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
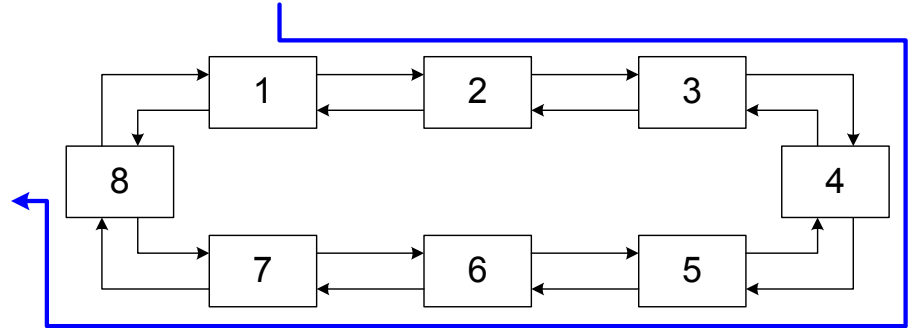
Functional Requirements

- 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
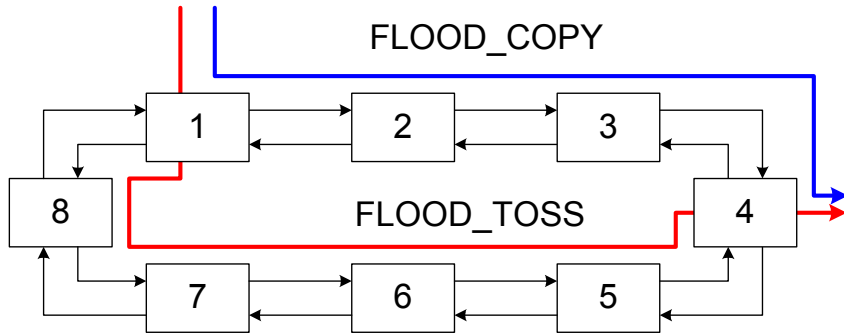
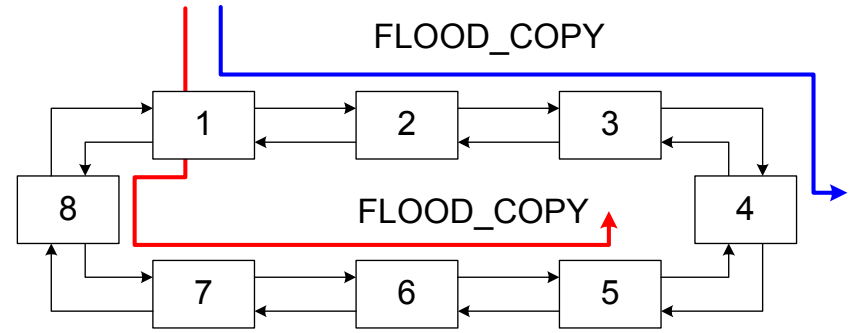# Flooding Alternatives

Unidirectional1
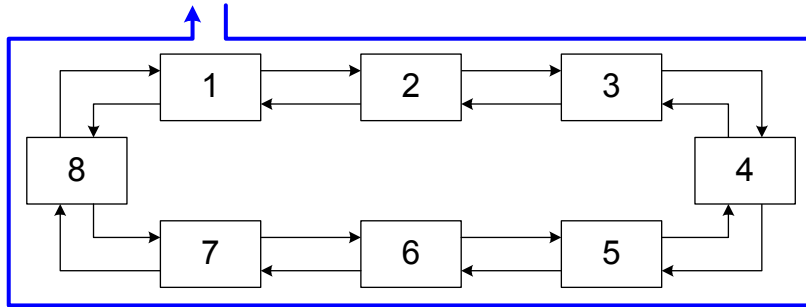
Unidirectional2

Bidirectional2

FLOOD_COPY

FLOOD_TOSS

Bidirectional1

FLOOD_COPY

FLOOD_COPY

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?)
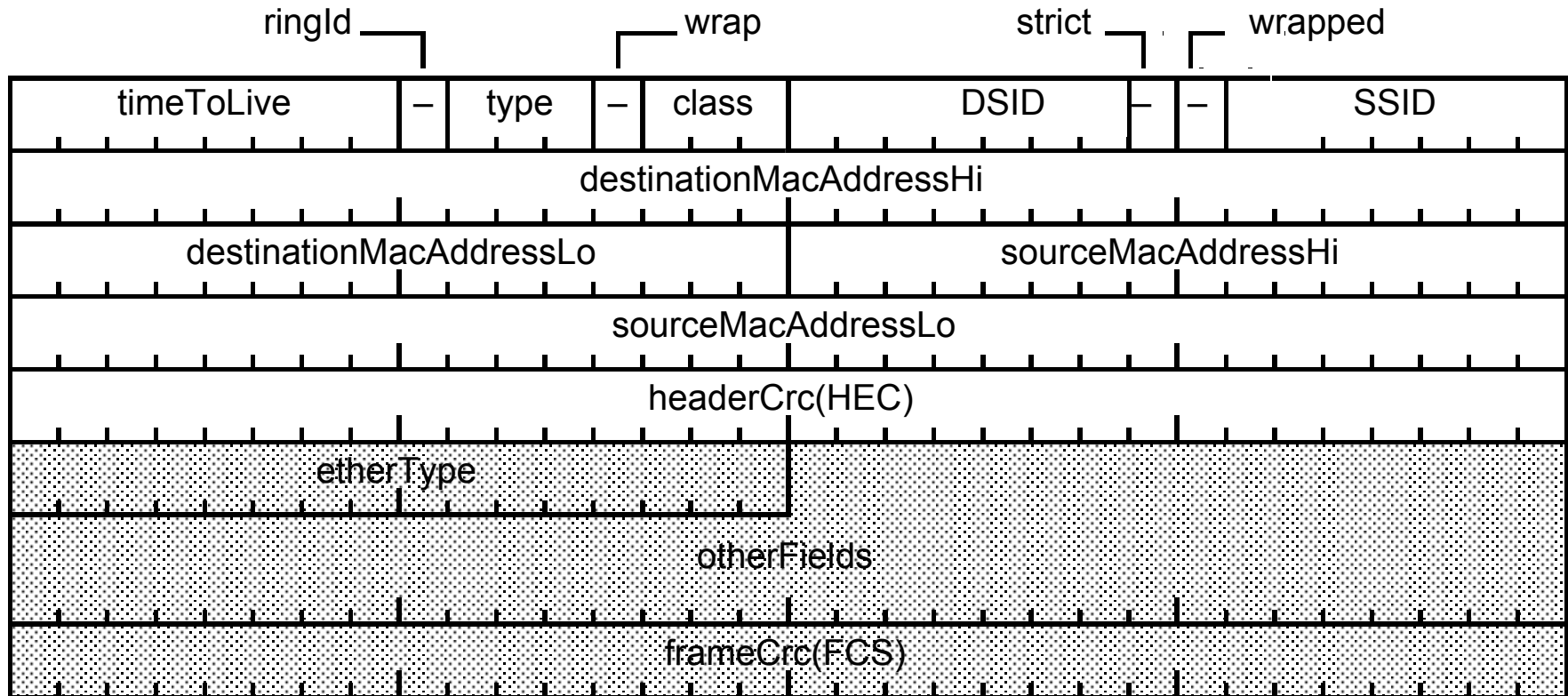
Assignment of 7-bit Station IDs

- 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.

- 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

- For non-protection related changes to the flooding method, a node must be silent for 1 RTT

Proposed Frame Format

ringId		wrap		strict		wrapped	
timeToLive	–	type	–	class	DSID	–	–	SSID

destinationMacAddressHi

destinationMacAddressLo	sourceMacAddressHi

sourceMacAddressLo

headerCrc(HEC)

etherType

otherFields

frameCrc(FCS)

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