



International Civil Aviation Organization

**Middle East Air Navigation Planning and
Implementation Regional Group**

**Sixteenth Meeting (MIDANPIRG/16)
(Kuwait, 13 – 16 February 2017)**

Agenda Item 5.2.2: Specific Air Navigation issues

GNSS PLANNING AND IMPLEMENTATION

(Presented by the Secretariat)

<p>SUMMARY</p> <p>This paper presents the outcomes of the ACAC/ICAO MID Workshop on GNSS and the CNS SG/7 meeting related to GNSS.</p> <p>Action by the meeting is at paragraph 3.</p>
<p>REFERENCES</p> <ul style="list-style-type: none">- CNS SG/7 Report- ACAC/ICAO MID Workshop on GNSS SoD

1. INTRODUCTION

1.1 The ACAC/ICAO MID Workshop on GNSS was successfully held at Golden Tulip Farah Hotel, Rabat, Morocco, 5 April 2016.

1.2 The Seventh meeting of the MIDANPIRG Communication, Navigation and Surveillance Sub-Group (CNS SG/7) was held at the ICAO MID Regional Office, Cairo, Egypt, 31 May - 02 June 2016.

2. DISCUSSION

2.1 Protecting the frequency band 1559-1610 MHz used for elements of GNSS is of paramount importance in the safety of air navigation. Therefore, States are urged to provide effective spectrum management and protection including the promulgation of the necessary regulation to reduce the likelihood of interference or degradation of GNSS performance.

2.2 The CNS SG/7 meeting reviewed the recommendations of the Joint ACAC/ICAO MID Workshop on GNSS at **Appendix A** and highlighted the importance of sharing information/experience on GNSS related issues. Accordingly, the meeting encouraged States to benefit from the European Commission offer to conduct Cost Benefit Analysis free of charge.

2.3 The CNS SG/7 meeting underlined the role of ACAC and ICAO to carry out study on assessing the likelihood and effects of GNSS vulnerabilities in the MID Region airspace and encouraged States to provide necessary support, as needed. To this effect, the meeting may wish to note that ACAC and ICAO are planning to organize a joint Workshop on GNSS vulnerabilities in November 2017.

2.4 The meeting may wish to note that the GNSS signal interference and vulnerabilities were discussed in detail at the CNS SG/7 meeting. Accordingly, it was agreed that as a first step it is needed to gather data on actual interference causes and users were also requested to collect data from pilots. The GNSS Interference Report Form for data collection purpose is at **Appendix B**.

2.5 The meeting may wish to recall that GNSS signal disruption cannot be ruled out completely and States/ANSPs must be prepared to deal with loss of GNSS signals. They need to conduct risk assessment, and implement mitigation strategies as outlined in ICAO Doc 9849 GNSS Manual.

2.6 The CNS SG/7 meeting noted the progress regarding EGNOS (European Geostationary Navigation Overlay Service) that is the European SBAS (Satellite Based Augmentation System). It was also noted that the GPS Aided Geo Augmented Navigation (GAGAN) system has been developed by Indian Space Research Organization (ISRO), and the meeting was of the view to follow-up the developments in the other regions and encouraged concerned States to benefit from these experiences.

2.7 The meeting may wish to note that during the CNS SG/7 meeting IATA reiterated their position for not supporting the SBAS solution and some States informed that they have no plans for SBAS for commercial aviation.

2.8 The meeting may wish to note that ICAO developed new guidance on GNSS monitoring for inclusion in the GNSS Manual (Doc 9849), the corresponding updates to Annex 10 will also become applicable by November 2018.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information in the paper and take action as appropriate;
- b) urge States to provide sufficient protection to the GNSS frequency band;
- c) encourage States to actively participate in the ACAC/ICAO Workshop on GNSS vulnerabilities; and
- d) encourage States and users to report GNSS interferences, using the form in **Appendix B**.

APPENDIX A

No	Recommendation	Action description and Status
1	ACAC has to continue raise awareness regarding the Global Navigation Satellites System (GNSS: EGNOS, GBAS) (Workshops, Seminar and training etc	On Going Basis
2	ACAC GNSS WG AN Provide regular papers to the MIDANPIRG CNS SG	On Going Basis
3	States to provide effective spectrum management and protection of Global Navigation Satellite System (GNSS) frequencies to reduce the likelihood of unintentional interference or degradation of GNSS performance;	On Going Basis
4	States engage all Stakeholders in all planning process;	On Going Basis
5	Plan the upgrade of Air Navigation systems based on the identification of needs and expectation of the airspace users and the identification of the optimum solution from operational and economic perspective. Maximize the use of the available technologies before investing in any new technologies;	On Going Basis
6	States to share experience on GNSS and ASBU B0 Modules implementation including sharing of training and implementation packages and visits to other States;	On Going Basis
7	State to identify operational requirements/Scope and improvements and plan for implementation accordingly taking into account the cost benefits of the different Augmentation systems available	On Going Basis
8	GAGAN (ISRO/AAI) to provide to CNS SG/7 details on the services and the requirement for extension of these services to the MID Region	Completed
9	EC to provide working papers to the CNS SG/7 on the progress achieved in the MID/ACAC States from the MEDUSA including the work programme for the Workshop in September which will discuss the template of the International Agreements;	Completed
10	States participated in the MEDUSA interested in further progress on EGNOS activities have to send official letters to EC, and provide updates on their GNSS plans and implementations Status to the CNS SG/7;	Partially Completed
11	EC is ready to assist any ACAC States not participated in MEDUSA for the conduct of the cost benefit analysis free of charge upon official request from the CAA or ACAC;	On Going
12	JPO and MID Region to share their experience on legal and institutional frame work on EGNOS implementation. JPO is also ready will provide support to interested African States;	On Going
13	ACAC and ICAO assist in harmonization to enhance interoperability and maximize available resources;	On Going Basis
14	ACAC GNSS WG with ICAO Support to carry out the study to assess the likelihood and effects of Global Navigation Satellite System Vulnerabilities in the MID Region airspace;	On Going
15	CNS SG and GNSS WG to develop MID Region GNSS mitigation strategy	Not started
16	Regional and Global coordination should be improved in order to define and meet the requirements of the Regional ANP and GANP; and	On Going
17	Evaluation of the implementation of GBAS system costs and benefits in the area of Arab Countries.	On Going

APPENDIX B

- Guidance for GNSS Interference Reporting to States

REPORTING OF GNSS RFI

Example form for use by ATS personnel

Originator of this report	
Organisation	
Department	
Street / No.	
Zip-Code / Town	
Name / Surname	
Phone No.	
E-Mail	
Date and time of report	
Description of interference	
Affected GNSS element	<input type="checkbox"/> GPS <input type="checkbox"/> GLONASS <input type="checkbox"/> other constellation <input type="checkbox"/> EGNOS <input type="checkbox"/> WAAS <input type="checkbox"/> other SBAS <input type="checkbox"/> GBAS (VHF data-link for GBAS)
Observability of the interference	Interference was noticeable: <input type="checkbox"/> only on board of aircraft <input type="checkbox"/> only on ground <input type="checkbox"/> both
Source of initial interference report	Pilot <input type="checkbox"/> Engineer/technician <input type="checkbox"/> Other <input type="checkbox"/>
Degradation of GNSS performance	<input type="checkbox"/> Large position errors (details): <input type="checkbox"/> Loss of integrity (RAIM warning/alert) <input type="checkbox"/> Complete outage <input type="checkbox"/> Loss of satellites in view (details): <input type="checkbox"/> Lateral indicated performance level changed from ___ to ___ <input type="checkbox"/> Vertical indicated performance level changed from ___ to ___ <input type="checkbox"/> Indicated dilution of precision changed from ___ to ___ <input type="checkbox"/> Information on PRN of affected satellites (if applicable) <input type="checkbox"/> Low signal-to-noise (density) ratio <input type="checkbox"/> other
In case of report by pilot	
Airline name	
Aircraft type and registration	

Flight number	
Airway/route flown	
Coordinates of the first point of occurrence / Time (UTC)	UTC: Lat: Long:
Coordinates of the last point of occurrence / Time (UTC)	UTC: Lat: Long:
Flight level or altitude at which it was detected	
Affected ground station (if applicable, e.g. GBAS)	Name/indicator: Lat: Long:
In case of report by ATS personnel	
Coordinates of the first point of occurrence / Time (UTC)	UTC: Lat: Long:
Coordinates of the last point of occurrence / Time (UTC)	UTC: Lat: Long:
Affected area	
Affected flight route	
Problem duration:	Days, hours, minutes, seconds _____ [] continuous [] intermittent
Information on presumed source of interference	
Presumed location of interference source	Lat: Long: or Nearest city or landmark:
Interfering frequency (if known)	
Signal strength and reference bandwidth (if known)	
Further descriptions of the interference case	[] Spectrum plot [] Map Other material:

Example form for use by pilots

Originator of this report	
Organisation	
Department	
Street / No.	
Zip-Code / Town	
Name / Surname	
Phone No.	
E-Mail	
Date and time of report	

Description of interference	
Affected GNSS element	<input type="checkbox"/> GPS <input type="checkbox"/> GLONASS <input type="checkbox"/> other constellation <input type="checkbox"/> EGNOS <input type="checkbox"/> WAAS <input type="checkbox"/> other SBAS <input type="checkbox"/> GBAS (VHF data-link for GBAS)
Aircraft type and registration	
Flight number	
Airway/route flown	
Coordinates of the first point of occurrence / Time (UTC)	UTC: Lat: Long:
Coordinates of the last point of occurrence / Time (UTC)	UTC: Lat: Long:
Flight level or altitude at which it was detected	
Affected ground station (if applicable, e.g. GBAS)	Name/indicator:
Degradation of GNSS performance	<input type="checkbox"/> Large position errors (details): <input type="checkbox"/> Loss of integrity (RAIM warning/alert) <input type="checkbox"/> Complete outage <input type="checkbox"/> Loss of satellites in view (details): <input type="checkbox"/> Lateral indicated performance level changed from ___ to ___ <input type="checkbox"/> Vertical indicated performance level changed from ___ to ___ <input type="checkbox"/> Indicated dilution of precision changed from ___ to ___ <input type="checkbox"/> information on PRN of affected satellites (if applicable) <input type="checkbox"/> Low signal-to-noise (density) ratio <input type="checkbox"/> other
Problem duration	<input type="checkbox"/> continuous <input type="checkbox"/> intermittent

- GNSS RFI reporting does in no way replace the reporting requirements identified within an individual State.

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