

The Impact of Phase Noise in Digital Satellite Communications



C. Louis Cuccia
Ford Aerospace and Communications Corporation
Palo Alto, California

Many military and commercial satellite communication links are being used which utilize standard or staggered QPSK. At bit rates below one megabit, these links operate in environments which produce two types of impairments—continuous and random--which determine the final bit error rate and data throughput.

This paper will discuss the impact of random phase jitter which is a major impairment which can be contributed at every point in the link. This phase jitter can cause significant phase and timing errors at the receiver output and can even lead to drop-outs of key terminal equipments.

The various sources of phase jitter will be discussed and related to system performance. Particular emphasis will be made of the contributions of scintillation and random atmospheric effects and by equipment malfunctions to phase noise which can cause not only periods of increase in bit and timing error, but also clock slippage and I/C reversal which can cause decoders description and demultiplexers to become inoperative. This paper will also include considerations of cochannel and adjacent channel interference on phase jitter.