SATELLIC TOLL DETECTION

MODERN ON-BOARD APPLICATION FOR ACCURATE TOLL CHARGING

If electronic tolling systems based on autonomous on-board units (OBUs) are to be successful, accurate and reliable toll detection is a must. To ensure high accuracy and reliability, Satellic Toll Detection comprises a number of functions that run on the OBU.
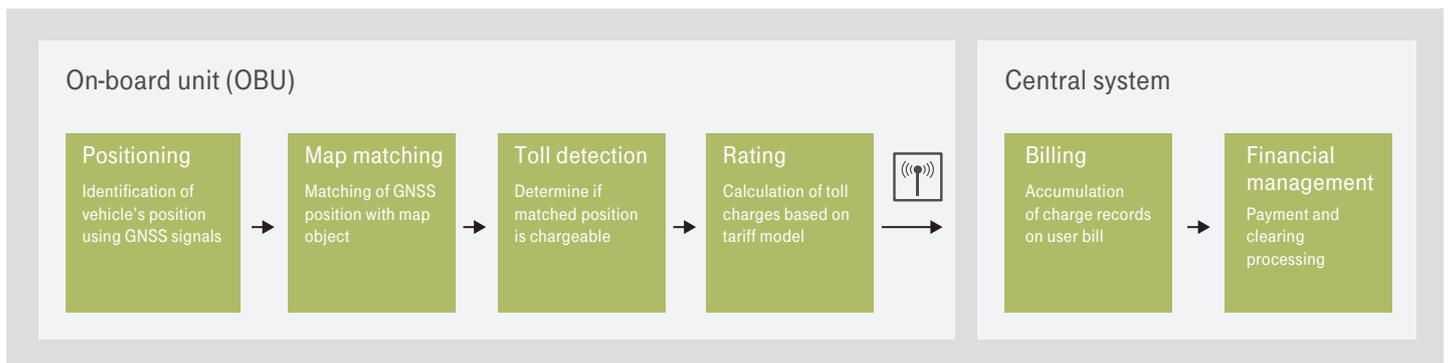
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KEY FEATURES

- Innovative map-matching algorithm detects use of toll roads by means of GNSS position signals

- Determination of relevant tariff data (e.g. kilometers driven, time, duration, location, direction)

- Local rating, toll charge calculation, collection and aggregation of charge data

- Temporary storage of charge data in secure on-board storage system

- Secure transmission of charge data to the central system via GSM/GPRS

- Extremely high precision on all road types

- Ability to cover complete national street networks (all road types)

BENEFITS

The on-board operation of Satellic Toll Detection delivers significant benefits:

- Robust privacy protection; no location data is transmitted to the central system if not requested by the road user

- Compliant with European privacy legislation

- Reduction in mobile communication costs and central processing equipment as a result of reduced data transmission

- Increased user acceptance thanks to immediate display of the detected toll fee

FOUR KEY STEPS TO FLAWLESS TOLL CHARGING

On-board unit (OBU)

Positioning	Map matching	Toll detection	Rating
Identification of vehicle's position using GNSS signals	Matching of GNSS position with map object	Determine if matched position is chargeable	Calculation of toll charges based on tariff model

Central system

Billing	Financial management
Accumulation of charge records on user bill	Payment and clearing processing

1. POSITIONING
The OBU's integrated GNSS/GPS receiver provides GNSS information such as position, speed, orientation and confidence degree on a second-by-second basis.

2. MAP-MATCHING
Based on the GNSS data, the map-matching algorithm identifies the related road segment or area on a digital map.

3. TOLL DETECTION
After the map-matching algorithm has identified that the vehicle has used a geo object (road segment or area), the toll detection process checks whether or not this geo object is part of a chargeable tariff scheme. To do this, the toll detection algorithm searches in a toll-object table, which links each chargeable geo object to a toll object. If the identified geo object is not part of a tolling scheme, all position data is immediately deleted.

4. RATING
If vehicles are driving on a chargeable road segment or within a chargeable area, the toll charge is calculated based on tariff rules linked to the toll object. This process is called rating and it generates a charge data record (CDR), which is securely transmitted to the central system for billing.