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ELEVENTH AIR NAVIGATION CONFERENCE

Montreal, 22 September to 3 October 2003

Agenda Item 7 : Aeronautical air-ground and air-to-air communications

TOWARDS A FUTURE COMMUNICATIONS CONCEPT

(Presented by the European Organisation for the Safety of Air Navigation — EUROCONTROL, on behalf of its Member States and those of ECAC[2])

SUMMARY

Air traffic management (ATM) development depends upon there being sufficient communications capacity, both voice and data. It is unlikely that current communications systems will be able to support such development in the foreseeable future.

Therefore urgent global action needs to be taken to define, develop and implement a new communications system for aviation. This paper addresses the key attributes for such a system.

Suggested action by the conference is in paragraph 6.

[1] English, French, Russian and Spanish versions provided by EUROCONTROL.

[2] The ECAC Member States are: **Albania**, Armenia, **Austria**, Azerbaijan, **Belgium**, Bosnia and Herzegovina, **Bulgaria**, **Croatia**, **Cyprus**, **the Czech Republic**, **Denmark**, Estonia, **Finland**, **France**, **Germany**, **Greece**, **Hungary**, Iceland, **Ireland**, **Italy**, Latvia, Lithuania, **Luxembourg**, **Malta**, **Moldova**, **Monaco**, **the Netherlands**, **Norway**, Poland, **Portugal**, **Romania**, Serbia and Montenegro, **the Slovak Republic**, **Slovenia**, **Spain**, **Sweden**, **Switzerland**, **The former Yugoslav Republic of Macedonia**, **Turkey**, Ukraine **and the United Kingdom**.

The 31 Member States of EUROCONTROL appear in **bold**.

1. INTRODUCTION

1.1 Over the past ten years the telecommunications industry has experienced great change. Mobile telephone advances have given the world unparalleled ease of access to communications services for non-critical applications.

1.2 However, air traffic management (ATM) has not yet taken advantage of these developments. This has resulted in a dependence on outdated, inefficient and expensive solutions for communications. For example, air/ground radio communications still rely on systems that are based on those developed over 50 years ago.

1.3 The ability to increase air traffic capacity is directly dependent on the availability of the communication channels to match the ATM requirements (performance, capacity). Aeronautical communications must be substantially improved if the requirements of airspace users and air navigation service providers are to be realised.

1.4 VHF-based radiotelephony (R/T) communications between pilots and controllers will approach saturation because of the limited available radio spectrum.

1.5 Security concerns in recent times have drawn attention to the vulnerability of the existing R/T system to both spurious and intentional interference.

1.6 There is a continuing need for an evolutionary modernisation and expansion of the air/ground communications infrastructure that serves the global airspace user community. In meeting this need it is recognised that this activity will have a major impact on the airspace users because of the need for interoperability between ground based and airborne systems.

1.7 In pursuit of a global air traffic communications system, it is necessary to consider the following fundamental aspects.

1.7.1 First, present global development plans can and should be harmonised in the near term through the use of multi-mode avionics capable of user-transparent and seamless operations in all ICAO regions.

1.7.2 Second, the pursuit of future communications solutions is best accomplished as a global activity. The future communications infrastructure should possess the following characteristics:

a) backward compatibility with the present mainly-VHF-based infrastructure to provide safe transitions and to protect existing community investments;

b) capability for both voice and data services;

c) spectrum efficiency in all bands of operations including the ability to operate in more than one band simultaneously;

d) capability to provide expanded capacity as the needs of the aviation community dictate;

e) minimum economic impact on airspace users; and

f) potential to consist of more than one system (e.g. terrestrial and satellite).

1.8 It is recalled that ICAO endorsed the digital VDL Mode 3 concept in 1995, but insufficient VHF radio spectrum has prevented further consideration of its implementation in Europe.

2. KEY CHALLENGES

2.1 Today communications is considered in terms of its analogue voice and digital data components. In the future an integrated systems approach will be necessary in order to take full advantage of available radio spectrum and evolving technology.

2.2 Commercial technology, which offers the potential for attractive lower cost solutions to future aviation communications needs, may need certain modification to meet aviation community standards or air traffic quality of service levels. The convergence of aviation and commercial requirements needs to be promoted.

2.3 Coordinated global efforts will be necessary to directly influence the evolution of technologies such as satellites and other commercial mobile communications systems towards the aviation industry requirements.

3. KEY ACTIVITIES

3.1 Work to explore the feasibility of the evolving technology must be continued as a global effort. This should include flexible airborne architecture (e.g. software radio technology, multi-mode antenna technologies) as it could well be the critical enabler for future communications transition and harmonisation.

3.2 Current certification practices that are focused on single system or single threaded services are a major cost driver for airspace users since they demand continued re-certification as the system expands. It will be necessary to investigate alternative and streamlined "best certification practices" for accommodating potential solutions that rely on multi-system solutions that can expand dynamically.

3.3 Feasibility studies must undertake of means of sharing communications capacity between a range of services (e.g. air traffic control (ATC), aircraft operation centre (AOC) and aeronautical passenger communications (APC)). The need to maintain separation between services will be of paramount importance. Among other things it will be necessary to evaluate current and planned "firewall" protection.

3.4 The complexity of the future systems as well as the current trend leading towards separation of service provision introduces new types of responsibilities. This tendency is making the institutional and financial arrangements more complex (how to ensure the financial viability of the development? Which

structure has to be set up to operate the service?) These issues have to be clarified for any new systems development, as well as for its future operation.

3.5 Any future communication system can only be implemented if suitable global radio spectrum has been allocated. A key activity must therefore be to obtain sufficient spectrum allocations through the International Telecommunications Union. In particular, the World Radio-communications Conference 2007 could provide an opportunity to gain a more flexible use of existing aeronautical allocations.

4. EUROCONTROL ACTIVITIES

4.1 EUROCONTROL is exploring the potential of new technologies for aviation. (e.g. wide band communication systems based on evolving international telecommunications standards and satellite based systems). This would enable the financial benefits of commercial off the shelf (COTS) products to be realised, as well as allowing the flexible use of radio spectrum and its effectiveness.

4.2 EUROCONTROL has already embarked on progressing part of the key activities as identified in section 3.

5. CONCLUSIONS

5.1 The development of air traffic management will demand a significant increase in both capacity and flexibility of communications, both voice and data.

5.2 The telecommunications industry has transformed communications over the last decade and there is an opportunity for aviation to take advantage.

5.3 An ICAO coordinated global initiative is urgently required to develop and implement new communications capabilities outside the VHF band.

6. ACTION BY THE CONFERENCE

6.1 The conference is invited to:

a) acknowledge that communications should be handled as an integrated entity and urge States to work towards an integrated solution for future communications to meet the needs of all ICAO regions; and

b) note the work being undertaken by EUROCONTROL regarding terrestrial and satellite solutions.

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