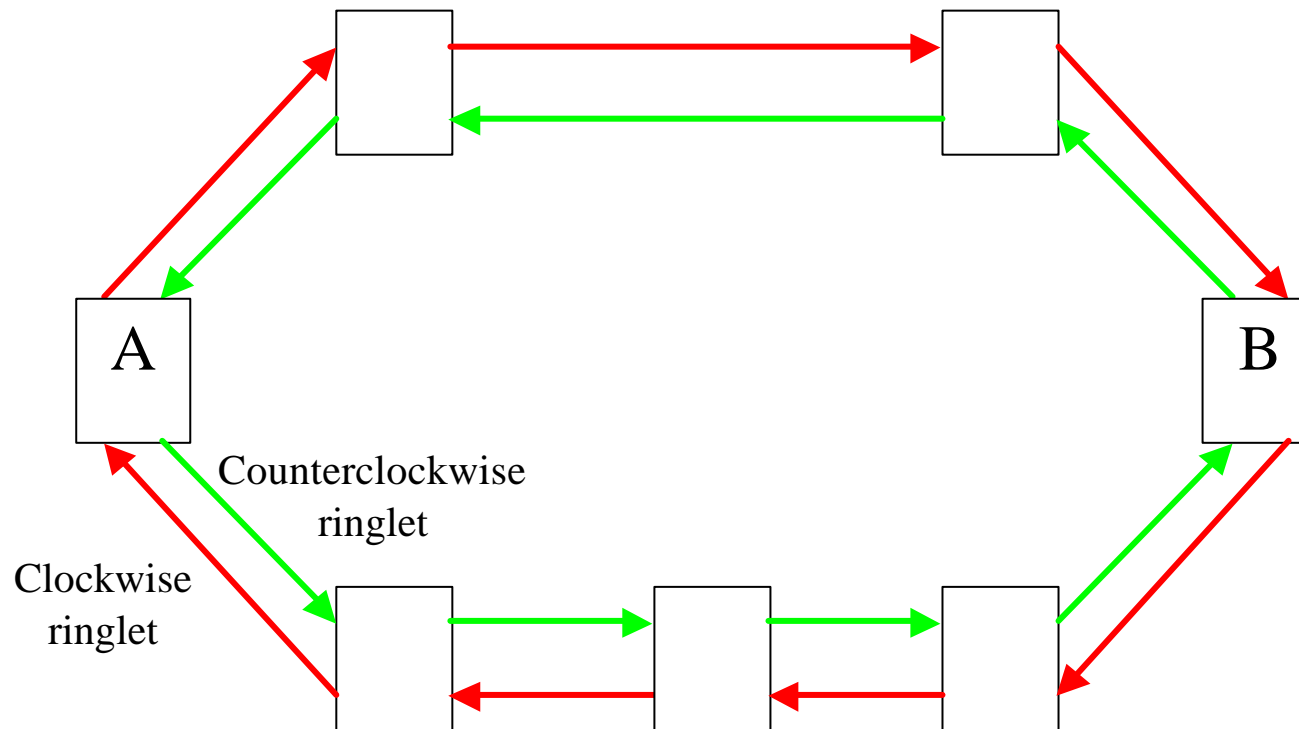
OAM Functionality in RPR



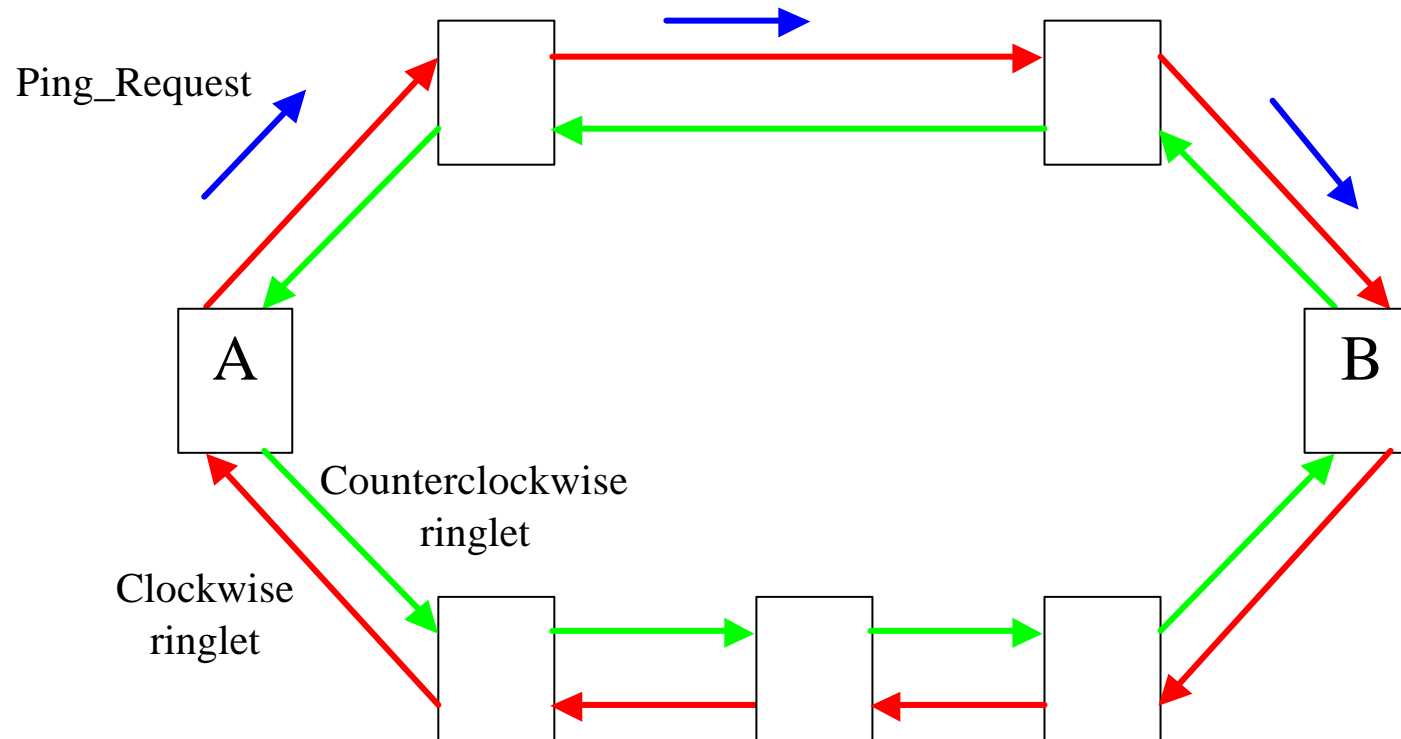
- ◆ We need an on-demand in-service troubleshooting mechanism to check reachability, at the MAC level, between two RPR stations on a ring
 - ◆ It is triggered on operator requests, through a traditional operator/NE interface (e.g. a CLI or a MIB interface)
 - ◆ It requires exchanging only two type of messages

- ◆ This mechanism is very similar to already existing mechanisms for connectionless networks, like the Ping in IP networks
 - ◆ Some enhancements are introduced for dual counter rotating ring topologies

Reference Ring Topology



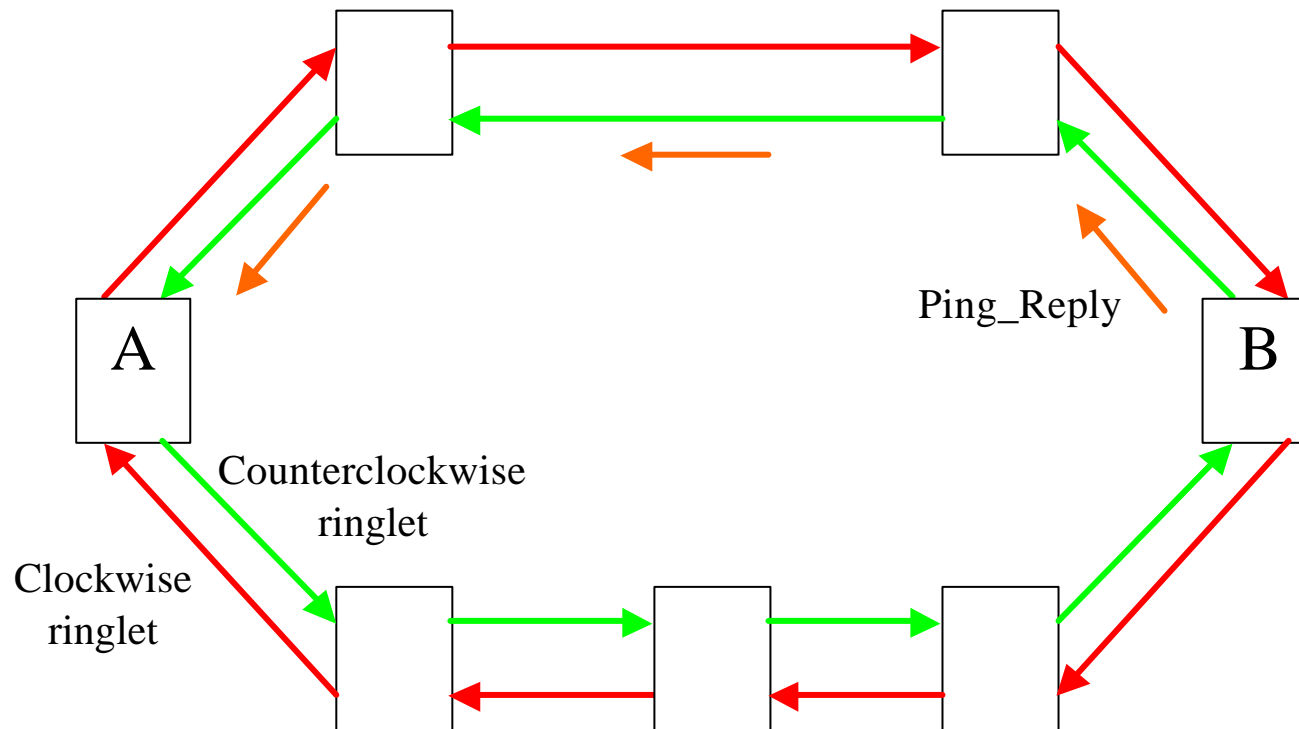
- ◆ Problem to be solved – check the reachability at the RPR MAC layer between the two stations A and B



- ◆ Operator asks node A to check reachability of node B
- ◆ Node A sends an RPR Ping Request to node B

Loopback request – options

- ◆ When asking for an RPP Ping, the operator can specify the following options
 - ◆ How the RPR ping request OAM RPR frame should be sent:
 - ◆ Through the shortest path (selected using the topology discovery information) – default
 - ◆ On the clockwise ringlet
 - ◆ On the counterclockwise ringlet
 - ◆ The CoS value to use for the loopback request (the highest priority – default)
 - ◆ How the addressed station should respond with the RPR ping reply OAM RPR frame
 - ◆ Through the shortest path (selected using the topology discovery information) – default
 - ◆ On the clockwise ringlet
 - ◆ On the counterclockwise ringlet



- ◆ When node B receives the RPR Ping Request, it generates the RPR Ping Reply to node A



RPR Ping Reply reception

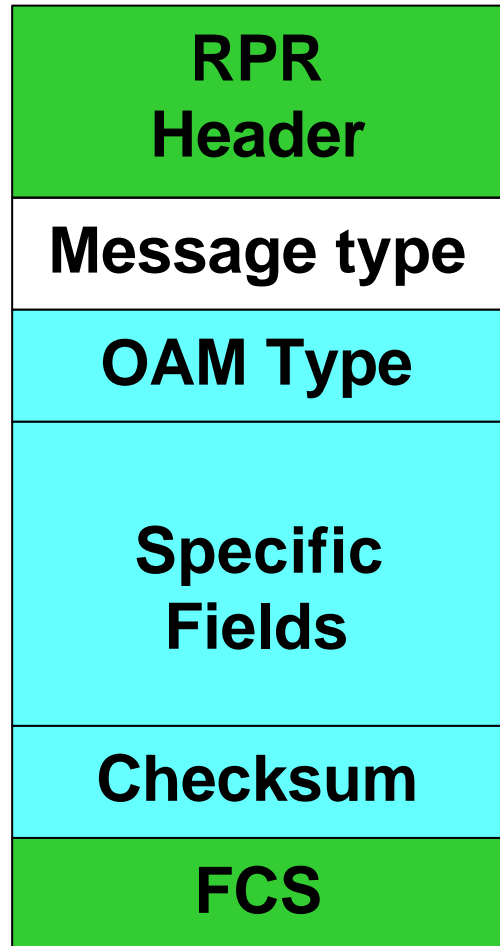


- ◆ When station A receives back the RPR Ping Request within a predefined timeout value it notifies the operator that the ping procedure has succeeded
- ◆ Otherwise, the ping procedure is declared as failed and the operator is notified about this failure



Loopback Messages Definition

OAM RPR Frame Format



- ◆ A OAM RPR control frame format is defined
 - ◆ This allows IEEE 802.17 to easily update OAM functionality
- ◆ Proposed values for the **OAM Type** are defined in the next slide
- ◆ The format, structure and syntax of the **Specific Fields** are defined for each OAM frame type
- ◆ The **Checksum** is the CRC-16 calculated on all the OAM payload (from the OAM Type field)

OAM Type Proposed Values

OAM Type	Description
0x00	RPR Ping Request
0x01	RPR Ping Reply
All the others	Reserved for future use

All the received RPR OAM frames that are addressed to the station and have a reserved OAM Type must be discarded

Ping Request OAM RPR Frame

RPR Header	
Message type	
OAM Type	1 Byte
Request Type	1 Byte
Identifier	2 Bytes
Sequence Number	2 Bytes
Checksum	2 Bytes
FCS	

- ◆ **OAM Type** – 0x00 value is assigned
- ◆ **Request Type** – Signal to the looped station how it has to respond
 - ◆ Proposed values are defined in the next slide
- ◆ **Identifier and Sequence Number** – Used to correlated requests with replies.
 - ◆ How to use them is left to the implementation.

Request Type Proposed Values

Request Type	Description
0x00	The echoed station replies on the ringlet chosen by the shortest path (via topology discovery)
0x01	The echoed station replies on the clockwise ringlet
0x02	The echoed station replies on the counterclockwise ringlet
0x03	The echoed station replies on the same ringlet it has received the request
0x04	The echoed station replies on the opposite ringlet it has received the request
All the others	Reserved for future use

All the received RPR OAM loopback request frames that have a reserved Request Type must be discarded

Ping Reply OAM RPR Frame

RPR Header	
Message type	
OAM Type	1 Byte
Reserved	1 Byte
Identifier	2 Bytes
Sequence Number	2 Bytes
Checksum	2 Bytes
FCS	

- ◆ **OAM Type** – 0x01 value is assigned
- ◆ **Reserved** – It is set to 0x00 in transmission and ignored in reception
- ◆ **Identifier and Sequence Number** – They are copied from the request message



Conclusion

Conclusions

- ◆ The RPR OAM ping can allow operators to check the reachability, at the MAC level, between two RPR stations on the ring
- ◆ This mechanism is very simple, implying the exchange of only two messages
- ◆ It is very similar to already existing mechanisms, like the IP Ping
 - ◆ It adds some particular testing features targeted to a dual counter rotating ring topology (RPR Rings)
- ◆ It is proposed to adopt this mechanism as an OAM functionality for the IEEE 802.17 RPR MAC Standard