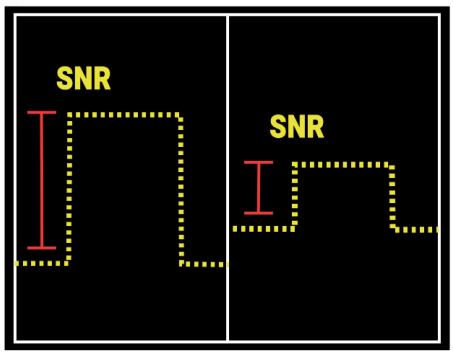
Noise Tolerance & Jitter Measurements for Satellite Networks

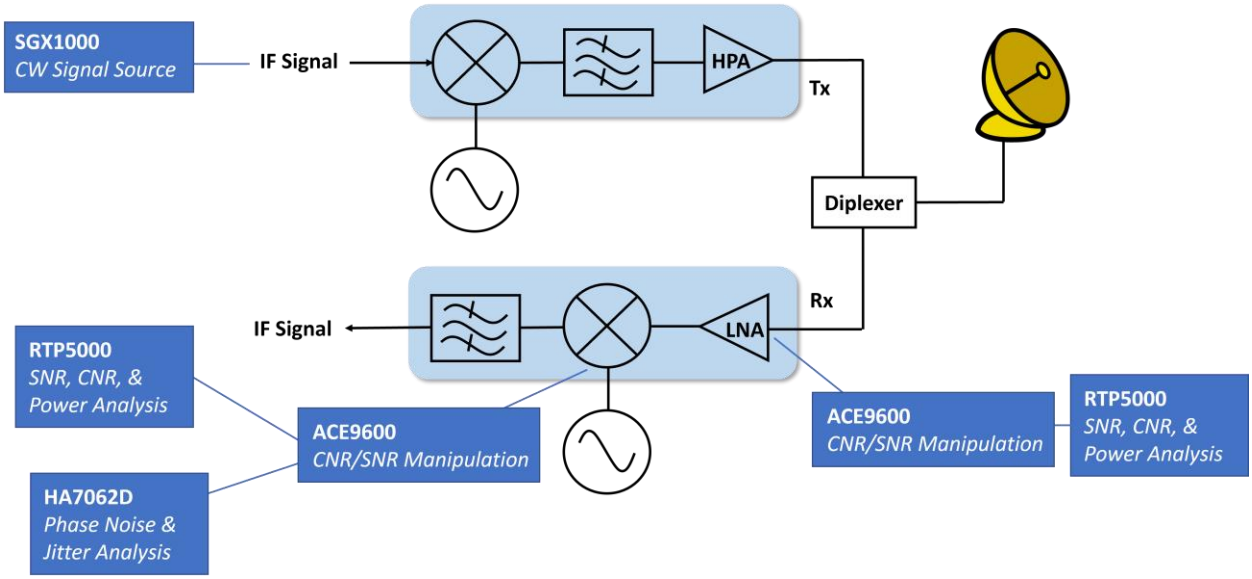
As more and more satellites are launched into low Earth orbit (LEO), satellite networks must contend with various communications from relay satellites and uplink/downlink stations. To ensure performance observed in the lab is replicated after deployment, satellite communications networks must be designed to operate in real-world RF interference conditions.



Precision Carrier and Noise Manipulation

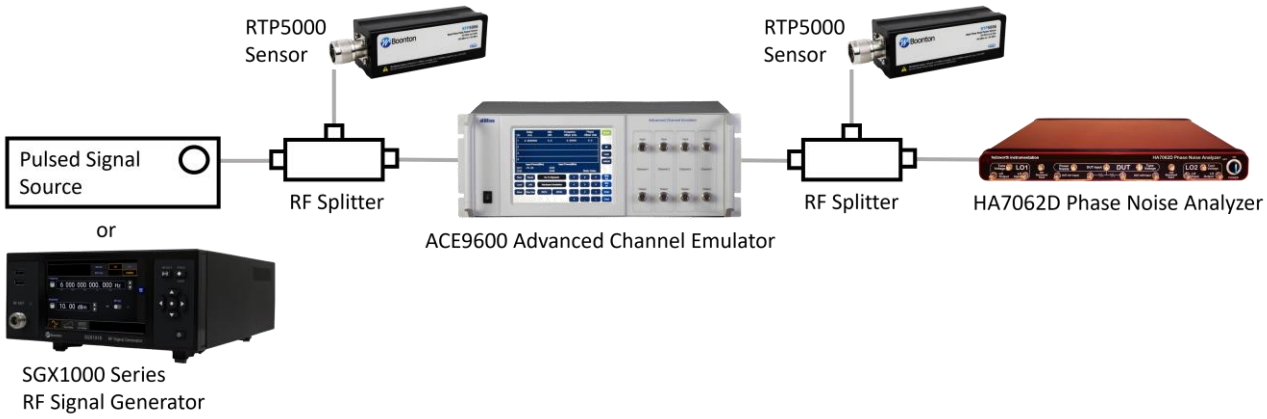
The dBm ACE9600 Advanced Channel Emulator can create additive white Gaussian noise (AWGN) signals that satellite network designers can inject into their unique RF uplink/downlink paths. The superior performance of Boonton RTP5000 Series Real-Time USB Peak Power Sensors (100,000 measurements per second, real-time processing, 3 nanosecond rise times, etc.) can be used to measure and display SNR, CNR, and power level measurements.

Increasing AWGN on a signal can also affect phase noise and jitter, both of which are used to denote signal stability. Jitter manifests as time-domain variations of the waveform, while phase noise measures frequency instabilities. Satellite network developers can utilize the Holzworth HA7062D Real-Time Phase Noise Analyzer to test the jitter and phase noise of their satellite network.



AOC 2023 Test Setup:

The ACE9600 introduces highly controllable AWGN onto the carrier generated from the signal source to simulate real-world RF interference. RTP5000 Series sensors monitor the input and output signals for SNR, CNR, and power level analysis. After passing through the ACE9600, the HA7062D is used to analyze the effects of jitter on the signal. The setup will also observe the impact the noise signal has on the client's device.



Product Overviews:

dBm ACE9600 Advanced Channel Emulator:
The dBm ACE9600 Advanced Channel Emulator can add RF link impairments (delay, Doppler, path loss, AWGN, multipath fading) and hardware-in-the-loop impairments (amplifier compression/distortion, phase noise, IMUX/OMUX filter shaping) to fully emulate satellite uplinks/downlinks.

Boonton RTP5000 Series Real-Time USB Peak Power Sensors:
Boonton RTP5000 Series sensors deliver the fastest measurement rate of 100,000 measurements per second with zero latency or gaps in acquisition. Its superior performance also includes 3 ns rise times, 195 MHz of video bandwidth, and 100 ps time resolution.

Holzworth HA7062D Real-Time Phase Noise Analyzer:
Holzworth Phase Noise Analyzers utilize real-time, dual core engines for cross correlation speed, which are coupled with a pair of high performance internal LOs from Holzworth HSX Series RF Synthesizers. The reconfigurable front panel enables additional feature sets and customized measurement setups, including noise floor measurement capability of the analyzer.

More Resources:

Visit info.wtcom.com/aoc-2023 to learn more about T&M solutions for satellite communications systems.