Dealing with 802.1CB and Out-of-Order PDUs

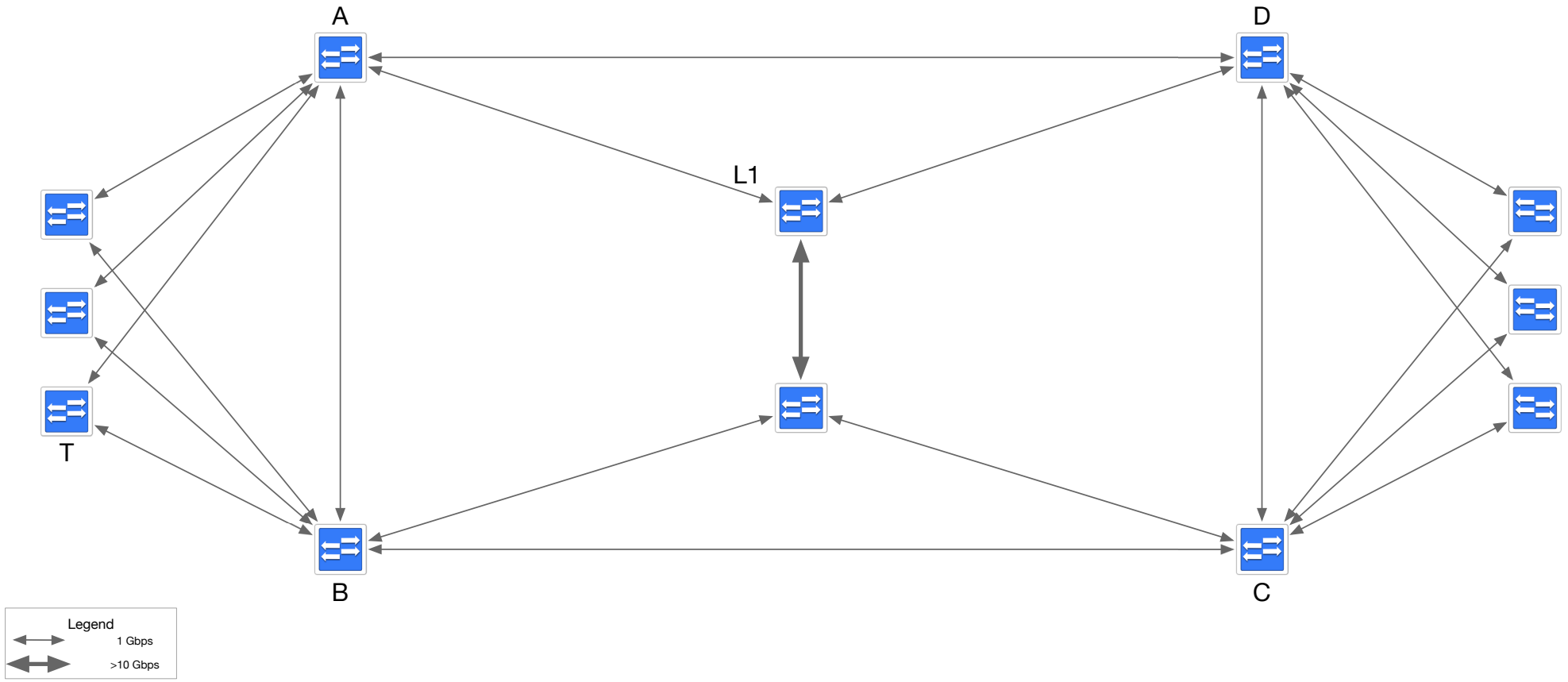
Gordon Bechtel

2020-05-26

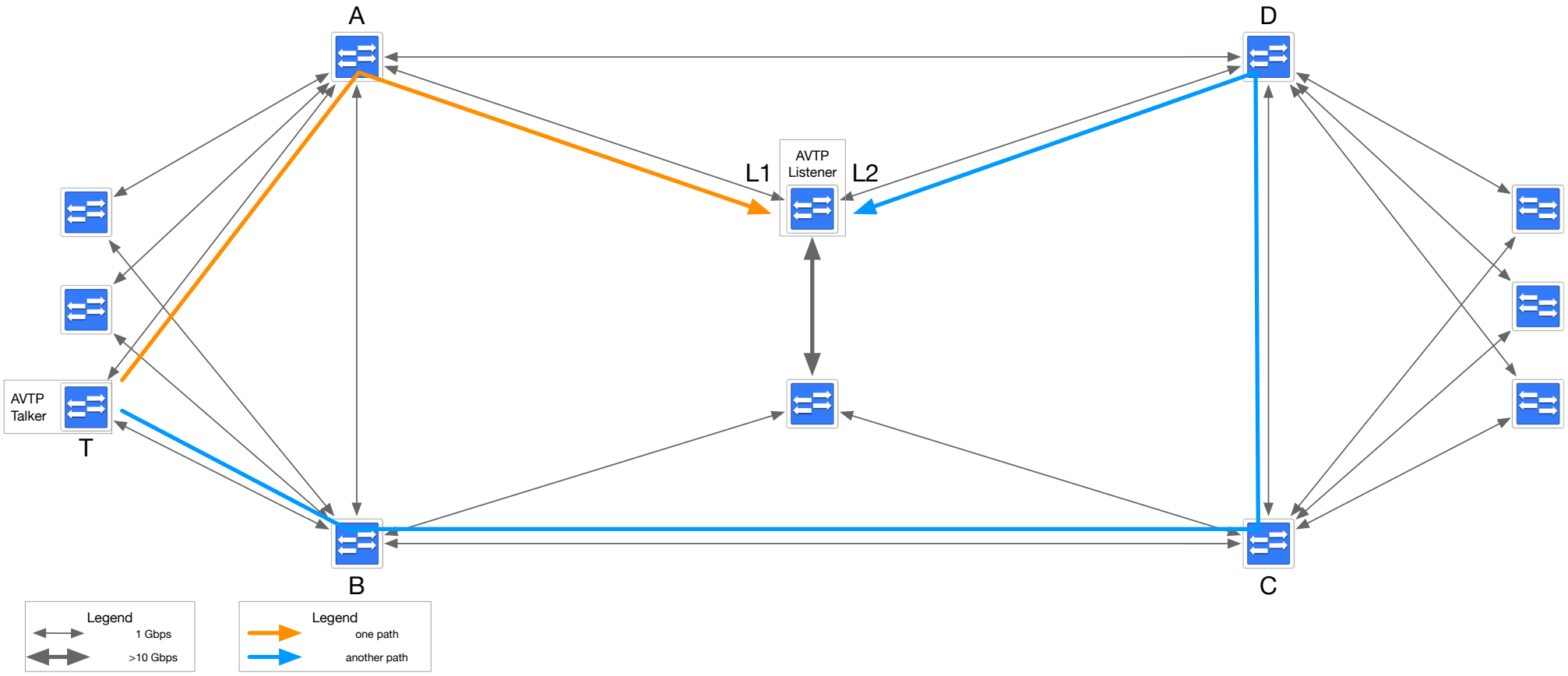
Revision History

Revision	Made By	Date	Description
0.1	Gordon Bechtel	2020-05-19	Initial Release
0.2	Gordon Bechtel	2020-05-26	Added details on sequence number reordering

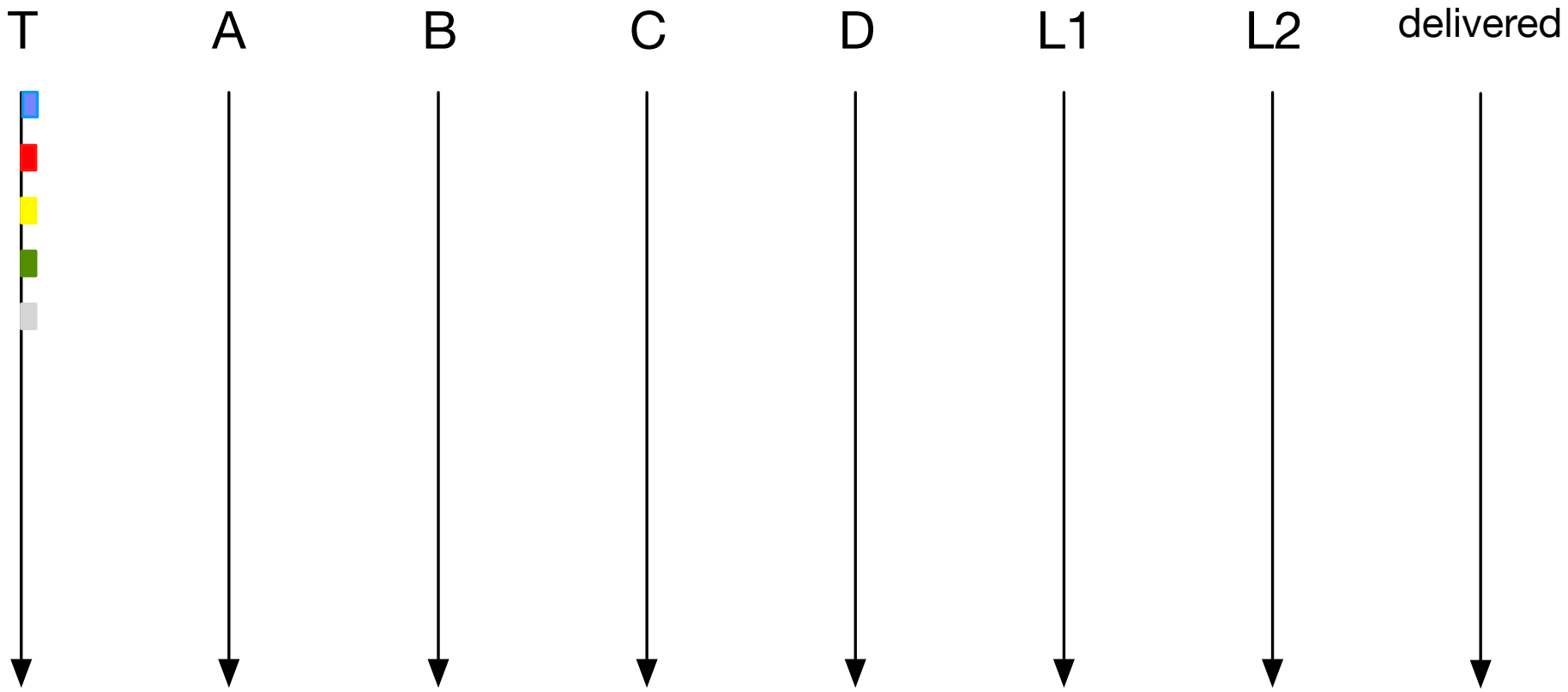
Example Topology



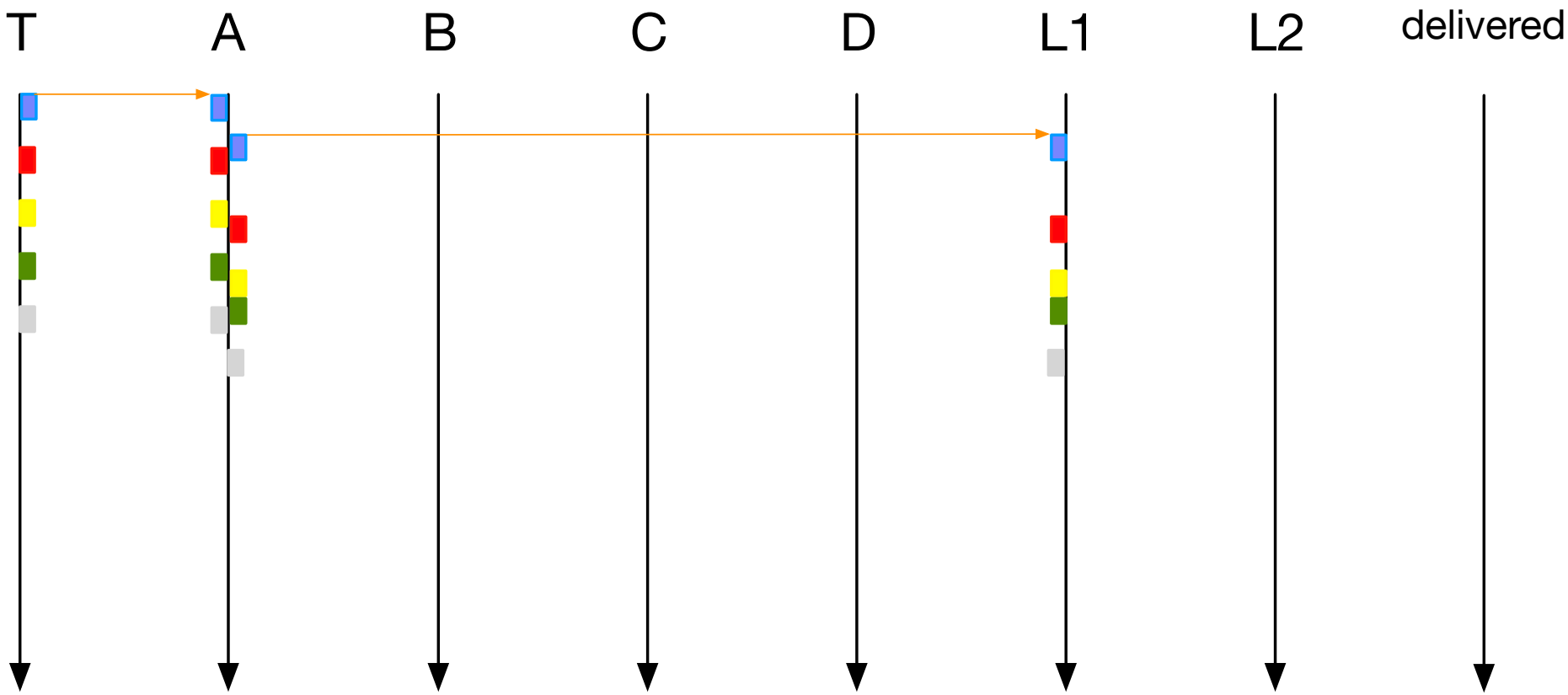
Example of Redundant Paths



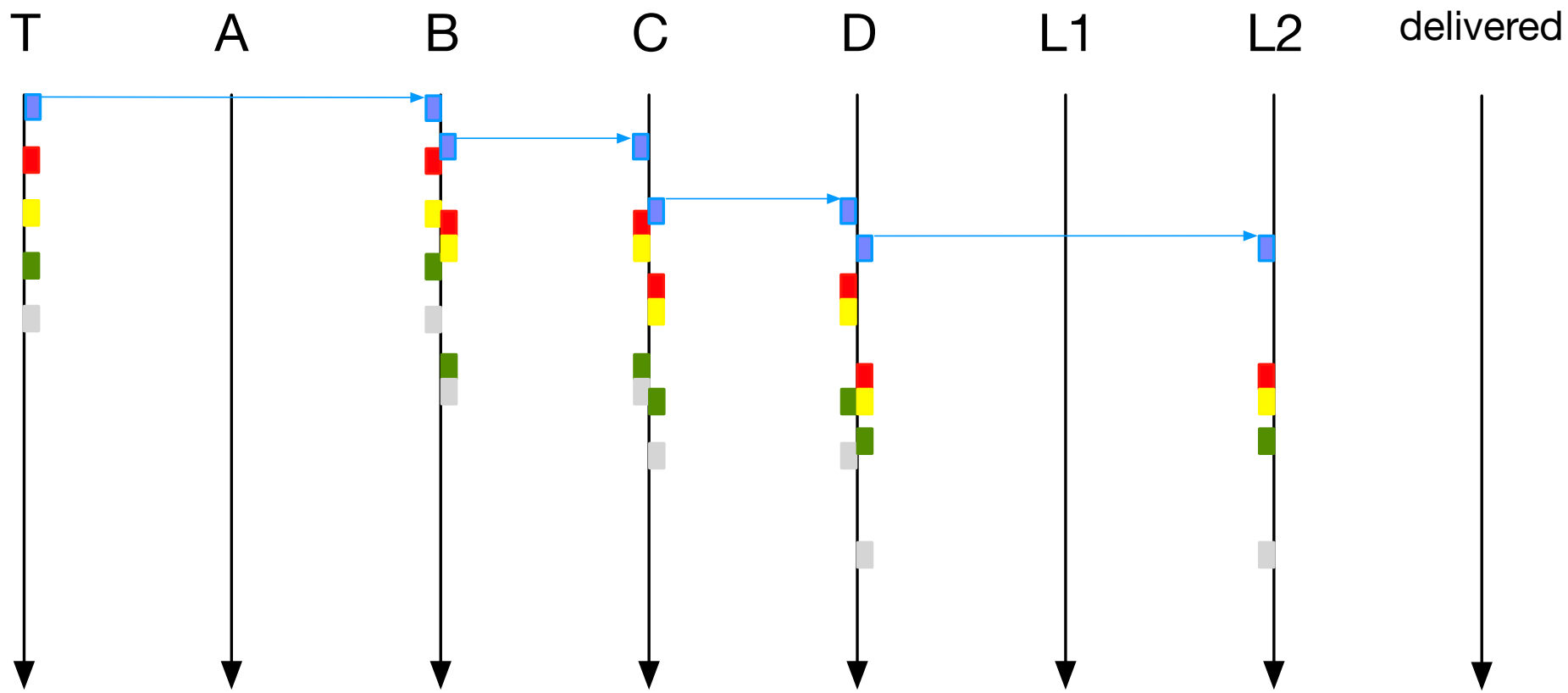
Example PDUs and Timing on Network



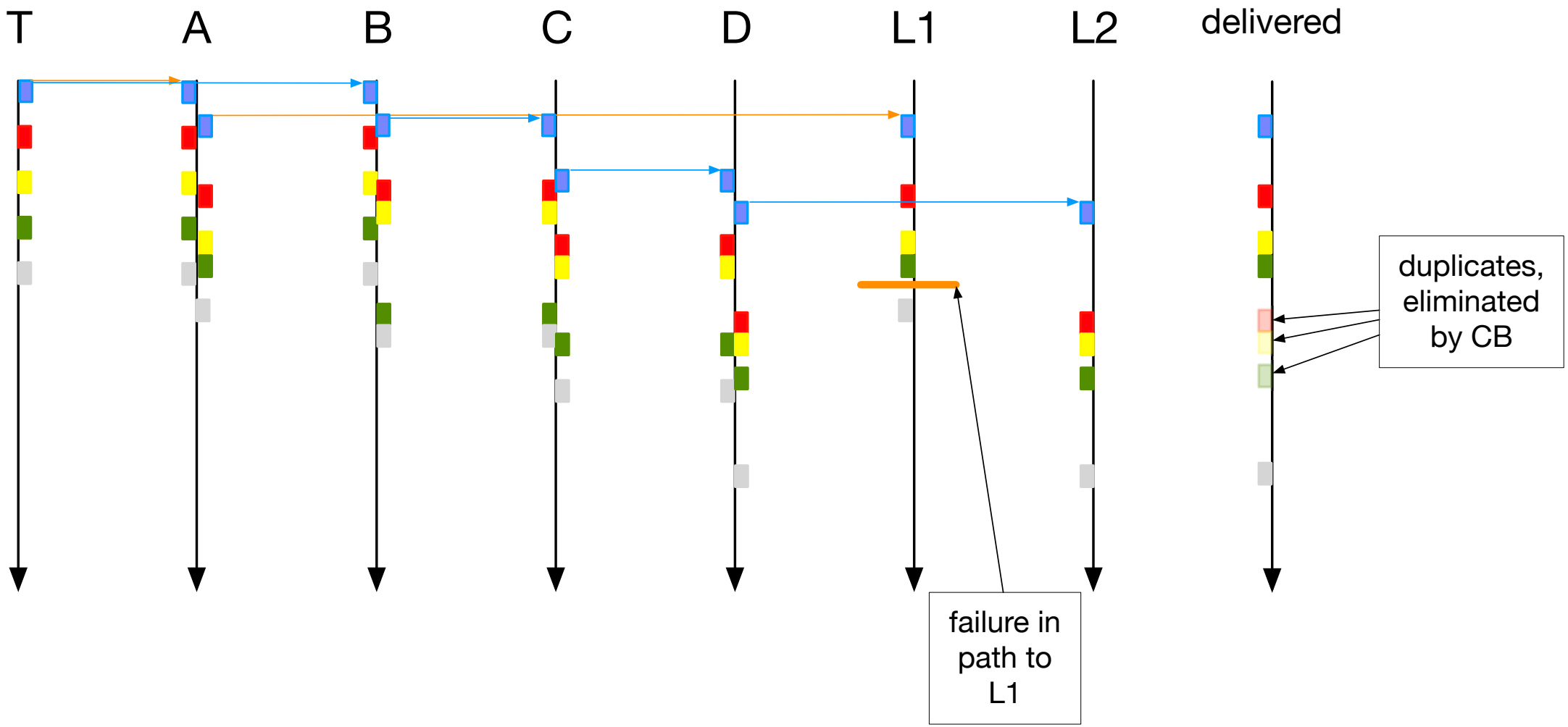
Orange Path



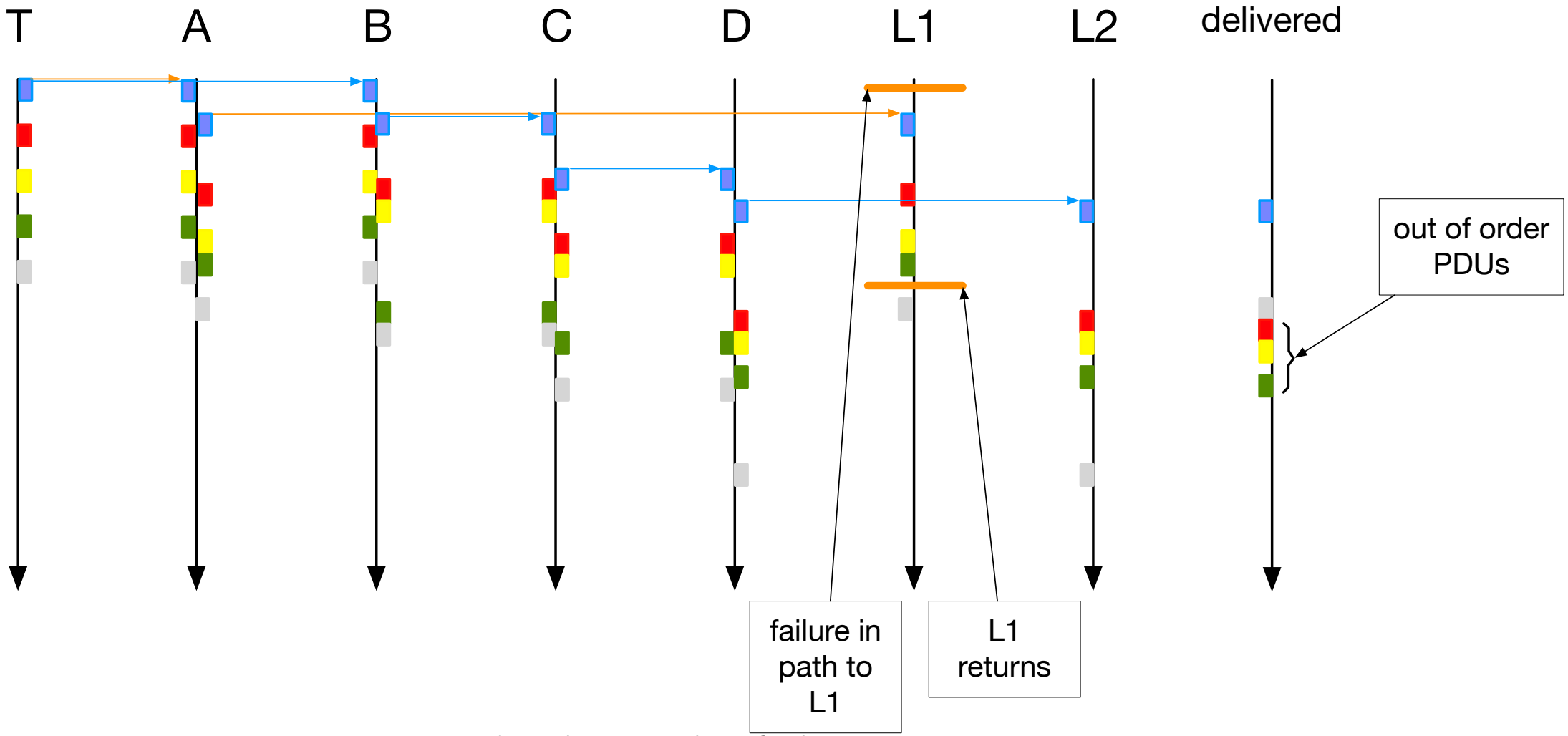
Blue Path



Delivery: Short Path Failure

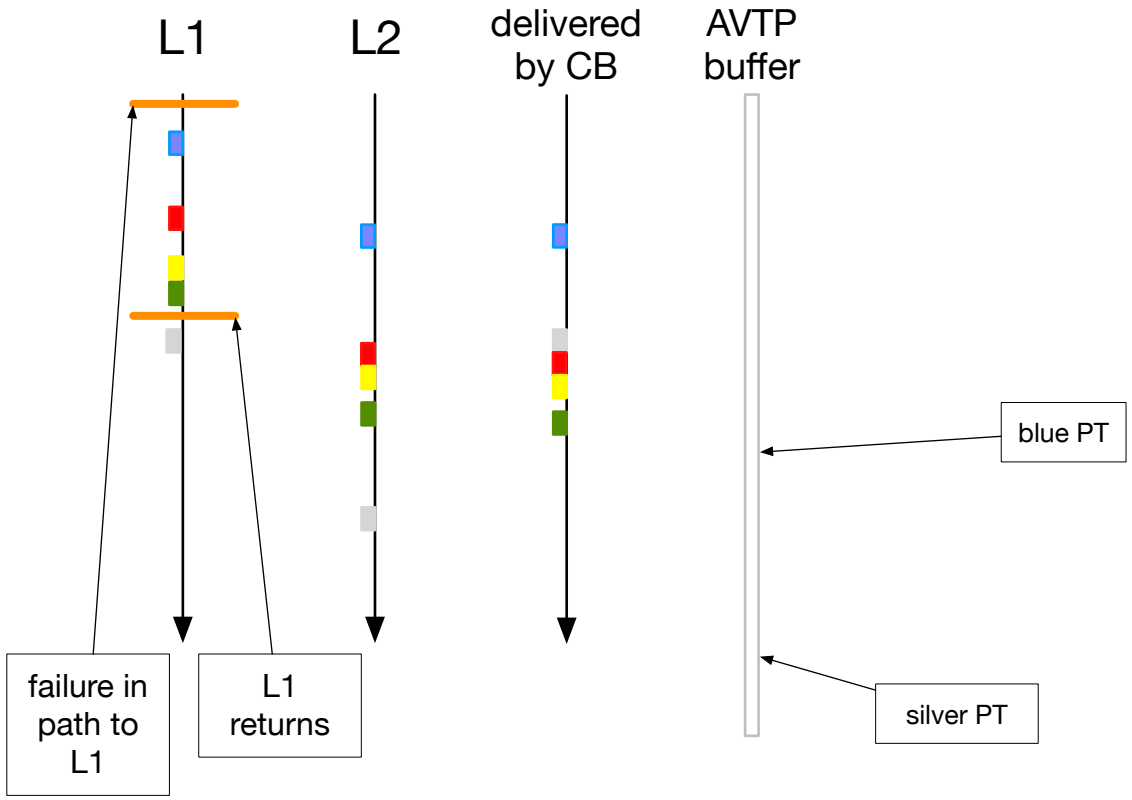


Delivery: Short Path Fails and Returns

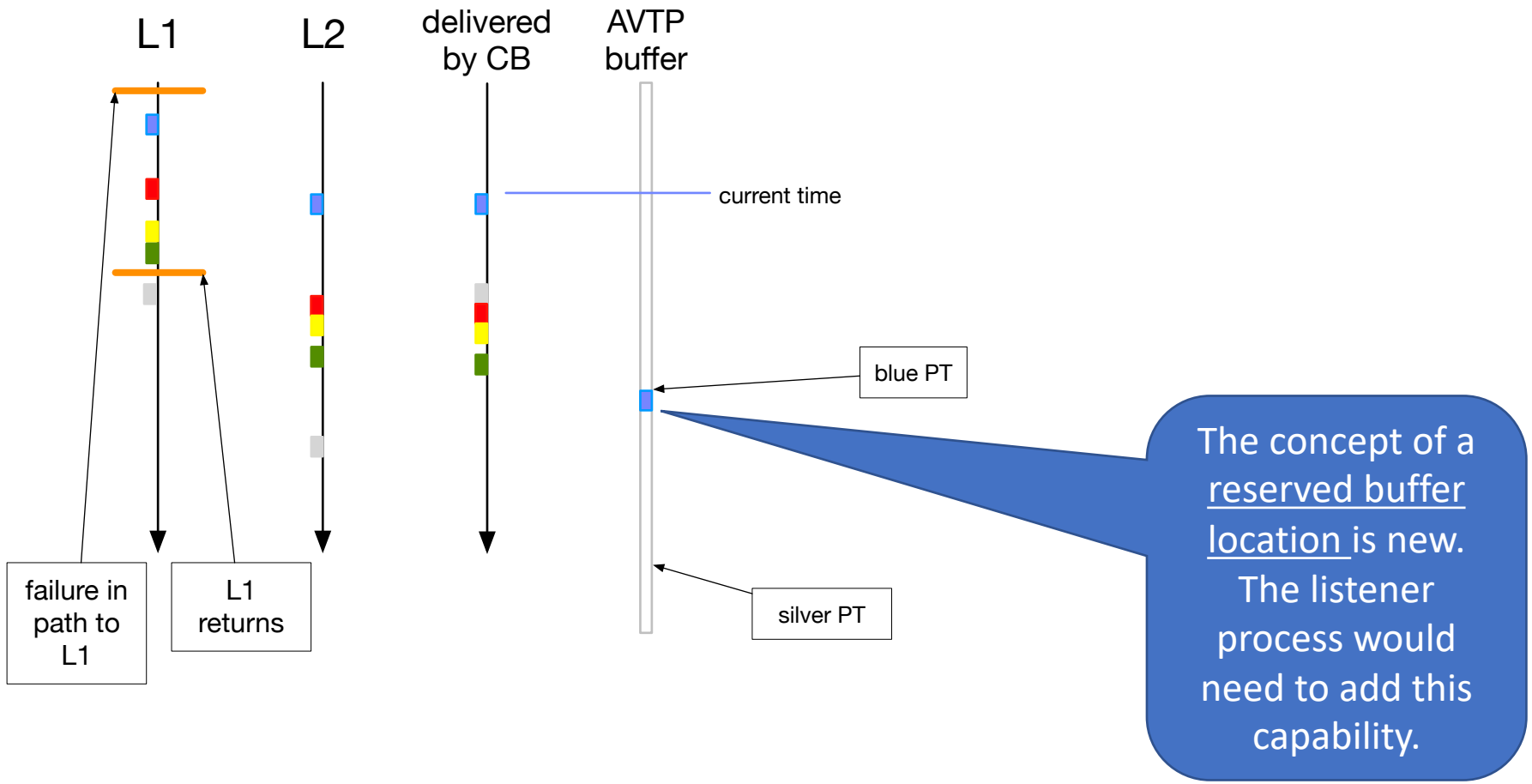


AVTP Has the Tools to Handle the Problem

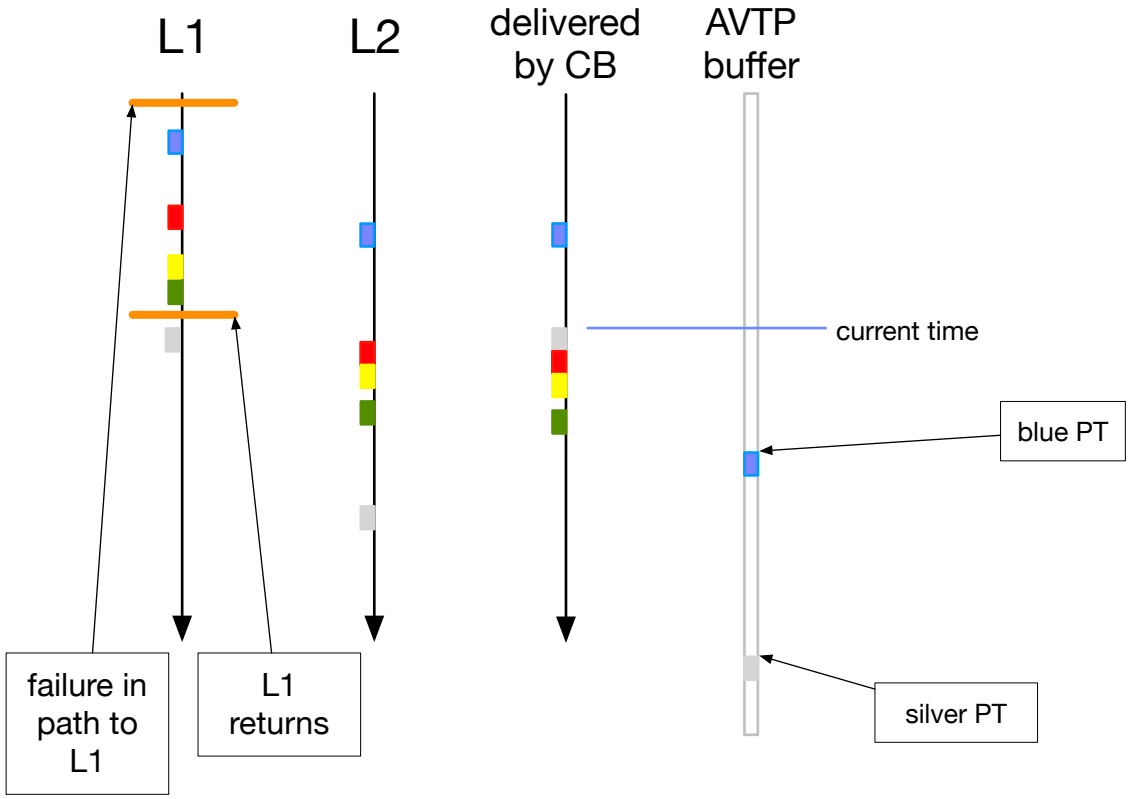
(With Some New Processing)



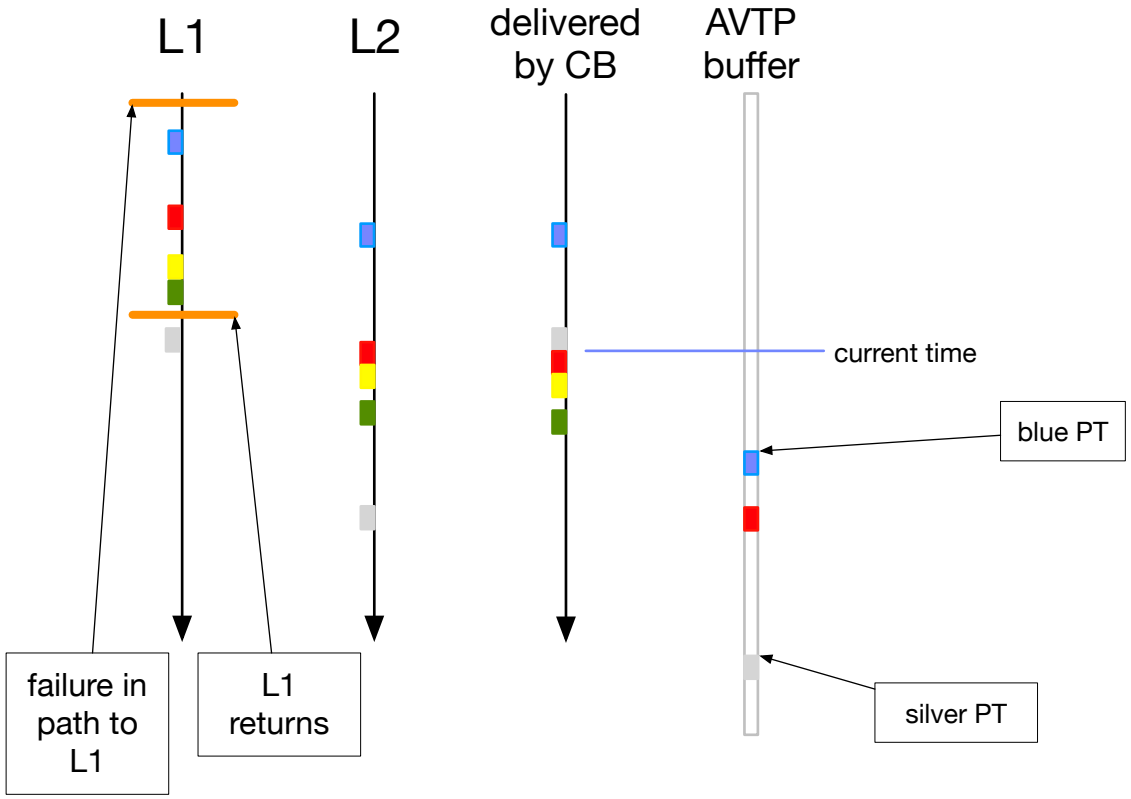
Put Blue PDU in it's "Reserved" Spot in Buffer



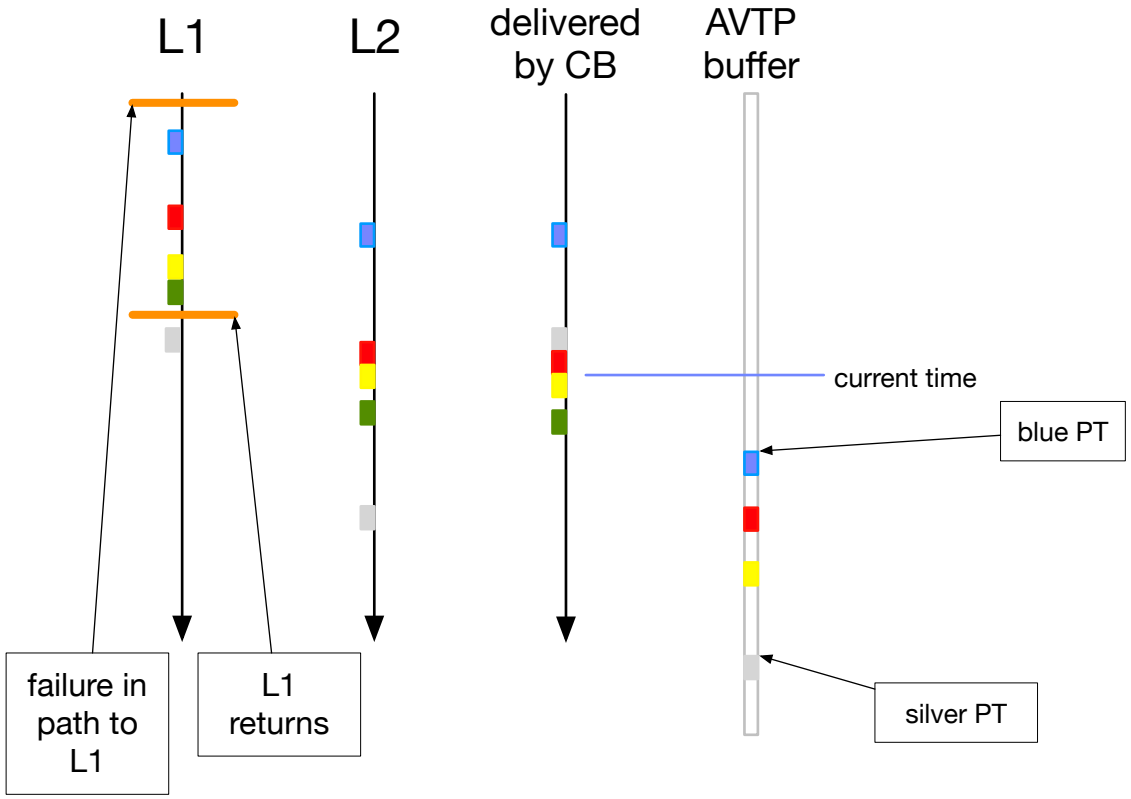
Same for Silver, even though it's Out-of-Order



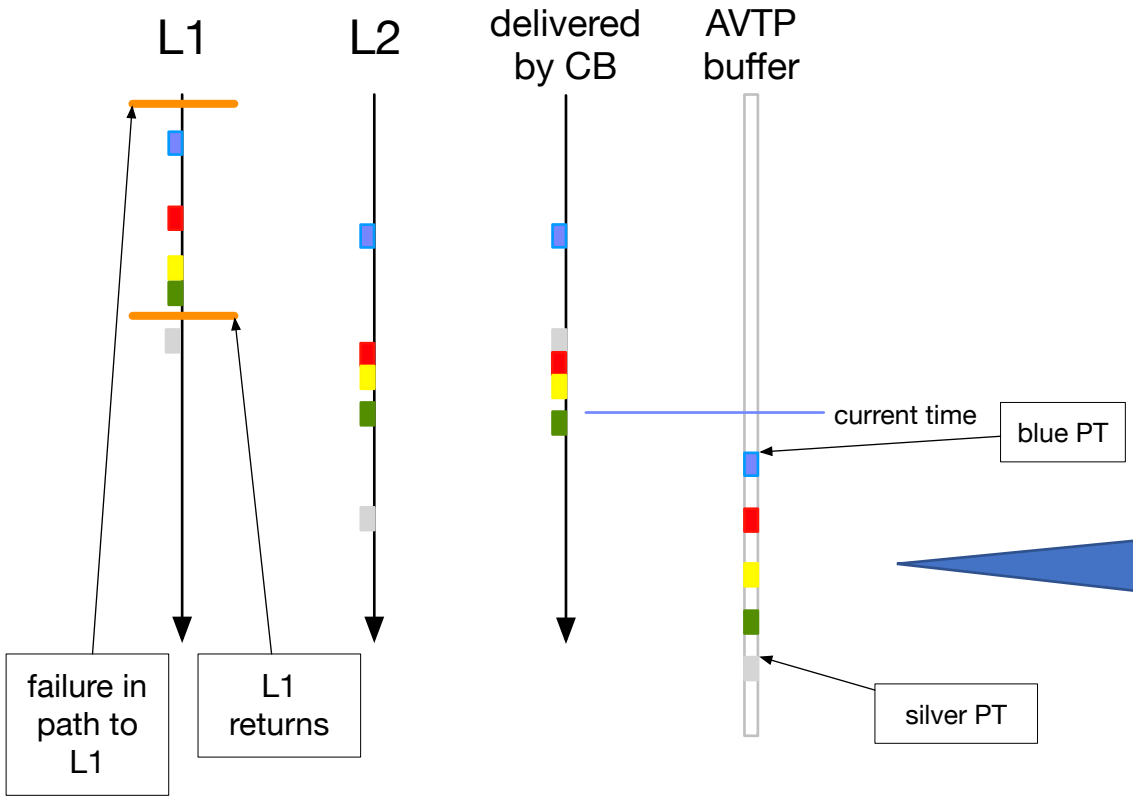
Same for the Red PDU



…And Yellow


L1
L2
delivered by CB
AVTP buffer
current time
blue PT
silver PT
failure in path to L1
L1 returns

…And Finally Green



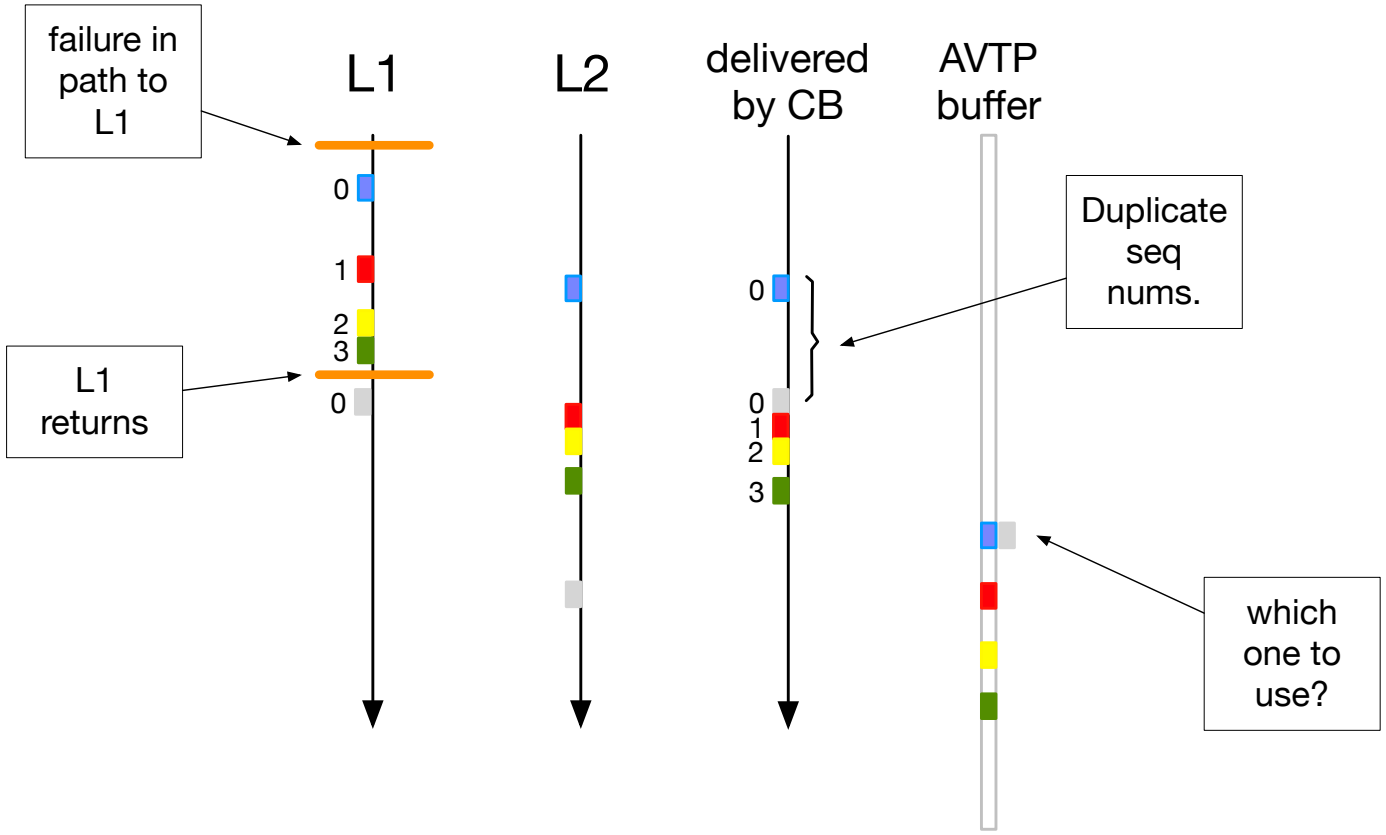
The PDUs are back in order and on-time for distribution to the listener application.

What about Sequence Numbers?

- If the AVTP stream is not using presentation time, how to re-order PDUs?
- Sequence numbers are our only option, within the AVTP framework.
- How well will that work? What are the limitations?
  - A short sequence number could cause problems. How short is too short?

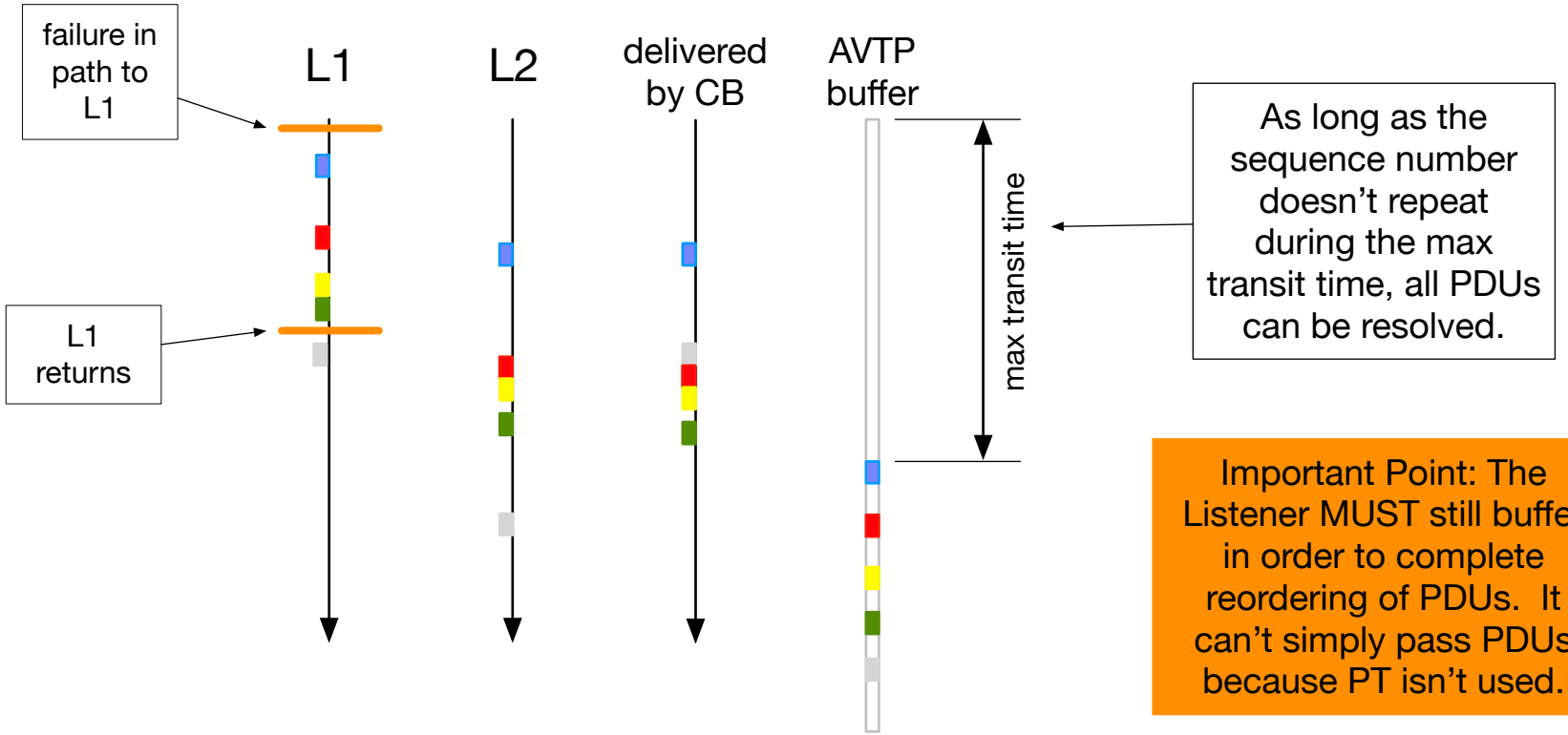
2-bit Sequence Number Example: Too Short!

For this example, assume the sequence number is 2 bits long…



Sequence Number Can't Repeat Within the Delay Difference between Paths

- The worst-case delay difference is typically the max transit time.
- This occurs if the short path is zero and the long path is as long as possible.



Example Calculations

$$R_M = \frac{seqnumsize \times PayloadBytes \times 8}{MTT}$$

where R_M is the max data rate possible for a particular PDU, sequence number size and Max Transit Time combination.

Seq Num Size	Payload Bytes	MTT	Note	R_M
256	1468	2ms	Raw video, full Ethernet frame, class A	1.503 Gbps
256	1468	15ms	Raw video, full Ethernet frame, class C	200.4 Mbps
256	1468	50ms	Raw video, full Ethernet frame, class B	60.13 Mbps

We have a problem. For instance, raw 24bit, 1080p, 60fps video has a 2.98Gbps rate. It won't fit.