URSI GASS 2021, Rome, Italy, 28 August - 4 September 2021

Timing Offset and Timing Stability for a Channel Sounder

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1 Introduction

Some channel models capture real-world channel propagation. Channel sounders measure this channel propagation [1,2]. To ensure accurate and proper measurements, evaluation of the channel sounder hardware performance must analyze the system's timing offset and stability [3]. This is vital because channel sounding relies on high-quality timing synchronization between a channel sounder's transmitter and receiver [4,5].

We provide a unique mathematical framework for evaluating timing offset in channel sounders based on a second-order deterministic model. We also perform a qualitative analysis of the timing noise processes using Time Deviation, which is closely related to the Allan Deviation [6,7]. Analysis of a correlation-based channel sounder [8] results provide measured data about the channel sounder's timing offset and timing noise. We study timing behavior in three clock-distribution configurations. In the "untethered" configuration, the transmitter and receiver have their own rubidium clock without a physical connecting cable. In the "tethered" configuration, we connect the two rubidium clocks together using a coaxial cable that synchronizes their timing. Finally, we use a benchmark "single-clock" configuration where a single rubidium clock drives the transmitter and receiver.

References

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