



RPR Protection

Gal Mor, Corrigent

Jim Kao, Cisco Systems

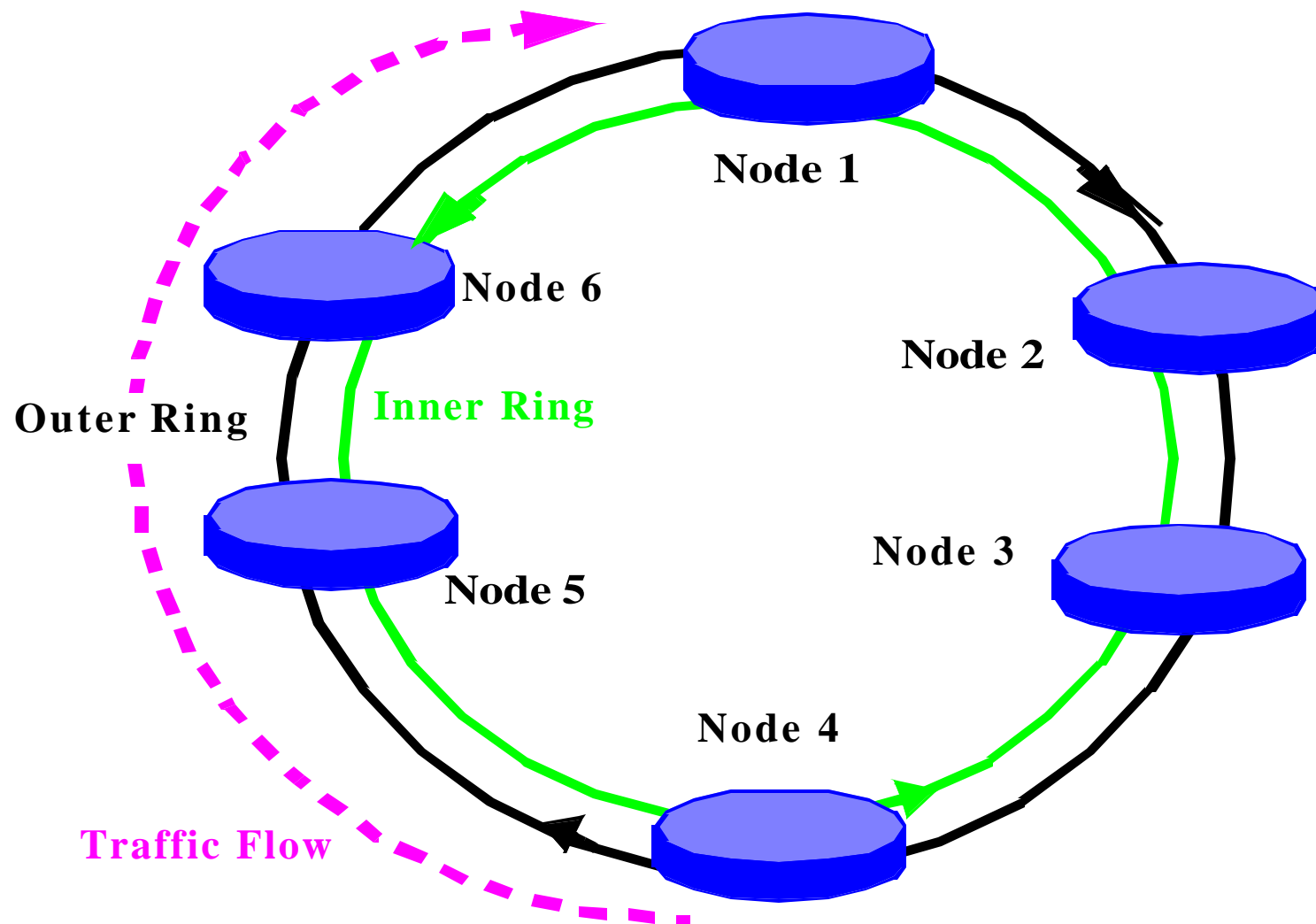


Requirements

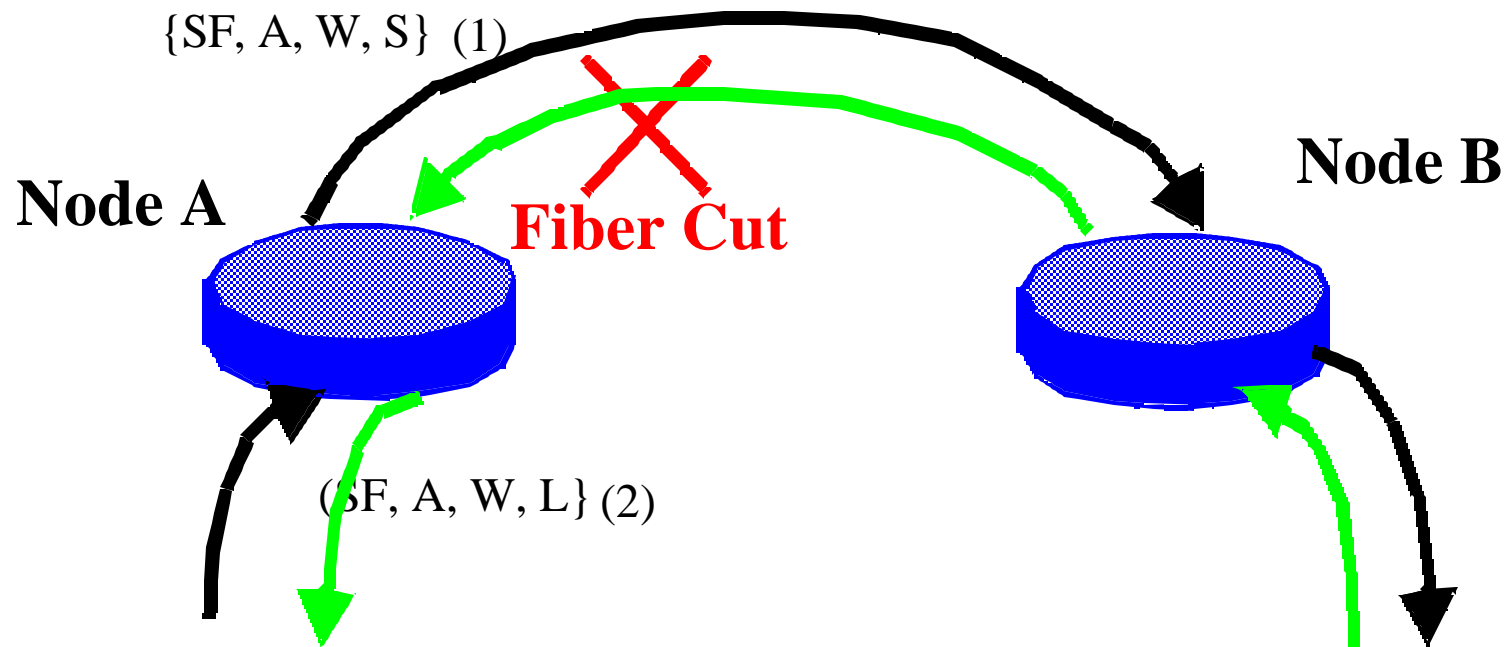


- Protection within 50 ms
- Wrap protection is required
- Steer protection is optional
- Use topology discovery protocol to determine nodes protection method support
- If all nodes can do both
 - Operator's selection
- If steer don't support on all nodes use wrap protection (SWIS)
 - certain packets can be designated steer only

RPR Ring



Fiber Failure Detection

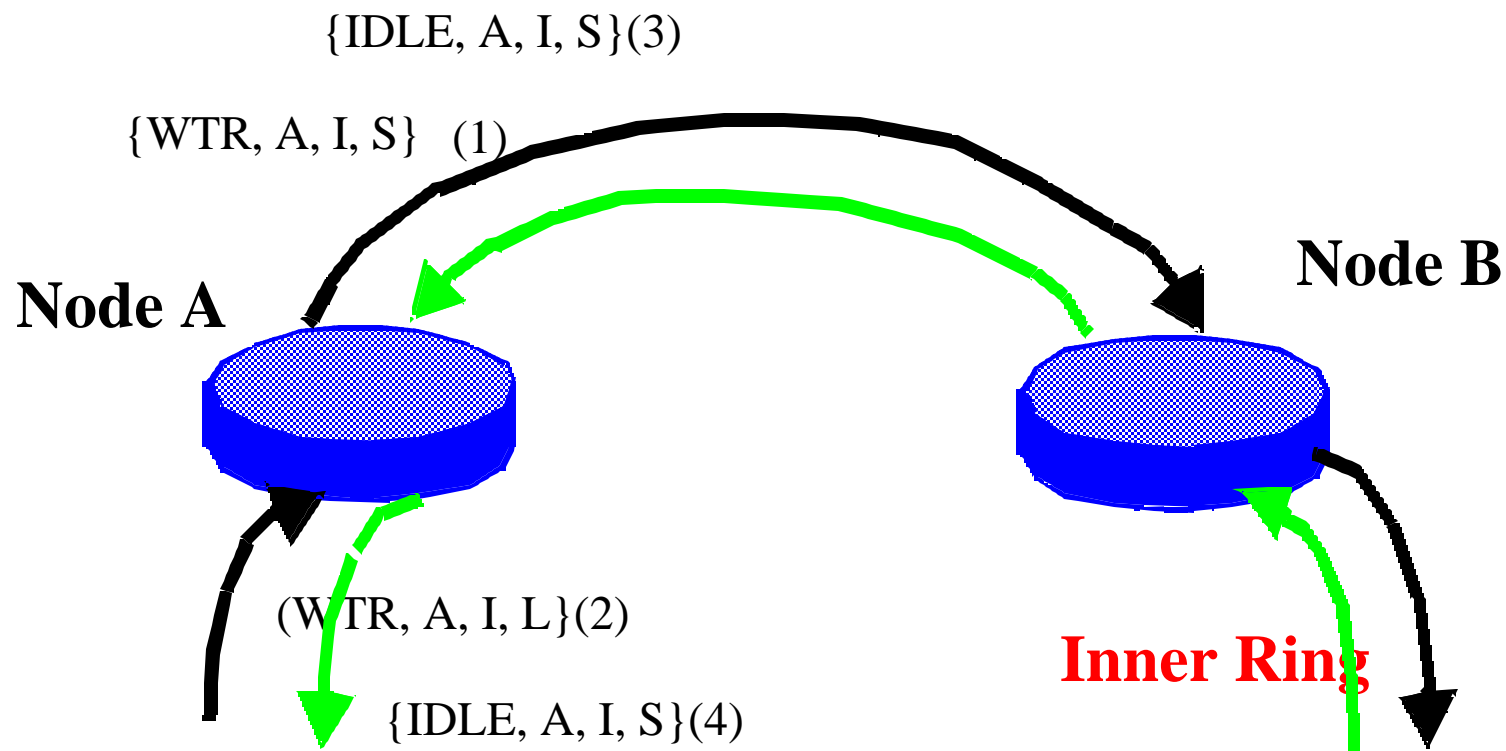




Fiber Failure Detection(cont)

- Station that noticed a failure on its receiver port will generate:
 - Broadcast “Short” message on the opposite ring
 - Broadcast “Long” message around the ring, away from the failure
- The Station will repeat protection message generation every $T1$ sec until receive its protection message back
 - Recommendation: $T1 = 1$

Fiber Recovery





Fiber Recovery(Cont.)

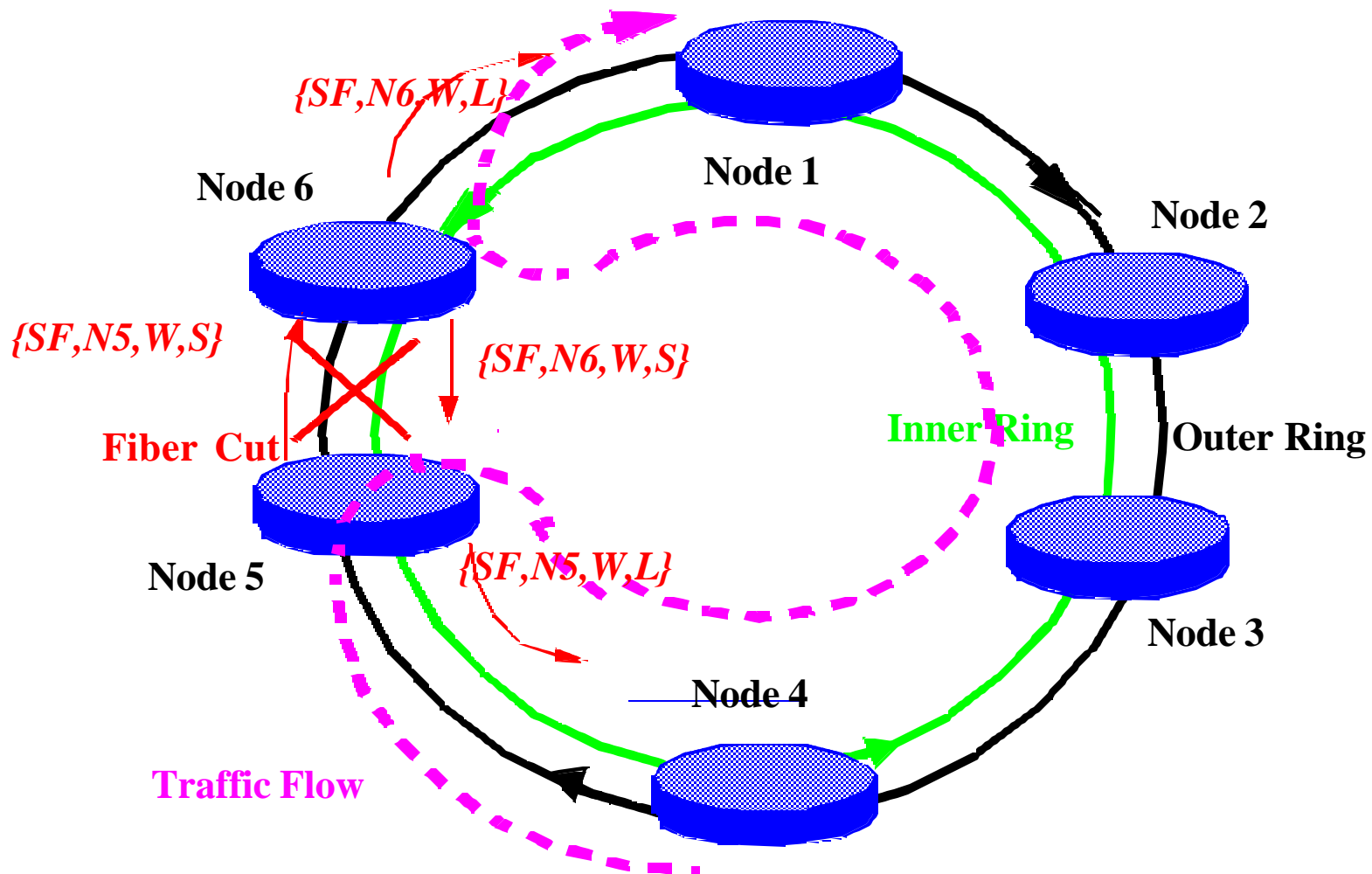
- Station that detects disappearance of failure on its interface will generate:
 - “Short” message with WTR indication on the opposite ring
 - “Long” message with WTR indication around the ring, away from the recovered failure
- Station will repeat the protection generation every T_1 sec until it receive its protection message back



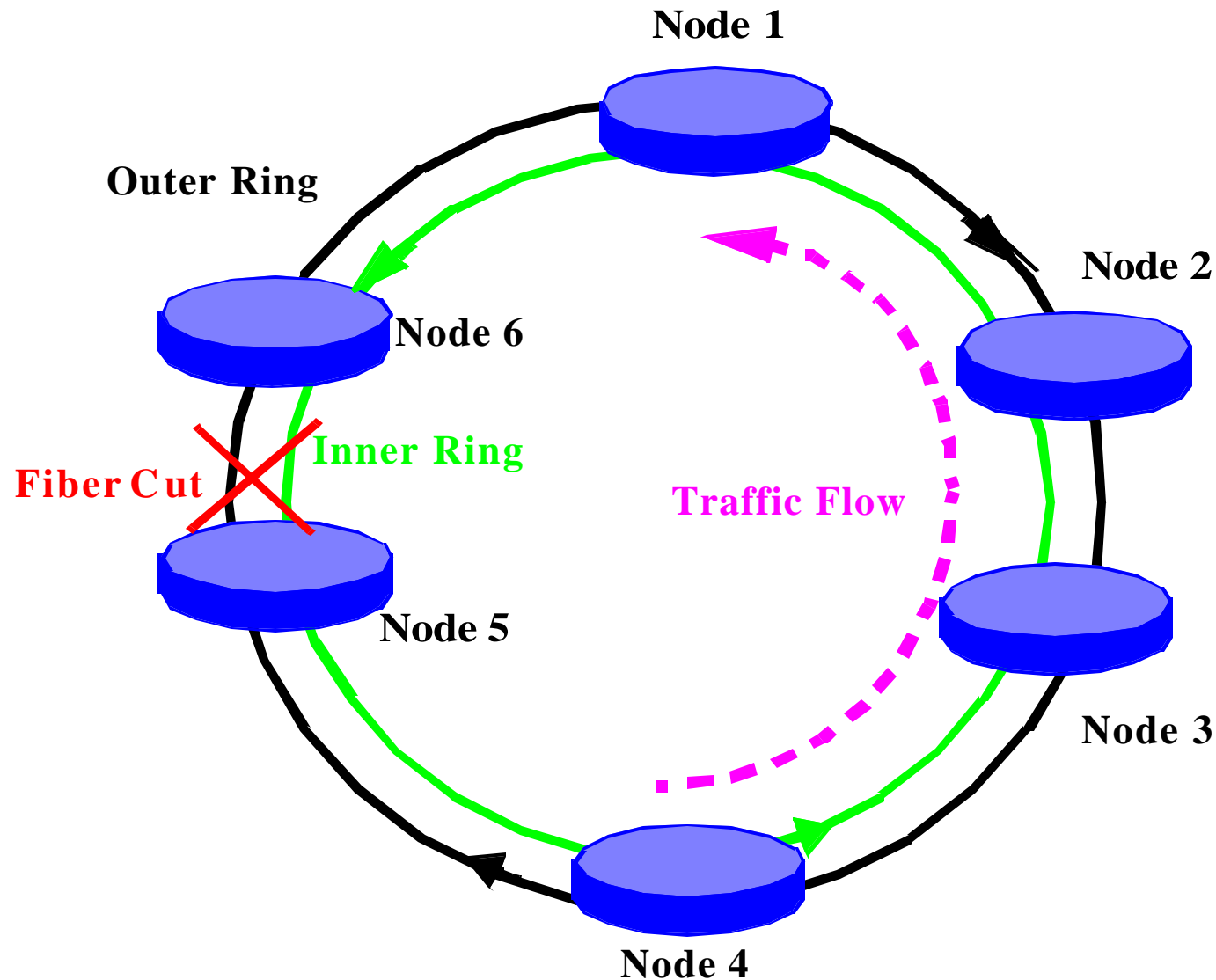
Fiber Recovery(Cont.)

- After WTR period, the Station will generate:
 - “Short” message with IDLE indication on the opposite ring
 - “Long” message with IDLE indication around the ring, away from the recovered failure
- The IDLE messages are generated only once

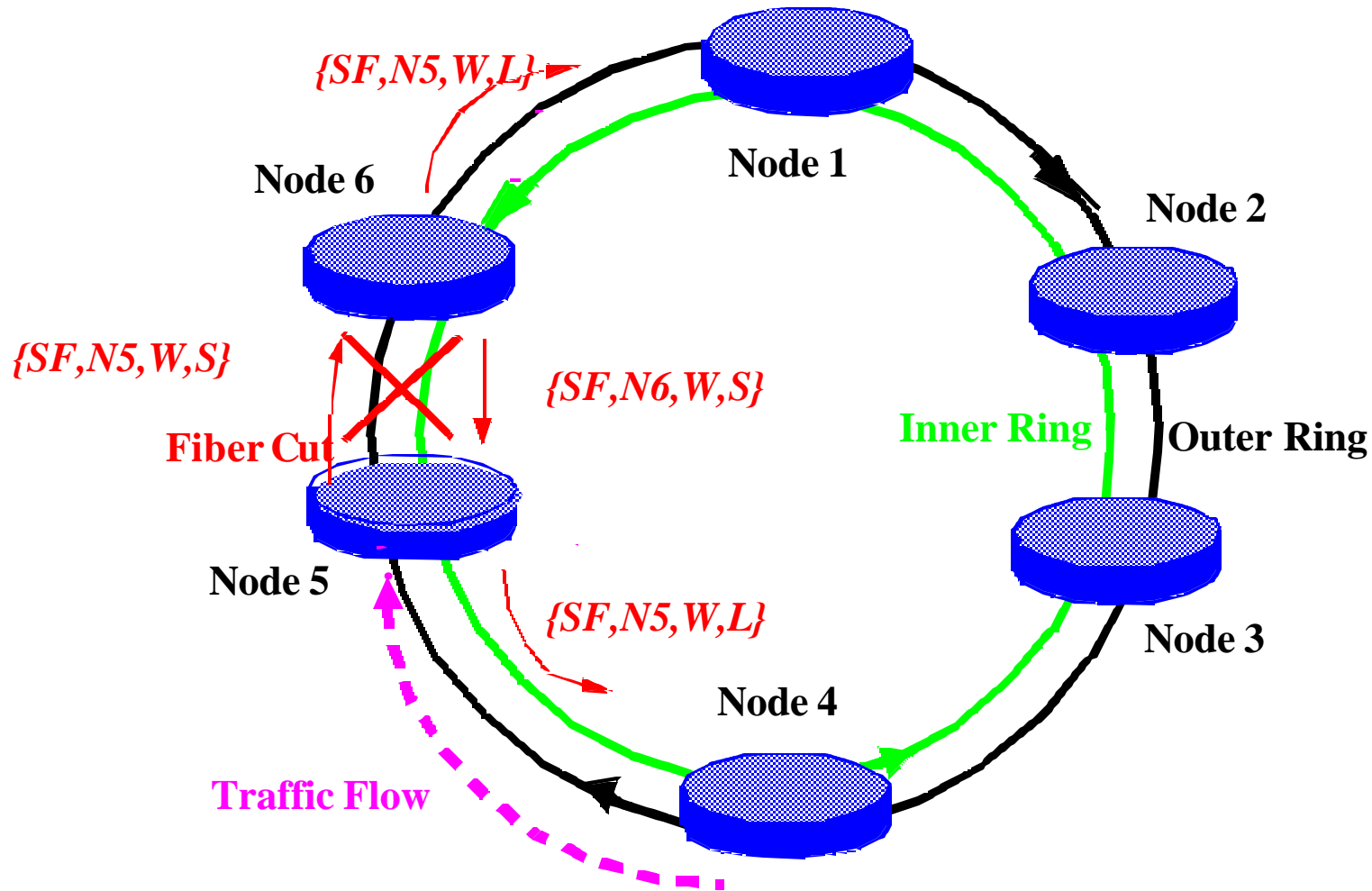
Wrap Protection



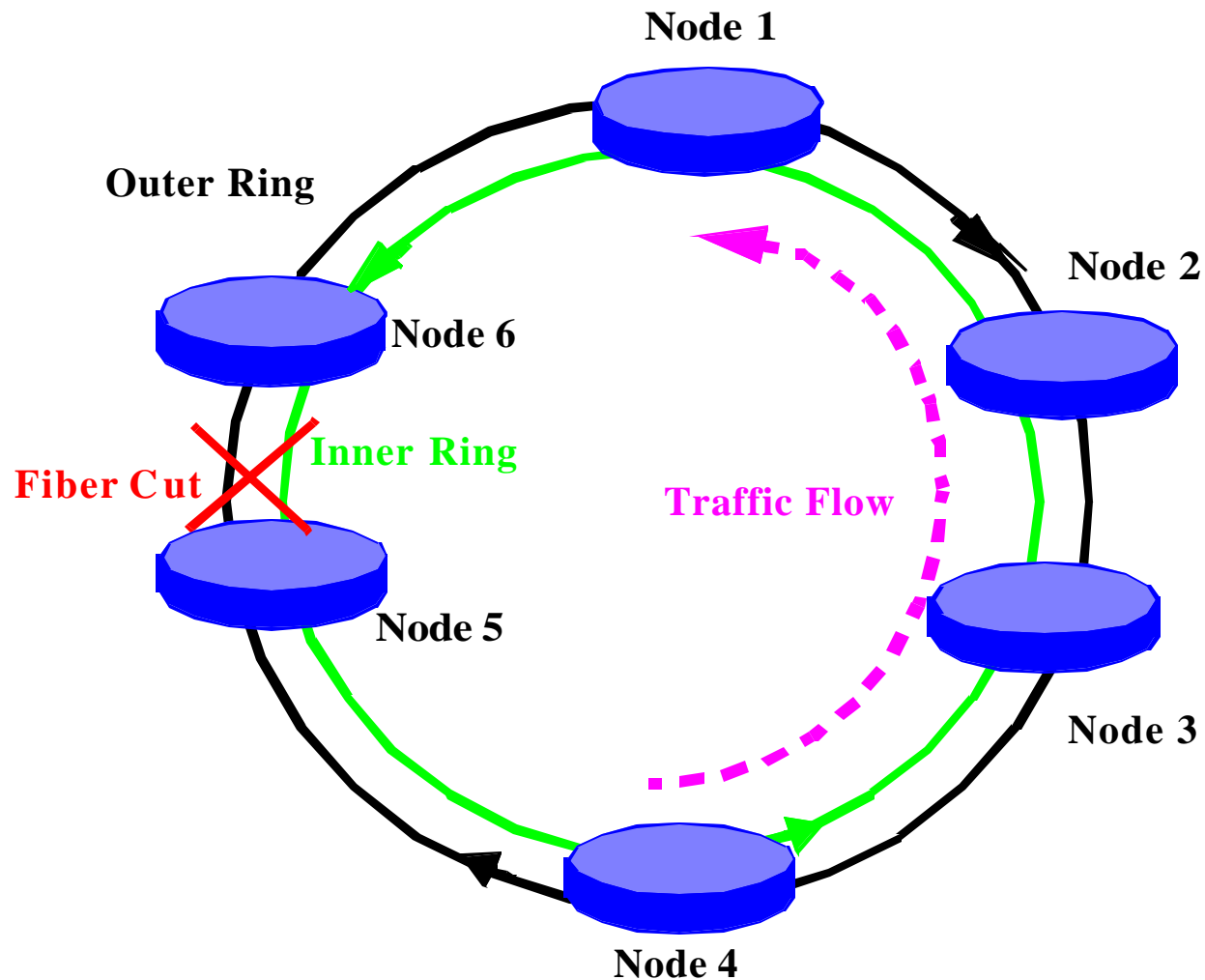
Optional Steering after Wrap Protection



Steer Protection



Steer Protection (Cont.)





Comparison

- Wrapping provides fastest response to failure
 - no need to communicate with all other stations for corrective action
 - lowest packet loss
 - no special cases for multicast packets
- Steering does not require a “Mate” link
 - simpler HW
 - not an issue for a dual ringlet MAC chip



SWIS

- Packets Wrap based on “type” field
- On failure the wrapping node will discard packets with the “steering only” indication in the “type” field
- For “steering only” packets:
 - Packet source node will set type field to: “steering only”
 - Source node is responsible to perform Steer within 50 msec



SWIS applications

- Wrap protection for Multicast and Control, Steer protection for Unicast
- Wrap protection for BE traffic, Steer protection for TDM



Protection Message

- Messages sent on fault detection/recovery in broadcast style.
- Protection message format{Request_Type, Source_Address, Wrap_Status, Path_indicator}
- Request_Type
 - Force Switch
 - Signal Fail
 - Signal Degrade
 - Manual Switch
 - Wait to Restore
 - Idle

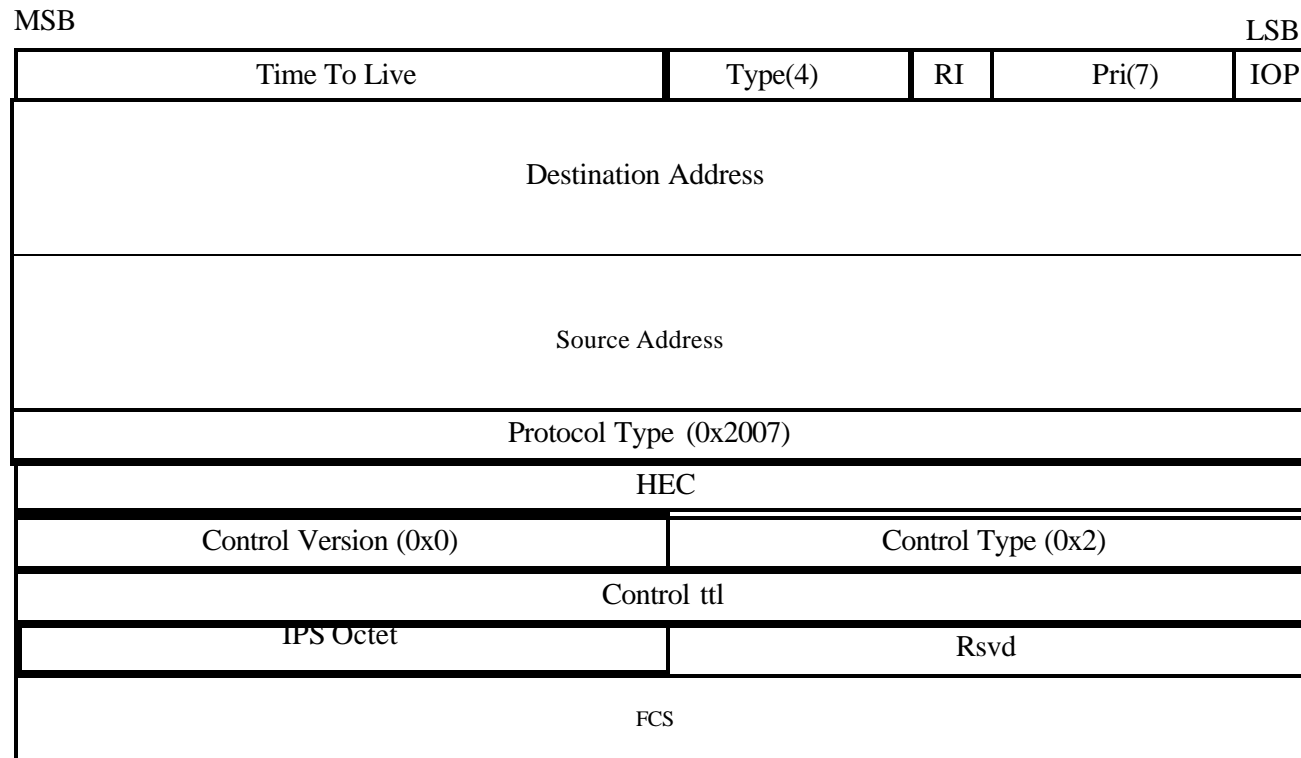


Protection Message(Cont.)

- Wrap_Status
 - Idle
 - Wrap
- Path_indicator
 - Short message
 - Toward upstream nodes on failed ring through opposite ring
 - Long message
 - Toward downstream nodes on failed ring



Protection Control Message Frame Format





Conclusions

- Same message format can be used for either steering or wrapping
- Standard should have wrap as the base case and steer as an optional case