



Topology Discovery

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Requirements

- Support 63 nodes, scalable up to 255 nodes
- Without a master node
- Plug and play for RPR ring operation
 - Ring topology
 - Node's attribute
- Quick convergent time



Topology Discovery

- Triggered by
 - While Node join the ring
 - Local fiber failure detection
 - Remote protection message received
 - Periodically
- Topology packets
 - Hop by hop unicast packet and source strip
 - Append node's attribute one by one around the ring



Topology Frame Format

2 OCTETS	RPR HEADER (TYPE=0x5)
6 OCTETS	DESTINATION MAC ADDRESS
6 OCTETS	SOURCE MAC ADDRESS
2 OCTETS	PROTOCOL=0x2007
2 OCTETS	HEADER CHECKSUM
1 OCTET	CONTROL VERSION(0x0)
1 OCTET	CONTROL TYPE(0x1)
2 OCTETS	CONTROL TTL
2 OCTETS	TOPOLOGY LENGTH
6 OCTETS	ORIGINATOR's MAC ADDRESS
2 OCTETS	MAC TYPE
2 OCTETS	MAC ADDRESS
nn OCTETS	OTHER MAC BINDINGS
4 OCTETS	FCS



Topology Frame Format(Cont)

- Control Version
 - The version number is zero
- Control Type
 - The control type value for topology discovery is 0x1.
- Control TTL
 - The control layer hop-count. Default is 255.
- Topology Length
 - The length of the topology message starting with the first MAC Type/MAC Address binding
- Topology Originator
 - Node's globally unique MAC address



Topology Frame Format(Cont)

- MAC type

Bit	Attribute
0	Single transit buffer(0)/Dual transit buffer
1	Ring Identifier(1 or 0)
2	Wrapped node(1)/Unwrapped node(0)
3	Wrap protection capable(1)
4	Steer protection capable(1)
5-7	Fairness message format version
8	9K Jumbo frame support(1)
9 -15	Reserved



Topology Packet Process

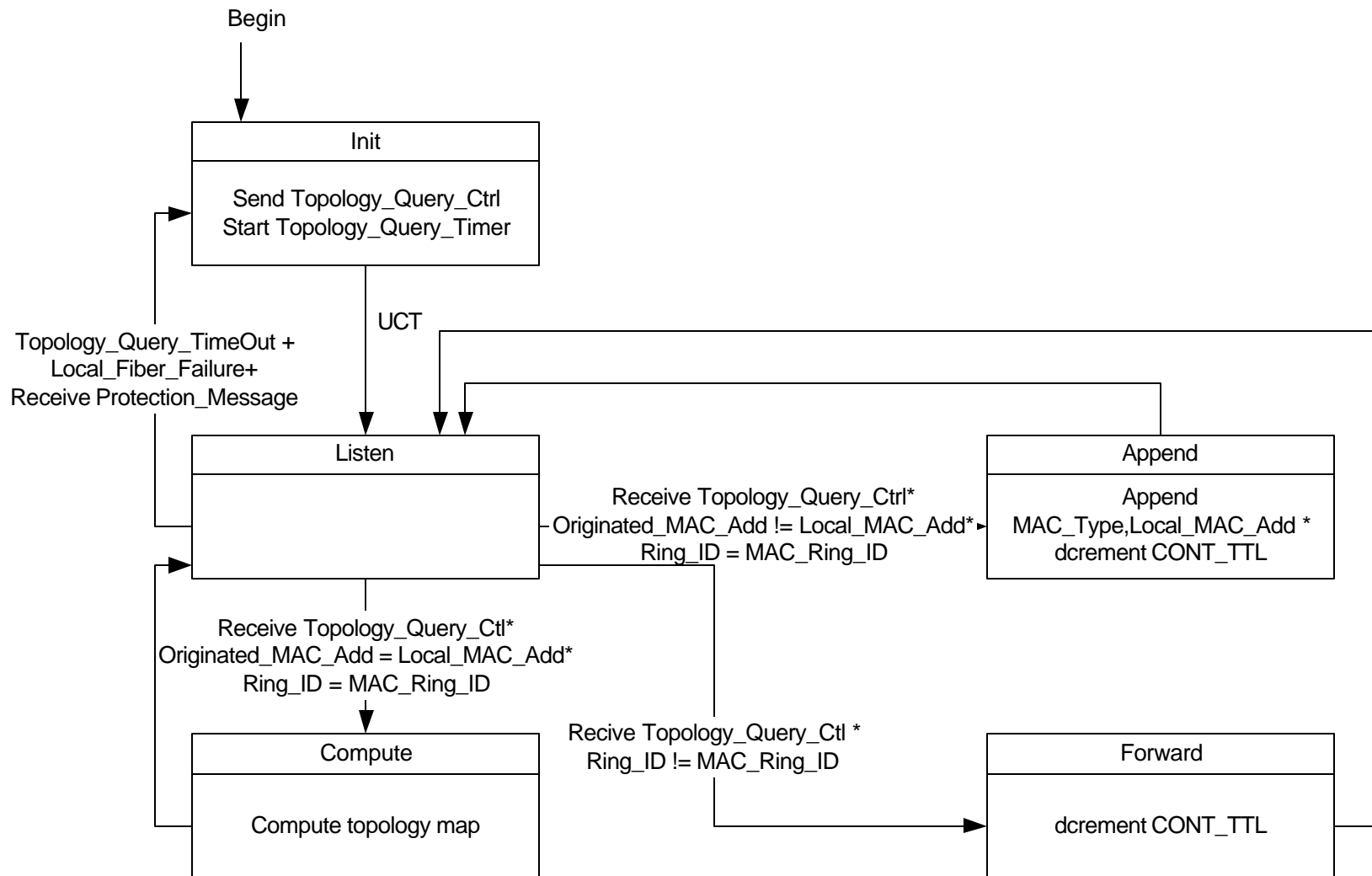
- If ring identifier of packet is matched with RPR MAC's
 - If the packet is originated by the node(Globally Unique MAC address match)
 - Strip the packet from ring and compute the topology map
 - Else
 - Decrement control TTL by one
 - If control ttl is zero, strip the packet from ring
 - Else append the MAC address, type
 - if fiber not failure, forward the packet to downstream node
 - Else forward to opposite ring



Topology Packet Process (cont)

- Else
 - Decrement control TTL by one
 - If the control TTL is zero, strip the packet from ring
 - Else
 - if fiber not failure, forward the packet to downstream node
 - Else forward to opposite ring

State Transition





Convergent Time

- Span propagation delay + Node process delay
 - 255 nodes, 200 km circumference
1ms(propagation delay)
+ 255 1ms(process delay) = 256 ms



Conclusions

- Convergent time is less than second
- Standard should have a simple efficient Topology Discovery protocol