# Questions about Asynchronous Traffic Shaping

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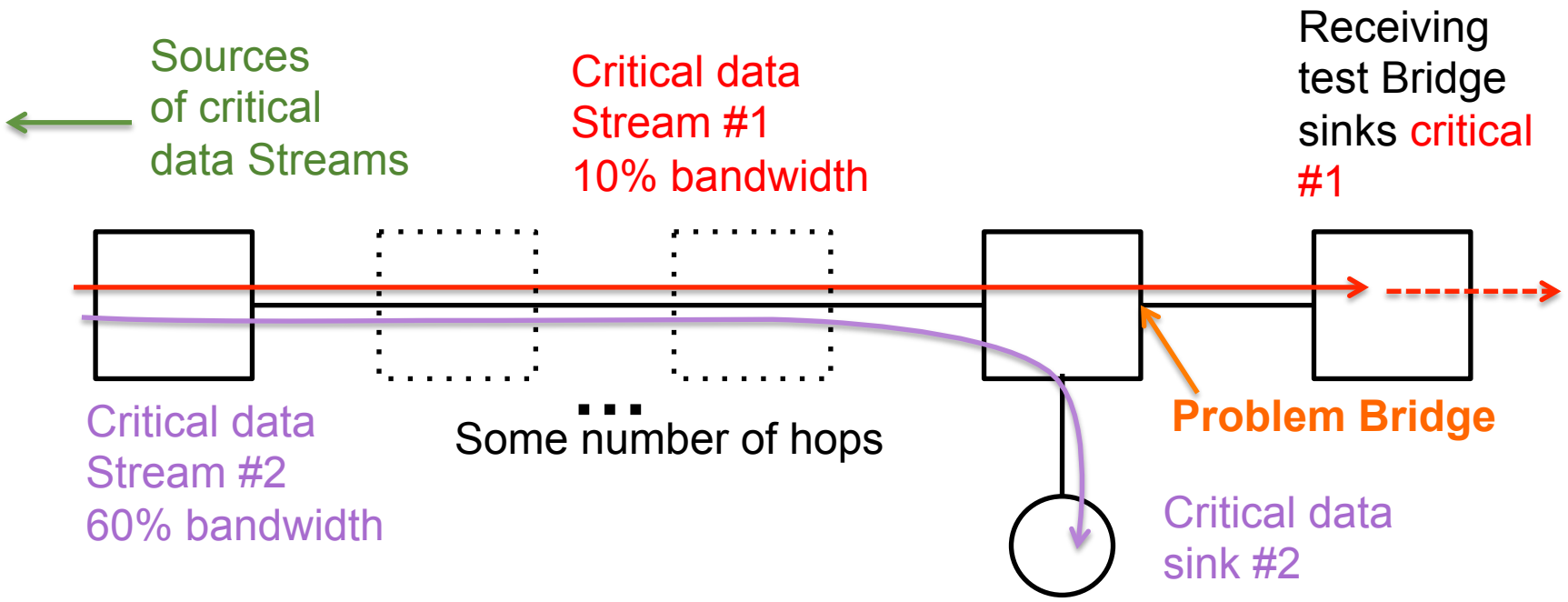
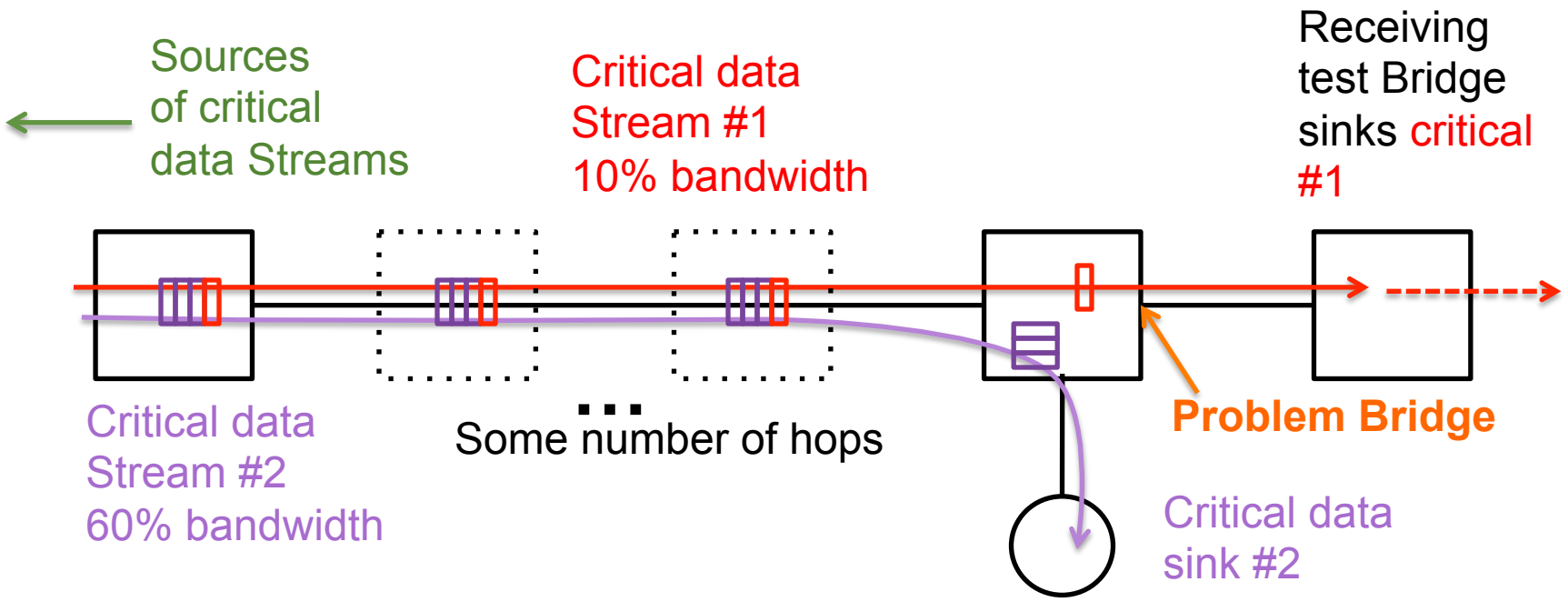
# Is this a claim being made?

- Reading the P802.1Qcr PAR, it seems to claim that having one asynchronous buffer **per input port** (per output port) is sufficient to compute a maximum buffer requirement in each Bridge without reference to the overall network topology.
- I claimed in version 01 of this presentation that the requirement is one asynchronous buffer **per Stream** per output port to achieve independence from the network topology, and that the situation that causes the problem is easily encountered in a normal network.
- My claim was invalid and the PAR is OK because, while the number of shaper state machines = the number of Streams, **multiple state machines can be attached to one queue**, so the number of queues = the number of input ports (per output port).
- Thanks to Johannes Specht for correcting me.

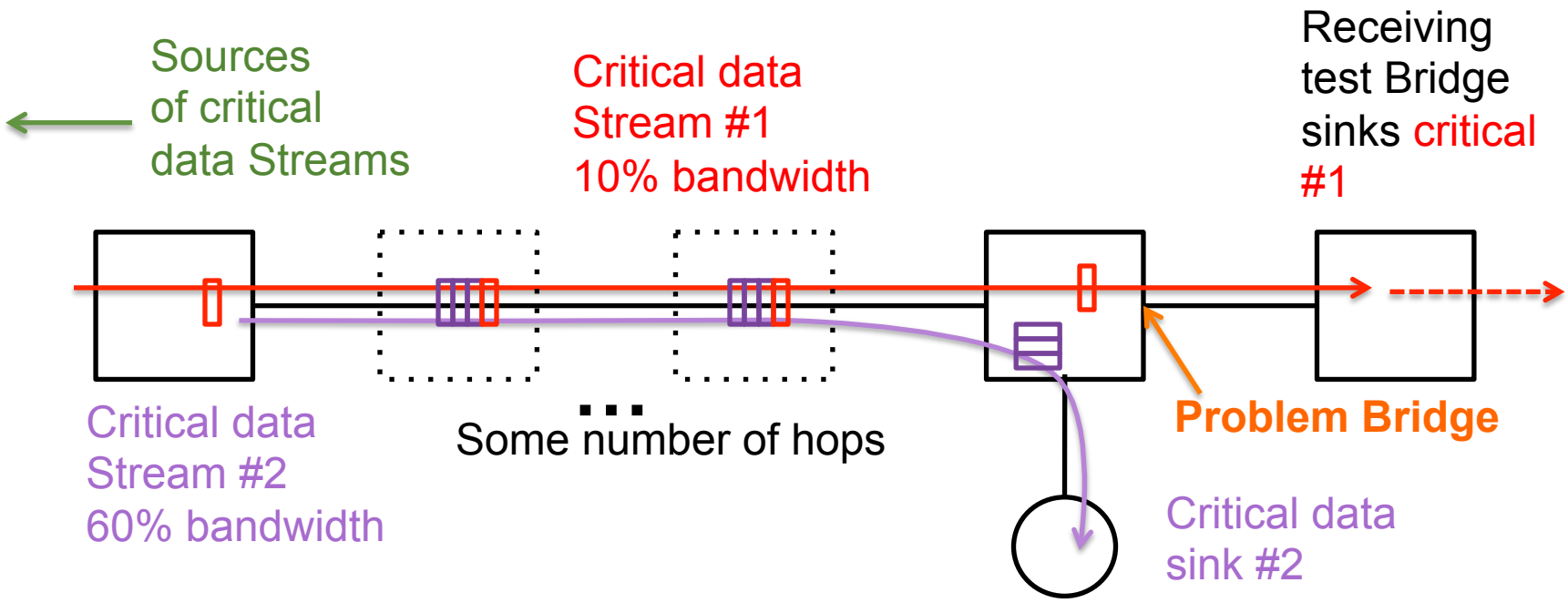



- Two critical Streams:
  - **Stream #1**: **10%** of line rate.
  - **Stream #2**: **60%** of line rate.
- Both Streams take the same route until the “Problem Bridge”.
- Both Streams use the same **Credit-based shapers** until the Problem Bridge, because both take the same path.



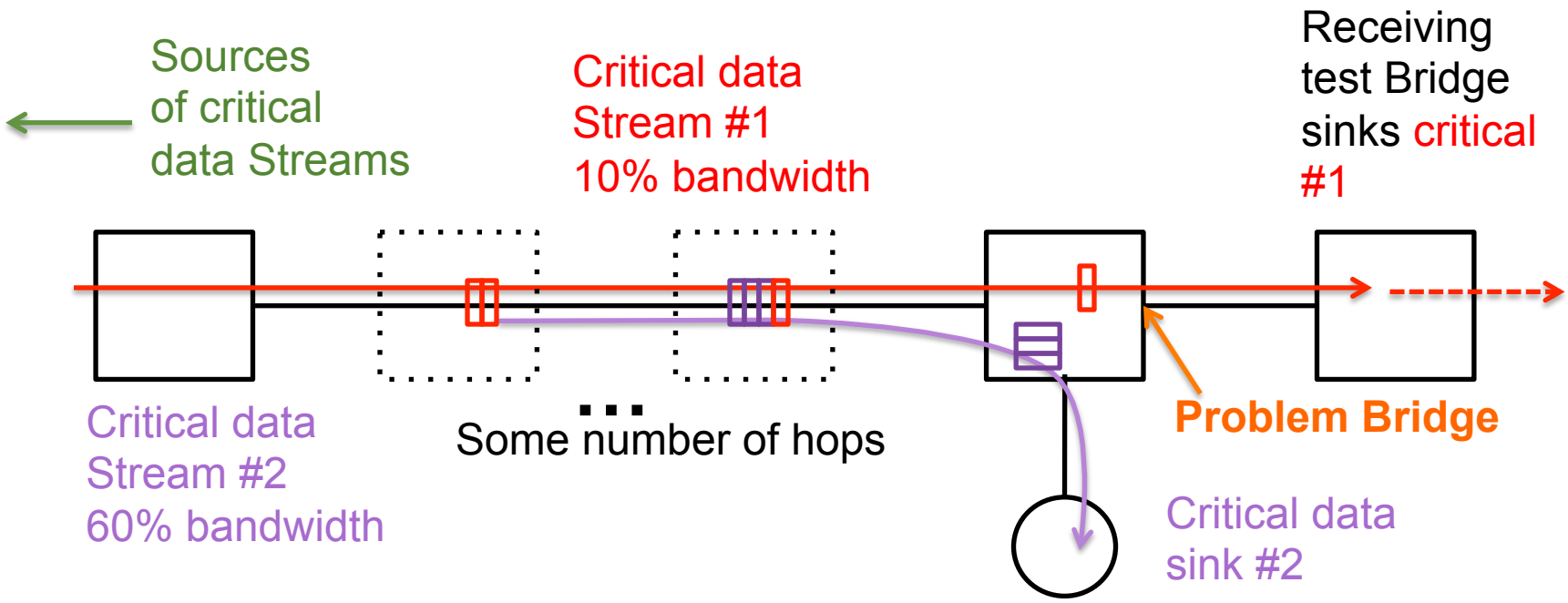

# The setup:

- Queues become occupied to the expected, normal, non-0 level.
- Each asynchronous queue is partly filled with packets from Stream #1, partly filled with packets from Stream #2.
- **NOTE:** We are only looking at the CB shaper queues, asynchronous queues.




# The sting:

- The source of critical Stream #2 stops transmitting.
- Critical Stream #1 starts draining at 70% line rate towards the right.

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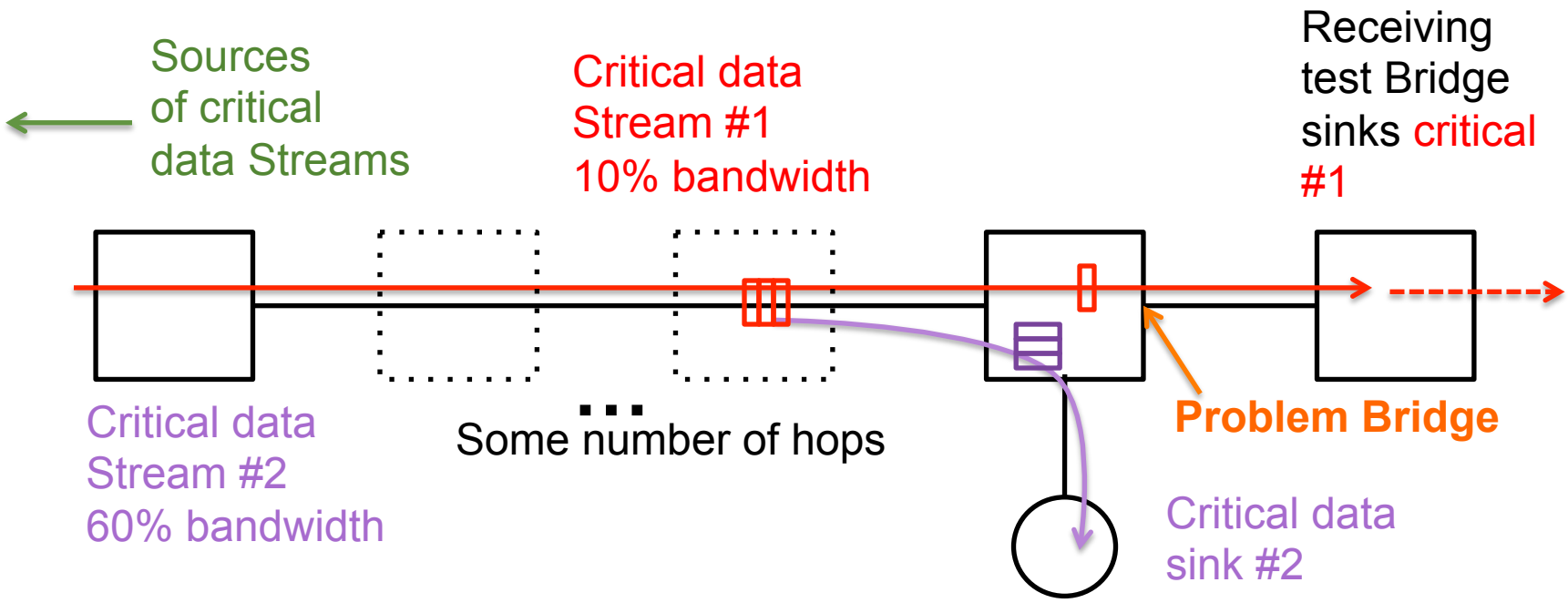


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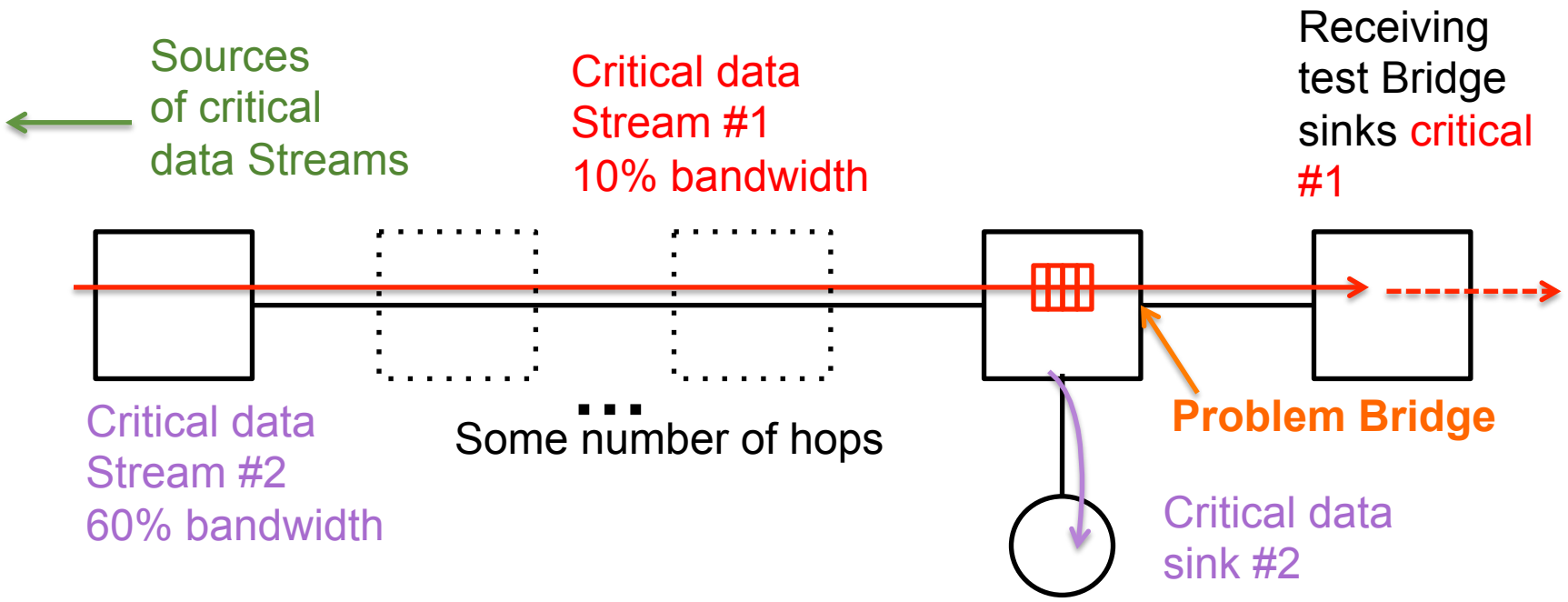
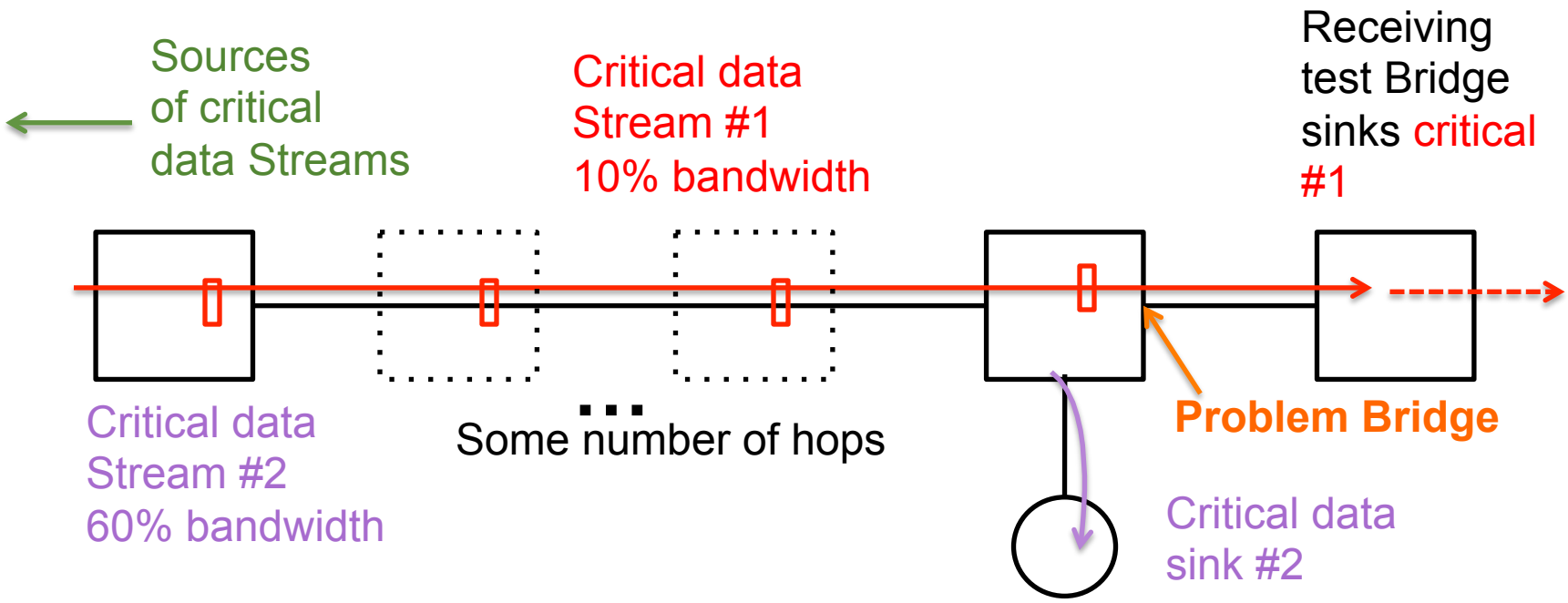



# The sting:

- The source of critical Stream #2 stops transmitting.
- Critical Stream #1 starts draining at 70% line rate towards the right.
- **The CBS buffer in Problem Bridge is still draining at 10% line rate. It must store a number of packets proportional to the number of hops.**

# Questions

1. Does this mean you can “pump” the rightmost queue until it fills, no matter how big it is?
   - Answer: “**No. It’s OK.**” If you turn Stream #2 back on, it will cause delays in Stream #1 that will allow the rightmost queue to empty before cutting off Stream #2 fills it, again.
2. Aren’t we back where we were when Christian Boiger pointed out the AVB problems?
   - **Yes**, for AVB queues. **No** for Asynchronous queues.
3. Don’t we need per-Stream asynchronous queues, instead of per-input-port asynchronous queues?
   - Not exactly. We need **per-Stream state machines**.
   - These state machines **can** be assigned to individual per-Stream queues. But you can also assign multiple per-Stream state machines to one queue per input port per output port.




# The cure:

- Each Stream has its own state machine in the queue that combines the flows from the same input-output port pair at each hop.
- When the Stream #2 stops, the state machines belonging to Stream #1 continue to shape Stream #1 to prevent overflow.

Thank you.