Agenda Item 1.4: to consider, based on the results of ITU-R studies, any further regulatory measures to facilitate introduction of new aeronautical mobile (R) service (AM(R)S) systems in the bands 112-117.975 MHz, 960-1 164 MHz and 5 000-5 030 MHz in accordance with Resolutions 413 (Rev.WRC-07), 417 (WRC-07) and 420 (WRC-07)

Background Information: WRC-12 agenda item 1.4 provides an opportunity to complete the studies requested in Resolution 413 (WRC-07) and propose to WRC-12 any additional regulatory measures to facilitate the introduction of new AM(R)S systems in the bands 112 – 117.975 MHz. The International Civil Aviation Organization (ICAO) will address compatibility of the AM(R)S with ICAO standardized systems. The ITU is addressing compatibility with in-band and adjacent band non-ICAO systems identified in Resolution 413 (WRC-07). Due to the introduction of AM(R)S systems in the 112-117.975 MHz band, the ITU-R conducted studies on compatibility between analogue broadcasting and AM(R)S systems. These studies indicate that no harmful interference to analogue FM broadcasting receivers below 108 MHz will arise from the introduction of AM(R)S systems in the band 112-117.975 MHz. The studies concluded that both services can operate compatibly. The ITU-R will pursue compatibility studies with digital broadcasting systems below 108 MHz under ITU-R study group activities and outside the WRC process; therefore, this proposal modifies Resolution 413 (Rev.WRC-07) to account for the completed ITU-R study work.

WRC-12 agenda item 1.4 also resolves, under Resolution 420 (WRC-07), to investigate, if necessary, the feasibility of a new allocation to AM(R)S in the frequency bands in 5 000 – 5 030 MHz for surface applications at airports, provided that requirements for those applications cannot be satisfied in the 5 091 – 5 150 MHz band, and that those applications are compatible with the radionavigation-satellite service (RNSS) in the 5 000 – 5 030 MHz band and the radio astronomy service (RAS) in the adjacent 4 990 – 5 000 MHz band. ITU-R Report M.2120 concluded that new surface applications at airports require approximately 60-100 MHz of AM(R)S spectrum in the 5 000 – 5 150 MHz band. Some administrations support a spectrum requirement of approximately 60 MHz. This requirement cannot be fulfilled entirely within 5 091 – 5 150 MHz. ITU-R studies concluded that compatibility between planned AM(R)S and RNSS feeder link and telemetry, tracking, and commanding (TT&C) stations in the 5 000-5 010 MHz band is feasible under worst-case conditions. However, to avoid interference to AM(R)S systems, feeder link and TT&C stations and the AM(R)S systems need to maintain separation distances determined based on system characteristics and local conditions such as terrain, building obstruction, and airport layout. Current GPS feeder link and TT&C stations are fixed; however, in the future these stations may be transportable and located near airports. If systems cannot maintain the required separation distances, certain AM(R)S channels in the 5 000 – 5 010 MHz band may not be useable at those geographic locations.

This contribution does not propose an AM(R)S allocation in the 5010 – 5030 MHz band because neither the AM(R)S operational environment nor the RNSS signal characteristics are sufficiently defined to finalize ITU-R compatibility studies between the two services.
Proposal:

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. 2.1)

NOC  USA/AI 1.4/1

75.2-137.175 MHz

<table>
<thead>
<tr>
<th>Allocation to services</th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>108-117.975</td>
<td></td>
<td>AERONAUTICAL RADIONAVIGATION 5.197 5.197A</td>
<td></td>
</tr>
</tbody>
</table>

Reasons: Any modifications to the 108-117.975 MHz band may place additional constraints on the broadcasting service in the 87-108 MHz band.

MOD  USA/AI 1.4/2

5 000-5 010 MHz

<table>
<thead>
<tr>
<th>Allocation to services</th>
<th>Region 1</th>
<th>Region 2</th>
<th>Region 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 000-5 010</td>
<td></td>
<td>AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (Earth-to-space) 5.367 ADD 5_AMR</td>
<td></td>
</tr>
</tbody>
</table>

Reasons: To provide an allocation to support AM(R)S surface applications at airports.

NOC  USA/AI 1.4/3
5 010-5 030 MHz

<table>
<thead>
<tr>
<th>Allocation to services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region 1</td>
</tr>
<tr>
<td>5 010-5 030</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Reasons:** Neither the AM(R)S operational environment nor the RNSS signal characteristics are sufficiently defined to finalize ITU-R compatibility studies between the two service. Therefore, no allocation is proposed for the AM(R)S in this band.

**ADD** USA/AI 1.4/4

**5.AMR** The band 5 000-5 010 MHz is also allocated to the aeronautical mobile (R) service. Such use shall be in accordance with Resolution [USA/AI1.4/1-5 GHZ AM(R)S] (WRC-12).

**Reasons:** To provide an allocation to support AM(R)S surface applications at airports.

**MOD** USA/AI 1.4/5

**RESOLUTION 413 (Rev.WRC-1207)**

**Use of the band 108-117.975 MHz by the aeronautical mobile (R) service**

The World Radiocommunication Conference (Geneva, 201202),


considering


a) the current allocation of the frequency band 108-117.975 MHz to the aeronautical radionavigation service (ARNS);

b) the current requirements of FM broadcasting systems operating in the frequency band 87-108 MHz;

c) that digital sound broadcasting systems are capable of operating in the frequency band at about 87-108 MHz as described in Recommendation ITU-R BS.1114;

d) the need for the aeronautical community to provide additional services by enhancing navigation systems through a radiocommunication data link;
e) the need for the broadcasting community to provide digital terrestrial sound broadcasting services;

f) that this allocation was made by this Conference in the knowledge that studies are ongoing with respect to the technical characteristics, sharing criteria and sharing capabilities;

g) the need for the aeronautical community to provide additional services for radiocommunications, relating to safety and regularity of flight, in the band 112-117.975 MHz;

h) that the WRC-07 Conference has modified the allocation of the band 112-117.975 MHz to the aeronautical mobile (R) services (AM(R)S) in order to make available this frequency band for new AM(R)S systems, and in doing so enabled further technical developments, investments and deployment;

i) that the frequency band 117.975-137 MHz currently allocated to the AM(R)S is reaching saturation in certain areas of the world;

j) that this new allocation is intended to support the introduction of applications and concepts in air traffic management which are data intensive, and which could support data links that carry safety-critical aeronautical data;

k) that additional information is needed about the new technologies which will be used, the amount of spectrum required, the characteristics and sharing capabilities/conditions, and that therefore studies are urgently required on which AM(R)S systems will be used, the amount of spectrum required, the characteristics and the conditions for sharing with ARNS systems,

recognizing

a) that precedence must be given to the ARNS operating in the frequency band 108-117.975 MHz;

b) that, in accordance with Annex 10 of the Convention of the International Civil Aviation Organization (ICAO) on International Civil Aviation, all aeronautical systems must meet standards and recommended practices (SARPs) requirements;

c) that within ITU-R, compatibility criteria between FM broadcasting systems operating in the frequency band 87-108 MHz and the ARNS operating in the frequency band 108-117.975 MHz already exist, as indicated in the most recent version of Recommendation ITU-R SM.1009;

d) that all compatibility issues between FM broadcasting systems and ICAO standard ground-based systems for the transmission of radionavigation-satellite differential correction signals have been addressed,

noting

a) that aeronautical systems are converging towards a radiocommunication data link environment to support aeronautical navigation and surveillance functions, which need to be accommodated in existing radio spectrum;

b) that some administrations are planning to introduce digital sound broadcasting systems in the frequency band at about 87-108 MHz;
c) that no compatibility criteria currently exist between FM broadcasting systems operating in the frequency band 87-108 MHz and the planned additional aeronautical systems in the adjacent band 108-117.975 MHz using aircraft transmission;

d) that no compatibility criteria currently exist between digital sound broadcasting systems capable of operating in the frequency band at about 87-108 MHz and aeronautical services in the band 108-117.975 MHz,

resolves

1 that any aeronautical mobile (R) service systems operating in the band 108-117.975 MHz shall not cause harmful interference to, nor claim protection from ARNS systems operating in accordance with international aeronautical standards;

2 that any AM(R)S systems planned to operate in the frequency band 108-117.975 MHz shall, as a minimum, meet the FM broadcasting immunity requirements contained in Annex 10 of the ICAO Convention on International Civil Aviation for existing aeronautical radionavigation systems operating in this frequency band;

3 that AM(R)S systems operating in the band 108-117.975 MHz shall place no additional constraints on the broadcasting service or cause harmful interference to stations operating in the bands allocated to the broadcasting service in the frequency band 87-108 MHz and No. 5.43 does not apply to systems identified in recognizing d);

4 that frequencies below 112 MHz shall not be used for AM(R)S systems excluding the ICAO systems identified in recognizing d);

5 that any AM(R)S operating in the frequency band 108-117.975 MHz shall meet SARPs requirements published in Annex 10 of the ICAO Convention on International Civil Aviation;

6 invites ITU-R

invites ITU-R

1 to study any compatibility issues between the broadcasting and AM(R)S services that may arise from the introduction of AM(R)S systems in the band 112-117.975 MHz, and to develop new or revised ITU-R Recommendations as appropriate;

2 to study any compatibility issues between the broadcasting and AM(R)S services in the band 108-117.975 MHz that may arise from the introduction of appropriate digital sound broadcasting systems, described in Recommendation ITU-R BS.1114, and to develop new or revised ITU-R Recommendations as appropriate;

3 to report to WRC-11 on the results of these studies;

instructs the Secretary-General

to bring this Resolution to the attention of ICAO.
Reasons: Editorial modifications to the resolution are consequential to the no change proposal in the band 108-117.975 MHz.

ADD USA/AI 1.4/6

RESOLUTION [USA/1.4/1-5 GHZ AM(R)S] (WRC-12)

Use of the 5 000-5 010 MHz band by the aeronautical mobile (R) service and protection of the radionavigation-satellite and the radio astronomy services

The World Radiocommunication Conference (Geneva, 2012),

considering

a) the current allocation of the frequency band 5 000-5 010 MHz to the aeronautical mobile satellite (R) service (AMS(R)S) subject to agreement obtained under No. 9.21, the aeronautical radionavigation service (ARNS) and the radionavigation-satellite service (RNSS) (Earth-to-space);

b) that this Conference has made an allocation to the aeronautical mobile (R) service (AM(R)S) in the band 5 000-5 010 MHz limited to systems operating in accordance with recognized international aeronautical standards;

c) that the International Civil Aviation Organization (ICAO) is in the process of identifying the technical and operating characteristics of new systems operating in the AM(R)S in the band 5 000-5 010 MHz;

d) that compatibility between AM(R)S systems and ARNS systems operating in accordance with international aeronautical standards is ensured by ICAO,

recognizing

a) that ICAO publishes recognized international aeronautical standards and recommended practices (SARPs) for AM(R)S;

b) that ITU-R studies demonstrate the compatibility of surface-based AM(R)S systems with planned RNSS systems in the band 5 000-5 010 MHz, and with the radio astronomy service operating in the band 4 990-5 000 MHz;

c) that the RNSS will need access to the band 5 000-5 010 MHz for feeder links in the longer term;

d) that spectrum efficiency is enhanced in situations where new applications can be implemented compatibly in bands to be used by multiple services;
e) that restriction of the AM(R)S to surface applications at airports results in conditions such that compatibility with the radio astronomy service can be assured through geographic separation and/or coordination as necessary,

noting

a) that ITU-R is developing new recommendations regarding the technical characteristics and operational parameters for the RNSS in the band 5 000-5 010 MHz;

b) that the use of the band 5 000-5 010 MHz by the AM(R)S needs to ensure protection of the current and planned use of this band by the RNSS,

resolves

1 that stations in the AM(R)S operating in the band 5 000-5 010 MHz shall meet SARPs requirements published in Annex 10 of the ICAO Convention on International Civil Aviation and the maximum instantaneous equivalent isotropically radiated power for the aggregate transmissions in any given direction from all AM(R)S at a single airport operating in the 5 000-5 010 MHz band shall not exceed 40.6 dBm/10 MHz below 5 degrees elevation, or 37.1 dBm/10 MHz at or above 5 degrees elevation, which will ensure protection of RNSS systems operating in this band;

2 that AM(R)S use in the band 5 000-5 010 MHz shall be limited to surface applications at airports;

3 that administrations, in making assignments, shall first satisfy the requirements for the AM(R)S in the band 5 091-5 150 MHz before making AM(R)S assignments in the 5 000-5 010 MHz band;

4 that, notwithstanding No. 4.10, in the case where transmissions from RNSS earth stations exceed AM(R)S interference thresholds, AM(R)S stations operating in the band 5 000-5 010 MHz shall cease their use of certain frequencies when sufficient geographic separations cannot be maintained;

5 that if the separation distance for AM(R)S stations operating in the band 5 000-5 010 MHz with respect to stations in the RAS operating in the band 4 990-5 000 MHz is less than 150 km, site-specific compatibility studies including local conditions shall be undertaken in order to ensure that the RAS is protected,

invites ICAO
to take account of the power limits in resolves 1 when developing SARPS for AM(R)S systems in the 5 000-5 010 MHz band,

instructs the Secretary-General
to bring this Resolution to the attention of ICAO.
**Reasons:** A resolution is needed to establish conditions of the proposed use of the band 5 000-5 010 MHz by the AM(R)S and to explain the role of administrations, ITU-R, and ICAO in developing technical and operational parameters, and compatibility studies, in order to ensure protection of the RNSS and RAS from emissions of the AM(R)S in this band.

SUP USA/AI 1.4/7

**RESOLUTION 420 (WRC-07)**

**Consideration of the frequency bands between 5 000 and 5 030 MHz for aeronautical mobile (R) service surface applications at airports**

**Reasons:** ITU-R studies with respect to this resolution are complete.