MESA® Radar Solutions for Critical Infrastructure

BETTER DATA. BROADER AWARENESS. MORE SECURE SPACES.
New Security Concerns Require Breakthrough Technology.

Security needs at high-risk sites are being stretched. As the number of clueless to nefarious actors increases, both on the ground and in the air, security teams require better situational awareness and more time to respond. To maintain present operational levels with a now 3-dimensional (3D) perimeter, technology must create the advantage, act as a force multiplier, and achieve greater situational awareness.

Echodyne metamaterials electronically scanned array (MESA) radar solutions deliver that advantage in an ultra-low SWaP format that is mission powerful and budget friendly.

Radar is the workhorse of modern perimeter intrusion and drone detection systems, streaming high-fidelity location data in real-time and amplifying the effectiveness of other sensors. Radar is the only sensor that detects and tracks all movement on the ground and in the air, regardless of lighting or weather conditions. And radar is required if “dark” or “silent” drones, ones that are not detectable by RF signature, are part of the risk assessment.

Forward-looking security teams are making MESA radar the cornerstone sensor in their detection stack, ingesting the high-fidelity radar data into their C2 and VMS to boost situational awareness in all domains:

- Detect, track and classify multiple threats at the same time
- Slew optical sensors for eyes-on-object
- Inform and direct mitigation responses

Different by Design, MESA Radar Delivers Enhanced Multi-Domain Situational Awareness.

Until Echodyne’s breakthrough in radar design, commercial security was priced out of using powerful electronic scanned array (ESA) radar for perimeter intrusion and drone detection. The long-standing military gold-standard for multi-domain threat detection, today’s fielded ESA radars offer extraordinary performance at an equally extraordinary cost. The primary obstacle to broader use of ESA is directly related to the system architecture, which is built using complex Tx/Rx modules with high lifecycle costs. Simply, ESA has historically required significant investment in equipment, staffing, and maintenance.

Echodyne has taken a different approach to radar design, employing a physics design concept called metamaterials which creates counter-intuitive results when conventional materials are assembled in a very specific way. Echodyne’s patented MESA design allows electromagnetic energy to be shaped and steered without moving parts. This approach unlocks other elements in radar design that produce a compact, solid-state radar with the range and, importantly, the accuracy to detect and track objects of interest across a large field of view. And the object metadata from MESA radar is richer, faster, more accurate, and more reliable, with the precision and data rates required for robust situational awareness.

Combined with powerful on-radar and off-radar software, Echodyne’s MESA design creates a commercially priced radar with ultra-low SWaP and unrivaled performance, tested and trusted by defense, government, and commercial customers as the foundation for more effective threat detection and safer outcomes.

Radar reinvented.
Why are Echodyne Radars Preferred for Critical Infrastructure Protection?

**Engineering Breakthrough.** MESA design delivers military-grade ESA beamforming performance with no moving parts. The result is an ultra-low SWaP powerhouse that is affordable, simple to launch, durable, and easy to maintain. Plus, Echodyne radars are all designed and built in the USA.

**Multi-Domain Detection.** Designed to meet the needs of a changing threat landscape, Echodyne radars are tested and proven accurate and reliable for detecting and tracking multiple ground and air threats at the same time.

**Systems Integration.** Built for data fusion and systems integration, Echodyne radars utilize open architecture, produce multiple rich data options, and connect via TCP/IP over Gigabit Ethernet.

**Software Defined.** A powerful suite of off-radar software tools tunes the radar for site and mission requirements, helps reduce false positives, visualizes radar performance, and intelligently networks radars.

**Data Fidelity.** Echodyne radars generate the most accurate and dependable location and track data in their respective classes.

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Key Applications

**DRONE DETECTION**
Fast, nimble, easy to build, and simple to operate, the drone threat is now a core element of risk assessments for critical infrastructure sites nationwide. And as more drones fly and pilots become familiar, modifications of retail equipment can quickly make a drone much less detectable. Radar detects everything that moves, making it the key to attaining and maintaining comprehensive situational awareness. Echodyne’s precision radar data can be ingested directly and integrates easily with other sensors and systems, acting as a technology force-multiplier in a layered sensor stack.

**Radar Solutions**
- **EchoShield**
  - Medium-range, best-in-class accuracy for wide open spaces with high threat risk including large campus environments and takeoff/landing corridors.
- **EchoGuard CR**
  - Lower power requirement. Tuned for highly accurate intrusion detection in urban environments and at close range.
- **EchoFlight**
  - Ultra-low SWaP for short-range monitoring from tethered drones.

**3D SECURITY**
Critical infrastructure faces a battery of threats. As the modern threat landscape evolves, new tools are needed to enhance perimeter intrusion detection systems and improve situational awareness - primarily on the ground and increasingly in multiple domains.

High-performance MESA radar provides multi-threat ground detection, optional air coverage and integrates with optics for eyes-on trespass confirmation. Actionable, high-fidelity radar data provides insight when time is on your side and threats are at a distance.

**Radar Solutions**
- **EchoGuard**
  - Unrivaled performance. Short-range trespass detection, tracking, and targeting. Ultra-low SWaP for mobile and fixed requirements.
- **EchoGuard CR**
  - Lower power requirement. Tuned for highly accurate intrusion detection in urban environments and at close range.
- **EchoShield**
  - Medium-range, best-in-class accuracy for wide open spaces with high threat risk.
- **EchoFlight**
  - Ultra-low SWaP for short-range monitoring from tethered drones.
EchoGuard®
4D Surveillance Radar
Superior Drone Detection
Enhanced Perimeter Security
Market-Leading Performance

Multi-Domain Vigilance

Echodyne’s patented MESA technology combines with powerful software to deliver ESA performance in a compact solid-state format that detects, tracks, and classifies objects of interest on the ground or in the air, regardless of weather or lighting conditions. Exclusive to Echodyne, concentrated Tx/Rx cell modules direct thousands of pencil-thin beams across the 120° azimuth x 80° elevation field of view (FoV) in milliseconds. EchoGuard rapidly detects and precisely tracks up to 20 objects of interest, delivering high-fidelity data in a proprietary format over a standard TCP/IP Gigabit Ethernet connection. With multiple data-rich output options available by API, including raw data, EchoGuard’s superior spatial accuracy creates a robust data foundation for critical infrastructure protection including drone detection, enhanced perimeter intrusion detection, and mobile deployment for surveillance and hot zone coverage.

Close-Range Precision

Part of the EchoGuard family of 4D beamforming radars, EchoGuard CR is specifically built for performance in semi-urban, urban, and other close-range environments. EchoGuard CR’s low-power signature maintains high performance by managing energy output to reduce signal clutter and reflection. EchoGuard CR rapidly and accurately detects and assesses multiple ground and air targets within the 120° azimuth and 80° elevation field of view. High-fidelity data for up to 20 simultaneous tracks includes latitude, longitude, range, velocity, bearing, closing time, and more. Standard TCP/IP Gigabit Ethernet connections and multiple data-rich output options available by API ease integration with other sensors and systems.

Radar Specifications

**EchoGuard**
- **Frequency**: K-band 24.45 – 24.65 GHz (USA)
- **Field of View**: 120° Azimuth x 80° Elevation
- **Track Accuracy**: < 1° Azimuth x < 1.5° Elevation
- **Track Update Rate**: 10 Hz
- **Size**: 20.3 cm x 16.3 cm x 4 cm
- **Weight**: 1.25 kg
- **Power**: +15 to +28 VDC

**EchoGuard CR**
- **Frequency**: K-band 24.45 – 24.65 GHz
- **Field of View**: 120° Azimuth x 80° Elevation
- **Track Accuracy**: < 1° Azimuth x < 1.5° Elevation
- **Track Update Rate**: 10 Hz
- **Size**: 20.3 cm x 16.3 cm x 4 cm
- **Weight**: 1.25 kg
- **Power**: +12 to +30 VDC

Learn More About EchoGuard ➔
Learn More About EchoGuard CR ➔
**EchoFlight®**
Airborne Security
Ultra-Light
BVLOS Enabled

**EchoShield®**
Multi-Mission 4D Radar
Next-Gen ESA
Intelligent Search
Multi-Domain, Multi-Mode

### Extended-Range Protection
Ideal for sites desiring comprehensive situational awareness at greater range, EchoShield is a next-generation, software-defined, medium range, pulse-Doppler, cognitive 4D radar. Concentrated Tx/Rx modules direct thousands of pencil-thin beams across the wide field of view (FoV) in milliseconds. EchoShield detects and precisely tracks up to 1,000 objects of interest while continuing to interrogate the remaining field of view. High-fidelity data is delivered in a proprietary format over a standard TCP/IP Gigabit Ethernet connection. Multiple data-rich output options are available by API, easing integration with other sensors and systems. EchoShield’s unparalleled accuracy and multi-mission capabilities are a value for high-risk critical infrastructure sites seeking 360° protection.

### Airspace, Site, and Asset Surveillance
When security requires semi-permanent, temporary or movable threat detection, a tethered drone equipped with EchoFlight delivers wide-view, stable surveillance. Unparalleled performance in an ultra-low size, weight, and power (SwaP) package, EchoFlight delivers high-fidelity location data and offers rich-data output choices to complement other sensors and systems. EchoFlight detects threats on the ground and in the air and prioritizes up to 20 tracks at once.

#### Tracking Range (not maximum)

**EchoShield®**

- **Human:** 8 km
- **Vehicle:** 11 km
- **Cessna:** 10 km
- **Phantom 4:** 3 km
- **Matrix 600:** 6 km

**EchoFlight®**

- **Phantom 4:** 750 m
- **Matrix 600:** 1 km
- **Cessna:** 2 km

### RADAR SPECS

**EchoShield®**
- **Frequency:** Ku-band 15.4 – 16.6 GHz
- **Field of View:** 130° Azimuth x 90° Elevation
- **Track Accuracy:** < 0.5° Azimuth x < 0.5° Elevation
- **Track Update Rate:** 10 Hz
- **Size:** 42.5 cm x 33 cm x 18 cm
- **Weight:** 17.8 kg
- **Power:** + 21.5 to + 33 VDC

**EchoFlight®**
- **Frequency:** K-band 24.45 – 24.65 GHz
- **Field of View:** 120° Azimuth x 80° Elevation
- **Track Accuracy:** < 1° Azimuth x < 1.5° Elevation
- **Track Update Rate:** 10 Hz
- **Size:** 18.7 cm x 12 cm x 4 cm
- **Weight:** 817 g (Natural Convection)
- **Power:** + 12 to + 28 VDC
Featured Applications

Kits & Accessories

SOFTWARE UPDATES
Continuous Improvement from Software-Defined Radar
- Includes All Major and Minor Releases
- Improve Radar Operations
- Enhanced Classification
- Radar Data Visualization Tools
- Radar Support Tools

TECHNICAL SUPPORT
Priority Access to Radar Support
- Review and Training Sessions
- Systems Integration
- Troubleshooting
- Performance Review
- Planning

PRIORITY TECHNICAL SUPPORT
Priority queuing via company match when using support@echodyne.com.

CUSTOMER PORTAL
24/7 access to all tools, manuals, and materials.

PERFORMANCE ENHANCEMENT
Continuous improvements through software development.

USER COMMUNITY
Submit requests for features and functionality.

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Echodyne Corp.

Echodyne, the radar platform company, is a U.S. designer and manufacturer of advanced radar solutions for defense, government, and commercial market applications. The company's proprietary metamaterials electronically scanned array (MESA®) architecture is a rare breakthrough in advanced radar engineering, leveraging an innovative physics-design approach, Echodyne’s MESA radars use standard materials and manufacturing processes to shatter unit cost barriers for high performance radar. The result is a solid-state, low-SWaP, exportable, commercial radar with advanced software capabilities that delivers superior performance, unparalleled data integrity, and exceptional situational awareness.

For more information, please visit: Echodyne.com.