802.1CB maintenance

“265” – FRER MatchRecoveryAlgorithm

IEEE 802.1 Maintenance TG
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Some terminology used in 802.1CB

Sequence recovery function (7.4.2)

— The Sequence recovery function operates on a merged set of Member Streams originally marked with sequence_number (6.1) values from a single instance of the Sequence generation function (7.4.1).

— An instantiation of the Sequence recovery function consists of the following:

a) An instantiation of the Base recovery function (7.4.3), either the VectorRecoveryAlgorithm (7.4.3.4) or the MatchRecoveryAlgorithm (7.4.3.5), with its frerSeqRcvyIndividualRecovery object (10.4.1.10) set to False, configured to apply to one or more values of the sequence_number subparameter; and

b) An instantiation of the Latent error detection function (7.4.4).

Individual recovery function (7.5)

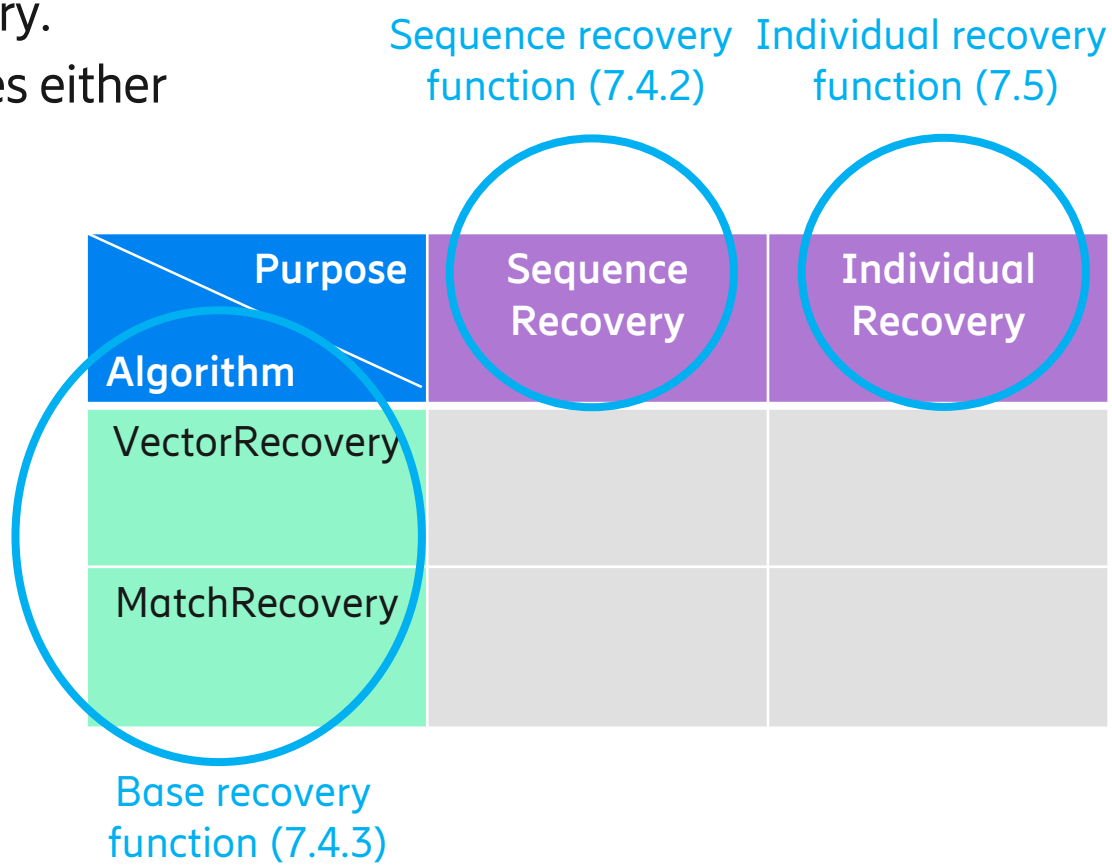
— An instantiation of the Individual recovery function consists of an instantiation of the Base recovery function (7.4.3) with its frerSeqRcvyIndividualRecovery object (10.4.1.10) set to True, configured to apply to a single Member Stream.

Some terminology used in 802.1CB

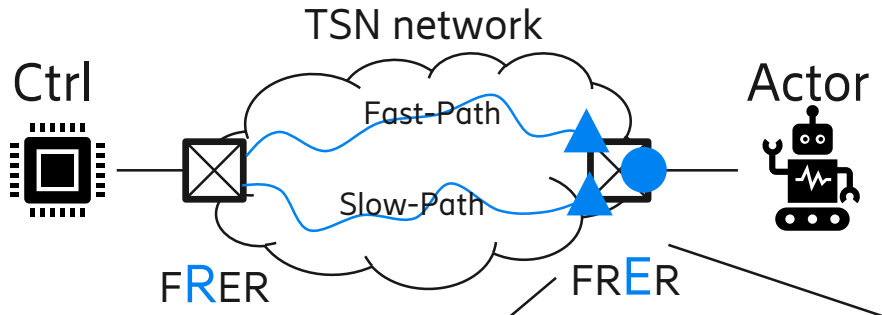
Base recovery function (7.4.3)

- It describes the algorithms, which can be used for recovery.
- An instantiation of the Base recovery function (7.4.3) uses either
  - the VectorRecoveryAlgorithm (7.4.3.4)
    or
  - the MatchRecoveryAlgorithm (7.4.3.5)

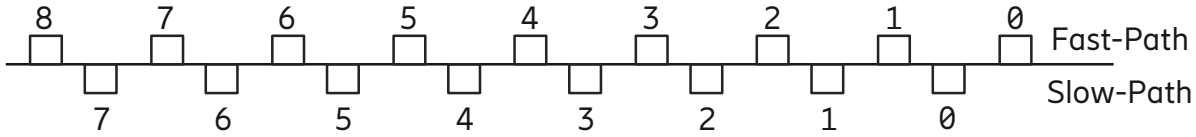
- A given instantiation of a Base recovery function can function as either a Sequence recovery function (7.4.2) or an Individual recovery function (7.5).



Analysis of 802.1CB
MatchRecoveryAlgorithm



Purpose / Algorithm	Sequence Recovery	Individual Recovery
VectorRecovery		
MatchRecovery	●	▲



7.4.3.5 MatchRecoveryAlgorithm

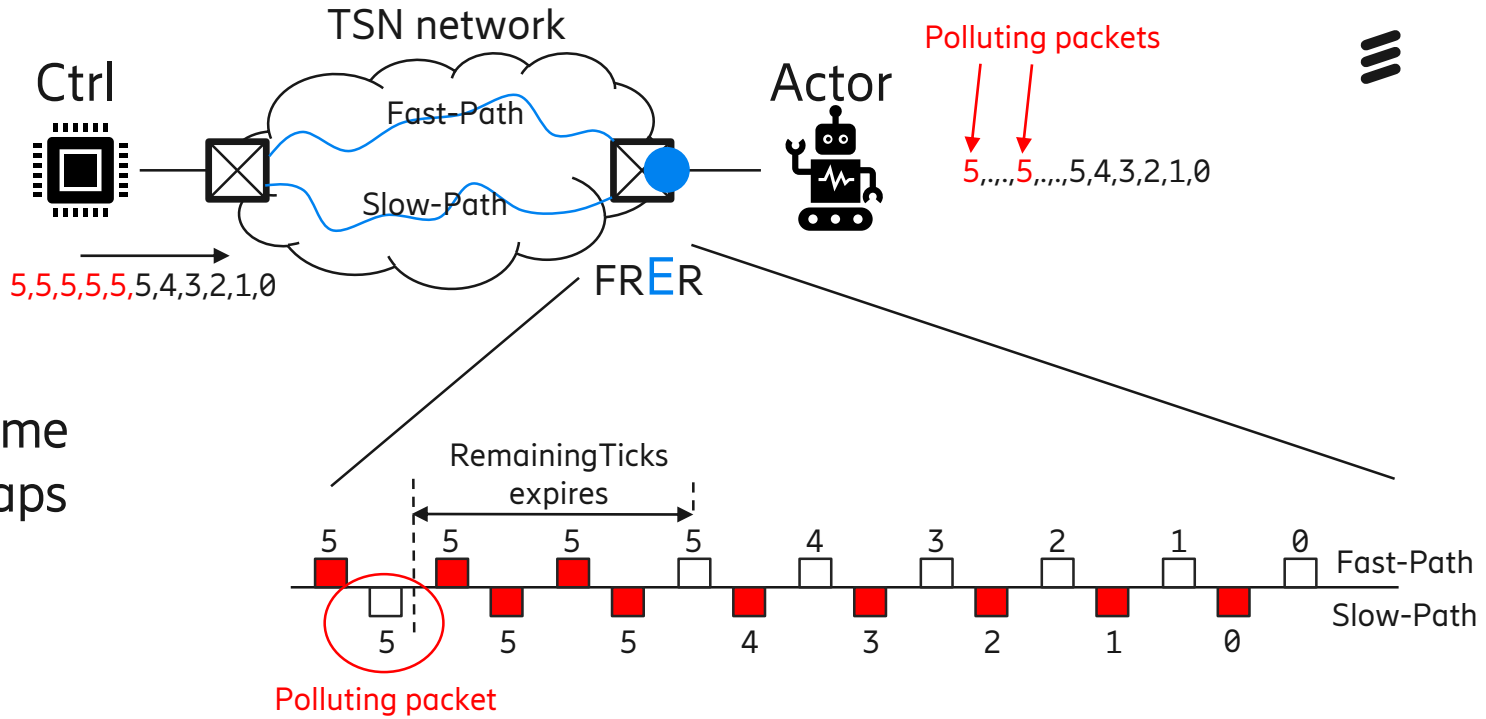
— After the first packet has been accepted, all subsequent packets either match the last packet number accepted, and are therefore discarded, or do not, in which case they are accepted.

— Can work on

● — multiple Member Streams (frerSeqRcvyIndividualRecovery=FALSE)
  — Packets discarded by the MatchRecoveryAlgorithm will NOT cause the variable RemainingTicks (7.4.3.2.4) to be reset.

▲ — an individual Stream (frerSeqRcvyIndividualRecovery=TRUE)
  — Packets discarded by the MatchRecoveryAlgorithm will cause the variable RemainingTicks (7.4.3.2.4) to be reset.

Analysis of 802.1CB
MatchRecoveryAlgorithm …



Talker fails (1):

— repeatedly transmit packets with the same sequence_number subparameter (perhaps repeating exactly the same packet)

— here packet “5”

7.4.3.5 MatchRecoveryAlgorithm

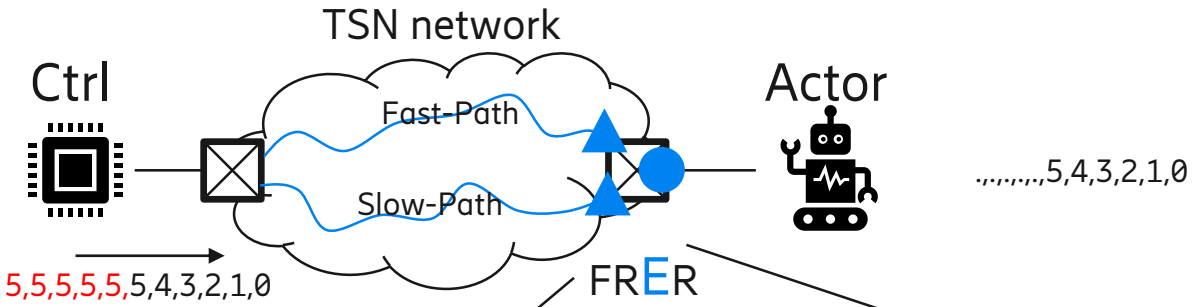
Packet discarded by

— works only on multiple Member Streams (frerSeqRcvyIndividualRecovery=FALSE)

  — Packets discarded by the MatchRecoveryAlgorithm will NOT cause the variable RemainingTicks (7.4.3.2.4) to be reset.

— result: first packet “5” accepted, than until RemainingTicks expires all packet “5” dropped. Next packet “5” accepted and again until RemainingTicks expires all packet “5” dropped …

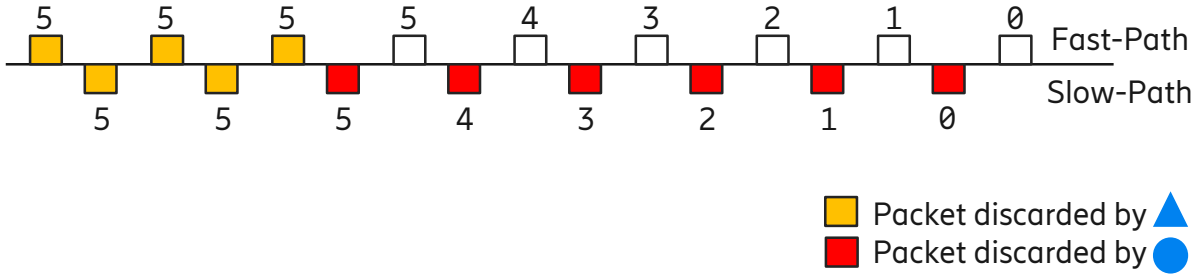
Analysis of 802.1CB
MatchRecoveryAlgorithm …



Talker fails (2):

— repeatedly transmit packets with the same sequence_number subparameter (perhaps repeating exactly the same packet)

— here packet “5”



7.4.3.5 MatchRecoveryAlgorithm

— works on an individual Stream (frerSeqRcvyIndividualRecovery=TRUE)

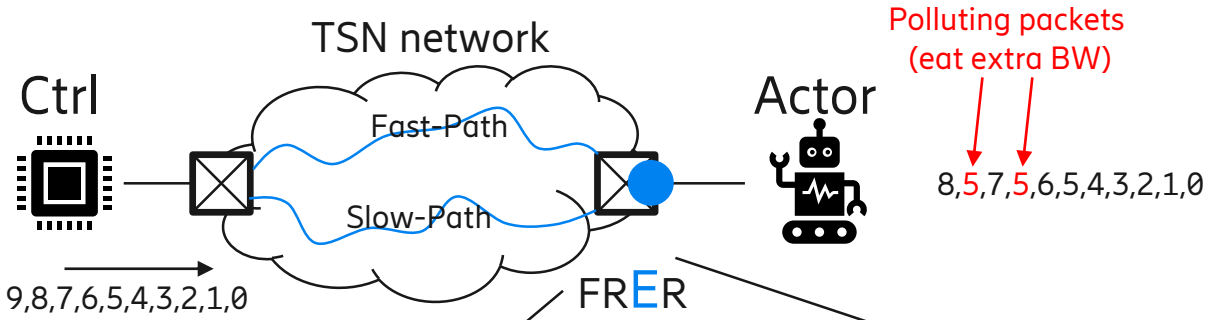
  — Packets discarded by the MatchRecoveryAlgorithm will cause the variable RemainingTicks (7.4.3.2.4) to be reset.

— result: first packet “5” accepted, than all packet “5” dropped

— additionally it works also on multiple Member Streams (frerSeqRcvyIndividualRecovery=FALSE)

— result: first packet “5” accepted, than RemainingTicks expires, but no more packet

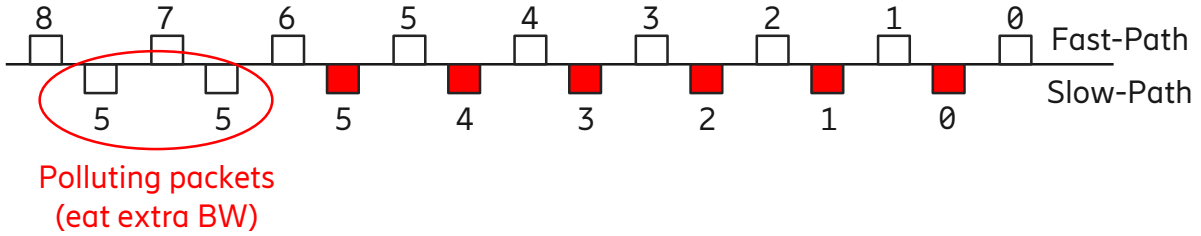
Analysis of 802.1CB
MatchRecoveryAlgorithm …



Relay fails (1):

— repeatedly transmit packets with the same sequence_number subparameter (perhaps repeating exactly the same packet)

— here relay on Slow-Path fails, packet “5”



7.4.3.5 MatchRecoveryAlgorithm

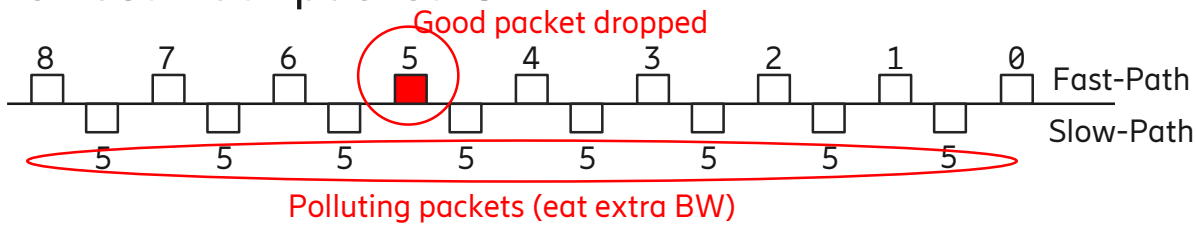
— works only on multiple Member Streams (frerSeqRcvyIndividualRecovery=FALSE)

  — Packets discarded by the MatchRecoveryAlgorithm will NOT cause the variable RemainingTicks (7.4.3.2.4) to be reset.

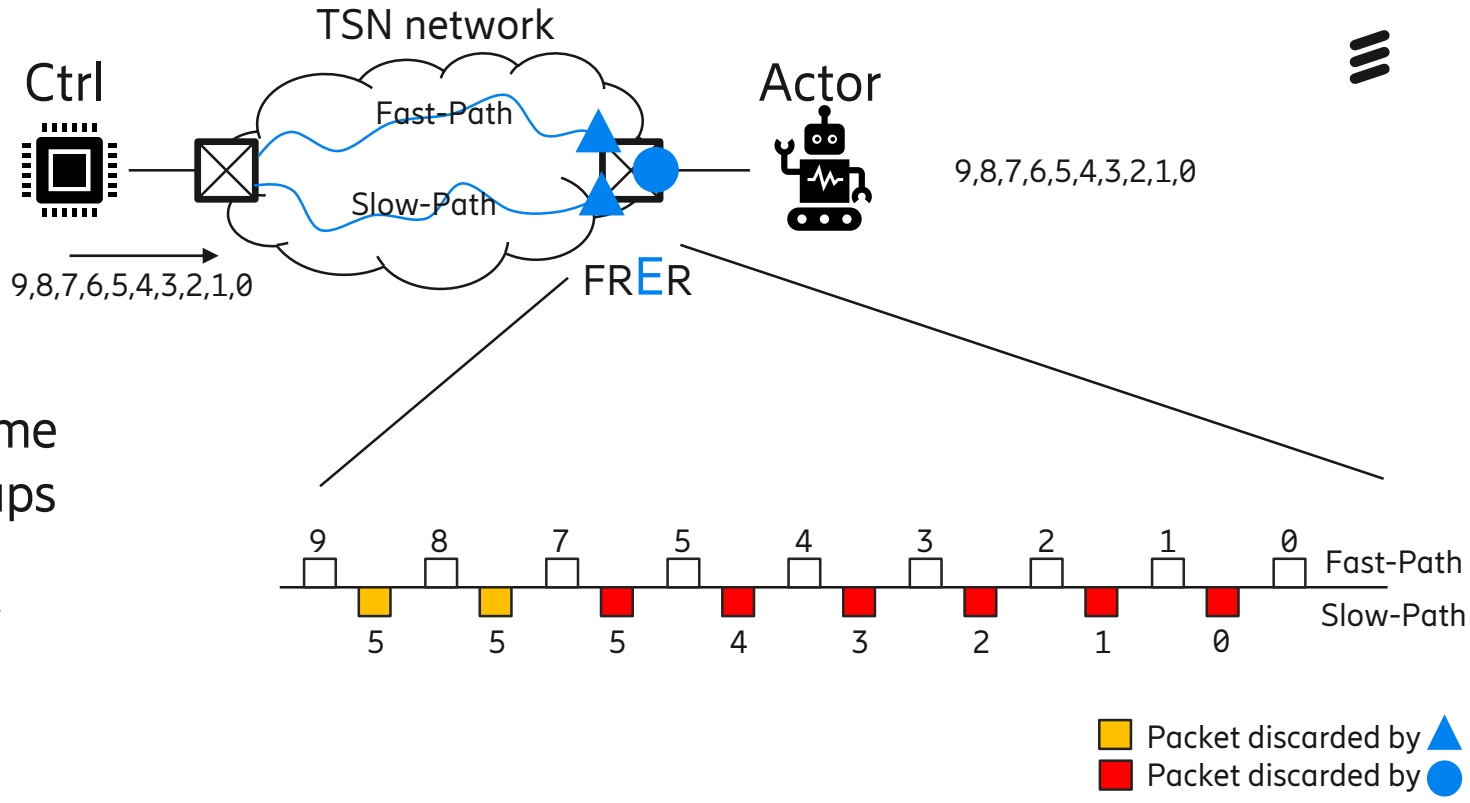
— result: first packet “5” accepted, after packet “6” all packet “5” accepted until wrap around. After wrap around the Slow-Path packet “5” kick off the Fast-Path packet “5”

Packet discarded by

After wrap around



Analysis of 802.1CB
MatchRecoveryAlgorithm …



Relay fails (2):

— repeatedly transmit packets with the same sequence_number subparameter (perhaps repeating exactly the same packet)

— here relay on Slow-Path fails, packet “5”

7.4.3.5 MatchRecoveryAlgorithm

— works on an individual Stream (frerSeqRcvyIndividualRecovery=TRUE)

  — Packets discarded by the MatchRecoveryAlgorithm will cause the variable RemainingTicks (7.4.3.2.4) to be reset.

— result: first packet “5” accepted, than all packet “5” dropped

— additionally it works also on multiple Member Streams (frerSeqRcvyIndividualRecovery=FALSE)

— result: first packet “5” accepted, no issue at wrap around (Slow-Path packets already dropped by the Individual Recovery ☺)

Proposed changes
Issue1

- Issue1: “If a Talker or a relay system fails in such a way as to repeatedly transmit packets with the same sequence_number subparameter (perhaps repeating exactly the same packet), those packets will continue to be discarded, at least until the sequence_number wraps around.”
- This sentence is not correct. Wraps around of sequence_number does not really matter. The result depends on whether or not individual recovery is used.
- If Talker fails as described, then
  - in case of individual recovery, all repeated packets are discarded.
  - in case of NOT individual recovery, all except one repeated packets are discarded per RemainingTicks interval.
- If a relay system fails, then
  - in case of individual recovery, all packets are discarded.
  - in case of NOT individual recovery, if there is a correct member stream, then the failed member stream pollutes the correct member stream.
- Therefore, I would say that in case of MatchRecoveryAlgorithm is used as base recovery, it is highly recommended to use it together with individual recovery.

Proposed changes
Issue1 …

- Update the text to:
- “If a Talker fails in such a way as to repeatedly transmit packets with the same sequence_number subparameter (perhaps repeating exactly the same packet), then in case of Individual Recovery (7.5), all repeated packets are discarded. If only Sequence Recovery (7.4.2) is used, then all except one repeated packets are discarded per RemainingTicks interval. If a relay system fails like that, then in case of Individual Recovery (7.5), all packets are discarded. If only Sequence Recovery (7.4.2) is used and if there is a correct member stream, then the failed member stream pollutes the correct member stream. Therefore, it is highly recommended to use MatchRecoveryAlgorithm on individual Streams as well when MatchRecoveryAlgorithm is used as Sequence Recovery function (7.4.2).”

Proposed changes
Issue2

- Issue2: Text refers to C.10 also containing incorrect statements.
- “The Sequence recovery functions (7.4.2) in the two systems receiving the Member Streams 1 and 2 will discard the repeated packets until the sequence_number subparameter on the good Member Stream 2 wraps around after 65 536 packets. Then, whichever packet 5 is received first will be relayed to the next stage. It could be the new, good, Member Stream 2’s packet 5 or the old, bad, Member Stream 1’s packet 5.”
- Statement on packet 5 is wrong. What happens with packet 5 depends on which Sequence recovery function (7.4.2) is used on the member streams. In case of VectorRecoveryAlgorithm (7.4.3.4), the bad packet 5 is always forwarded (as it arrives before and accepted by the history window). In case of MatchRecoveryAlgorithm (7.4.3.5), the failed stream pollutes the correct stream (see issue1).

Proposed changes
Issue2 …

— Update the text in C.10 to:
— “The VectorRecoveryAlgorithm of Sequence Recovery functions (7.4.2) in the two systems receiving the Member Streams 1 and 2 will discard the repeated packets until the sequence_number subparameter on the good Member Stream 2 wraps around after 65 536 packets. Then due to the history window, packet 5 of Stream-1 is received first, accepted and will be relayed to the next stage. The new, good, Member Stream 2’s packet 5 will be discarded.”

Questions …