



STARLING® Positioning Engine

Starling® PRODUCT SUMMARY

Positioning Engine

Starling is an advanced GNSS positioning engine designed for automotive and IoT autonomy applications and is market proven through its use in Swift Navigation's precision GNSS receivers. Starling's software enhances the measurements for commercially available GNSS receivers to provide true precision and integrity capabilities to a variety of automotive-grade and consumer-grade GNSS chips.

ABSOLUTE POSITION, VELOCITY AND TIME

Starling features multi-band, multi-constellation support to provide centimeter-level accuracy. It supports the calculation of precise position, velocity and time (PVT) together with integrity. When combined with inertial sensor measurements, wheel odometry and other sensor inputs, the Starling Positioning Engine can assist with vehicle localization, decision and control.

DESIGNED FOR PORTABILITY

Starling has been designed for fast portability to leading automotive processors and operating systems. Customer engineering investment in porting and bring-up time are minimized through the use of industry standard protocols and application program interfaces (APIs).

SCALABLE SOLUTION

Starling is capable of supporting legacy GNSS solutions that only support L1 operation. In this configuration, the Swift combination of Starling and Skylark™ corrections demonstrates substantial performance improvements to accuracy and repeatability and enables the ability to upgrade without requiring a hardware redesign.

PLATFORM INDEPENDENT

In addition to providing precision positioning in Swift's real-time kinematic (RTK) GNSS receivers, Starling enhances the measurements for commercially-available GNSS receivers to provide true precision and integrity capabilities. Starling is capable of ingesting raw GNSS observations from any measurement engine (ME).

GNSS RECEIVER AGNOSTIC

Starling works with multi-frequency, multi-constellation automotive and commercial-grade GNSS measurement engines, including the TeseoAPP and TeseoV automotive-grade GNSS chips. When combined with the wide-area Skylark cloud-based GNSS precise positioning service, Starling significantly reduces the cost of high-accuracy positioning for autonomous applications.

ENGINEERED FOR AUTOMOTIVE SAFETY APPLICATIONS

Starling has been engineered from the ground up to comply with the automotive industry functional-safety standard—ISO 26262 for Automotive Safety Integrity Level (ASIL)-B safety standards.

CONSTELLATION CONFIGURABLE

Starling is capable of running in real time and in post processing, allowing customers the flexibility to configure Starling to suit their system level requirements from the number of constellations tracked to the output rate desired. Starling supports the following: GPS L1/L2/L5, GLONASS G1/G2, BeiDou B1i/B2a, Galileo E1/E5b/E5a and SBAS.

BENEFITS

- GNSS Receiver Agnostic
- Supports Third-Party GNSS Measurement Engines
- Built for Integrity
- ASIL Ready
- Centimeter-Level Performance
- Scalable Solution Works with Legacy, L1-Only Options

FEATURES

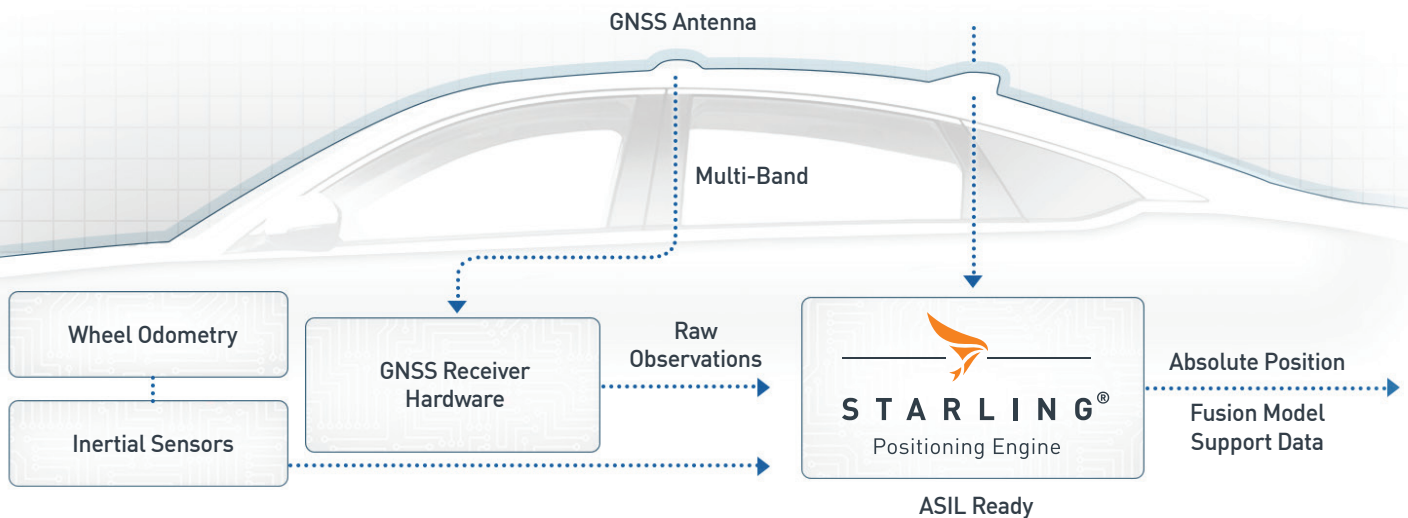
- Real-Time Processing Engine
- Highly Portable & Flexible Architecture
- Configurable to Suit Customer Processing Requirements
- Works with Multi-Constellation, Multi-Frequency GNSS Receivers
- Supports GPS L1/L2/L5, GLONASS G1/G2, BeiDou B1i/B2a, Galileo E1/E5b/E5a & SBAS
- Navigation Outputs: Swift Binary Protocol (SBP) & NMEA 0183
- Reference Inputs / Outputs: RTCM 3.1, 3.2

Precise Positioning Requirements for Automotive Safety Applications

Emerging automotive applications require improved position accuracies and integrity that cannot be met with the navigation positioning systems historically available.

Swift is engineering precise positioning solutions to deliver the accuracy and reliability required for tomorrow's automobiles. This includes combining the Starling Positioning Engine with automotive-grade GNSS chips and utilizing Skylark to stream corrections from the cloud to deliver accurate positioning.

With this comprehensive approach, Swift successfully delivers the precise positioning required at fleet-friendly prices.





STARLING®
Positioning Engine

STARLING FEATURES	
Benefits	Precision Software Positioning Engine with GNSS and Sensor Fusion
Sensor Fusion Support	IMU Wheel Odometry
Accuracy	2cm 50%*
Compatible With Chipsets	STM Teseo V STA8100 STM TeseoAPP STA9100 STM Teseo III STA8089 Broadcom BCM477xx Allystar HD8040 Qualcomm (Android) Broadcom (Android) Contact for Latest
Compatible With Modules	Quectel LG69T (TeseoV) u-blox F9 u-blox M8
Positioning Technologies	SSR PPP-RTK Hybrid Dead Reckoning / Sensor Fusion
Supported Corrections Data Formats	RTCM 3 SSR
Supported Corrections Transport	NTRIP
Integrity	Protection Level of 1m and TIR of 10^{-7} Failures / Hour**
Fast Convergence to Sub-Meter Accuracy	5s Convergence to 25cm Accuracy**
Output Formats	NMEA SBP (Swift Binary Protocol)
Integration Options	Linux Portable C++ Library Others Upon Request
Evaluate Starling	PGM Evaluation Platform

*2 cm 50% accuracy measured over 24 hours stationary with geodetic antenna, receiver, and single baseline corrections. Actual system performance may vary, dependent but not limited to; environmental, receiver and antenna characteristics, location of operation.

**When using Skylark corrections

www.swiftnav.com | [@SwiftNav](https://twitter.com/SwiftNav) | sales@swiftnav.com