

# EUROCONTROL Guidelines on 8.33kHz channel spacing for military operators

**EUROCONTROL  
GUIDELINE ON 8.33 KHZ  
CHANNEL SPACING FOR  
MILITARY OPERATORS**

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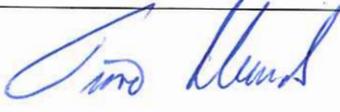
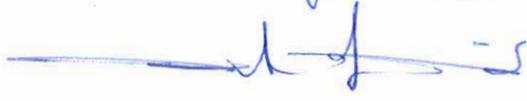
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<b>Abstract</b>			
<p>This EUROCONTROL document provides non-binding technical guidance to Military Organisations and ATM planners on the implementation and use of VHF 8.33 kHz channel spacing in the ICAO European Region. It includes aspects resulting from the obligations stemming from ICAO European Air Navigation Planning Group (EANPG), provisions contained in the European Commission Regulation on Air-Ground Voice Channel Spacing (AGVCS) and support to the Network Manager Radio Frequency Function (RFF).</p> <p>This document is mainly a compilation of information contained in multiple sources and supports the harmonisation of the ATC air-ground voice communications service using VHF 8.33 kHz. It describes good practices, procedures and implementation options concerning: aircraft equipage, provision of UHF to handle non-8.33 kHz State aircraft flying as GAT/IFR, frequency conversions, flight planning, frequency management matters, use of 8.33 kHz for military aircraft operating as GAT and OAT and civil-military coordination mechanisms and some certification-considerations. Technical support is available at EUROCONTROL through the civil-military working arrangements and the 8.33 kHz Implementation Support Group (ISG).</p> <p><b>The present document was endorsed at the 18<sup>th</sup> meeting of the Military ATM Board (MAB) on 20 April 2016.</b></p>			
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# CONTENTS

<b>EXECUTIVE SUMMARY</b> .....	<b>7</b>
<b>1. INTRODUCTION</b> .....	<b>1</b>
1.1 Background .....	1
1.3 Scope .....	3
1.4 Conventions.....	3
1.5 Glossary .....	3
<b>2. REGULATORY ENVIRONMENT</b> .....	<b>4</b>
2.1 Single European Sky Interoperability.....	4
2.2 Air-Ground Voice Channel Spacing (AGVCS) Implementing Rule.....	4
<b>3. AIRCRAFT EQUIPAGE</b> .....	<b>8</b>
3.1 Disclaimer .....	8
3.2 Civil Equipage Compliance Conditions .....	8
3.3 FM Immunity .....	10
3.4 Certification .....	11
<b>4. GROUND SYSTEMS</b> .....	<b>12</b>
<b>5. FLIGHT PLANNING</b> .....	<b>13</b>
5.1 IFPS User Manual .....	13
5.2 Flight Planning Procedures for GAT/IFR .....	13
<b>6. UHF PROVISION</b> .....	<b>15</b>
6.1 Context.....	15
6.2 Requirements.....	15
6.3 UHF Coverage Considerations .....	15
6.4 UHF Frequency Management Aspects.....	16
6.5 UHF Technical Integration .....	16
<b>7. PHRASEOLOGY</b> .....	<b>18</b>
<b>8. VHF FREQUENCY MANAGEMENT</b> .....	<b>19</b>
8.1 General .....	19
8.2 Military use of VHF COM .....	19

- 8.3 Best Practices.....20**
- 9. STAKEHOLDER SUPPORT .....21**
- 9.1 The role of the Network Manager (NM).....21**
- 9.2 The 8.33 kHz Implementation Support Group (ISG) .....22**
- ANNEX A: GLOSSARY .....24**
- ANNEX B: REFERENCES.....27**

## EXECUTIVE SUMMARY

Air-ground voice communications supporting Air Traffic Control (ATC), in the context of General Air Traffic (GAT) operations, traditionally rely on instantaneous voice communications between pilots and controllers using an infrastructure based on VHF line-of-sight.

Even for the medium and longer term, Air Traffic Control will continue to use the allocated VHF spectrum (117,975-137 MHz) to support such voice exchanges between ATC and pilots. This band supports not only air-ground voice but also air-ground data link communications. In order to support the continued demand for additional voice channels and to avoid frequency congestion problems, 8.33 kHz channel spacing has been implemented replacing 25 kHz channels in this VHF spectrum in the sequence of several ICAO and European (EU) decisions.

Frequency congestion triggers the need to seek more efficient options to use the VHF spectrum (better frequency re-use, etc.) but also a considerable effort to equip aircraft and ground ATS systems with 8.33 kHz capable radios. Alternative digital voice technologies are not expected to be introduced before 2035, consequently, analogue VHF voice will remain as a fundamental enabler of routine air-ground ATC communications.

In October 1999 the carriage and operation of VHF 8.33 kHz channel spacing radio communication equipment was introduced in 7 states of the European core area for GAT/IFR operations above Flight Level (FL) 245. In October 2002 the area of applicability was horizontally expanded. A first Single European Sky (SES) Regulation on air-ground voice channel spacing (AGVCS) (Regulation No. 1265/2007 of 26 October 2007) was published turning the 8.33 kHz requirement into legislation, binding for the States, mandating the carriage of 8.33 kHz radios for GAT/IFR operations above Flight Level (FL) 195 and the provision of ground services by ANSPs.

Subsequently, a new Commission Implementing Regulation (EU) No 1079/2012 of 16 November 2012 was published in the Official Journal of the European Union, laying down requirements for voice channel spacing for the SES extending 8.33 kHz below FL195 and repealing the previous regulation (1265/2007). Article 9 of this Regulation includes specific arrangements for State aircraft and for ANSPs to continue to accommodate non-equipped State aircraft on UHF or on VHF 25 kHz channels. This regulation puts also requirements on radio manufacturers by mandating them to ensure that all radios intended to operate in the VHF band are 8.33 kHz channel spacing capable.

During the last decade military authorities have made very significant efforts to migrate towards VHF 8.33 kHz channel spacing. Over the last 10 years more than 1000 State<sup>1</sup> aircraft became equipped. In accordance with latest plans provided by the States to the EUROCONTROL, the equipage rates of the European State aircraft fleet reached in 2014 around 70% for transport-type State aircraft and 60% for other aircraft types.

The continued implementation of VHF 8.33 kHz operations throughout Europe calls for close stakeholder support and harmonization at technical level. EUROCONTROL remains committed to continue to produce technical guidance and to support military authorities in their efforts to cope with the provisions of Regulation No. 1079/2012 while minimizing adverse impacts. This effort entails also the necessary civil-military coordination actions within the Network Manager Radio Frequency Function (RFF).

The users of this guideline document are advised to undertake local safety assessments before implementing any of the proposed measures.

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<sup>1</sup> Military, customs and police aircraft

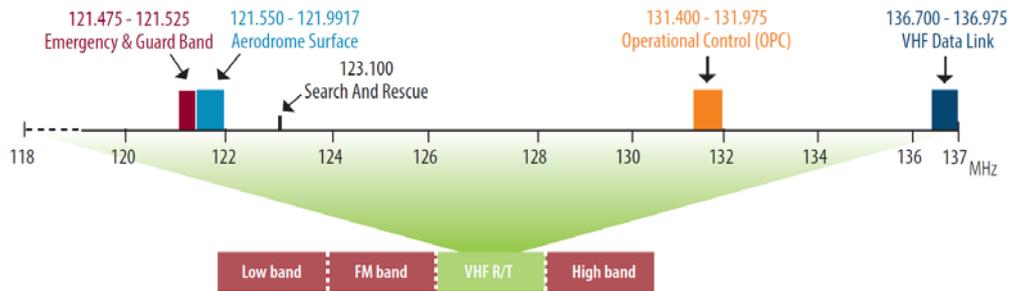
## 1. INTRODUCTION

### 1.1 Background

- 1.1.1 In the context of the European ATM Network (EATMN) supporting General Air Traffic (GAT) operations, the air-ground voice communications for air traffic control (ATC) between pilots and controllers are based on an Air Navigation Service Provider (ANSP) infrastructure based on VHF DSB AM line-of-sight.
- 1.1.2 Air-ground voice radio communication systems for civil aircraft are used primarily for the purpose of ATC relying on the ICAO VHF COM band (117,975 - 137 MHz). The band supports also some air-ground data link allocations<sup>2</sup>. Within this band, the same frequency can be reassigned many times provided that there are no interference problems. At the time of writing, there are more than 10,000 VHF assignments in this band used in Europe (as per ICAO COM2 Table).
- 1.1.3 In 1994, it was decided to face VHF congestion in Europe by changing the channel spacing from 25 to 8.33 kHz. The use of VHF with 8.33 kHz channel spacing was introduced above FL245 in the International Civil Aviation Organization (ICAO) European (EUR) Region from October 1999 and above FL195 from March 2007. Further phases of vertical expansion below FL195 followed from 2012.
- 1.1.4 The way air-ground voice is used will change in the medium/long term when air-ground data link becomes the primary enabler of routine air-ground ATC communications. By then, analogue VHF voice is expected to remain in service only to sustain safety-critical communications until alternative digital voice solutions become available (not before 2035+).
- 1.1.5 For air-ground voice communications in oceanic and remote areas, civil evolution will be to migrate from High Frequency (HF) to SATCOM voice (e.g. INMARSAT) with HF voice retained as backup. This will provide increased throughput and transmission quality.
- 1.1.6 The 8.33 kHz voice channel spacing requirement was finally subject of Single European Sky (SES) interoperability regulatory measures in 2007 and 2012. European Commission regulations No 1265/2007 and No 1079/2012 on air-ground voice channel spacing (AGVCS) were published, respectively on 26/10/2007 and 16/11/2012. These regulations turned the 8.33 kHz requirement into binding legislation, mandating the carriage of 8.33 kHz radios for GAT/IFR operations, initially above Flight Level (FL) 195 and subsequently expanded into the lower airspace, as well as the provision of ground services by ANSPs.

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<sup>2</sup> ACARS/FANS, VHF Data Link (VDL) Mode 2, VDL Mode 4



**Figure 1 – VHF COM Band**

- 1.1.7 The majority of civil European ANSPs is presently providing UHF support for the handling of non-8.33 kHz State aircraft occasionally operating as GAT/IFR in the airspace designated for 8.33 kHz operations. Some ANSPs provide VHF 25 kHz support instead of UHF where this radio coverage is not available. Guidance material is available on the use of UHF for ATC [see Reference 5].
- 1.1.8 Technical equipment requirements for a State aircraft to claim compliance with 8.33 kHz EC regulatory obligations entail at least two independent sets of 8.33 kHz capable radios to be installed. It is of utmost importance that military aircraft operators use the appropriate technical references (e.g. EUROCAE ED 23 B/C) followed by adequate certification practises.
- 1.1.9 The deployment of 8.33 kHz operations has a direct impact on frequency management activities related with the allocation and use of VHF band (117,975-137 MHz). Spectrum resources are used in this band by the military and civil-military coordination is essential to ensure that all allocations remain interference-free. In this domain the work is normally conducted in support of the Network Manager Radio Frequency Function (RFF) as envisaged in the NM Regulation [Ref 4]. Guidance material is available on the use of ICAO Aeronautical Mobile (Route) Service VHF Band (117,975-137 MHz) by the military [Ref 5].
- 1.1.10 The operational use of 8.33 kHz communications in GAT environment requires also adequate flight planning practices. This is critical for the accommodation of non-8.33 kHz State aircraft and provision of alternative UHF or 25 kHz service.

## **1.2 Objective**

- 1.2.1 This EUROCONTROL document provides technical guidance to military organisations and ATM planners on the implementation and use of VHF 8.33 kHz channel spacing in the ICAO European Region. It includes all aspects resulting from the obligations stemming from ICAO European Air Navigation Planning Group (EANPG), provisions contained in the European Commission Regulation on Air-Ground Voice Channel Spacing (AGVCS) and support to the Network Manager Radio Frequency Function (RFF).
- 1.2.2 The present guidance document is developed to help ATM planners (including NM RFF) as well as military aircraft operators and service providers to implement and use VHF 8.33 kHz resources in compliance with the provisions contained in the European Commission Regulations (EC) No 1265/2007 and No 1079/2012 on Air Ground Voice

Channel Spacing and associated specifications and guidance material. It does not cover the required safety assessments to be conducted locally in the sequence of 8.33 kHz implementation, service provision and operational use.

### **1.3 Scope**

- 1.3.1 This document is mainly a compilation of information contained in multiple sources and supports the harmonisation of the ATC air-ground voice communications service using VHF 8.33 kHz. It describes regulatory requirements, good practices, procedures and implementation options concerning: aircraft equipage, provision of UHF to handle non-8.33 kHz State aircraft flying as GAT, frequency conversions, flight planning, frequency management matters, use of 8.33 kHz for military aircraft operating as GAT and OAT and civil-military coordination mechanisms as well as some certification-considerations. Technical support is available at EUROCONTROL through the civil-military working arrangements and the 8.33 kHz Implementation Support Group (ISG).
- 1.3.2 The content of this document does not replace or override contents of National documentation and does not cover military-military interoperability requirements. This document covers expert-level technical guidance and it is not suited to support political/institutional discussions.
- 1.3.3 To cope with local conditions, the service providers and aircraft operators that decide to use this guidelines document shall undertake local safety assessments, where needed, and to ensure local coordination and agreements needed without prejudice to wider harmonisation goals.

### **1.4 Conventions**

- 1.4.1 The implementing options and requirements described in this document aim at harmonising the European military 8.33 kHz environment. Those options should be applied when compatible with the local conditions for ATC provision, military aircraft equipage and operational constraints.
- 1.4.2 Throughout this document conventions for denoting requirements are as follows:
- the word “shall” (or “must”) indicates a mandatory requirement, which must be satisfied by all procedures or practices claiming conformity to this guidelines
  - “should” indicates a recommendation or best practice, which may or may not be satisfied by all procedures or practices claiming conformity to this guidelines
  - “may” refers to a “nice to have” requirement which will not significantly impact the results to be attained.

### **1.5 Glossary**

- 1.5.1 A glossary containing Abbreviations and Definitions is included in Annex A.

## **2. REGULATORY ENVIRONMENT**

### **2.1 Single European Sky Interoperability**

- 2.1.1 The Single European Sky (SES) was an initiative launched by the European Commission to reform European Air Transport to meet future capacity and safety needs, organizing airspace and air navigation on a European scale. The initiative relies on a harmonized regulatory framework in which the technical regulation stems from essential requirements and where rules and standards are complementary and consistent. Interoperability deserves great emphasis in SES processes.
- 2.1.2 The SES basic regulations include Regulation (EC) No 552/2004 of the European Parliament and of the Council of 10 March 2004 on the interoperability of the European ATM network (the interoperability Regulation) [Ref 5].
- 2.1.3 The Member States adopted, in parallel with the first SES package, a general statement on military issues related to the Single European Sky. According to this “Common Declaration” statement, included in Regulation (EC) No 549/2004, Member States should, in particular, enhance civil-military cooperation and, to the extent deemed necessary by all Member States concerned, facilitate cooperation between their armed forces in all matters of ATM.
- 2.1.4 It is assumed that civil-military CNS interoperability developments contribute to the Essential Requirements defined in the SES Interoperability Regulation once brought into the appropriate SES regulatory context either as binding implementing rule provisions or as voluntary specifications or guidance material.
- 2.1.5 EASA regulatory materials, including specifications, do not directly apply to military systems due to the provisions set out in the EASA Basic Regulation (216/2008 amended by 1108/2009). This regulation explicitly states that it does not apply to products, parts, appliances, personnel and organisations carrying out military, customs, police, search and rescue, firefighting, coastguard or similar activities or services. Nevertheless, the Member States must undertake to ensure that such activities or services have due regard as far as practicable to the objectives of that Regulation (article 1). EASA Certification Specification and Acceptable Means of Compliance (CS-ACNS) contains relevant voice channel spacing requirements both to support certification (civil) and to identify technical references.

### **2.2 Air-Ground Voice Channel Spacing (AGVCS) Implementing Rule**

- 2.2.1 Regulation 1265/2007 on air-ground voice channel spacing (AGVCS) turned the 8.33 kHz VCS requirement into binding legislation, mandating the carriage of 8.33 kHz radios for GAT operations above Flight Level (FL) 195 and the provision of ground services by ANSPs. Subsequently, SES Regulation No 1079/2012, also on AGVCS, repealed the first AGVCS regulation and expanded the 8.33 kHz requirement into the lower airspace.

- 2.2.2 Article 9 of the abovementioned SES AGVCS Regulation 1079/2012 includes specific provisions for State aircraft 8.33 kHz. In parallel, the flights of remaining non-8.33 kHz equipped State aircraft, which cannot be retrofitted for a justified compelling reason, are accommodated by the civil ANSPs on UHF or 25 kHz VHF assignments provided that they can be safely handled within the capacity limits of the ATM system.
- 2.2.3 The arrangements described in that Regulation include regulatory provisions related with State aircraft equipage with VHF 8.33 kHz radios and measures to ensure the handling of non-equipped State aircraft by the Air Traffic Service (ATS) Providers. Those regulatory requirements are detailed in the regulation 1079/2012 as follows<sup>3</sup>:

Part repealing Regulation 1265/2007 for above FL 195:

1. *Member States shall ensure that transport-type State aircraft operating flights above FL 195 are equipped with radios having the 8.33 kHz channel spacing capability.*
2. *Where procurement constraints prevent compliance with paragraph 1, Member States shall ensure that transport-type State aircraft operating flights above FL 195 are equipped with radios having the 8.33 kHz channel spacing capability by 31 December 2012 at the latest.*
3. *Member States shall ensure that non-transport-type State aircraft operating flights above FL 195 are equipped with radios having the 8.33 kHz channel spacing capability.*
4. *Member States may allow non-compliance with paragraph 3 due to:*
  - (a) *compelling technical or budgetary constraints;*
  - (b) *procurement constraints.*
5. *When procurement constraints prevent compliance with paragraph 3, Member States shall ensure that non-transport-type State aircraft operating flights above FL 195 are equipped with radios having the 8.33 kHz channel spacing capability by 31 December 2015 at the latest.*

Part introduced only in Regulation 1079/2012 for above and below FL 195:

6. *Member States shall ensure that new State aircraft entering into service from 1 January 2014 are equipped with radios having the 8.33 kHz channel spacing capability.*
7. *Member States shall ensure that from 1 January 2014, whenever the radios installed on-board the State aircraft are subject to radio upgrades, the new radios have the 8.33 kHz channel spacing capability.*

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<sup>3</sup> Please refer to the Regulation to see the full regulatory legal text.

8. *Member States shall ensure that all State aircraft are equipped with radios having the 8.33 kHz channel spacing capability by 31 December 2018 at the latest.*
  9. *Without prejudice to national procedures for the communication of information on State aircraft, Member States shall communicate to the Commission by 30 June 2018 at the latest the list of State aircraft that cannot be equipped with radios having the 8.33 kHz channel spacing capability in accordance with paragraph 8 due to:*
    - (a) *compelling technical or budgetary constraints;*
    - (b) *procurement constraints.*
  10. *Where procurement constraints prevent compliance with paragraph 8, Member States shall also provide to the Commission by 30 June 2018 at the latest the date by which the aircraft concerned will be equipped with radios having the 8.33 kHz channel spacing capability. That date shall not be later than 31 December 2020.*
  11. *Paragraph 8 shall not apply in respect of State aircraft that will be withdrawn from operational service by 31 December 2025.*
  12. *Air traffic service providers shall ensure that State aircraft not equipped with radios having the 8.33 kHz channel spacing capability can be accommodated, provided that they can be safely handled within the capacity limits of the air traffic management system on UHF or 25 kHz frequency assignments.*
  13. *Member States shall publish procedures for the handling of State aircraft which are not equipped with radios having the 8.33 kHz channel spacing capability in their national aeronautical information publications.*
  14. *Air traffic service providers shall communicate to the Member State that has designated them on an annual basis, their plans for the handling of State aircraft which are not equipped with radios having the 8.33 kHz channel spacing capability, taking into account the capacity limits associated with the procedures referred to in paragraph 13.*
- 2.2.4 Military aircraft operators have made considerable progress in their efforts to equip aircraft with 8.33 kHz radios and their equipage levels evidence substantial equipage rates by end 2014 (around 77% for transport type aircraft and 65% for fighter aircraft).
- 2.2.5 In January 2015 the European Commission (EC) organised an interoperability workshop on Air Ground Voice Channel Spacing, with the objective of assessing the current implementation of Regulation (EU) No 1079/2012, to identify existing issues or areas of concern and to discuss the potential evolutions of the Regulation. Conclusion was that the Regulation seems under control with good progress for ground implementation by the ANSPs, for State aircraft equipage by the military community and for civil aircraft equipage by commercial airlines.
- 2.2.6 It is important to highlight that Regulation (EU) No 1079/2012 contains also a

provision (article 4) for the manufacturers of radios intended to operate in the VHF band, or their authorised representatives established in the Union, to ensure that from 17 November 2013 all radios placed on the market, are 8.33 kHz channel spacing capable.

2.2.7 In accordance with article 6, service providers are obliged to ensure, by the 31 December 2018, the conversion of all frequency assignments (including on their VHF ground receiver sites) to 8.33 kHz channel spacing, with the exception of assignments staying in 25 kHz due to safety reasons or used to accommodate non-equipped State aircraft. Article 2 contains also a list of 25 kHz frequencies to which conversion requirements do not apply (channels used for emergency, SAR, data link, ACARS and where carrier off set (CLIMAX) is used).

2.2.8 Article 2 of the Regulation states:

*The conversion requirements shall not apply to frequency assignments:*

*(a) that will remain in 25 kHz channel spacing on the following frequencies:*

*(i) the emergency frequency (121,5 MHz);*

*(ii) the auxiliary frequency for search and rescue operations (123,1 MHz);*

*(iii) the VHF digital link (VDL) frequencies (136,725 MHz, 136,775 MHz, 136,825 MHz, 136,875 MHz, 136,925 MHz and 136,975 MHz);*

*(iv) the aircraft communications addressing and reporting system (ACARS) frequencies (131,525 MHz, 131,725 MHz and 131,825 MHz);*

*(b) where offset carrier operation within a 25 kHz channel spacing is utilised.*

### **3. AIRCRAFT EQUIPAGE**

#### **3.1 Disclaimer**

- 3.1.1 SES Regulations as such are binding but the supporting acceptable means of compliance/specifications are non-binding by definition. Consequently, for the case of 8.33 kHz capabilities, the SES Regulation 1079/2012 makes reference to EUROCAE ED 23 B/C standards and accepts that arrangements for State a/c take into account their specific constraints (recitals (11) to (13)).
- 3.1.2 Those EUROCAE references and additional technical specifications, which can be seen as describing the supporting acceptable means of compliance (including certification specification), are only applicable to civil aircraft. This category of technical references includes documents like ICAO Annex 10, EASA CS-ACNS and EUROCAE ED-23 B/C and any JAA documents.
- 3.1.3 Consequently, and also because of a lack of alternative specific military technical standard on 8.33 kHz equipage, the present guideline offers only guidance (non-binding) on appropriate 8.33 kHz equipage options based on the technical criteria applicable to civil aircraft.
- 3.1.4 The existing criteria set out for civil aircraft shall be seen as one of the (non-binding) options for compliance. It can be used, or not, by the national authorities dealing with certification. The technical specifications referenced in this section were designed only for civil aircraft and military requirements have never been added. Hence, if a national military certification authority finds alternative ways to certify for 8.33 kHz compliance it shall suffice. Nevertheless, safety must be ensured.
- 3.1.5 The lack of dual independent 8.33 kHz airborne radios, and operations with single VHF and UHF radio configurations, can be hazardous when operating in areas without UHF coverage and a VHF radio failure occurs (some countries do not have UHF coverage and alternative handling can only be ensured on VHF 25 kHz). National certification processes may introduce solutions to cover such risks. For certain requirements it is expected that a future performance-based approach (under development) can address challenges in that respect. Bottom line: the Section 3 of the present guideline is simply sharing the civil practice as one of the routes for compliance.
- 3.1.5 These considerations apply only when State aircraft operates as GAT. For OAT those equipage considerations are not relevant. Even for GAT State aircraft can alternatively be accommodated on UHF or on VHF 25 kHz.

#### **3.2 Civil Equipage Compliance Conditions**

- 3.2.1 EASA CS-ACNS states that the aircraft voice communication systems shall conform to the performance requirements of the following sections of ICAO Annex 10, Volume III, Part 2 (Second Edition — July 2007 incorporating Amendment No 85), Chapter 2

'Aeronautical Mobile Service':

- (a) Section 2.1 'Air-ground VHF communication system characteristics'.
  - (b) Section 2.2 'System characteristics of the ground installations' of ICAO.
  - (c) Section 2.3.1 'Transmitting function'.
  - (d) Section 2.3.2 'Receiving function' excluding sub-section 2.3.2.8 'VDL — Interference Immunity Performance'.
- 3.2.2 Airborne equipment for VHF 8.33 kHz communications must be compliant with EUROCAE Minimum Operational Performance Specification for Airborne VHF Receiver-Transmitter operating in the frequency range 117,975-137 MHz document ED 23B, (a sufficient means of compliance) or EUROCAE ED 23C (a preferred option whenever possible).
- 3.2.3 The aircraft voice communication system shall be capable of 8.33 kHz and 25 kHz channel spacing and shall be capable of operating with off-set carrier frequencies on 25 kHz channel spacing.
- 3.2.4 In terms of installation requirements/flight deck interface, a means shall be provided to:
- (a) select the voice communications channel;
  - (b) display the selected voice communications channel to the flight crew;
  - (c) indicate the non-operational status or failure of the system without undue delay.
- 3.2.5 Civil aircraft operating in the ICAO EUR region must be equipped with at least two independent sets of 8.33 kHz capable radios to meet the relevant provisions of existing Regulation (EU) No 1079/2012, ICAO provisions laid down in Annex 10 and the abovementioned EUROCAE ED-23B/C.
- 3.2.6 For State aircraft, specific VHF 8.33 kHz equipage aspects like the required number of independent radio sets for fighters are not yet clearly harmonised at international level. Some military stakeholders would prefer to flight plan as "8.33 kHz compliant" and not as "Exempted State aircraft". In the last case sometimes they face operational restrictions dictated by safety limits. Military operators continue to raise recurrent questions on the possibility to claim compliance when a State aircraft is only equipped with one VHF 8.33 kHz radio and one independent UHF transceiver (which could serve as a "back up" where coverage exists).
- 3.2.7 More concrete guidance on this aspect needs to be further discussed and agreed. A possible option, pending of subsequent agreement, can be a recommendation that if a State aircraft is operated in airspace controlled by a Civil ANSP will have to comply with 3.2.5 except if specific conditions apply: e.g. UHF as a backup if the flight is operated in areas in which UHF ATC communication can be provided.
- 3.2.8 Modern military airborne transceivers are multi-band and integrate normally VHF (8.33 and/or 25 kHz) and UHF capabilities (voice and data), provide 121.5 MHz and

243.0 MHz guard channels, have modular upgradeable construction with remote control and may also be multimode and programmable. These characteristics were never considered by civil standardisation developments.

- 3.2.9 This equipage aspect is omitted in the abovementioned AGVCS Regulation and EASA materials are not directly binding for State aircraft. Should this situation be reviewed in the future, the national regulators are the competent authorities to decide.
- 3.2.10 Where national military certification alternatives are not available, military aircraft operators are free to take advantage of civil certification specification material and claim 8.33 kHz compliance when filling and submitting GAT/IFR flight plans on the basis of civil AMCs when fully meeting the requirements as for civil aircraft mentioned above (i.e. two independent sets of VHF 8.33 kHz capable radios).
- 3.2.11 EUROCONTROL recommendation for cases on non-compliance with the AGVCS regulation, in terms of airborne equipage dates, is for the aircraft operators to contact directly the European Commission to justify transition arrangements as envisaged in the regulation. The same applies to clarify applicability of the regulated equipage requirements to non-European military aircraft operators flying in European 8.33 kHz airspace.

### **3.3 FM Immunity**

- 3.3.1 Since 1 January 2001, VHF (30 - 300 MHz) broadcasting stations in Europe have been allowed to operate with reduced restrictions and increased transmitter power levels. This has significant implications for aircraft with VHF receivers. It impacts particularly navigational VHF Omnidirectional Range (VOR) and Instrument Landing System (ILS) equipment.
- 3.3.2 Consequently, for safety reasons, VOR and ILS receivers in aircraft were required to be protected against potential interference from VHF broadcast transmissions. This entails the use of FM (Frequency Management) immune VHF equipment through the modification of existing equipment or re-equipage. Some States have mandated the carriage of FM Immune VHF NAV avionics for en-route and at airports. Exemptions for State aircraft are negotiated on a bilateral basis.
- 3.3.3 Similar requirement applies to VHF communication resources. The applicability of FM immunity to VHF COM transceivers was first recognised in the JAA Temporary Guidance Leaflet (TGL) Nr 7 where it is stated that compliance with the standards for immunity against interference from FM radio broadcast stations will need to be met. The referenced EUROCAE specifications are consistent with this objective.
- 3.3.4 Aircraft operators and aircrew are to refer to national aeronautical publications (Aeronautical Information Publication/AIP, Aeronautical Information Circular/AIC) for current official policy and procedures on FM immunity in particular to determine the airspaces/airports where FM Immunity is a mandatory requirement.

### **3.4 Certification**

- 3.4.1 Certification of military systems is performed in accordance with the national certification framework designed for those assets. Certification of military aircraft voice communication systems installation should be supported by applicable military acceptable means of compliance (AMC) and guidance material.
- 3.4.2 In case those AMCs do not exist, the contents of Book 2 of EASA Certification Specification and Acceptable Means of Compliance for Airborne Communications, Navigation and Surveillance (CS-ACNS), or any relevant AMC, might be used to support such certification activities. This is valid even when not mandatory for military aircraft. Such choice remains at the discretion of the national certification authorities empowered to certify those assets and at the discretion of the national military certification authorities.

## 4. GROUND SYSTEMS

- 4.1 Regulation 1079/2012 applies to all radios operating in the 117,975-137 MHz band allocated to the aeronautical mobile route service, including systems, their constituents and associated procedures (article 2). The regulation applies also to flight data processing systems serving ATC units providing services to GAT, their constituents and associated procedures.
- 4.2 As described in paragraph 2.2.7, service providers have a regulatory obligation to convert to 8.33 kHz channel spacing all frequency assignments of ground receiver sites that operate within the VHF band from 117,975 to 137 MHz by 31/12/2018, with the exception of assignments staying in 25 kHz due to safety reasons or used to accommodate non-equipped State aircraft or due to the other justified reasons described in the regulation (article 2).
- 4.3 Depending of the arrangements in each State, this conversion requirement may impact military VHF ground systems. When the levels of airborne equipage with 8.33 kHz capability reach the vast majority of military fleets, it is expected that military ANSPs decide to consider a transition to provide air-ground communications services on the basis of a comprehensive 8.33 kHz infrastructure (airborne and ground). The regulation preamble states that military operations and training are not covered in accordance with article 1(2) or EC 549/2004, hence it might be up to national authorities to finally regulate the military ANSPs ground system requirements (this statement has no precedence over any interpretation of the regulatory text).
- 4.4 For additional details please consult the document *EUROCONTROL Guidance on the Use of ICAO Aeronautical Mobile (Route) Service VHF band (117.975 – 137 MHz) by the Military, Document 10/06/04-63, Edition 1.0, 08 April 2010* [4].

## 5. FLIGHT PLANNING

### 5.1 IFPS User Manual

- 5.1.1 A detailed description of flight planning procedures for GAT/IFR in relation with 8.33 kHz can be found in the latest version of the Integrated Initial Flight Plan Processing System (IFPS) User Manual which can be accessed through the EUROCONTROL web site.

[https://www.public.nm.eurocontrol.int/PUBPORTAL/gateway/spec/PORTAL.19.0.1.1.86/\\_res/IFPS\\_Users\\_Manual\\_19\\_0\\_1.pdf](https://www.public.nm.eurocontrol.int/PUBPORTAL/gateway/spec/PORTAL.19.0.1.1.86/_res/IFPS_Users_Manual_19_0_1.pdf)

### 5.2 Flight Planning Procedures for GAT/IFR<sup>4</sup>

- 5.2.1 The current Edition (19.0.1) of the IFPS User Manual describes the flight planning procedures applicable to State aircraft flying GAT/IFR as follows:

5.2.1.1 Whenever a State aircraft is equipped with the 8.33 kHz radios, the letter Y shall be inserted in Item 10: Equipment, of the filed flight plan.

5.2.1.2 For State aircraft [see Note below] that are NOT equipped with 8.33 kHz capable radios<sup>5</sup> but are equipped with UHF, shall be permitted to fly in 8.33 kHz airspace where UHF coverage is provided or special procedures are implemented [see the national AIP of the State concerned]. To indicate such, the letters 'U' and 'Z' shall be inserted in Item 10a Equipment and 'COM/EXM833' shall be inserted in Item 18 of the filed flight plan.

5.2.1.3 In addition to the current processing, IFPS shall include in the acknowledgement message (ACK) transmitted to the flight originator the following comment:

'THIS FLIGHT MAY REQUIRE SPECIAL HANDLING BY ATC DUE TO 8.33 kHz  
CARRIAGE REQUIREMENTS'

5.2.1.4 Medical flights specifically declared by the medical authorities and aircraft engaged in search and rescue missions, are not automatically exempted from the 8.33 kHz mandatory carriage requirements. However, these special flights shall not be rejected by the IFPS whenever STS/HOSP or STS/SAR are identified by the IFPS system in the filed flight plan.

5.2.1.5 Where the status of the 8.33 kHz radio capability changes, such a change shall be

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<sup>4</sup> The contents of this paragraph are a direct extract from the current IFPS User Manual. It does not describe specific equipage requirements for SAR or any other operation but facilitates the integration in the flight planning process of exemption opportunities when GAT.

<sup>5</sup> For civil aircraft (when the aircraft cannot be considered State aircraft) that are NOT equipped with 8.33kHz radios but the aircraft is exempted from the carriage of the 8.33 kHz radios [refer to the national AIP of the state concerned to see if the flight is eligible], the letter Y shall not be inserted in Item 10: Equipment, but COM/EXM833 shall be inserted in the Item 18 as well as 'Z' in Item 10a of the filed flight plan.

notified to the IFPS by means of a modification message (CHG) or by filing a new flight plan

**Note** For ATM purposes and with reference to Article 3(b) of the Chicago Convention, only aircraft used in military, customs and police services shall qualify as State aircraft. Accordingly:

- Aircraft on a military register, or identified as such within a civil register, shall be considered to be used in military service and hence qualify as State aircraft.
- Civil registered aircraft used in military, customs and police service shall qualify as State aircraft.
- Civil registered aircraft used by a State for other than military, customs and police service shall not qualify as State aircraft.

5.2.2 The aircraft operator shall ensure that the information provided in the flight plan (i.e. 8.33 kHz equipage information or the presence of the exemption indicator) is consistent with the aircraft to be used and airspace with applicability of GAT 8.33 kHz requirement.

5.2.3 The pilot-in-command is ultimately responsible for ensuring that the radio communication equipment appropriate for the flight to be conducted is available and operational on board the aircraft.

## 6. UHF PROVISION

### 6.1 Context

- 6.1.1 The ultra-high frequency (UHF) radio infrastructure (225 MHz - 400 MHz) is used by most air navigation service providers (ANSPs) as a fundamental alternative to ensure the ATC communications with non-8.33 kHz equipped State aircraft<sup>6</sup>.
- 6.1.2 These ATC-related UHF services are provided by civil and military ANSPs. Depending on the State's local arrangements, military ANSPs normally provide UHF support whilst civil ANSPs can offer this service for State aircraft.
- 6.1.3 As described above the provision of UHF (or VHF 25 kHz) to non-8.33 State aircraft is a regulatory obligation. In fact, article 9 of the SES Regulation No 1079/2012 prescribes that the flights of non-8.33 kHz equipped State aircraft, which cannot be retrofitted for a justified compelling reason, are accommodated by the civil ANSPs on UHF or 25 kHz VHF assignments provided that they can be safely handled within the capacity limits of the ATM system. Publication in national aeronautical information publication (AIP) of applicable procedures is also required.

### 6.2 Requirements

- 6.2.1 A number of requirements are an essential prerogative to establish the appropriate level of UHF provision by civil and military ANSPs. Such requirements include:
- Assurance of enough UHF coverage
  - Improved frequency management coordination when allocating UHF frequencies
  - Establishment of commonly agreed operating procedures
  - Availability of recognised standard harmonising technical characteristics
  - Optimal system integration and lack of cross-coupling with VHF channels
- 6.2.2 Most of those requirements have been subject of specific guidance contained in the document: *EUROCONTROL Guidelines on the Use of UHF for ATC, GUID-138-2009, Edition 1.0, 02 June 2010*. Additional details can be found in the EUROCONTROL UHF web page:

<http://www.eurocontrol.int/services/uhf>

### 6.3 UHF Coverage Considerations

- 6.3.1 Military UHF infrastructure was implemented in the initial NATO Western Europe member States to respond to specific NATO military requirements. Eastern and Central European States that joined NATO at a later stage did not have immediately UHF facilities in place. The implementation of such capabilities is not yet finalised in

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<sup>6</sup> State aircraft encompasses military, police and customs aircraft.

the entire ECAC area.

- 6.3.2 In the States where a UHF infrastructure is not available for civil ANSPs, or where the coverage is insufficient, the alternative is to retain a residual number of VHF 25 kHz channels. As a consequence, these 25 kHz frequencies cannot be converted into 8.33 kHz channels and frequency benefits are not achieved. Hence, the lack of UHF is an indirect obstacle to 8.33 kHz implementation.

## 6.4 UHF Frequency Management Aspects

- 6.4.1 The 225-400 MHz band is historically known as the “NATO UHF Band”. In fact, UHF frequencies are mainly used by military Air Defence to control aircraft flying within segregated airspace and when performing military air operations (e.g. air policing, air interception) and by military ATC to control military traffic.
- 6.4.2 In each NATO Member State, the management of this UHF band is delegated by spectrum regulators to military frequency management agencies designated National Allied Radio Frequency Agencies (NARFA). NATO Member States have delegated the coordination/management activities for this portion of the frequency spectrum to the NATO Committee that deals with frequency management matters.
- 6.4.3 The NATO Spectrum and C3 Infrastructure Branch (SC3IB), at NATO Headquarters, responds to frequency requests and coordinates the air-ground and air-air frequency assignments to civil and military ANSPs. This branch supports the abovementioned Committee during the periodic reorganisations of the UHF band leading to a more efficient utilisation. This is a prerequisite to be able to meet the UHF usage demand since the band is already relatively congested.
- 6.4.4 The procedures for obtaining UHF frequency allocations for ATC are described in the ICAO Frequency Management Manual (Doc. EUR-011 Part IV - Frequency Co-ordination and Registration Procedures).

## 6.5 UHF Technical Integration

- 6.5.1 The technical details applicable for UHF installations used by ATC are available in the European Telecommunications Standards Institute (ETSI) Specification “*ETSI EN 302 617 V1.1.1 (2009-01) Electromagnetic compatibility and Radio spectrum Matters (ERM); Ground-based UHF radio transmitters, receivers and transceivers for the UHF aeronautical mobile service using amplitude modulation; Part 1: Technical characteristics and methods of measurement*”. NATO STANAG 4205 also includes relevant technical details.

<http://www.eurocontrol.int/publications/etsi-standard-ground-based-uhf-radio-transmitters-receivers-and-tranceivers-uhf>

- 6.5.2 Most of the hazards associated with the use of UHF to handle too many non-8.33 kHz State aircraft entering a sector can be mitigated if UHF and VHF channels are appropriately cross-coupled.

6.5.3 Some Voice Communication Systems (VCS) models may constrain the implementation of cross-coupling. In fact, the way cross-coupling is implemented depends of the vendor specifications of each VCS. However, the extent of the cross-coupling (two or more frequencies) will be specified by the implementer (ANSP). Also, the means of selection and control of cross-coupling will be specified by the ANSP but the following are typical options: 1) at any CWP, 2) at a specified supervisor working position, 3) by means of a system management terminal.

6.5.4 Whatever means of cross-coupling that is selected it is extremely important that the user (or users) are given clear indications as to which frequencies are in a cross-coupled mode. Operational safety hazards, particularly during busy/heavy traffic situations, may arise due to cross-coupling where the chance of missed or disturbed radio transmissions increases significantly.

6.5.5 In view of the safety hazards outlined above consideration should be given to restricting the extent of cross-coupling as follows:

- limiting the number of frequencies that can be cross-coupled
- limiting the number of cross-coupling sessions at a CWP
- limiting the number of cross-coupling sessions for the whole VCS

It is also important, in order to prevent coupling chains, to ensure that a particular frequency can only be included in one cross-coupling session.

6.5.6 The following guidelines identify some important human engineering aspects that shall be considered for Human Machine Interfaces (HMI). Irrespective of cross-coupling being present or not it shall be guaranteed that:

- The interaction between a controller and the HMI should leave the controller in no doubt about the next action to be taken in performing the current function.
- The indicator associated with the aircraft call should be distinctive to enable active frequencies to be easily identified.
- A distinctive and clear indicator showing any frequencies that have been cross-coupled should be provided.

## 7. PHRASEOLOGY

7.1 Also for the handling of State aircraft operating in 8.33 kHz airspace, consistent use of the correct radiotelephony phraseology procedures shall be observed in all cases on the basis of ICAO Annex 10, Volume II, Chapter 5 as well as relevant phraseology described in the PANS-ATM, Chapter 12.

7.2 The table below describes some 8.33 kHz-related phraseology procedures relevant for the handling of State aircraft.

Circumstance	Phraseology
To request confirmation of 8.33 kHz capability	CONFIRM EIGHT POINT THREE THREE
To indicate 8.33 kHz capability	* AFFIRM EIGHT POINT THREE THREE
To indicate lack of 8.33 kHz capability	* NEGATIVE EIGHT POINT THREE THREE
To request UHF capability	CONFIRM UHF
To indicate UHF capability	* AFFIRM UHF
To indicate lack of UHF capability	* NEGATIVE UHF
To request status in respect of 8.33 kHz exemption	CONFIRM EIGHT POINT THREE THREE EXEMPTED
To indicate 8.33 kHz exempted status	*AFFIRM EIGHT POINT THREE THREE EXEMPTED
To indicate 8.33 kHz non-exempted status	* NEGATIVE EIGHT POINT THREE THREE EXEMPTED
To indicate that a certain clearance is given because otherwise a non-8.33 equipped and/or non-exempted aircraft would enter the airspace of mandatory carriage	DUE EIGHT POINT THREE THREE REQUIREMENT

\* Denotes pilot transmission.

## **8. VHF FREQUENCY MANAGEMENT**

### **8.1 General**

- 8.1.1 The aeronautical VHF band (118-137 MHz)<sup>7</sup> is the main radio communications band for line-of-sight air-ground voice communications used at all ATC Centres and Airports, for en-route, approach and landing phases of flight. The increasing demand and congestion of VHF frequencies in European high-density traffic areas have motivated the introduction of 8.33 kHz channel spacing.
- 8.1.2 Military organisations provide Air Traffic Services using aeronautical spectrum bands not under ICAO coordination) to sustain military operations (e.g. harmonised military bands UHF (225 MHz – 400 MHz) and VHF Aeronautical Mobile (Off-Route) Service (138 MHz – 144 MHz) for Operational Air Traffic – OAT).
- 8.1.3 Nevertheless, there are particular military missions, tasks and services that require the availability at military side of additional VHF assignments in the ICAO VHF COM (118-137 MHz) namely when military organisations provide Air Traffic Services<sup>8</sup> to civil airspace users. The type of service, airspace volume and phase of a flight may vary depending on local arrangements in each State.

### **8.2 Military use of VHF COM**

- 8.2.1 The cases where ATS provision or other missions or tasks do justify the assignment to or the use by the military of VHF COM frequencies (from the ICAO COM2 table) include:
- Military ATC can have the responsibility for the provision of ATS services to any airspace user, either civil or military, as OAT or GAT, in a designated part of the national airspace. For example, there are multiple cases in Europe where the military are in charge of controlling all the traffic in the lower airspace of a particular State
  - Military ATS units (Approach Control and Aerodrome Control, including Ground) may be designated by States to provide ATS within airspace structures (ATZ, CTR and TMA) associated with a military aerodrome
  - Most military aerodromes have to provide ATC support to any airspace user crossing its area of responsibility. VHF communications is the means to provide such ATC support when handling civil traffic crossing terminal airspace
  - The safe and efficient conduct of flights requires the availability of information services. For example, in specific circumstances it is possible to allow the

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<sup>7</sup> VHF COM band for Aeronautical Mobile (Route) Service (air-ground and air-air communications, VHF voice and data) coordinated by ICAO as described in ICAO Doc. 9718

<sup>8</sup> In compliance with ICAO Annex 11 or equivalent as determined by the national regulations

crossing of a restricted area where military activity is performed. Any airspace user not involved in this activity has the obligation to contact and to request a clearance to the appropriate responsible ATC unit

- The responsible ATC unit can be military but flights to be supported can be civil airspace users flying GAT, hence the only interoperable means to support the required ATC information exchanges are VHF radio frequencies within the aeronautical VHF band (118-137 MHz).
- Flight Information Services (FIS) will have to be equally available to civil and military traffic
- Special aeronautical events like air shows, dedicated military exercises organised in non-permanent airspace structures and training involving less-capable flying units (e.g. military aircraft from Eastern countries unable to tune military bands) are examples of activities that may entail the need to use VHF COM resources
- Search and Rescue (SAR) is a national responsibility with associated activities very often performed by the military. Nevertheless, SAR activities can also involve civil aircraft. The same applies to emergency, distress, medical and hospital flights. Air-ground voice communications are vital for these missions
- Calibration flights are conducted to check the performance of ground-based and airborne ATC systems including surveillance, navigation, and approach and landing aids for civil and military use. Required VHF COM frequencies are in some cases assigned to the military entities that organise such activities
- Test and functional check flights can be conducted by/for military and civil aircraft. In many States the military organise all or some of these activities and have VHF COM frequencies assigned for the required support
- In some States, the training of military pilots is conducted by civil aircraft operators using aircraft not equipped with military communications enablers. Military ATC units providing a service to this traffic will need dedicated ICAO VHF COM assignments.

### **8.3 Best Practices**

8.3.1 The norms and rules guiding frequency management are defined at national level. However, the shared use of VHF COM band recommends some best practices to be taken into account. Those best practices should include:

- the regular review of assignments and the need to avoid old assignments being maintained when there is no operational justification
- use temporary assignments when the justifying mission or task has a short duration

- communicate to the frequency manager any modification on the coverage (DOC) requirement so that the data base can be updated (DOC associated with VHF frequency assignments shall be adapted to the real operational need)
- employ shared assignments when civil and military ATC units are integrated or, at least, co-located
- monitor and react immediately in case of harmful interference.

## **9. STAKEHOLDER SUPPORT**

### **9.1 The role of the Network Manager (NM)**

- 9.1.1 Through Regulation (EU) 677/2011 of 07 July 2011, the European Commission created the Network Manager (NM) function so as to optimise the aviation network's performance.
- 9.1.2 The Network Manager addresses performance issues strategically, operationally and technically. Its overarching mission is to contribute to the delivery of air traffic management's (ATM) performance in the pan-European network in the areas of safety, capacity, environment / flight efficiency and cost effectiveness.
- 9.1.3 One of the NM functions is to provide a central function for Frequency Allocation designated as Radio Frequency Function (RFF). The main purpose of the Radio Frequency Function (RFF) is to mitigate the network impact of the limited aeronautical radio spectrum. The RFF will coordinate all frequencies used within the aviation spectrum for communication, navigation and surveillance (CNS) systems in the ICAO EUR/NAT Region.
- 9.1.4 The RFF is conducted together with ICAO and States. One of the first priorities is to address the VHF congestion and maximise the benefit of the 8.33 kHz expansion.
- 9.1.5 The RFF provides frequency management support to States in the following areas:
- managing the block planning process to find effective frequency shifts to satisfy frequency requirements;
  - assisting States in finding appropriate frequencies and maximising the use of the available spectrum;
  - assisting States in finding suitable frequencies in cases of urgency (e.g. interferences);
  - providing training and support for the frequency management software systems.
- 9.1.6 RFF contributes to network performance by assigning VHF frequencies which don't create critical delay for airspace improvements. Additionally, it will ensure that the appropriate channels are available for new application deployment (VDL2 for

instance) and that congestion for navigation aids frequencies is also reduced.

9.1.7 To support the RFF processes an European Aviation Frequencies Central Register based on the SAFIRE (Spectrum And Frequencies Information REsource) system is in place to:

- Store the operational information required by the ATM network functions regulation to support the enhanced frequency management processes.
- Support the complete life-cycle of a frequency assignment, providing suitable support to the assessment of the network impact and the prioritisation of new requests.

9.1.8 Related working arrangements comprise the Radio Frequency Function group (RAFT). The RAFT is the managing body of the RFF. It is composed of the National Frequency Managers (NFM) nominated by the European States, ICAO and the NM.

## **9.2 The 8.33 kHz Implementation Support Group (ISG)**

9.2.1 To support 8.33 kHz implementation, an 8.33 kHz Implementation Support Group (ISG) was established within the Network Manager.

9.2.2 The remit of the 8.33 ISG is to provide a direct channel of communication between the Network Manager and its stakeholders on activities related to Implementation of 8.33 voice channel spacing (VCS).

9.2.3 Within the aforementioned framework, the 8.33 ISG coordinates the planning and implementation of the 8.33 VCS. The main purpose is to ensure the proper implementation and performance of the 8.33 VCS in the entire EU area. Link with the NM-RFF is established to measure the benefit that 8.33 kHz will bring on frequency congestion.

9.2.4 Participation at 8.33 ISG is open also to military aircraft operators. The 8.33 ISG tasks, inter alia, include to:

- Coordinate the implementation of 8.33 VCS as prescribed by EC Reg. No. 1079/2012.
- Ensure technical support for the potential evolution of the 8.33 VCS Implementing rule as required.
- Provide common focal point for any planning issues (with special attention to possible adverse impact on network management) and other issues such as system impacts.
- Identify and plan changes to supporting European procedures, such as LoAs, to support stakeholders in implementing 8.33 assignments.
- Identify and plan changes to supporting European-wide engineered systems, such as IFPS, to support stakeholders in implementing 8.33 assignments effectively.

- Coordinate states, Airspace users, ANSPs, Military, General Aviation, Airports, and other stakeholders in preparation for future conversions.
- Ensure technical support to stakeholders when and if required.
- Disseminate information on best practices with reference to the 8.33 VCS implementation.

9.2.5 The 8.33 ISG is available to support military aircraft operators on their 8.33 kHz implementation activities.

## ANNEX A: GLOSSARY

### Abbreviations

<b>ACARS</b>	Aircraft Communication and Reporting System
<b>AGVCS</b>	Air Ground Voice channel Spacing
<b>AIP</b>	Aeronautical Information Publication
<b>ANSP</b>	Air Navigation Service Provider
<b>ATC</b>	Air Traffic Control
<b>ATM</b>	Air Traffic Management
<b>ATS</b>	Air Traffic Services
<b>CLIMAX</b>	Carrier Off Set System
<b>CNS</b>	Communications, Navigation and Surveillance
<b>CNST</b>	CNS Team
<b>COM</b>	Communications
<b>COMSG</b>	Communications Sub Group
<b>COOPATS</b>	Cooperative ATS
<b>COSEP</b>	Cooperative Separation
<b>COTR</b>	Coordination and Transfer
<b>COTS</b>	Commercial Off-The-Shelf
<b>CS-ACNS</b>	Certification Specifications – Acceptable Means of Compliance for Airborne Communications, navigation and Surveillance
<b>CTR</b>	Control Area
<b>CWP</b>	Controller Working Position
<b>EANPG</b>	European Air Navigation Planning Group (ICAO)
<b>EASA</b>	European Aviation Safety Agency
<b>EATMN</b>	European Air Traffic Management Network
<b>EATMP</b>	European Air Traffic Management Programme
<b>ECAC</b>	European Civil Aviation Conference
<b>EUROCAE</b>	European Organisation for Civil Aviation Equipment
<b>FCI</b>	Future Communications Infrastructure
<b>FIS</b>	Flight Information Service
<b>FL</b>	Flight Level
<b>FPL</b>	Flight Plan
<b>GAT</b>	General Air Traffic
<b>HF</b>	High Frequency
<b>HMI</b>	Human Machine Interface

<b>ICAO</b>	International Civil Aviation Organisation
<b>IFPS</b>	Initial Flight (Plan) Processing System
<b>IFR</b>	Instrument Flight Rules
<b>ISG</b>	Implementation Support Group
<b>NATO</b>	North Atlantic Treaty Organisation
<b>NFM</b>	National Frequency Manager
<b>NM</b>	Network Manager
<b>OAT</b>	Operational Air Traffic
<b>RFF</b>	Radio Frequency Function
<b>SAR</b>	Search and Rescue
<b>SARPS</b>	Standards and Recommended Practices (ICAO)
<b>SES</b>	Single European Sky
<b>TGL</b>	Temporary Guidance Leaflet
<b>TMA</b>	Terminal Manoeuvring Area
<b>UHF</b>	Ultra High Frequency
<b>VCS</b>	Voice Communication System
<b>VDL</b>	VHF Data Link
<b>VFR</b>	Visual Flight Rules
<b>VHF</b>	Very High Frequency
<b>WRC</b>	World Radiocommunication Conference

## Definitions

<b>Coverage</b>	The coverage provided by a radio-navigation system is that surface area or space volume in which the signals are adequate to permit the user to determine position to a specified level of accuracy. Coverage is influenced by system geometry, signal power levels, receiver sensitivity, atmospheric noise conditions and other factors which affect signal availability.
<b>Forward fit</b>	Forward fit means new aircraft, not yet in service (or suffering a major mid-life overhaul), due for delivery already fitted with the capability implemented prior to delivery. A shorter notice period can also be given to operators for the equipage of new aircraft than that provided for retrofits. In aviation, when an aircraft is made and delivered with all agreed Supplier Furnished Equipment (SFE) equipment it may be considered forward fitted. The opposite of SFE is buyer-furnished equipment (BFE), which is purchased by the buyer and given to the aircraft manufacturer to be installed before delivery by the aircraft manufacturer. SFE is alternatively referred to as forward fit, while BFE is referred to as retrofit. Typically the SFE is elegantly integrated appearing as a natural part of the original system. BFE in contrast often appears to be a late 'bolt on' that interrupts the smooth lines and operations of the original system. BFE also includes preferred galley equipment. In many cases the aircraft is designed to accommodate the BFE during the initial engineering phase.
<b>General Air Traffic</b>	Encompasses all flights conducted in accordance with the rules and procedures of ICAO.
<b>Operational Air Traffic</b>	Encompasses all flights which do not comply with the provisions stated for GAT and for which rules and procedures have been specified by appropriate national authorities.
<b>Retrofit</b>	Retrofit means to install (new or modified parts or equipment) in something previously manufactured or constructed system or a newly-designed piece of equipment added to an older airplane. It may be to fix an older version (older versions) as part of the same process of fixing the newest version
<b>State aircraft</b>	For ATM purposes and with reference to article 3(b) of the Chicago Convention, only aircraft used in military, customs and police services shall qualify as State Aircraft. Accordingly: Aircraft on a military register, or identified as such within a civil register, shall be considered to be used in military service and hence qualify as State Aircraft; Civil registered aircraft used in military, customs and police service shall qualify as State Aircraft; Civil registered aircraft used by a State for other than military, customs and police service shall not qualify as State Aircraft.

## **ANNEX B: REFERENCES**

- [1] EUROCONTROL Roadmap on Enhanced Civil-Military CNS Interoperability and Technology Convergence, Edition 2.0 dated 17 October 2013
- [2] Regulation (EC) No 1265/2007 of 26 October 2007 laying down requirements on air-ground voice channel spacing for the Single European Sky
- [3] Regulation (EC) No 1079/2012 of 16 November 2012 laying down requirements for voice channel spacing for the Single European Sky
- [4] EUROCONTROL Guidance on the Use of ICAO Aeronautical Mobile (Route) Service VHF band (117.975 – 137 MHz) by the Military, Document 10/06/04-63, Edition 1.0, 08 April 2010
- [5] EUROCONTROL Guidelines on the Use of UHF for ATC, GUID-138-2009, Edition 1.0, 02 June 2010
- [6] ICAO Frequency Management Manual (Doc. EUR-011)
- [7] ETSI EN 302 617 V1.1.1 (2009-01) Electromagnetic compatibility and Radio spectrum Matters (ERM); Ground-based UHF radio transmitters, receivers and transceivers for the UHF aeronautical mobile service using amplitude modulation; Part 1: Technical characteristics and methods of measurement
- [8] Regulation (EC) 677/2011 of 07 July 2011, Network Manager (NM) regulation
- [9] EUROCONTROL Website - Avionics Requirements Web Pages (<http://www.eurocontrol.int/articles/avionics-requirements>)



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