

CHAPTER 2

AERONAUTICAL AND MARITIME ISSUES



Input Document to EACO WG Meeting

28/02/2022

"Contributing body/ organization/ rapporteur"

Agenda Item 1.6

Part A: Description

to consider, in accordance with **Resolution 772 (WRC-19)**, regulatory provisions to facilitate radiocommunications for sub-orbital vehicles;

Resolution 772 (WRC-19)

Consideration of **regulatory provisions** to facilitate the **introduction of sub-orbital vehicles**

Part B: Key Elements - the notables

Resolution 772 (WRC-19), in preparation for agenda item 1.6 (WRC-23), invites the ITU-R:

1 to study **spectrum needs** for communications between stations on board sub-orbital vehicles and terrestrial/space stations providing functions such as, **inter alia**, **voice/data communications**, **navigation**, **surveillance and TT&C**;

2 to study appropriate **modification**, **if any**, **to the Radio Regulations**, excluding any new allocations or changes to the existing allocations in Article **5**, to accommodate stations on board sub-orbital vehicles, whilst avoiding any impact on conventional space launch systems with the following objectives:

- to determine the status of stations on sub-orbital vehicles, and study corresponding regulatory provisions to determine which existing radiocommunication services can be used by stations on sub-orbital vehicles, if necessary;
- to determine the technical and regulatory conditions to allow some stations on board sub-orbital vehicles to operate under the aeronautical regulation and to be considered as earth stations or terrestrial stations even if a part of the flight occurs in space;
- to facilitate radiocommunications that support aviation to safely integrate suborbital vehicles into the airspace and be interoperable with international civil aviation;
- to define the relevant technical characteristics and protection criteria relevant for the studies to be undertaken in accordance with the bullet point below;
- to conduct sharing and compatibility studies with incumbent services that are allocated on a primary basis in the same and adjacent frequency bands in order to avoid harmful interference to other radiocommunication services and to existing applications of the same service in which stations on board sub-orbital



vehicles operate, having regard to the sub-orbital flight application scenarios. 3 to identify, as a result of the studies above, whether there is a need for access to additional spectrum that should be addressed after WRC-23 by a future competent conference.

The Report **ITU-R M.2477** provides information on the current understanding of radio communications for SoVs use, including a definition of suborbital vehicles, suborbital vehicle operational concept, Functional and spectrum needs for communications between stations on-board sub-orbital vehicles and terrestrial/space stations, Spectrum needs for sub-orbital vehicles , **Technical studies on suborbital vehicles in non-segregated airspace**, Technical studies on suborbital vehicles in segregated airspace and it also look at the Regulatory considerations to facilitate operating stations.

According to **Report ITU-R M.2477**, a **suborbital vehicle** is a vehicle executing suborbital flight and suborbital flight is defined as the intentional flight of a vehicle expected to reach the upper atmosphere with a portion of its flight path that may occur in space without completing a full orbit around the Earth before returning to the surface of the Earth.

Examples of the operational concepts of suborbital flight









Sub-orbital vehicles are being developed which are intended to operate at higher altitudes than conventional aircraft, with a sub-orbital trajectory these sub-orbital vehicles are expected to perform various missions which include:

- a) Space transportation cargo, passengers, tourism;
- b) **Scientific research** space science, biological & physical research, environmental exploration, geoscience etc.;
- c) **Technology testing & demonstration** promote maturity of space industry, test new technologies;
- d) Deployment of launchers of satellites;
- e) **Remote sensing** collection of earth data;
- f) **Astronauts' training** experience of micro-gravity for astronauts training more representative than underwater.

The stations on board sub-orbital vehicles have a need for **voice/data communications**, **navigation**, **surveillance and telemetry**, **tracking and command (TT&C)**. In this regard there is a need to ensure that equipment installed on such vehicles can communicate with air traffic management systems and relevant ground control facilities.

Why do we want to facilitate radiocommunications for sub orbital vehicles?



• Current situation:

- a) Aviation & Satellite systems: SoV's can travel intercontinentally within a short period, at higher altitudes & faster speed – this may cause technical & operational issues to current aviation and satellite systems;
- b) There is a **potential for collision between SoV's and aircrafts which is currently mitigated on a case by case** by airspace authorities;
- c) Some of **the frequency ranges** used currently include aeronautical allocations used by **ATC systems** and thus are considered safety-of-life;

SoV must integrate safely into the same airspace as conventional aircraft during their transition to and from space.

Four Methods are proposed to address this agenda item:

Method A

No change to the Radio Regulations (RR).

Method B

A WRC Resolution, not incorporated by reference in the RR.

Method C

Modification of RR Article 4.

Some Administrations propose to change RR Article 4.

Method D

No Change to RR Article **4**.

Some other Administrations propose not to change RR Article **4** due to the fact that: a) the understanding of this agenda item is not to change any Article of the RR, and b) that such modification is complying with the objectives and purposes of Article **4** of the RR since there is no similar course of action in that Article in this regard.

Part C: Current Status of Band

There are several existing radiocommunications services that can be used by stations on-board suborbital vehicles using existing coordination processes and procedures. These services include, but may not necessarily be limited to:

- AM(R)S: The aeronautical mobile (route) service, e.g. VHF voice and data communications and ADS-B, when permitted by ICAO SARPs.
- RNSS: The GNSS systems using 1 164-1 215 MHz and 1 559-1 610 MHz can be used for navigation.
- MSS: The mobile satellite service in the frequency bands 1 518-1 544 &



1 545-1 559 MHz (space-to-Earth), 1 610-1 626.5 MHz, and 1 626.5-1 645.5 & 1 646.5-1 660.5 MHz (Earth-to-space), and 1 668-1 675 MHz (Earth-to-space) can be used for safety (AMS(R)S allocation in the 1 610-1 626.5 MHz band) and non-safety applications.

[MS: in RR No. **5.394**, some Administrations expressed the view that, the use of the band 2 300-2 390 MHz by the aeronautical mobile service for telemetry has priority over other uses by the mobile services. Some other Administrations expressed the view that, use of the band 2 360-2 400 MHz by the aeronautical mobile service for telemetry has priority over other uses by the mobile services.

TT&C applications in the aeronautical mobile service (AMS) are currently using aeronautical mobile telemetry (AMT) in the 2 200-2 290 MHz for telemetry and 2 025-2 110 MHz for command shared with other services including SOS, EESS, and SRS and upper S-band 2 360-2 395 MHz for telemetry. Therefore, there is no need for changes to the Article **5** of the Radio Regulations in these bands.]

Part D: Conclusion of the results of studies, if any

In the **27**th **meeting of WP5B** which was held in virtually from 29 November – 10 December 2021, Based on the contributions (5B/433, 5B/447, 5B/466) received during its November/December 2021 meeting, the drafting group prepared a merged document WD towards a PDN Report ITU-R M. [SUBORBITAL STUDIES]. The content was adjusted to reflect the progress of the analysis of the needs in terms of radio communications for suborbital vehicles reminding its definition defined during the previous study cycle in Report ITU-R M.2477.

Based on the contribution (5B/431), the draft CPM text was updated with a method no change and three other methods proposing a new Resolution still to be developed, or consideration of Article 4 of the **RR** (modification or no change to Article 4).

Based on the contribution (5B/432), the work plan was updated to reflect the current and expected progress of the activity.

Part E: Options and Associated Implications

Four Methods are proposed to address this agenda item:

Method A

No change to the Radio Regulations (RR).

Method B

A WRC Resolution, not incorporated by reference in the RR.

Method C

Modification of RR Article 4.

Some Administrations propose to change RR Article 4.



Method D

No Change to RR Article **4**.

Some other Administrations propose not to change RR Article **4** due to the fact that: a) the understanding of this agenda item is not to change any Article of the RR, and b) that such modification is complying with the objectives and purposes of Article **4** of the RR since there is no similar course of action in that Article in this regard.

Part F: Proposed East Africa Common View and/or Position

EACO Administrations are invited to:

- Support the proposed invites under Resolution 772.
- **Support** the ongoing ITU-R studies to develop regulatory provisions to facilitate the operation of sub-orbital vehicles, while ensuring the protection of current civil aviation, space launch systems and radio astronomy.
- Note and recall that the scope of this agenda item excludes any new allocations or changes to the existing allocations in Article 5.

Part G: Recommendations and Way Forward EACO administrations to actively participate in WP 5B meetings.

Part H: Other Regional Groups and International Organizations Preliminary Positions

1. ASMG – October 2021:

There is no objection to developing regulatory procedures to facilitate the operation of sub- orbital vehicles, while ensuring that they do not affect the systems of civil aviation and the current space launch system.

No change in Article 5 of the Radio Regulations.

Follow-up studies in the radio sector

2. CEPT – November 2021:

CEPT is of the view that the definition of sub-orbital flight in Report ITU-R M.2477 "to be an intentional flight of a vehicle expected to reach the upper atmosphere with a portion of its flight path that may occur in space without completing a full orbit around the Earth before returning back to the surface of the Earth" is sufficient.

CEPT supports the categorization of radiocommunication station for suborbital vehicle by the purpose of the mission:

• Some suborbital vehicles that will have at least one phase of its their flight occurring in airspace shared with other aircraft, should use onboard terrestrial stations or/and Earth



stations operated in the same radiocommunication services as the ones for conventional aircraft independently of the maximum altitude reached.

• Other types of suborbital vehicles that fly in non-shared airspace, may use onboard terrestrial stations or/and Earth stations operated in relevant radiocommunication service to allow the transmission of location information during all phases of flight and communication of other data for other functions.

The suborbital vehicles shall ensure the protection and not impose any constraint on other services or applications operated in the same service. The suborbital vehicles shall not impact the radiocommunications of conventional satellite launchers.

3. CITEL – November 2021:

An administration considers to pursue studies called for by Resolution **772 (WRC-19**) as a basis for possible new regulatory provisions to support the growing radiocommunications needs of sub-orbital vehicles.

4. RCC – December 2021:

The RCC Administrations consider that, since the stations on board sub-orbital vehicles shall provide voice/data communications, navigation, surveillance, telemetry, tracking and command, they shall operate only within the current frequency allocations to:

- ✓ the aeronautical mobile (OR) service,
- ✓ mobile, except aeronautical mobile on route (R) service,
- ✓ aeronautical radionavigation service;
- ✓ mobile satellite, except for aeronautical mobile satellite on route (R);
- ✓ radionavigation satellite services,
- \checkmark as well as the space operation service, depending on the transmitted information.

The RCC Administrations also consider that stations on board a sub-orbital vehicle shall ensure its safe flight in international airspace and its interoperability with civil aviation systems, moreover, these stations shall not cause unacceptable interference to the operation of stations on board launch vehicles.

5. APT – November 2021:

APT Members support ITU-R studies of spectrum needs for communications between stations on board sub-orbital vehicles and terrestrial/space stations and of appropriate modification, if any, to the Radio Regulations consistent with Resolution **772 (WRC-19)**.

APT Members are of the view that when studying appropriate modification to the Radio Regulations, existing services should be properly protected, and new allocations or changes to the existing allocations in Radio Regulations Article **5** are excluded under this agenda item at WRC-23.



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Agenda Item 1.7

Part A: Description

to consider **a new aeronautical mobile-satellite (Route) service (AMS(R)S) allocation** in accordance with **Resolution 428 (WRC-19)** for both the Earth-to-space and space-to-Earth directions of **aeronautical VHF communications in all or part of the frequency band 117.975-137 MHz**, while preventing any undue constraints on existing VHF systems operating in the AM(R)S, the ARNS, and in adjacent frequency bands;

Resolution 428 (WRC-19)

Studies on **a possible new allocation to the aeronautical mobile satellite (R)** service within the frequency band **117.975-137 MHz** in order to support **aeronautical VHF communications** in the Earth-to-space and space-to-Earth

Part B: Key Elements - the notables

Space-based VHF communication is a concept in which aircraft operating in **remote regions** and **oceanic areas** provide communications from the **aircraft to air traffic control (ATC) via satellite using VHF frequencies** within the 117.975-137 MHz range.

This concept, when implemented, is expected to enhance air traffic management and flight operations in oceanic and remote airspace and will complement current aviation use of satellite-based navigation and surveillance technologies.

While currently there are other long-range communication systems, such as HF and SATCOM, available to facilitate communications between aircraft to ATC in remote and oceanic airspace, the performance of these current systems is not adequate to safely support close aircraft-to-aircraft separation in a similar fashion as to what is being applied in dense airspace where terrestrial-based VHF communications infrastructure is predominant. Therefore, this leads to constraints in airspace capacity and efficiency in oceanic and remote areas, where it is not practical to deploy VHF terrestrial infrastructure.

Figure 1 is an illustration of the space-based VHF communication concept. The space segment is able to receive and transmit to standard VHF radios already installed on board aircraft and is designed to behave as if it was just another VHF-tower located in the sky, with a larger footprint than terrestrial towers.

Space-based VHF Communication Concept







Current use of the VHF frequency band 117.975-137 MHz

Below is the Radio Regulations (RR) table of allocations and associated footnotes for the band 117.975-137 MHz. It shows that services allocated in this band on a primary basis are:

- Aeronautical mobile (R) service throughout all the band.

- Aeronautical mobile (OR) service in the bands 132-136 MHz and 136-137 MHz in certain countries listed respectively in RR Nos. **5.201** and **5.202**.

	Allocation to Services		
	Region 1	Region 2	Region 3
17.975-137 AERONAUTICAL MOBILE (R)			
	5.111 5.200 5.201 5.202		

5.111 The carrier frequencies 2 182 kHz, 3 023 kHz, 5 680 kHz, 8 364 kHz and the frequencies 121.5 MHz, 156.525 MHz, 156.8 MHz and 243 MHz may also be used, in accordance with the procedures in force for terrestrial radiocommunication services, for search and rescue operations concerning manned space vehicles. The conditions for the use of the frequencies are prescribed in Article **31**.

The same applies to the frequencies 10 003 kHz, 14 993 kHz and 19 993 kHz, but in each of these cases emissions must be confined in a band of =3 kHz about the frequency. (WRC-07)

5.200 In the band 117.975-137 MHz, the frequency 121.5 MHz is the aeronautical emergency frequency and, where required, the frequency 123.1 MHz is the aeronautical frequency auxiliary to 121.5 MHz. Mobile stations of the maritime mobile service may communicate on these frequencies under the conditions laid down in Article **31** for distress and safety purposes with stations of the aeronautical mobile service. (WRC-07)

5.201 Additional allocation: in Armenia, Azerbaijan, Belarus, Bulgaria, Estonia, the Russian Federation, Georgia, Hungary, Iran (Islamic Republic of), Iraq (Republic of), Japan, Kazakhstan, Mali, Mongolia, Mozambique, Uzbekistan, Papua New Guinea, Poland, Kyrgyzstan, Romania, Senegal, Tajikistan, Turkmenistan and Ukraine, the frequency band 132-136 MHz is also allocated to the aeronautical mobile (OR) service on a primary basis. In assigning frequencies to stations of the aeronautical mobile (OR) service, the administration shall take account of the frequencies assigned to stations in the aeronautical mobile (R) service. (WRC-19)

5.202 Additional allocation: in Saudi Arabia, Armenia, Azerbaijan, Bahrain, Belarus, Bulgaria, the United Arab Emirates, the Russian Federation, Georgia, Iran (Islamic



Republic of), Jordan, Mali, Oman, Uzbekistan, Poland, the Syrian Arab Republic, Kyrgyzstan, Romania, Senegal, Tajikistan, Turkmenistan and Ukraine, the frequency band 136-137 MHz is also allocated to the aeronautical mobile (OR) service on a primary basis. In assigning frequencies to stations of the aeronautical mobile (OR) service, the administration shall take account of the frequencies assigned to stations in the aeronautical mobile (R) service. (WRC-19)

Current Use of the frequency bands adjacent to 117.975-137 MHz

Radiocommunication services operating in the 108-117.975 MHz frequency band based on the RR Table of Allocations

Below is the RR table of allocations and associated footnotes for the band 108-117.975 MHz. It shows that services allocated in this band on a primary basis are:

- Aeronautical radio navigation service
- Aeronautical mobile (R) service.

Allocation to Services			
Region 1 Region 2 Region		Region 3	
108-117.975 MHz	AERONAUTICAL RADIONAVIGATION		
	5.197 5.197A		

5.197 Additional allocation: in the Syrian Arab Republic, the band 108-111.975 MHz is also allocated to the mobile service on a secondary basis, subject to agreement obtained under No. **9.21**. In order to ensure that harmful interference is not caused to stations of the aeronautical radionavigation service, stations of the mobile service shall not be introduced in the band until it is no longer required for the aeronautical radionavigation service by any administration which may be identified in the application of the procedures invoked under No. **9.21**. (WRC-12)

5.197A Additional allocation: the band 108-117.975 MHz is also allocated on a primary basis to the aeronautical mobile (R) service, limited to systems operating in accordance with recognized international aeronautical standards. Such use shall be in accordance with Resolution **413 (Rev.WRC-07)**. The use of the band 108-112 MHz by the aeronautical mobile (R) service shall be limited to systems composed of ground-based transmitters and associated receivers that provide navigational information in support of air navigation functions in accordance with recognized international aeronautical standards. (WRC-07)

Radiocommunication services operating in the 137-143.6 MHz frequency bands based on the Radio Regulations table of allocations

EAC East African Communications Organisation

Below is the RR table of allocations and associated footnotes for the band 137-143.6 MHz. It shows that services allocated in this band on a primary basis are:

Primary services in 137-138 MHz:

- Aeronautical mobile (OR) service in certain countries under RR No. 5.206
- Broadcasting service in Australia under RR No. 5.207
- Fixed service in certain countries under RR No. 5.204 and No. 5.205
- Meteorological satellite service (space-to-Earth)
- Mobile satellite service (space-to-Earth)
- Mobile service in certain countries under RR No. 5.204 and No. 5.205
- Space operation service (space-to-Earth)
- Space research service (space-to-Earth)

Primary services in 138-143.6 MHz:

- Aeronautical mobile (OR) service in Region 1
- Broadcasting service in Australia under RR No. 5.207
- Fixed service in Region 2, Region 3, and certain countries in Region 1 under RR No. **5.212** and No. **5.214**
- Land mobile service in certain countries in Region 1 under RR No. 5.211
- Mobile service in Region 2, Region 3, and certain countries in Region 1 under RR No. **5.212**
- Maritime mobile service in certain countries in Region 1 under RR No. 5.211
- Radio location service in Region 2 and in China under RR No. 5.213

Allocation to Services				
Region 1 Region 2 Region 3				
137-137.025	SPACE OPERATION (space-to-Eart	h) 5.203C		
	METEOROLOGICAL-SATELLITE (sp	METEOROLOGICAL-SATELLITE (space-to-Earth)		
	MOBILE-SATELLITE (space-to-Earth) 5.208A 5.208B 5.209 SPACE RESEARCH (space-to-Earth)			
	Fixed			
	Mobile except aeronautical mobile (R)			
	5.204 5.205 5.206 5.207 5.208			
137.025-137.175 MHz	SPACE OPERATION (space-to-Eart	h) 5.203C		
	METEOROLOGICAL-SATELLITE (sp	ace-to-Earth)		
	SPACE RESEARCH (space-to-Earth)		
	Fixed			
	Mobile except aeronautical mobil	e (R)		
	Mobile-satellite (space-to-Earth)	5.208A 5.208B 5.209		



5.204 5.205 5.206 5.207 5.208			
137.175-137.825 MHz	SPACE OPERATION (space-to-Earth) 5.203C 5.209A METEOROLOGICAL-SATELLITE (space-to-Earth)		
	MOBILE-SATELLITE (space-to-Earth) 5.208A 5.208B 5.209		
	SPACE RESEARCH (space-to-Earth)		
	Fixed		
	Mobile except aeronautical mobile (R)		
	5.204 5.205 5.206 5.207 5.208		
137.825-138 MHz	SPACE OPERATION (space-to-Earth) 5.203C		
	METEOROLOGICAL-SATELLITE (space-to-Earth)		
	SPACE RESEARCH (space-to-Earth)		
	Fixed		
	Mobile except aeronautical mobile (R)		
	Mobile-satellite (space-to-Earth) 5.208A 5.208B 5.209		
	5.204 5.205 5.206 5.207 5.208		
138-143.6 MHz	138-143.6	138-143.6	
AERONAUTICAL MOBILE (OR)	FIXED	FIXED	
	MOBILE	MOBILE	
5 210 5 211 5 212 5 214	RADIOLOCATION	Space research (space-to-Earth)	
5.210 5.211 5.212 5.214	Space research (space-to-Earth)	5.207 5.213	

5.203C The use of the space operation service (space-to-Earth) with nongeostationary satellite short-duration mission systems in the frequency band 137-138 MHz is subject to Resolution **660 (WRC-19)**. Resolution **32 (WRC-19)** applies. These systems shall not cause harmful interference to, or claim protection from, the existing services to which the frequency band is allocated on a primary basis. (WRC-19)

5.204 Different category of service: in Afghanistan, Saudi Arabia, Bahrain, Bangladesh, Brunei Darussalam, China, Cuba, the United Arab Emirates, India, Indonesia, Iran (Islamic Republic of), Iraq, Kuwait, Montenegro, Oman, Pakistan, the Philippines, Qatar, Singapore, Thailand and Yemen, the frequency band 137-138 MHz is allocated to the fixed and mobile, except aeronautical mobile (R), services on a primary basis (see No. **5.33**). (WRC-19)

5.205 Different category of service: in Israel and Jordan, the allocation of the band 137-138 MHz to the fixed and mobile, except aeronautical mobile, services is on a primary basis (see No. **5.33**).

5.206 Different category of service: in Armenia, Azerbaijan, Belarus, Bulgaria, Egypt, the Russian Federation, Finland, France, Georgia, Greece, Kazakhstan, Lebanon, Moldova, Mongolia, Uzbekistan, Poland, Kyrgyzstan, the Syrian Arab Republic, Slovakia, the Czech Rep., Romania, Tajikistan, Turkmenistan and Ukraine, the allocation of the band 137-138 MHz to the aeronautical mobile (OR) service is on a primary basis (see



No. 5.33). (WRC-2000)

5.207 Additional allocation: in Australia, the band 137-144 MHz is also allocated to the broadcasting service on a primary basis until that service can be accommodated within regional broadcasting allocations.

5.208 The use of the band 137-138 MHz by the mobile-satellite service is subject to coordination under No. **9.11A**. (WRC-97)

5.208A In making assignments to space stations in the mobile-satellite service in the frequency bands 137-138 MHz, 387-390 MHz and 400.15-401 MHz and in the maritime mobile-satellite service (space-to-Earth) in the frequency bands 157.1875-157.3375 MHz and 161.7875-161.9375 MHz, administrations shall take all practicable steps to protect the radio astronomy service in the frequency bands 150.05-153 MHz, 322-328.6 MHz, 406.1-410 MHz and 608-614 MHz from harmful interference from unwanted emissions as shown in the most recent version of Recommendation ITU-R RA.769-2. (WRC-19)

5.208B[•] In the frequency bands:

137-138 MHz, 157.1875-157.3375 MHz, 161.7875-161.9375 MHz, 387-390 MHz,

400.15-401 MHz,

1 452-1 492 MHz, 1 525-1 610 MHz, 1 613.8-1 626.5 MHz, 2 655-2 690 MHz, 21.4-22 GHz,

Resolution 739 (Rev.WRC-19) applies. (WRC-19)

5.209 The use of the bands 137-138 MHz, 148-150.05 MHz, 399.9-400.05 MHz, 400.15-401 MHz, 454-456 MHz and 459-460 MHz by the mobile-satellite service is limited to non-geostationary-satellite systems. (WRC-97)

5.209A The use of the frequency band 137.175-137.825 MHz by non-geostationarysatellite systems in the space operation service identified as short-duration mission in accordance with Appendix **4** is not subject to No. **9.11A**. (WRC-19)

5.210 Additional allocation: in Italy, the Czech Rep. and the United Kingdom, the bands 138-143.6 MHz and 143.65-144 MHz are also allocated to the space research

^{*} This provision was previously numbered as No. **5.347A**. It was renumbered to preserve the sequential order.



service (space-to-Earth) on a secondary basis. (WRC-07)

5.211 Additional allocation: in Germany, Saudi Arabia, Austria, Bahrain, Belgium, Denmark, the United Arab Emirates, Spain, Finland, Greece, Guinea, Ireland, Israel, Kenya, Kuwait, Lebanon, Liechtenstein, Luxembourg, North Macedonia, Mali, Malta, Montenegro, Norway, the Netherlands, Qatar, Slovakia, the United Kingdom, Serbia, Slovenia, Somalia, Sweden, Switzerland, Tanzania, Tunisia and Turkey, the frequency band 138-144 MHz is also allocated to the maritime mobile and land mobile services on a primary basis. (WRC-19)

5.212 Alternative allocation: in Angola, Botswana, Cameroon, the Central African Rep., Congo (Rep. of the), Eswatini, Gabon, Gambia, Ghana, Guinea, Iraq, Jordan, Lesotho, Liberia, Libya, Malawi, Mozambique, Namibia, Niger, Oman, Uganda, Syrian Arab Republic, the Dem. Rep. of the Congo, Rwanda, Sierra Leone, South Africa, Chad, Togo, Zambia and Zimbabwe, the frequency band 138-144 MHz is allocated to the fixed and mobile services on a primary basis. (WRC-19)

5.213 Additional allocation: in China, the band 138-144 MHz is also allocated to the radiolocation service on a primary basis.

5.214 Additional allocation: in Eritrea, Ethiopia, Kenya, North Macedonia, Montenegro, Serbia, Somalia, Sudan, South Sudan and Tanzania, the frequency band 138-144 MHz is also allocated to the fixed service on a primary basis. (WRC-19)

Part D: Conclusion of the results of studies, if any

The current status for the sharing and compatibility studies is as follows:

- The in-band sharing study between AM(R)S and the new AMS(R)S, as indicated by ICAO that there is no need to perform compatibility studies between these two different services, which are technically similar and utilizing the same on-board avionics system (for ATC VHF communications). Although, the ICAO have indicated that they can manage any potential interference between both systems through conventional frequency planning exercises.
- The adjacent compatibility study between systems operating under ARNS and AMS(R)S at the frequency band 108 117.975 MHz, the ICAO has outlined that there is no need to perform any compatibility and sharing studies between both AMS(R)S and ARNS, as the ICAO could manage the frequency planning and coordination between both services to ensure compatibility between them.
- The adjacent compatibility with non-ICAO services, should be conducted with respect to the Space Earth direction only, as the currently operating AM(R)S earth stations (ES) are transmitting at the same direction as the ES of AMS(R)S.
- The adjacent compatibility between AMS(R)S (S-E) and the MSS (S-E) at the frequency bands 137-137.025 MHz and 137.175-137.825 MHz is still under development.



Meanwhile, the preliminary assumptions provide that in order to ensure the protection of systems operating under MSS, the unwanted emission level above 137 MHz would need to be attenuated by 45dB compared to the maximum in-band level from the operating AMS(R)S systems below 137 MHz.

These studies could be summarized in the table below:

New Service/ Proposed Allocation	Incumbent Service/ Allocated Freq Band	Nature of Studies	Results
AMS(R)S (117.975MH – 137MHz)	AM(R)S (117.975MH – 137MHz)	In-band sharing	Even though AM(R)S and AMS(R)S would represent two different ITU-R services within the frequency band 117.975- 137 MHz, the same on-board cockpit avionics system (for ATC VHF communications) would be used for ground and satellite communications. Therefore it will not be necessary to perform a comprehensive compatibility study between the two services
AMS(R)S (117.975MH - 137MHz)	ARNS (Below 117.975MHz)	Adjacent, compatibility study	Similarly (as in the line above), ICAO has outlined that there is also no need to perform a comprehensive compatibility study within ITU-R between the AMS(R)S and ARNS
AMS(R)S (117.975MH – 137MHz)	MSS (137 – 138MHz)	Adjacent, compatibility study	Condition 1: In order to ensure protection of MSS, the unwanted emission level above 137 MHz of an AMS(R)S system operating below 137 MHz would have to be attenuated by 45 dB compared to its maximum in-band level. Other aspects: Yet to be concluded
AMS(R)S (117.975MH – 137MHz)	SOS (137 – 138MHz)	Adjacent, compatibility study	Studies still on-going
AMS(R)S (117.975MH – 137MHz)	SRS (137 – 138MHz)	Adjacent, compatibility study	Studies still on-going
AMS(R)S (117.975MH – 137MHz)	MetSat (137 - 138MHz)	Adjacent, compatibility study	Studies still on-going
AMS(R)S	Radioastronomy	Adjacent,	Studies still on-going



137MHz) study	(117.975MH -	(150.05 - 153MHz)	compatibility	
	37MHz)		study	

In the 27th meeting of WP 5B which was held In November/December 2021, three contributions (5B/403, 5B/419, 5B/450) were received proposing updates to the new ITU-R Report with some proposals to revise general background, technical analysis including budget links with revised parameters and an annex on the scintillation effect including the answers from ICAO on questions raised in a previous liaison statement by WP 5B. After discussion on the various proposal dealing with the type of communication: voice and/or data, and the frequency band 117.975-136 MHz or 117.975-137 MHz, the WD towards a PDN Report ITU-R M.[SPACE-VHF] was agreed to be adjusted after review of the different proposals.

Based on the contribution (5B/449), a liaison statement was agreed to be sent to inform ICAO on the progress of the activity on this agenda item and to raise some technical questions.

Based on the contributions (5B/448, 5B/419), the draft CPM text was updated with a method no change and three other methods proposing a new allocation to AMS(R)S in the frequency band 117.975-136 MHz, or a new allocation to AMS(R)S in the frequency band 117.975-[136/137] MHz or a new allocation to AMS(R)S in the frequency band 117.975-137 MHz with a pfd mask.

Part E: Options and Associated Implications

Method A: No change

Method B: New AMS(R)S allocation in the band 117.975-136 MHz

Method B proposes to add a new allocation to the aeronautical mobile-satellite (R) service (AMS(R)S) in the frequency band 117.975-136 MHz, limited to internationally standardized aeronautical systems.

Method C: Allocation of AMS(R)S in the band 117.975-[136/137] MHz

Create a new co-primary allocation for the AMS(R)S service in the frequency band 117.975-[136/137] MHz limiting to systems that operate in accordance with international Standards and Recommended Practices and procedures established in accordance with the Convention on International Civil Aviation.

Method D: Allocation of AMS(R)S in the band 117.975-137 MHz

Create a new co-primary allocation for the AMS(R)S service in the frequency band 117.975-137 MHz on the condition that maximum power flux density radiated over the Earth above 137 MHz is limited to $[-197.7 \text{ dB}(W/(m^2 \cdot \text{Hz}))]$ and limited to internationally standardized aeronautical systems.

Part F: Proposed East Africa Common View and/or Position

EACO administrations are invited to support the ITU-R ongoing technical studies and regulatory procedures in order to improve/enhance the aeronautical communications in oceanic and



remote areas, while ensuring the protection of the existing radio communication services, without imposing any operational constraints on existing VHF aeronautical systems or other services operating at the adjacent frequency bands.

Part G: Recommendations and Way Forward

The EAC administrations to actively participate in WP5B meetings

Part H: Other Regional Groups and International Organizations Preliminary Positions

1. ASMG – October 2021:

Support ongoing regulatory studies and procedures with the aim of strengthening aviation systems over remote areas and oceans while ensuring that existing services and existing aviation systems are protected and that no operational restrictions are imposed on them.

2. CEPT – November 2021:

CEPT supports a new primary allocation to AMS(R)S in the Earth-to-space and space-to-Earth directions in all or part of the frequency band 117.975-137 MHz while:

- limiting the use of the new AMS(R)S allocation to internationally standardised aeronautical systems;
- ensuring protection of AM(OR)S service in the band 117.975-137 MHz;
- ensuring protection of services in adjacent bands and not constraining these service

CEPT is of the view that in-band coexistence between AM(R)S and AMS(R)S and adjacentband coexistence between ARNS and AMS(R)S around 117.975 MHz will be ensured through frequency planning and coordination work.

3. CITEL – November 2021:

Some administrations support the ongoing technical and regulatory studies for co- existence between potential new primary AMS(R)S service in the frequency band 117.975 – 137 MHz and existing terrestrial primary allocated in-band and adjacent band services with the anticipation of providing space-based VHF communications between pilot and air traffic controllers. This potential new allocation must protect current systems using existing primary allocated services and not constrain planned usage of those systems.

4. RCC – December 2021:

The RCC Administrations do not oppose the new allocation of all or part of the frequency band 117.975-137 MHz to aeronautical mobile-satellite (R) service on the primary basis for the development of aeronautical VHF communications systems for both Earth-to-space and



space-to-Earth directions provided that the existing VHF systems operating in AM(R)S, AM(OR)S, ARNS operating in common and adjacent frequency bands, including the systems of the SOS, SRS and meteorological satellite service in the 137-138 MHz frequency band, unacceptable restrictions will not be imposed.

5. APT – November 2021:

APT Members support ITU-R studies defined in Resolution **428 (WRC-19)** for a new AMS(R)S allocation for both the Earth-to-space and space-to-Earth directions in all or part of the frequency band 117.975-137 MHz, while taking into account the protection of existing services operating in this frequency band and in adjacent frequency bands.

APT Members support the new AMS(R)S allocation that is limited to the relaying of aeronautical VHF air traffic management communications in accordance with international Standards and Recommended Practices and procedures established in accordance with the Convention on International Civil Aviation.

APT Members are of the view that unacceptable interference shall not be caused to the services to which the band is currently allocated as well as to the additional allocation of the aeronautical mobile (OR) service on a primary basis operating in the bands 132-136 MHz and

6. ICAO – December 2021:

To support ITU-R studies and the definition of relevant technical characteristics as called for by Resolution 428 (WRC-19).

To support a global allocation to the aeronautical mobile-satellite (route) service for both the Earthto-space and space-to-Earth directions in the frequency band 117.975-137 MHz and that the use of the allocation be limited to the relaying of aeronautical VHF air traffic management communications.

To support that those systems shall operate in accordance with international Standards and Recommended Practices and procedures established in accordance with the Convention on International Civil Aviation.

To ensure that any change to the regulatory provisions and spectrum allocation resulting from this agenda item do not adversely impact the operation of existing VHF systems in the band 117.975-137 MHz operating in the AM(R)S, including regional usage of terrestrial VHF, nor require any changes to aircraft equipage or to existing installations.

Input Document to EACO WG Meeting

28/02/2022

"Contributing body/ organization/ rapporteur"



Agenda Item 1.8

Part A: Description

to consider, on the basis of ITU-R studies in accordance with **Resolution 171 (WRC-19)**, appropriate regulatory actions, with a view to reviewing and, if necessary, revising Resolution **155** (**Rev.WRC-19**) and No. **5.484B** to accommodate the **use of fixed-satellite service (FSS) networks by** control and non-payload communications of unmanned aircraft systems;

Resolution 171 (WRC-19)

Review and possible revision of Resolution 155 (Rev.WRC-19) and No. 5.484B in the frequency bands to which they apply.

Resolution 155 (Rev.WRC-19)

Regulatory provisions related to earth stations on board unmanned aircraft which operate with geostationary-satellite networks in the fixed-satellite service in certain frequency bands not subject to a Plan of Appendices 30,30A and 30B for the control and non-payload communications of unmanned aircraft systems in non-segregated airspaces.

This Resolution **155** (Rev.WRC-19) resolves that assignments to stations of geostationary FSS satellite networks operating in the frequency bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space to-Earth), 11.7 12.2 GHz (space-to-Earth) in Region 2, 12.2-12.5 GHz (space-to-Earth) in Region 3, 12.5 12.75 GHz (space-to-Earth) in Regions 1 and 3 and 19.7-20.2 GHz (space-to-Earth), and in the frequency bands 14-14.47 GHz (Earth-to-space) and 29.5-30.0 GHz (Earth-to-space), may be used for unmanned aircraft system (UAS) control and non-payload communication (CNPC) Links in non-segregated airspace, provided that the conditions specified in resolves are met.

Part B: Key Elements - the notables

- 1 The ongoing studies consider within its mandates the following topics:
- 1.1 Define the characteristics and parameter values of UAS CNPC link/Earth
- 1.2 Sharing studies with space and terrestrial services
- 1.3 Procedural consideration of implementing Resolution 155.

WRC-23 is to review and undertake a potential revision of Resolution **155** (**Rev.WRC-19**) and No. **5.484B** in the frequency bands to which they apply.

The responsible group WP 5B has initiated the work by sending liaison statements to the contributing groups, WP 4A and WP 4B, as well as to WP 3M, WP 5A, WP 5C, and WP 7D to request information on technical/operational characteristics and protection criteria of services which they look over, and on propagation models.

So far, WP 5B has considered contributions, providing proposed amendments to the WD towards PDN Recommendation/Report ITU-R M.[UAS CNPC_CHAR], which provides characteristics of unmanned aircraft system control and non-payload communications (UAS CNPC) earth stations for use with space stations operating in the fixed-satellite service. The WP 5B May 2021 meeting decided to request the Director BR to provide updated information and statistics on satellite networks in the MIFR meeting the requirements of



Resolution 155 (Rev.WRC-19).

WP 5B has also considered contributions providing proposed amendments to the PDN Report ITU-R M. [UA_PFD] "review of power flux-density limits in accordance with resolves 16 of Resolution **155 (Rev.WRC-19)**" as well as proposals to upgrade this document to a draft new report to be submitted to SG 5 for approval. The WP 5B May 2021 meeting agreed not to update the status and noted that the characteristics of mobile services as well as those provided from the BR needs to be considered.

In response to its liaison statement to ICAO, WP 5B received a reply liaison statement from ICAO, informing about the status of its work on the international Standards And Recommended Practices (SARPs) associated with unmanned aircraft systems, termed remotely piloted aircraft (RPA) within ICAO and also provided excerpts of the SARPs. WP 5B noted that the first package of SARPs, of a more general nature, was approved by ICAO Council March 2021 and the second package, containing technical solutions, including the use of the FSS, due to be approved 2023.

The November 2020 meeting of WP 5B established a correspondence group (CG). At the May 2021 meeting of WP 5B, the CG presented a working document (<u>5B/261</u>) which addressed principles associated with UAS CNPC operation in the frequency bands identified in Resolution 155 (Rev. WRC-19). The meeting noted that the first two sections has reached conclusion, however, section 3 and onwards still had not been discussed. To be able to complete its work and deliver the draft CPM text on time, WP 5B has decided to continue the work of the CG on WRC-23 agenda item 1.8 between the May 2021 meeting and the next meeting of WP 5B in November-December 2021.

In the 27th meeting of WP 5B which was held In November/December 2021, In respect of Agenda Item 1.8 where WP 5B is the responsible working party, it is noted that discussions within the WG continue to be difficult and consequently, little progress was made. Practically all time was spent introducing the received contributions, taking very long time for each contribution to have views expressed following each presentation, but having little constructive discussions to progress the work on the agenda item. Consequently, while it was agreed during the opening Plenary that during this WP 5B meeting, discussions should conclude on all principles for the methods to meet this agenda item, close to no time was left to discuss this and no progress was made. At present, the preparatory work on this agenda item is far behind where it should have been at this stage and WP 5B is at great risk of not completing its required work in time for the CPM deadline. Despite this, there was no support to continue the work of the correspondence group which has worked between the two previous WP 5B meetings.

Under Agenda Item 1.8, consideration of a Resolution to govern UAS CNPC operation is a key element, either as a new Resolution or as a revision of Resolution **155** (**Rev. WRC-19**). It has been agreed that before considering specific text for a Resolution, the principles that would be the basis for this Resolution would need to first be agreed. This meeting of WP 5B received contributions 5B/427, 5B/455 and 5B/467 giving specific proposals for revisions to Resolution **155** (**Rev. WRC-19**) where document 5B/427 replaced earlier proposals. Document 5B/456 furthermore provided explanations for the proposals in Document 5B/455. It was recognized that these three contributions, together with the earlier received Document 5B/22 which also contain specific proposed revisions to Resolution **155** (**Rev. WRC-19**), together with other contributions with suggestions addressing principles for UAS CNPC operation would need to be considered when



embarking on crafting specific Resolution text.

In addition to specific Resolution text, WP 5B received three contributions, Documents <u>5B/444</u>, <u>5B/467</u> and <u>5B/470</u>, with proposals for text for other elements of the CPM text, e.g. executive summary, background, technical studies etc. To start the work on creating CPM text, a merger of the proposed elements contained in these three contributions, excluding the Resolution to govern UAS CNPC operation, is contained in Annex 4 to this Chairman's Report as a Working Document towards draft CPM text. It should be emphasized that the elements of the three contributions have not yet been discussed and no agreement should therefore be assumed on any part of this document.

Part C: Current Status of Band

- The operation of unmanned aircraft systems (UAS) requires reliable control and non payload communication (CNPC) links, in particular to relay air traffic control communications and for the remote pilot to control the flight, and that satellite networks may be used to provide these CNPC links beyond line-of-sight.
- UAS CNPC links relate to the safe operation of UAS and have to comply with certain technical and regulatory requirements, and will operate in accordance with international Standards and Recommended Practices (SARPs) and procedures established in accordance with the Convention on International Civil Aviation.
- The International Civil Aviation Organization (ICAO) is developing SARPs to ensure the technical aspects of using fixed-satellite service (FSS) satellites to support safe and reliable UAS CNPC links.
- Conclusion is required on the feasibility of use of the FSS frequency bands identified by Resolution 155 (Rev.WRC-19) to support the safe implementation of UAS CNPC links in non-segregated airspace.
- The frequency bands under consideration include

12.5 - 12.75 GHz (space-to-Earth)

14.0 - 14.47 GHz (Earth-to-space) **19.7-20.2 GHz** (space-to-Earth) **29.5 - 30.0 GHz** (Earth-to-space)







Resolution 155 (Rev.WRC-19).

1 Sharing studies with space services

1.1 Sharing studies with the Fixed-Satellite Service

- GSO FSS networks
- Non-GSO FSS systems

Non-geostationary-satellite systems in the fixed-satellite service in the respective frequency bands are secondary (see and Article **22.2** footnote **5.484A**).

1.2 Sharing studies with the other space services

Sharing studies with the Broadcasting-Satellite Service (space-to-Earth)

Broadcasting-Satellite Service is allocated primary in 12.5-12.75 GHz in Region 3.

Sharing studies with the Mobile-Satellite Service

Mobile-Satellite Service is allocated primary in 19.7-20.1 GHz and 29.5-29.9 GHz in Region 2 and in 20.1-20.2 GHz and 29.9-30 GHz for all regions.

2 Sharing studies with terrestrial services

2.1 Sharing studies with the Fixed Service

Fixed Service is allocated primary in 10.95-11.2 GHz and 11.45-11.7 GHz in all regions, in 11.7-12.1 GHz in Region 2, 12.2-12.75 GHz in Region 3, 14-14.3 GHz in some countries, 14.3-14.4 GHz in Regions 1 and 3, and in 14.4-14.47 GHz in all regions.

This work is being documented in the Report, **Review of power flux-density limits in accordance** with resolves 16 of Resolution 155 (WRC-15), [UA_PFD], 5B/712, Annex 7.

2.2 Sharing studies with the Mobile Service

Mobile Service is allocated primary in 10.95-11.2 GHz and 11.45-11.7 GHz in all regions, 12.2-12.75 GHz in Region 3, 14.3-14.4 GHz in Region 1 and 3, and in 14.4-14.47 GHz in all regions.

2.3 Sharing studies with the Radionavigation Services

Radionavigation Service is allocated primary in 14.0-14.3 GHz band.

Part E: Options and Associated Implications

Part F: Proposed East Africa Common View and/or Position

EACO Administrations are invited to **<u>support</u>** the review and possible revision of Resolution 155



(Rev.WRC 19) and No. 5.484B in the frequency bands to which they apply. Specifically, support the application of safety of life standards with UAS CNPC links and ensure that the requirements of ICAO with respect to UAS CNPC links operations are considered, as well as ensure the protection of the current systems operating in terrestrial and space services without imposing any undue constraints on it.

Part G: Recommendations and Way Forward

EAC administrations to actively participate in WP 5B meetings and in the correspondence group as outlined above.

Part H: Other Regional Groups and International Organizations Preliminary Positions

- 1. **ASMG** November 2021:
- 2. Support the application of safety and life conservation standards with UAS CNPC links and

ensuring that the requirements of ICAO on the condition that:

- 3. no additional restrictions are imposed on the ground systems
- 4. does not affect the existing agreement between the notifying administrations, reached

during the FSS satellite coordination process;

5. doesn't affect the future coordination of FSS networks at the application of the provisions

of Articles 9 and 11 of the Radio Regulations;

6. **CEPT** – November 2021:

CEPT acknowledges the opportunities of the use of networks of the FSS for UAS CNPC links and CEPT is of the view that UAS CNPC links using FSS in non-segregated airspace shall operate:

- in accordance with ICAO SARPs (see resolves 3 of Resolution 155 (Rev.WRC-19));
- under successfully coordinated assignments for FSS applications notified with class of earth station "UG" (see *resolves* 2 and 13 of Resolution 155 (Rev.WRC-19)).

CEPT is of the view that the safety aspects of UAS CNPC shall not have any impact on: the existing terrestrial services and their current and expected applications (see *resolves* 8 of Resolution **155**



(**Rev.WRC-19**));the relevant existing agreements reached during FSS satellite coordination process (see *resolves* 6, 7, and 9 of Resolution **155** (**Rev.WRC-19**));the future coordination of FSS networks during the application of provisions of Articles 9 and **11** of the RR (see *resolves* 9 of Resolution **155** (**Rev.WRC-19**));all cases which fall under RR **11.41** (see *resolves* 9 of Resolution **155** (**Rev.WRC-19**)).

CEPT is of the view that in order to ensure safety-of-flight operation of UAS, the administrations responsible for the operation of UAS CNPC links under the ICAO SARPs shall take the required measures on their side to ensure freedom from harmful interference to earth stations on board UA. (see *resolves* 7 and 13 of Resolution **155 (Rev.WRC-19)**).

CEPT is of the view that the pfd mask labelled as example b in Annex 2 of Resolution **155 (Rev. WRC-19)** is appropriate to protect the terrestrial services.

CEPT is of the view that the RR No. **5.149** for the protection of Radioastronomy from harmful interference in the frequency band 14.47-14.5 GHz has to be taken into account (see *resolves* 17 of Resolution **155** (**Rev.WRC-19**)).

CEPT recognises that ICAO is responsible for the safe operation of aircraft including UAS and is developing appropriate SARPs covering all aspects of safe operation of UAS including the required communication system and that RR **4.10** does not apply to the use of networks of the FSS for UAS CNPC links. This implies that any administration notifying FSS network as well as any administration authorising the operation of stations of the terrestrial services in accordance with the RR in the frequency bands identified in *resolves* 1 of Resolution **155** (**Rev.WRC-19**) are not responsible for the application of RR **4.10**.

CEPT is of the view that if the conditions for the safety operation of CNPC established by ICAO cannot be met with the existing FSS link as it stands, then this link should not be used for UAS.

CEPT recognises that ICAO is responsible for the safe operation of aircraft including UAS and is developing appropriate SARPs covering all aspects of safe operation of UAS including the required communication system and that RR **4.10** does not apply to the use of networks of the FSS for UAS CNPC links. This implies that any administration notifying FSS network as well as any administration authorising the operation of stations of the terrestrial services in accordance with the RR in the frequency bands identified in *resolves* 1 of Resolution **155** (**Rev.WRC-19**) are not responsible for the application of RR **4.10**.

CEPT is of the view that if the conditions for the safety operation of CNPC established by ICAO cannot be met with the existing FSS link as it stands, then this link should not be used for UAS.



The RCC Administrations consider that only ITU-recorded frequency assignments to FSS satellite networks with which coordination has been successfully completed shall be used for the operation of control and non-payload communication links of unmanned aircraft systems.

The RCC Administrations consider that the control and non-payload communication links of unmanned aircraft systems shall operate in accordance with the ICAO-developed SARPs covering all aviation security aspects.

The RCC Administrations consider that the radio links of FSS satellite networks non-complying with ICAO requirements for unmanned aircraft control and communication links shall not be used.

The RCC Administrations consider that the revision of the current Resolution 155 (Rev.WRC-19) or development of a new Resolution shall be based on results of compatibility studies of unmanned aircraft control and communication links operating in the same and adjacent (if necessary) frequency bands.

The RCC Administrations believes that the stations of the unmanned aircraft control and communication links that are not connected to the payload shall not cause more interference and claim more protection from the stations of the FSS satellite networks coordinated and registered by the Radiocommunication Bureau.

The RCC Administrations believes that the control and communication links of the unmanned aircraft that are not associated with the payload should not limit future development and impose additional restrictions on existing services that have allocations in coincident and adjacent frequency bands relative to the frequency bands used by the control and communication links of the unmanned aircraft.

2. **APT** – November 2021:

APT Members support ongoing studies being carried out by ITU-R WP 5B in relation to Agenda Item 1.8 in accordance with Resolution **171 (WRC-19)**.

3. CITEL - November 2021:

Some administrations support completion of the studies called for by Resolutions **171 (WRC-19)** and **155 (Rev.WRC-19)** to define the conditions for operating UAS CNPC links in the FSS (see resolves 19 of Resolution **155 (Rev.WRC-19)**) in the frequency bands for which No. **5.484B** already applies. Based on the results of studies, to consider revisions to Resolution **155 (Rev.WRC-19)** in order to finalize the provisions needed to accommodate the use of FSS networks by UAS CNPC systems and to revise No. **5.484B** to provide clarity that the provisions apply to the use of earth stations on board unmanned aircraft.



"Contributing body/ organization/ rapporteur"

Agenda Item 1.9

Part A: Description

to review Appendix **27** of the Radio Regulations and consider appropriate regulatory actions and updates based on ITU-R studies, in order to accommodate digital technologies for commercial aviation safety-of-life applications in existing HF bands allocated to the aeronautical mobile (route) service and ensure coexistence of current HF systems alongside modernized HF systems, in accordance with **Resolution 429 (WRC-19);)**

Resolution 429 (WRC-19)

Consideration of regulatory provisions for **updating Appendix 27** of the Radio Regulations in **support of aeronautical HF modernization**

Resolution 429 (WRC-19), in the resolves to invite section, invites the ITU-R to conduct and complete in time for WRC-23 the following:

- to identify any necessary modifications to Appendix 27 for the aeronautical mobile (route) service between 2 850 and 22 000 kHz noting recognizing c);
- to identify any necessary transition arrangements for the introduction of new digital aeronautical wideband HF systems and any consequential changes to Appendix 27;
- to recommend how new digital aeronautical wideband HF systems can be introduced while ensuring compliance with safety requirements and recognizing e);
- to define the relevant technical characteristics and to conduct any necessary sharing and compatibility studies, taking account noting e), with incumbent services that are allocated on a primary basis in the same or adjacent frequency bands to avoid harmful interference in accordance with recognizing e);

Part B: Key Elements - the notables

- Appendix 27 include all the provisions governing the use of the frequencies and frequency bands allocated to the AM(R)S in the frequency bands between 2850 to 22000 kHz. These frequency bands are used by AM(R)S systems for both the transmission and the reception, and it is organized with a 3 kHz channel allotment.
- The current HF voice systems suffer from noise and propagation effects that require



skilled and knowledgeable radio operators on the ground to provide reliable HF communications. In addition to, the existing HFDL does not have the throughput required to sufficiently satisfy the communication needs.

- HF communication equipage is required by all commercial aircraft requesting oceanic clearance. The new modernized HF communication systems are supposed to enhance the aviation safety of life applications and provide the following benefits to aircraft operators:
 - Improve the quality and capacity of existing HF systems
 - Ability to meet RCP 240 requirements
 - Avionics size, weight, and power reduction
 - Ease of use
 - User authentication
- HF radio systems provide long communication ranges for aeronautical systems to support safe, efficient air travel over long-range routes that exceed the communication range provided through ground-based VHF systems. In addition to, regulatory authorities have recognized the use of satellite systems in long-range communications provides diversity and increase the availability and reliability of communications.
- Introduction of new wideband HF systems is supposed to complement existing longrange aeronautical communications links such as L-Band SATCOM. As, HF and SATCOM have different environmental susceptibilities and failure modes (e.g., solar events, rain fade, jamming, satellite failures, ground station failures, etc.) thus, HF will provide a spectrally diverse, terrestrial based long-range communications path supporting high availability aeronautical systems through dissimilar redundancy and increase the useful bandwidth available for aircraft communications.
- The New wideband HF systems will bring the listed benefits to the aviation industry in numerous areas but first and foremost would be Major Air Routes, Polar routes and remote land masses with poor VHF infrastructure.
- Modification of RR Appendix 27 will allow spectrally efficient advanced waveforms, which were not previously considered for use in 3 kHz channel allotments for legacy HF voice and High Frequency Data Link (HFDL). This will allow digital voice for significantly reduced noise and improved clarity, as well as 100+ kbps data rates.
- The use of digital wideband HF radio technologies is the expected major



modernization for the aeronautical applications operated in these frequency bands.

• The new modernized HF communication systems should coexist with the existing analog voice and data communication systems. In addition to, ensuring the compatibility with adjacent band primary services.

In the 27th meeting of WP 5B which was held In November/December 2021,

- Based on the Input contribution: 5B/225 (Annexes 3 & 4), 5B/355 (Annex 32), 5B/393 and on the basis of the comments received by WP 6A in its liaison statement (5B/393), the new WD towards a PDN Report ITU-R M.[AERO-WIDEBAND-VHF] was agreed to be updated accordingly as the draft CPM text.
- WP 6A was kept informed of the progress of the work through a liaison statement agreed by WP 5B.

Part C: Current Status of Band

- RR Appendix 27, details the international and regional frequency allotment plans for HF channels operating under the AM(R)S exclusive allocations in frequency bands between 2850 to 22000 kHz, and the related provisions governing the use of these frequencies and frequency bands. Moreover, the band is organized with a 3 kHz channel allotment, and contains a total of 427 channels of 3 kHz (435 for region 2) over all frequency bands.
- The table below include the incumbent primary services allocations in the frequency band from 2850 to 22000 kHz.

RR Article 5 radio communication services allocated		
Aeronautical Mobile (R)	AMATEUR	
Aeronautical Mobile (OR)	Land Mobile	
FIXED	MARITIME MOBILE	
MOBILE	STANDARD FREQUENCY AND TIME SIGNAL	
BROADCASTING	AMATEUR-SATELLITE	
RADIO ASTRONOMY	-	

Part D: Conclusion of the results of studies, if any

The working document towards preliminary draft new report <u>ITU-R M.[AERO-WIDEBAND-HF]</u>, presents all the elements and technical characteristics for wideband HF (WBHF) systems. As well as, it will include all the conducted compatibility and sharing studies related to Agenda Item 1.9.

A Brief overview on the latest updates within the report:



- WP5B invites administrations who which to complement the set of parameters under the technical and operational characteristics of their existing systems, until WP5B's next meeting at March/April 2022. In order to start conducting the sharing and compatibility studies.
- The report provide an overview on the new wideband HF system, including the proposed system technical characteristics and spectral emission masks.
- The proposal added to the regulatory section indicated that the WBHF signal will comply with the HFDL spectral mask expressed in peak envelope power defined in Recommendation ITU-R M.1458-0. As a result, the power spectral density profile for the WBHF signal should not exceed the current HFDL signal. Which ensure the compatibility and interoperability with existing HF voice and HFDL users on adjacent channels, as well as with incumbent services in the adjacent bands.

In the 27th meeting of WP 5B which was held In November/December 2021, three contributions (5B/225, 5B/355, 5B/393) were received. On the basis of the comments received by WP 6A in its liaison statement (5B/393), the new WD towards a PDN Report ITU-R M.[AERO-WIDEBAND-VHF] was agreed to be updated accordingly as the draft CPM text.

WP 6A was kept informed of the progress of the work through a liaison statement agreed by WP 5B.

Part E: Options and Associated Implications

- The protection of existing primary services operating at the same and adjacent frequency bands shall be ensured.
- The frequency implementation should be coordinated with ICAO and its regional groups for HF assignments in Flight Information Regions (FIRs). In addition to, the WBHF systems should operate in accordance with the international Standards and Recommended Practices and procedures established by ICAO.
- To use digital HF aeronautical spectrum which would increase the data rates to reach required performance by modern aeronautical systems.

Part F: Proposed East Africa Common View and/or Position

EAC administrations are invited to support the ITU-R technical and regulatory studies to identify the necessary modifications to RR appendix 27, in order to accommodate digital technologies that are supposed to improve the HF communication systems and enhance aviation safety-of-life applications.

- The new proposed HF systems should coexist with the existing analog voice and data communication systems and operate in accordance with the ICAO international Standards and Recommended Practices and procedures.
- Protection of in band and adjacent band services shall be ensured.



Part G: Recommendations and Way Forward

- Continue follow up and participation in the development of ITU-R Report [Aero-Wideband-HF-Studies] and assist in the sharing and compatibility studies that will be conducted, as well as regulatory considerations.
- To update the position of EAC based on the developments of this Agenda Item

Part H: Other Regional Groups and International Organizations Preliminary Positions

1. ASMG – October 2021:

Support the promotion of optimal use of the frequency spectrum by introducing digital technologies for safety applications in the HF bands allocated to the aeronautical mobile servic , provided that coexistence is ensured with the current analogue systems.

2. CEPT – November 2021:

CEPT supports the modification of the Appendix **27** of RR that would allow new digital wideband HF systems including aggregating contiguous and/or not contiguous channels, if retained, ensuring:

- 3. the protection of other primary services operating in band and in adjacent frequency bands, and
- 4. coexistence with existing aeronautical analogue voice and data HF systems.
- 5. CITEL November 2021:

An administration supports studies called for by Resolution **429** (WRC-19) to accommodate new digital HF technologies.

6. RCC – December 2021:

The RCC Administrations do not oppose modifications to RR Appendix 27, aimed at the use of digital technologies for commercial aviation AM(R)S safety-of-life applications in existing HF bands allocated to the aeronautical mobile (route) service when ensuring coexistence of current HF systems alongside modernized HF systems.

7. APT – November 2021:

APT Members support studies with a view to identify any necessary modifications to RR. Appendix 27 to accommodate wideband HF technologies for the aeronautical mobile (route) service (AM(R)S) between 2 850 and 22 000 kHz in accordance with Resolution **429 (WRC-19)** with the need to avoid harmful interference to primary services in the same and adjacent bands in particular existing AM(R)S HF systems.

APT Members are of the view that there are differing wideband HF technologies and are of the view that changes to RR. Appendix 27 should allow new digital wideband HF systems taking into account



technology neutrality.

APT Members are also of the view that the implementation of new wideband AM(R)S HF systems require necessary coordination through ICAO given their role in organizing HF aeronautical channel plans in flight information regions.

- 8. ICAO December 2021:
- To support ITU-R studies as called for by Resolution 429 (WRC-19).
- To support, based on agreed studies, the necessary modification of Appendix 27 to the Radio Regulations that will enable the introduction of HF wideband aeronautical communication systems. Those systems shall be operated in accordance with international Standards and Recommended Practices and procedures established in accordance with the Convention on International Civil Aviation.

Input Document to EACO WG Meeting

28/02/2022

"contributing body/ organization/ rapporteur"

Agenda Item 1.10

Part A: Description

to conduct studies on spectrum needs, coexistence with radiocommunication services and regulatory measures for **possible new allocations for the aeronautical mobile service for the**



use of non-safety aeronautical mobile applications, in accordance with Resolution 430 (WRC-19);

Resolution 430 (WRC-19)

Studies on frequency-related matters, including **possible additional allocations**, for the possible introduction of **new non-safety aeronautical mobile applications**

Part B: Key Elements - the notables

Resolution **430 (WRC-19)** in its *resolves to invite the ITU Radiocommunication Sector*, invites the ITU-R to conduct, and complete in time for WRC-23:

- 1 studies on **spectrum needs** for new non-safety aeronautical mobile applications for air-air, ground-air and air-ground communications of aircraft systems
- 2 sharing and compatibility studies in the frequency band 22-22.21 GHz, already allocated on a primary basis to the mobile, except aeronautical mobile, service, in order to evaluate the possible revision or deletion of the "except aeronautical mobile" restriction while ensuring the protection of primary services in the considered frequency bands and, as appropriate, in adjacent frequency bands;
- 3 sharing and compatibility studies on possible new primary allocations to the aeronautical mobile service for non-safety aeronautical applications in the frequency band 15.4-15.7 GHz, while ensuring the protection of primary services in the considered frequency bands and, as appropriate, adjacent frequency bands;

The Working Party 5B meeting, held in November/December 2021 managed to;

Based on five of the contributions (5B/416, 5B/418, 5B/425, 5B/440, 5B/468), the new WD towards a PDN Report ITU-R M.[NON-SAFETY AMS CHARACTERISTICS AND SHARING STUDIES] was revised with updated parameters for the AMS non-safety, possible scenarios, preliminary sharing studies, and comments.

The draft CPM text and associated work plan were not updated due to a lack of contributions and time and therefore the outcome from the previous WP 5B is to be carried forward to the next meeting.

Part C: Current Status of Band

TABLE 1

Relevant ITU-R documents containing system characteristics of incumbent services in the frequency



Frequency band (MHz)	Service	Relevant ITU-R documents
	ΓΔΡΤΗ ΕΧΡΙ ΟΡΔΤΙΟΝ-	Recommendation ITU-R RS.1813-1
	SATELLITE (passive)	Recommendation ITU-R RS.1028
-		Recommendation ITU-R RS.1029
		Recommendation ITU-R RA.769-2
15.35-15.4	RADIO ASTRONOMY	Recommendation ITU-R S.1341-0
		Recommendation ITU-R SA.509-3
		Report ITU-R M.2170
	SPACE RESEARCH (nassive)	Recommendation ITU-R SA.509-3
	STACE RESEARCH (pussive)	Recommendation ITU-R SA.510-2
		Recommendation ITU-R M.1730-1
		Report ITU-R M.2170
	RADIOLOCATION	Report ITU-R M.2229
		Report ITU-R M.2230
15.4-15.43	AERONAUTICAL RADIONAVIGATION	Recommendation ITU-R S.1340-0
		Recommendation ITU-R S.1341-0
		Report ITU-R M.2170
		Report ITU-R M.2229
	FIXED-SATELLITE (Earth-to- space)	Report ITU-R M.2230
		ITU-R S.1328-3
		Report ITU-R M.2170
-		Report ITU-R M.2230
45.40		Recommendation ITU-R M.1730-1
15.43-	RADIOLOCATION	Report IIU-R M.2229
15.05		Report ITU-R M.2230
		Recommendation ITU-R S.1340-0
	RADIONAVIGATION	Report ITL-R M 2229
		Report ITU-R M.2230
		Recommendation ITU-R M 1730-1
	RADIOLOCATION	Report ITU-R M.2230
15.63-15.7		Recommendation ITU-R S.1340-0
	AERONAUTICAL RADIONAVIGATION	Recommendation ITU-R S.1341-0
		Report ITU-R M.2230
22-22.21	FIXED	



		MOBILE except aeronautical mobile	
		EARTH EXPLORATION- SATELLITE (passive)	Recommendation ITU-R RS.1813-1 Recommendation ITU-R RS.1028 Recommendation ITU-R RS.1029
		FIXED	
	22.21-22.5	MOBILE except aeronautical mobile	
		RADIO ASTRONOMY	Recommendation ITU-R RA.769-2
			Recommendation ITU-R SA.509-3
			Recommendation ITU-R SM.1633
		SPACE RESEARCH (passive)	Recommendation ITU-R SA.509-3
	Part D: Conclusion of the results of studies, if any		

PDN Report ITU-R M.[NON-SAFETY AMS CHARACTERISTICS AND SHARING STUDIES] The Report introduces typical operational scenarios and spectrum needs associated to the possible use of non-safety aeronautical mobile applications in the frequency bands 15.4-15.7 GHz and 22-22.21 GHz. Furthermore, it provides technical characteristics of non-safety Aeronautical Mobile Service (AMS) systems in these bands and performs sharing and compatibility studies with incumbent services in the same or in adjacent frequency bands, in accordance with Resolution **430 (WRC-19)**.

The report further contains sharing and compatibility studies between the AMS and other systems in the frequency ranges 15.4-15.7 GHz 22-22.21 GHz.

Part E: Options and Associated Implications

- Study **technical characteristics** of the aeronautical mobile service systems in the frequency range 15.4-15.7 GHz
- Study Spectrum Emission Mask of AMS Systems in the frequency band 15.4-15.7 GHz
- 1. Recommendation ITU-R S.1340.
- 2. Report ITU-R M.2170.
- Study **technical and operational characteristics** of the non-safety AMS systems in the frequency band **22-22.21 GHz**
- Study parameters of typical fixed service systems in the frequency band
 -22.1 GHz (Recommendation ITU-R F.758)

Protection criteria for Radio Astronomy services (Recommendation ITU-R RA.769)

Part F: Proposed East Africa Common View and/or Position

EAC Administrations are invited to support the ITU-R studies (Working Party 5B) to ensure the protection of incumbent services as well as the adjacent services, such as defining unwanted emission limits and appropriate protection measures for station of aeronautical



mobile service in the frequency bands 15.35-15.4 GHz and 22.21-22.5 GHz to protect EESS

(passive) and radio astronomy service.

Part G: Recommendations and Way Forward

EAC administrations are invited to participate in WP 5B meetings in order to among other things to determine the sharing and compatibility of the identified frequency bands.

Part H: Other Regional Groups and International Organizations Preliminary Positions

1. **ASMG** – October 2021:

The necessity of providing the necessary protection to the existing in-band and adjacent band services, for the frequency bands under study.

2. **CEPT** - November 2021:

CEPT acknowledges the need for additional spectrum to fulfil the increasing demand for nonsafety aeronautical applications and is considering a new allocation to AMS for non-safety application in whole range or a part of the frequency bands 15.4-15.7 GHz and 22-22.21 GHz while:

- any modification of the RR should ensure appropriate protection for the EESS/SRS (passive) and the RAS (taking into account RR No. 5.149) allocated in adjacent frequency band from unwanted emissions of the AMS;
- ensuring protection for in-band radiolocation and aeronautical radionavigation and FSS (Earth-to-space) services in the relevant part of the frequency band 15.4 – 15. 7 GHz;
- ensuring protection for in-band fixed and mobile services in the frequency band 22-22.21 GHz, noting that the fixed service is allocated in the 21.2-23.6 GHz frequency range.
- 3. **RCC** December 2021:

The RCC Administrations consider that, when identifying possible new allocations to aeronautical mobile service in the frequency band 15.4 – 15.7 GHz as well as when removing constraints on the use of the frequency band 22 – 22.21 GHz by aeronautical mobile service, it is necessary to:

- provide protection of radiolocation and aeronautical radionavigation services in the frequency band 15.4-15.7 GHz, of fixed satellite service in the frequency band 15.43-15.63 GHz, and of fixed service in the frequency band 22-22.21 GHz;

- provide protection of radioastronomy service in the frequency bands 15.35-15.4 GHz and 22,21-22,5 GHz identify unwanted emissions' limits of aeronautical mobile service stations in these frequency bands.



4. **APT** – November 2021:

APT Members support ongoing ITU-R studies on spectrum needs, coexistence with radiocommunication services and regulatory measures for possible new allocations for the aeronautical mobile service for the use of non-safety aeronautical mobile applications, in accordance with Resolution **430 (WRC-19)**.

APT Members are of the view that the protection of existing primary services in the 15.4-15.7 GHz and 22-22.21 GHz frequency bands and, as appropriate, in adjacent frequency bands should be ensured.

APT Members are also of the view that the frequency band 21.2-23.6 GHz is extensively used by terrestrial services, in particular the fixed service, to support the development of telecommunication infrastructure in many countries and crucial in developing countries, and no adverse effect on the terrestrial services allocated in this band and its future development should be ensured.

- 5. **ICAO** December 2021:
 - To support ITU-R studies as called for by Resolution 430 (WRC-19).
 - To support, based on the agreed results of studies, new allocations to the aeronautical mobile service only for use by non-safety aeronautical mobile applications.
 - To ensure that any such modification does not adversely affect the status or provision of aeronautical safety services.

6. WMO - December 2021:

WMO supports studies to ensure protection of the EESS (passive) in the adjacent frequency band 22.21-22.5 GHz. WMO is also concerned that adjacent band interference may limit usability of passive sensing in the 15.35-15.4 GHz band, however ensuring protection may not be possible due to the lack of operational characteristics and sharing criteria.

Input Document to EACO WG Meeting

28/02/2022

"Contributing body/ organization/ rapporteur"

Agenda Item 1.11

Part A: Description

to consider possible regulatory actions to support the modernization of the Global Maritime Distress and Safety System and the implementation of e-navigation, in accordance with **Resolution 361**

Resolution 361 (Rev.WRC-19)

Consideration **of possible regulatory actions** to support the modernization of the Global Maritime Distress and Safety System and the **implementation of e-navigation**

Part B: Key Elements - the notables

- 1. **GMDSS modernization** is the continuation of the agenda item 1.8, Issue A of WRC-19. The modernization of GMDSS, for which the work undertaken by IMO was not finalized at the time of WRC-19. WRC-19 was able to take some preliminary decision regarding the **NAVDAT** in the **MF and HF bands**.
- 2. The adoption of the amendments to the 1974 SOLAS Convention chapters III and IV, together with related and consequential amendments to existing instruments other than SOLAS is expected to be finalised in 2022. These amendments will enter into force in 2024 and conclude the modernization of the GMDSS.
- 3. One of the changes to the SOLAS Convention is the removal of non-406 MHz satellite emergency position indicating radio beacons (EPIRBs), leaving only EPIRBs operating on 406 MHz. Consequently, satellite EPIRBs operating on 1.6 GHz (1 645.5-1 646.5 MHz) and terrestrial EPIRBs using VHF-DSC (Very High Frequency Digital Selective Calling) operating at 156.525 MHz no longer form a part of the GMDSS. Given the removal of 1.6 GHz EPIRBs by the IMO, and noting that the use of the 1.6 GHz EPIRB has already ceased operation, WRC-23 may consider possible changes to the RR related to use of the band 1 645.5-1 646.5 MHz (Earth-to-space) for EPIRBs under Issue A of AI 1.11.
- 4. This Agenda have three issues for consideration:-
 - 1. Issue A: GMDSS Modernization
 - 2. Issue B: E-navigation
 - 3. Issue C: Introduction of addition satellite system into GMDSS

Issue A: GMDSS Modernization

- In the GMDSS modernization under consideration by the International Maritime Organization (IMO), MF and HF band radio communication systems will continue to be used. However, it is difficult to select an appropriate frequency in consideration of communication distance, season, time, geographical location, etc. in MF/HF frequency bands, because no radio communication specialist has been on board since the introduction of GMDSS. Therefore, it is required to introduce an automatic connection system (ACS) by automatically selecting a frequency.
- GMDSS uses the **digital selective-calling (DSC) system**, which automatically transmits



distress alert in each frequency band (2, 4, 6, 8, 12 and 16 MHz bands) in sequence.

- For the introduction of ACS to the MF/HF frequency bands in the marine mobile service, it is appropriate to use the DSC system that has already been used.
- Therefore, draft IMO performance standard stipulates that the MF/HF equipment should comprise a facility to establish a connection between stations of the maritime mobile service by simple means using DSC.

Automatic connection system function on MF/HF

Automatic connection system (ACS) enables to establish a communication link between ship station and ship/coast station by automatically selecting a frequency.

DSC equipment should be provided visual indication that automatic frequency switching by ACS function is enabled.

Issue B: E-navigation

The e-navigation is a concept under study at IMO since the MSC 81 in 2005. The definition of e-navigation is given by IMO:

"E-navigation is the harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance berth to berth navigation and related services for safety and security at sea and protection of the marine environment."

As shipping moves into the digital world, e-navigation is expected to provide digital communications and digital information for the benefit of maritime safety, security and protection of the marine environment, reducing the administrative burden and increasing the efficiency of maritime trade and transport.

Among the objectives of the e-navigation, quoting the strategy implementation plan (SIP) of the IMO, there are the improvements of communications in general, the standardization and automation of ship's reporting and the integration and presentation of available information in graphical displays received via communication equipment.

Communication is a key element for e-navigation. Future communication systems should be digital and could include VHF data exchange system (VDES) and in the future NAVDAT and be developed to facilitate wide information management solutions.

Issue C: Introduction of additional satellite systems into the GMDSS

Two satellite systems have been providing safety communication in the GMDSS. IMO is considering introducing an additional GSO MSS system for GMDSS which may require new or modified regulatory provisions, based on the results of the ITU-R studies

Part C: Current Status of Band or Issue



- Regarding issue 3: Introduction of additional satellite systems into the GMDSS, there is one additional GSOs MSS system being considered by the IMO for recognition to provide GMDSS uses MSS frequencies in the frequency bands 1 610-1 626.5 MHz and 2 483.5-2 500 MHz.
- 2. The frequency bands under study is already primary allocations for MSS. For this reason, no new allocation is necessary by WRC-23 in order to accommodate the GMDSS. Meanwhile, what is needed during this study period is to determine the quantity of spectrum, among the frequency bands under consideration.

The Working Party 5B meeting, held in November/December 2021;

The meeting considered six contributions with the proposals to update the draft CPM text. The discussion during the meeting focused on the *issue* A of Resolution **361 (Rev.WRC-19)**, Global maritime distress and safety system (GMDSS) modernization.

The proposed main changes to provisions of RR included a number of topics, which are:

- Removal of Narrow Band Direct Printing (NBDP) for distress and safety communications from the GMDSS (NBDP still being used for transmission of Maritime Safety Information, MSI),
- Introduction of the NAVDAT frequencies in MF and HF in RR provisions,
- Implementation of Automatic Connection System (ACS) for DSC in MF and HF Bands,
- Using AIS-SART as homing equipment for survival craft station to replace RADAR-SART and
- Modification of provisions to remove the limit of exclusive usage of EPIRBs in the frequency band 1 645.5 - 1 646.5 MHz to allow the general maritime radiocommunication.

One method was developed on *issue B* "E-Navigation" and proposed no modification to RR. During the meeting, the views were also expressed that WP 4C may wish to submit CPM text for *resolves 3* to CPM management team after WP 5B meeting in July, 2022. This group invited WP 4C to make effort to prepare the draft CPM text related to *resolve 3* of agenda item 1.11 in time to convey to WP 5B as decided by CPM23-1. Otherwise, WP 4C may need to inform the CPM management team for further advise.

One liaison statement to WP 4C and 7D was prepared to invite views on example modifications to RR No. 5.375, regarding use of the frequency band 1 645.5 - 1 646.5 MHz, including the possible deletion of its reference to inter-satellite links. Additionally, the meeting updated the workplan accordingly.

Revision of ITU-R Maritime related Recommendations. These recommendations include:

1. **Recommendation ITU-R M.1371-5** Technical characteristics for an automatic identification system using time division multiple access in the VHF maritime mobile frequency band.

This group continued its work on revision to Recommendation ITU-R M.1371-5 and considered all three inputs to this meeting. The meeting considered the proposal to add a message to indicate the activated



AIS locating equipment (AIS SARTs, Class M MOB devices and 406 MHz radio beacons) is manually switched off and two options remained. Another discussion during the meeting is on the topic that transmission of Cospas-Sarsat beacon 15 Hex-ID using message 24A. One liaison statement was prepared to IMO and copy to IALA and CIRM to solicit views on the above two topics. The document was attached to Chairman Report.

2. **Recommendation ITU-R M.2058-0** Characteristics of a digital system, named navigational data for broadcasting maritime safety and security related information from shore-to-ship in the maritime HF frequency band.

Due to the time constraints, the proposals from the input contribution were not considered and discussed. The document was updated and carried forward to next WP 5B meeting.

3. **Recommendation ITU-R M.2092-0** Technical characteristics for a VHF data exchange system in the VHF maritime mobile band

The document was modified with several editorial changes and agreed by WP 5B to forward to SG 5 for further consideration.

4. **Recommendation ITU-R M. 2010-1** Characteristics of a digital system, named Navigational Data for broadcasting maritime safety and security related information from shore-to-ship in the 500 kHz band

This group considered one input and updated the content of Annex 3 and Annex 4. The proposed modification to the working document from the input 5B/408 was not fully addressed due to time limit. Therefore, the working document was annexed to Chairman Report for further consideration in next WP 5B meeting.

5. **Recommendation ITU-R M.493-15** Assignment and use of identities in the maritime mobile service

The maritime group updated the working document with the proposals from two inputs. and believe that the document is in mature stage and upgraded the status of the document to a "Preliminary draft revision".

6. **Recommendation ITU-R M.541-10** Operational procedures for the use of digital selective-calling equipment in the maritime mobile service

The working document was modified to delete NBDP related description to reflect the decision taken by IMO to remove NBDP for distress and safety communications from the GMDSS. The substance on automatic connection system (ACS) using digital selective-calling (DSC) system was updated and improved. This working document was annexed to chairman report for further consideration.

7. **Recommendation ITU-R M.585-8** Assignment and use of identities in the maritime mobile service

The meeting agreed to use 3-digit prefix 979 for AMRD Group B with AIS capabilities, and regarding MOB



devices, only MOB class M was identified numbering scheme in this recommendation. This document was elevated to draft document and submitted to SG5 for further consideration.

8. **Recommendation ITU-R M.2135-0** Technical characteristics of autonomous maritime radio devices operating in the frequency band 156-162.05 MHz

The working document was updated with the proposals from two input contributions. New Annex 2 was draft with the content extracted from Recommendation ITU-R M.493 to describe the general functionality of class M MOB devices, identified as AMRD Group A devices, using DSC for alerting and AIS for tracking. The parts on general requirements, characteristics for AMRD Group B, and how their data should be formatted and transmitted were also discussed. The working document was annexed to the Chairman Report.

The preliminary draft new report is work on progress. This include:

ITU-R M. [UHF_ONBOARD_USAGE] Usage of the frequency bands 457.5125-457.5875 MHz and 467.5125-467.5875 MHz by Maritime mobile service is work on progress. There was no any contribution in this meeting therefore it has been carried forward to the next meeting.

Since there was no contribution to this meeting on this issue the annex to the last Chairman's Report was carried forward.

Draft new Report ITU-R M.[LED EMI]

The maritime group considered two liaison statements from WP 1A and CISPR and one input from administration. The new updates to the document include the protection criteria for the VHF Data Exchange System (VDES), review of Emission Limits in the GNSS Bands and EMC test results from maritime LEDs navigation lights to VHF and AIS Installation. The working document was elevated to preliminary draft document and annexed to Chairman Report.

Part D: Conclusion of the results of studies, if any

Existing relevant ITU-R Recommendations and Reports:

Recommendations ITU-R M.476, ITU-R M.492, ITU-R M.493, ITU-R M.541, ITU-R M.625.

Existing relevant Recommendations and Reports for Issue C:

Recommendations ITU-R M.1184-3, ITU-R M.1188-1, ITU-R RA.769-2, ITU-R RA.1513-2,

Report ITU-R M.2369-0; WDPDN Report ITU-R M.[ADD-GSO-GMDSS].

Global maritime distress and safety system modernization

 Current regulatory status of narrow band direct printing for global maritime distress and safety system



Technical characteristics of narrow band direct printing (NBDP) in the maritime mobile service (MMS) are provided by Recommendations ITU-R M.476-5 and ITU-R M.625-4, which are incorporated by reference in the RR. In Recommendation ITU-R M.625-4 direct printing telegraphy is explicitly considered as part of the GMDSS. Further characteristics are given in Recommendation ITU-R M.627 (referenced by RR No. **51.41**).

An automatic connection system for MF and HF

Recommendations ITU-R M.493 and ITU-R M.541 have been revised in order to allow the introduction of an automatic connection system (ACS) based on DSC for communication in the MF and HF bands. Communication by MF/HF remains an integral part of the GMDSS. The implementation of ACS will ensure simple and reliable access to the required radio links for the mariner.

NAVDAT

The amendments to the 1974 Safety of Life at Sea (SOLAS) Convention chapters III and IV made it possible for NAVDAT to become an element of the modernized GMDSS. The frequencies for NAVDAT in MF and HF have been identified in RR Article **5** and Appendix **17** by the WRC-19. These frequencies need now to be inserted in RR Appendix **15**.

1.6 GHz Emergency position indicating radio beacons

The frequency band 1 645.5-1 646.5 MHz is allocated to the MSS (Earth-to-space) and was previously used by EPIRBs ("1.6 GHz EPIRBs") operating with GSO MSS networks. Recommendation ITU-R M.632-3, last revised in 1997, provides technical characteristics. The 1.6 GHz EPIRB service has already been withdrawn and as far as can be determined; this band is currently unused. The adjacent frequency band, 1 626.5-1 645.5 MHz is allocated to the MSS and is used to provide MSS service (Earth-to-space) for ships, including GMDSS communications. The use of the frequency band 1 645.5-1 646.5 MHz in the Earth-to-space direction for GMDSS SAT-COM including the transmission of safety messages and for general maritime radiocommunications would provide additional spectrum to support new GMDSS requirements using GSO satellite networks, potentially also supporting e-navigation and autonomous surface ships.

E-navigation

The study in IMO has not introduced e-navigation in the GMDSS. NAVDAT may become part of the GMDSS as a result of the modernization and thereby potentially become one of the systems that support e-navigation; however, it will not change the regulatory status of e-navigation.

Various existing satellite networks would support e-navigation together with the NAVDAT and the VDES.

The NAVDAT system is described in the Recommendation ITU-R M.2010 for the MF band and ITU-R M.2058 for the HF band. The VDES is described in the Recommendation ITU-R M.2092.

Introduction of additional satellite systems into the global maritime distress and safety system



One additional GSO MSS system, which consists of five GSO satellites located at 58.75E, 80E, 110.5E, 140E and 160E, being considered by the IMO to provide GMDSS uses MSS allocations within the frequency bands 1 610-1 626.5 MHz and 2 483.5-2 500 MHz.

This system could provide two-way communication services for Asia and Western Pacific region with overlapping coverage. The filings used by the GSO system includes CHINASAT-31 (80E), -32 (140E), -33 (110.5E) and COMPASS-58.75E, -80E, -110.5E, -140E, -160E, which are recorded in the ITU MIFR under RR No. **11.41**.

The band 1 610-1 626.5 MHz is allocated to the mobile-satellite service (MSS) (Earth-to-space) on a primary basis. The allocation used by this system for uplink is also used by other non-GSO MSS systems. The service uplink signals of the additional GSO MSS system have three carriers in frequency bands 1 610.18-1 618.34 MHz, 1 614.26-1 622.42 MHz and 1 618.34-1 626.5 MHz. Frequency coordination of the GSO MSS satellite systems being considered has not been completed with the existing NGSO MSS systems, there is potential harmful interference caused into the existing satellite systems without the possibility of frequency avoidance. In the event that harmful interference is caused to the frequency assignments of these systems by the GSO MSS satellite systems under consideration, such interference must be immediately eliminated (see RR No. **11.42**).

The band 2 483.5-2 500 MHz is allocated to the mobile-satellite service (MSS) (space-to-Earth) on a primary basis. The allocation used by this system for downlink are also used by other non-GSO MSS systems. The service downlink signal of the additional GSO MSS system has one carrier in the frequency band 2 483.59-2 499.91 MHz.

Part E: Options and Associated Implications



Issue A: GMDSS modernization

Method A1: Removal of narrow band direct printing from the global maritime distress and safety system and introduction of automatic connection system for MF and selected HF bands; Introduction of the NAVDAT in the Radio Regulations.

This method proposes:

The deletion of the NBDP for distress and safety communications from GMDSS in the RR Appendices **15** and **17** for MF and HF in all bands. This is due to the fact that NBDP for such purpose has been deleted by the IMO from SOLAS Chapter IV. As NBDP is not in practical use on ships for distress alerting the deletion simplifies the operational use and reduces the burden on the administrations to maintain a system which is no longer in use.

- The implementation of an ACS for MF and HF in selected bands using DSC technology as indicated by IMO in the related performance standards, taking into account studies performed within ITU-R, especially in [Rev. Recommendation ITU-R M.493-15] and [Rev. Recommendation ITU-R M.541-10]. It is proposed to implement this on the frequencies which had previously been used by NBDP for GMDSS in MF and all HF bands in RR Article 5 and Appendix **17** by a footnote.
- The introduction of the NAVDAT frequencies in MF and HF in RR Appendix **15** and modification of the relevant provisions in RR Articles **5**, **32**, **33** and **52**.

Method A2: Automatic identification system search and rescue transmitter as homing equipment for survival craft station

This method proposes:

- To implement Automatic identification system search and rescue transmitter (AIS SART) as homing equipment frequencies are protected by reference in RR Appendix **15** taking into account studies performed within ITU-R, especially in [Rev. Recommendation ITU-R M.1371-X]. It is proposed to amend RR No. **31.7** that survival craft stations may carry this equipment as an alternative to the RADAR-SART to be in line with SOLAS Chapter IV.

Method A3: 1.6 GHz Emergency position indicating radio beacons

This method proposes:

- To modify RR No. **5.375** and Table 15-2 of Appendix **15** such that the frequency band 1 645.5-1 646.5 MHz is no longer limited to use exclusively by EPIRBs. The band would be available for use for the GMDSS and for general maritime radiocommunications. The availability of this band as an addition to the current



SAT-COM band 1626.5-1645.5 MHz would provide additional capacity in the Earthto-space direction for communications by ships.

Issue B: E-Navigation

Method B1:

- Previous WRCs have identified the frequency bands to be utilized for the VDES and the NAVDAT. These two systems can both support e-navigation.
- Satellite networks which would support the e-navigation have already their allocation identified in the Radio Regulation.
- E-navigation is not part of the GMDSS.

These elements bring to the conclusion that no additional frequency allocation is necessary in RR Article **5** for the e-navigation. Therefore ,it is proposed a no change to RR Article **5**.

Issue C: Introduction of additional satellite systems into the GMDSS

One existing geostationary-satellite system operating on 1 610-1 626.5 MHz (Earth-to-space) and 2 483.5-2 500 MHz (space-to-Earth) is under consideration by IMO in order to become a new GMDSS satellite provider.

These frequency bands under study contained already primary allocation for MSS, for this reason no new allocation is necessary by WRC-23 in order to accommodate the GMDSS.

What is needed during this study period is to determine the quantity of spectrum, among the frequency bands under consideration in the *recognizing d*), necessary for this geostationary-satellite system to provide GMDSS functionalities, and the status of coordination with the satellite systems already operating in them as well as if the IMO has introduced the indicated satellite network.

Method C1: [title of Method C1, if any]

[In view of the above, in order to support the requirement of safety of life aspects by the GMDSS and implement applicable provision of RR, Method C1 propose the addition of the band 1 610.18-1 622.42 MHz (Carrier 1 and Carrier 2), 2 483.59-2 499.91 MHz to Table 15-2 of RR Appendix **15**, as well as provisions RR No. **33.50** and RR No. **33.53** of RR Article **33**.

Method C1 also propose to modify the RR No. 5.368 to apply that MMSS (Earth-to-space) in the band 1 610.18-1 622.42 MHz is used for safety services and the RR No. **4.10** applies.]

4C/258 (RUS):

Proposed by CHN:

Method C1 also propose to modify the RR No. **5.368** to apply that MMSS (Earth-to-space) in the band 1 610.18-1 622.42 MHz is used for safety services and the RR No. **4.10** applies and keep the status to protect the ARNS service.



4C/260 R1 (USA)

Method C2: International Maritime Organization does not approve the new global maritime distress and safety system satellite provider

If the IMO does not provide Recognition of the proposed satellite network than there is no requirement to modify the Radio Regulations in any way. This Method is NO Change (NOC).

Another text:

No Change (NOC).

The Radio Regulations address the use and protection of radio frequencies, including those used for provision of GMDSS. However, the Regulations do not identify or regulate systems that may provide GMDSS, which is the responsibility of the IMO. Resolution **361** (WRC-19) recognises that IMO is evaluating an application from an existing geostationary-satellite system to become a new GMDSS satellite provider.

If the IMO does not approve the application for the proposed satellite network, then the satellite network cannot provide GMDSS. In this case there would be no requirement to modify the Radio Regulations at this time.

4C/260 R1 (USA)

2/1.11/4.3.3 Method C3: [Non Successful Coordination]

Provisions of Article **9** of the Radio Regulations require coordination resulting in protection of the MSS satellite systems operating in the same frequency bands as the proposed satellite network. If such coordination has not been successfully completed that the MSS network should not be included in the GMDSS, and no modification to the Radio Regulations is required.

Proposal by CHN:

If the coordination has not been successfully completed, a new footnote may be considered to protect the relative satellite networks with date priority.

On the Regulatory and procedural considerations

For Issue A: GMDSS modernization

For Method A1: Removal of narrow band direct printing from the global maritime distress and safety system and introduction of an automatic connection system for MF and selected HF Bands; Introduction of the NAVDAT in RR

Modification of provisions under Article 5, Article 32, Article 33, Article 34, Article 47 and Article 51, Article 52, Appendix 15, Appendix 17, Resolution 349 (WRC23), Resolution 354 (WRC 07),



Introduction of New Resolution on Coordination of NAVDAT services have been made

For Method A2: Introduction of the Automatic Identification System Search and Rescue Transmitter (AIS-SART) as homing equipment to the survival craft station Modification of provisions under Article 5, Article 31, Article 32, Appendix 15 have been made

For Issue B: E-Navigation

Modification of provisions under Article 5, Appendix 15, Article 33

For Issue C: Introduction of additional satellite systems into the GMDSS

No any proposed regulatory text yet

Part F: Proposed EACO Common View and/or Position

EAC Administrations are invited to support the development of possible regulatory procedures for GMDSS modernization, E-navigation implementation and introducing a new GMDSS satellite system while ensuring the protection of radio astronomy and other incumbent services as well as current GMDSS systems.

Part G: Recommendations and Way Forward

- 1. To continue making follow-up on the process of revising the recommendations and drafting the new reports to support the *modernization of the Global Maritime Distress and Safety System and the implementation of e-navigation*.
- 2. EAC administrations are invited to actively participate in WP 5B and WP 4C meetings.

Part H: Regional Groups and international organizations Preliminary Positions

- **ASMG** November 2021: Support the possible regulatory procedures for updating the GMDSS system and implementing electronic navigation, and introducing a new GMDSS satellite system while ensuring the protection of other existing services and systems operating in the GMDSS system.
- 4. **CEPT** November 2021:

Issue A: Modernisation of GMDSS

CEPT supports the possible regulatory actions needed to implement the GMDSS modernisation in the Radio Regulation based on decisions to be taken in IMO.

Issue B: e-navigation

1.

CEPT supports, based on decisions to be taken in IMO, the possible regulatory actions in the



Radio Regulation needed to support the implementation of the e-navigation, if appropriate.

Issue C: Regulatory actions due to the introduction of additional satellite systems into the GMDSS by IMO

CEPT supports regulatory actions to introduce an additional satellite system into the GMDSS, based on decisions to be taken in IMO. . However, approval by IMO of any existing satellite system/network as complying with the requirements for GMDSS shall not lead to a change in the status of frequency assignments of this system/network and/or the allocation status of the corresponding service within which this system/network is notified.

5. **RCC** – December 2021:

In part of Problem A (modernization of GMDSS)

The RCC Administrations supports the development of possible regulatory measures to facilitate the modernization of the GMDSS, based on IMO decisions, and subject to ensuring compatibility with the systems of existing services.

In part of Problem B (introduction of electronic navigation (e-navigation))

The RCC Administrations supports the development of possible regulatory measures to facilitate the implementation of electronic navigation based on IMO decisions, and subject to ensuring compatibility with the systems of existing services.

In part of Problem C (IMO implementation of new satellite networks in GMDSS)

The RCC Administrations consider that IMO approval of any existing satellite system/the network as meeting the requirements for the GMDSS cannot lead to a change in the status of frequency assignments of this system/the network and/or distribution status of the corresponding service within which this network is registered.

6. **APT** – November 2021:

Issue A (resolves 1): GMDSS Modernization

APT Members support ITU-R studies to progress the modernization of GMDSS, taking into consideration the activities of IMO, for GMDSS modernization, including introduction of NAVDAT system and revised IMO performance standards of GMDSS equipment.

APT Members support possible introduction of the automatic connection system (ACS) for MF and selected HF bands and international NAVDAT service for the modernization of GMDSS, while ensuring no adverse effect on the allocation of the existing services and their future development in the same and adjacent frequency bands. APT Members are of the view that introduction of new radiocommunication technologies should not adversely affect the operation of the GMDSS.



APT Members are also of the view that the modernization of GMDSS including the introduction of the automatic connection system (ACS) should be affordable and simple to operate, so that non-SOLAS/non-Convention vessels could also benefit from it.

Issue B (resolves 2): E-navigation

APT Members support ITU-R studies, taking into consideration the activities of IMO, for implementation of e-navigation, while ensuring no adverse effect on the operation of the existing services and their future development in the same and adjacent frequency bands.

APT Members are also of the view that the implementation of e-navigation should be affordable and simple to operate, so that non-SOLAS/non-Convention vessels could also benefit from it.

Issue C (resolves 3): Introduction of additional satellite systems into the GMDSS

APT Members support the introduction of additional GSO satellite systems into the GMDSS, provided that the results of studies on sharing and compatibility with other radiocommunication services in the same and adjacent frequency bands ensure the protection of the services in the frequency bands under consideration by this agenda item.

7. CITEL - November 2021:

An administration supports GMDSS modernization and could support additional satellite providers of GMDSS contingent upon demonstrating compatibility of proposed GMDSS operations with other satellite systems operating within the band 1 610-1 626.5 MHz, and with the radio astronomy service operating in the band 1 610-1 613.8 MHz. Further, the proposed system should complete ITU-R coordination and notification with other MSS systems operating within the band 1 610-1 626.5 MHz, and also obtain IMO approval prior to consideration by WRC-23.

8. **ICAO** – December 2021:

To ensure that any change to the regulatory provisions and spectrum allocations resulting from this agenda item do not adversely impact on the capability of search and rescue aircraft, including helicopters, to effectively communicate with vessels during disaster-relief operations.

To ensure that any regulatory provisions in response to this agenda item do not adversely impact SARPs compliance of aeronautical mobile-satellite (route) service systems.



Input Document to EACO WG Meeting

28/02/2022

"Contributing body/ organization/ rapporteur"

Agenda Item 9.1 Topic(b)

Part A: Description

To consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention; on the activities of the Radiocommunication Sector since WRC 19:

Review of the amateur service and the amateur-satellite service allocations in the frequency band 1 240 1 300 MHz to determine if additional measures are required to ensure protection of the radionavigation-satellite (space-to-Earth) service operating in the same band in accordance with **Resolution 774** (WRC 19);

Resolution 774 (WRC-19)

Studies on technical and operational measures to be applied in the frequency band 1240-1300 MHz to ensure the protection

Part B: Key Elements - the notables

RNSS systems using the frequency band 1 240-1 300 MHz are operational, or becoming operational, in various parts of the world, with the aim of supporting a wide range of new satellite positioning services, for example enhanced accuracy and position authentication.

Some cases of harmful interference caused by emissions in the amateur service into RNSS (space-to-Earth) receivers have occurred, and resulted in investigations and in instructions to the operator of the interfering station to cease transmissions.

The number of RNSS receivers in the frequency band 1 240-1 300 MHz is currently limited in certain regions, but will increase dramatically in the near future with the ubiquitous deployment of receivers used in mass-market applications.

The amateur service in the frequency band 1 240-1 300 MHz is currently used for amateur voice, data and image transmission in several countries in Europe and around the globe, and may transmit a variety of emission types including wideband, continuous and/or high equivalent isotopically radiated power (e.i.r.p.) transmissions.

<u>A working document towards a preliminary draft new Report ITU-R M.[AMATEUR.CHARACTERISTICS]</u> is in preparation in WP 5A. WP 4C produced a <u>working document towards a preliminary draft new Report</u>



<u>ITU-R M.[Amateur-RNSS]</u> to document its ongoing work on the studies for this topic. This document will eventually include complete relevant amateur/amateur-satellite transmitter parameters and interference scenarios agreed with WP 5A, relevant RNSS receiver parameters and protection criteria developed in WP 4C, analysis methodologies employing propagation models discussed with WP 3M, and the results of studies once completed. WP 4C also revised the Recommendations ITU-R M.1902-1 and M.1787-3 to support the studies.

WORKINGDOCUMENTTOWARDSPreliminarydraftCPMtextforWRC-23 Agenda Item 9.1 TOPIC B)is also under development, but no content or direction can be
confirmed at the moment.

Part C: Current Status of Band

Allocation to services			
Region 1 Region 2 Region 3			
1 240-1 300	1 240-1 300 EARTH EXPLORATION-SATELLITE (active)		
	RADIOLOCATION		
RADIONAVIGATION-SATELLITE (space-to-Earth)			
(space-to-space)			
5.328B 5.329 5.329A			
SPACE RESEARCH (active)			
Amateur			
	5.282 5.330 5.331 5.332 5.335 5.335A		

- The frequency band 1 240-1 300 MHz is allocated worldwide to the RNSS on a primary basis;

- The frequency band 1 240-1 300 MHz is allocated worldwide to the amateur service on a secondary basis;
- The amateur-satellite service (Earth-to-space) may operate in the frequency band 1 260-1 270 MHz under No. 5.282;

Part D: Conclusion of the results of studies, if any

The Studies are ongoing. However, the following is the case:

Summary of the results of ITU-R studies

In accordance with Administrative Circular CA/251, dated 19 December 2019, Working Party (WP) 5A is the responsible group for this topic, and WP 4C is a contributing group. The Administrative Circular also outlines that WP 4C is responsible for developing studies on item 2



of resolves to invite the ITU Radiocommunication Sector part of Resolution **774 (WRC-19)** and sending this to WP 5A.

WP 4C is considered to be responsible for conducting the interference studies and studying possible technical and operational measures to ensure the protection of RNSS (space-to-Earth) receivers from amateur and amateur-satellite services within the frequency band 1 240-1 300 MHz.

WP 4C has developed a working document toward a preliminary draft new report (WD-PDNRep ITU-R M. [Amateur-RNSS]), available in document [https://www.itu.int/dms_ties/itu-r/md/19/wp4c/c/R19-WP4C-C-0162!N11!MSW-E.docx] in order to initiate studies called for in "resolves to invite ITU-R 2" of Resolution 774 (WRC-19). This document will eventually include relevant amateur/amateur-satellite transmitter parameters and interference scenarios agreed with WP 5A, relevant RNSS receiver parameters and protection criteria developed in WP 4C, analysis methodologies employing propagation models discussed with WP 3M, and the results of studies once completed.

The following contributions have been received on this Agenda Item:

Contributions of International Amateur Radio Union (Annex 1):

As at date, the International Amateur Radio Union contributed four documents, the first one dated on 10 July 2020 in which it proposes his proposed work plan for WP 5A to address WRC-23 agenda item 9.1, topic b) and covers participation in review of the amateur service and coexistence with the radio navigation satellite service.

The second document dated on 1 November 2020 is about the applications and typical operational aspects of the amateur and amateur satellite services operating in the band 1 240-1 300 MHz.

The IARU would like to emphasise the following important aspects with regard to their review consulted with a number of national amateur radio societies:

- This review is specific to amateur operations in the band 1 240-1 300 MHz, and builds upon the general information detailed in ITU-R Recommendation M.1732-2.
- As far as possible the IARU and national amateur radio societies have consulted to gather published and traceable data pertaining to operating periods and activity levels.

The third document dated 7 April 2021 presents its **preliminary views** as of March 2021 on six WRC-23 agenda items of principal concern: 1.2, 1.12, 1.14, 1.18, 9.1 Topic A, and 9.1 Topic B. These positions have been approved by the IARU Administrative Council and are subject to revision as WRC-23 preparations proceed.

The IARU seeks to protect the primary amateur and amateur-satellite service allocations in all



the bands that may be affected by WRC-23 agenda items. The IARU does not wish to see any changes or reductions in the primary allocations to the amateur and amateur-satellite services.

During many years of operational experience, the secondary amateur and amateur satellite services have successfully co-existed with all the primary services in the range 1 240-1 300 MHz with very few issues. In cases where certain applications (in particular wide bandwidth, high duty cycle applications) could increase the potential for interference, careful spectrum management and national licensing conditions have minimised any risk. Radio amateurs have successfully co-existed and innovated in this frequency range for many years and IARU believes that the regulatory status of the amateur and amateur satellite services in this range is already clear. Therefore any additional regulatory, operational or technical measures incorporated into the Radio Regulations are unnecessary. Any recommendations resulting from studies under Resolution 774 can be applied on a national basis and should be based on realistic assumptions, proportionate in scope and carefully justified so as not to unnecessarily inhibit development of the amateur services.

Proposal of IARU:

The fourth document dated 20 April 2021 the IARU proposes that the information provided below in **Table 1** be considered for adoption into the working document towards a PDNReport ITU-R M. [AMATEUR.CHARACTERISTICS] and that it would be desirable to highlight the information with WP4C to assist their studies in relation to WRC-23 AI 9.1 topic b).

Table 1			
Frequency range (MHz)	Applications	Comments	
1 240 -1 260	Low bandwidth telegraphy, voice and data modes up to around 20 kHz. Amateur TV (ATV using Analogue or Digital technologies).	Organised into channelized groups for voice and data applications in some regions. One 16.75 MHz block is identified for ATV in this range in Region 1. Two 6 MHz blocks are identified for ATV in Region 2.	
1 260 - 1 270	Satellite uplink band.	In Region 2 simplex ATV is also identified for experimental use in this range.	
1 270 -1	Low bandwidth telegraphy, voice and	Organised into channelized groups	



296 data modes up to around 20 kHz. Amateur TV (ATV using Analogue or	for voice and data applications in some regions.	
	Digital technologies).	One 18.994 MHz block is identified for ATV in this range in Region 1.
		Two 6 MHz blocks are identified for ATV in Region 2.
1 296 - 1 297	Low bandwidth telegraphy, voice and data modes up to 3 kHz.	Focused on narrowband weak signal applications in all three regions including beacons. No channelization.
1 297 - 1 300	Low bandwidth voice and data modes up to around 20 kHz. Medium bandwidth data up to 150 kHz bandwidth.	Organized into channelized groups for voice and data applications in some regions.

Noting that the WP4C working document attached to Document 5A/247 has highlighted the frequency ranges for the various RNSS systems operating in the range 1 240 – 1 300 MHz, IARU proposes to provide additional information that shows their relationship in the frequency range to the band plans and applications for the amateur and amateur-satellite services. This is provided below in **Table 2**.





Part E: Options and Associated Implications

Studies are still going on and no method has been proposed yet.

Part F: Proposed East Africa Common View and/or Position

EAC administrations are invited to support the protection of RNSS (space-to-Earth) receivers from the amateur and amateur-satellite services in the frequency band 1240-1300 MHz

Part G: Recommendations and Way Forward

To continue making follow up on the following:-

i. The possible technical and operational measures to ensure the protection of RNSS (space-to-Earth) receivers from the amateur and amateur-satellite services in the frequency band 1240-1300 MHz

The detailed review of the different systems and applications used in the amateur service and amateur-satellite service allocations in the frequency band 1240-1300 MHz

Part H: Other Regional Groups and International Organizations Preliminary Positions

1. Asia-Pacific Telecommunity (APT) - November 2021

APT Members support studies in ITU-R in accordance with Resolution **774 (WRC-19)**, to protect RNSS (space-to-Earth) receivers from the amateur and amateur-satellite services in the frequency band 1 240-1 300 MHz without considering the removal of the amateur and amateur-satellite service allocations.

2. Arab Spectrum Management Group (ASMG) -November 2021

Support the possible technical and operational measures to ensure the protection of receivers of systems operating according to the primary allocation of the RNSS service in the frequency band 1240 - 1300 MHz.

3. European Conference of Postal and Telecommunications Administrations (CEPT) – November 2021

CEPT supports the protection of the RNSS.

CEPT supports the development of a new ITU-R Report or Recommendation to provide guidance towards the implementation of technical and operational measures for the continued use of the frequency band 1240-1300 MHz by the Amateur and Amateur-satellite services in accordance with the RR in order to protect the RNSS.

CEPT supports that above mentioned measures to be applied on the use of secondary Amateur and Amateur-satellite services, should be based on the results of co-existence studies and



measurement campaigns.

4. Regional Commonwealth in the Field of Communications (RCC) – December 2021

The RCC Administrations consider that when studying possible technical and operational measures aimed at protecting RNSS receivers from the amateur and the amateur-satellite services in the frequency band 1 240-1 300 MHz it is necessary to determine technical and operational measures to ensure the protection of RNSS receivers from amateur and amateur satellite services in the frequency band 1240-1300 MHz.

5. Inter American Telecommunication Comission (CITEL) - November 2021

One administration is of the view that changes to the Radio Regulations are outside the scope of Agenda Item 9.1. For WRC-23 Agenda Item 9.1, Topic b), and supports studies to be carried out under Resolution **774 (WRC-19)**. The results of these studies should seek to identify possible technical and operational measures to ensure the protection of RNSS (space-to-Earth) receivers from the amateur and amateur-satellite services in the frequency band 1 240-1 300 MHz, without considering the removal of these amateur and amateur-satellite service.

Another administration supports studying the potential for interference to RNSS (space- to-Earth) receivers from amateur and amateur-satellite services in the frequency band 1 240–1 300 MHz and, if warranted, providing possible technical and/or operational measures to prevent any future cases of such interference, without considering any regulatory measures under this topic.

6. IARU

During many years of operational experience, the secondary amateur and amateur satellite services have successfully co-existed with all the primary services in the range 1 240-1 300 MHz with very few issues. In cases where certain applications (in particular, wide bandwidth, high duty cycle applications) could increase the potential for interference, careful spectrum management and national licensing conditions have minimised any risk. Radio amateurs have successfully co-existed and innovated in this frequency range for many years and IARU believes that the regulatory status of the amateur and amateur satellite services in this range is already clear. Therefore, any additional regulatory, operational, or technical measures incorporated into the Radio Regulations are unnecessary. Any recommendations resulting from studies under Resolution 774 can be applied on a national basis and should be based on realistic assumptions, proportionate in scope, and carefully justified so as not to unnecessarily inhibit development of the amateur services.

7. ICAO

To ensure that ITU-R studies under Resolution 774 (WRC-19) address whether potential mitigation



measures will impact the protection of aeronautical radar systems operating under the existing aeronautical radionavigation or radiolocation service allocations.