

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)  
Advanced Systems (1)

Author: Mr. Pasi Kämppi  
Laurea University of Applied Sciences, Finland, pasi.p.kamppi@laurea.fi

Dr. Jyri Rajamäki  
Finland, jyri.rajamaki@laurea.fi

Mr. Robert Guinness  
Finland, guinness@isunet.edu

## FIELD TESTING FOR SATELLITE BASED TRACKING SYSTEM

**Abstract**

Satellite-based tracking is a rapidly growing business area in many parts of the world. Tracking devices have become inexpensive, mobile network coverage has grown, and the internet has become part of our everyday life. This evolution has enabled the proliferation of satellite-based tracking applications. The basic principle behind satellite-based tracking is that a tracked device is positioned by GNSS satellites, and the positioning data is delivered for post-processing via mobile networks and the internet. This system is complex, and field testing provides an effective way to test system reliability and performance with real applications. In this research, analysis was performed on the reliability of satellite-based tracking using commercially-available systems during various routes in several regions in Finland. Several different models of mobile phones were transformed into tracking devices by installing a tracking application. Data created in the mobile devices were sent over mobile networks to the third-party GPS tracking service. Later data from both the GPS tracking server and the mobile phones were downloaded and compared. Use cases included different activities like car driving, sailing and bicycling.

We found that the system performs very well and basic functionality is very stable. Practical testing, however, did reveal a few vulnerabilities that have not been found in theoretical risk analysis. This study describes the main structure of the satellite-based tracking system, presents known technical risks, describes the test setup we used, and gives results on the performance of the satellite-based tracking system.