International Civil Aviation Organization

SEVENTEENTH MEETING OF THE COMMUNICATIONS/NAVIGATION/SURVEILLANCE SUB-GROUP (CNS SG/17) OF APANPIRG

Bangkok, Thailand, 13 – 17 May 2013

Agenda Item 6: Navigation

6.5) review Navigation Strategy

CHARACTERISTICS OF AN ALTERNATIVE POSITION, NAVIGATION AND TIMING FOR THE ASIA/PACIFIC REGION

(Presented by Australia)

SUMMARY

This paper invites the meeting to consider the need for an alternative position, navigation and timing system for the Asia/Pacific Region as part of a global implementation and for the meeting to develop a functional requirement statement for such as service.

1. Introduction

1.1 Aeronautical navigation services are transitioning from terrestrial conventional navigation aids to global navigation satellite services (GNSS). At the 12th Air Navigation Conference (Montreal, November 2012) the vulnerabilities GNSS were discussed and the conference was informed that several States have identified the need for an alternative position, navigation and timing (APNT) strategy. The goal of these strategies is maintaining air navigation services to the maximum extent possible in the event of a GNSS signal outage, by taking advantage of current systems, and defining a realistic evolution path. The minimum capability is to provide navigation sufficient to recover an aircraft in flight to an appropriate aerodrome with enhance capability to be able to maintain contingency air services. The economic consequence of restriction on commencement of flight whilst GNSS is not available can be evaluated separately.

1.2 ANConf-12 Recommendation 6/7 in part calls on ICAO to assess the need for, and feasibility of, an alternative position, navigation and timing system.

2. Discussion

2.1 The Navigation System Panel (NSP) has discussed a variety of solutions for an APNT services. These have included;

(a) Retaining a network of conventional navigation aids at suitably located aerodromes to provide navigation for terminal area, approach and landing guidance. Conventional navaids include VOR, DME, and ILS. Some discussions have also included NDB;

(b) Development of additional networks of DME strategically position to support DME-DME RNAV;

(c) Aircraft capability contained on the aircraft such inertial navigation system; and

(d) Development of alternative system such as:
i. eLORAN
ii. LOCATA *[NSP-WGW10/WP3*]
iii. SSR Mode N [*NSP Mar13 WGW/WP 11]*
iv. LDACS (L-band digital aeronautical communication system) [*NSP Dec 11 WGW /IP10]*

The NSP not yet made any recommendations.

2.2 An APNT must achieve safety, accessibility and financial viability. Non-satellite system require extensive ground infrastructure, services are generally limited by line-of-sight propagation, may involve extensive inter-site communications and may required coverage of multiple ground site in appropriate geometry.

2.3 Existing and future aircraft equipage should also be considered when selecting an alternative APNT system. Points of note are:

(a) modern jet transport aircraft include inertial sensors in their navigation system sufficient for RNP-10 for some hours; sufficient for enroute and oceanic navigation hence APNT may only be required for terminal and approach navigation/surveillance;

(b) larger aircraft carry the bulk of paying passengers and freight and hence have the greatest economic implications; for some States supporting commencement of new flight by large jet aircraft only during GNSS outage may be an economically suitable solution; and

(c) safety and larger jet transport aircraft operate worldwide not just in an ICAO region; hence across regional navigation needs to be considered.

2.4 For the Asia/Pacific Region DME-DME solutions have been discounted in considerations by the CNS/MET SG of APANPIRG. Like DME-DME the alternative systems considered will be costly and difficult to implement due to availability of land verses the large ocean areas within the region.

2.5 Is there a real need for an APNT if the region is serviced by core constellations of GPS, GLONASS, Galileo and BeiDou and augmentations of MSAS, GAGAN, WAAS and EGNOS? Agenda Item 6 of ANConf-12 discussed the vulnerability of GNSS and further information is available in the recently published Global Navigation Satellite System (GNSS) Manual (Doc 9849 2nd Ed 2013).

2.6 The global adoption of an APNT based on requirements of other regions can impose unnecessary cost on the States within this region and not provide the functionality required to maintain operations.

3. Action by the Meeting

3.1 The meeting is invited to:

(a) discuss the need for an alternative position, navigation and timing system for the Asia/Pacific Region,

(b) assess the short, medium and long term risk of loss of GNSS from all causes in terms of safety, reliability, regularity and cost, and

(c) develop a functional requirements statement for an APNT to suit the Asia/Pacific Region.

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