ENAV15 Input paper

Agenda item 10

Task Number

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Proposal for Extension of EGNOS Coverage using VDES

# Summary

**1.1 Purpose**

This paper proposes that extension of Satellite Based Augmentation Systems (SBAS) coverage to the high latitudes be considered as a potential application for the VHF Data Exchange System (VDES).

**1.2 Background**

VDES is being developed as a communications component of the e-Navigation system. It has the potential to meet many data exchange applications within e-Navigation, whilst averting the risk of overloading the primary AIS channels, which are vital for safety applications.

Broadcasting corrections to satellite navigation systems (GNSS) would be such an application. In particular, the coverage limitations of Satellite Based Augmentation Systems (SBAS) such as the European Geo-stationary Navigation Overlay Service (EGNOS) and Wide Area Augmentation System (WAAS) in the Arctic could be overcome, or at least mitigated, so that coverage could be provided in important areas, such as the Northern Sea Route.

**2 ACTION REQUESTED**

The Committee is invited to consider the information provided in the Annex, with a view to possible inclusion of this application in the development plans for the VDES.

**ANNEX**

**Proposal for Use of VDES to extend SBAS Coverage in High Latitudes**

**Introduction**

Satellite Based Augmentation Systems, such as WAAS, EGNOS, SDCM, GAGAN and MSAS, use geo-stationary satellites to broadcast corrections and integrity information for GNSS. The geo-stationary orbit limits coverage of these systems to latitudes below about 700.

The opening up of the Northern Sea Route between Asia and Europe and the increasing number of cruise ships navigating in high latitudes raises concerns about the adequacy of infrastructure in these regions to support safe navigation and Search and Rescue operations.

**Existing Infrastructure**

Although existing GNSS, essentially GPS and GLONASS, provide good positioning accuracy in polar regions, they do not have inherent integrity and the lack of monitoring sites in high latitudes exacerbates this problem. There are few IALA Beacon DGPS sites in these regions and although there is quite good coverage by existing Loran and Chayka stations, these do not currently have the capability to provide corrections or integrity messages for GNSS.

There are some coastal VHF stations in the areas under consideration, but additional stations would almost certainly be needed to provide adequate coverage.

**Potential Solutions**

Extending coverage of existing SBAS could be achieved in several ways. Polar orbiting satellites could be employed, either using existing constellations such as Iridium, or with dedicated space-craft, which could also be used for AIS monitoring in support of SAR. Existing Loran and Chayka stations could be provided with the necessary equipment for GNSS integrity and corrections, as well as communications to support SAR. Additional IALA Beacon DGPS stations could be installed to cover the higher latitudes. However, all these solutions are potentially costly and would require some measure of international cooperation.

VDES offers a potentially low-cost, flexible solution that could be implemented by individual nations to cover their areas of interest, providing GNSS corrections and integrity, as well as communications support for SAR.

**Timescale**

The VDES solution could be implemented quite quickly on a national basis. If a coordinated international plan could be formed then complete coverage of these regions could be achieved, in conjunction with the deployment of satellite AIS, once the standardisation process has been completed. It is expected this can be achieved within the planned implementation period for the first phase of e-Navigation, 2015-19.

**Proposed approach**

If this proposal receives support from the ENAV Committee, then the application can be included in the development plans for VDES. The data capacity needed can be assessed as part of ongoing studies into VDES and SBAS. These studies would need to include consideration of existing infrastructure and the additional stations required. They should also take account of the coverage of existing reference stations, where additional reference stations might be needed and where they could be located. The infrastructure requirements could then be included in proposals for the future development of SBAS and any additional technical requirements for VDES could be incorporated in the draft recommendations being prepared in cooperation between IALA and ITU-R.