International Civil Aviation Organization

WORKING PAPER

A41-WP/208[1]
LE/12
2/8/22
Revision No. 1
16/9/22

ASSEMBLY — 41ST SESSION

LEGAL COMMISSION

Agenda Item 41: Work Programme of the Organization in the Legal Field

A PRACTICAL WAY FORWARD ON LEGAL AND INSTITUTIONAL ASPECTS OF COMMUNICATION, NAVIGATION AND SURVEILLANCE/ATM (CNS/ATM) SYSTEMS

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

REVISION NO. 1

EXECUTIVE SUMMARY

This document presents aspects of the Global Navigation Satellite System (GNSS) that require additional legal frameworks/ instruments to guide:

a) the operational services; and

b) the introduction of more satellites within the GNSS constellation.

GNSS is a constellation of satellites providing signals from space, by transmitting positioning and timing data to terrestrial GNSS receivers. The receivers then use this data to triangulate aircraft location. GNSS is used widely across the globe for both en-route, and approach phases of flights. Over the years GNSS has been accurately providing critical form of flight navigation at most major airports.

Action: The Assembly is invited to:

a) note the information in this Working Paper, and

b) direct the ICAO Council to prioritize and develop a legal framework /instrument to address aspects of GNSS operations in support of the Global ATM System.

Strategic Objectives:	Air Navigation Capacity and Efficiency.
Financial implications:	The financial implications may be for the administrative work that will be required by the Legal Commission in further research and the formulation of the frameworks as best decided.
References:	Doc 9849, *ICAO Global Navigation Satellite System (GNSS) Manual* Annex 10, *Aeronautical Telecommunications, Volume I — Radio Navigation Aids*

[1] English and French provided by African Civil Aviation Commission.

[2] Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cabo Verde, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Democratic 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, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Togo, Tunisia, Uganda, United Republic of Tanzania, Zambia and Zimbabwe.

1. INTRODUCTION

1.1 In 1994 and 1996 respectively two ICAO Member States offered the GPS Standard Positioning Service (SPS) and the Global Navigation Satellite System (GLONASS) to support the needs of international civil aviation, enabling worldwide civil space-based Positioning, Navigation, and Timing (PNT) services (to include GPS SPS augmentations), and to provide open, free access to information necessary to develop and build equipment to use these services." The ICAO Council accepted both offers endorsed the development and use of GNSS as a primary source of future navigation for civil aviation.

2. REQUIREMENTS OF CONTRACTING STATES

2.1 The Global Navigation Satellite System (GNSS) is defined in Annex 10 — Aeronautical Telecommunications as a worldwide position and time determination system that includes one or more satellite constellations, aircraft receivers and system integrity monitoring, augmented as necessary to support the Required Navigation Performance (RNP) for the intended operation.

2.2 GNSS enables Performance Based Navigation (PBN) and provides navigation guidance for all phases of flight, from en-route through to precision approach. By providing position information, GNSS enables Automatic Dependent Surveillance–Broadcast (ADS-B), Automatic Dependent Surveillance–Contract (ADS-C), moving map displays, Terrain Awareness and Warning Systems (TAWS) and synthetic vision systems.

2.3 Due to the increased application of GNSS as a primary means of navigation support during all phases of flight, it is important to ensure the safety, availability, and continuity of GNSS. As per ICAO Annex 10, the State is required to provide GNSS monitoring, equivalent to conventional terrestrial based navigational aids.

2.4 GNSS monitoring, as defined in ICAO Doc 9849 - Global Navigation Satellite System (GNSS) Manual, consists of 4 functions:

a) GNSS performance assessment
b) GNSS operational status monitoring
c) GNSS data recording
d) GNSS interference monitoring.

2.5 Each of these functions serves a specific role.

a) The availability, integrity, accuracy, and continuity of the GNSS signal may have different meanings to the constellation service providers, which therefore need to be considered when identifying parameters to be used in performance assessment of GNSS.
b) States are required to build the technology (Augmentation Systems GBAS/SBAS) for GNSS monitoring and report to the user about restrictions/limitations.

3. LEGAL ASPECTS TO CONSIDER REGARDING THE GLOBAL SATELLITE SYSTEMS AND SERVICES SUPPORTING INTERNATIONAL AIR NAVIGATION SERVICES.

3.1 States do not have control over the GNSS network, it becomes very difficult to define what level of monitoring or any of the components within ICAO Annex 10 is required to ensure the safety of the ATM system in support of all phases of flight. It is therefore prudent that there be clear regulations on the requirements as set out in Doc 9849 to provide uniformity within Member States with the required monitoring.

3.2 The emergence of other satellites for the use of air navigation was addressed in the12th Air Navigation Conference (Recommendation 6/5); Air Navigation Commission (191-9) wherein it was recognised that "*the gradual introduction of next generation GNSS elements and their combined use need to be supported by appropriate ICAO provisions and associated operational considerations"*. There is a need to enhance the legal framework to deal with the technical and operational issues associated with the use of multiple satellites, current GNSS with the new (BeiDou Navigation Satellite System (BDS) and Galileo), and the implications thereof to Member States.

3.3 Regulations will also have to be developed to address the probability of private ownership of the satellites systems supporting international air navigation in terms of implications to Member States.

4. CONCLUSION

4.1 GNSS has resulted in substantial safety, efficiency and capacity benefits and is a main component of various essential communication, navigation, and surveillance (CNS) and flight safety/control. It is therefore imperative that aspects of GNSS operations be supported by substantial and comprehensive legal frameworks and instruments in support of the Global ATM System.

— END —