The traditional way to evaluate the effects of the ECM systems is a test range that involves several ships or airplanes in an operational environment. This method is very expensive and most of the time real threats are unavailable.

Another approach is using one of the many simulation software on the market to conduct a cheaper test in an EW-Lab.

The major limitation, with both methods, is that it is not clear the real effect of the ECM on the threats, as well as their ability to react by putting into practice an ECCM. In fact the only way to test the ESM/ECM effects on enemy Radars is to use an Hardware-in-the-loop Programmable Radar Simulator capable to emulate them. This innovation is called E-PRS. The E-PRS can simulate a broad range of Radars, including ground based, airborne, shipborne ones and missile seekers too.

The greater test reliability is ensured using a real radar digital receiver, waveform generator and programmable signal and data processor. This method takes into proper account the response and limitations of a real hardware processing. The radar models to simulate are user created by the E-PRS programming graphic user interface according to the user’s intelligence information. In a similar way, the scenarios are prepared by the dedicated scenario graphic user interface. These scenarios take care of both the platforms motion and the relevant RF echo signals. Finally, it is necessary to designate in the scenario the System Under Test Platform. By running the E-PRS simulation, it is possible to assess both the System Under Test ESM/ECM and the simulated radar ECCM.

The software required to program and to operate the EPRS simulation is provided with the system; it consists of:

- The programming graphic user interface, also called “E-PRS Framework”.
- The scenario graphic user interface software.
- The E-PRS operative Control and Display software.

With the Framework software, the user can generate the radar models according to his needs using the provided functional library modules in a graphic environment. Advanced users may add further functional library modules if required. Finally, the software allows to record all the relevant simulation data for further analysis and playback.

The E-PRS opens new perspectives to the Radar Simulation world for EW Systems evaluation and other technical and operates purposes.
TECHNICAL SPECIFICATIONS OF STANDARD VERSION
(customized versions available upon request)

GENERAL


Scenario: User programmable standalone scenario or interface for external scenario.

Radar environment simulation: Skin-echo signal generation according to the scenario. @RF or @IF, number of targets depending upon HW configuration. Optional Chaff, optional clutter generation.

Number of simultaneous Systems Under Test (S.U.T.): From 1 to 4, according to the HW configuration for TX and RX channels.

Control e Communications: FAST Ethernet (GB) on optic fibers and Reflective Memories.

Dimensions: 2 cabinets, each: w 830 mm / d 1000 mm / h 1910 mm (Note: dimensions subject to change).

Power Consumption: ≤ 60W (Baseline configuration) @ 230Vac ±10%, 50Hz ÷ 60Hz.

RF Output Power: ≥ 0 dBm.

Number of RX Channels: Up to 4 for handling up to 4 S.U.T. (ECM) from different "directions" or special configuration like cross-pol or cross-eye.

TRANSMITTER

Frequency Range (4 channels): 0.5 – 18 GHz (optionally 0.05-0.5 and 26-40 GHz bands are available).

Frequency Agility band (Operational Bandwidth): ≤ 6.25 MHz (0.05-0.5 GHz), ≤ 125 MHz (0.5-2 GHz), ≤ 250 MHz (2-5 GHz), ≤ 500 MHz (5-8 GHz), ≤ 1 GHz (8-40 GHz): pseudo random, linear, sinusoidal, user defined groups.

Waveforms: Fully user-programmable: see Radar transmitter library.

Intra Pulse Bandwidth: ±2.0 MHz (wider bandwidth available upon request).

Pulse Repetition Frequency (1Hz – 1 MHz): Fixed, Staggered (pulse to pulse), Group stagger, Jitter (pseudo random).

RF Output Power: ≥ 6 dBm.

Number of TX Channels: Up to 4 for stimulating multiple S.U.T. in different “directions”.

Specifications subject to change without notice.

RECEIVER

Type: Analog Front-End: Band: 0.5 –18 GHz (optionally 0.05-0.5 and 26-40 GHz); No. 4 Digital Receiver channels (options for more channels upon request) each with 16 bits A/D Converter (> 120 MHz sampling frequency).

Instantaneous Bandwidth / Dynamic Range: ±20 MHz (optionally higher bandwidth) / ≥ 90 dB (with IF AGC-STC on 1 MHz bandwidth).

Signal Processing and Data Processing: Matched Filter using FPGA libraries with algorithms of typical Radar Processing techniques on multi-processor multi core server PC. Scalable computational power starting from 450 GFlops.

Number of RX Channels: Up to 4 for handling up to 4 S.U.T. (ECM) from different "directions" or special configuration like cross-pol or cross-eye.

ANTENNA

Simulated Antenna types: Monopulse: SUM, Delta Az, Delta El. Omnidirectional: Linear scan, Circular scan, Helical scan, Conical scan, Spiral scan, Single or Stacked Beams.

User Defined Antenna pattern: Main-lobe and Sidelobes 0.5 – 10 deg. beamwidth (angular resolution 0.088 deg.).

Number of Beams per "direction": No. 4 (optionally no. 8 beams).

RADAR DISPLAY

Display modes: Plan Position Indicator – PPI, Scope, B – Scope, C – Scope (dual trace mode available).

RADAR STANDARD LIBRARY

Key features
- Multi-environment ESM/ECM assessment
- Radar ECCM assessment
- Full programmability allows the simulation of any type of Radar
- Real RF emission

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