

Asynchronous events in RTCM-SSR synchronous messaging

F. Lahaye, P. Collins

Summary

RTCM-SSR messages are synchronized to specific epochs of GPS time. Normally, modeled elements (orbits & slow clocks) are transmitted less frequently than stochastic elements (fast clocks). Thus, when asynchronous events happen affecting the consistency of fast and slow information, users must be warned that the content they possess is no longer valid. When implementing the full suite of RTCM-SSR messages, NRCan devised a method of warning users of such events. The method makes use of existing features of the adopted specifications of RTCM-SSR for fast messages, specifically satellite URA indices 0 and 63 in message type 1061 and the special value of high-rate clock correction in message type 1062. In addition, the absence of a satellite high-rate clock correction at a specific epoch also carries information to users.

Depending on the type of events, two key actions were defined for users, among other less critical actions:

- 1) stop using a satellite even if slow models are available; the service operator resumes sending satellite slow information when the consistency problem is resolved;
- 2) update slow models with new versions of the existing messages; this implies the service operator re-issue slow model information for affected satellites.

Asynchronous events

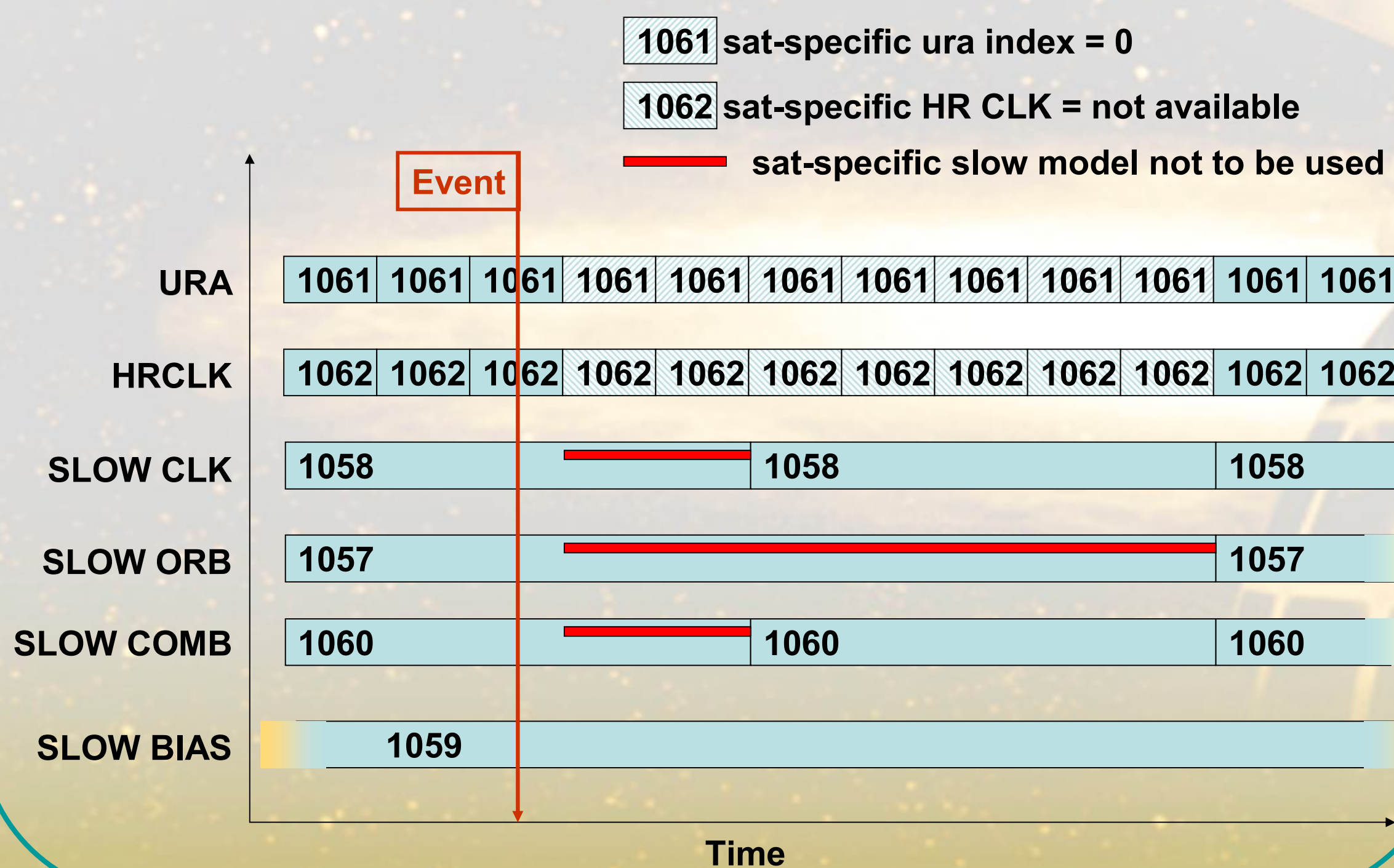
- Sat. rising/setting over service area (0)→(5)→(1)→(2)→(0)
- Loss of satellite tracking with ambiguity reset (1)→(2)→(1)
(1)→(2)→(3)→(1)
- Satellite ambiguity reset (1)→(3)→(1)
- Change in precise ephemeris source (5)→(1)
- Change in slow clock model (5)→(1)
- Premature change of reference IODE (6)→(1)
- Satellite yawing event (6)→(0)→(1)
- High-rate clock limits exceeded (6)→(1)

State sequence

State table (satellite-specific)

		HR CLOCK (1062)		
		None	[-209.7151, 209.7151]	Unavailable [-209.7152]
URA (1061)	0	Not Monitored satellite does not appear in slow messages either (0)	Reacquire models (URA=0 until next slow update) (5)	DO NOT USE even if you have models (6)
	[1-62]	Normal operations for 1060 + 1059 + 1061 Service	Normal operations full message suite (1)	Satellite temporary unavailability (2)
	63		Satellite not phase quality (3)	Combination of (2) and (3) (4)

Example: Stop Using Slow models



Example: Reacquire Slow models

