



International Civil Aviation Organization

CAR/SAM REGIONAL PLANNING IMPLEMENTATION GROUP (GREPECAS)

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Agenda Item 2: Navigation systems developments

GNSS IMPLEMENTATION IN THE CAR/SAM REGIONS

(Presented by Spain)

SUMMARY

In this note, it is indicated the possibilities and advantages to implement GNSS systems in the CAR/SAM Regions

1. Introduction

1.1 The CAR/SAM Regions, due to its geographical characteristics, with wide isolated areas, mountainous zones, maritime areas and airport dispersion, constitute an excellent example of suitability to implement GNSS systems for air navigation in the different phases of flight, having for this purpose, to interrelate the different possibilities of augmentation, that is to say, in addition to the base systems (GPS), will use augmentation systems, like SBAS and GBAS

1.2 This becomes even more clear if we have in mind the difficulty of implantation, maintenance and update of the necessary network of ground navaids, for all that the extension of the territories demands a numerous number of stations (NDB, VOR, DME), which sometimes are very difficult to install and maintain (zones of high mountain, forest), and even of planning its suitable position.

1.3 In the other hand, the modernisation of commercial flits of aircraft, jointly with the corporative fleets, makes that the avionics are prepare for the new systems, and in the case of light aircrafts or old ones, the availability of low cost avionics, that integrate conventional systems with the new GNSS (like for example Garmin 480), allow a rapid adaptation the new needs.

2. Advantages of the GNSS

2.1 The GNSS transition plans, are being perform all over the world under different criteria, but all of them are based in the fact than moderns aircrafts used it as primary means of navigation jointly with others elements, basically the INS and DNE/DME navigation.

2.2 In a typical flight analysis, the main advantages to implement GNSS affect all phases of flight,

- Departure, where the procedures can be optimized due to the flexibility in the design.
- Route, where to have a high accurate system and with high integrity will allow to unsure it.
- Descend, where the design of continuous descent procedures will allow saving a significant quantity of fuel.
- TMA, where it is possible to achieve an increase of the capacity of the air space.
- Approach and landing, where the APV procedures implementation will increase security and safety, in addition to make possible to increase the number of operations in airports where it is not possible to implement an ILS, or where the meteorological conditions demand to apply restrictions due to lack of guidance. If the new definition from CAT I goes away for SBAS systems, it is clear the added value that this will imply. With the GBAS implementation, CAT II and III will be achieved.

2.3 Also, the flexibility that it is possible to obtain in the air space, redounds to other aspects such as those of type,

- Ecological, due to it is possible to avoid protected areas or thus where the noise impact will affect to populated areas.
- Economical, due to it is possible to reduce flight time in some procedures.
- Safety, due to GNSS systems can improve it in the operations, mainly on those based on navigational aids that are difficult to maintain or deploy.
- Cost optimization, due to the implementation of guaranteed SoL systems will impact in a renegotiation of insurance policies by the airlines companies.

3. GNSS Implementation

3.1 The GNSS implementation in a region, will have to be subject to the ICAO recommendations and the needs of the air space, as well as the situation of the NAVAIDS, especially having in mind the need of repositioning of it, implantation of new ones and the costs or difficulty of maintenance.

3.2 Furthermore, the considerations to be taken into account before the decision to implement a concrete augmentation, it is different based on the functionality of such augmentation, so, SBAS is a regional decision that will affect to several States and will require a high investment that just can be assumed from the multistate optics and multimodal applications, although it is true that, compared with the global cost of navigational aids as VOR and NDB, this cost can be well-taken. If on the contrary, we refer to GBAS systems, its implantation is of local character, and in consequence it is a decision at airport level and it will be based on the services of approach (CAT I, the II or III) and the traffic that they move. It is necessary to emphasize that, in case of CAT I or Superior, it is necessary to consider the cost of the approaching lights and runways inside the investing local plan of an airport.

3.3 For all this, the implantation of procedures based on GNSS, as well as systems like SBAS and GBAS, will have to be based on financial and cost / benefit analyses, that allow to establish the temporary rule for his implantation, quite on the base of a common plan of the regions CAR/AM, due to are decisions that will affect to both regions.

3.4 The decision making process on this matter, has to be realized from a perspective of common approach, where the political aspects acquire a vital importance, mainly taking into account that the commitments of the States hosting facilities must be solid, especially from the point of view of the legal Responsibilities associated with the installation of a certain element in a concrete State.

4. Implementation Phases

4.1 Once the decision to implement the system has been taken, it is clear that it is not possible to implement it in a complete way, but it is necessary to act based on phases that will be an evolution of one on the other one. This is what is defined as the implantation of a prototype that will evolve towards the definitive system.

4.2 It is clear, that the current SBAS systems (WAAS and EGNOS), cannot be settled per se in the CAR/SAM regions, due to it will be necessary to include modifications in the lines of process and computation to adapt them to the special circumstances that meet in the above mentioned regions, especially from the ionosphere point of view. This is the reason way it will be necessary to identify a region, complete one or split between Caribbean and South America (more expensive and complex option) for the installation of the prototype and from this one; all the system will be extended based on the installation of new stations.

4.3 In implantation for phases, it is necessary to study the air space and the category of the different airports. It is necessary to have in mind that SACCSA would give services LPV I (at present in analysis made by the FAA they are trying to demonstrate it is possible to adapt this category to CAT I), which will allow safety operations in all the airports, but in those who are going to operate in CAT I, the II or III, will be necessary to support the ILS and later the GBAS. This makes that will be necessary to include operational aspects in the definitions of operations with SBAS, due to the impact of a reduction of the services performances for local effects (like ionosphere one) could be reduced using local stations where necessary, implying in the rest of the airfields a reduction of the type of operation up to the recovery of the nominal services levels

4.4 Due to it, the analysis of GNSS implementation must take into account the concept at global level and not to focus in every one of its elements separately (GPS, GBAS, SBAS, ABAS, etc). To it, it will be necessary to add the study of the operations with the above mentioned system and the actions to take before possible reductions of the service.

5. Conclusion

5.1 The Meeting is invited to take note of the indicated in this WP.