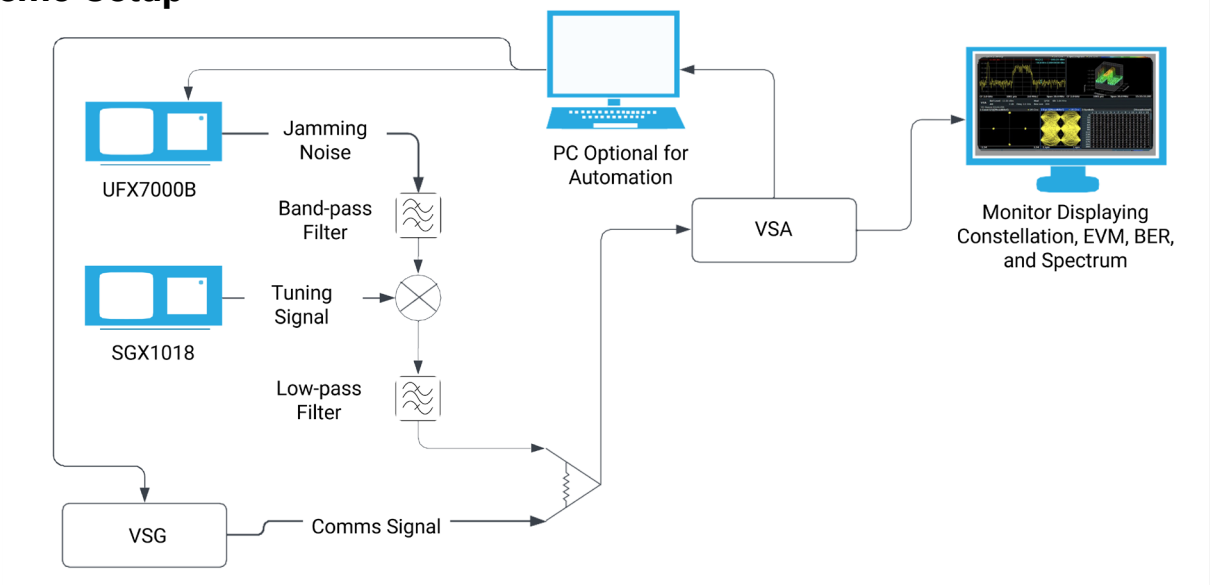
Noise Generation for Testing Jamming Resilience

Jamming, whether intentional from adversarial systems or unintentional from nearby sources, degrades signal integrity by introducing unwanted interference into the same frequency bands as the communications signal. The risk of being jammed increases with the rise of low-Earth orbit (LEO) satellites and increasing congestion within the spectrum from various sources including satellites and ground stations. Contending with high-density wireless environments, satcom networks must be designed to deliver optimal performance under real-world RF interference conditions and the Maury Microwave UFX7000B Programmable Noise Generator will be used to demonstrate this concept.

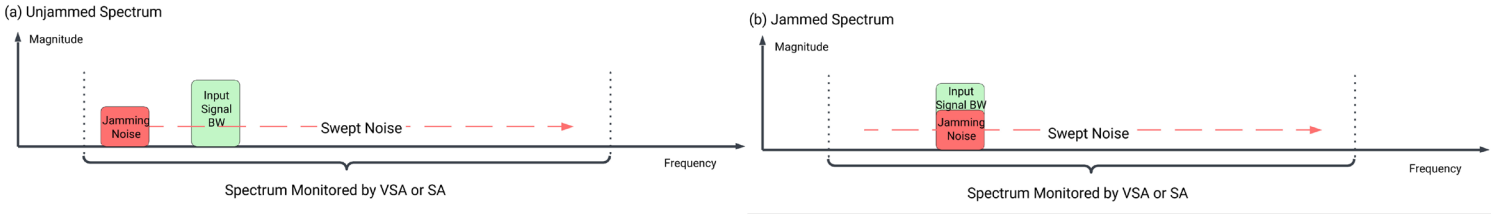
In a SATELLITE 2025 demonstration, the UFX7000B is used to create a dynamic jamming signal with additive white Gaussian noise (AWGN). After filtering to the desired frequency range, the jamming noise is up-converted by the sweeping output of the SGX1018 RF Signal Generator. The resulting signal undergoes additional filtering before being added to the user communications signal. By analyzing results consisting of constellation points, error vector magnitude (EVM), and bit error rate (BER), engineers can measure the impact of dynamic jamming on the signal performance.

Demo Setup



Target Users

Target users include design engineers and system integrators focused on analyzing and mitigating the impact of jamming on satellite communications systems and non-terrestrial networks (NTN).



An unjammed spectrum (a) versus a jammed spectrum with overlapping noise (b).

Product Overviews

UFX7000B Programmable Noise Generator

The UFX7000B has a powerful single board computer with a flexible architecture used to create complex custom noise signals for advanced test systems. Offering both remote and manual control capabilities, the instrument's precision components provide high output power with superior flatness while the flexible architecture allows control of multiple attenuators, switches, and filter banks.

KEY SPECIFICATIONS AND FEATURES:

- Output power up to +30 dBm
- 127 dB of attenuation; 1 dB step size (optional 0.1 dB step size)
- Highly customizable to fit a variety of design needs

SGX1000 RF Signal Generator

The SGX1000 Series of RF Signal Generators provides ultra-low phase noise and a lightning-fast frequency switching speed of 350 µs. With models up to 18 GHz, it's a great solution for component characterization, frequency agile radar, communications systems, and high throughput manufacturing applications at a surprisingly low cost.

KEY SPECIFICATIONS AND FEATURES:

- Frequency ranges: 10 MHz to 3 or 6 GHz, and 100 MHz to 18 GHz
- Ultra-low phase noise: -122 dBc/Hz at 3 GHz, 10 kHz offset
- Lightning-fast switching speed: 350 µs
- Excellent amplitude accuracy: ±0.5 dB down to -40 dBm

More Resources

Visit info.maurymw.com/satellite-2025 to learn more about Maury Microwave solutions.