Why RF Record/Playback?

Modern RF record/playback technology is reducing expensive surprises in the field and late design cycle product revisions by providing a more reliable and repeatable avenue for testing earlier in the design cycle, when it is less costly to make changes.

Make accurate and effective course corrections throughout the design cycle.

For generations, engineers have relied on bench-top test equipment to make course corrections throughout the design cycle.

This has been a vital part of the design cycle because it reduces unwanted surprises when the design is implemented in the field. But the limitation is that bench-top test equipment doesn't model the realworld in its full complexity, so there

Today's Testing Workflow:

Reductions in risk and late design changes

- 1. **Capture** real world conditions with high-fidelity, multi-channel RF recording.
- 2. Share your stored RF library and collaborate with colleagues.
- 3. **Replicate** and test real world RF environments in the lab.
- 4. Validate in a final field test.

Legacy Signal Generation Workflow: Prolonged design cycle and changes late in development

- 1. **Approximate** the real world RF environment.
- 2. **Specify** signal generator configuration parameters.

are always expensive surprises in the field. High-fidelity, multi-channel RF recording/playback reduces those expensive surprises.

- 3. Test technology under expected RF environment.
- 4. **Adjust** design to accomodate field test surprises and repeat the entire process.



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Bring the Real World into the Lab

Your engineers can review and analyze the data in the lab using an exact reproduction of the RF environment in which a failure originally occurred as many times as required to find the cause and determine the fix.

The ability to play back recorded RF signals in the lab at a fidelity that captures the complexity of the real world allows you to test early and often without the high cost of field tests.

- Catch design flaws early in the process when it's less expensive to make modifications.
- Make that risk-versus-benefit upgrade decision faster, with higher confidence and lower cost.
- Each new product release or algorithm revision can be tested, benchmarked, and validated against the environmental conditions captured in your permanent library of RF recordings. In many cases, your library will be all you need to validate backwards compatibility. An RF signals library creates enduring value for future testing and competitive bidding.

Turn an Expense into an Advantage

Make every trip out to the field a long-term investment in your proprietary library of RF recordings, and not just a black hole of expenses without long-term gain. The capture of the real world RF environment becomes a resource that is used throughout the test process by multiple engineers and labs. With a shareable signal library, you can ensure uniform testing across the design cycle.

Need to generate signals from scratch? Today's RF record/playback allows engineers to create more complex signals than legacy signal generators.

Performance that exceeds that of commodity signal generators, at a cost that is only slightly more.

Spectrum Defender Performance-to-Cost Ratio



Very High Compared to Competitive Systems

	Bench-Top Instruments	RF Record/Playback	Environment Emulator
Signal Definition Method	Specified by user or synthesized in vendor tool	Specified by user, captured from real-world field tests, or synthesized in MatLab	Specified by user or loaded from scenario library
Signal Types	Simple Basic modulation, arbitrary waveforms	Unlimited complexity. Generates or plays signals that reproduce full real world complexity	Real-world approximated via complex scenario definitions.
Signal Duration	Seconds Loop the same signal repeatedly	Hours or days. Arbitrary waveforms of any length	Hours or days. Scenarios of any length.
Signal Dynamics	Limited	Unlimited, but must be precompiled	Unlimited, reactive in real-time
Accessibility for Engineers	Excellent. Everyday, ad-hoc testing by individual engineers or small teams	Excellent. Everyday, ad-hoc testing by individual engineers or small teams	Limited. Shared asset creates schedule dependencies and project manager coordination
Cost	50 - 150k per channel	50 - 150k per channel	>1 Million or daily facility rental rates
Recommended Application	Use for legacy applications.	Early, mid, and late design cycle validation prior to final test at environment simulator	Gold standard for specific applications (e.g. AGNS, CEESIM).