***ACP WGF Flimsy***

**Aeronautical Communications Panel (ACP)**

**Working Group F Meeting**

(Bangkok, 8 - 18 December 2009)

**Agenda Item:**

Source: WP20, IP14 and IP15

**Contribution to ITU-R Working Party 4C on WRC-12 Agenda Item 1.7**

**“**

**Discussions on ITU-R Resolution 222 (WRC-07) and proposed modifications of CPM text on Spectrum Requirements”**

**1. Background**

AI 1.7 of the WRC12 is:

*1.7 to consider the results of ITU-R studies in accordance with Resolution 222 (Rev.WRC-07) in order to ensure long-term spectrum availability and access to spectrum necessary to meet requirements for the aeronautical mobile-satellite (R) service, and to take appropriate action on this subject, while retaining unchanged the generic allocation to the mobile-satellite service in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz*

This is basically is calling on ITU Res. 222 (WRC-07) to study and provide results that “ensure” long-term spectrum availability and access to spectrum necessary to meet the requirements of AMS(R)S and take appropriate actions.

This paper will hence analyse the current ITU-R WP4C studies called for in the invites ITU-R of the current Res. 222, so to propose conclusion on each of the invites of such resolution.

**2. ITU-R Resolution 222**

The ITU-R Resolution 222 (WRC07) states that:

invites ITU-R

*to conduct, in time for consideration by WRC-11, the appropriate technical, operational and regulatory studies to ensure long-term spectrum availability for the aeronautical mobile-satellite (R) service (AMS(R)S) including:*

*(i) to study, as a matter of urgency, the existing and future spectrum requirements of the aeronautical mobile-satellite (R) service;*

*(ii) to assess whether the long-term requirements of the AMS(R)S can be met within the existing allocations with respect to No.* ***5.357A*** *while retaining unchanged the generic allocation for the mobile-satellite service in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz, and without placing undue constraints on the existing systems operating in accordance with the Radio Regulations;*

*(iii) to complete studies to determine the feasibility and practicality of technical or regulatory means, other than the coordination process referred to in resolves 1 or the means considered in Report ITU-R M.2073, in order to ensure adequate access to spectrum to accommodate the AMS(R)S requirements as referenced in resolves 3 above, while taking into account the latest technical advances in order to maximize spectral efficiency;*

*(iv) if the assessment identified in invites ITU-R (i) and (ii) indicates that these requirements cannot be met, to study existing MSS allocations or possible, new allocations only for satisfying the requirements of the aeronautical mobile satellite (R) service for communications with priority categories 1 to 6 of Article****44****, for global and seamless operation of civil aviation taking into account the need to avoid undue constraints on existing systems and other services,*

We will now analyse each of these invites.

**2.1 Invites (i): “*to study, as a matter of urgency, the existing and future spectrum requirements of the aeronautical mobile-satellite (R) service;*”**

At the last WP4C a working document toward an ITU-R draft new report on long-term spectrum requirements (year 2025) was drafted. This document is now residing on the WP4C chairman’s report Doc. 338 Annex 9.

Here, ICAO analyses and reports the work undertaken so far at the ITU WP4C regarding the long-term AMS(R)S spectrum estimations in the following contributions, i.e.:

4C/245 (Annex 15) Chairman’s Report of previous meeting

4C/215 from Egypt

4C/239 from the United Arab Emirates

4C/279 from Brazil

4C/318 from Japan

4C/326 from UK

4C/333 from ESA (Global Requirements)

4C/334 from Germany/ESA (European Requirements)

The aim of this contribution is to analyse and provide the final worst case results of each of the above studies in year 2025.

* + 1. **Regional Requirements**

1. **ESA study Doc. 4C/334: Europe**

The ESA study is based on an hypothetical satellite network covering the European and North Atlantic airspace supporting 100% of the aviation traffic on the TMA, ENR and ORP domains.

The assumptions made are consistent with the COCR V2 and European air traffic growth provided by Eurocontrol. Also, ESA made assumption that some AOC services could be transmitted over a multicast mode instead of unicast. However this assumption will require a review by the aviation community in order to check that this is compatible with safety requirements. Hence, at this moment ICAO suggests that only the unicast results are considered with the assumption that these are worst case and that potential use of multicast can improve the results.

Overall the results show that the worst case long-term European spectrum requirements are:

**Forward-Link (space-to-Earth; 1.5 GHz band) : 3.3 MHz**

**Return-Link (Earth-to-space; 1.6 GHz band): 1.3 MHz**

1. **Brazil Study Doc. 4C/279**

The Brazil study is based on Brazilian airspace which includes Brazil and the South Atlantic Ocean.

This study is a thorough method based on PIAC over the given airspace and then by analysing the COCR V2 services an estimation of communication needs in the airspace is given.

The spectrum is then calculated based on a given communication system and the document has considered “Classic Aero – Inmarsat/MTSAT”.

The results of this study are that over the given Brazilian airspace the long-term spectrum requirements are:

**Forward-Link (space-to-Earth; 1.5 GHz band): 0.648 MHz**

**Return-Link (Earth-to-space; 1.6 GHz band): 0.715 MHz**

1. **Japan Study Doc. 4C/318: Asia-Pacific**

The Japanese/MTSAT study is based on the table provided in Document 4C/318, using PIAC methodology, assuming a future AMS(R)S system.

The results of this study are categorised into two parts, (1) one for one single satellite covering the Asia-Pacific and (2) one for a global coverage based on several satellites.

The provisional results are for a single satellite system, i.e:

**Case of global beam 0.744 MHz**

**Case of beam cluster 0.809 MHz**

1. **UK Study Doc. 326: Europe**

The UK/Inmarsat study is based on a global system coverage of the Inmarsat-4 satellite network.

In particular the study uses the ESA information volume results given in Doc. 4C/334 and concentrates its efforts over Europe in order to compare them. Then it extrapolates these results to the global coverage.

Since the aim of this paper is to show the worst case results, we will only consider the UK results of the unicast and 100% satellite services (in TMA, ENR and ORP domains).

The worst case results of the UK study (from Table 4 of document 4C/326) are:

**Forward-Link (space-to-Earth; 1.5 GHz band): 2.7 MHz**

**Return-Link (Earth-to-space; 1.6 GHz band): 0.235 MHz**

1. **Egypt Study Doc. 4C/215: Middle-East and Africa**

The study from Egypt was based on the maximum number of airplanes that may be logged on simultaneously (i.e. 500) and on the “Classic Aero” system characteristics.

The Administration of Egypt stated that this work is preliminary and that an update will be provided at the next WP4C meeting. Hence the preliminary results are provided below, i.e:

**Forward-Link (space-to-Earth; 1.5 GHz band): 1.730 MHz**

**Return-Link (Earth-to-space; 1.6 GHz band): 3.118 MHz**

1. **Summary of Long-term Regional Spectrum Requirements**

The following Table 1 provides the summary of these worst case results.

**Table 1:** **Results of worst case long-term**

**Regional AMS(R)S spectrum requirements**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Coverage** | **Forwad-Link**  **(MHz)** | **Return-Link**  **(MHz)** |
| **ESA – Doc. 4C/334** | Europe/North Atlantic Ocean | 3.3 | 1.3 |
| **Brazil – Doc. 4C/279** | Brazil/South Atlantic Ocean | 0.648 | 0.715 |
| **Japan – Doc. 4C/318** | Asia-Pacific Ocean | 0.809 | 0.809 |
| **UK – Doc. 4C/326** | Europe/North Atlantic Ocean | 2.7 | 0.235 |
| **Egypt – Doc. 4C/215** | Middle-East and Africa | [1.730]1  under revision | [3.118][[1]](#footnote-1)  under revision |
| **Maximum Value** |  | **3.3** | **1.3[[2]](#footnote-2)** |

* + 1. **Global Requirements**

1. **ESA study Doc. 4C/333**

This study is similar to the one made in Doc. 334, i.e. COCR V2 communication services, traffic growth similar to European growth and satellite system characteristics. However, with the major exception that it comprises different airspace coverage over a very large region. Such region comprises Europe, North and Mid Atlantic, South America and South Atlantic, Africa, Middle-East/Near Asia and Russia/Near Asia.

Furthermore, the study assumes that the region is covered by different satellite systems with various beam sizes. The study is based on hypothetical worst case assumptions. However, it assumes that all the satellite systems will be interoperable and having the same type of satellite characteristics.

As it is stated above, this document will consider only the worst case assumption, i.e. unicast type of communications.

The results of the study based on 18 regional spot beams are:

**Forward-Link (space-to-Earth; 1.5 GHz band): 4.2 MHz**

**Return-Link (Earth-to-space; 1.6 GHz band): 1.6 MHz**

1. **Japan Study Doc. 4C/318**

Following from the reported analysis in section 3 of 2.1.1 above, the Japanese document 4C/318 makes heuristic assumptions on how many satellite systems can cover the globe airspace.

The results are given in Document 4C/318 and they assume 3 satellite networks for which the total spectrum requirements are:

**Case of Global Beam 2.231 MHz**

**Case of Beam Cluster 2.428 MHz**

1. **UK Study Doc. 4C/326**

The UK study was based on Inm4 and over the European region. Here its underlying assumption is that as Europe is an airspace with very highly dense air traffic, and as the Inm-4 system is a global network of many satellites and with the same type of spot beams, then it is expected that the European spectrum requirements will also drive the global spectrum requirements.

Hence, if we assume that the Global requirements are the same as the European requirements then the results are:

**Forward-Link (space-to-Earth; 1.5 GHz band): 2.7 MHz**

**Return-Link (Earth-to-space; 1.6 GHz band): 0.235 MHz**

1. **UAE Study Doc. 4C/239**

The document from UAE is based on a study conducted in the 1999 using values and assumptions available in that period.

The calculation of spectrum is based on a global oceanic only coverage by a single global satellite system (e.g. Inmarsat 4), which makes certain carrier loading and efficiency assumption on the satellite beam. It also makes certain assumptions on the number of aircraft manoeuvres and aircraft position reporting for the calculation of the amount of data transfer for each communication (voice and data).

The methodology for this estimation is provided in the document 4C/239. The only comment offered is that such study should consider recent aviation requirements as detailed on COCR V2.

The document concludes that for the global oceanic coverage then spectrum requirements are:

**Voice: 0.80 MHz**

**Data: 0.28 MHz**

**Total: 1.08 MHz**

The UAE document has made these calculations for the air-to-ground case, i.e. return link (1.6 GHz band) and has stated that the forward-link may be more efficient. Taking into account that no calculation is provided for the forward link it is assumed, as a worst case, that they will be the same as the return link, i.e:

**Forward-Link (space-to-Earth; 1.5 GHz band): 1.08 MHz**

**Return-Link (Earth-to-space; 1.6 GHz band): 1.08 MHz**

1. **Summary of Long-term Regional Spectrum Requirements**

The following Table 2 provides the summary of the global worst case spectrum requirements results.

**Table 2:** **Results of worst case long-term**

**global AMS(R)S spectrum requirements**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Coverage** | **Forwad-Link**  **(MHz)** | **Return-Link**  **(MHz)** |
| **ESA – Doc. 4C/334** | Global | 4.2 | 1.6 |
| **Japan – Doc. 4C/318** | Global | 2.428 | 2.428 |
| **UK – Doc. 4C/326** | Global | 2.7 | 0.235 |
| **UAE – Doc. 4C/239** | Oceanic only | 1.08 | 1.08 |
| **Maximum Value** |  | **4.2** | **2.428** |

**2.1.3 Conclusion of Long-term Global Spectrum Requirements**

Although the WP4C spectrum estimations is to be concluded (as per work plan) at the next WP4C meeting March 2010, this document provides here the worst case results of the current studies, which on a Global level and for year 2025 these are about (Table 2):

**Forward-Link (space-to-Earth; 1.5 GHz band): 4.2 MHz**

**Return-Link (Earth-to-space; 1.6 GHz band): 2.428 MHz**

**2.1.4 Closure of invites (i) of Res 222**

As the studies called by invites (i) of Res. 222 have been performed and concluded. Hence, it is proposed to close the invites (i) of Resolution 222.

**2.2 Invites (ii): “to assess whether the long-term requirements of the AMS(R)S can be met within the existing allocations with respect to No. 5.357A while retaining unchanged the generic allocation for the mobile-satellite service in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz, and without placing undue constraints on the existing systems operating in accordance with the Radio Regulations”**

This text is divided into two parts as given below in section 2.2.1 and 2.2.2.

* + 1. **Long-Term Spectrum Fits in 2 x 10 MHz**

The results of the studies show that the total worst case long term spectrum requirement is well below 2x10 MHz (in particular 4.2 MHz in the forward-link and 2.4 MHz in the return-link).

Hence, this covers the first part of invites (ii) of res. 222 (WRC-07).

* + 1. **Long-Term Spectrum Does Not Cause Undue Constraints**

The second part of invites (ii) talks about “undue constraints”.

ICAO’s understanding of the words “undue constraint” is that this does not mean that the victim service will be free of constraints, instead it means that reasonable constraints to a victim service may be caused and accepted, and it is a matter of defining or understanding what these reasonable constraints are. The constraints may become “undue” or may become extremely detrimental such that the victim service may find it difficult to continue its operations. Hence, it does not mean that the victim must be “constraint free”.

As the global worst case long-term spectrum requirements of AMS(R)S will be small, i.e. less than 10% of the available MSS spectrum in L-band (i.e. 40 MHz), and as future MSS satellite systems (e.g. year 2025) will likely be more spectrum efficient, thus improving themselves the current spectrum congestion situation, then it is believed that AMS(R)S long-term needs will not cause undue constraints to the MSS.

**2.2.3 Closure of invites (ii) of Res 222**

Taking into account the results of the previous sections, it is believed that invites (ii) of resolution 222 (WRC07) has been fulfilled and can be deleted.

**2.3 Invites *(iii): “to complete studies to determine the feasibility and practicality of technical or regulatory means, other than the coordination process referred to in resolves 1 or the means considered in Report ITU-R M.2073, in order to ensure adequate access to spectrum to accommodate the AMS(R)S requirements as referenced in resolves 3 above, while taking into account the latest technical advances in order to maximize spectral efficiency”***

**2.3.1 Regarding “regulatory means”**

ICAO supports Method B of draft CPM text to modify Resolution 222 to improve the regulatory aspects that ensures access to spectrum to AMS(R)S to close this invites (iii) of Res. 222 (WRC-07). The modification of resolution 222, will have to take into account the new approach proposed by ICAO in its other contribution to WP4C (<title of contribution>).

**2.3.2 Regarding “technical means”**

ICAO believes that an improvement in the efficient use of spectrum of current MSS and AMS(R)S satellite systems will greatly improve the sharing situation between these two types of networks and reduce the current congestions in the 1.5/1.6 GHz band.

**2.3.3 Closure of invites (iii) of Res 222**

Taking into account the results of the previous sections, it is believed that invites (iii) of resolution 222 (WRC07) has been fulfilled and can be deleted.

**2.4 Invites *(iv): “if the assessment identified in invites ITU-R (i) and (ii) indicates that these requirements cannot be met, to study existing MSS allocations or possible, new allocations only for satisfying the requirements of the aeronautical mobile satellite (R) service for communications with priority categories 1 to 6 of Article 44, for global and seamless operation of civil aviation taking into account the need to avoid undue constraints on existing systems and other services”***

Taking into account that invites (i) and (ii) have been fulfilled and that the long-term spectrum requirements of AMS(R )S can be met in the existing frequencies bands 1545-1555 MHz and 1646.5-1656.5 MHz. Hence, no studies are required to propose existing or new frequency allocations for AMS(R)S for communications with priority categories 1 to 6 of Article 44. As a consequence, ICAO proposes that invites (iv) of Res. 222 (WRC-07) can be deleted.

**3. Conclusion and Recommendation**

This paper analyses several contributions on the results of several studies of the long-term AMS(R)S spectrum requirements under AI 1.7, as called by invites (i) of Resolution 222 (WRC-07). Invites (i) has been fulfilled.

It also analyses the fulfilment of invites (ii), (iii) and (iv) of Resolution 222 (WRC-07), i.e.:

* For invites (ii), the AMS(R)S long-term spectrum requirements fit in the current 2 x 10 MHz called by No. 5.357A without causing undue constraints to MSS, thus ICAO proposes its deletion;
* For invites (iii):
  + in order to fulfil this invites by regulatory means, ICAO supports Method B of the draft CPM text, by modification of Resolution 222 (as per the additional ICAO contribution to WP4C (<title>));
  + In order to fulfil this invites by technical means, ICAO propose that this can be fulfilled by an improvement in the efficient use of spectrum both MSS and AMS(R)S satellite systems.

ICAO proposes the deletion of invites (iii) of res. 222 (WRC07);

* For invites (iv), ICAO proposes its deletion since invites (i) and (ii) have been fulfilled and no studies are required for new or existing allocations.

Based on discussion above and contributions to WP4C, suggested CPM text is annexed to this paper.

ANNEX

**Proposed modification to the parts of the CPM text**

**for the WRC-11 Agenda Item 1.7**

# **Source: Attachment 14 to Doc. 4C/338**

5/1.7/2 Background

Replace two parts of [Views of some administrations: ...] by the following text.

"The multilateral coordination process is conducted under Article 9 of the Radio Regulations and was established by the notifying Administrations of MSS networks to facilitate the coordination of these networks.

In line with the normal practice in frequency coordination for all types of satellite networks, the Administrations involved in the bilateral and multilateral processes conducted for the 1.5/1.6 GHz bands MSS networks have agreed to keep the coordination agreements confidential.

The current coordination process includes a validation process of requested spectrum assignments. In this process, AMS(R)S spectrum requirements should be clearly identified in accordance with RR Article 44 categories 1 to 6.

One AMS(R)S operator has encountered difficulty several times in the ORM process for access to spectrum since 2003 since their spectrum requirements are treated on an equal basis with all MSS operators. In particular, despite of the priority given by RR No. 5.357A their spectrum requirements were only satisfied for no more than 70% of their justified and agreed spectrum needs in the framework of one MLM group (Regions 1 and 3). When then considering the additional constraints coming from the other operators in Region 2 the overall resulting spectrum freely accessible for the AMS(R )S network were less than 50%. This is because the spectrum assigned in one MLM group (Regions 1 and 3) is not reusable with the other MLM group (Region 2).

In the past, at the ORM (Regions 1 and 3) there has not been a consensual agreement on the request of new assignments which resulted in no new assignments being made to any of the operators. Hence, as it is important for AMS(R)S safety communications needs to be accommodated in the long-term with stable access to spectrum, the disagreements in the ORM framework which may result in freeze of assigned spectrum between operators can cause undue operational constraints to the AMS(R)S network.

Moreover, the ORM assignments agreed under the provisions of the MoU of the MLM are not available in the public domain. This makes it very difficult for the aviation community to develop long-term plans for spectrum access in order to serve their safety communication needs.

The process is not sufficiently transparent to all parties. Consequently, there is a need to add some openness and transparency in the process.

The current mechanism does not address in which unacceptable interference is caused to AMS(R)S.

Due to the above reasons, the view of some Administrations is that the provisions of RR No. 5.357A and Resolution 222 (Rev.WRC-07) have not been put into practice within the current framework of the multilateral frequency coordination meetings and in order to resolve such matter, Agenda item 1.7 was adopted by WRC-07.”

# **5/1.7/5 Methods to satisfy the agenda item**

## 5.1 Method A – No Change to the regulatory provisions of the Radio Regulations

Coordination between mobile-satellite service (MSS) networks is required in accordance with the procedure of RR Article **9,** No. **5.357A**.

Until now there have been some cases where an existing AMS(R)S system, could not have all the requirements fulfiled during the multilateral coordination process;

The AMS(R)S spectrum requirements have been estimated [as less than 2 x 10 MHz]. The existing Radio Regulation provision RR No. **5.357A** and the resolves of Resolution **222 (Rev.WRC-07)** provide sufficient priority for current and future AMS(R)S requirements. Under these provisions, notifying administrations of the AMS(R)S systems should identify required spectrum for AMS(R)S communications (within priority categories 1 to 6 of RR Article **44)** in order that validated ASM(R)S requirements are provided through the coordination process.

Advantages

– based on recent studies the spectrum requirements for AMS(R)S up to the year 2025 can be accommodated in the frequencies bands according to RR No. **5.357A**;

– the generic allocation to the mobile-satellite service in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz remains unchanged, [ensuring the flexible and efficient use of them];

The view of some administrations is that the existing regulatory procedures are adequate to ensure that the spectrum requirements of AMS(R)S systems could be satisfiedDisadvantages

– since no additional procedures will be included in the Radio Regulations, the problems that have led to the adoption of A.I. 1.7 will not be solved.

– – undue constraints will be cause to the long term for AMS(R)S.

– experience gained in the over 10 years indicates the coordination process in these bands between operators at regular annual multilateral coordination meetings, based on the capacity-planning approach, has not been satisfactory for accommodating AMS(R)S spectrum requirements;

# **5.2 Method B – New ITU-R Resolution, or a modified ITU-R Resolution 222 which implements additional procedures for the provision of RR No. 5.357A**

The spectrum requirement has been estimated for 2025 and would be considerably less than 2x10 MHz in the Space to Earth and Earth to Space direction.

This new ITU-R Resolution, or modified ITU-R Resolution 222should aim at implementing additional procedures to ensure priority access to AMS(R)S spectrum under provision RR No. **5.357A**.

One option is that the new ITU-R Resolution, or modified ITU-R Resolution 222may require notifying administrations of both MSS and AMS(R)S networks involved in the coordination process to consider necessary spectrum requirements for the AMS(R)S networks for the year concerned, and to assign spectrum to AMS(R)S networks prior to other MSS network separately, while accepting MSS usage within this spectrum under the provisions of RR No. **5.357A**.

Another option is the approach proposed by ICAO in the contribution (<< title flimsy 1>>)

Consequentially, editorial modifications to RR No. **5.357A** may be needed.

Advantages

– priority access to AMS(R)S communications is ensured, and generic MSS networks are able to share with AMS(R)S networks.

– this method would not result in placing undue constraints to the existing systems as far as real spectrum requirements would be considerably less than 2 x 10 MHz.– this method would result in efficient use of spectrum by keeping generic MSS allocation in conformity with Resolution 222 (WRC-07).

Disadvantages

– additional worldwide administrative meetings need to be held.

## 5.3 Method C – New allocations only for satisfying the requirements of AMS(R)S for communications

[*Editor’s note: this Method is relevant only as per invites iv) of Resolution 222.*]

Disadvantages

– undue constraints will be cause to the long term for AMS(R)S.

# 5.4 **Method D – New ITU-R Resolution, or a modified ITU-R Resolution 222 which implements additional procedures to improve coordination among AMS(R)S systems**

[*Editor’s note: this Method needs to be clarified by future contributions and may be part of Method B.*]

# **5/1.7/6 Regulatory and procedural considerations**

## Method B

– Modify Resolution **222 (Rev. WRC-07)**.

– Retain provision of RR No. **5.357A** with consequential amendments, as appropriate.

It is proposed that:

– the current provision RR No. **5.357A** should generally be retained as it is with small amendments;

– WRC-12 should modify Resolution **222 (Rev.WRC-07)** as per attachment

[– remove reported difficulties and deficiencies that memberships encountered in implementation of Resolution 222 (WRC-07)]

– Invites ICAO to the process of determining yearly spectrum requirements for AMS(R)S and approve these spectrum requirements.

– Instruct Administration of AMS(R)S systems to also oversee the process of estimating spectrum requirements for AMS(R)S systems.

– Instruct Administrations of MSS systems taking part in the MLM/ORM process, to give priority access to AMS(R)S spectrum requirements as approved by ICAO. In case of ORM does not achieve any agreement, then the Administrations taking part in the ORM/MLM shall make spectrum available to the AMS(R)S requirements as approved by ICAO.

A draft revision of ITU-R Resolution **222** in that sense is proposed in Annex A.Annex A

**MOD**

Preliminary Draft MODIFICATION TO

RESOLUTION 222 (Rev.WRC-12)

Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz   
by the mobile-satellite service, and studies to ensure long-term   
access for the aeronautical mobile-satellite (R)   
service

The WorldRadiocommunication Conference (Geneva, 2012),

considering

*a)* that prior to WRC-97, the bands 1 530-1 544 MHz (space-to-Earth) and 1 626.5‑1 645.5 MHz (Earth-to-space) were allocated to the maritime mobile-satellite service and the bands 1 545-1 555 MHz (space-to-Earth) and 1 646.5‑1 656.5 MHz (Earth-to-space) were allocated on an exclusive basis to the aeronautical mobile-satellite (R) service (AMS(R)S) in most countries;

*b)* that WRC-97 allocated the bands 1 525-1 559 MHz (space-to-Earth) and 1 626.5‑1 660.5 MHz (Earth-to-space) to the mobile-satellite service (MSS) to facilitate the assignment of spectrum to multiple MSS systems in a flexible and efficient manner;

*c)* that WRC-97 adopted No. **5.353A** giving priority to accommodating spectrum requirements for and protecting from unacceptable interference distress, urgency and safety communications of the Global Maritime Distress and Safety System (GMDSS) in the bands 1 530-1 544 MHz and 1 626.5-1 645.5 MHz and No. **5.357A** giving priority to accommodating spectrum requirements for and protecting from unacceptable interference the AMS(R)S (providing transmission of messages with priority categories 1 to 6 in Article **44)** in the bands 1 545‑1 555 MHz and 1 646.5-1 656.5 MHz;

*d)* that AMS(R)S is an essential element of ICAO CNS/ATM to provide safety and regularity of flight in the civil air transportation,

further considering

*a)* that coordination between satellite networks is required on a bilateral basis in accordance with the Radio Regulations, and, in the bands 1 525-1 559 MHz (space-to-Earth) and 1 626.5‑1 660.5 MHz (Earth-to-space), coordination is partially assisted by regional multilateral meetings;

*b)* that, in these bands, geostationary satellite system operators currently use a capacity‑planning approach at multilateral coordination meetings, with the guidance and support of their administrations, to periodically coordinate access to the spectrum needed to accommodate their requirements;

*c)* that spectrum requirements for MSS networks, including the GMDSS and AMS(R)S, are currently accommodated through the capacity-planning approach and that, in the bands to which Nos. **5.353A** or **5.357A** apply, this approach, and other methods may prove insufficient in accommodating the expected increase of spectrum requirements for GMDSS and AMS(R)S;

*d)* that Report ITU-R M.2073 has concluded that prioritization and inter-system pre-emption between different mobile-satellite systems is not practical and, without a significant advance in technology, is unlikely to be feasible for technical, operational and economical reasons. It summarized that prioritization and intersystem real-time pre-emption would not necessarily increase the efficiency of spectrum use compared to the current situation, but it would certainly complicate substantially the coordination process and network structure;

recognizing

*a)* that absolute priority to all telecommunications concerning safety of life at sea, on land, in air or in outer space is given by No. 191 of the ITU Constitution;

*b)* that the International Civil Aviation Organization (ICAO) has adopted Standards and Recommended Practices (SARPs) addressing satellite communications with aircraft in accordance with the Convention on International Civil Aviation;

*c)* that all air traffic communications as defined in Annex 10 to the Convention on International Civil Aviation fall within priority categories 1 to 6 of Article **44**;

*d)* that Table 15-2of Appendix **15** identifies the bands 1 530-1 544 MHz (space-to-Earth) and 1 626.5-1 645.5 MHz (Earth-to-space) for distress and safety purposes in the maritime mobile‑satellite service as well as for routine non-safety purposes,

e) that ICAO coordinates aviation communications and spectrum requirements

resolves

1 that, in frequency coordination of MSS in the bands 1 525-1 559 MHz and 1 626.5‑1 660.5 MHz, administrations shall ensure that the spectrum needed for distress, urgency and safety communications of GMDSS, as elaborated in Articles **32** and **33**, in the bands where No. **5.353A** applies is accommodated;

2 that, prior to the frequency coordination of MSS in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz, administrations shall ensure that the spectrum needed for AMS(R)S communications in the bands where No. **5.357A** applies is accommodated with priority over any other services in the same and/or different network as stipulated in No. **5.357A**;

3 that administrations shall ensure the use of the latest technical advances, in order to achieve the most flexible, efficient and practical use of the generic allocations;

4 that administrations shall ensure that MSS operators carrying non‑safety-related traffic yield capacity, as and when necessary (in particular at the coordination meetings), to accommodate the spectrum requirements for distress, urgency and safety communication of GMDSS communications, as elaborated in Articles **32** and **33**, and for AMS(R)S communications; this could be achieved in advance through the frequency coordination process in *resolves* 1, and when necessary, through other means if such means are identified as a result of studies in *invites ITU-R*;

5 in case that unacceptable interference is caused to AMS(R)S, in application of this Resolution, the unacceptable interference shall be immediately eliminated upon the seek of advice,

6 To achieve the process indicated in *resolves 4*, all administrations providing and planning AMS(R)S networks should hold consultation meetings on a regular basis (e.g. yearly) to

i) accommodate the AMS(R)S spectrum requirements coordinated by ICAO;

ii) ensure that AMS(R)S spectrum requirements as derived by ICAO communication requirements are given priority access to spectrum in respect to ensuring that No. **5.357A** is fulfilled;

1. make spectrum available for AMS(R)S in case that no agreement is reached during the regular coordination process with MSS networks.

instructs the Secretary General

to bring this Resolution to the attention of ICAO,

*instructs the Director of the Radiocommunication Bureau*

to publish annually the assignments made to AMS(R)S covered by No. **5.357A**, identifying portion of such spectrum devoted to ASM(R)S and to general MSS respectively,

invites ICAO to

to consider this resolution ;

1. These values need to be confirmed by the Administrations of Egypt at the next WP4C meeting. [↑](#footnote-ref-1)
2. This value does not consider the results from Egypt Doc. 4C/215. [↑](#footnote-ref-2)