



The Growing Use of Drones in Emergency & Security Applications

RF-Guided Autonomous Sensing Platforms

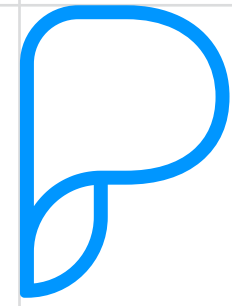
Christian Mazzucco

Chief Innovation Officer, Polus Tech LTD.

Politecnico di Milano

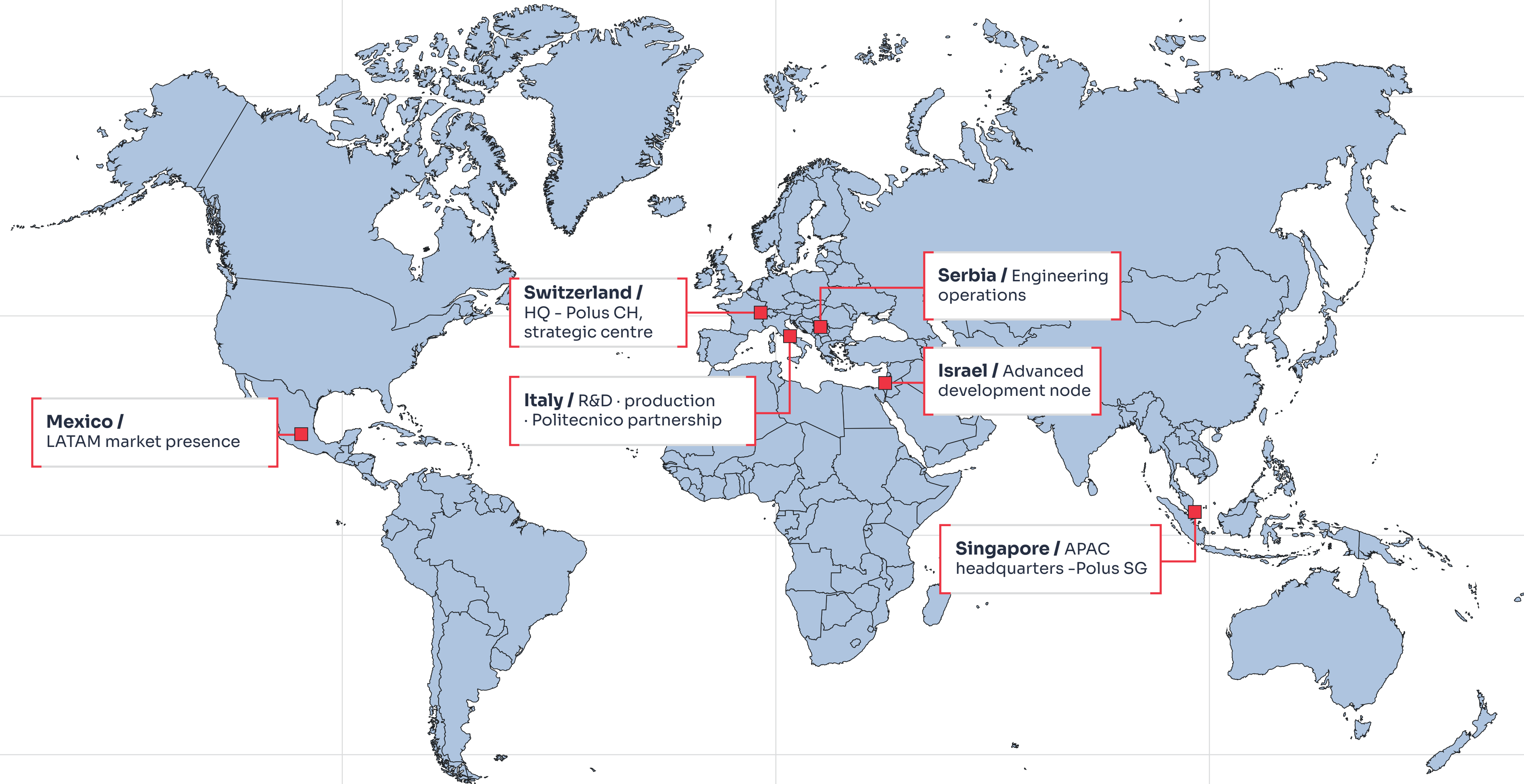
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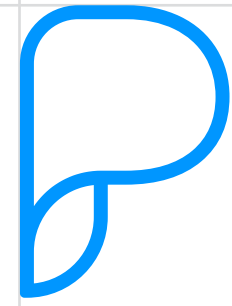




ABOUT POLUS

Global Footprint





THE CHALLENGE

Why Conventional Approaches Fall Short

Slow Detection

Human-operated sensors require constant manning and suffer delays in complex, signal-dense environments.



Poor Localization

Traditional DF systems need multiple widely-spaced nodes, limiting rapid deployment in dynamic scenarios.



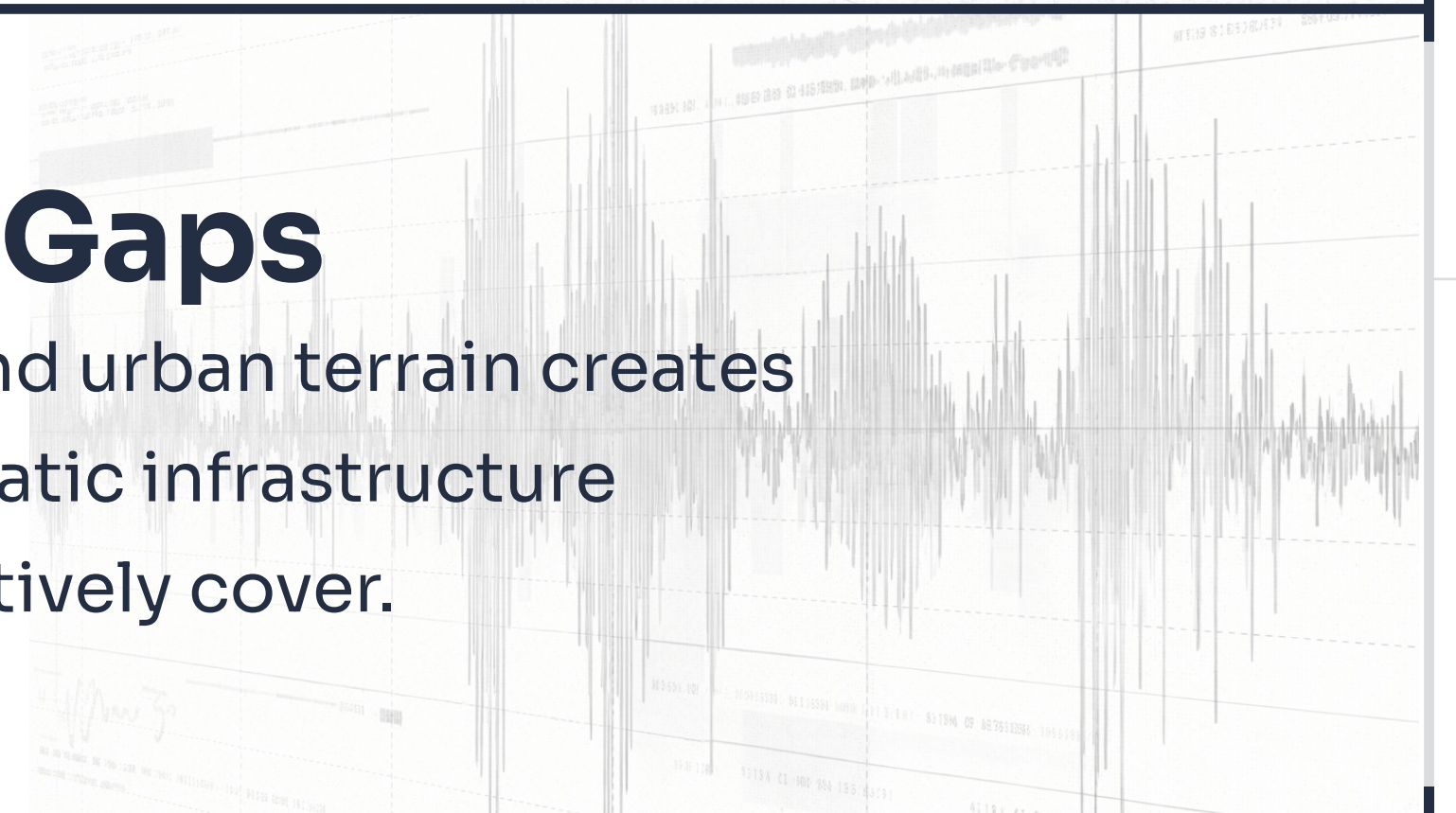
No Autonomous Response

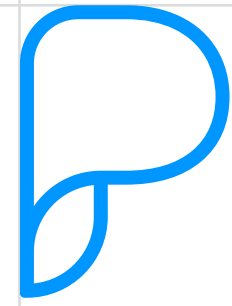
From detection to action, the targeting cycle demands human intervention at every step - increasing latency.



Coverage Gaps

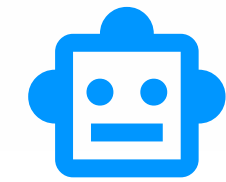
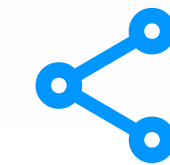
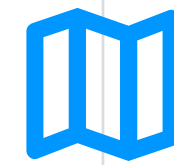
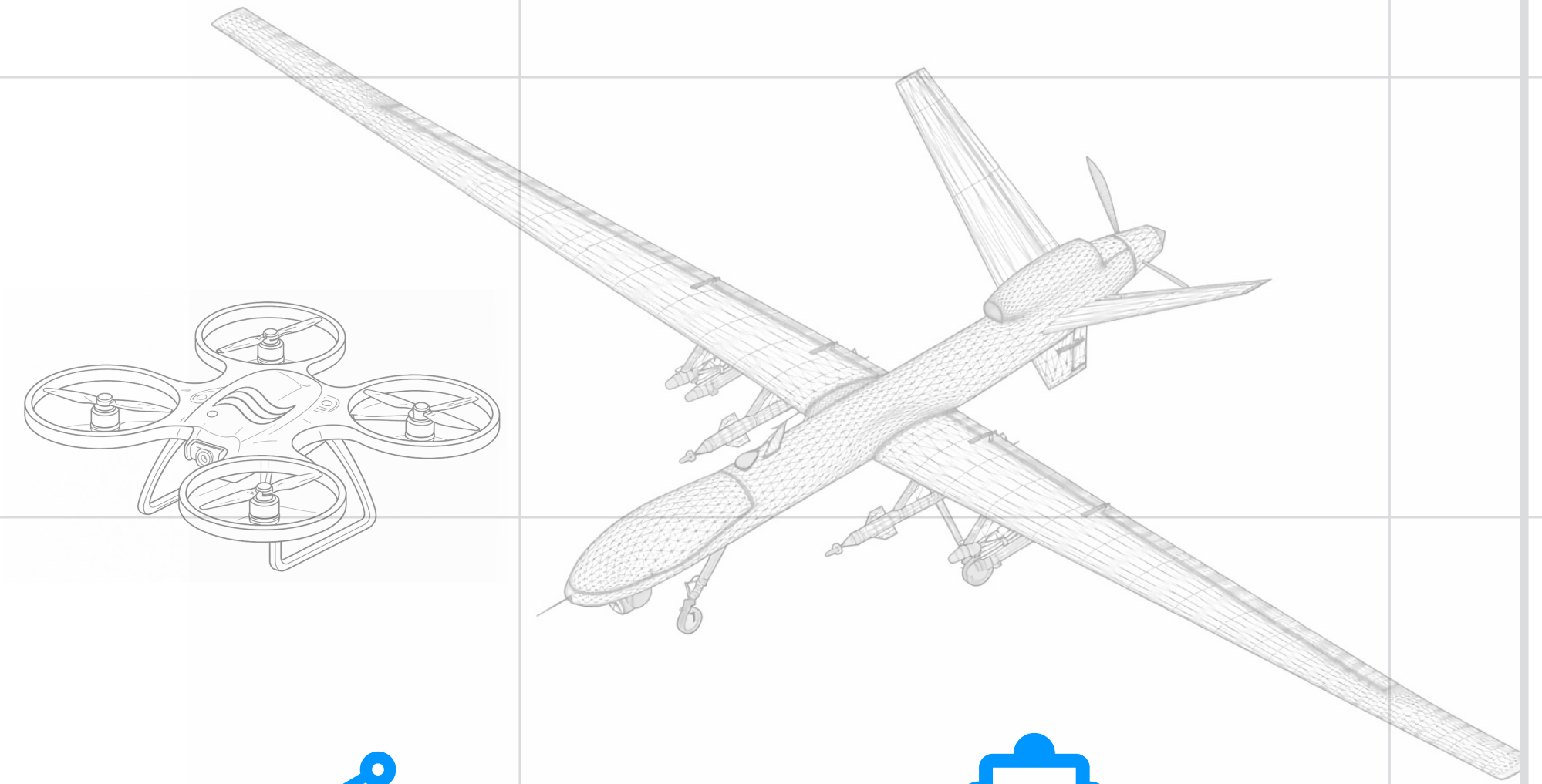
Coastal, border, and urban terrain creates blind spots that static infrastructure cannot cost-effectively cover.





WaveSense ARCHITECTURE

Autonomous Engagement Cycle



1. Detect

2. Localize

3. Map

4. Share

5. Automate

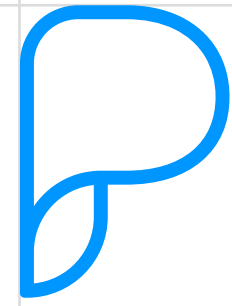
Mobile signals from altitude with unprecedented sensitivity

Pinpoint devices with high precision from a single sensor

Comprehensive network intelligence for operational awareness

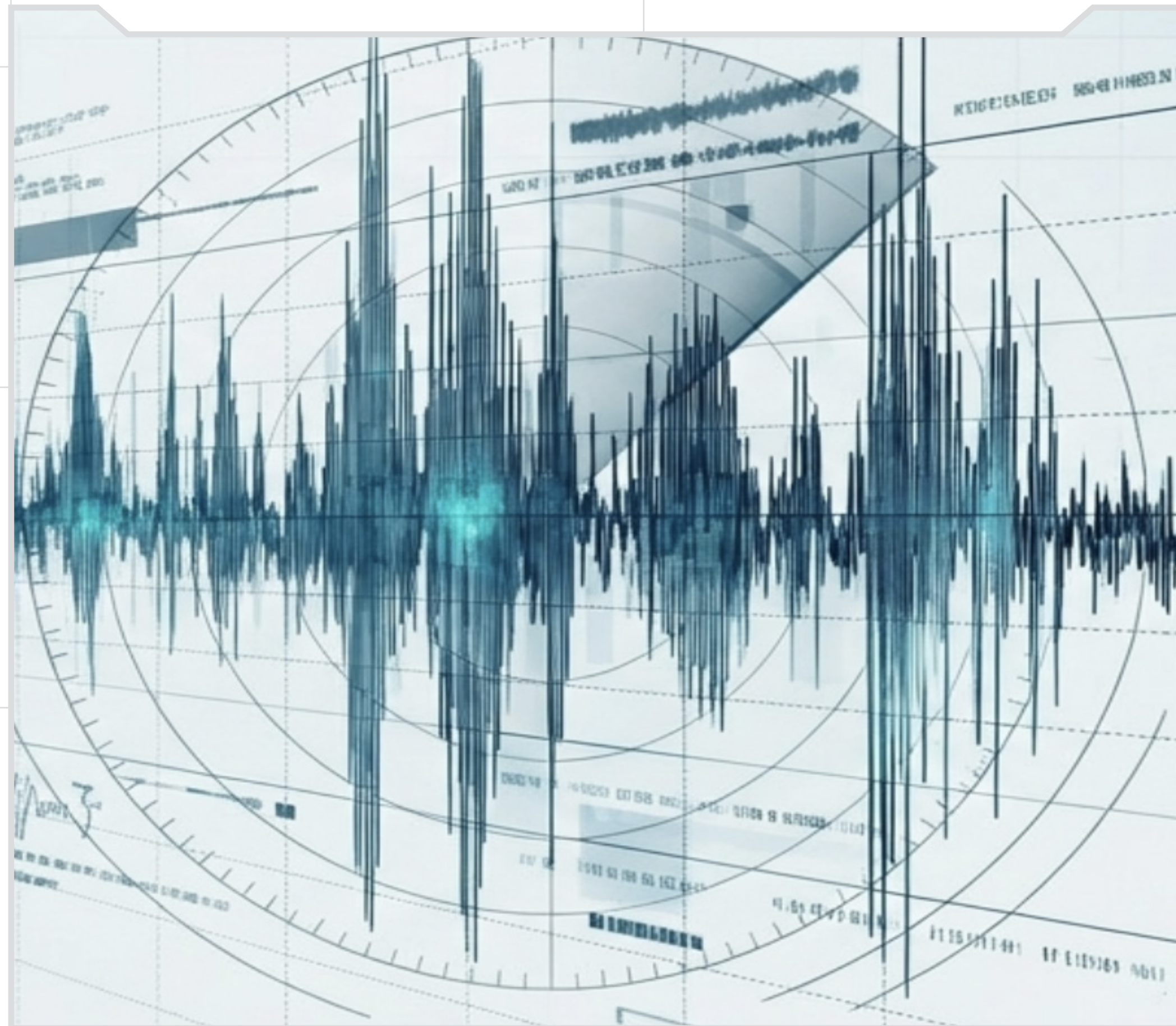
Intel transmission to platforms through secure channels

Autonomous engagement cycles - minimal human intervention



TECHNOLOGY

Passive RF Sensing & AI Localization



Passive LTE/5G Sensing

Detects uplink signals (SRS, PUSCH) with no active emission - fully covert operation.

Single-Sensor Localization

Proprietary algorithms extract AoA and TA from a single platform - no multi-node DF required.

Edge AI Processing

Onboard inference pipeline classifies signals and tracks targets in real-time with sub-second latency.

RF-Guided Navigation

Autonomous drones navigate exclusively using RF bearing - no GPS dependency in contested environments.

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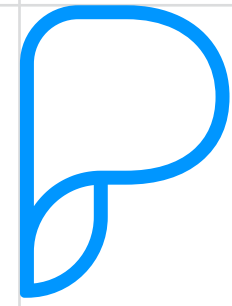
Target detection latency

3-4km

Operational altitude range

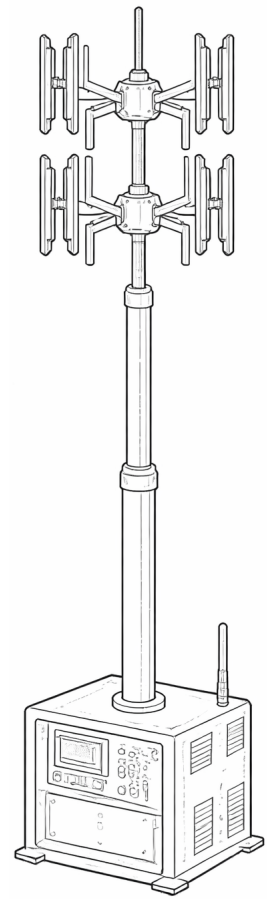
4G / 5G

Protocol coverage

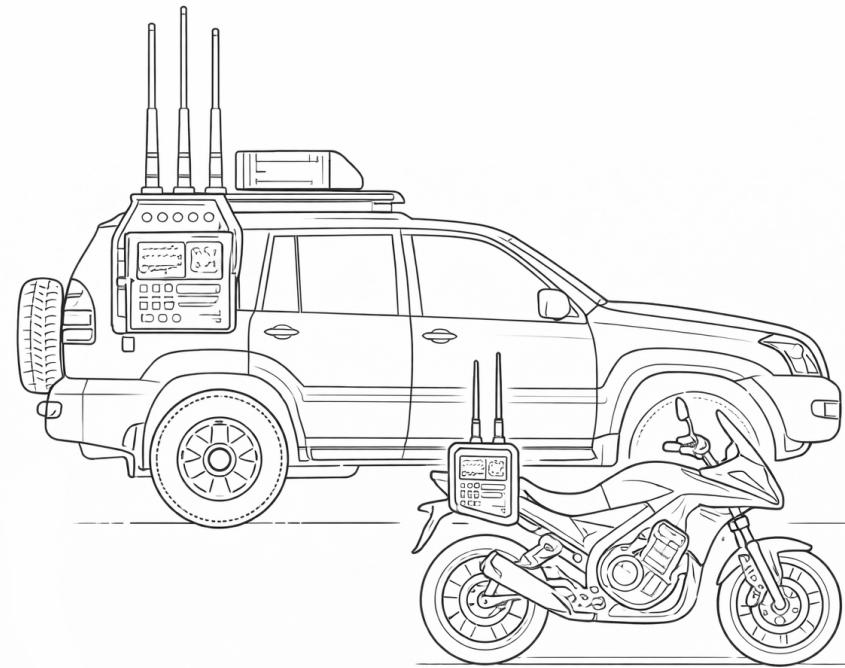


PRODUCT FAMILIES

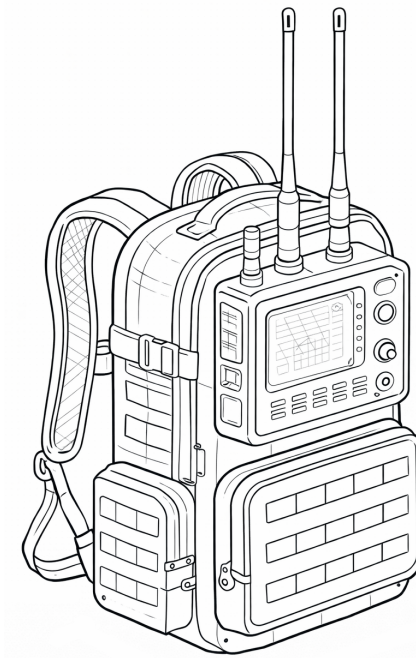
Industrialized Dual-Family Ecosystem



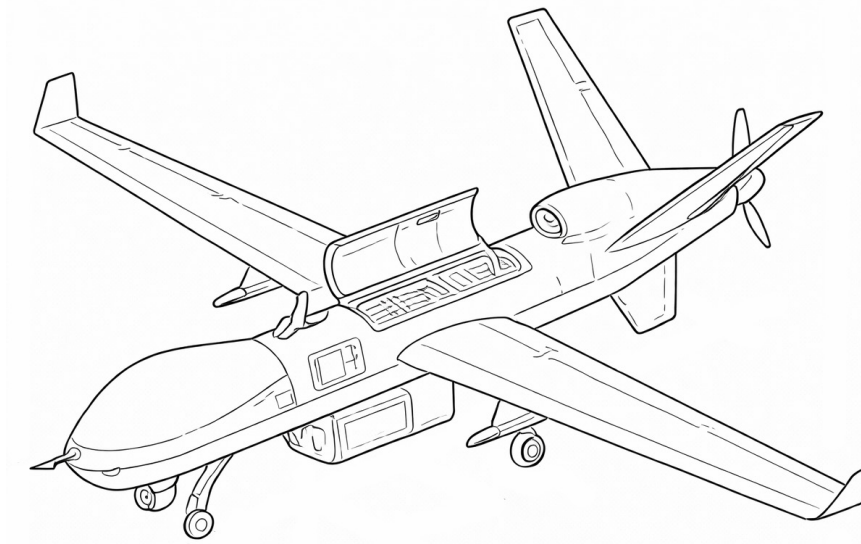
FIXED INSTALLATION



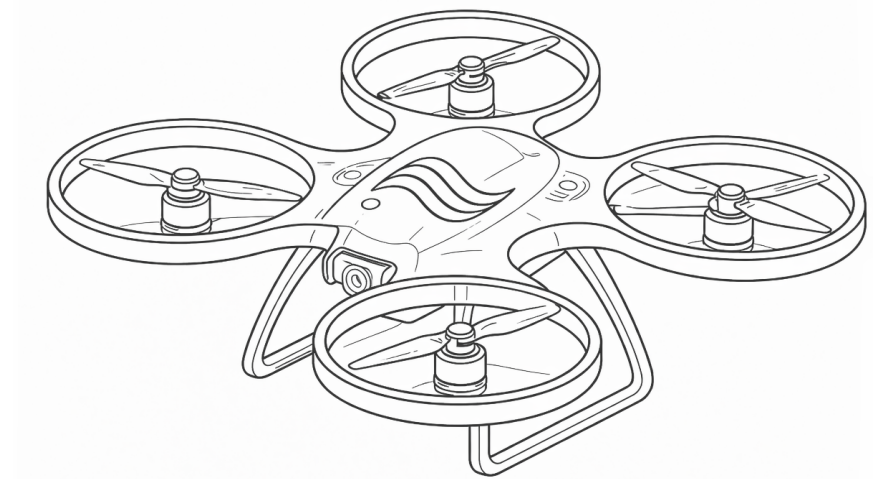
VEHICULAR & MOTORCYCLE



BACKPACK TACTICAL UNIT



UAV PAYLOADS



AUTONOMOUS DRONES

Category 1: Ground Range (EW & COMINT Systems)

- Fixed Installation - permanent ISR node
- Vehicular & Motorcycle - mobile intercept
- Backpack Tactical Unit - dismounted ops

Common RF core & C2 layer — modular by design

Category 2: WaveSense (Autonomous RF Sensors)

- UAV Payloads - transforms Class II/III UAVs
- Autonomous Drones - RF-only navigation
- AI-powered for air, ground, and sea ops

Industrial-grade build - export-ready, repeatable production



USE CASE - URBAN OPERATIONS

Public Order & Urban Security

01

GROUND SCAN

A vehicle-mounted WaveSense unit patrols the area - in motion or stationary - detecting active mobile devices.

02

DRONE DEPLOY

On detection of a device of interest, an autonomous drone is deployed from the vehicle platform.

03

RF-GUIDED SENSING

WaveSense navigates the drone using RF bearings alone, homing in on the target with no GPS dependency.



USE CASE · BORDER SURVEILLANCE

Automated 24/7 Border Monitoring

KEY BENEFITS

- Zero on-site personnel - reduced cost
- Continuous coverage - no shift gaps
- RF-only navigation - GPS-denied ready
- Immediate autonomous response
- Scalable node deployment

01

PERSISTENT MONITORING
WaveSense fixed nodes cover border sectors 24/7 — no on-site personnel required.

03

AUTONOMOUS LOCALIZATION
A WaveSense-equipped drone is deployed and navigates solely via RF signals to the target.

02

REAL-TIME DETECTION
Mobile signals are detected and devices of interest are identified automatically.



USE CASE · PROVEN IN FIELD

Autonomous Multi-UE Localization

SCENARIO

The drone operates as a non-serving passive sensor, detecting and localizing multiple target devices simultaneously in realistic mixed-environment conditions — including line-of-sight and non-line-of-sight targets behind metallic obstructions.



Mixed-Environment Validation

Open-field campaign with line-of-sight and in-vehicle targets - demonstrating robust operation through metallic obstructions.

Simultaneous Multi-Target

Multiple devices identified and localized in parallel — proprietary multiplexing on the uplink reference signal.

Sub-Metric Accuracy

Sub-metric localization error on LoS targets; consistent decametric accuracy on obstructed NLoS targets.

Minutes-Scale Mission

Complete autonomous mission - detection, localization, refinement - accomplished in minutes, no operator intervention.

Real-time edge AI inference · Onboard processing · Autonomous decision loop



USE CASE - ADAPTIVE AUTONOMY

The Drone Plans Its Own Mission

SCENARIO

The drone operates as a non-serving passive sensor, detecting and localizing multiple target devices simultaneously in realistic mixed-environment conditions — including line-of-sight and non-line-of-sight targets behind metallic obstructions.

01

Perimeter Scan

The drone sweeps the mission boundary to acquire a coarse estimate for every detected target - no prior knowledge required.

02

Adaptive Refinement

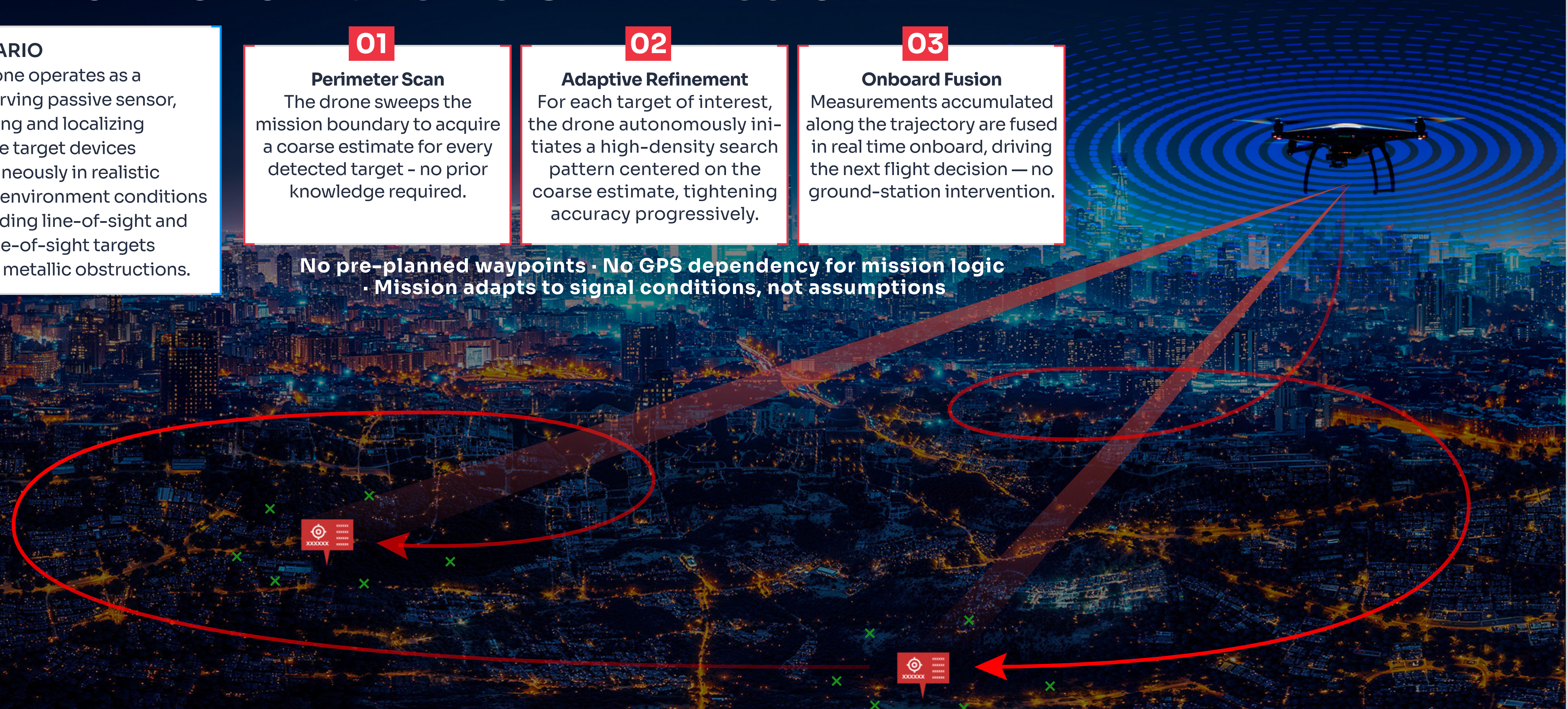
For each target of interest, the drone autonomously initiates a high-density search pattern centered on the coarse estimate, tightening accuracy progressively.

03

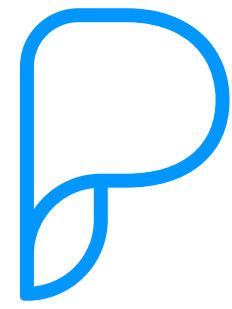
Onboard Fusion

Measurements accumulated along the trajectory are fused in real time onboard, driving the next flight decision — no ground-station intervention.

No pre-planned waypoints - No GPS dependency for mission logic
- Mission adapts to signal conditions, not assumptions

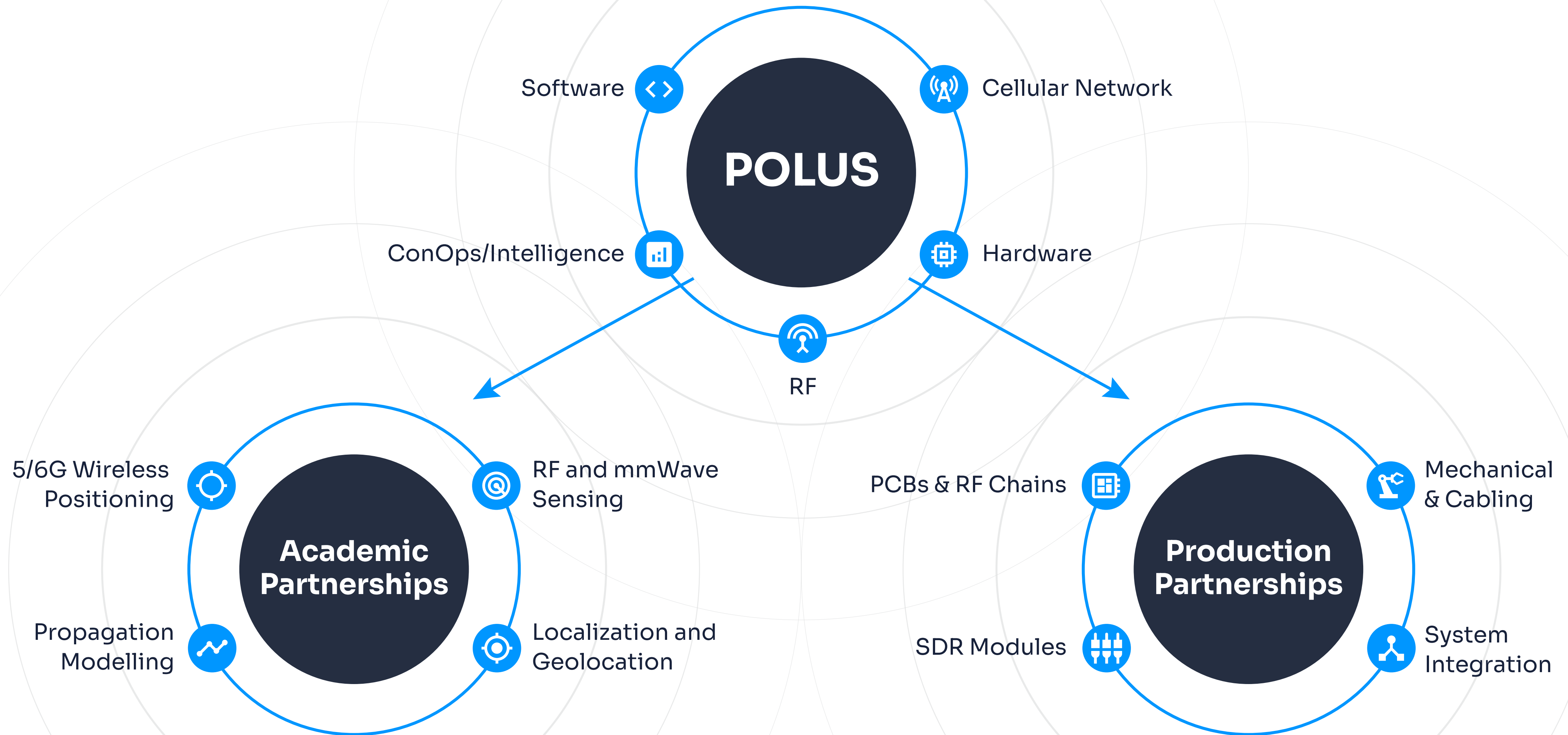


Developed in joint research with Politecnico di Milano — DEIB.



TECHNOLOGY FOUNDATION

Core Competencies and Partnerships



THANK YOU.

