LNE-SYRTE Report

by

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Summary

LNE-SYRTE has two fully operational TWSTFT stations (OP01 – equipped with a satellite simulator developed in the laboratory – and OP02).

OP01 operates within the two networks: Paris - Europe and Paris - USA. The major links with OP01 are calibrated by the BIPM.

In February 2010, OP02 interrupted two-way links within the Europe to Asia network due to the unavailability of a geostationary satellite covering Paris area.

OP01 and OP02 are judiciously installed permitting to do measurements in the frame of research and development in the field (collocation configuration, satellite simulator technique, SAW-filters issues, two-way carrier phase experience, optimization of the technical parameters).

OP received a new license (authorization) from the French authority for the French two-way stations installed at OP (Paris) and at OCA (Calern)

Last realizations

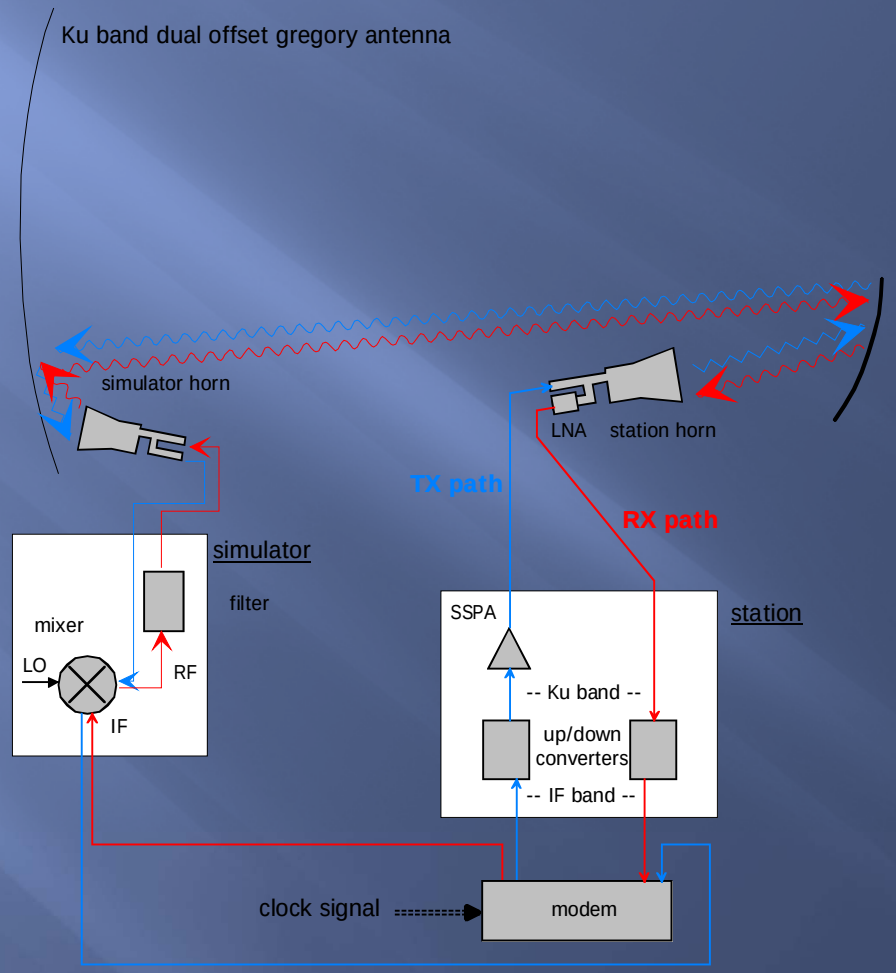
1- Characterization of the OP01's differential delay using a satellite simulator within 400 ps combined uncertainty;

2- Considerable improvement of the short-term noise (down to 1 ns) on the two-way links with OP by the introduction of offsets into the transmitted frequencies;

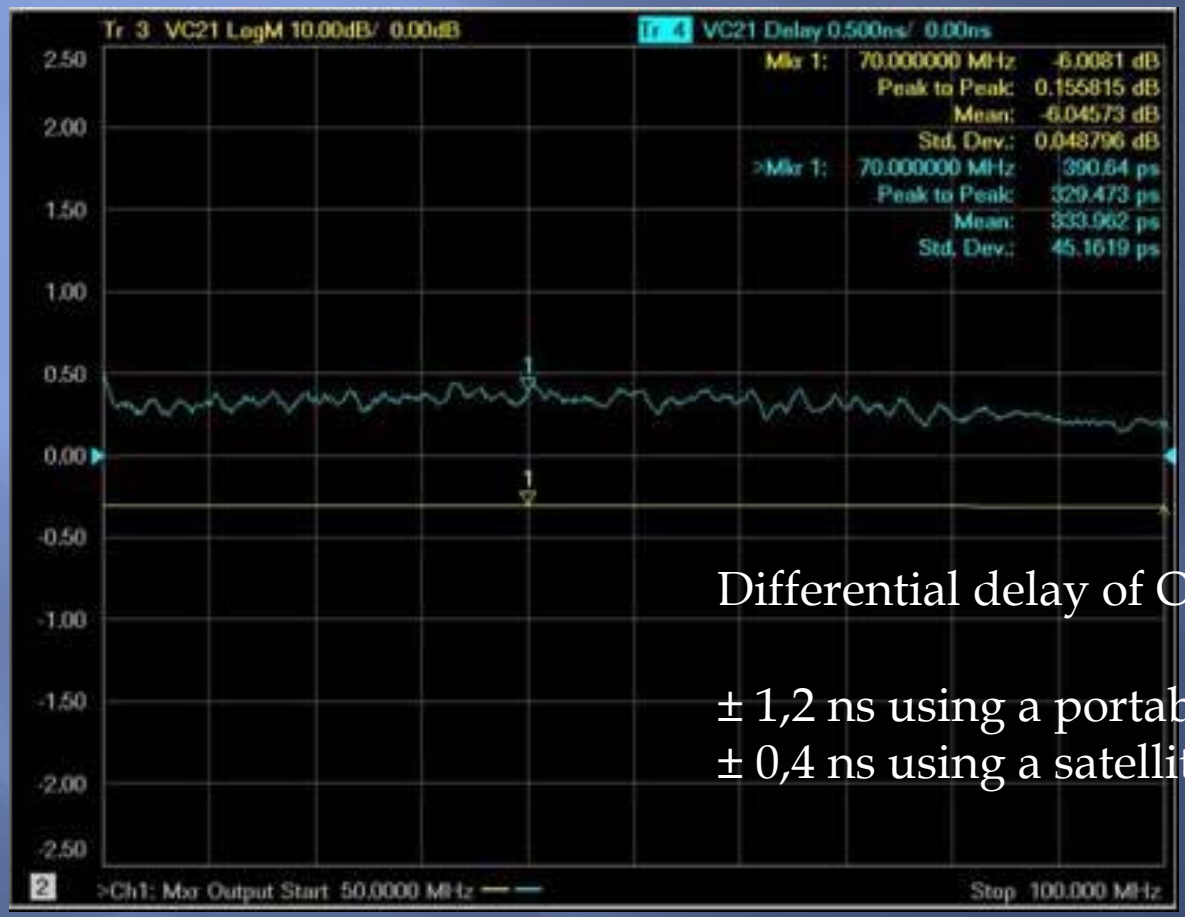
3- Implementation of the carrier phase technique: frequency stability of 1×10^{-12} at 1 s and 3×10^{-14} at 100 s are obtained with OP01 and OP02 in collocation; however, a degradation on the stability is observed at 300 s. Further investigations are in progress;

4- The use of a quiet transponder with appropriate configuration of stations improves considerably the main characteristics of a 1 MChips two-way network: an excellent stability of 40 ps at 1 d is obtained on the OP-PTB link (the diurnal effect and noise were reduced).

Design of The Satellite Simulator



Satellite simulator: improvement of absolute delay measurement using a MVNA



Differential delay of OP01 station known at:

± 1,2 ns using a portable station (relative value)
± 0,4 ns using a satellite simulator (absolute value)