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Satellite communications, earth observation, navigation and positioning and control stations

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No final surprises in advance satellite communication systems

Introduction

As advanced satellite communication systems are designed to maximize data rates and capacities, many parameters and variables need to be considered. Any parameter or real-world effect not analyzed or taken into account could offer surprises that lead to degraded performance. On the other hand, an over-designed system unnecessarily increases costs in price, components, weight and complexity. Simulation becomes a must. By proper real-time channel impairment simulation, designs can be optimized and problems can be detected before production.

The SIMSAT system has been designed to create precise and repeatable real time channel impairments to the input signal simulating a real world transmission channel. Simulated impairments include fixed and dynamic doppler shifts, due to the terminal-satellite speed and acceleration, fixed and dynamic delays and finally, fixed and dynamic fadings due to atmospheric effects and obstacles. Future impairments to be implemented include HPA (SSPA, TWTA) non-linear effects and multipath channel propagation. The SIMSAT also allows the synchronization of dynamic impairments in the three independent channels.

Designers of communication systems and satellite operators could find this simulation tool very useful in determining how their various communications equipments will perform in the real world before entering into the big cost of actual field testing.

SIMSAT is controlled remotely via an intuitive graphical software. Configuration and simulation parameters can be easily set with a mouse click.

Main characteristics

- IF inputs: 70 MHz
- Bandwidth: 20 MHz
- Input level: -20 to +5 dBm
- Number of channels: 3
- Maximum delay: 2 ms
- Dynamic delay variation: 4 kHz (sinusoidal or triangle variation)
- Maximum doppler frequency shift: 25 kHz
- Frequency resolution: 1 Hz
- Dynamic doppler frequency shift: 10 kHz (sinusoidal or triangle variation)
- Channel attenuation: 0 to 30 dB (0.5 dB steps) (sinusoidal, triangle or arbitrary variation)
- Maximum dynamic channel attenuation: 1 dB
- Control interface: RS-232

Highlights

- Simulate real-world signal transmission channel impairments
- Fixed and dynamic doppler shifts
- Fixed and dynamic delays
- Fixed and dynamic fadings
- Up to 3-channel simulator
- Synchronization of impairments in different channels
- 20 MHz bandwidth
- Excellent price/performance ratio

Main advantages

- Allow your system to be fully tested prior to launch
- Validate your system in the early development stages
- Up to three-channel simulators
- Save costs in your real environment tests
- Easy-to-use graphical user interface

The SIMSAT system simulates a real satellite channel allowing to reproduce in a precise and repeatable way all channel impairments before satellite launch.

Simplified block diagram

The SIMSAT allows simulation of the most common impairments found in satellite communications, fixed and dynamic delays, doppler shift, fadings due to atmospheric effects...
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- Frequency resolution: 1 Hz
- Dynamic doppler frequency shift: 10 kHz (sinusoidal or triangle variation)
- Channel attenuation: 0 to 60 dB (at 15 dB steps) (sinusoidal, triangle or arbitrary variation)
- Maximum dynamic channel attenuation: 1 dB
- Control interface: RS-232

Highlights

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