OAK BMS

Battlespace Management System

A live, real-data common operating picture — built for real-world operations, operator in the loop.

UNCLASSIFIED · OPERATOR-IN-THE-LOOP DECISION SUPPORT

From tools to one live picture

The gap it fills

- **Sensors and analysis tools each carry their own laydown — the operator stitches the picture together by hand.**
- **OAK BMS runs them as ONE live, time-stepped battlespace fed by real data.**
  - Sensing → multi-INT fusion → common track picture → tasking → synchronisation — on one clock.
- **Built on faithful, first-principles physics — honest by design, not a black box.**

What it does

Three jobs, one console

Live common operating picture

Real feeds → multi-INT fusion → one fused track picture on a layered geographic-theatre → tactical-engagement display.

Geolocate & characterise

Multi-sensor ELINT cross-fixing → real positions with error ellipses; trails give course & speed; CPA to defended assets.

Decide & act

Operator confirms ID & allegiance; automatic threat alerts; effects tasked & scored on the suite's own physics, synchronised.

The layered COP

Strategic picture → tactical engagement

Theatre (geo)

Geographic world picture: own forces, fused tracks (allegiance-coloured), hostile engagement rings. Select a track to drill in.

Tactical (x/y km)

The engagement frame the physics live in: trails, position-uncertainty & engagement rings, coloured tasking lines.

Synchronisation

MDO effect timeline, combined mission-effect %, per-domain contributions and own-force spectrum-fratricide checks.

Real-data feeds

Seven receive-only inputs, not a simulator

- Track-link — TCP, newline-JSON track messages (the primary COP populator).
- Cursor-on-Target (TAK) — CoT 2.0 events to and from TAK / ATAK and fielded C2.
- INS / GNSS — own-platform position/attitude via the ANPP nav HAL.
- ELINT / PDW — real ESM receivers over TCP / UDP / SCPI.
- Multi-sensor geolocation — ≥2 ESM cross-fixed to a real position + ellipse.
- Keysight PXA / VSA capture — spectral detection via the instrument HAL.
- EO/IR video tracks, plus a multi-operator shared picture over the network.

Multi-sensor geolocation

Real fixes, visible uncertainty

Cross-fix, not a guess

Two or more separated ESM report angle-of-arrival; lines-of-bearing are cross-fixed into a real position.

Error ellipse on the COP

The fix uncertainty (GDOP) is drawn as an ellipse — the operator sees fix quality, it isn't hidden in one number.

Honest single-sensor

A lone analyzer gives frequency, not bearing — flagged low-confidence; a real fix needs ≥2 baselines.

Symbology & tracking

A real military picture

MIL-STD-2525 / APP-6

Affiliation-framed track symbols and the full STANAG identity set (Pending → Friend → Suspect → Hostile).

Kalman tracker

Stable track numbers and smoothed velocity; a track dead-reckons (coasts) when its feed drops, instead of vanishing.

MGRS · zones · 3-D

MGRS grid readout, range/bearing measure, geofence zones that alert on breach, and a 3-D altitude view.

Operator in the loop

The human makes the call

Confirm identity

Assign ID / allegiance / class / threat to a track. The label sticks and follows the track as the picture updates.

Threat alerting

CRITICAL when an own asset is inside a hostile's engagement ring; WARNING inside a defended radius or a breached zone.

Course / speed / CPA

Track detail gives MGRS, course and speed, and the closest point of approach to the nearest own asset.

Task & synchronise

Decision support on real physics

Effect tasking

EW noise/deception, GNSS denial, cyber — scored against the track on the suite's own ecm / commsjam / cyber models.

Cross-domain sync

Combined mission effect and own-force spectrum-fratricide flagged across overlapping RF effects.

Operator-validated

The BMS recommends and scores; the operator decides and confirms — not an autonomous fires system.

TEWA

Threat evaluation & weapon-target pairing

Rank the threats

Threats are scored by level, closest-point-of-approach and urgency, and ranked highest-first.

Recommend the effector

Each threat gets a recommended effect/effector, scored across own assets on the suite's own physics.

Operator approves

One click tasks the recommendation — the operator decides; the BMS does the staff work.

Record · replay · review

Capture the engagement

Record live

The whole picture — tracks, alerts, taskings — is captured each cycle to a portable recording.

Replay & scrub

Play the engagement back or drag a slider to any moment — for training and analysis.

After-action report

Export a self-contained HTML AAR: alert timeline, tasking summary, per-track summary and a trail overview.

Multi-operator

One shared common operating picture

Publish

One console publishes its picture over TCP to any number of subscribed consoles.

Subscribe

Other operators tick 'Shared picture' and see the same COP, live.

Interchangeable

The network frame is the same format as a recording — a live share and a replay are interchangeable.

Interoperate & export

Speaks the standards your kit speaks

Cursor-on-Target ⇄ TAK

Ingest CoT from TAK / ATAK and emit the picture as conformant CoT — affiliation and dimension preserved both ways.

Export anywhere

KML / KMZ for Google Earth & QGIS, a CSV track list, and a SITREP that carries the classification.

Open formats

MIL-STD-2525, CoT 2.0, MGRS, KML/GeoJSON, ANPP, SCPI — inspectable, no proprietary lock-in.

Security & accountability

Built for a fielded console

Sign-in & roles

Operator sign-in with role-based access (Viewer / Analyst / Admin) — gating tasking, classifying and export.

Classification banners

Top & bottom classification banners; the level is set by an authorised operator and carried into exports.

Audit trail

Every operator action — sign-in, classify, task, export — is written to an audit log.

Verification & validation

Evidence, not adjectives

- **Requirements-traceable V&V: 11 requirements / 26 checks vs analytical, surveyed and standard references — all within acceptance.**
- **Gated in CI with a coverage floor (~87%) and real-socket interop conformance tests — the evidence can't silently rot.**
- **Geolocation RMS < 1.7 km (3 ESM); tracker RMS 1.3 km from 2 km noise.**
  - Engineering evidence, not an accreditation — ATO and field test remain the deploying authority's.

Deployable

Offline, air-gap friendly

- **Standalone one-folder Windows build — no Python required on the target.**
- **Per-user PowerShell installer or a single Inno Setup Setup.exe with Start-menu / desktop shortcuts.**
- **Fully offline — bundled world basemap; nothing phones home.**

– Built on the OAK DEFENSE model libraries — one proven physics base, shared with the EW SUITE.

Honest by design

What it is — and isn't

- Faithful first-principles physics; geolocation uncertainty shown on the picture, not hidden.
- Operator-in-the-loop decision support — NOT a certified targeting / fires system.
- Real-world deployment is subject to the operator's own V&V, security classification, and export-control / controlled-goods handling.
- All feeds are receive-only.

At a glance

Capability summary

Area	Capability
Picture	Live multi-INT fused track picture; MIL-STD-2525; layered theatre→tactical→3-D
Tracking	Kalman tracker — stable TNs, smoothed velocity, dead-reckoning
Geolocation	Multi-sensor AOA cross-fix with error ellipses; honest single-sensor
Decide	TEWA threat evaluation & weapon-target pairing; operator approves
Effects	EW/GNSS/cyber tasking on real physics; cross-domain synchronisation
Map tools	MGRS grid, range/bearing, geofence zones with breach alerts
Interop	Cursor-on-Target (TAK) in/out · KML/KMZ · CSV · SITREP
Security	Sign-in, role-based access, classification banners, audit trail
Assurance	Requirements-traceable V&V (26 checks) gated in CI (~87% coverage)
Deploy	Offline one-folder exe · PS1 + Inno Setup installers · multi-operator

OAK BMS

One live picture. Operator in the loop. Deployable.

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