



SUMMARY OF DISCUSSIONS

1. GENERAL

1.1. Place and Duration

1.1.1 The ACAC/ICAO GNSS Workshop was successfully held at the Golden Tulip Farah Hotel, Rabat, Morocco, 7 and 8 November 2017. The Workshop was supported by the European Commission (EC).

1.2. Opening

1.2.1 Mr. Mohamed REJEB, ACAC Air Navigation and Aviation Safety Expert opened the Workshop on behalf of His Excellency Eng. Mohamed Ibrahim Sherif, Director General of ACAC. Mr. Mohamed Smaoui, Deputy Regional Director, ICAO Middle East Regional Office provided also an opening speech on behalf of ICAO.

1.3. Attendance

1.3.1 The Workshop was attended by a total of forty-nine (49) participants, from nine (9) States (Algeria, Egypt, France, India, Lebanon, Libya, Morocco, Tunisia and Yemen), six (6) Organizations (ACAC, ICAO, IFALPA, EC, JPO and IATA) and six (6) Industries (Telespazio, Thales Alenia Space, DLC Consultant ESSP, RESYS Consultants and Abdus Salem International Center for Theoretical Physics). The List of Participants is at **Attachment A**.

1.4. Agenda

1.4.1 The Agenda was developed around the main following topics:

- a) Session 1: Global and Regional Developments related to GNSS
- b) Session 2: Regional SBAS: EGNOS and SBAS initiative for GCC States, Iraq and Yemen
- c) Session 3: SBAS Initiative in East Africa and GAGAN
- d) Session 4: Panel Discussion on GNSS/SBAS implementation
- e) Session 5: GBAS implementation
- f) Session 6: GNSS vulnerabilities and mitigation measures
- g) Session 7: Conclusions and Closing Session

1.4.2 The Work Programme is at **Attachment B**.

2. WORKSHOP OBJECTIVES

2.1 The main objectives of the Workshop were to provide a forum for sharing the current and future developments related to GNSS with a focus on SBAS and GBAS implementation and GNSS vulnerability and mitigation measures.

3. Sessions of the Seminar

3.1 Thirteen (13) presentations were delivered during the six (6) Sessions of the Workshop. Sufficient time was allocated for discussion to identify the priority areas and examine possible partnerships that could be established.

3.2 The presentations are available on the ACAC and ICAO MID websites: www.acac.org.ma and www.icao.int/mid

4. CONCLUSIONS/RECOMMENDATIONS

4.1 The Workshop developed the following Conclusions/Recommendations:

- The Workshop was apprised of the Global and Regional Developments related to GNSS implementation, including the MID Region Air Navigation Strategy, the MID Region PBN Implementation Plan and the ACAC GNSS Strategy.
- The Workshop was apprised of EGNOS Status, roadmap and extension to EUROMED.
- It was noted that five (5) ACAC/EUROMED States have already officially notified their interest in EGNOS implementation (Algeria, Jordan, Lebanon, Libya, and Tunisia). The extension of the EGNOS coverage to the EUROMED States requires the deployment of three (3) additional RIMS.
- Interested States to use EGNOS Safety of Life (SoL) service need to initiate negotiation with the EC for the signature of an EGNOS International Agreement in parallel with the RIMS installation, and provision of technical assistance.
- EGNOS provision of SoL Service includes NPA, APV-I and LPV-200 service levels.
- The Workshop was apprised of the results of the study case carried out by Thales related to the implementation of an Autonomous SBAS system for the GCC States, Iraq and Yemen. The Workshop noted the outcomes of the CBA and the methodology used, as well as the recommendations from CBA related to the ANSPs and States.
- The Workshop noted the availability on the European side of a pool of industries, which can provide a complete range of support needed for the development of and operation of a turn-key SBAS system up-to service provision.

- The Workshop was apprised of the Programme management Office (JPO) activities related to GNSS, including the benefits analysis for SBAS implementation in East Africa. The Cost Benefit Analysis is foreseen as the next step to support the choice of the technical scenario.
- The Workshop noted the challenges faced by JPO related to the data collection from some States for the development of the CBA.
- The Workshop was apprised of the GAGAN developments and the possibility to extend services to the MID States. Interested states need to approach CAA INDIA for further coordination.
- The workshop noted that SARPs are available for GBAS CAT I. For CAT II/III the SARPs are under development.
- The Workshop was apprised of France experience related to GBAS implementation, including the outcomes of the Paris CDG GBAS Study, which was not very positive in terms of replacement of the current ILSs by GBAS, due mainly to low level of fleet equipage, lack of standards (for CAT II/III) and need to modify the ATC tools.
- GBAS implementation is currently not economical for small airports (1 RWY). The cost of 1 GBAS is around 1.5 to 2 M Euros per Station (# cost of 3 ILSs).
- The need for business case before any GBAS implementation, considering inter-alia, fleet equipage was underlined.
- It was noted that GBAS CAT I is being implemented in few parts of the world, however, overall GBAS CAT I deployment remains limited.
- The Workshop was apprised of the effects of solar radio bursts on GNSS operations by Prof. Sandro RADICELLA, Abdus Salam International Center for Theoretical Physics.
- As part of the GNSS vulnerability issues, Dr. Adlen LOUKIL, from Tunisia University made a presentation on Cybersecurity, safety and resilience, and the need of developing national Security policy against cyber threats including awareness and training programmes.
- States are encouraged to implement best practices related to GNSS Vulnerabilities mitigation measures, as per ICAO guidance material, including the coordination between CAA and Military Authorities related to GNSS interferences.
- The Workshop was apprised of and supported the MIDANPIRG outcome related to the reporting of GNSS Vulnerability incidents/ occurrences, including the development of a RASG-MID Safety Advisory (RSA) related to GNSS vulnerabilities and mitigations measures.
- The Workshop noted the IATA position with regard to SBAS implementation.
- The Workshop reiterated the ANC/12 Recommendations related to GNSS Vulnerabilities:
 - ✓ Recommendation 6/6 – Use of multiple constellations.
 - ✓ Recommendation 6/7 – Assistance to States in mitigating global navigation satellite system vulnerabilities.
 - ✓ Recommendation 6/8 – Planning for mitigation of global navigation satellite system (GNSS) vulnerabilities.
 - ✓ Recommendation 6/9 – Ionosphere and space weather information for future global navigation satellite system implementation.

- States are encouraged to embrace early benefits from Basic GNSS (ABAS) implementation (PBN RNP APCH operations).
- States to keep pace with GNSS global and regional developments, and explore all possible solutions to achieve the required performance objectives, in accordance with the GANP and regional priorities and plans.
- The regional and national GNSS implementation plans/strategies should be linked to the regional ASBU implementation Plans approved by the relevant PIRG.
- Airspace users should be involved in the planning of any GNSS implementation, in order to take into consideration operational needs and fleet capabilities.

5. CLOSING

5.1 In closing, Mr. Mohamed Rejeb, Air Navigation and Safety ACAC Expert and Mr. Mohamed Smaoui, Deputy Regional Director, ICAO Middle East Regional Office thanked the participants for their presence and expressed ACAC/ICAO MID gratitude to the States, EC and all the stakeholders from International Organizations/Industry for their valuable contributions and excellent support to the Workshop.

5.2 The participants recognized the usefulness of the event and expressed their thanks to ACAC/ICAO MID for organizing such a fruitful Workshop and underlined the importance of necessary follow-up actions on the Recommendations & Conclusions mentioned above, and the conduct of additional Joint ACAC/ICAO MID Workshops.



List of Participants
ACAC/ICAO GNSS WS
Golden Tulip Farah 7 and 8 November 2017

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**Joint ACAC/ICAO MID GNSS Workshop
Hotel Golden Tulip Farah
RABAT, MOROCCO, 7-8 November 2017
PROGRAMME OUTLINE**

Day 1: 7 November 2017

Registration		
08:30 – 09:00	Registrations to be completed by 09:00	
Opening and introductory session		
09:00 – 09:15	Welcome and opening remarks	Mr. Ibrahim Ahmed SHERIF (DG of ACAC)/ Mr. Mohamed Smaoui (DRD ICAO MID Office)
09:15 – 09:30	Setting Objectives of Workshop	Mr. Mohamed REJEB (ACAC Expert)
09:30 – 10:00	Group Photo & Coffee/Tea break	
Session 1	GNSS Global & Regional Developments	Moderator – Mohamed REJEB (ACAC)
10:00 – 10:45	ICAO Global and Regional Developments related to GNSS	Mr. Mohamed Smaoui, Deputy Regional Director, ICAO MID Office
10:45 – 11:00	ACAC Strategy Overview	Mr. Khalid AL MATRAFI - ACAC Chairman GNSS WG
Session 2	Regional SBAS: EGNOS and SBAS Initiative for GCC States, Iraq and Yemen	Moderator – Mohamed Rejeb (ACAC)
11:00 – 11:30	EGNOS status and Roadmap & EGNOS extension to EUROMED	Mr. Ugo CELESTINO - EC
11:30 – 12:00	EGNOS service provision	Mr. Jose-Maria LORENZO - ESSP
12:00 – 12:30	SBAS system for GCC, Iraq and Yemen	Mr. Frederic DUALE - Thales Alenia Space
12:30 – 13:00	SBAS system for GCC, Iraq and Yemen - Costs and benefits evaluation	Ms. Antonella DI FAZIO - Telespazio
13:00 – 14:00	Lunch	

Session 3	<i>SBAS Initiative in East Africa and GAGAN</i>	<i>Moderator – Mr. Benoit ROTURIER (Direction Générale de l'Aviation Civile France)</i>
14:00 – 14:30	Benefit analysis for a SBAS Eastern Africa Module	Mr. Semou DIOUF- EGNOS AFRICA JPO Mr. Daniel LUDWIG - DLC
14:30 – 15:30	GAGAN extension to the Gulf Region	Mr. RAMASUBRAMANIAN - ISRO
15:30 – 15:45	Coffee/Tea Break	
Session 4	<i>Panel Discussion</i>	<i>Moderator – Mr. Mohamed REJEB (ACAC)</i>
15:45 – 16:30	Discussion (questions & answers)	Panellists: ICAO-MID, EC, ESSP, Telespazio, ISRO, EGNOS AFRICA JPO, DLC, Thales Alenia Space
END of Day 1		

Day 2: 8 November 2017

Session 5		GBAS implementation	Moderator – Mohamed REJEB (ACAC)
09:00 – 09:45	Global and Regional Developments related to		Mr. Benoit ROTURIER - Direction Générale de l'Aviation Civile France
09:45 – 10:00	Discussion (questions & answers)		All
10:00 – 10:30	Coffee/Tea break		
Session 6		GNSS vulnerabilities and mitigation measures	Moderator – Mr. Mohamed REJEB (ACAC)
10:30 – 11:00	The effects of solar radio bursts on GNSS operations		Prof. Sandro RADICELLA - Abdus Salem International Center for Theoretical Physics
11:00 – 11:30	Cyber security, safety and resilience – Airline perspective		Dr. Adlen LOUKIL - Cyber security Expert
11:30 – 12:00	GNSS vulnerabilities, challenges for the implementation of SBAS in Africa		Mr. Moustapha BOUKARY MALAM, EGNOS AFRICA JPO Mr. Benoit ROTURIER - Direction Générale de l'Aviation Civile France
12:00 - 12:30	GNSS vulnerability including GPS signal interference		Mr. Jehad FAQIR - Deputy Regional Director - IATA Middle East & North
12:30 – 14:30	Lunch		
Session 7		Conclusions and Closing	Moderators – Mr. Mohamed REJEB (ACAC) Mr. Mohamed Smaoui (ICAO MID)
14:30 – 15:30	Conclusions and Recommendations		All
15:30 – 16:00	Closing Session		Mr. Mohamed REJEB (ACAC) Mr. Mohamed Smaoui (ICAO MID)
END of Workshop			

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