

# MPLS-TP Shared Ring Protection (MSRP) Mechanism

draft-cheng-mpls-tp-shared-ring-protection-00

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# Problem Statement

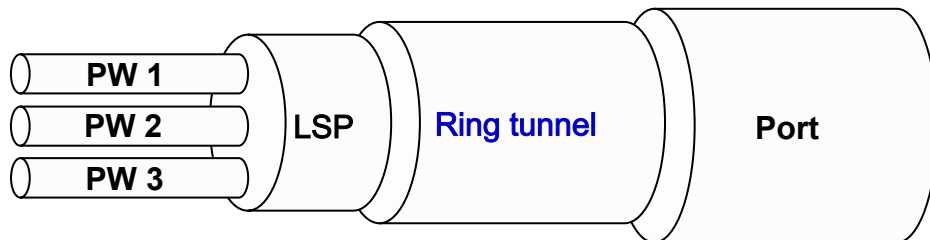
- The proposal (MSRP) in draft-cheng-mpls-tp-shared-ring-protection provides effort to meet the requirements described in RFC 5654 about protection mechanism in a ring topology for MPLS-TP networks, with special considerations of
  - Recovery for multiple failures
  - Upgrade from linear protection to ring protection
  - Configuration complexity
- The proposal(MSRP) is designed based on the existing ring protection mechanisms for transport networks.
  - *“MPLS-TP recovery techniques SHOULD be identical (or as similar as possible) to those already used in existing transport networks to simplify implementation and operations. (from RFC 5654)”*.

# Scope

- This document focuses on the ring protection mechanism for point-to-point MPLS-TP transport path.
- The solution for point-to-multipoint MPLS-TP transport path is under evaluation and will be illustrated in a separate document.

# “Ring tunnel ” in MSRP

- A logical ring tunnel is introduced for both working LSP and protection LSP
  - to minimize the number of labels for protection paths,
  - to minimize the number of recovery elements in the network, and
  - to optimize the number of control and management transactions necessary,.
- Once the ring tunnel is established , the configuration, management and protection of the ring are all based on the ring tunnel.
  - One port can carry more than one ring tunnel;
  - One ring tunnel can carry several LSPs.



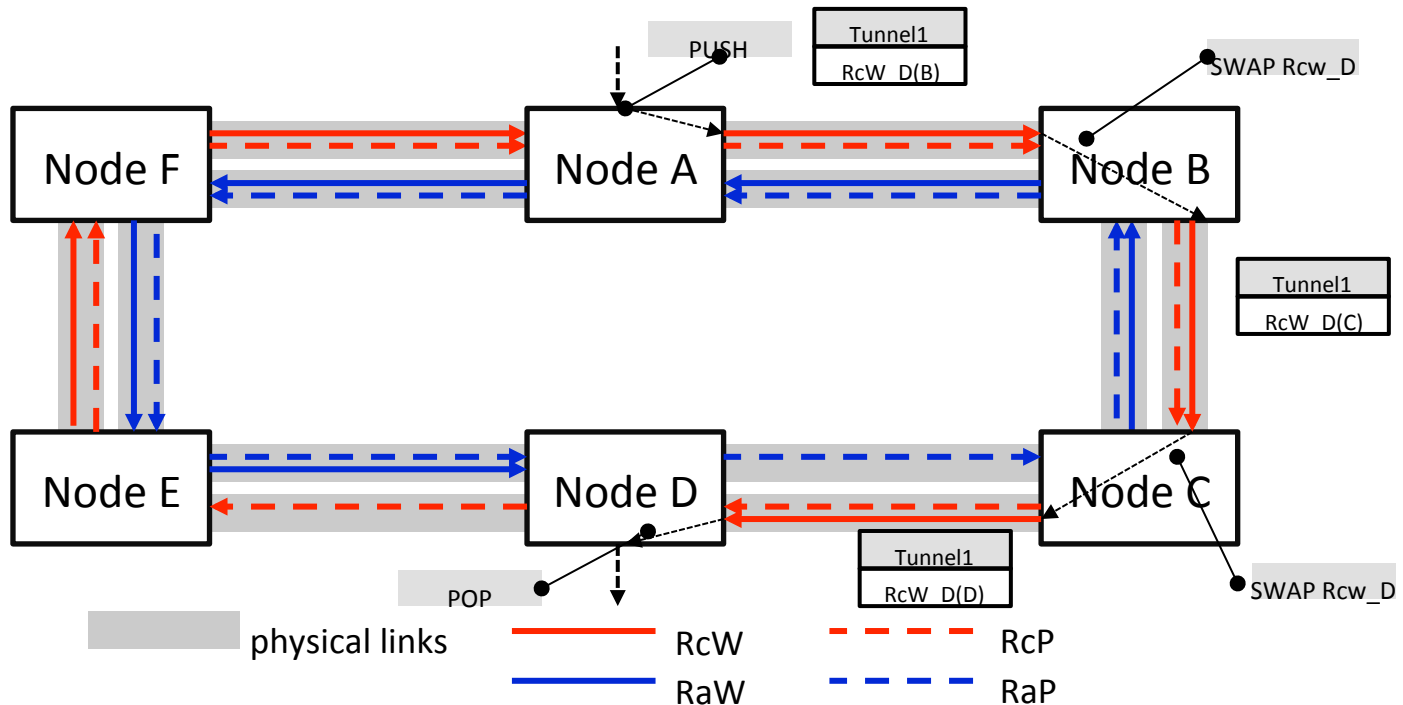
The logic ring tunnel in MSRP

<b>Ring tunnel label</b>
LSP label
PW label
Payload

Label stack used in MSRP

# Establishment of the Ring tunnels in MSRP

- Ring tunnels are created per **exit** node. The exit node means the node on the ring where the traffic leaves the ring. **All the LSPs which transverse the ring and exit at the same ring node share the same working ring tunnels and protection ring tunnels.** For each exit node, 4 ring tunnels are established:
  - 1 clockwise working ring tunnel, protected by
  - 1 anticlockwise protection ring tunnel
  - 1 anticlockwise working ring tunnel, protected by
  - 1 clockwise protection ring tunnel.
- An example of MSRP ring tunnel is shown below for where Node D behaves as an exit node. The similar provisioning of ring tunnels should be repeated for every other node on the ring.
- The following description takes LSP A-B-C-D as the working LSP.



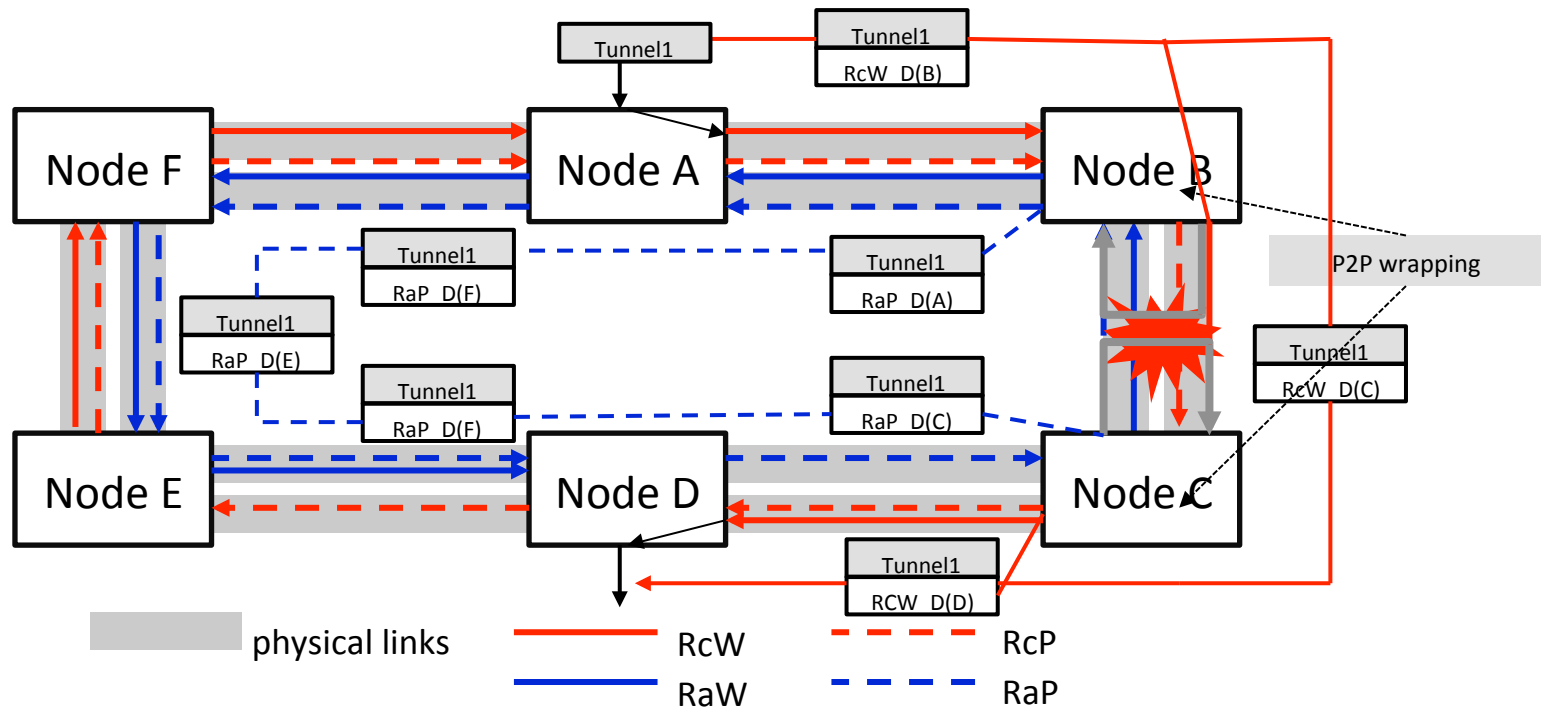
**MSRP Ring tunnels(Node D as an exit node )**

# Distribution of Ring tunnel Labels

- Ring tunnel labels are distributed by means of downstream-assigned mechanism as defined in [RFC3031].
  - When an MPLS-TP transport path, e.g. LSP, enters the ring, according to the ring ID and the exit node, the ingress node pushes the working ring tunnel label and sends the traffic to the next hop;
  - The transit nodes of the working ring tunnel swap the ring tunnel label and forward the packets to the next hop;
  - When arriving at the egress node, the egress node pops the ring tunnel label and forwards the packets based on the inner LSP label and PW label.

For simplicity, only the protection switching for the working LSP A-B-C-D in one direction is described.

## P2P wrapping for link failure

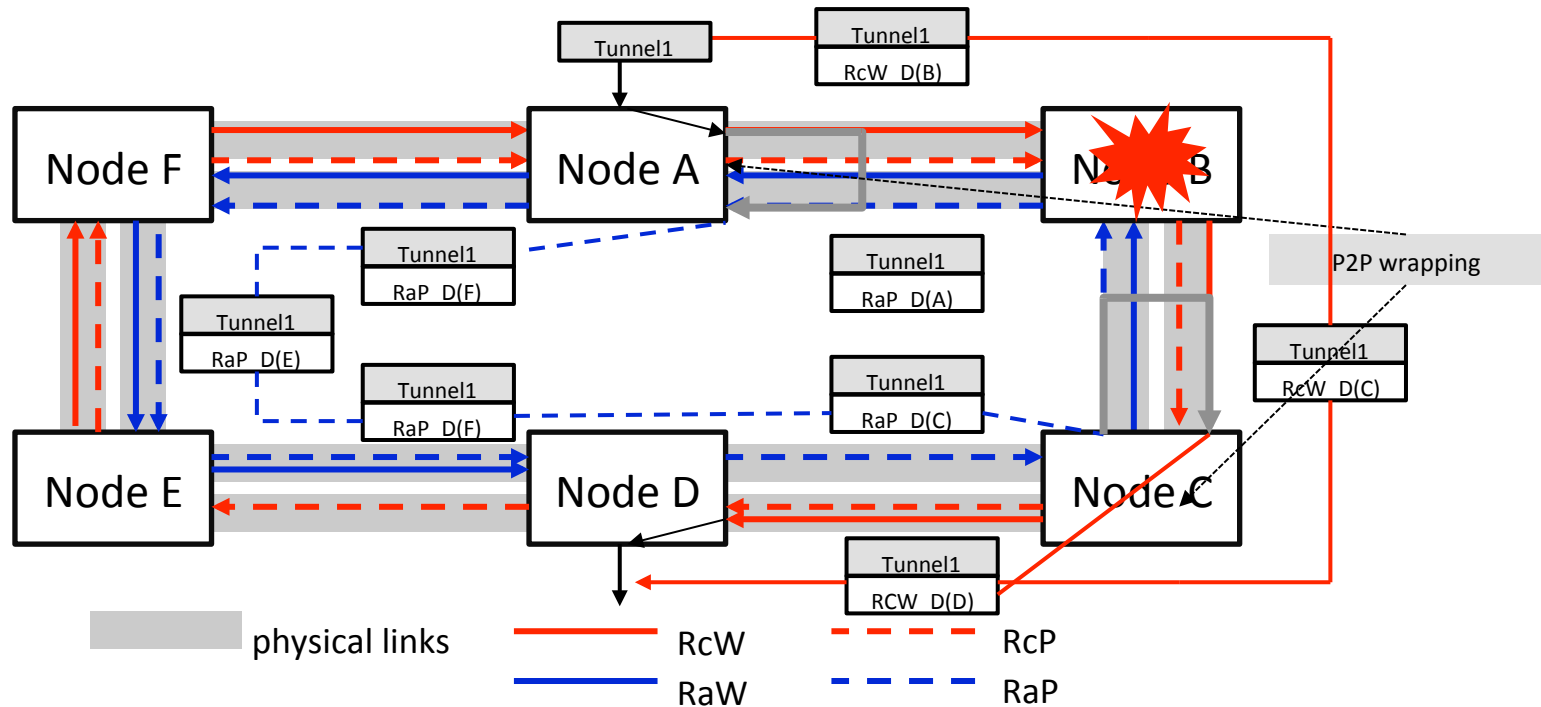


### P2P wrapping for link failure (Link B-C fails)

- **Failure detection** : When a link failure between Node B and Node C occurs, both Node B and Node C detect the failure by MPLS-TP OAM mechanism.
- **Wrapping** :
  - Node B switches the clockwise working ring tunnel(RcW\_D) to the anticlockwise protection ring tunnel (RaP\_D) and switches the clockwise protection ring tunnel(RcP\_D) to the anticlockwise work ring tunnel(RaW\_D).
  - Node C switches anticlockwise protection ring tunnel(RaP\_D) to the clockwisework ring tunnel(RcW\_D).

For simplicity, only the protection switching for the working LSP A-B-C-D in one direction is described.

## P2P wrapping for node failure



### P2P wrapping for node failure (Node B fails)

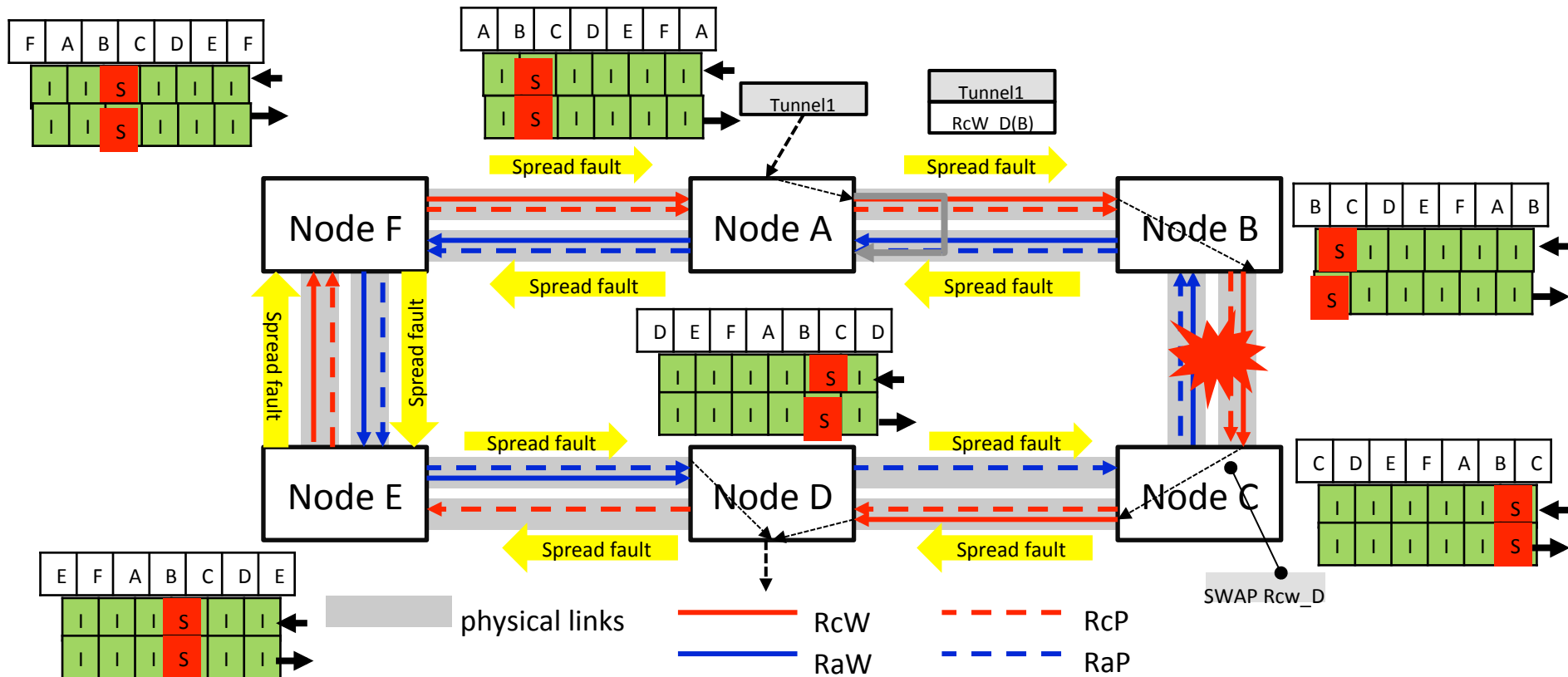
- **Failure detection** : When Node B fails, its neighbour nodes Node A and Node C detect the failure by MPLS-TP OAM mechanism.
- **Wrapping** :
  - Node A switches the clockwise working ring tunnel(RcW\_D) to the anticlockwise protection ring tunnel (RaP\_D) and switches the clockwise protection ring tunnel(RcP\_D) to the anticlockwise work ring tunnel(RaW\_D).
  - Node C switches the anticlockwise protection ring tunnel(RaP\_D) to the clockwise work ring tunnel(RcW\_D) and switches the anticlockwise work ring tunnel(RaW\_D) to the clockwise protection ring tunnel(RcP\_D).



For simplicity, only the protection switching for the working LSP A-B-C-D in one direction is described.

# P2P Steering

- Failure detection** : Each working ring tunnel is associated with a protection ring tunnel in the opposite direction. Every node needs to know the ring topology by configuration or topology discovery. When the failure occurs, the nodes which detect the failure will spread the fault indication in the opposite direction node by node in the ring.
- Steering** : When the node receives the message of fault indication, it will quickly figure out the location of the fault based on the topology information that is maintained by itself, so that it will determine whether the LSPs enter the ring from itself needs a switch-over. If yes, it will switch the LSPs from the working ring tunnel to its protection ring tunnel. If no, it will ignore the fault indication message.



**P2P steering**

# Next Step

- MSRP switching mechanism to be added.
- Any enhancement based on the feedbacks from the group