Velocity

Mobility Screening

4G/5G: Deterministic Screening for Drone Detection, Border Security and Illicit Mobile Use

Ruleset-driven mobility detection covering drone detection, border protection, and other use cases.
Fully auditable. No ML, no black-box models.

A separate deterministic screening application spanning **4G LTE**, **5G NSA** and **5G SA** core environments. Lightweight and explainable—deployable independently of any AI framework.

The Melrose Networks portfolio is structured as a progressive ladder—from accessible analytical tools to full operational systems. Velocity complements our **LTE S1 Analyser** (Core Platform and Operational Edition, 4G/5G NSA) and the forthcoming **4G/5G Unified Analyser** (Q3 2026). The ML-enabled platforms deliver full-scale behavioural analytics—analysing signalling sequences over time for deeper modelling and higher-confidence classification at national scale. Velocity provides the deterministic screening alternative where regulatory or assurance constraints apply. These are standalone capabilities; organisations may deploy either approach depending on operational maturity and requirements.

Supported: 4G LTE (S1AP) · 5G NSA (S1AP) · 5G SA (NGAP)

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Two Approaches—Standalone Capabilities

Where ML can be adopted, the **LTE S1 Analyser** and forthcoming **4G/5G Unified Analyser** deliver full-scale behavioural analytics—analysing signalling sequences over time for deeper modelling and higher-confidence classification of cellular-connected drones. These platforms are operational at national and multi-region scale.

By contrast, **Velocity** (the deterministic screening application) does not rely on trained models. It applies structured signalling logic and mobility heuristics to identify patterns atypical for ground-based mobile devices—designed for environments where the ML platforms are not the right fit.

No Model Training

Requires no training. Operates using predefined signalling logic.

Transparent & Auditable

Provides transparent, auditable outputs. Every detection has a clear rule and evidence chain.

AI Constraints

Can be deployed where AI adoption is constrained by regulation or policy.

Standalone

Deploy either approach based on regulatory posture and assurance requirements.

Use Cases

This level of control-plane performance underpins use cases including:

- **Detection and tracking of cellular-controlled drones**
- **Border and corridor protection**
- **Critical national infrastructure protection**
- **National mobility analytics and anomaly detection**
- **Illicit mobile use** — detecting unauthorised devices within restricted areas

Velocity can be used to monitor regions, limited areas, or geographic corridors.

Target Audience

Aligned with the Melrose Networks portfolio, Velocity serves:

- **National and government security authorities**
- **Law enforcement and public-safety bodies**
- **Critical infrastructure operators**
- **Airspace monitoring, control, and regulatory authorities**
- **Telecommunications operators and infrastructure owners**

This provides flexibility in how signalling-based detection is introduced.

How It Works

Velocity screens cellular signalling (S1AP/NGAP) using rulesets that cover drone detection, border protection, and other use cases. It detects devices whose mobility patterns are inconsistent with ground-based use: aerial movement, cross-border travel at speed, and rapid cell-hopping. Detection is fully deterministic—no ML, no training, no black-box models.

Performance at Scale

Mobile network control-plane analytics at scale—4G and 5G NSA. Velocity sustains ingest rates in the order of **10k+ signalling messages per second** for S1AP and NGAP.

This performance applies across 4G LTE S1AP (EPC control-plane), 5G NSA (where mobility and session control remain EPC-anchored), and 5G SA NGAP. For engineers, the platform can operate alongside live MME/AMF environments without becoming a bottleneck—even under burst conditions such as attach spikes, paging surges and mobility cascades.

For decision makers and policy stakeholders, this means the platform is capable of operating at national or multi-region scale—not as a lab prototype, but as an operational signalling sensor. Performance determines whether a system can be deployed in the real world.

Detection Categories

Velocity includes rulesets that cover drone detection, border protection, and other use cases. Built-in rulesets use configurable thresholds based on mobility heuristics, signalling logic, and cross-border behaviour.

Web UI & Ingestion

- **Flexible ingestion pipeline** — processes inputs in multiple formats
- **Ruleset composer** — create, edit, enable/disable rulesets
- **Realtime detections** — live list via Server-Sent Events
- **Map** — Leaflet map with detection markers, device tracks, cell locations
- **Areas of interest** — draw rectangles/polygons to scope RAN filtering
- **Input formats** — REST API, TCP NDJSON, file, PCAP; CSV/JSON import of cell data
- **Output formats** — In addition to the web UI for viewing detections, output can be to webhook or queue; also console and file

Supported Technologies

Technology	Interface
4G LTE	S1AP
5G NSA	S1AP (LTE anchor)
5G SA	NGAP

Velocity vs ML Analysers

Velocity sits alongside the LTE S1 Analyser (Core Platform and Operational Edition) and forthcoming 4G/5G Unified Analyser (Q3 2026)—each a standalone capability suited to different regulatory and operational contexts. The full product ladder is described in the Melrose Networks 2026 Product Portfolio Overview.

Aspect	LTE S1 / 5G/5G Unitified Analyser	Velocity
Approach	Machine learning	Predefined rules
Training	Required	None
Explainability	Model-dependent	Full (rule + evidence)
Deployment	AI framework needed	Standalone
Performance	100k+ msgs/sec	10k+ msgs/sec
Use case	High-confidence classification	Screening, triage, constrained environments

Organisations may deploy either approach—or both—depending on regulatory posture, operational maturity, or assurance requirements. For full-scale behavioural analytics where ML is viable, the LTE S1 and Unified Analyser platforms offer the depth of analysis; for constrained environments, Velocity provides the deterministic alternative.

Licensing & Pricing

Server Application

- Includes one (1) engineer seat license
- Additional seat licenses available

All pricing: POA

Contact Melrose Networks for a tailored quote.

Next Steps

If you are exploring the use of mobile networks for detecting cellular-controlled drones, border security, or large-scale signalling visibility, we would welcome a conversation—for demonstrations, technical briefings, or licensing enquiries.

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