SOIS Synchronization Service and SpW-RT

F. Torelli ESA-ESTEC

SOIS Synchronization Service

SOIS Synchronization Service:

- **Distribution of onboard time across the sub-network.**
- **Notification of time events to the sub-network users.**

The service is managed by the OnBoard Reference Time master (normally the **OBC**) which is in charge to distribute to the users on the sub-network:

- The value of the onboard elapsed time.
- The synchronization pulse (PPS) to latch in users local timers the previously distributed elapsed time.
- Event messages.

Synch Service in SpW Network Context

Assumptions:

a. The spacewire network master has access to the OBRT without degradation in the onboard time precision and resolution.

Requirements:

1. Elapsed time shall be broadcasted to the SpW network users.
2. Elapsed time shall be in CCSDS Unsegmented Time Code (CUC) format.
3. Synchronization pulse shall be broadcasted to the SpW network users with less than S_MAX μsec latency.
4. Time event messages shall be distributed to the requesting SpW network users with less than E_MAX μsec latency.
5. Synchronization pulse and time events shall be generated synchronously with the network schedule (when present).

Synch Service and SpW-RT

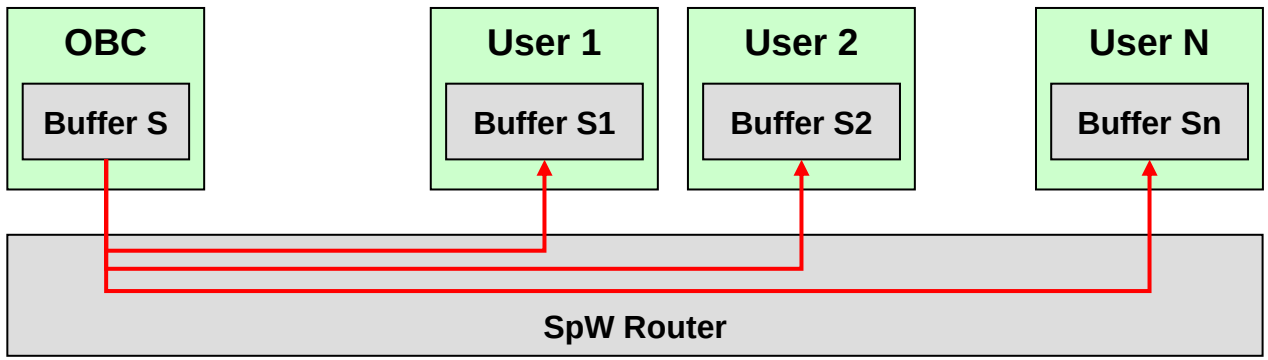
Required to identify adequate mechanisms to implement the service in an efficient way.

Open points for discussion:

1. Mechanism to mimic broadcast to be analysed for SpW-RT.
2. Time-code can be used as synchronization pulse (better if with a frequency of 1Hz).
3. Slots in schedule or priority channels can be reserved to event messages in order to have bounded latency in the transmission.

SpW-RT and “Broadcast ET”

- To assign predefined channels between network/OBRT master and the network users.
- To reserve bandwidth within one or more slots for the transmission of the elapsed time.
- To encapsulate the elapsed time packet in a data PDU (data segment).

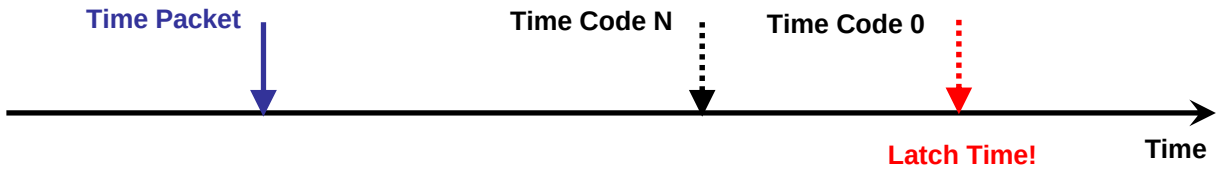


SpW-RT and Synch Pulse

Option 1:

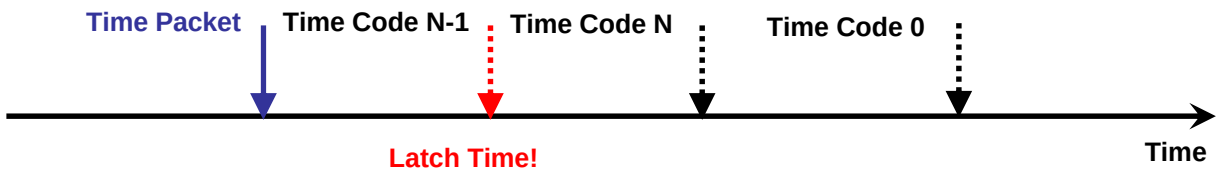
a. Latch time on time-code 0 occurrence.

b. Latch time every M time-code 0 occurrences.



Option 2:

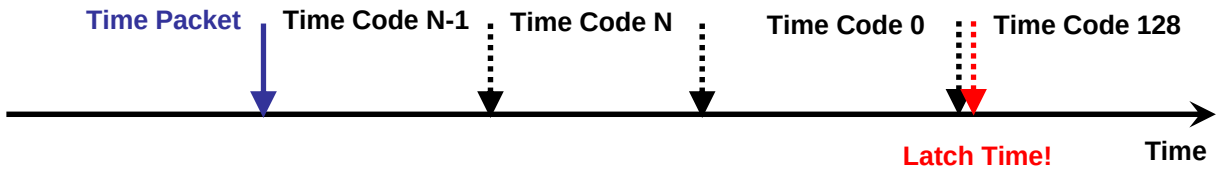
- Latch time on the time-code occurrence right after time packet reception.



SpW-RT and Synch Pulse

Option 3:

- To use one of the spare/reserved bits in the time-code format as PPS and/or other time event message codes.



All the options have pro and cons and an open discussion to these points is welcome!

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