GNSS in rail safety applications

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GNSS applications in railways

Short-medium term
- Assets management
- Tracking and tracing
- Trackside personnel protection
- Dangerous goods tracing
- Power consumption management and optimisation

Medium-long term
- Simplified low cost ATP
- Level Crossing protection
- ERTMS/ETCS applications:
  - Improved odometry
  - Train Awakening L2/L3
  - Virtual Balise
  - Train Integrity L3
Expected benefits

- Reduction of installation and maintenance costs in trackside elements
- Overcome current sensors problems
  - Unavailability in some environments
  - Low speeds
  - High maintenance
- Bring additional functionality
- New generation of simplified ATP
Key issues for GNSS adoption in rail safety applications

Safety issues

- Safety approval process
- Compatible with TSI
- Standardisation and certification of products/services
- Service Guarantee
- Provision of Service

Economical factors

- Acquisition and retrofitting costs
- Service Cost
- ROI:
  - Productivity increase
  - Safety increase
  - Less infra costs
APOLO PROJECT

APOLO.- Advanced POsition LOcator system

FP4

INECO, RENFE, THALES, ERRI, CD, SAB-WABCO, RAILTRACK

Focused on location accuracy

• Better performances in location function:
  • APOLO SSA Precision ~ 5m (2σ al 95 %)
  • APOLO HA Precision < 1m (2σ al 95 %)

• high continuity
• high availability
GADEROS: GALileo DEmonstrator for Railway Operation System

- Introduction of GNSS in ETCS: theoretical study
- Preliminary safety study
- On-site trials: Madrid-Talavera. Locator prototype
- Virtual Balise simulations
GRAIL PROJECT

GRAIL.- GNSS Introduction in the RAIL sector

- Common specification agreed by industry and users
- First HW/SW prototype integrated in ETCS
- On-site tests (Madrid-Lleida) and laboratory tests (CEDEX)
### Technical support to GSA for standardisation and certification activities

- Identification of main items to be standardised
- Roadmap for standardisation of rail products and services
- Promotion of GNSS in the rail sector
- Definition of standard performances for rail application
GNSS enhanced odometry for ETCS

- Development of HW/SW prototype.

KEY ISSUES

- Safety activities – pre-certification.
- Validation
- Prototype close to product.

Expected benefits

- Costs at the same level.
- Better accuracy and availability: less delays and incidents.
Conclusions

- GNSS can bring additional features to existing safety applications or build-up new ones
- Focus on RTD shall be put in V&V and safety demonstration
- Standardisation and certification are needed
- Spain is leading the introduction of GNSS technology in rail safety related applications