Channel Sounder Measurement Verification: Conducted Measurement Campaign
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J. Quimby*(1), C. Hammerschmidt(2), A. Koepke(1), R. Johnk*(2), J. Rezac(1), J. Jargon,(1), R. Leonhardt(1), P. Hale(1), K. Remley(1), P. McKenna(2), I. Stange(2), M. Chang(2), S. Tran(2), N. DeMinco(2)
(1) NIST Communication Technology Laboratory, Boulder, CO, 80305, https://www.nist.gov/ctl/rf-technology-division/metrology-wireless-systems-group
(2) Institute for Telecommunication Sciences, Boulder, CO, 80305, https://www.its.bldrdoc.gov/about-its/contact-us.aspx

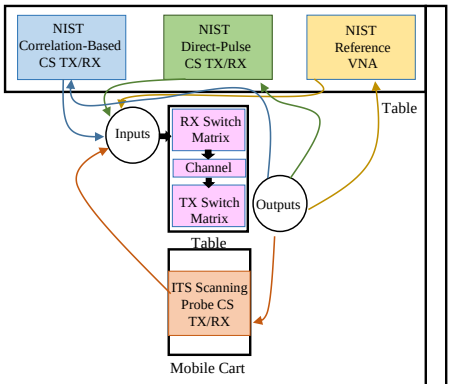

Figure 1: Measurement configuration for conducted channel tests

In 2016, researchers from the US Department of Commerce National Institute of Standards and Technology (NIST) and the Institute for Telecommunication Sciences (ITS) began a collaboration of metrology-grade channel sounder verifications to identify sources of systematic and random measurement errors in channel sounder hardware. Three distinct channel sounder hardware architectures operating in the 3.5 GHz frequency band were studied. The hardware and processing performances was studied by comparing the channel path gain measurements to a reference path gain measurement provided by a vector network analyzer. The vector network analyzer's measurements included a comprehensive error analysis and the propagation of the uncertainties to the path gain was carried out with the NIST's Microwave Uncertainty Framework (J. A. Jargon, 87th ARFTG, 2016) software. Two key features were shifting of the VNA reference plane to align directly to the individual channel sounders' reference planes. A second key feature was a switch matrix (Figure 1) to ensure a stable measurement environment.

The channel sounder verification utilized conducted-channel measurements to focus on errors within the channel sounding hardware, as opposed to antenna and channel variations, as a base-line test of the channel sounder's performances. Two simulated propagation channels were studied: a length of cable and an attenuator to simulate a pure line-of-sight channel and a pair of splitters joined by coaxial cables of different lengths to simulate a multipath environment.

The work concludes with path gain comparisons, guidance and best-practice procedures with the intent of allowing users to perform similar verifications of their channel sounders.