International Civil Aviation Organization

WORKING PAPER

A37-WP/192
TE/107
English only
21/9/10

ASSEMBLY — 37TH SESSION

TECHNICAL COMMISSION

Agenda Item 41: Support of the ICAO policy on radio frequency spectrum matters

REQUIREMENT FOR A LONG-TERM RADIO FREQUENCY SPECTRUM STRATEGY

(Presented by Belgium, on behalf of the European Union and its Member States,[1] by the other States Members of the European Civil Aviation Conference[2] and by EUROCONTROL)

EXECUTIVE SUMMARY

This paper addresses the need for a cohesive strategic approach to spectrum planning of aeronautical systems that support critical safety and operational requirements as well as a roadmap for the transition from the current situation to the future system. It identifies the potential benefits that could result from such an approach and is complementary to A37-WP/35 (Revised) submitted by the Council of ICAO.

Action: Taking due account of the new concepts and related systems that will be developed, evaluated and validated through SESAR, NextGen and any other regional programme, the Assembly is invited to:

a) task ICAO with the identification of the global CNS concepts and systems that will be required to support future global aircraft operations;
b) task ICAO with the determination of a spectrum strategy based on, and consistent with, the required global CNS systems and a roadmap for the transition from the current situation to the future system (including use of existing aeronautical frequency bands for new systems);
c) establish a timeframe within which technology transitions should take place and redundant systems removed; and
d) include an agenda item on the 2012 Air Navigation Conference with a view to reporting on these activities.

Strategic Objectives:	This working paper relates to Strategic Objectives A, D and E on safety, efficiency and continuity and supporting implementation strategy.
Financial implications:	Nil
References:	Nil

[1] Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom.

[2] Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Croatia, Georgia, Iceland, Monaco, Montenegro, Norway, Republic of Moldova, San Marino, Serbia, Switzerland, The former Yugoslav Republic of Macedonia, Turkey and Ukraine.

1. INTRODUCTION

1.1 The provision of radio frequency spectrum for communication, navigation and surveillance (CNS) systems is a fundamental requirement for aviation. As the aviation industry has developed so has there been a demand for new CNS systems in order to support traffic growth whilst improving safety standards. These systems require radio frequency spectrum that is allocated on a worldwide basis through the International Telecommunications Union and recorded in the Radio Regulations[3]. However, aviation is not the only industry requiring or seeking radio frequency spectrum and as these other industries have developed so has the demand for spectrum increased to the point where there is now competition for spectrum access. This has lead to increased sharing of spectrum by multiple users or un-used spectrum being reassigned.

1.2 Aviation has developed at varying rates throughout the world and hence the demand for and implementation of new CNS systems has also varied according to the State or region. However, aircraft are now capable of flying ever greater distances and have to be equipped with all the different types of CNS systems that will be encountered or needed during the flight. Through its various technical and operational panels, ICAO has over the years standardized new systems but these systems have not necessarily been implemented globally, although the most modern among them are more spectrum efficient than some belonging to previous generations. This has resulted in aircraft being equipped with both the new and the old systems that could, through harmonized transitions, be rationalized, thereby reducing aircraft equipage.

1.3 It is the view of Europe that the aviation industry needs to demonstrate that its spectrum requirements are minimized and managed efficiently.

2. DISCUSSION

2.1 The development of new ATM concepts, their evaluation and validation through SESAR and NextGen and any other regional programme will determine the CNS systems required for the future and should shape the long-term radio frequency spectrum strategy. Assuming that the ATM concepts are developed in such a way that the aim is to integrate functions, make more efficient use of spectrum and rationalize the equipment needed then the spectral requirement can be optimized. SESAR and NextGen will actively support initiatives to increase aeronautical spectrum efficiency. In the following step, ICAO in consultation with States, needs to decide which CNS systems will be required globally in the future, taking into account regional requirements and the need for justifiable redundancy to ensure the integrity and sustainability of the overall CNS system. Of course it is highly desirable that new systems (e.g. data links) could operate in existing aeronautical frequency bands.

2.2 Based on the future global CNS systems, a long-term radio frequency spectrum strategy should be developed that includes the migration path from the current to the future situation and takes into account that the use of spectrum may need to change. To support this strategy it will probably be necessary for ICAO to mandate changes, including the removal of obsolete equipment.

[3] The Radio Regulations are an intergovernmental treaty text of the International Telecommunications Union (a United Nations Agency) that defines how internationally, spectrum can be used by different radio services which can only be amended by a World Radiocommunications Conference.

2.3 The rationale for developing such an approach is as follows.

2.4 **Spectrum:** Aviation needs to demonstrate that the radio frequency spectrum allocated to aeronautical services is necessary and is being managed efficiently: a claim that cannot be made for some of the systems in operation today whose origins can be traced back at least fifty years. If aviation has a clear logical argument for spectrum usage, then access to that spectrum should not be challenged. Furthermore, once a certain portion of spectrum has been allocated by ITU to civil aviation, the management of frequency channels inside said portion, should be optimized, where possible, on a regional scale, e.g. through continental network management functions. In this respect, one of the goals of the future European Network Management Regulation is to achieve better coordination between European States to optimize the use of available aviation frequencies.

2.5 **Aircraft design:** A modern airliner has approximately forty communication systems, including backups, to cover the communication, navigation and surveillance functions. Integrating these systems on an airframe, especially as some of the systems operate in the same frequency band, has become one of the hardest tasks for avionics/airframe designers, especially as the number of standardized systems continues to grow. Whilst minimizing the number of frequency bands will minimize the number of antennas and increase spectral efficiency, fitting multiple systems in a single band could bring integration and frequency planning issues. Therefore a rationalization of the number of systems onboard an aircraft is necessary, thus making the task of systems integration far easier while increasing spectrum efficiency. Additionally, this would assist, where appropriate, in ensuring compatibility with authorized military applications operating in aeronautical frequency bands. This applies also to unmanned aircraft system (UAS) which, in addition, also need a “command and control” link. To that end, a strategy is needed for the long term to deliver a global solution.

2.6 **Costs:** Fitting a piece of equipment to an aircraft has a number of cost elements associated with it. Initially there is normally a significant cost for procurement and installation and thereafter there are life cycle operating, maintenance and associated training costs. However, there is also a price to pay in terms of fuel to carry the equipment. In addition to the cost of fuel there is also the CO_2 emissions generated to consider. If the number of CNS systems fitted to an aircraft could be reduced further, then the cost savings and environmental benefits would be greater.

2.7 This paper is intended to support and strengthen the ICAO position in radio regulatory activities, as outlined in the Council’s paper A37-WP/35 (Revised). The success of future negotiations to access and protect spectrum at world radiocommunication conferences would be significantly improved if the ICAO position can demonstrate clearly that the spectrum required is necessary and used as efficiently as practicable. ICAO should develop this demonstration through the expertise of the panels of the Air Navigation Commission and relevant study groups which will have to take into account the outputs of SESAR, NextGen and any other regional programme, and the necessary transition period to switch between existing and future equipment before any spectrum release.

3. CONCLUSION

3.1 Aviation, through ICAO, needs to have a clear understanding of what CNS systems will be required globally in the future to meet the CNS needs of aviation taking into due account new concepts developed, evaluated and validated through SESAR, NextGen and any other regional programme. It must develop a clear strategy for reaching that goal and demonstrate that systems required for the future are both required and spectrally efficient. Based on this information, a spectrum strategy can be developed

that provides a logical and valid argument for access to and protection of the required spectrum. Additionally aviation should benefit from a reduction in the number of CNS systems required thus providing cost and environmental benefits for both airlines and service providers. Such an approach should cover the period that will allow consideration of the new concepts that can be incorporated into new aircraft designs and hence are not limited by current aircraft design.

3.2 If ICAO takes such a cohesive strategic approach that ensures efficient spectrum use to support safety and operational requirements, then this should minimize obsolescence and demonstrate spectral efficiency and cost and environmental benefits. As a result, aviation will be in a stronger position relative to other industries to maintain or argue for appropriate spectrum access.

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