Contribution ID: **76** Type: **Poster**

An Interferometric Residual Phase Noise Measurement System at S-Band

Traditional analog residual phase noise measurement systems have long been transitioning from saturated mixer type to interferometric type systems. Both types show substantially lower noise floors than present digital receivers. While the saturated mixer type relies heavily on baseband electronic performance, the interferometric type relies on the performance of rf carrier suppression and rf electronics. By suppressing the carrier with an interferometer, the noise sidebands can be greatly amplified and detected at rf frequencies. This could open up possibilities for combined analog and digital techniques to improve interferometric system implementations and digital receiver noise floors.

Towards those possibilities, an S-Band analog interferometric system was designed with two levels of carrier suppression and compared to a saturated mixer based system. The interferometric sensitivity was measured to be 15.6 V/rad compared to 0.4 V/rad for the mixer system, a 32dB improvement. Power law noise coefficients were measured to be -155 dBrad^2 for 1/f noise, a 15dB improvement, and -176 dBrad^2/Hz for white noise at a +14dBm input, a 4dB improvement. However, 1/f^2 and 1/f^3 terms were higher due to mechanical stability of the interferometer. The cumulative phase noise was measured to be 32 micro-degrees rms [0.1Hz-100kHz] at 2.815 GHz. A novel technique of properly orienting the measurement plane is also described.

Author: BERENC, Tim (Argonne National Laboratory)

Co-author: BUABTHONG, Pakpoom (University of Illinois at Urbana-Champaign)

Presenter: BERENC, Tim (Argonne National Laboratory)