



TWELFTH AIR NAVIGATION CONFERENCE

Montréal, 19 to 30 November 2012

Agenda Item 1: Strategic issues that address the challenge of integration, interoperability and harmonization of systems in support of the concept of “One Sky” for international civil aviation

1.1: Global Air Navigation Plan (GANP) – framework for global planning

b) Communications roadmap

c) Navigation roadmap

RATIONALIZATION OF RADIO SYSTEMS

(Presented by the International Coordinating Council of Aerospace Industries Associations)*

SUMMARY

For many years, in the field of communication, navigation and surveillance (CNS) functions aircraft have been required to carry multiple kinds and redundant radio systems in order to be compliant with safety and equipment certification regulations. In spite of the emergence of new and more spectrally efficient CNS systems, legacy systems are still required in some areas. This paper discusses the need to rationalize radio systems at aircraft level.

Action: The Conference is invited to agree to the recommendations in paragraph 3.

1. BACKGROUND

1.1 Aircraft manufacturers are continuously seeking to reduce the weight of aircraft in order to make them more fuel efficient, environmentally friendly, and require less maintenance, in order to save costs and help the environment. In this spirit, different tracks are considered like advanced materials, improved aerodynamics, wireless networks and among those tracks; the reduction of amount of radio equipment on board aircraft is identified as an interesting one.

2. DISCUSSION

2.1 In order to comply with the international, regional and national regulations, aircraft have been required to carry and utilize on-board a certain amount of radio equipment for communication, navigation and surveillance (CNS) functions.

*The following organizations support ICCAIA's conclusions and recommendations as expressed herein: European Organization for Civil Aviation Equipment (EUROCAE), International Air Transport Association (IATA), International Federal of Air Traffic Control Associations (IFATCA), RTCA, Inc., and SAE International.

2.2 The development of new systems dealing with safety, precision, voice quality, bandwidth, communication costs reduction, and spectrum congestion items have been noticed by International Coordinating Council of Aerospace Industries Associations (ICCAIA) member companies, while systems like ADF continue to be required in some countries in spite of new global navigation satellite system (GNSS) systems deployment (GPS, Galileo, GLONASS).

2.3 It is becoming increasingly difficult to find appropriate locations for additional power, cooling, cabling and antennas for new systems while maintaining legacy systems and ensuring non-interference between all systems.

2.4 Current modern aircraft are equipped with more than 30 antennas to provide the three basic CNS functions linked to the aircraft control domain in the field of safety-of-flight. The next aircraft generation will have to comply with SESAR and NextGen future mandates which will require additional on-board systems to cope with traffic increase while still providing safety in dense areas and supporting a safe air traffic management system. While recent technologies based on new digital signal processors (DSPs), micro electro mechanical systems (MEMs) and utilizing software defined radio (SDR) can offer a better integration and box size reduction through multiple systems providing the same or similar functionality, the aircraft fuselage is still limited to host the new radio systems.

2.5 The aeronautical community should begin to consider rationalizing radio systems at the aircraft and ATM level. New technologies and associated systems will offer opportunities with better performances in term of redundancy, aircraft failure hazard analysis, and aircraft dispatch. However, we must also consider decommissioning older systems like ADF, VOR, and potentially HF.

2.6 An example is HF. The function that HF communications provide can be replaced by satellite communications which are smaller, cheaper and offer better voice quality. In addition, the HF antenna is complex, heavy and HF communications are highly dependent of propagation conditions (ionosphere layer /solar eruptions).

2.7 Removal of such equipment will reduce weight, drag, costs and CO2 emissions, allow MEL-MMEL relief considerations and will offer frequency spectrum reuse.

2.8 According to some discussions held in different forums within ICAO, and IATA bodies, some scenarios could be defined in order to adapt the number of required radio systems according to specific criteria, these scenarios could be defined as short-, mid- and long-term.

2.9 Because many levels of safety and regulatory bodies and agencies will be involved, the process is anticipated to be a long one. In addition, implementation of decisions will take a significant amount of time. For example, ground station decommissioning can be considered an important contributor of cost reduction at the national level for some countries, so the proposal is to begin the activities proposed in paragraph 3 as soon as possible in order to obtain the benefits from it.

2.10 ICAO Global Air Navigation Capacity & Efficiency Plan - 2013–2028 could be one umbrella to be used to cover this activity according to technology roadmap and block timeframes.

3. CONCLUSION

3.1 This Twelfth Air Navigation Conference has to be taken as a possible opportunity to develop a roadmap for CNS equipage transitions, the removal of unjustified redundant systems and to demonstrate that new systems are spectrally efficient, to support the aeronautical air traffic management strategy.

3.2 Considering all of the interested parties involved, the time to begin this effort is now.

3.3 The Conference is invited to:

Request ICAO, IATA, regulators, regional and country airworthiness entities, and other involved parties to explore possible ways to accelerate the decommissioning of some navigation aid ground station (beacons) and to identify scenarios to allow the rationalization of the on-board communications, navigation and surveillance systems.

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