SPEDIS-X

Panel-type radar target and jammer generator

The panel stands in front of the radar or RF seeker under test, receives its signal and radiates target echoes, jammers and decoys back through its transmit array. Scenarios are built on a geographic map at the operator workstation and run stand-alone or with platform states from a host simulation computer in HWIL operation. Several panels combine in one set-up for more entities or wider angular separation.

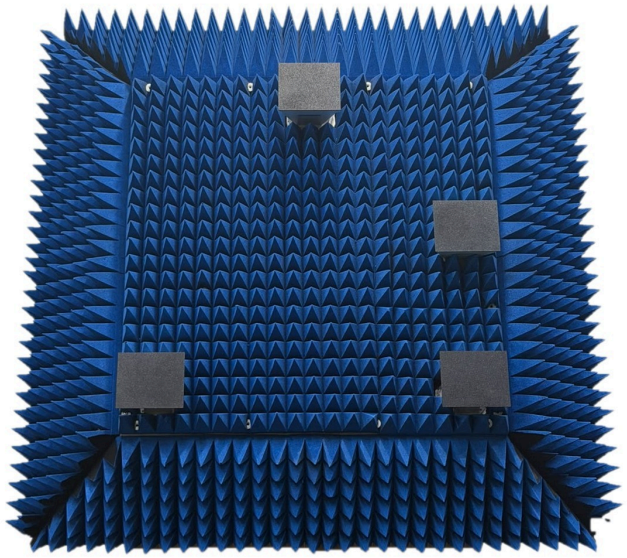


Figure 1. SPEDIS-X panel: four transmit antennas set in pyramidal absorber

Key Features

- The whole target generator in one panel
- Coherent echoes
- Radar emitters and noise jammers
- Angle of arrival
- Deception, decoys, chaff and clutter
- Scenarios on a map
- HWIL and customer software
- Several panels in one set-up

AT A GLANCE

FREQUENCY RANGE
2–18 GHz

INSTANTANEOUS BANDWIDTH
1 GHz

SIMULTANEOUS ENTITIES
4 per panel, each an echo-type or a self-generated entity; more with additional panels

SIMULATION FRAME
1 ms; delay, Doppler, amplitude and angle of arrival of every entity updated each frame

RANGE
300 m – 3000 km, 1 m resolution

APPLICATIONS

- Radar and RF seeker development and test
- Hardware-in-the-loop (HWIL) simulation
- ECCM performance evaluation
- Acceptance and production testing
- Anechoic chamber test facilities

Capabilities

The whole target generator in one panel

Receive antenna, one DRFM per entity slot, transmit array and simulation controller in a single panel. Its only connections are power and Ethernet, so it mounts on a fixed stand or a target motion system without RF cabling to the control room.

Coherent echoes

Target echoes, deceptive ECM, false targets, decoys, chaff, clutter and multipath are generated from the received radar signal and follow every change of its waveform, with no prior knowledge of it.

Radar emitters and noise jammers

Pulsed and CW emitters with agile frequency, PRI and pulse width, intrapulse modulation and antenna scan, and spot, swept and barrage noise jamming, generated independently of the radar under test.

Angle of arrival

The 2 × 2 transmit array places the apparent source of each entity within the panel: a decoy separating from its platform, the glint of an extended target, a multipath image.

Deception, decoys, chaff and clutter

RGPO and VGPO with programmable capture, walk, hold and release; towed and expendable decoys that separate from their platform; chaff clouds that bloom and drift. Main-beam ground clutter comes from the patch the radar beam illuminates.

Scenarios on a map

Platforms, routes and entity assignments on a geographic map with locally stored imagery and terrain, so no network connection is needed. During a run the map, entity status, received spectrum and time histories are shown together.

HWIL and customer software

In HWIL operation the panel takes platform and radar states from the host simulation computer over the same Ethernet link. The optional SPEDIS-X API controls the panel from customer software.

Several panels in one set-up

Panels combine for more simultaneous entities, or for entities separated by more than the angular extent of one panel.

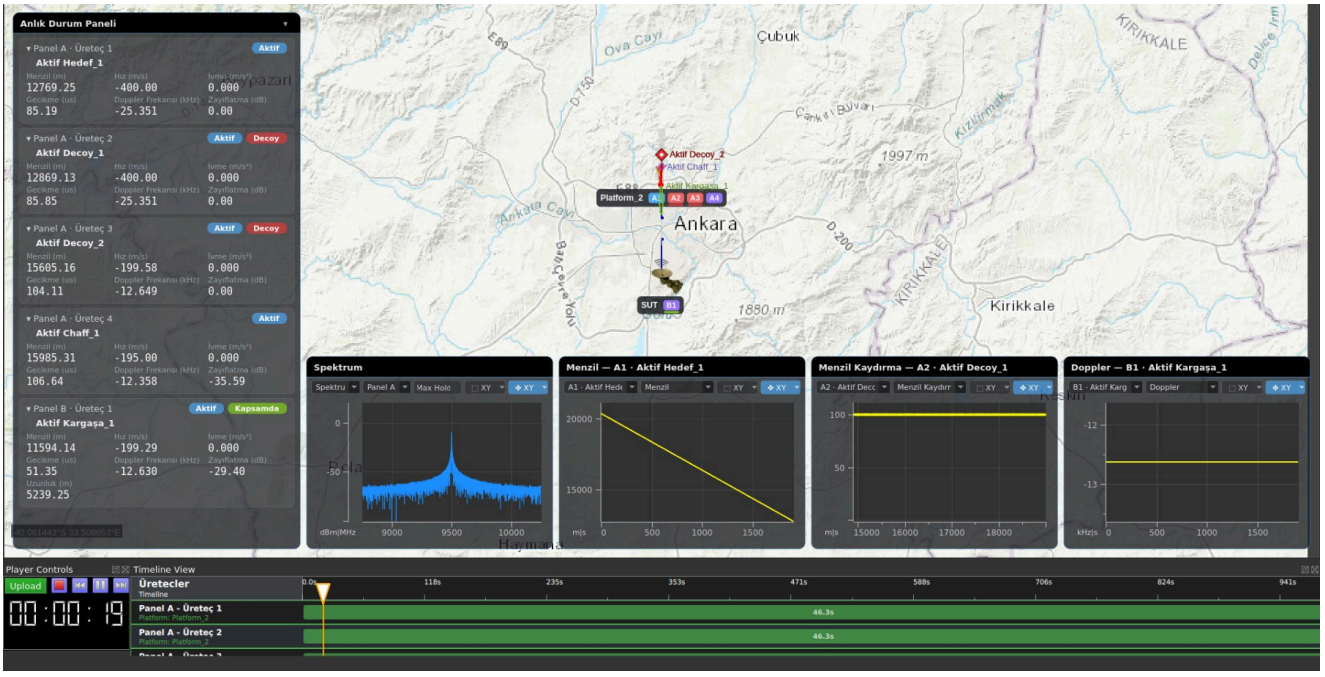


Figure 2. Scenario map page during a run: entity status, platforms on the map, received spectrum and time histories

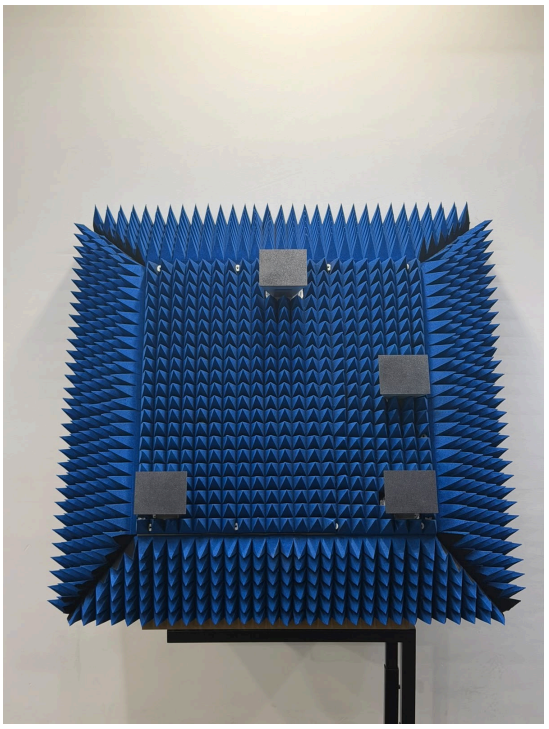


Figure 3. SPEDIS-X panel on its stand

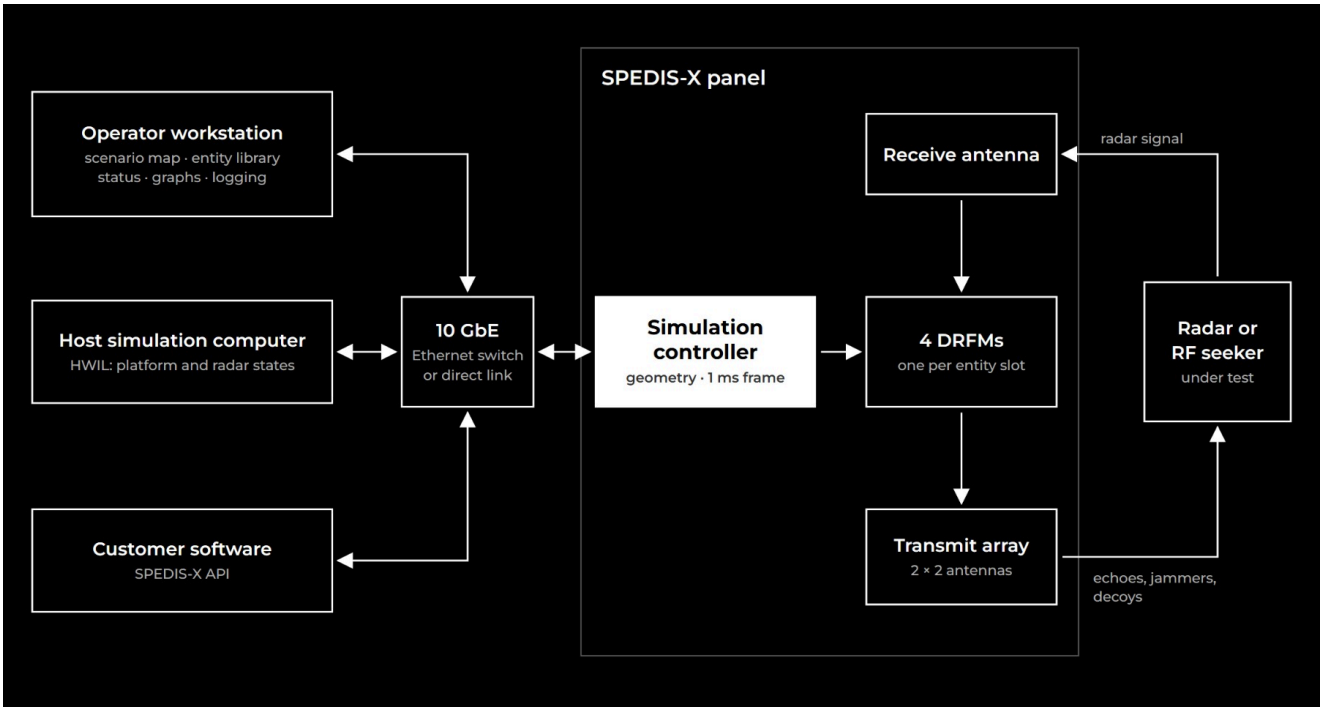


Figure 4. System connections: operator workstation, host simulation computer and customer software on 10 GbE; in the panel, the simulation controller drives one DRFM per entity slot between the receive antenna and the transmit array

Specifications

General	
Frequency range	2–18 GHz
Instantaneous bandwidth	1 GHz
Simultaneous entities	4 per panel, each an echo-type or a self-generated entity; more with additional panels

General	
Simulation frame	1 ms; delay, Doppler, amplitude and angle of arrival of every entity updated each frame
Range	300 m – 3000 km, 1 m resolution
Doppler shift	±2 MHz, 0.5 Hz resolution
Frequency resolution	1 Hz
Dynamic range	> 100 dB
Angle of arrival	Within the angular extent of the 2 × 2 transmit array
Propagation	Free-space loss (one-way or two-way) or fixed attenuation; test distance compensation
Target echo	Mean RCS or RCS table over aspect angle and frequency; Swerling 0–IV; several scattering centres; angular glint
Emitter frequency and PRI	Pulsed and CW; frequency constant, hopping, wobbulated or dwell-and-switch; PRI constant, staggered, jittered, wobbulated, dwell-and-switch or burst
Intrapulse modulation	LFM, stepped frequency, stepped amplitude, Barker, BPSK, QPSK, polyphase (Frank, Zadoff-Chu, P1–P4)
Antenna scan	Steady, circular, sector, conical, phased array, raster, helical, spiral; predefined or user-defined pattern
Noise jamming	Spot, swept spot and barrage; continuous, pulsed or blinking; self-screening and stand-off
Deceptive ECM	RGPO/I and VGPO/I, synchronised or not, cover pulse; programmable deception cycle; J/S set relative to the target echo
Multiple false targets	Distributed in range and Doppler: equally spaced, uniform or Gaussian
Decoys and chaff	Towed decoy (cable length, payout speed); expendable decoy (launch direction, speed, deceleration); chaff launch, bloom, spread and decay
Clutter and multipath	Main-beam ground clutter over sea, desert, farmland, forest, urban or user-defined terrain; multipath image returns
Antennas	2 × 2 transmit array, one receive antenna
Interface	10 GbE Ethernet: scenario, control, real-time platform states, status and measurement data
Operating modes	Stand-alone (routes on the scenario map) or HWIL (platform states from a host simulation computer)
Calibration and built-in test	Calibration ports for external test equipment; power-on, commanded and runtime built-in test
Software	Operator software included; optional SPEDIS-X API for control from customer software

Warranty

All hardware and software procured from Zeta is under warranty against manufacturing or design failures for 2 years. Customer-specific warranty terms may be arranged.

Disclaimer

Due to ongoing research and development, Zeta reserves the right to change product specifications without notice.

About Zeta

Zeta Defence develops electronic intelligence (ELINT) and communication intelligence (COMINT) equipment and radar / electronic warfare simulators. Its capabilities include RF transceiver system design, digital design and large-scale software development.

Contact

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