

Avoiding Frame Duplication and Misordering in 802.17

David James (dvj@alum.mit.edu)

Anoop Ghanwani (anoop@lanterncom.com)

Overview

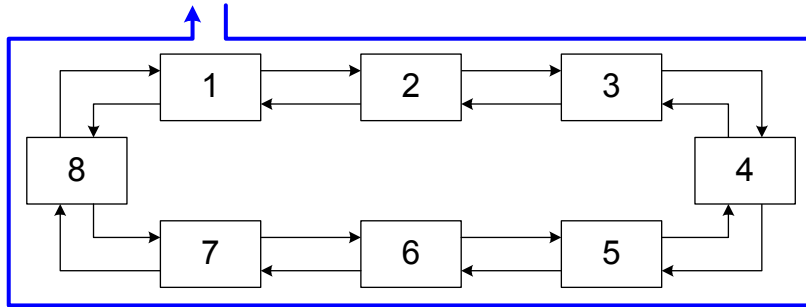
- This presentation describes the high-level concepts of a proposal for achieving zero frame duplication and misordering in 802.17
- The details are provided in separate presentation and in a detailed write-up

Functional Requirements

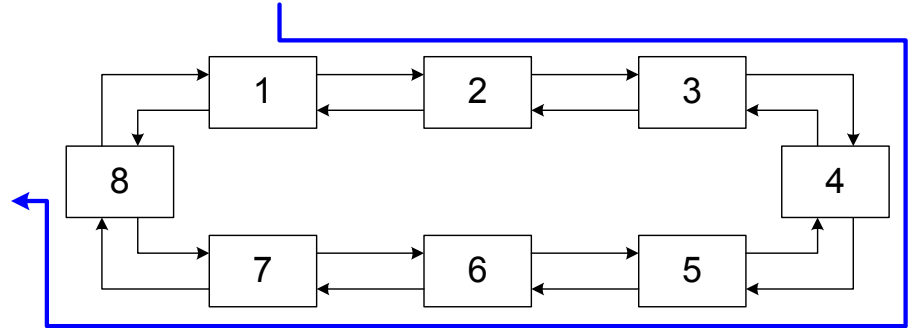
- There are many ways to flood frames
 - unidirectional, bidirectional symmetric, bidirectional asymmetric, etc.
- A node should be able to source frames without knowing that topology maps on all nodes on the ring are in sync
- Must be able to support bridged and non-bridged traffic

Flooding Alternatives

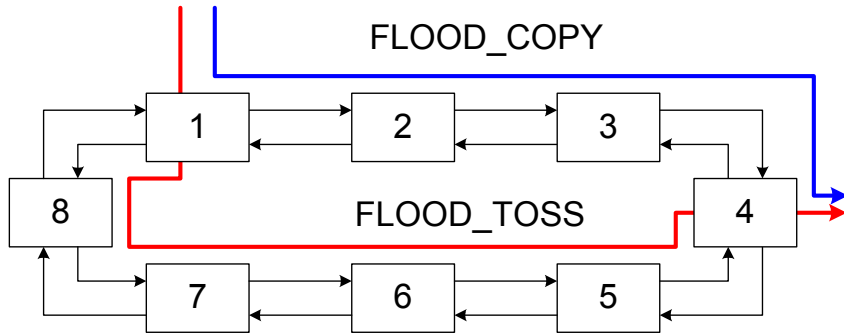
Unidirectional1



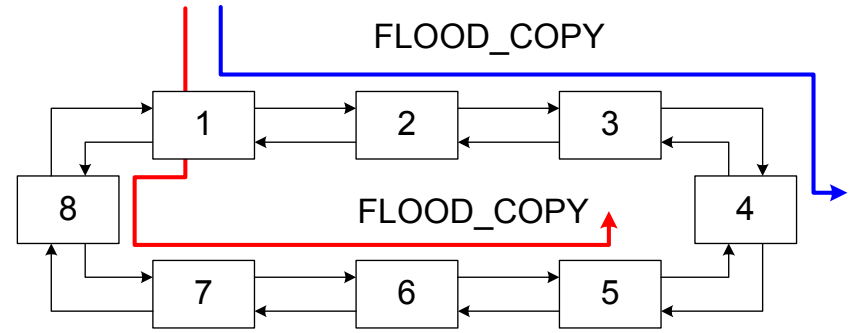
Unidirectional2



Bidirectional1



Bidirectional2



Basic Elements of the Proposal

- Ring-local source and destination station IDs are required for all frames
 - Even for flooded frames, the DSID is set to the node that will strip it
- A bit in the header is used to indicate FLOOD_TOSS or FLOOD_COPY
- A special procedure must be followed for marking and validating wrapped frames

Validation of Frames to Protect from Potential Duplication

- Nodes use the information provided by topology and protection to create a topology map
- If the TTL, SSID and DSID in the frame are not in sync with what the node expects per the topology map, the frame is discarded
 - The SSID identifies the source
 - The DSID identifies the destination
 - The TTL tells us how many hops the frame has traveled so far

Why Use Station IDs?

- Explicitly identifying the source and destination on the ring helps with bridging
- The MAC DA and SA always refer to end stations
- Without station IDs, it is not possible to strip bridged frames based on source / destination address
 - Also increases potential of frame duplication during failure scenarios
- Stations IDs can either be
 - 48-bit MAC addresses (requires a CAM in the transit path)
 - 8-bits or fewer depending on max. number of stations supported (How to ensure uniqueness?)

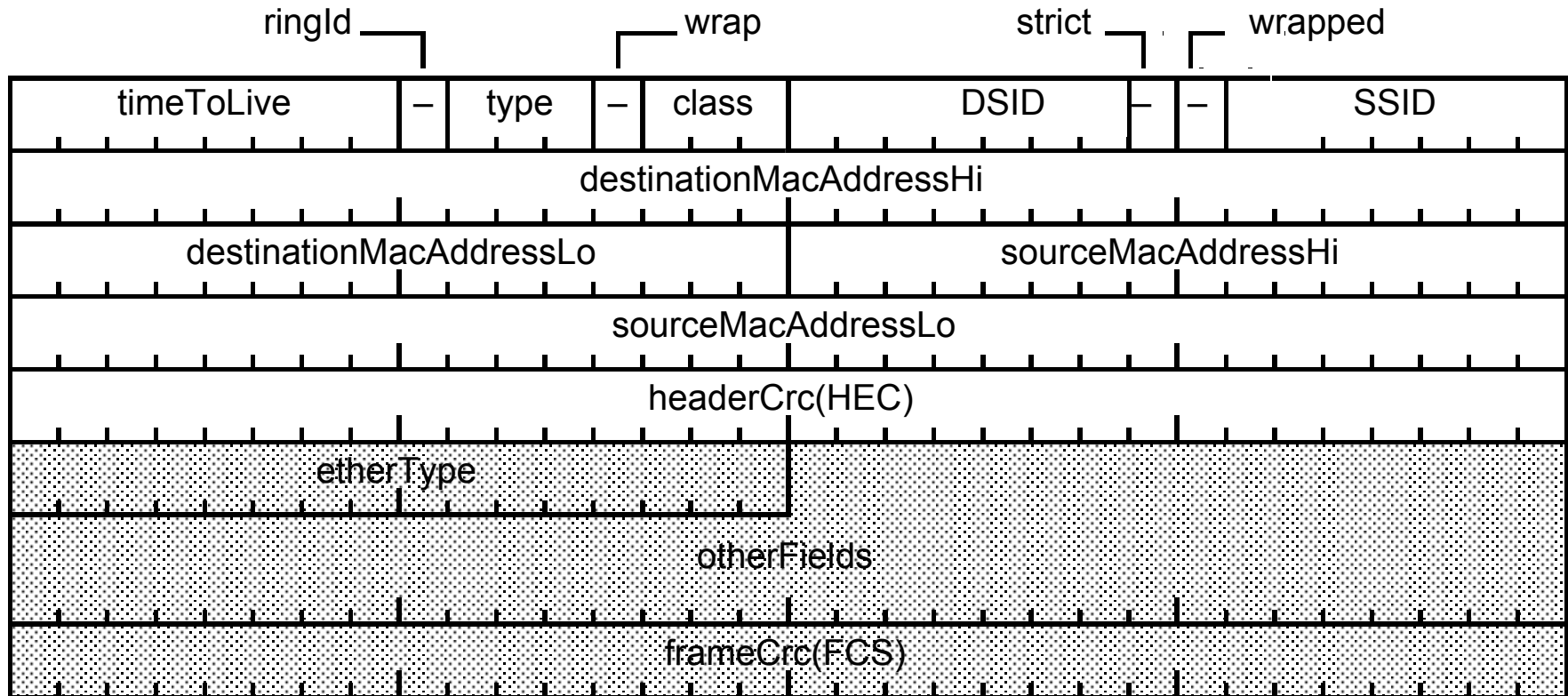
Assignment of 7-bit Station IDs

- 7-bits supports a maximum of 128 stations on the ring
- Manual configuration is one possibility
- Topology discovery can be enhanced to provide these in an automated fashion
 - Details are provided in a written contribution

Avoiding Frame Misordering

- Requires a ring purge whenever the flooding mechanism changes, e.g. unidirectional to bidirectional, etc.
 - A flooding mechanism change is warranted by a protection event
- This can be achieved by having each node do the following when it sees a protection status message indicating a change
 - Empty its transit buffers
 - Source no new traffic for a RTT

Proposed Frame Format



Summary

- A high-level overview of a method for avoiding frame duplication and misordering in 802.17 was discussed
- This proposal requires only 2 additional bytes to be added to the frame as part of RPR control
- The frame format is fixed regardless of whether or not traffic is bridged
- The details are provided in an accompanying written contribution and in a separate presentation