



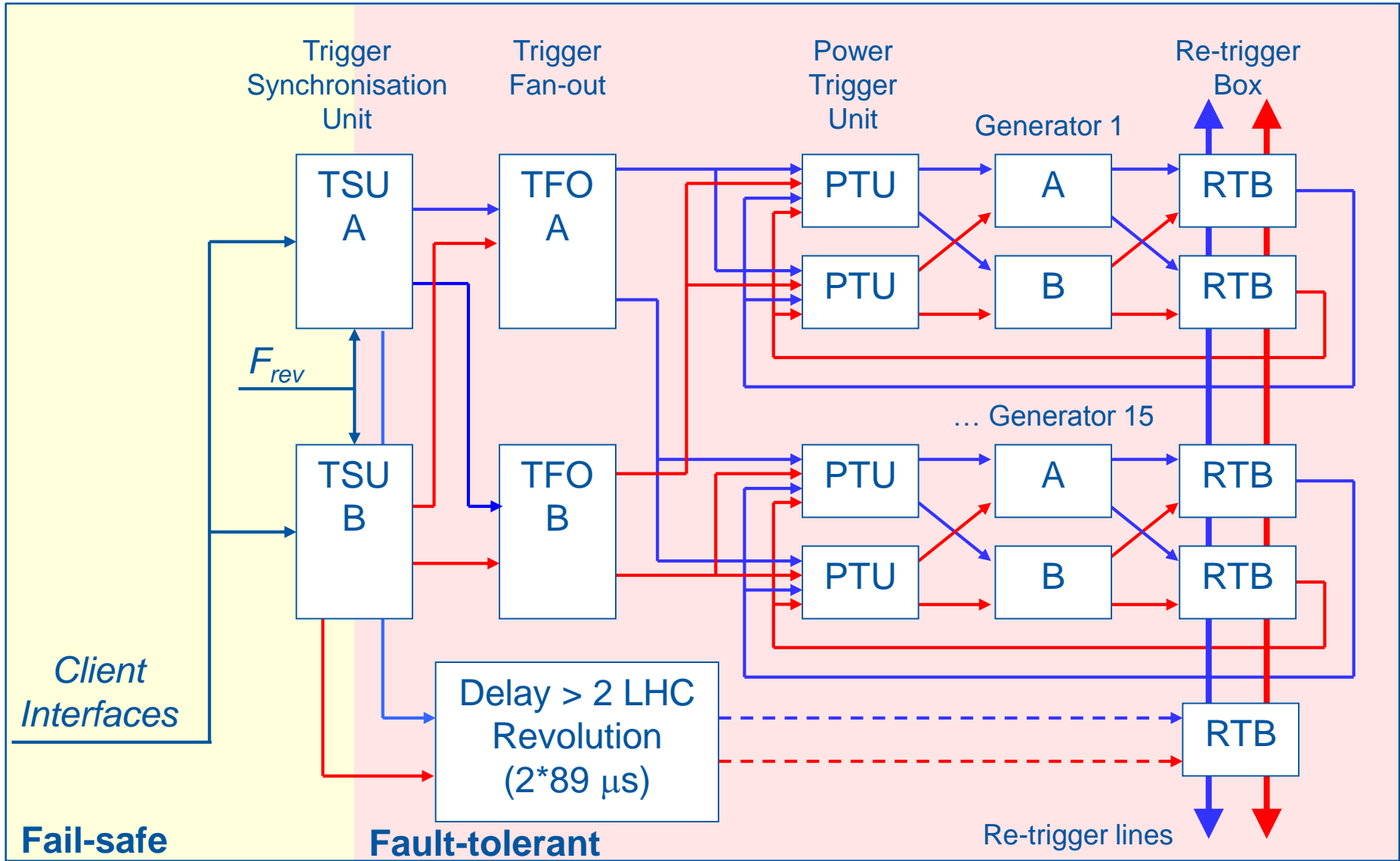
Unforeseen TSU gateway upgrade during EYETS

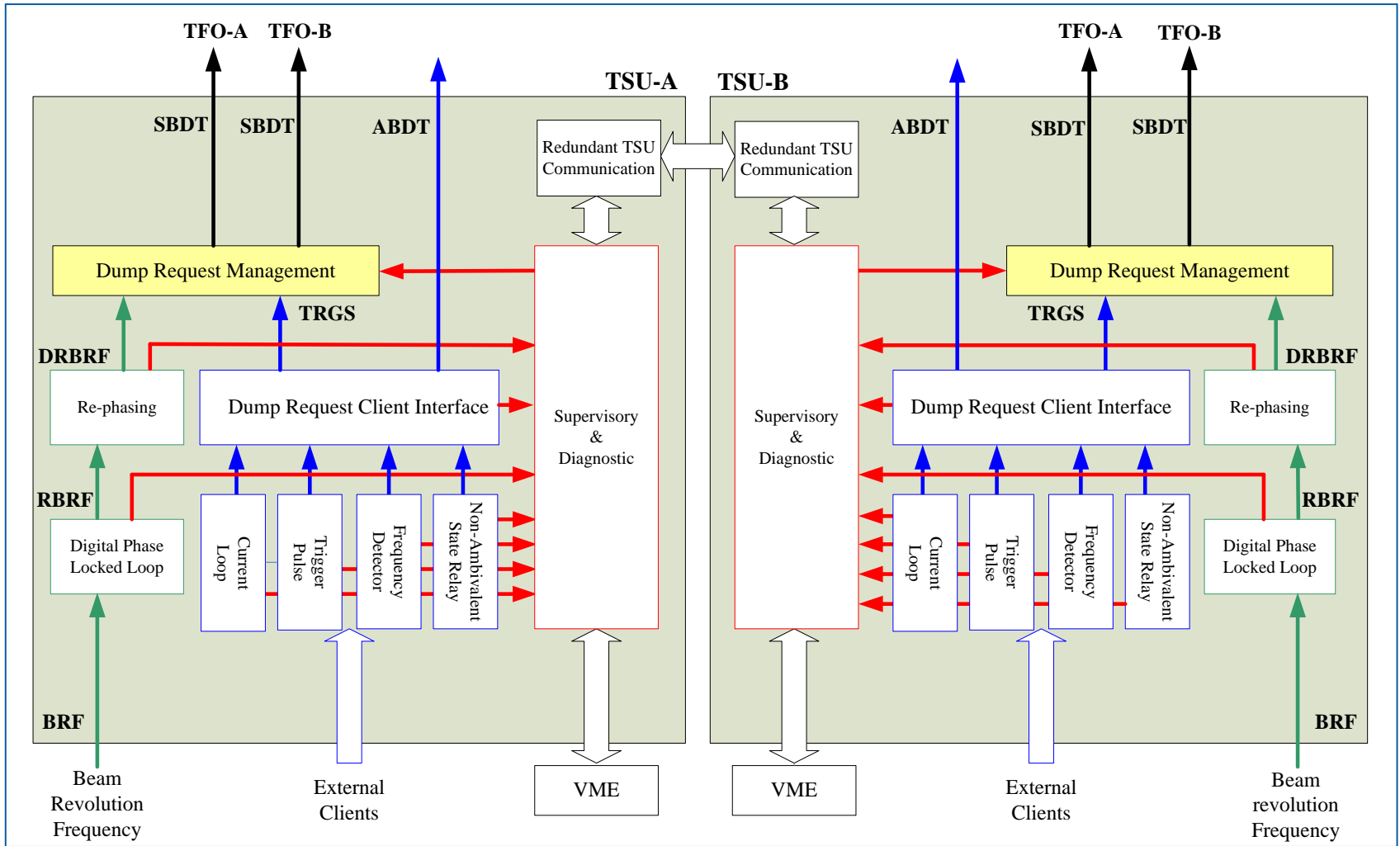
Alain ANTOINE, Etienne CARLIER, Nicolas MAGNIN, Nicolas VOUMARD

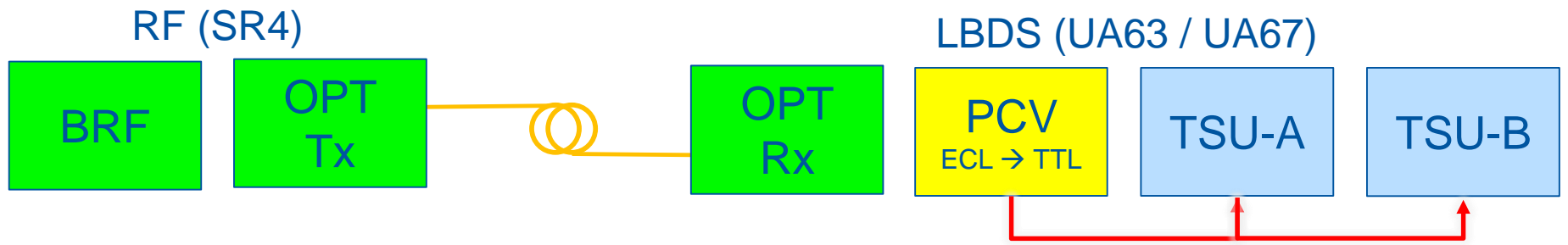
MPP – 16-12-2016









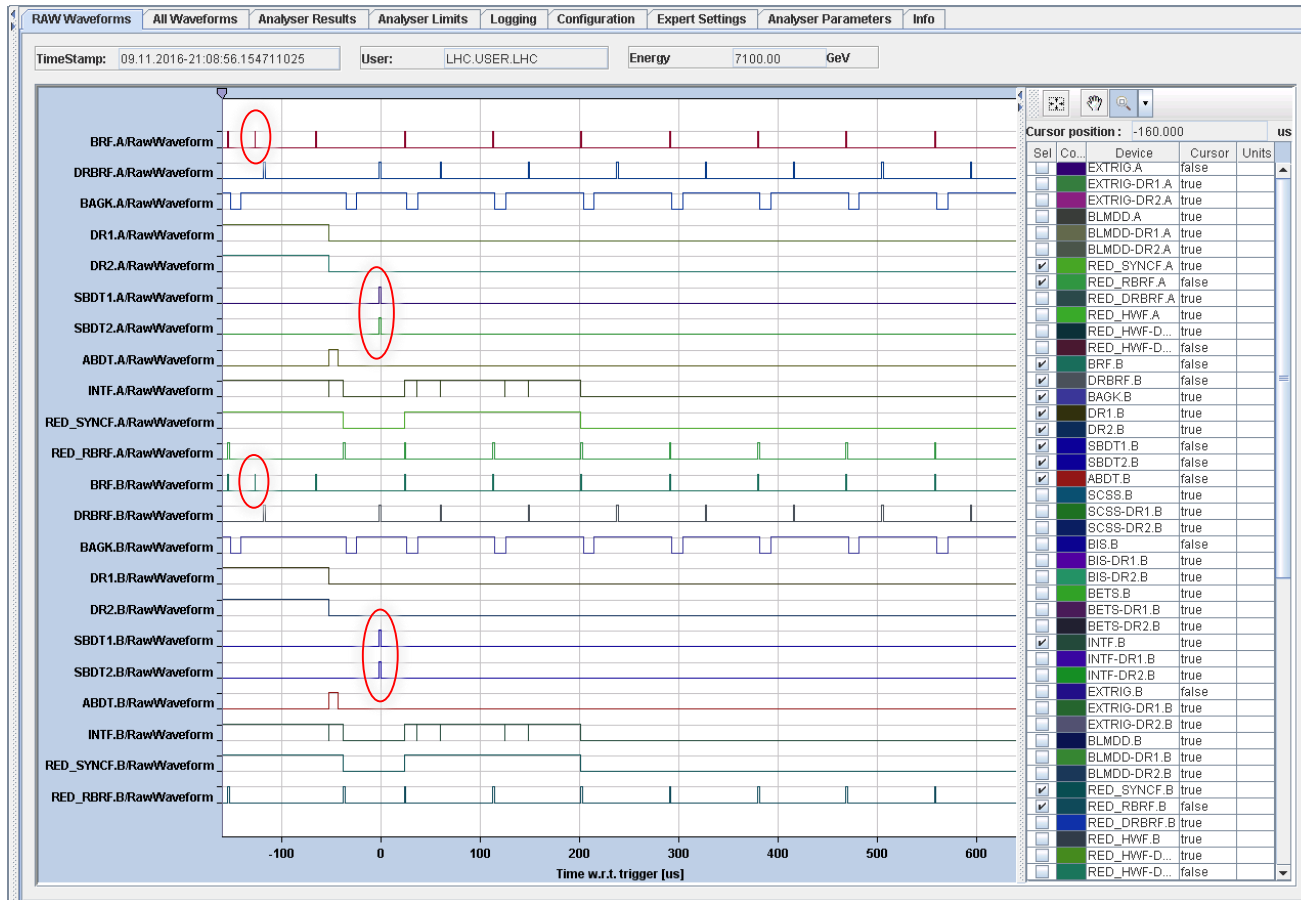


		TSU-A	
		OK	FAULTY
TSU-B	OK	A → Dump B → Dump	A → Inhibited B → Dump
	FAULTY	A → Dump B → Inhibited	A → Dump B → Dump Synchronisation?

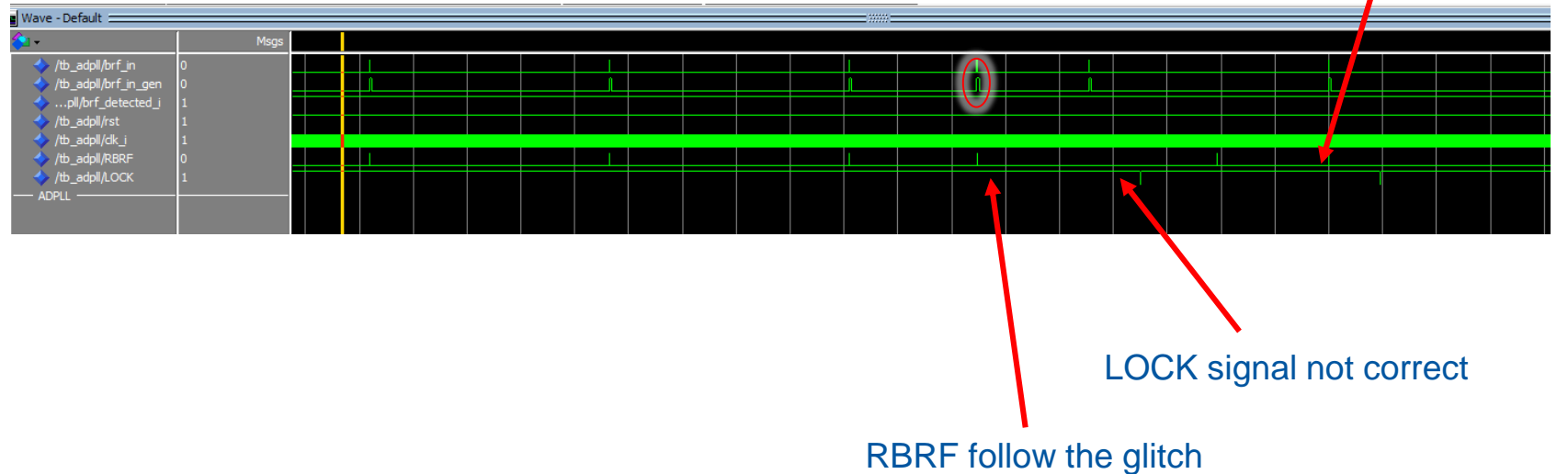
Potential problems detected in TSU gateway

Gateway version 1.3

- In case of a glitch on the BRF input affecting both TSUs, the TSU issues an asynchronous dump request
- This is due to a resynchronization of the RBRF NCO with the input BRF inside the ADPLL



BRF glitch simulation



- Simulations confirm identified failure mode
- RBRF generated in phase with the noise induced by the reset of the NCO with BRF signal itself (reduce jitter and drift)

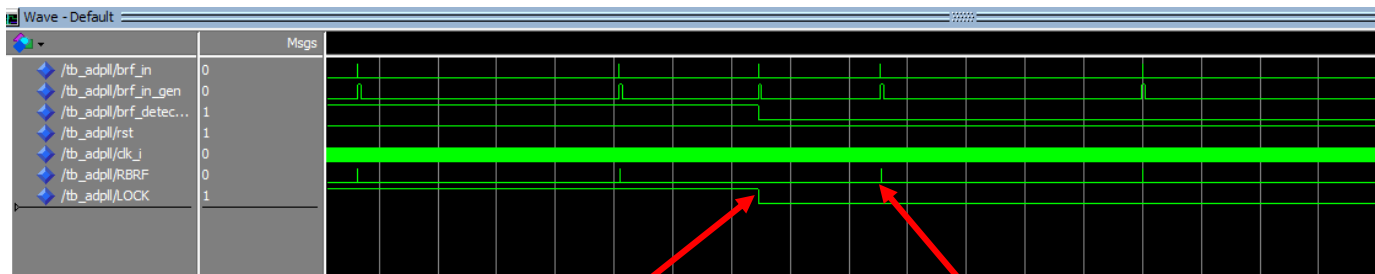
Failure consequences

		Beam	
		Synchronous	Asynchronous
Kick	Synchronous	BRF glitch affecting one TSU	BRF glitch affecting both TSUs
	Asynchronous	Not possible	Not possible

- Failure in the system since the beginning... but never happened
- Partially identified by the external review (incorrect reaction in case of sudden increase of the BRF)
- Not tested by the test bench... as not identified

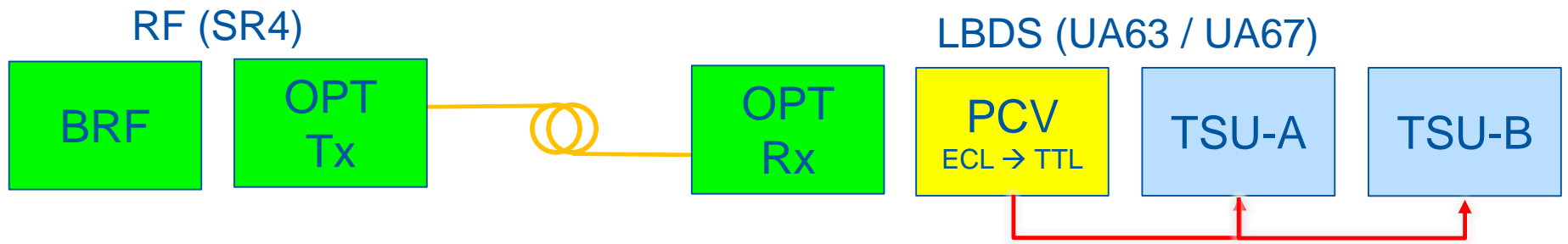
« BRF Glitch » bug fixes

- Improved BRF surveillance
 - Implementation of a new check that surveys that the actual BRF period is within +/- 30 ns of the last BRF period
 - Verification that the actual BRF period is within 88.8 us and 89.1 us. Remove LOCK signal if BRF detected outside surveyed window
- Modified ADPLL resynchronisation mechanism
 - Force ADPLL LOCK signal to FALSE in case of FALSE BRF detection
 - Inhibit NCO reset by BRF in case of ADPLL LOCK signal at FALSE
 - Generate dump request on TSU internal fault condition



LOCK is de-asserted

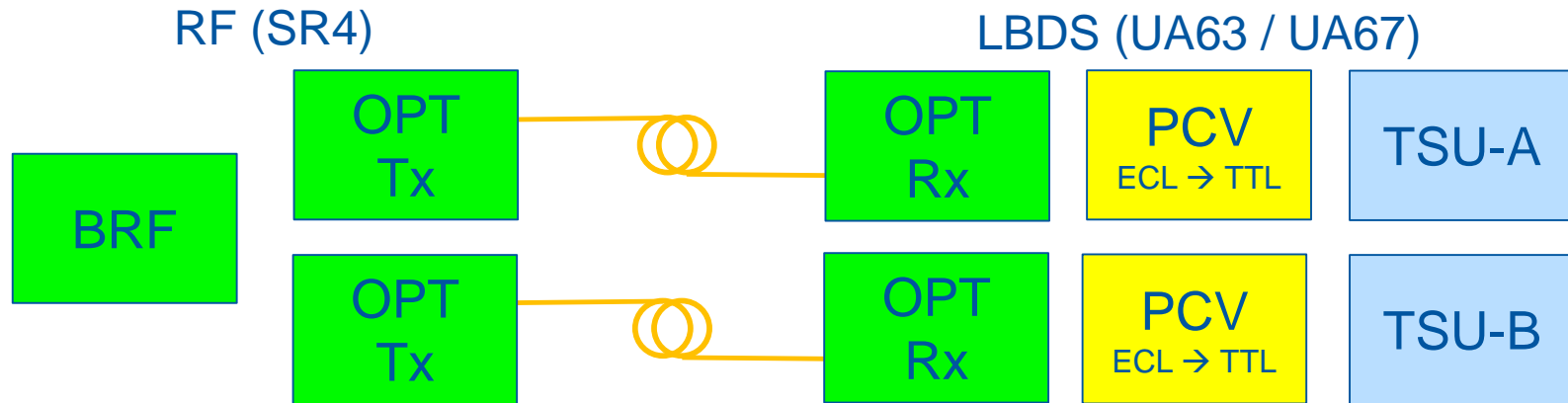
RBRF in phase
Beam dump requested



		TSU-A	
		OK	FAULTY
TSU-B	OK	A → Dump B → Dump	A → Inhibited B → Dump
	FAULTY	A → Dump B → Inhibited	A → Dump B → Dump Synchronised

Situation after modification

Next?



- Do we have to implement a redundant transmission of the BRF between RF and LBDS
- Impact of higher sensitivity to optical transmission discrepancy at the level of the TSU ADPLL to be evaluated more into details