KPI assessment of EGNOS reception on helicopters

About HEDGE
HEligoons Deploy GNSS in Europe (HEIDGE) is a project commissioned by the European GNSS Supervisory Authority (GSA) and part-funded under the EU’s Seventh Framework Programme (FP7). The aim of the project is to develop and demonstrate new helicopter approach procedures as well as other EGNOS applications for general aviation.

Objectives of the KPI study
To date, there has been little work done on the integration of EGNOS into helicopters. However, helicopters have:
1. a different operating environment to fixed wing;
2. complications from structure (i.e. interference from rotor blades).

HEIDGE provides an opportunity to implement EGNOS on helicopters and learn from certification authorities the requirements for EGNOS use in the cockpit, in turn, to facilitate an ‘easier’ upgrade path for helicopters and general aviation.

Due to the complications from structure (i.e. rotor blades) and operational use (i.e. typical low level flight), there is concern about the performance of EGNOS reception near the rotors. Will the impact of the rotors result in shielding of the signal strength or receiver lock and will this in turn affect the availability of the EGNOS signal?

To answer this question, HEDGE performed an analysis of at least 1,000 flight hours of EGNOS data recordings available through access to a fleet of 35 EC-120 helicopters, lent by HELIDAX to the French Defence Helicopter Flying School. These accumulate nearly 22,000 flight hours each year.

Methodology
The implementation of the methodology was performed by Helielios, one of the HEDGE partners. To establish a truth source, a static EGNOS receiver (in a lab on a geodetic point) recorded all EGNOS and GPS data 24 hours per day. Five recording boxes were developed to integrate EGOS receivers and data recorders into a portable package that can be installed into helicopters as ‘carry-on-baggage’ prior to flight.

A total of 9 EC-120 helicopters were certified to fly with L1/L2 antennas to enable data recording.

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APV SBAS: Application of Satellite Based Augmentation Systems to Helicopters

Recorders computed position distance
Receivers computed the computed difference in the horizontal and vertical position derived from different antenna receiver location. Differences in signal strength or receiver lock and will this in turn affect the availability of the EGNOS signal?

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Results and next steps
The initial analysis of the data collected through the free STC mobile parts has demonstrated that, even at low levels, the quality of the EGNOS signal received at the helicopter is unaffected from rotor interaction and performance is comparable to fixed-wing aircraft. This is reflected in the KPIs summarised above and is expected to be further supported when the consolidated report is made available on the HEDGE website by the end of 2010.

Applied to aviation applications, the KPIs illustrate that performance achieved is sufficient to support helicopter operations to fixed-wing aircraft. This is reflected in the KPIs summarised above and is expected to be further supported when the consolidated report is made available on the HEDGE website by the end of 2010.

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Applicable to aviation applications, the KPIs illustrate that performance achieved is sufficient to support helicopter applications (such as PinS, SOAP, and APV-SBAS) and provides tangible safety benefits to low level helicopter operators.