Skydel Wavefront Calibration Tech Brief

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Imagine yourself taking off in an airplane and going into an intense environment that's surrounded by jammer threats. The jammers are blocking your navigation system from accurately tracking your location. Your airplane begins to perform poorly because it cannot gather the navigation information that's needed to complete the mission. Fortunately, there are CRPA navigation systems and advanced GNSS simulators to test these intense realistic scenarios. Let's dive a little deeper into CRPAs and Skydel's Wavefront Solution!

CRPA Overview

Controlled Reception Pattern Antennas dynamically adapt to jamming and spoofing signal threats by:

1. Null steering to minimize threat signals.

2. Beam forming to maximize truth signals.

But before CRPAs are integrated and fielded with your navigation system, it is critical to test them in every scenario that they may encounter for verification and validation of their performance. This testing will provide you with the confidence that your CRPA navigation system is reliable and resilient out in the field.

Check out more information on CRPAs here!

Skydel's Wavefront System Solution

The most cost-effective and flexible solution to test CRPA navigation systems is the wavefront simulation method because any scenario can be created and repeatably simulated from the comfort of your lab. However, the difficulty with wavefront simulation is maintaining phase-coherency between the multiple elements of the CRPA. Many wavefront solutions require you to manually calibrate the time, phase, and power alignment of the system on a consistent weekly or monthly basis, or whenever the system is powered down. This results in many inefficiencies in testing as the system will be unusable for hours or days at a time until the calibration has been completed.

Thanks to the Skydel Simulation Engine, Skydel's Wavefront Systems have eliminated the calibration inefficiencies by autonomously time, phase and power aligning the signals for you. Using real-time monitoring the signals are assured to be synchronized within 1° for the duration of the simulation. This continuous calibration is imperative to keep your signals aligned through temperature fluctuations on the wavefront system.
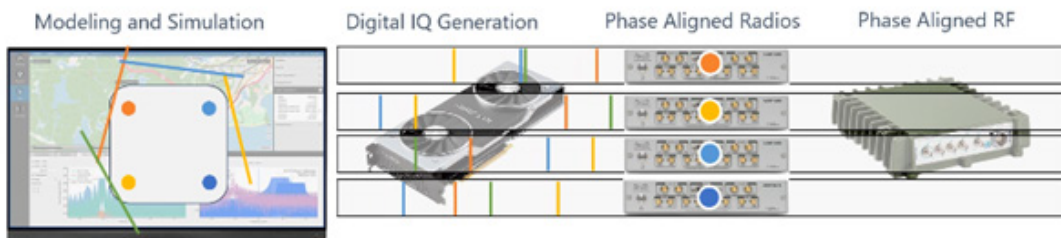
Skydel's Wavefront Systems guarantee:

• Carrier Phase Alignment < 1-deg RMS   • Code Phase Alignment +/-300 ps   • Power Alignment +/-0.1 dB

Now you can focus on the more important tasks of testing, verifying, and validating your navigation performance without calibration concerns.

Signal Capabilities

The software-defined architecture of Skydel's Wavefront Systems uses GPUs to compute real-time GNSS truth and threat signals. A single simulation can transmit all-in-view truth signals of the 4 major constellations. On each truth signal, you can simulate up to 4 multipath signals. In livesky, this would equate to around 240 signals for the all-in-view GNSS signals using just 1 multipath signal.

For threat signals, you can simulate over 100 jammers, and more than 6 spoofers or repeaters. Like the truth signals, the spoofers and repeaters can simulate the faux signals of the 4 major constellations. A typical spoofer or repeater would transmit about 80 signals, which includes 16 SVs and 5 code types.

The total number of signals are quickly adding up to over 400 signals for each element. With the flexibility of our Skydel Wavefront System we can easily simulate these realistic scenarios.

To view the full video on this subject, click here.

For more information on our wavefront system and other "Powered by Skydel" products please visit our website in the link below.

https://www.oroliads.com/gnss-testing-and-simulation