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TRANSFORMING HOW CARS OF THE FUTURE ARE BUILT

IEEE802.1ASDM – REDUNDANCY | JULY 2021

IEEE contribution

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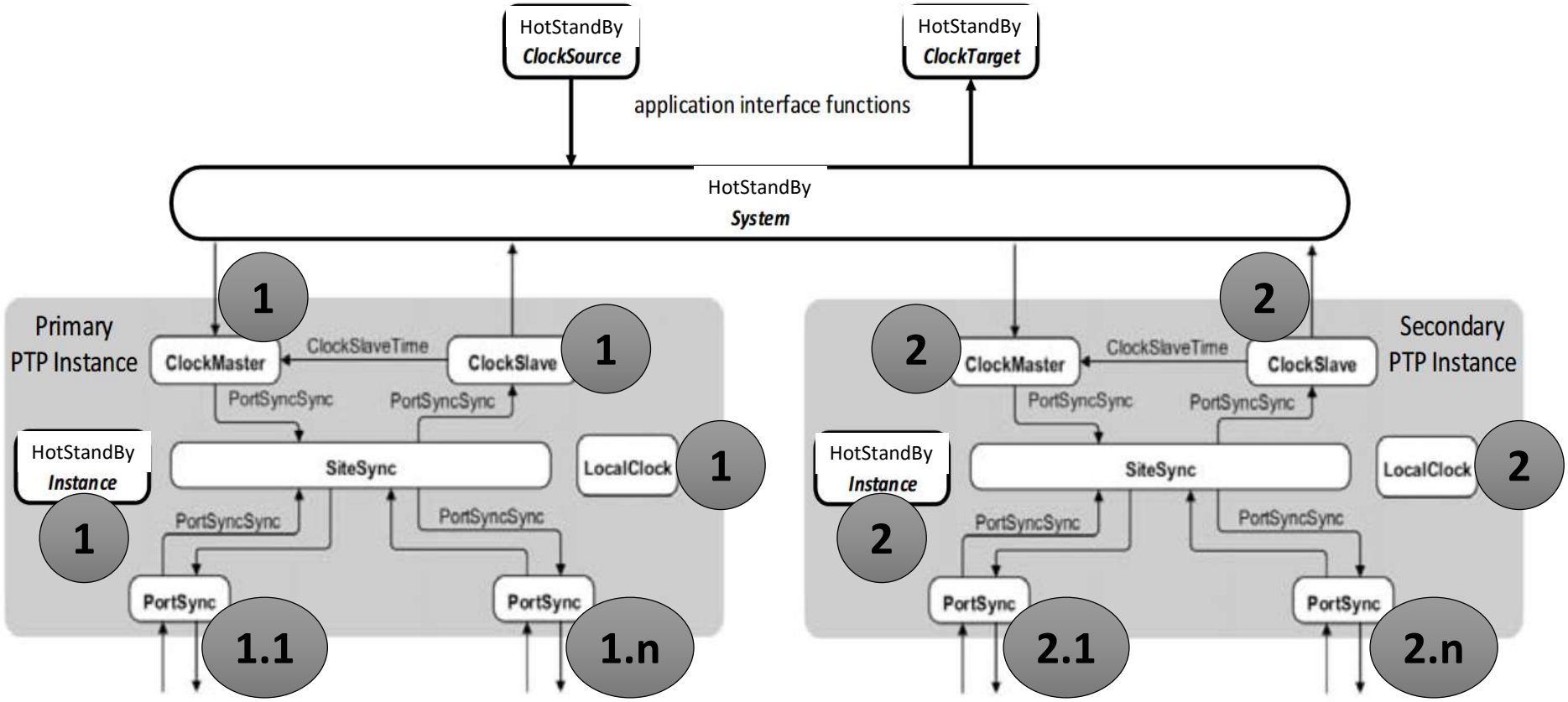
Figure 17-1—Model of hot standby redundancy for time synchronization



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HotStandBy System States

17.10.1 HotStandbySystemState: State of the HotStandbySystem for this hot standby timescale. The variable is an enumeration that takes one of the following values:

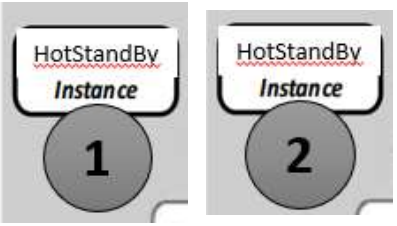
a) INIT: Initialization after the HotStandbySystem powers on and is enabled. In this state, the system is waiting for both PTP Instances to synchronize.

b) REDUNDANT: Both PTP Instances are synchronized according to the requirements of the respective application or TSN profile. Time synchronization is redundant.

c) FAULT: One PTP Instance is synchronized, and the other PTP Instance is faulted (not synchronized). Time synchronization continues to meet the requirements of the respective application or TSN profile. Time synchronization is not redundant.

d) HOLDOVER: Both PTP Instances are faulted (not synchronized). The HotStandbySystem is adjusting phase/frequency of its local time using the data stored in REDUNDANT or FAULT state, but that local time will eventually drift relative to other time-aware systems. During HOLDOVER state, time synchronization might not meet the requirements of the respective application or TSN profile.

HotStandBy Instance(s) States



17.5.1 hotStandbyInstanceState: State of the PTP Instance with respect to requirements of the respective application or TSN profile. The variable is an enumeration that takes one of the following values:

NOT Synced!

a) NOT_CAPABLE: For one or more external ports that is enabled for PTP, the neighbor is not exchanging the messages that are required for conformance to this standard.

Synced!

b) SYNCED: Time is synchronized to the requirements of this standard and the respective application or TSN profile.

NOT Synced!

c) SYNC_TIMEOUT: On the external port in SlavePort state, the port failed to receive time sync event messages according to the requirements of this standard.

d) NOT_QUALITY: Time synchronization does not conform to the quality requirements of the respective application or TSN profile.

17.12.3 Slave

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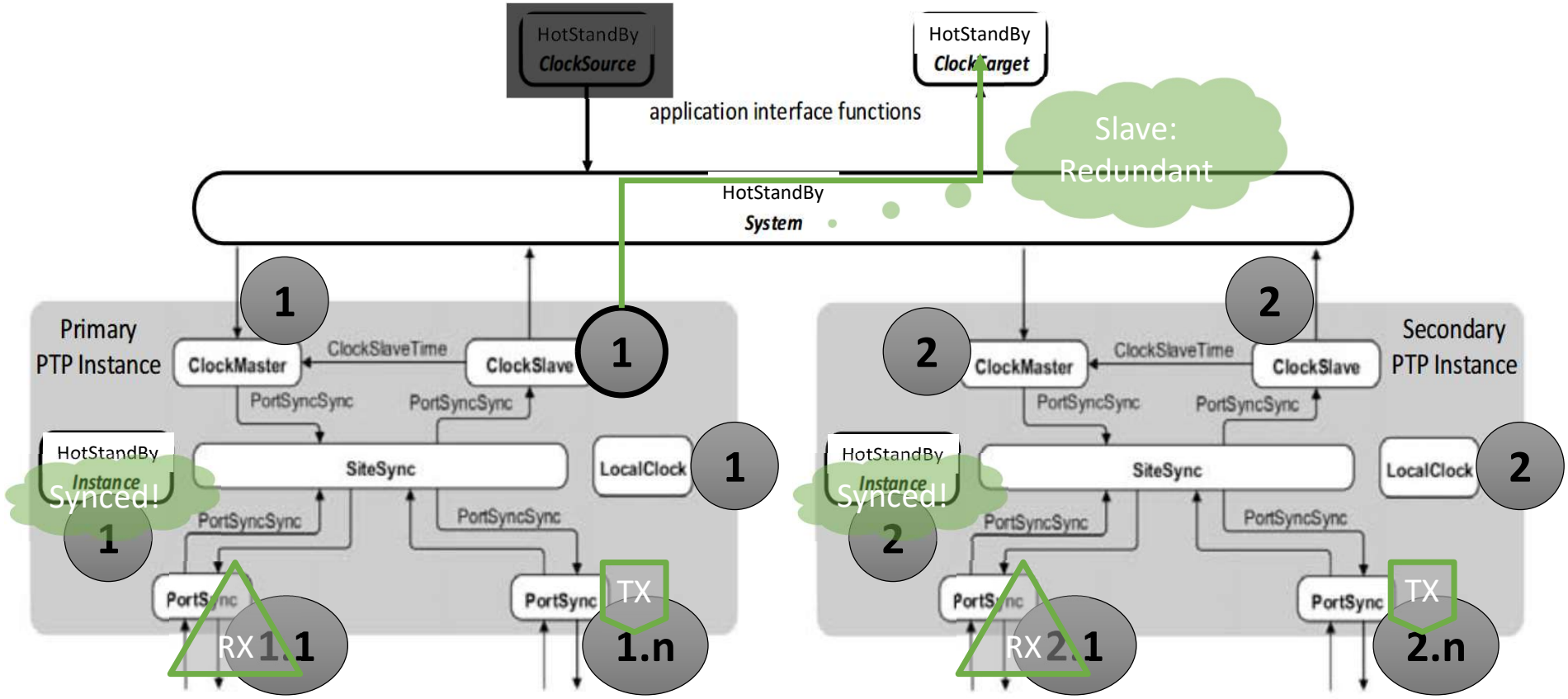
When the HotStandbySystem is a slave (i.e., neither PTP Instance is a grandmaster), and HotStandbySystemState is REDUNDANT, the HotStandbySystem shall transfer phase and frequency from the ClockSlave of the primary PTP Instance to the HotStandbyClockTarget (application).

When the HotStandbySystem is a slave, and the HotStandbySystem is in the FAULT state, the HotStandbySystem shall transfer phase and frequency from the ClockSlave of the synced PTP Instance (i.e. 60802InstanceState == SYNCED) to the HotStandbyClockTarget.

17.12.3 Slave - Redundant



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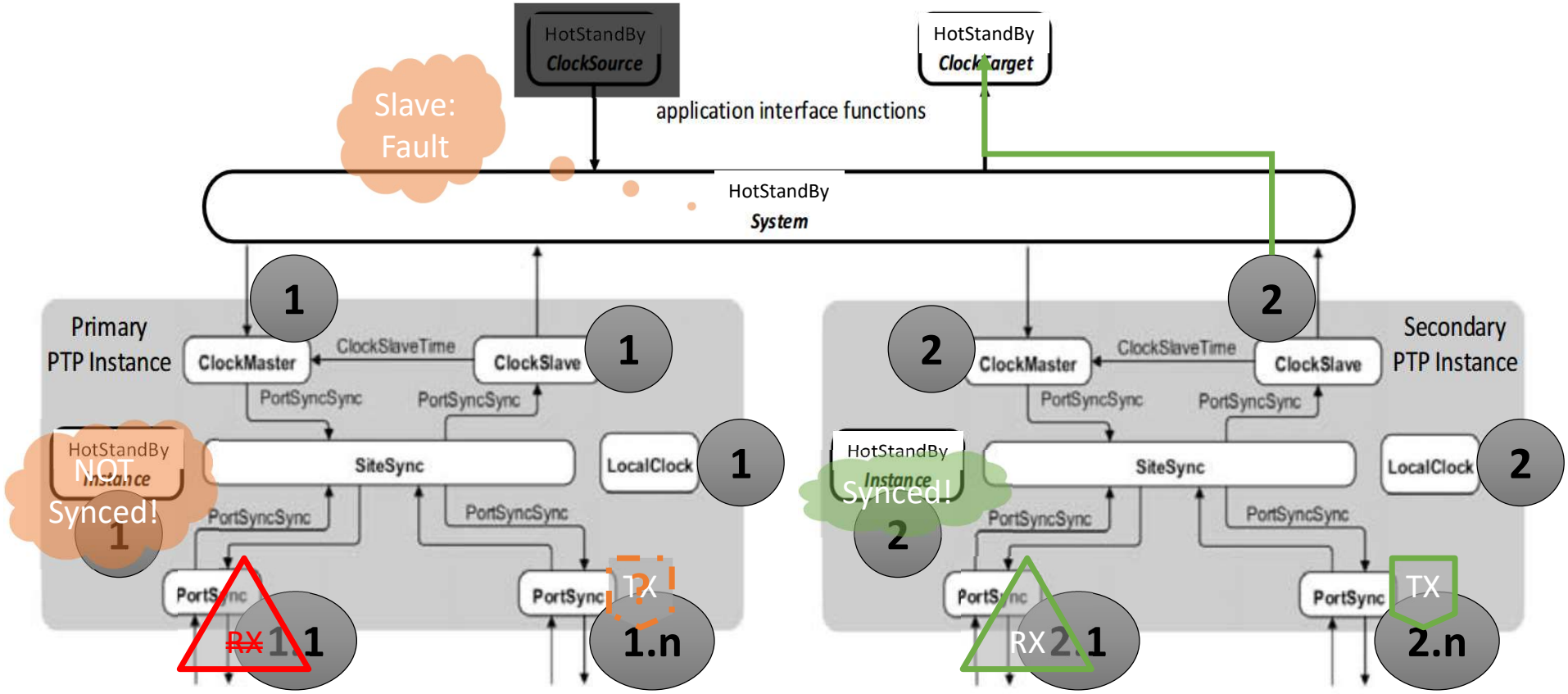
17.12.3 Slave - Fault



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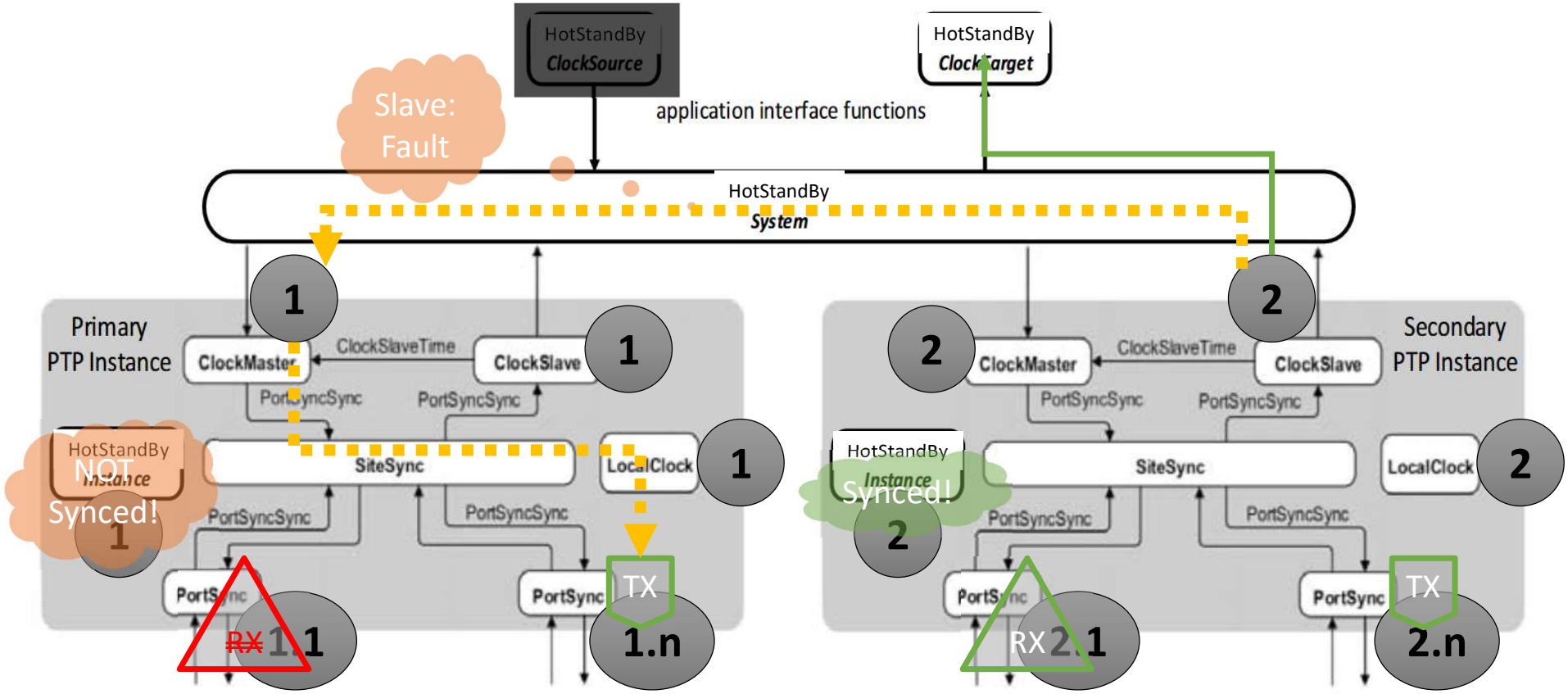
Slave - Fault: Enable Cross Bridge



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17.12.4 Holdover (Slave)

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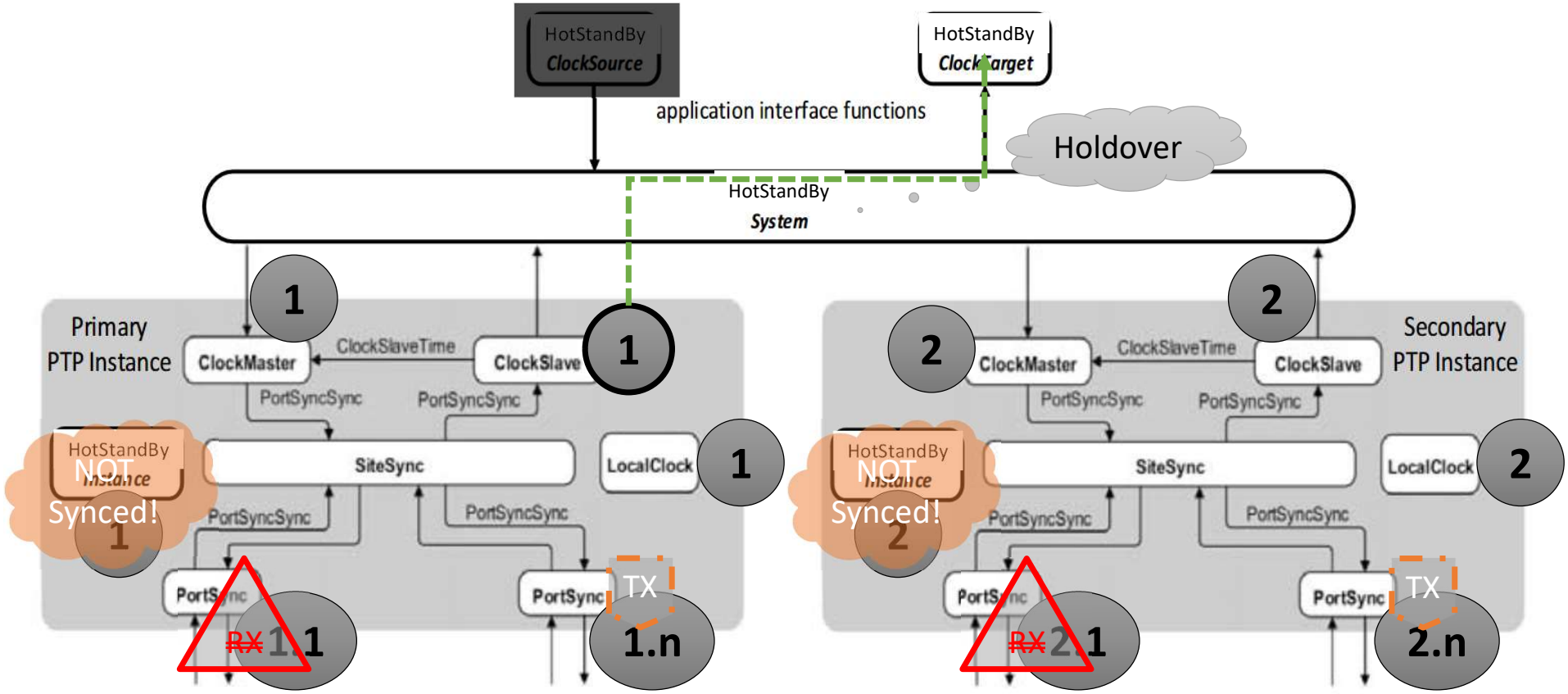
When HotStandbySystemState is HOLDOVER, the HotStandbySystem shall transfer phase and frequency from the ClockSlave of the primary PTP Instance to the HotStandbyClockTarget.

During HOLDOVER state, time synchronization performance is not required to meet the respective application or TSN profile requirements. Nevertheless, in order to mitigate drift, the primary PTP Instance should adjust phase/frequency of its local time using the data stored in REDUNDANT or FAULT state.

<<Editor's note: It might be desired to use a term other than HOLDOVER, because often a distinction is made among holdover within limits, holdover not within limits, and free-run.>>

17.12.4 Holdover



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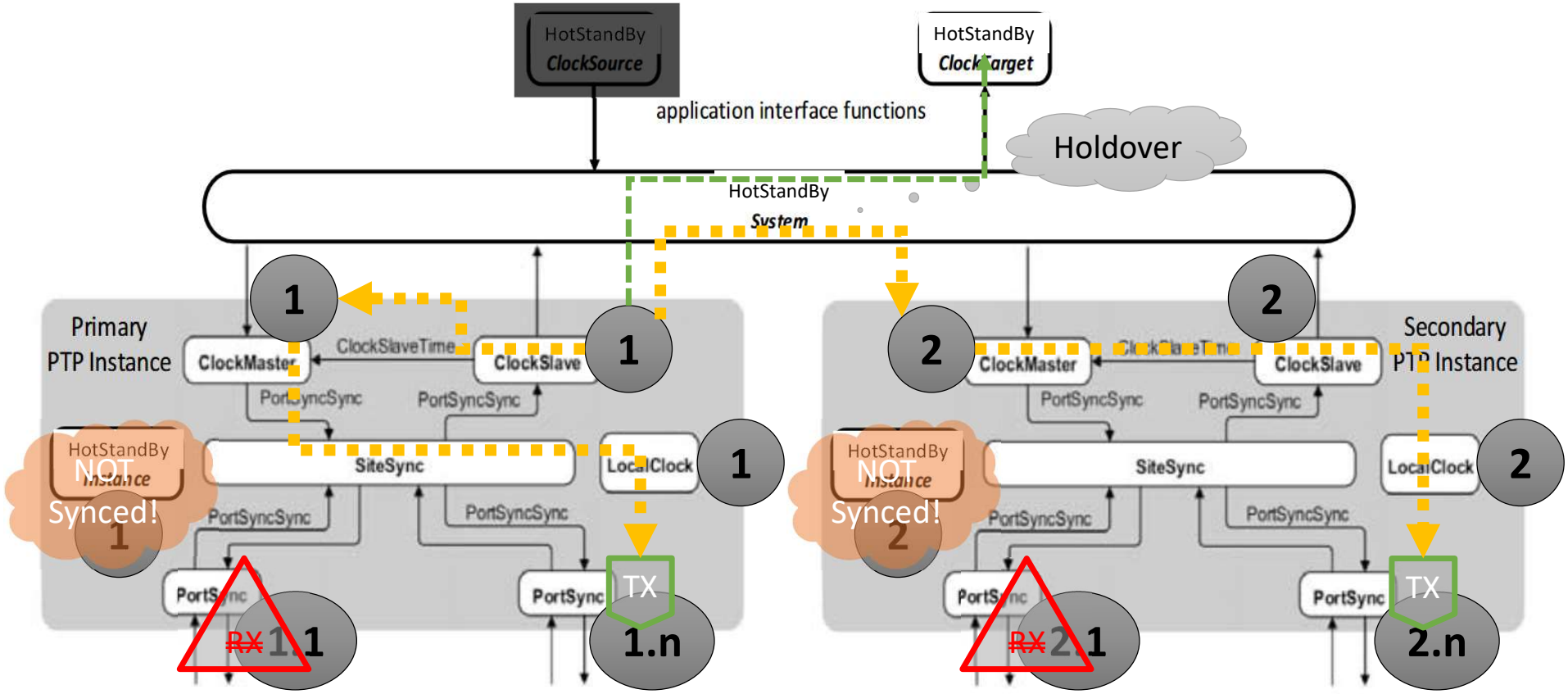
Holdover: Enable Cross Bridge



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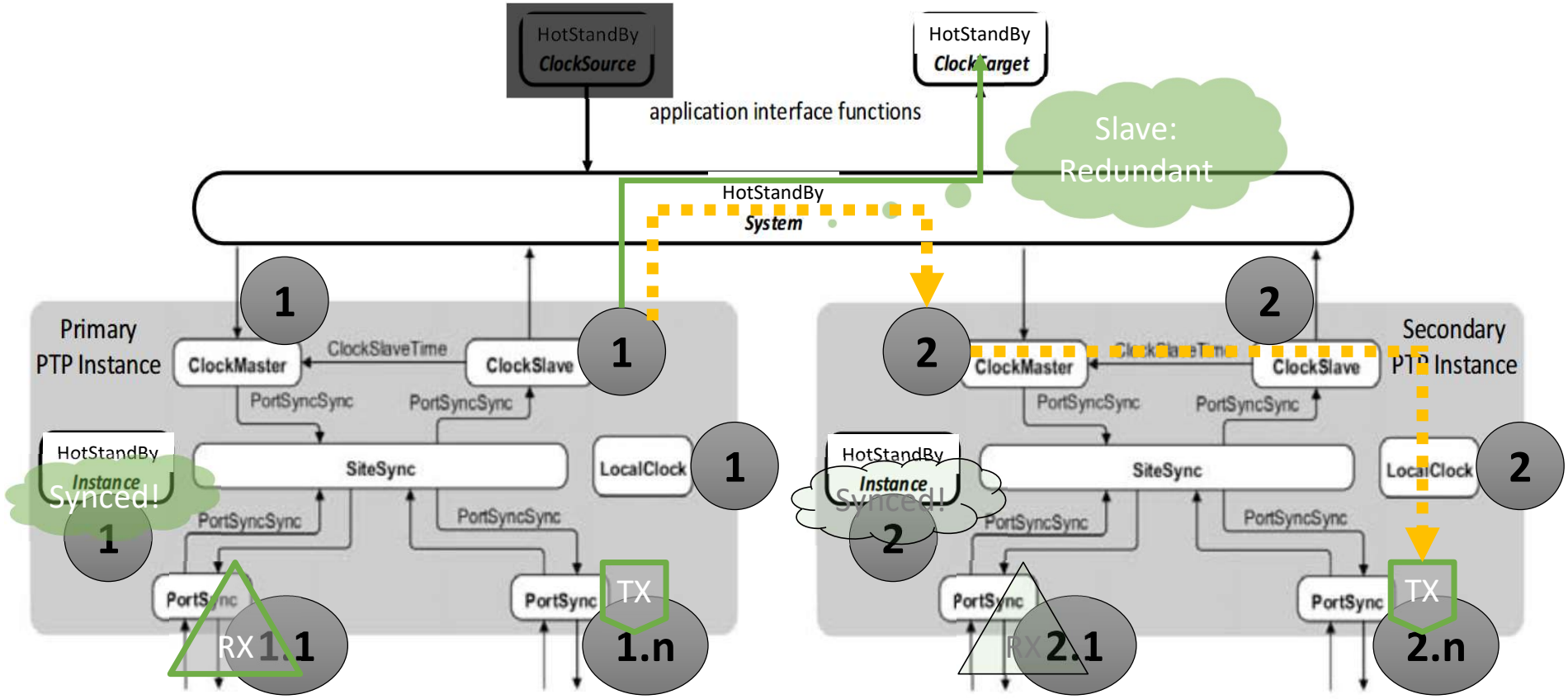
Slave: Real Redundancy – w/o Check!



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Bridge Operation

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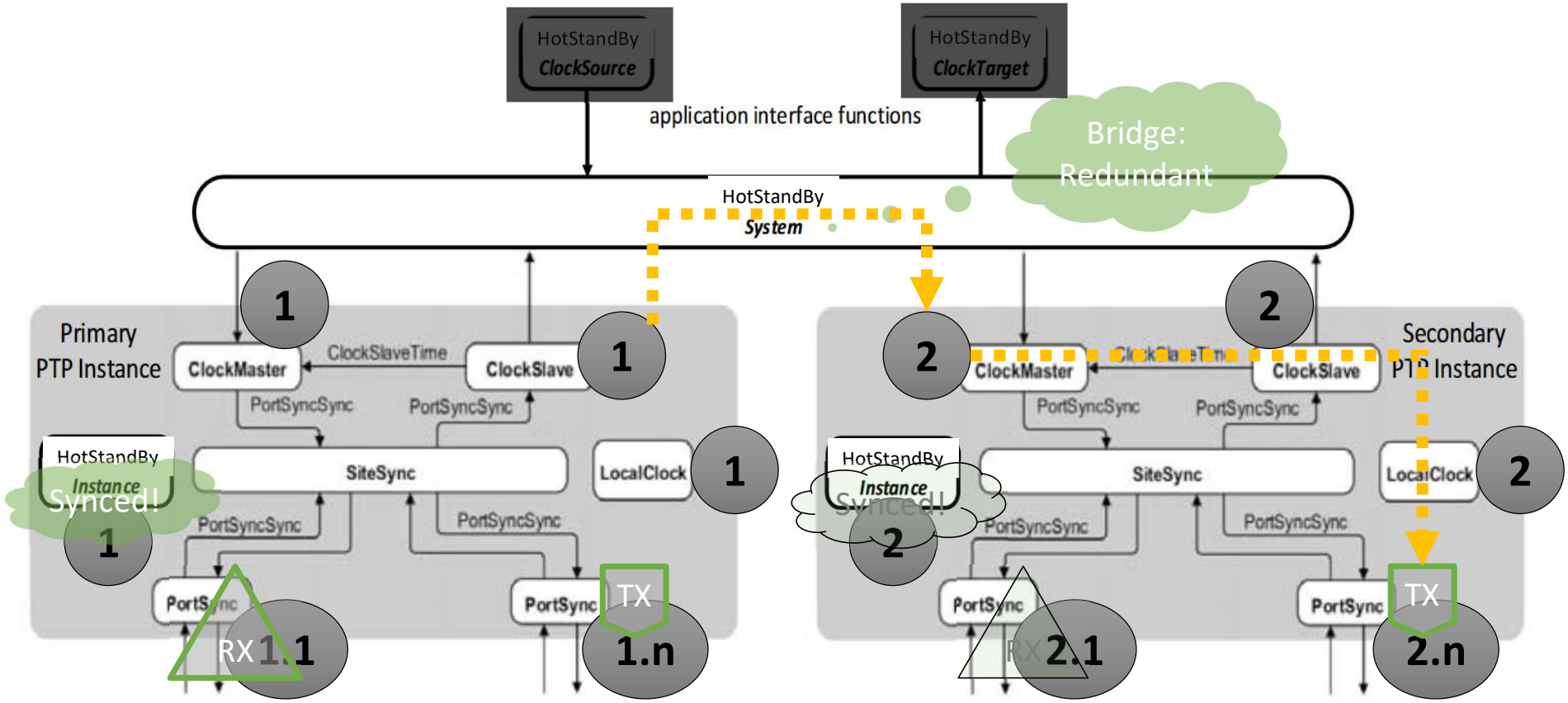
Bridge: Real Redundancy – w/o Check!



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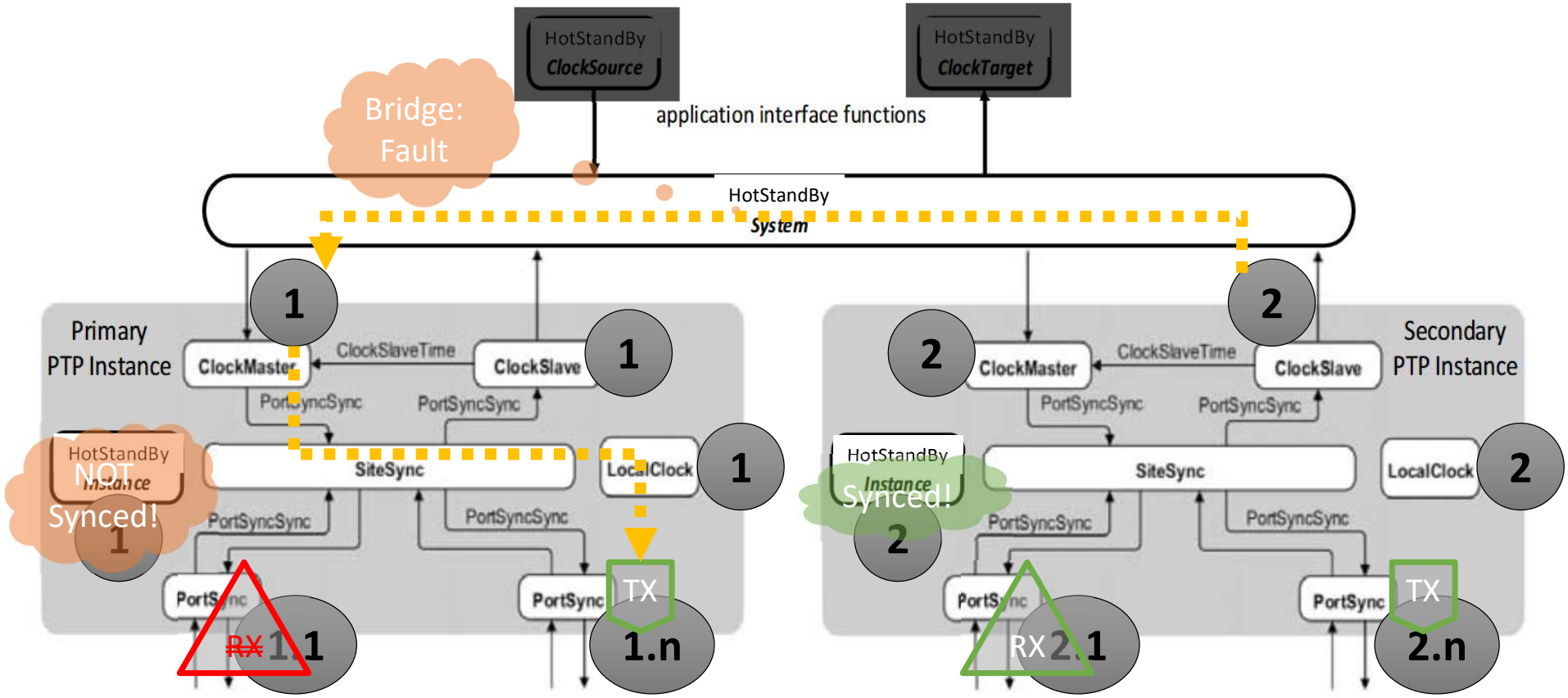
Bridge - Fault: Enable Cross Bridge



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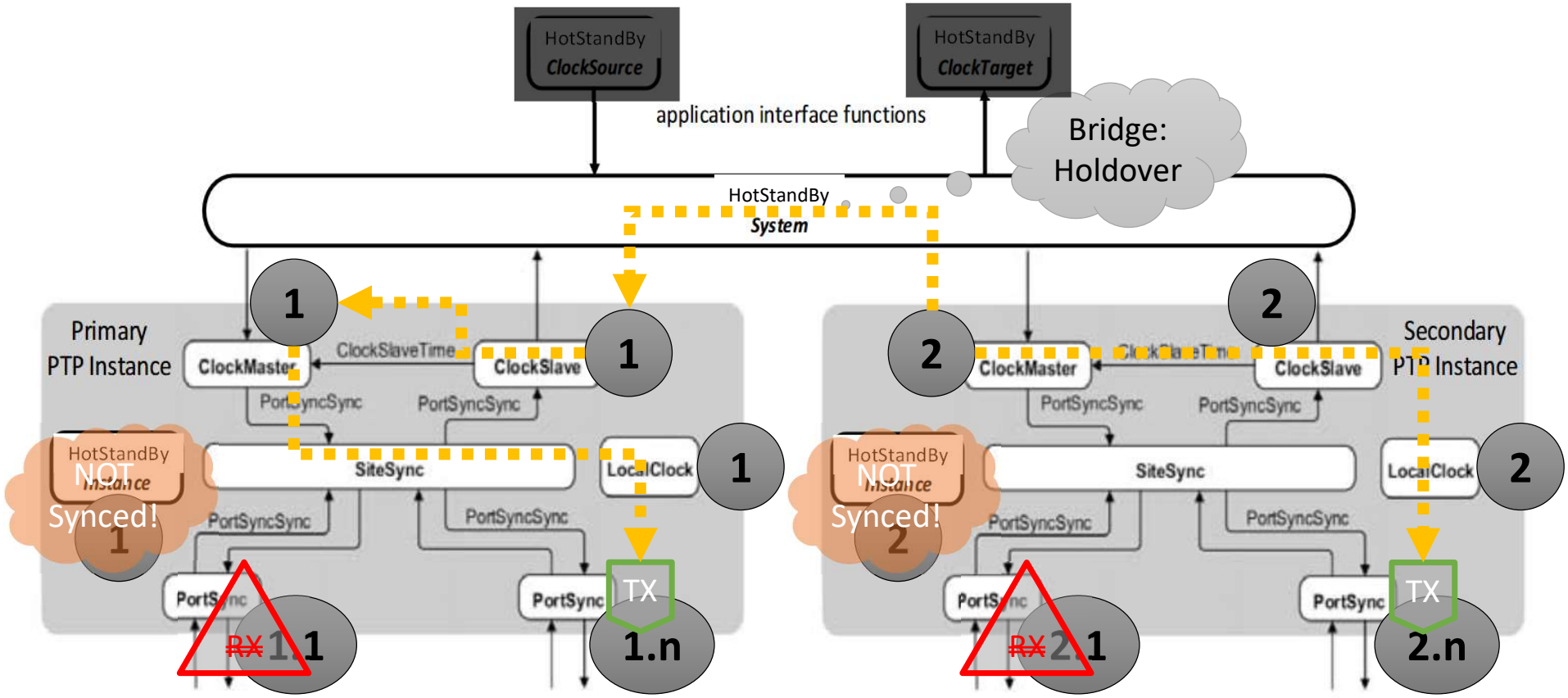
Bridge: Holdover



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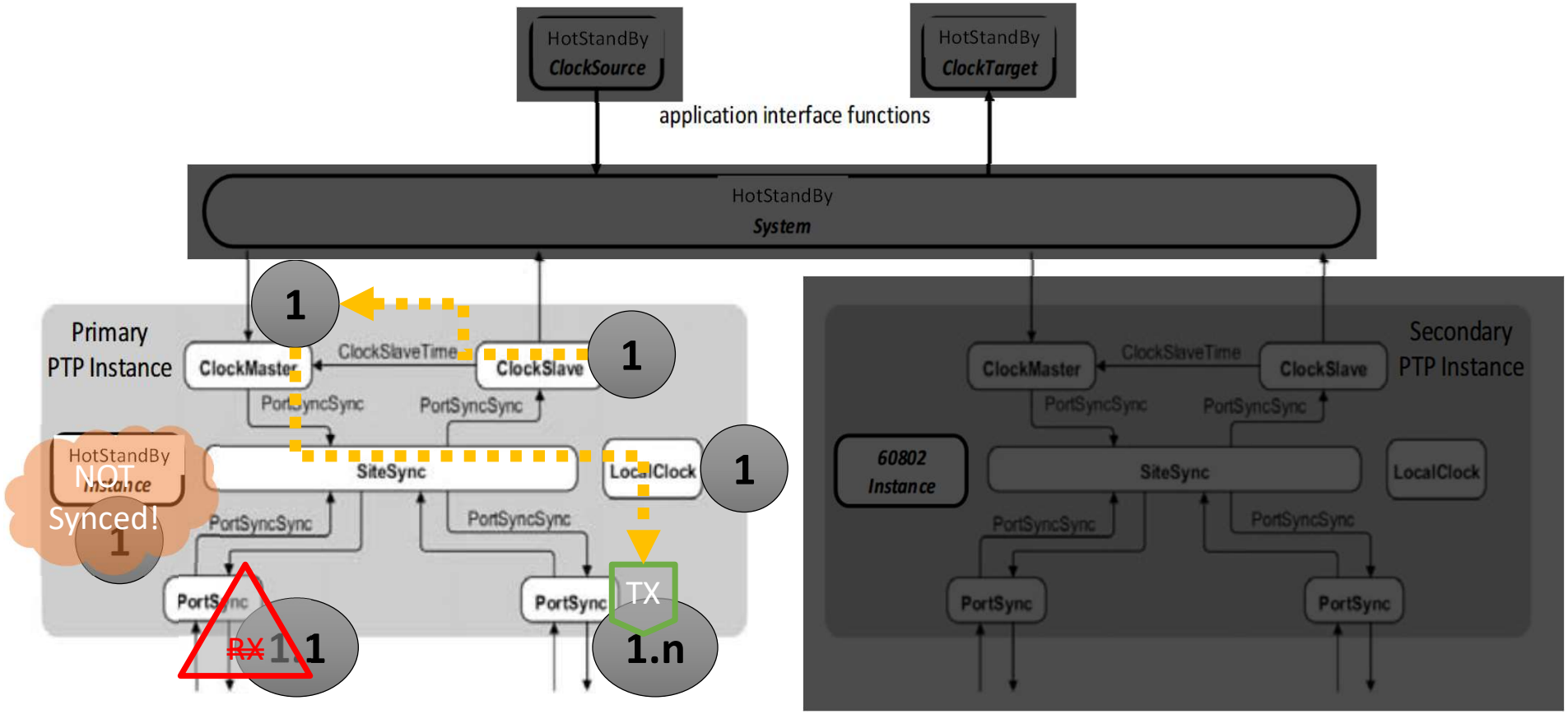
Single Instance: Holdover



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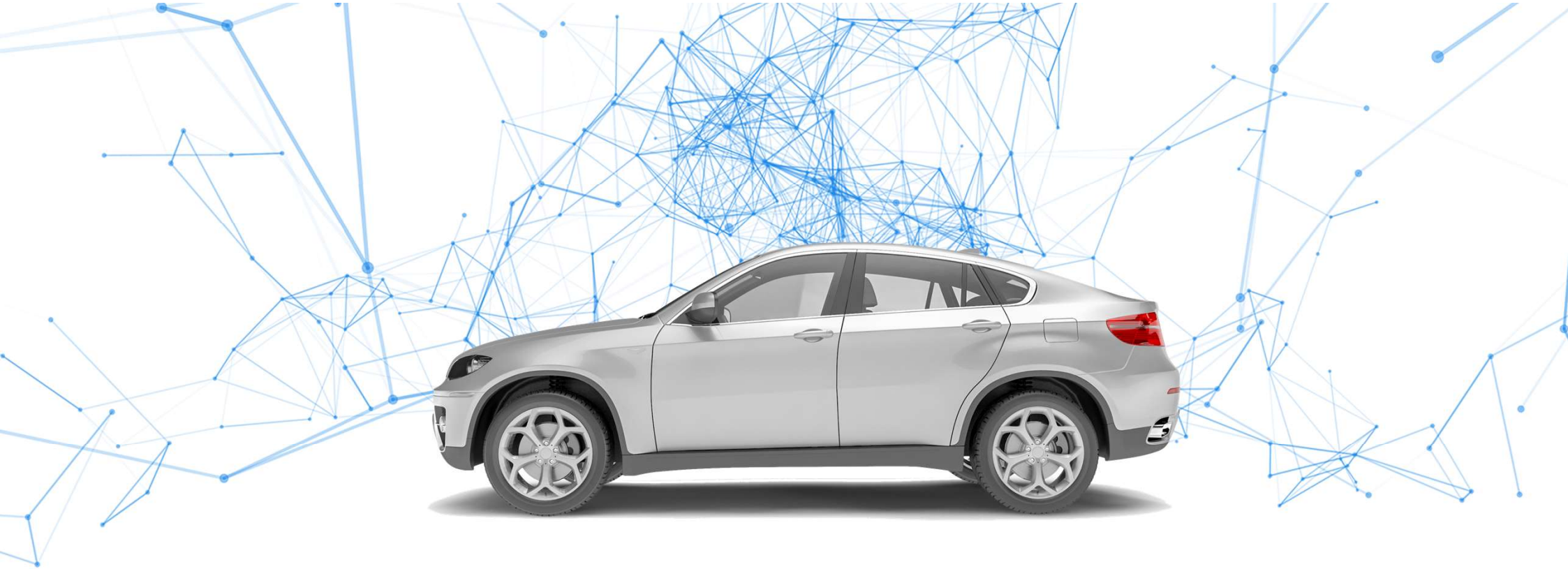

THANK YOU

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