Time Sync Integrity
For Aerospace Applications

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Objective

- **Review integrity solutions for aerospace**

Time Sync Integrity Example

Legend:
- Domain 1 Sync Tree
- Domain 2 Sync Tree
- Domain 3 Sync Tree
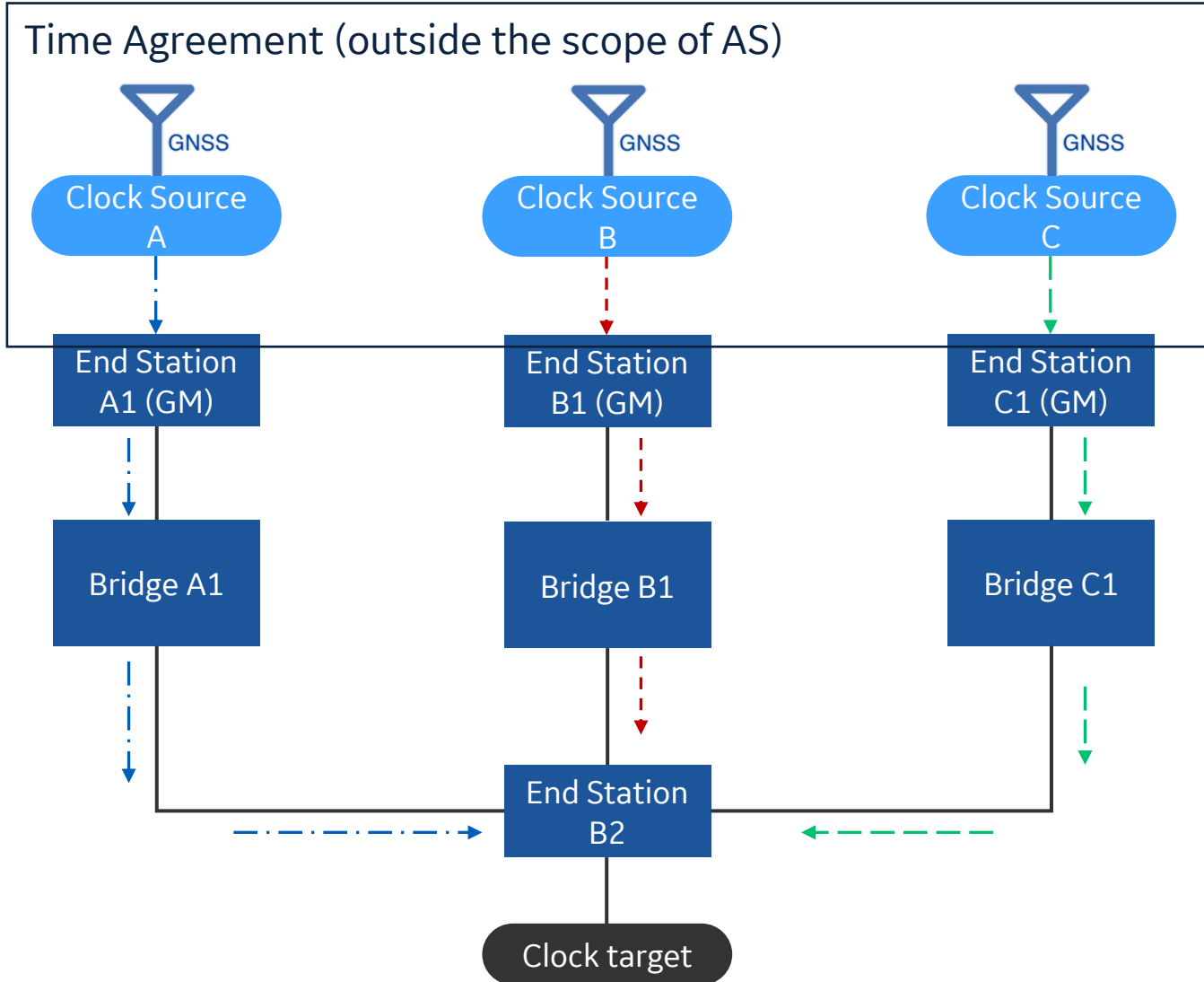
- Integrity mechanism at B2 over three PTP instances receiving time on three time domains (with 3 distinct synchronized GMS) allows end station B2 to be fail-operational
- Assumes each sync tree has sufficient availability. If not, additional (redundant) sync trees may be used to boost availability of time distribution from each GM.
- Other configurations are possible with two or four GMs
- Hot Standby (ASdm) is not required. It is not excluded either.

Potential Solution at End Station B2 (Not GM capable)
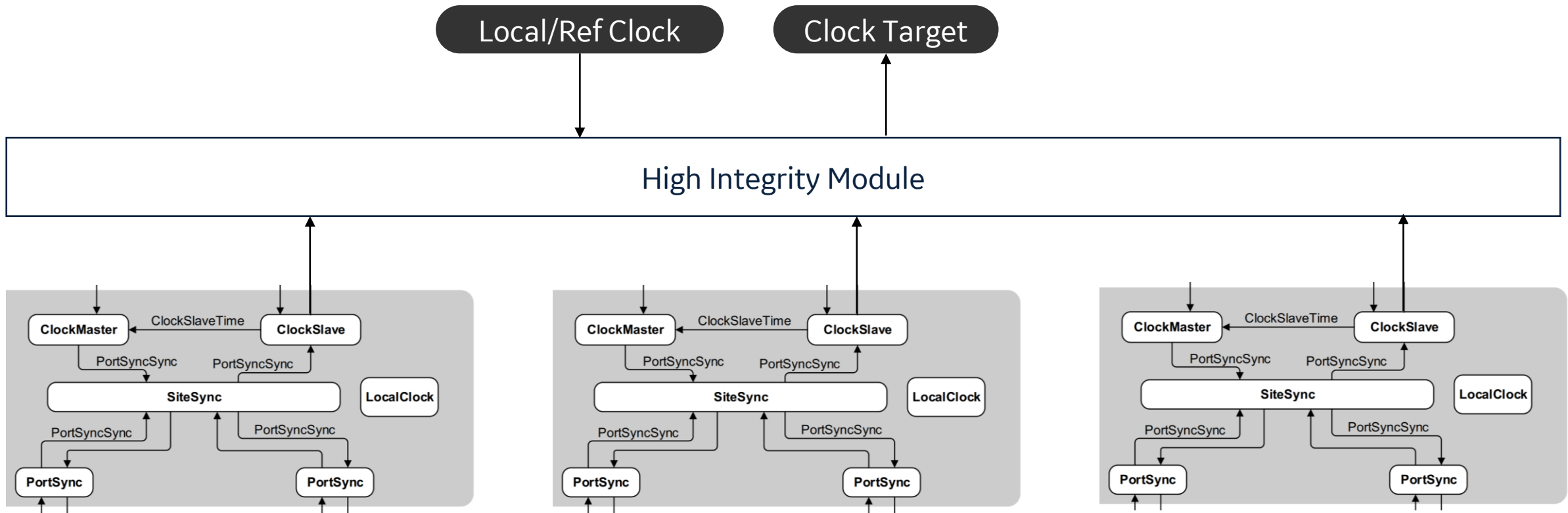
Summary

1. DP to specify "high integrity module" as an application function and define structure, interfaces, and a default selection algorithm(s). Applies to both end stations and bridges.

2. Default selection include different algorithms based on number of inputs to the integrity module. Covers 80% of use cases and still allows for implementation/user specific algorithm.

3. Devices to support at least 3 PTP domains, recommend 4 PTP domains. A quality local clock may serve as 4th time reference for integrity calculations

4. Hot Standby (ASdm) is not required. It is not excluded either.

5. Ongoing discussions... proposal may need fine tuning

Backup

Time Synchronization Integrity

Integrity Definition

"Integrity is the measure of the trust that can be placed in the correctness of the information supplied by a navigation system. Integrity includes the ability of the system to provide timely warnings to users when the system should not be used for navigation"

https://gssc.esa.int/navipedia/index.php/Integrity

Time Sync Integrity Definition in the context of TSN and 802.1AS

Integrity is the measure of the trust that can be placed in the correctness of the time supplied by a PTP system. Integrity includes the ability of the system to provide timely warnings to users when the PTP system should not be used for safety functions