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ASSEMBLY — 41ST SESSION

TECHNICAL COMMISSION

Agenda Item 31: Aviation Safety and Air Navigation Standardization

GNSS RADIO FREQUENCY INTERFERENCE (RFI) AND ITS IMPACT ON THE IMPLEMENTATION OF SBAS IN AFRICA

(Presented by the African Civil Aviation Commission (AFCAC) on behalf of 54 African States[2])

EXECUTIVE SUMMARY

Global Navigation Satellite System (GNSS) is considered as a technical enabler supporting improved services that meet the objectives of GANP. GNSS supports positioning, navigation and timing (PNT) applications. GNSS is already the foundation of Performance-Based Navigation (PBN), Automatic Dependent Surveillance – Broadcast (ADS-B), Automatic Dependent Surveillance – Contract (ADS-C), and Satellite based augmentation systems (SBAS). Unfortunately, GNSS vulnerability has been identified as a major safety issue especially at across international borders, which requires further international cooperation.

Strategic Objectives:	This working paper relates to the Safety and Air Navigation Capacity and Efficiency Strategic Objectives.
Financial implications:	None.
References:	Annex 10 — *Aeronautical Telecommunications*, Volume I, — *Radio Navigation Aids* Doc 9849, *Global Navigation Satellite System (GNSS) Manual* Doc 9750, *Global Air Navigation Plan* Doc 8071, *Manual on Testing Radio Navigation Aids, Volume II — Testing of Satellite-based Radio Navigation Systems*

[1] English and French versions provided by AFCAC.

[2] Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cabo Verde, Central African Republic, Chad, Comoros, Cote d'Ivoire, Democratic Republic of the Congo, Republic of the Congo, Djibouti, Egypt, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Togo, Tunisia, Uganda, United Republic of Tanzania, Zambia, Zimbabwe.

1. INTRODUCTION

1.1 GNSS is a satellite-based navigation system utilizing satellite signals, for providing accurate and reliable position, navigation, and time services to airspace users. It provides location and time information anywhere on, or near, the earth in all weather conditions.

1.2 GNSS also provides a common time reference used to synchronize systems, avionics, communication networks and operations, and supports a wide range of non-aviation applications.

1.3 In aviation sector, GNSS is considered as the foundation of performance-based navigation (PBN), automatic dependent surveillance – broadcasting (ADS-B) and automatic dependent surveillance – contract (ADS-C).

2. DISCUSSION

2.1 GNSS is an important pillar of the Communications, Navigation, and Surveillance (CNS) systems that can support navigation applications in all phases of flight as well as surveillance application, such as ADS-B. Furthermore, GNSS can be used in safety nets and provides the time reference for synchronization in various ANS systems.

2.2 Augmentation Systems provide additional data to users of GNSS equipment to improve accuracy, integrity, availability, or any other improvement to positioning, navigation, and timing. A wide range of different augmentation systems have been developed.

2.3 Satellite based augmentation systems (SBAS) is considered as one of the GPS augmentation systems which is designed to augment the navigation system constellations by broadcasting additional signals from geostationary (GEO) satellites. It can reduce errors comes from ionospheric errors, satellite position/clock errors, etc.

2.4 Global Navigation Satellite System (GNSS) and its augmentations (SBAS) is a solution in reaching the objectives of the Performance Based Navigation (PBN). It can provide wide-area coverage navigation solutions to African civil aviation and air transport community with the potential to enable the Single African Air Transport Market (SAATM).

2.5 GNSS vulnerability, including intentional and unintentional signal interference, has been identified as a major safety issue as GNSS is embedded into numerous critical infrastructures. Especially the intentional interference presents significant threat to aircraft and passengers. Therefore, such interference needs to be monitored and its operational risk needs to be assessed.

2.6 Many NOTAMs have been issued and published to inform airlines about such interference. Additionally, ICAO and IATA ask states to resolve the GNSS interference issues.

2.7 During the Meeting of the Africa-Indian Ocean Planning and Implementation Regional Group (APIRG/22), Ghana, 29 July - 02 August 2019, it was resolved that continental cost-benefit analysis (CBA) on SBAS introduction in the region be conducted, with the overall objectives to assess the SBAS economic attractiveness for the continent.

2.8 Additionally, the GNSS interference can limit the benefits of using SBAS in Africa.

2.9 Unfortunately, some reports indicate that such interferences occur across international borders, which require international cooperation with ICAO and other international organizations, such as International Telecommunication Union (ITU), to resolve such issues.

3. CONCLUSION

3.1 One of the challenges of effectively implementing SBAS is the interferences in general and at across international borders in particular. Therefore, international cooperation with ICAO and other international organizations, such as International Telecommunication Union (ITU), is necessarily to resolve such issues.

4. RECOMMENDATION

4.1 The Assembly is invited to support the following recommendations:

a) Take note of the information mentioned in the information paper.

b) Urge ICAO to help states in resolving GNSS RFI issues with cooperation from relevant international organizations, such as International Telecommunication Union (ITU).

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