

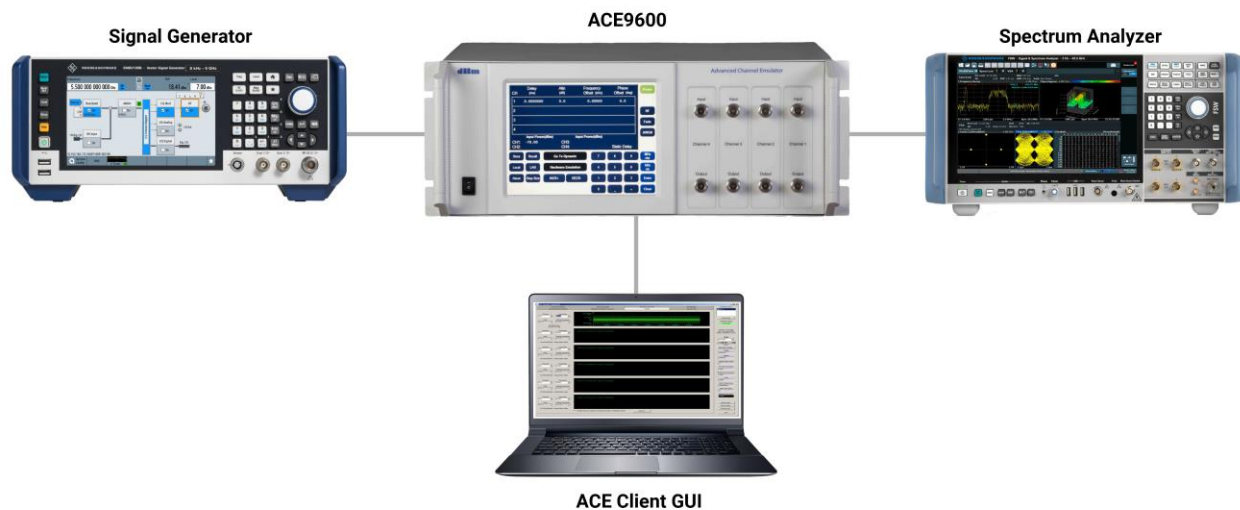
5G NTN Link Emulation and Hardware-in-the-Loop Test

The demonstration from Maury Microwave will showcase the leading-edge capabilities of the ACE9600 Advanced Channel Emulator, a non-terrestrial RF channel emulation solution that simulates link and hardware-based impairments on a signal's path.

The ACE9600 will use a 5G non-terrestrial network (NTN) signal from a signal source (R&S SMBV100B vector signal generator) connected to one of its channels. Using the ACE9600 control software (ACE Client), various link and hardware-generated impairments will be added to the signal, simulating real-world operating conditions. With the ACE9600 output signal displayed on a spectrum analyzer (R&S FSW), users can observe the impact these impairments have on signal constellation and other spectrum measurements.

Specific impairments and capabilities highlighted in the demonstration include hardware-in-the-loop testing, additive white Gaussian noise (AWGN), frequency-dependent signal Doppler with the resultant expansion/compression of the passband, and multipath fading (Rayleigh, Rician, etc.). The ACE9600 will also generate an orbit profile using ephemeris data for a Starlink satellite, aircraft, and a ground station located in Washington, DC, showing how the signal is affected as the satellite moves across the sky.

Demo Setup



Target Users

Target users include design engineers and system integrators for satellite communications systems and NTN.

Product Overview

ACE9600 Advanced Channel Emulator

The ACE9600 Advanced Channel Emulator (ACE) of the dBm product line is the most advanced non-terrestrial RF channel emulation solution to date. The emulated impairments include delay, signal Doppler, attenuation, phase offset, AWGN, frequency hopping, payload, and multipath fading. The instrument can house up to four 600 MHz instantaneous bandwidth channels. Impairment emulation can be set to fixed values in Static Mode, or continuously changed in real time in Dynamic Mode without any phase discontinuities.

KEY SPECIFICATIONS AND FEATURES:

- 600 MHz of instantaneous bandwidth per channel
- Timing synchronization up to 16 channels
- Link emulation including:
 - Phase continuous delay, Doppler, and attenuation changes
 - AWGN and Eb/No
 - 12 tap (path) multipath fading with Rayleigh, Rician, and CW; Angle of Arrival (AOA), k-factor, and correlation controls
 - RF frequency-agile up/down converters
- Payload emulation including:
 - IMUX/OMUX amplitude and group delay distortion
 - Amplifier compression (AM/AM and AM/PM)
 - Phase noise
- Static and dynamic link emulation
- Ephemeris data generation using SATGEN
- Remote instrument control through ACE Client application

ACE Client Application

The ACE Client is a comprehensive application that enables the remote control of all ACE9600 functions, graphically displays impairment file contents, and provides wizards for creating custom profiles for payload impairments. The ACE Client also enables signal capture, which generates both time and frequency domain plots of the excitation signal and the output signal after the application of impairments.

More Resources

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