13: EGNOS - POTENTIAL BENEFITS FOR RAILWAY APPLICATIONS

At the second ESTB Workshop in November 2001, the Czech SZT Laboratory of Intelligent Systems described how they had been using the ESTB in their APOLO project.

They installed GNSS and other sensors on two locomotives, and established track-side infrastructure to provide a source of "truth". Trials were then performed between two stations: Hradec Králové and Káranice. The ESTB delivered 95% horizontal accuracies of better than 1.5m, an improvement on GPS and comparable with local area DGPS. This is expected to facilitate improvements in supervision systems for dispatchers and to support signalling systems for low-density lines.

ESA and the EC have since instigated a number of railway demonstrations that make use of the ESTB: ECORAIL, LOCOLOC, INTEGRAIL and RUNE.

In the ECORAIL project, a team led by Technicatome (France) is looking to demonstrate the safe use of EGNOS at level crossings. The benefits include cost savings for the railway operators by reducing the amount of track-side wiring, increased traffic flow for motorists by optimising closing times, and a reduction of car exhaust emissions due to shorter waiting periods.
LOCOLOC (Locomotive Location) is a project to develop an innovative, safe and cost-effective system for train navigation based primarily on GNSS. The project team is being led by Alstom (Belgium). This builds on a project funded by the European Commission – LOCOPROL – that aims to develop a low-cost satellite-based signalling and protection system for low density traffic lines.

One of LOCOLOC's major tasks is to build a safety case for the system so that they can demonstrate that GNSS is safe for low-density train navigation. They need to show that the required level of safety can be met by EGNOS integrated with other sensors to overcome coverage gaps. LOCOLOC has the potential to deliver cost savings by transferring the safety functions from the track to the train, thus allowing expensive track-side infrastructure to be decommissioned.

The INTEGRAIL project is being led by Kayser Threde (Germany), and is looking at improving the use of EGNOS on low-density traffic lines following European Rail Traffic Management System (ERTMS) requirements. The team will be developing four prototype integration systems based on EGNOS and inertial systems. These will be deployed on two trains where they will provide information to both the driver and the control system. The benefits include: cost-savings to the rail infrastructure provider by minimising track-side eqiupment; cost-savings to train operators by harmonising signaling systems used in Europe; and improving journey times by keeping the same locomotive when a train crosses national boundaries.

In the RUNE (Railway User Navigation Equipment) project, a team led by Laben (Italy) is using EGNOS as part of an integrated solution to improve the train driver's situational awareness. Today, he does not receive advanced warnings of the status of signals or speed restrictions and, as a result, it is harder to deploy drivers on new lines. RUNE integrates EGNOS/GPS with other on-board positioning sensors, and signalling and speed restriction information from a central control centre. This will significantly improve safety as a result of improved situational awareness, and should also speed up the deployment of drivers on new routes.

Czech Republic APOLO Railway Trials