

Technical Sheet

Active Geolocation

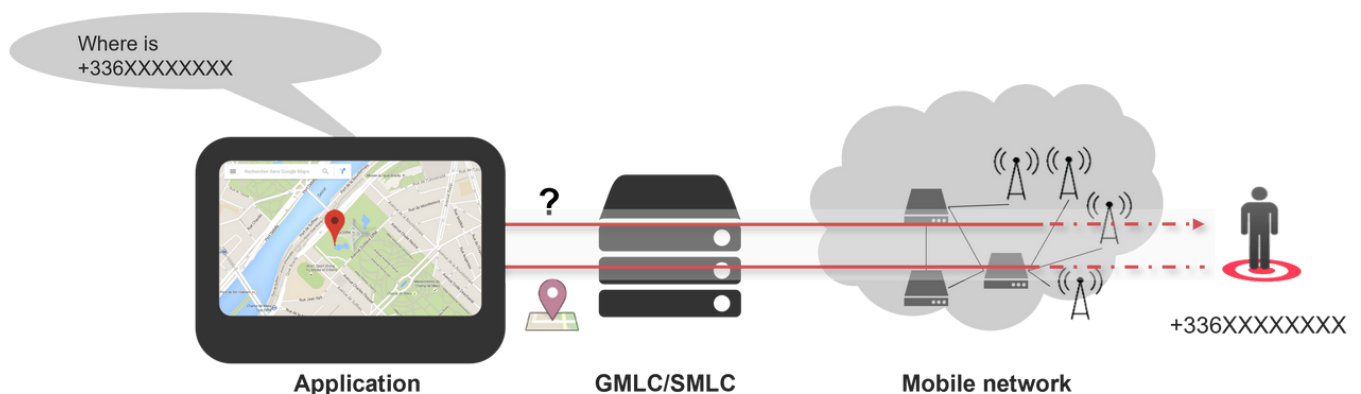
GMMLC / SMLC / SAS / E-SMLC / LMF

A Gateway Mobile Location Centre (GMMLC) is a platform that locates any mobile device at any time, without the need for an internet connection or an app download provided the mobile device is connected to its mobile carrier.

HOW DOES A GMMLC WORK?

By acquiring mobile devices' locations, it enables Location-Based Services (LBS), including emergency services, vehicle tracking, location-based advertising, and much more. In the case of emergency calls, for example, the Location Retrieval Function (LRF) fused with a GMMLC obtains the location information of the user who has started an emergency session. The Emergency Call Session Control Function (E-CSCF) receives the allocated outgoing address from the Routing Determination Function (RDF, collocated in Intersec GMMLC/LRF) to route the emergency request to a Public Safety Answering Point (PSAP).

GMMLC active location is enhanced by adding precise location components in the network, denominated Serving Mobile Location Centres SMLC in 2G, StandAlone SMLC in 3G, E-SMLC in 4G, Location Management Function LMF in 5G to greatly increase the precision of location reporting.



WHAT IS A SERVING MOBILE LOCATION CENTER (SMLC)?

The SMLC/SAS/e-SMLC/LMF is a network element in the LCS network of a PLMN. It manages the overall coordination, calculation and scheduling of resources required to determine the geo-graphical location of a MS in the network.

The Intersec SMLC provides its services into two distinct, mutually-independent configurations; namely, the Control Plane and the User Plane.

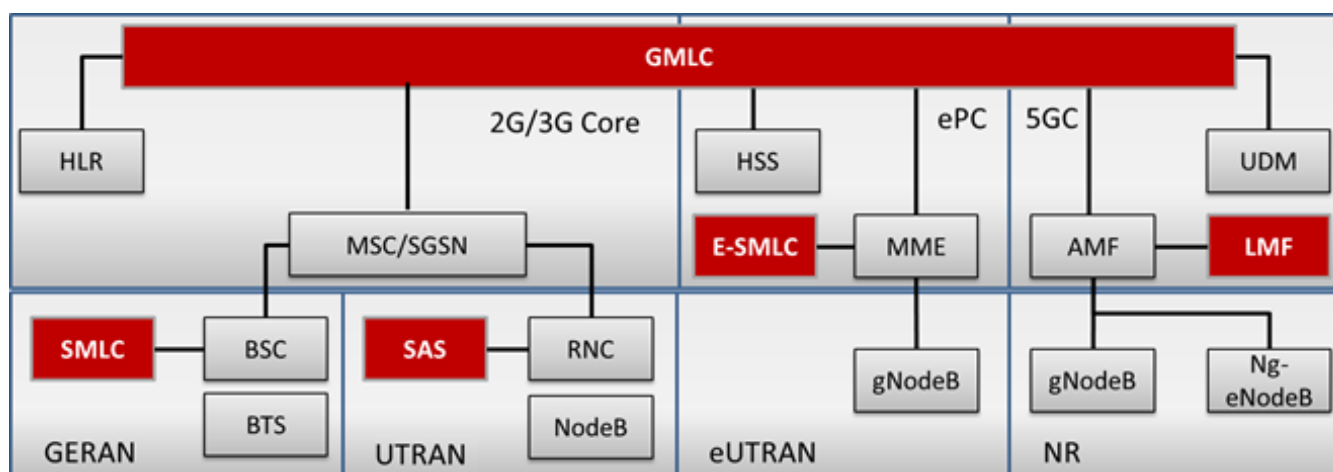
In the Control Plane solution, the Serving Mobile Location Center calculates the geographic location of a Mobile Station. SMLC receives location requests for the location of a MS from its associated BSCs/RNCs/MMEs and AMFs, determines the location of the MS, and returns the location estimate to the requesting node.

In the User Plane solution, the Serving mobile Location center acts as SLP adhering to SUPL architecture.

A STRONG EXPERTISE IN ACTIVE LOCATION

Intersec provides a full active location middleware stack, covering the following standard network nodes:

- GMLC
- 2G SMLC
- 3G SAS (Stand Alone SMLC)
- 4G E-SMLC
- 5G LMF

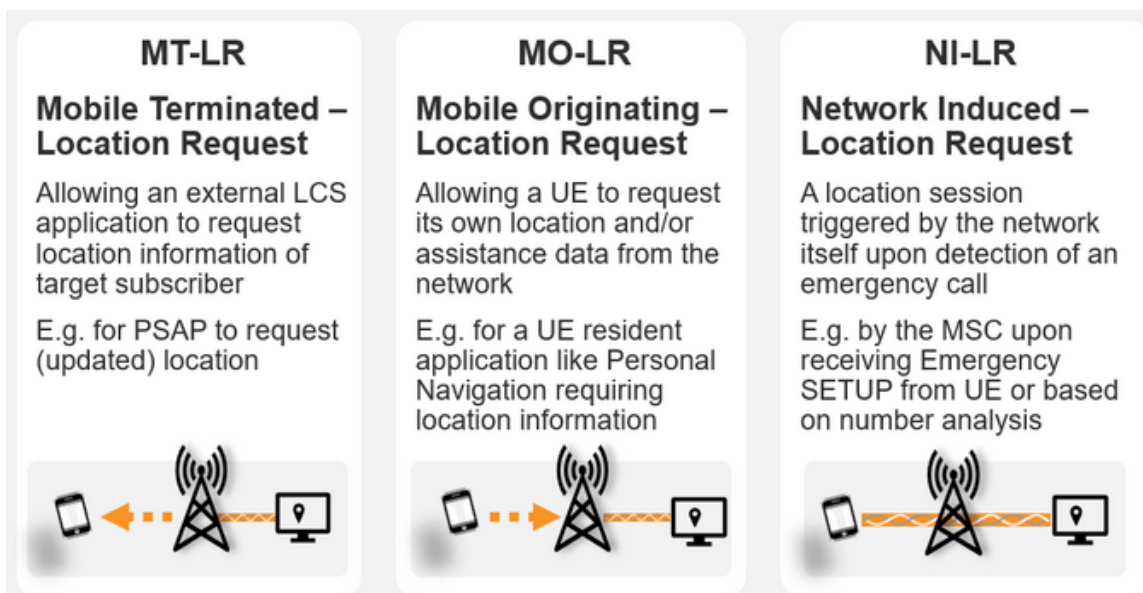


Key features:

- Extensive support of location technologies on all network generations:

2G SMLC	3G SAS	4G E-SMLC	5G LMF
<ul style="list-style-type: none"> CID eCID TA OTDOA RF Fingerprint SUPL AGNSS 	<ul style="list-style-type: none"> CID eCID RTT eCID RSCP OTDOA RF Fingerprint SUPL AGNSS 	<ul style="list-style-type: none"> CID eCID RSRP/RSRQ eCID TA OTDOA RF Fingerprint SUPL AGNSS RTK Wi-Fi Barometric UBP Indoor 	<ul style="list-style-type: none"> CID eCID TA eCID RSRP/RSRQ Multi-RTT AGNSS + DL-TDOA hybrid RF Fingerprint SUPL RTK Wi-Fi Barometric UBP Indoor

- LCS procedures



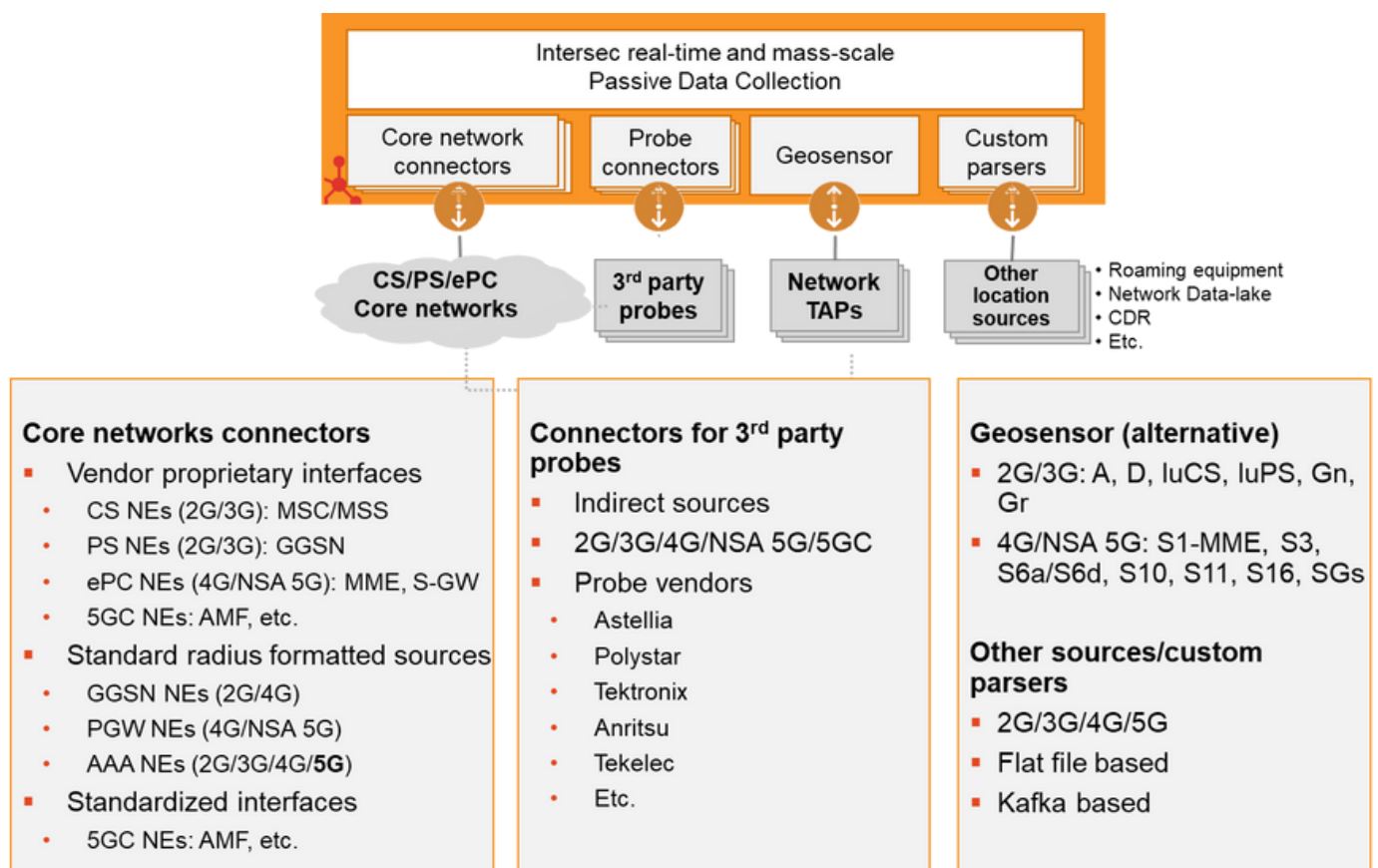
- Great flexibility to configure call-flows towards the core network thanks to Intersec active call-flow sequencer. Our GMLC can adapt to any network configuration.
- Hybrid positioning engine orchestrating the various location techniques to bring the best accuracy for each request.
- Fine-grained application profile management providing the best control over the use of location middleware resources and returned data.
- Vendor agnostic, can fit in heterogeneous network environment.

NOW WAIT... THERE'S MORE WITH PASSIVE LOCATION

Agora, the Intersec platform does not only provide active location technology, it combines and mutualizes active and passive geolocation techniques to make the most out of both technologies.

Agora, the Intersec platform, has been developed on a Fast Data core DNA, delivering unequaled capabilities in processing geospatial data extracted from mobile networks in real-time, at scale.

Over the past 12 years, Intersec has developed a comprehensive catalog of integration schemes, connecting to both the core network and radio access network depending on whether cell-id-based locations or sub-cell locations are respectively collected. This enables Agora to be deployed and integrated with any network configuration. This diagram presents typical passive geolocation integration schemes:



COMBINING ACTIVE AND PASSIVE LOCATION

Leveraging on its technology which supports both active and passive network location, Intersec has developed even further advanced features which unleash all benefits coming from their mutual enrichment. According to the use case and the context, the Agora platform chooses the most appropriate mechanism or combines them to benefit from their respective advantages.

This patented Intersec Technology enables:

- Increasing location spatial and temporal accuracy
- Optimizing network load
- Unlocking new use cases such as inbound roamer precise location

Agora hybrid position determination engine is mutualized between active and passive geolocation and leverages from both paradigms to derive the best location.

DERIVING ACTIONABLE INSIGHTS FROM LOCATION DATA

Agora does not only acquire location data, it also provides a fast data and geo specialized AI stack to derive actionable insights from location data extracted from the network, performing automatic trip and movement pattern analysis, most visited places identification, or real-time geofencing at scale.

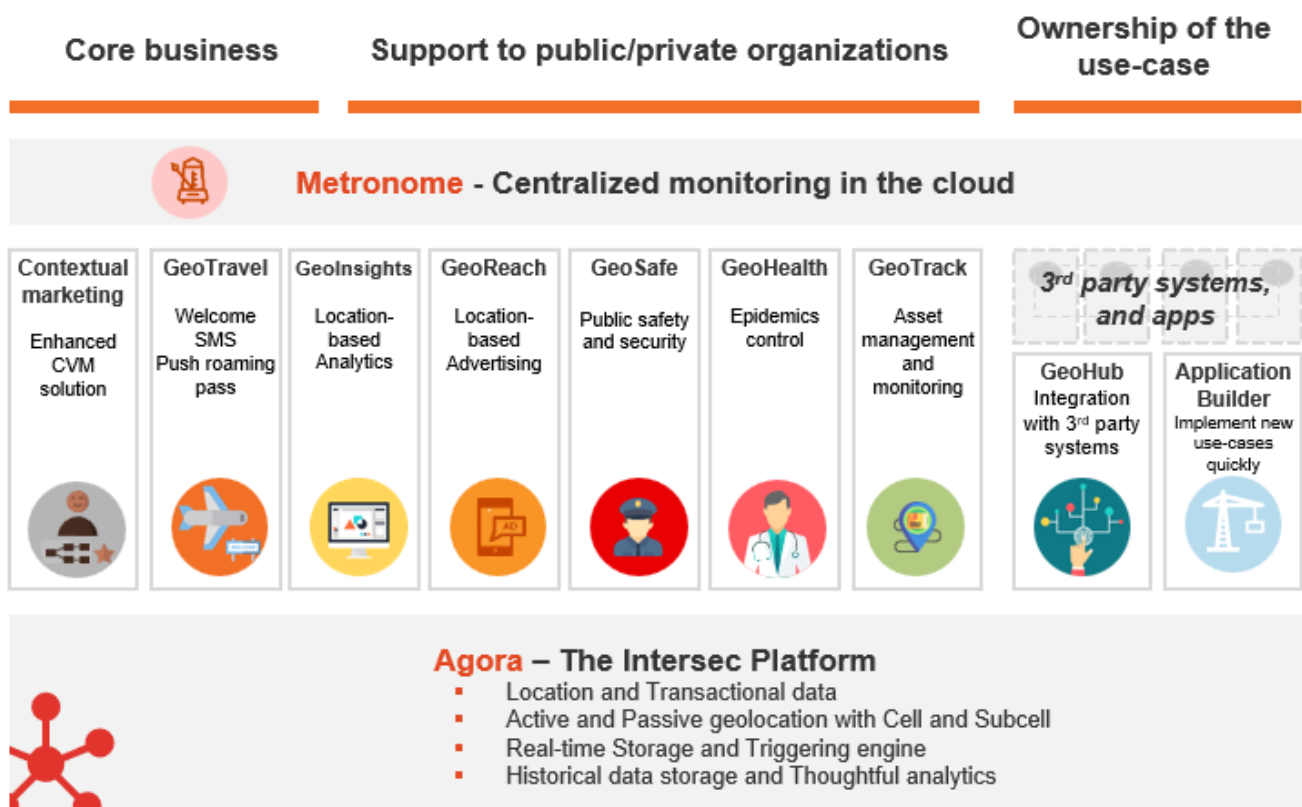
MONETIZING LOCATION DATA FROM DAY 1

The Intersec off-the-shelf application suite is turnkey in deriving value from day one. Its API and app builder fully integrates with existing apps or helps to develop new ones while unlocking monetization opportunities with existing use cases.

Intersec software empowers Communication Service Providers (CSPs) to leverage technical data produced by mobile networks to get actionable or monetizable insights and comply with regulatory purposes.

INTERSEC PRODUCT PORTFOLIO

The Intersec products address internal and external use cases for CSPs, from core business activities to innovative services geared for B2B, B2C, and B2G needs and expectations. They rely on a common framework that comprises high-performance software components built and consolidated over more than a decade of active development.



Intersec brings new services and revenue streams to CSPs and 3rd parties by disruptively enabling mass-scale extraction of value and monetization of enriched and computed mobility and activity information:

- **Contextual Marketing: Customer engagement**

Delivers a complete scenario designer for marketing teams to satisfy and upsell their customer base.

- **GeoTravel: Welcome SMS and roaming pass push**

Enables CSPs to boost revenues derived from subscriber roaming activities by enabling contextual engagement before, during, and after their journey abroad.

- **GeoInsights: Location-based analytics**

Enables CSPs to value mobile network devices' positions of their millions-sized subscriber base, monetizing them as geostatistics for different uses in B2B & B2G.

- **GeoReach: Location-based advertising**

Provides real-time geolocated advertisement at a massive scale and enables CSPs to derive value by selling highly contextual ad campaigns to brands.

- **GeoSafe: Public safety**

Helps CSPs to best meet public safety and security regulatory constraints. This product suite is composed of several components serving 3 main use-cases: public warning systems for CSPs and Public Authorities, lawful access location for Law Enforcement Agencies, and emergency call location and routing.

- **GeoHealth: Epidemics control**

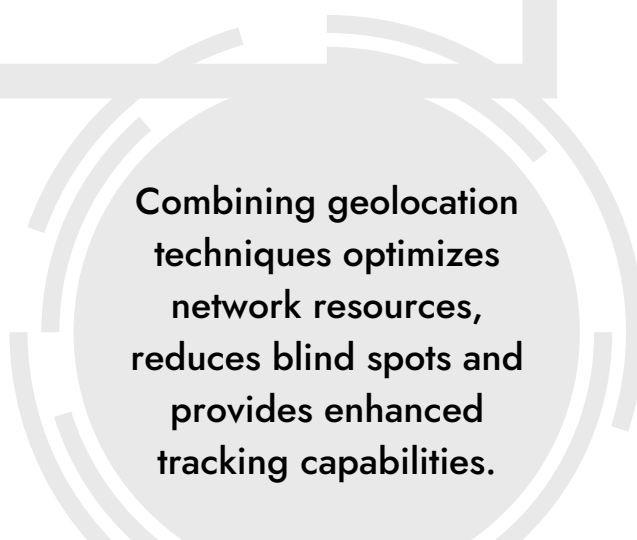
Provides means to CSP and public health authorities to have responsive and targeted control over epidemics, by spotting risk cases, investigating outbreaks, communicating with the population in a targeted manner, supporting the enforcement of protective measures, and shedding light on the situation through analytics.

- **GeoTrack: Asset management & monitoring**

Enhances a mobile network with alerts, geolocation, and an IoT management interface, enabling CSPs to unlock new use cases and create value.

- **GeoHub: Location enabler for 3rd part Location-Based Solutions.**

Derives value from network-originated geolocation by enabling a wide range of internal and external services and revenues streams, from traditional regulatory obligations to innovative applications using location at scale. GeoHub relies on the Intersec geolocation component and on a full set of APIs to reach the real-time location of entities.



Combining geolocation techniques optimizes network resources, reduces blind spots and provides enhanced tracking capabilities.

THE INTERSEC GEOLOCATION PLATFORM

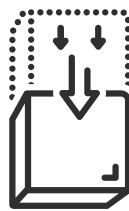


1- Collection of terabytes of anonymized mobility and activity datasets through a combination of location technologies



- Active location: SMLC, GMLC, SAS, E-SMLC, LMF
- Passive location: Cell and subcell accuracy at scale
- RF Fingerprinting: Highest accuracy

2- Mobility and activity data are processed and turned into actionable location insights



Equipment vendor-agnostic platform



Anonymized datasets



5G geofencing accuracy

3- A comprehensive set of mission-critical and high value-added applications for any use cases



About Intersec

Founded in 2004, Intersec is a global leader in activity and mobility data solutions. Intersec offers innovative and disruptive software enabling fast data analytics, mass communication, and AI-based decisions. Its industry-focused products enable private and public organizations to turn geodata into actionable insights in the fields of public safety, contextual marketing, geolocated advertising, smart cities, and the management of connected object fleets (IoT). With more than 100 clients in 80 countries, Intersec currently enables its customers to leverage the location of nearly one billion humans and connected objects. Learn more at intersec.com.

