EGNOS FACT SHEET

9: FLIGHT TRIALS CONFIRM EGNOS SIGNAL AVAILABILITY AT HIGH LATITUDES

DERA's BAC 1-11 "Flying Laboratory"

Aviation users have very stringent requirements for availability, and it is important to confirm that signal availability is maintained at high latitudes with low GEO elevations.

Aviation users have very stringent requirements for service availability - typically between 99% and 99.999% depending on the operational need. EGNOS service availability is dependent on maintaining connectivity between the user receiver and at least one of the EGNOS geostationary satellites (GEOs). Even using three well-spaced GEOs to help maximise signal availability, it is important to confirm that signal occultation at high latitudes does not result from terrain masking or airframe masking during the manoeuvres.

Flight trials designed to assess high latitude availability during the critical approach and departure phases of flight were carried out in March 2001.

This led to a set of flight trials designed to assess high latitude availability during critical approach and departure operations. These were carried out on the 14th and 15th March 2001 by the British National Space Centre, the Defence Evaluation and Research Agency (DERA) and National Air Traffic Services Ltd (NATS) with the assistance of the Norwegian Mapping Agency (NMA).

DERA's BAC1-11(200) "flying laboratory" aircraft was equipped with two aviation EGNOS receivers. These were connected to a single antenna along with a survey-quality receiver to provide a truth trajectory.

The aircraft flew three sorties taking in three Norwegian airfields at Trondheim, Tromso and Bardufoss. Trondheim was chosen as a logistics base for refueling the aircraft. Tromso and Bardufoss were chosen for their high latitude (greater than 69° North) and close proximity to challenging mountainous terrain.

A signal availability of 99.68% was achieved during these trials. These results indicate that high latitude masking should have little impact on flight operations once EGNOS procedures have been designed and the GEOs are operational.

The ESTB signal was only available from the AOR(E) satellite during the trials, and was monitored at Gatwick throughout the trial to establish an availability baseline. The results of these trials, albeit based on a limited data set, give some cause for optimism.

EGNOS messages were unavailable for only 55 seconds from a total flying time of 4 hours and 47 minutes above 60°N. This equates to a signal availability of 99.68%. Outages were not caused by terrain shielding and did not occur during the approach/departure operations. Outages only occurred during dynamic manoeuvres, and a roll angle of greater than 30° was needed to break lock in the worst case scenario, and might have been avoided if all three GEOs had been available.

From an operational perspective, it should be possible to predict masking when designing an SBAS procedure. If a bank angle of the order of 30° is required within an approach procedure, this turn should be kept outside of the critical SBAS Precision Approach Region - the area in which an SBAS system can be used to provide guidance for a precision approach.

ESA Navigation Web Page:
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