STRATEGIC BRIEFING: Wideband Capture and Processing at the Edge

Mission Relevance: Modern EW, radar, and SIGINT missions increasingly depend on processing wideband spectrum content fast enough to affect the outcome. As architectures become more distributed and bandwidths increase, sending everything upstream creates latency, backhaul burden, and unnecessary power draw. The mission requires deterministic edge processing that extracts mission-relevant content locally, then connects cleanly into platform and network spines for coordinated response, command & control, and situational awareness. *Bottom line: Edge processing turns spectral speed and coverage into timely decisions, with less data to move and less power to burn.*

1. Speed wins: shortening signal-to-response is decisive

In a dynamic EMS environment, opportunities close quickly, emitters hop, change modes, relocate, or go quiet.

If processing is slow, mission response is slow.

2. Coverage wins: broad spectral access reduces surprise

Threats are not confined to a single band or predictable operating pattern. Broad access reduces blind spots across EW, radar, and SIGINT.

If you can't see it, you can't decide or coordinate.

3. Determinism wins: repeatable latency is operational advantage

Mission systems need predictable behavior under load, not best-case lab performance. Deterministic processing supports consistent decisions and coordinated action.

If timing isn't predictable, outcomes aren't reliable.

> *"Assured edge processing turns spectral speed and coverage into timely decisions"*

4. Edge wins: local extraction reduces latency and backhaul

Sending everything upstream increases delay and burdens networks and compute. Local processing can extract mission-relevant content first so response and sharing are faster.

If you move less data, you can act faster and sustain operations with less power.

5. Operational connection wins: processing must plug into platform nodes

JADC2 requires rapid sharing for situational awareness and coordinated response; local AI increasingly tunes collection and assessment in-the-loop. Edge processing blocks must connect cleanly to platform-owned control and data spines.

Outputs and status can then be used across mission apps and networks.

If edge processing can't connect cleanly, it can't be operationalized at scale.

Spectrum Control Strategic Response

Sensor-to-data building blocks designed for edge processing headroom and engineered to connect cleanly to platform-owned control and data backplanes, supporting deterministic extraction, local processing, and dissemination of mission-relevant spectrum content for (1) AI-enabled assessment/tuning-in-the-loop and (2) networked command & control and situational awareness.

Proof points:

- High-speed, low-latency architecture (FPGA-based) supporting rapid mission actions

- Wideband spectral monitoring and very wide instantaneous bandwidth

- Multi-card synchronization supporting coherent operation across modules

- Management / health monitoring interfaces supporting operational visibility and integration into platform systems

- Standards-aligned form factor supporting deployable integration and upgrade paths

Solution Highlights - DirectRF+ Wideband Direct Sampling Transceiver

The DirectRF+ SCDP-08-ZC-000 (flagship) 8/8 transceiver from Spectrum Control enables rapid, wideband digitization (0.1 to 36 GHz) supports rapid signal capture and sampling with headroom for deterministic edge processing. Connects cleanly to platform-owned backplanes so mission-relevant content can be exploited locally and shared rapidly for coordinated response.

Rapid edge assessment and response
Faster decisions and faster mission actions.

Broad spectral access (0.1 - 36 GHz)
Fewer blind spots and stronger situational awareness continuity.

Deterministic local processing capacity
Repeatable latency and predictable operational behavior.

Reduced backhaul / compute burden
Less data to move/process; reduced compute/power burden.

Connectivity enabled (signal data + C2/SA backplanes)
Outputs and status integrate cleanly into mission software, AI workflows, and network dissemination.

For more info visit spectrumcontrol.com/sci-blocks

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