



WORKING PAPER

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

AERONAUTICAL RADIO FREQUENCY SPECTRUM NEEDS

(Presented by the Civil Air Navigation Services Organisation)

SUMMARY

ATM modernization programs will determine, inter alia, necessary systems, procedures and technologies in aircraft and on the ground required to provide operational performance improvements. A prerequisite for the successful deployment of such systems, procedures and technologies is the availability of adequate radio spectrum. For this the communication, navigation and surveillance (CNS) technology roadmaps which are developed to provide guidance to all stakeholders in making their investment decisions for CNS equipment, need to provide conclusively substantiated information necessary for the development of quantified and qualified statements of requirement for radio frequency spectrum.

Action: The Conference is invited to agree on the recommendation contained in paragraph 4.

1. BACKGROUND

1.1 The increasing use of radio-based technologies, together with the tremendous opportunities that these technologies provide, has opened the door to a variety of market applications such as mobile communications and broadband wireless access. These developments in particular for non-aeronautical users have generated greater interest and a significant increase in demand for the finite natural radio frequency spectrum resource. However, use of this resource is limited by technology and spectrum management capability.

1.2 Aeronautical services are prime users of radio frequencies without which aircraft operations would not be capable of meeting the global demand for safe, efficient and cost-effective air transport. In addition, global interoperability necessitates the use of standardised systems and consistent frequency resources, and equipment timescales preclude rapid transitions as new technologies develop.

¹Arabic, Chinese, English, French, Spanish and Russian versions provided by CANSO.

2. REGULATION OF RADIO SPECTRUM

2.1 A prime area for aviation concerns the regulation and use of the radio frequency spectrum for which the International Telecommunication Union (ITU), a specialized agency of the United Nations, has recognition and authority as the international body for telecommunications. The radio regulations are the instrument through which this specialization is expressed in internationally agreed terms for radio matters. These Radio Regulations have international treaty status and lay down the agreed apportionment of the radio frequency spectrum to the various aeronautical and non-aeronautical radio frequency spectrum users. These regulations, including the apportionment of bands to the different users, are reviewed every three to four years by a World Radiocommunication Conference (WRC) and existing allocations may be changed or removed if that is the consensus view.

2.2 Within ITU Member States, the telecommunication authorities normally control and operate the mechanism which develops proposals for amendments of the radio regulations and associated guidance material. Aeronautical stakeholders with their primary focus on safety are part of the process, but have in many cases to compete with other non-aeronautical spectrum users.

3. DISCUSSION

3.1 This conference has been invited to endorse, inter alia, communication, navigation and surveillance (CNS) roadmaps that reflect short, medium and long-term planning horizons in terms of systems, procedures and technologies expected to be available to aeronautical users. A prerequisite for the deployment of those systems and technologies is the availability of adequate radio spectrum.

3.2 Hence the CNS roadmaps must be associated with a radio spectrum strategy in support of which aviation stakeholders must develop and present, as necessary, its agreed policies and its quantified and qualified statements of requirement for radio frequency spectrum so as to ensure the continuing availability of adequate radio spectrum and, ultimately, the ongoing viability of air navigation services throughout the world.

3.3 The transition of legacy systems to future systems and technologies in line with the ASBU CNS roadmaps requires careful consideration. Of particular concern is the parallel operation of legacy and new systems during transition with an increasing demand of spectrum while its supply is limited, and new assignments for new services thus become difficult.

3.4 An aeronautical radio spectrum strategy should address measures to:

- a) maintain continued access to adequately protected radio spectrum for operation of legacy systems;
- b) provide access to adequately protected radio spectrum to expand legacy systems, when required;
- c) provide access to adequately protected radio spectrum for the deployment of future systems in line with the ASBU CNS roadmaps;
- d) recognize the special protection requirements of aeronautical safety services from harmful interference;
- e) ensure efficient spectrum management and use, both from the initial concepts and design of future CNS systems and when considering enhancements to legacy systems;

- f) allow for a proper transition of legacy systems to future systems and technologies including a potentially cumulated demand for protected radio spectrum during the transition phase; and
- g) make sufficient resources available to enable increased direct participation to influence spectrum management activities.

3.5 Past experience has shown that the identification of spectrum requirements for CNS systems is not trivial. Similar activities failed many times for very different reasons. A typical example is the identification of spectrum demand for precision approach and landing operations. For this type of operation ICAO had standardized the microwave landing system (MLS) intended to replace the instrument landing system (ILS). In the meantime as a result of the advances and associated expectations in satellite navigation such replacement was mainly put on hold. ICAO is still in the process of studying the capabilities of satellite navigation down to low visibility Category II and III operations. Until these studies have confirmed the strategy to move ahead with such technology and appropriate standards are available, the spectrum demand for such low visibility operations cannot be clearly identified and appropriately represented in international fora. Similar examples exist in the communications domain and to a lesser extend in the surveillance domain.

3.6 Increasing pressure on the spectrum has led to an increased sharing of frequency bands. Of particular concern to aviation is the addition of non-aeronautical services to previously exclusive aeronautical bands. Such moves are raising concerns when applied to aeronautical spectrum in particular regarding the associated safety impact under abnormal conditions (i.e. when the non-aeronautical service does not comply with the pre-agreed sharing criteria due to failure). In addition, sharing a frequency band between two radio services normally places constraints on any future expansion and implementation of both services.

3.7 As a result of spectrum shortage, some ITU Member States and their telecommunication administrations are starting to consider, and in some cases apply, economic spectrum management tools, such as spectrum pricing. This is seen by them as a tool to address spectrum shortage in a world of rapidly developing telecommunication markets and technology. Due to the inherent global nature of international aviation, aeronautical frequency bands are generally global allocations, and as such quite attractive to other radio communications-based industries that have similar requirements or aspirations for globally harmonized spectrum use.

4. CONCLUSION

4.1 The ASBU methodology and the associated roadmaps need to be supported by conclusively substantiated information in terms of quantified and qualified statements of requirement for radio frequency spectrum and how they can be effectively met and protected over the block upgrades.

Recommendation 1/x – Aeronautical radio frequency spectrum needs

That ICAO, its Member States and their operational stakeholders:

- a) recognize that a prerequisite for the deployment of systems and technologies in accordance with the aviation system block upgrade communications, navigation, and surveillance roadmaps is the availability of adequate radio spectrum;
- b) develop scenarios for the transition from legacy systems to new systems as contained in the communications, navigation, and surveillance roadmaps taking into account the radio spectrum shortage;

- c) develop quantified and qualified statements of radio frequency spectrum requirements for the continued operation of legacy systems and the deployment of future systems in line with the aviation system block upgrade communications, navigation, and surveillance roadmaps;
- d) address spectrum sharing issues including radio regulatory, operational and technical aspects relevant for the deployment of future systems in line with the aviation system block upgrade communications, navigation, and surveillance roadmaps; and
- e) consider this strategy and provide the necessary resource to participate in and influence global spectrum management activities.

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