

**PRIDA training on Aeronautical Communication Services,  
19 - 21 March 2024, Abidjan, Cote d'Ivoire**

# **Aeronautical frequency bands**

**By Karlis Bogens  
Head, Fixed and Mobile Services Division,  
Terrestrial Services Department,  
Radiocommunication Bureau**

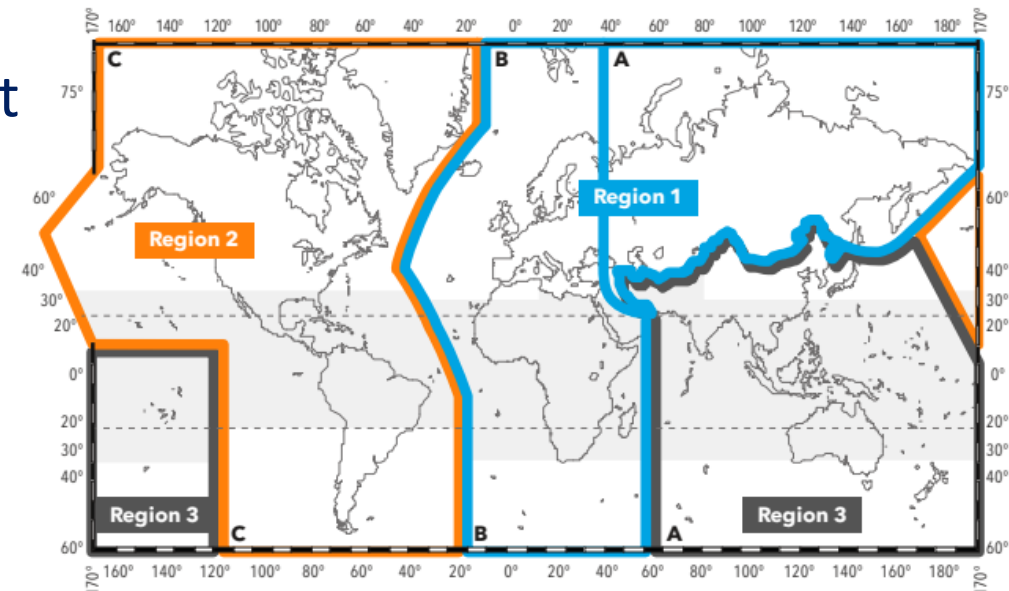
- Radio Regulations
- Aviation spectrum in the ITU Radio Regulations
  - Frequency bands exclusively allocated to aeronautical services
  - Frequency bands allocated to aeronautical services shared with other services
  - Aeronautical frequency worldwide Plans in HF
- Regulations relating to aeronautical services
- Allocations of aeronautical bands at WRCs
- WRC-23 aeronautical Agenda Items

# Radio Regulations (RR)

- Define the rules on use of spectrum/orbit resources for the rights and obligations of ITU Member States
- Intergovernmental treaty: mandatory for use of spectrum and satellite orbits
- Main goals of the RR:
  - interference free operation of stations
  - harmonization of spectrum/orbit use
- RR updated every 4 years by World Radiocommunications Conferences - WRCs



Radio Regulations

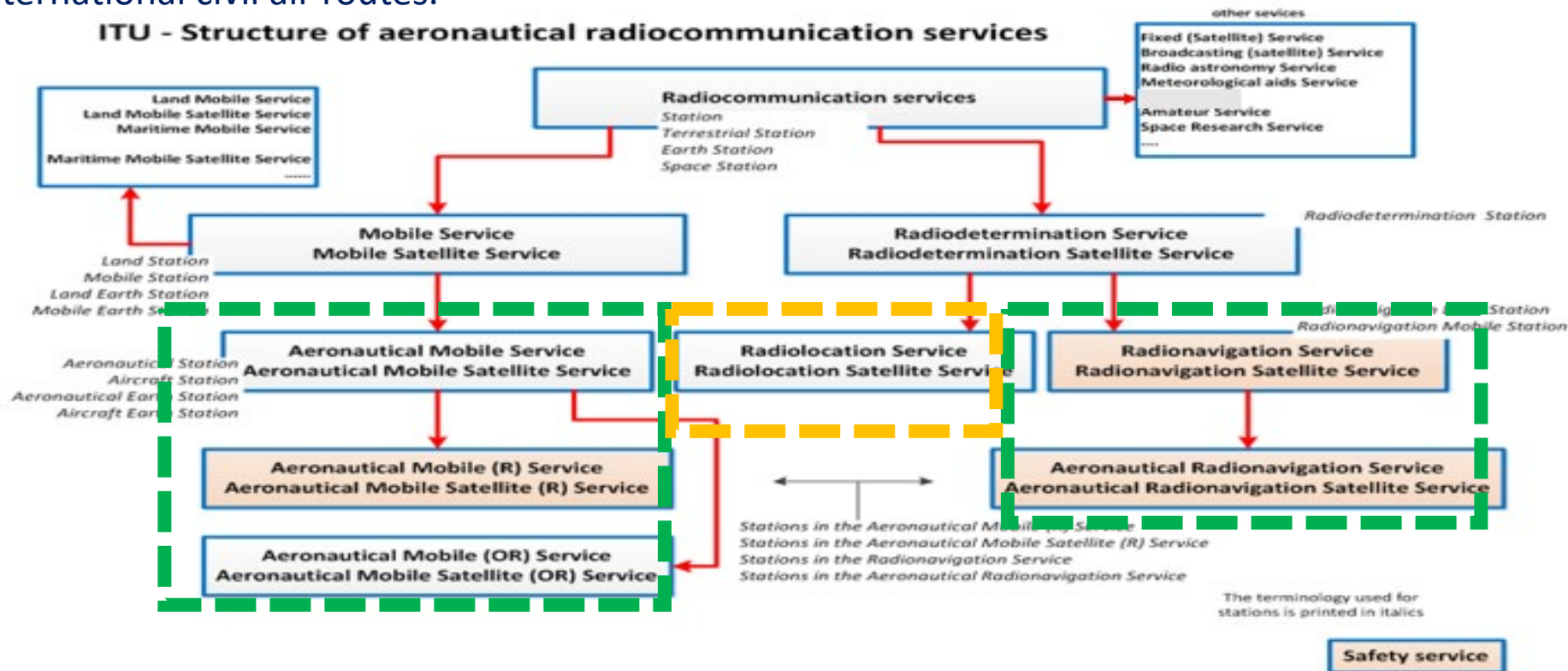


# Aeronautical services in the RR

■ Section III Radio services RR Article 1, as for example:

**1.33 aeronautical mobile (R)\* service:** An aeronautical mobile service reserved for communications relating to safety and regularity of flight, primarily along national or international civil air routes.

**1.34 aeronautical mobile (OR)\* service:** An aeronautical mobile service intended for communications, including those relating to flight coordination, primarily outside national or international civil air routes.



# Aviation spectrum in the ITU Radio Regulations

- **General concept of the RR:**
  - **Block allocations**
  - spectrum is allocated in blocks. Every block is given to compatible radio services
  
- **Characteristics of aviation spectrum**
  - **Exclusive** in many cases
  - **Global:** interoperability worldwide
  - **Large and valuable bands:** potential pressure for aviation frequencies from other users
  - **Protected.** Aviation spectrum is protected due to safety of life usage



Allocation to services in Radio Regulations (Art. 5)		
Region 1	Region 2	Region 3
4 500-4 800 MHz	FIXED FIXED-SATELLITE (space-to-Earth) <u>5.441</u> MOBILE 5.440A	

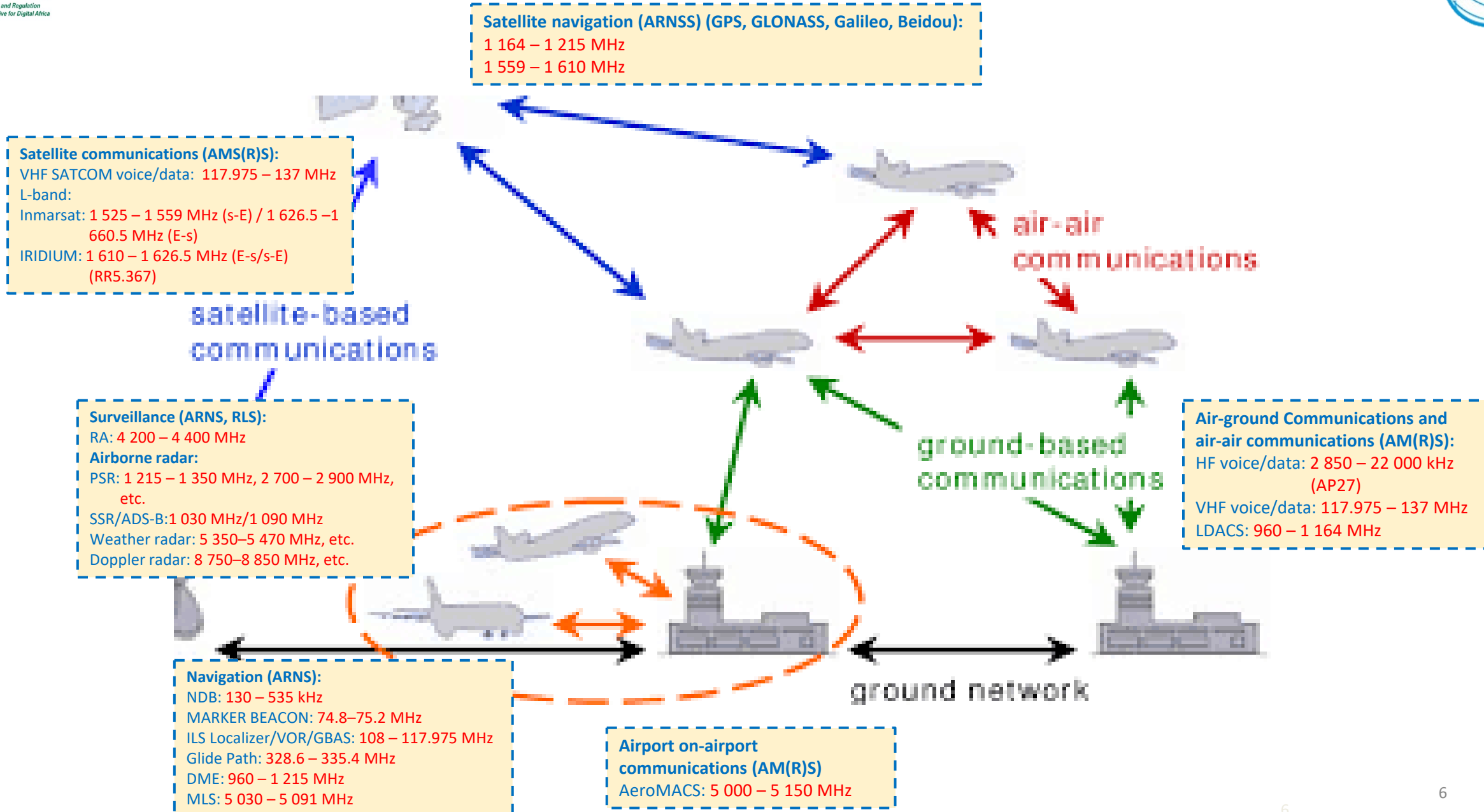
108-117.975	AERONAUTICAL RADIONAVIGATION <u>5.197 5.197A</u>	
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4 200-4 400	AERONAUTICAL MOBILE (R) <u>5.436</u> AERONAUTICAL <u>RADIONAVIGATION 5.438</u> <u>5.437 5.439 5.440</u>	
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Some ITU provisions on protection of aviation spectrum	
CS 191	Absolute priority for safety of life communications
RR 1.33	Definition of COM frequencies as safety of life
RR4.10	Measures for interference free operation of safety services
RR15.28	Ceasing interference to HF aeronautical frequencies



# Aeronautical frequency bands

Band	Service*	Aviation applications*
130–535 kHz exclusively allocated in some bands	ARNS	NDB
2 850–22 000 kHz exclusively allocated in AP27	AM(R)S	Air-ground communications (HF voice and data)
3 025–18 030 kHz exclusively allocated in AP26	AM(OR)S	Air-ground communications (HF voice and data)
3 023 and 5 680 kHz	AM(R)S	Search and rescue
74.8–75.2 MHz	ARNS	Marker beacon
108–117.975 MHz	ARNS AM(R)S	VOR/ ILS localizer/ GBAS/VDL Mode 4
117.975–137 MHz	AM(R)S	Air-ground and air-air communications (VHF voice and data)
121.5 MHz, 123.1 MHz and 243 MHz	AM(R)S	Emergency frequencies
328.6–335.4 MHz	ARNS	ILS glide path
406–406.1 MHz	MSS	Search and rescue
960–1 164 MHz	ARNS/RNSS AM(R)S	Air-ground communications/ DME/SSR/ACAS/UAT/ LDACS
1 030 and 1 090 MHz	ARNS	SSR/ACAS/ADSB
1 087.7–1 092.3 MHz	AMS(R)S	ADS-B
1 164–1 215 MHz	ARNS/RNSS	DME/GNSS

\*AM(R)S: Aeronautical mobile (route) service

AMS(R)S: Aeronautical mobile-satellite (route) service

ARNS: Aeronautical radionavigation service

MSS: Mobile-satellite service RLS: Radiolocation service

RNS: Radionavigation service RNSS: Radionavigation-satellite service

Allocation on exclusive basis

Allocation on shared basis

# Aeronautical frequency bands

Band	Service*	Aviation applications*
1 215–1 400 MHz	RLS/ RNSS ARNS	GNSS Primary surveillance radar
1 525–1 559 MHz	MSS (S-E)**	Satellite communications
1 559–1 626.5 MHz	ARNS/RNSS/ MSS	GNSS
1 626.5–1 660.5 MHz	MSS (E-S)**	Satellite communications
2 700–3 300 MHz	ARNS/RNS/ RLS	Primary surveillance radar
4 200–4 400 MHz	ARNS/ AM(R)S	Radio altimeter WAIC
5 000–5 091 MHz	ARNS AM(R)S AMS(R)S	MLS/UAS command and non-payload communication/airport surface communication
5 091–5 250 MHz	ARNS AM(R)S AMS(R)S	MLS command and non-payload communication/airport surface communication
5 350–5 470 MHz	ARNS	Airborne weather radar
8 750–8 850 MHz	ARNS/RLS	Airborne Doppler radar
9 000–9 500 MHz	ARNS/RLS/RNS	Precision approach radar/ airborne weather radar/ ASDE
13.25–13.4 GHz	ARNS	Airborne Doppler radar
15.4–15.7 GHz	ARNS/RLS	ASDE/other systems
24.25–24.65 GHz	RNS (Regions 2 and 3)	ASDE
31.8–33.4 GHz	RNS	ASDE/airborne radar enhanced flight vision system (EFVS)



# Frequency bands allocated to aeronautical services shared with other services

For example:

- **138 – 143.6 MHz**

Frequency band 138-143.6MHz in Regions 2 and 3 is allocated to mobile service on a primary basis. It can be used for AM(R)S and AM(OR)S but share with land mobile and maritime mobile services.

<b>138-143.6</b> AERONAUTICAL MOBILE (OR)  5.210 5.211 5.212 5.214	<b>138-143.6</b> FIXED <b>MOBILE</b> RADIOLOCATION Space research (space-to-Earth)	<b>138-143.6</b> FIXED <b>MOBILE</b> Space research (space-to-Earth) 5.207 5.213
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- **5 150 - 5 250 MHz**

It is allocated ARNS and other non-aeronautical services, i.e., fixed satellite service, land mobile and maritime mobile services.

<b>5 150-5 250</b>	FIXED-SATELLITE (Earth-to-space) <b>5.447A</b> MOBILE except aeronautical mobile <b>5.446A</b> 5.446B AERONAUTICAL RADIONAVIGATION 5.446 5.446C 5.446D 5.447 5.447B 5.447C
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# VSAT use for aeronautical communications

**3 400 - 4 200 MHz for the use by VSAT as an aid to the safe operation of aircraft and/or distribution of meteorological information in Region 1 countries (Res. 154 (Rev. WRC-15) and Rec.724 (WRC-07))**

Region 1
<p><b>3 400-3 600</b>            FIXED            FIXED-SATELLITE            (space-to-Earth)            MOBILE except aeronautical            mobile 5.430A            Radiolocation</p>
<p><b>3 600-4 200</b>            FIXED            FIXED-SATELLITE            (space-to-Earth)            Mobile</p>

- VSAT is used to provide supplementary aeronautical communications for the safe operation of aircraft to satisfy the overall communications infrastructure requirement by ICAO (e.g., air traffic control (ATC), voice or data communication) as in VHF band and to ensure distribution of meteorological information required by WMO

### Sharing

- Before bringing into use Fixed Wireless Access (FWA) and IMT to coordinate with existing and planned FSS earth stations
- To apply the appropriate mitigation techniques described in Recommendation ITU-R SF.1486 and ITU-R S.1856 as well as Reports ITU-R S.2199, ITU-R M.2109 and ITU-R S.2368, for sharing use with FWA and IMT.

### Licensing and notification

- To license the FSS earth stations and register in the MIFR.

# Worldwide frequency allotment plans for aeronautical services

- **Appendix 26** - Frequency allotment plan for AM(OR)S in the bands **3 025 – 18 030 kHz**, bands exclusively allocated to **AM(OR)S**



- **Appendix 27** - Frequency allotment plan for AM(OR)S in the bands **2 850 – 22 000 kHz**, bands exclusively allocated to **AM(R)S**



# Frequency allotment plan for AM(OR)S

## Appendix 26

- **Appendix 26** - Worldwide plan for aeronautical mobile off-route service  
**3 025 - 18 030 kHz**



- **Plan criteria:**

- 10 sub-bands /channelling arrangement of reference (carrier) frequencies
- Allotment areas in this plan are equal to countries
- Repetition half-distance determining the compatibility
- Maximum bandwidth - 2.8 kHz,
- Classes of emission - J3E; A1A; A1B; F1B(A,H)2(A,B); (R,J)2(A,B,D); J(7,9)(B,D,X)
- Mean effective radiated power: 1 kW (aeronautical stations) 50 W (aircraft stations)

# Frequency allotment plan for AM(OR)S Appendix 26

## Example:



**AP26 - Plan for aeronautical mobile (off-route) (AM(OR)S) service, HF bands (3 025 – 18 030 kHz )**

1	2
3 026	REG1 ARS BEN G KAZ KGZ LIE MCO RUS REG2 ATG DMA GRD JMC KNA LCA VCT REG3 BRU KOR TON
3 029	REGY ATA(ARG) REG1 ARS AZR BLR COG E F G I IRQ KAZ MDA NOR POL RUS SEN TUN UKR UZB REG2 ALS ARG B BER(USA) CLM HWA USA REG3 AUS CHN GUM IND J KOR MHL(USA) NZL PNG VTN
3 032	REGY ATA(ARG) REG1 ALG AZR BLR COG CTI E EGY F HNG IRQ KAZ MDA MDG MLT MRC NOR OMA POL RUS SEN TUN UKR UZB REG2 ALS ARG B BER(USA) CAN CLM DOM GRL HWA SLV USA REG3 AUS CBG CHN GUM IND J J(USA) LAO MHL(USA) NZL PNG VTN VUT

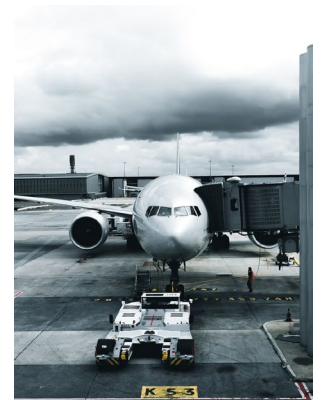
\* The procedure for modification of the Plan described in Part V of AP26

- **Appendix 27** - Worldwide plan for aeronautical mobile route service  
2 850 - 22 000 kHz



- **Plan criteria:**

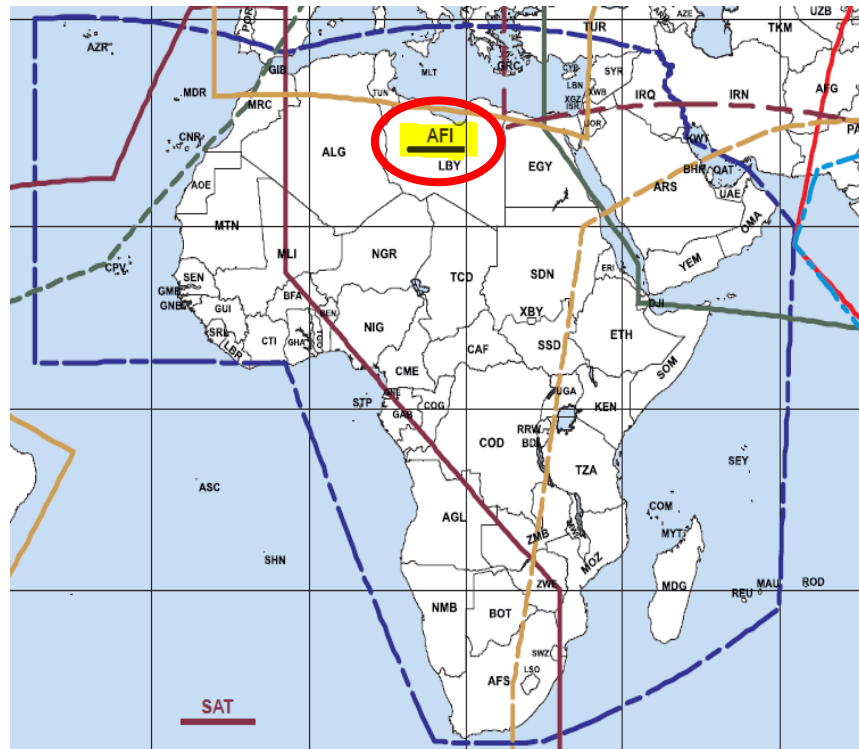
- Channelling arrangement of reference (carrier) frequencies
- Allotment areas in this plan are MWARA, RDARA, World-Wide and VOLMET areas
- Protection ratio of 15 dB determining the interference
- Frequency separation - 3 kHz, multiple to 1 kHz
- Classes of emission: J3E, H2B, J7B, J2D, J9X (A1A/A1B) and F1A/F1B
- Maximum peak envelope power in AP**27/60**, e.g.  
(J3E, H2B, J7B, JXX): 6 kW (aeronautical stations)  
400 W (aircraft stations)



## Example:



**AP27 - Plan for aeronautical mobile (route) (AM(R)S) service, HF bands (2 850 – 22 000 kHz)**



Area	Frequency bands (MHz)										
	3	3.5	4.7	5.4 (Reg. 2)	5.6	6.6	9	10	11.3	13.3	18
AFI	2 851 2 878	3 419 3 425 3 467	4 657		5 493 5 652 5 658	6 559 6 574 6 673	8 894 8 903		11 300 11 330	13 273 13 288 13 294	17 961

# Provisions in the RR related to aeronautical services

Chapters **IV**, **V**, **VI** and **VIII** of Radio Regulations

- Chapter **IV** Interferences (e.g. RR **15.8** avoiding interference on distress and safety frequencies)
- Chapter **V** Administrative provisions dealing with licensing Article **18** and identification of radio stations Article 29
- Chapter **VIII** on aeronautical services, e.g.
  - Article **36** - Authority of the person responsible for the station
  - Article **37** - Operator's certificates
  - Article **39** - Inspection of stations
  - Article **40** - Working hours of stations
  - Article **41** - Communications with stations in the maritime services
  - Article **42** - Conditions to be observed by stations
  - Article **43** - Special rules relating to the use of frequencies
  - Article **44** - Order of priority of communications
  - Article **45** - General communication procedure
- RR Appendix **16** containing the documents required on board of aircraft





# WRC cycle



# WRC-23 in numbers

20 November – 15 December 2023

**3987**  
Delegates

**163**  
Member States

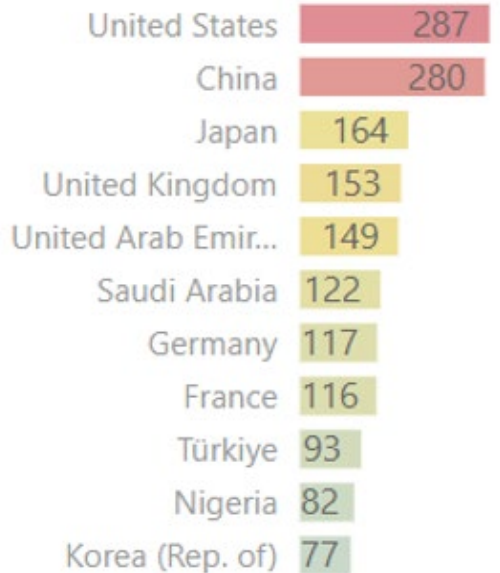
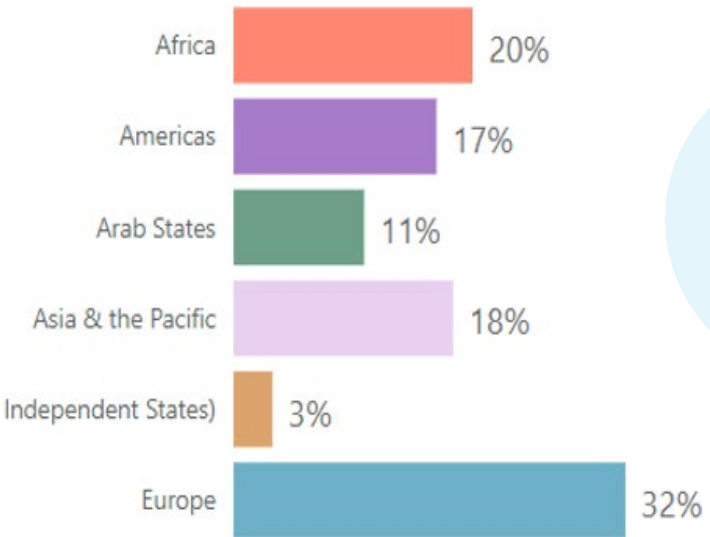
**967**  
Docs.

**4**  
weeks



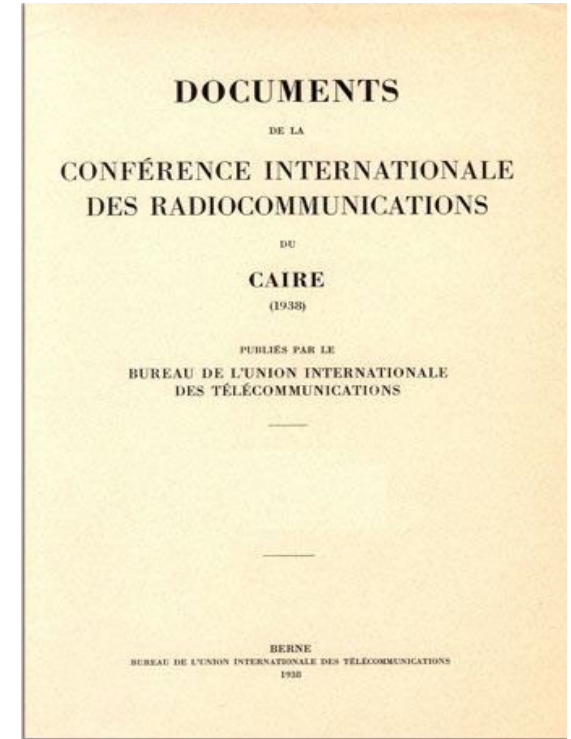
**151**  
observers

**6 024**  
proposals



# Allocations of aeronautical bands at WRCs

1927, Washington	First definitions of aeronautical and aircraft stations, allocations to aeronautical mobile service in LF and MF bands, e.g. 315 – 350 kHz
1938, Cairo	Exclusive allocations to HF aeronautical services between 6500 and 23380 kHz
1947, Atlantic City	Allocations of 108 – 118 MHz for ARNS and 118 – 132 MHz to the aeronautical mobile service
1963, Geneva	First Conference dealing with satellite issues. Allocation of frequency bands for communication-satellite and <u>radionavigation-satellite services</u>
1959/1964/1966, Geneva	Establishment and revision of the allotment plan for HF aeronautical mobile (R) service
1971, Geneva	Introduction of the aeronautical mobile-satellite service and allocations to it in 1.5/1.6 GHz band. Allocation of 406 – 406.1 to Cospas-Sarsat
....	.....
2015, Geneva	Allocation of spectrum for WAIC, GFT



Delegates at the 1947 Atlantic City Radio Conference

**1.6**

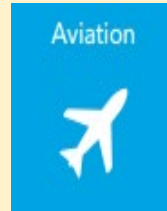


**Sub-orbital vehicles**

**1.7**

**1.8**

**1.9**



**New AMS(R)S VHF allocation**

**UAS CNPC links via FSS**

**Digital technology for aviation  
safety-of-life applications (App.27)**

**1.10**



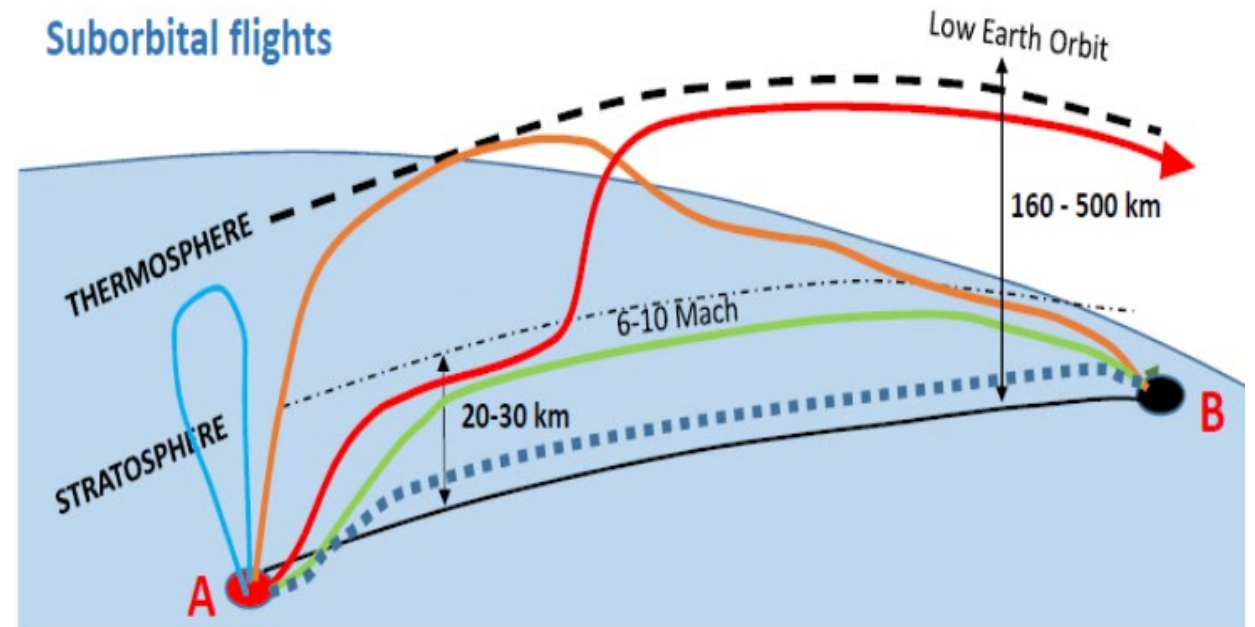
**New AMS alloc. (around 15.5 & 22 GHz)  
for non-safety applications**

# Aeronautical issues (WRC-23 agenda item 1.6)

Studies to consider regulatory provisions to facilitate radiocommunications for sub-orbital vehicles. ▶ **Res. 772 (WRC-19)**

## WRC-23 Results:

- NOC
- SUP Res. 772 (WRC-19)



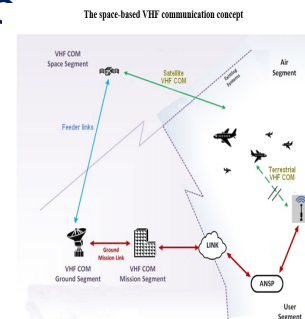
# Aeronautical issues (WRC-23 agenda item 1.7)

Studies to consider a new AMS(R)S allocation for aeronautical VHF communications in all or part of the frequency band 117.975-137 MHz (VHF-Sat)

► **Res. 428 (WRC-19)**

WRC-23 allocated 117.975 – 137 MHz to AMS(R)S, subject to

- Coordination under **RR9.11A** but **RR9.16** does not apply (No. **5.198A**). PFD trigger for coordination of AMS(R)S space stations was introduced in Annex 1 of Appendix **5**.
- In 117.975 – 137 MHz AM(R)S obtained priority over AMS(R)S (No. **5.198B**).
- New Resolution **406 (WRC-23) (COM4/2)** applies:
  - ✓ compliance with ICAO's standards,
  - ✓ applying ICAO frequency assignment planning procedures,
  - ✓ AMS(R)S experimental systems may be used before ICAO SARPs is developed, and
  - ✓ a limit of the out-of-band emissions from AMS(R)S into the adjacent band 137-138 MHz to protect adjacent science services.
- SUP Res. **428 (WRC-19)**

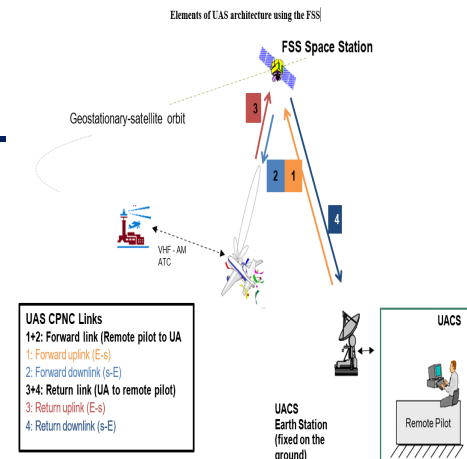


# Aeronautical issues (WRC-23 agenda item 1.8)

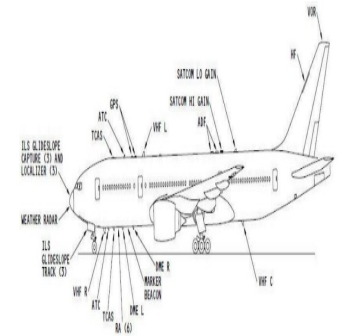
Studies to consider, appropriate regulatory actions, a view to reviewing, if necessary, revising **Resolution 155 (Rev.WRC-19)** and No. **5.484B** to accommodate the use of FSS networks by control and non-payload communications of unmanned aircraft systems. (Use of FSS networks by UAS ) ► **Resolutions 171 (WRC-19) & 155 (Rev. WRC-19)**

## WRC-23 decided

- to suspend any further action on Resolution **155 (Rev. WRC-19)** until decided by a future competent WRC.
- to study, as a matter of urgency, necessary measures to facilitate the operation of earth stations on board UAS used for CNPC operated using satellite links by the AMS(R)S in suitable frequency bands in order to decide on the appropriate course of action to be taken for WRC-31.
- instruct ITU-R to take necessary actions to implement this decision. Administrations are invited to contribute on the matter.
- SUP Res. **171 (WRC-19)**.



# Aeronautical issues (WRC-23 agenda item 1.9)



Studies to review Appendix **27** of the Radio Regulations and consider appropriate regulatory actions and updates based on ITU-R studies (Review of Appendix **27** )

► **Res. 429 (WRC-19)**

WRC-23 modified the technical basis of the aeronautical frequency Plan AM(R)S in HF bands contained in RR Appendix **27** as follows:

- The new provisions (**AP27/18A** and **AP/18A.1**) were added, allowing to aggregate individual contiguous or non-contiguous channels to provide wideband communication without changing the Plan for existing channels.
- The classes of emission corresponding to telegraphy or data transmissions, e.g., J7D, J9B, etc. were added to **AP27/58** and Table of **AP27/60** to allow the use of channels with digital modulations.
- Clarifications were made concerning the JXX class of emission in **AP27/57**, **AP27/58** and concerning the 100% modulation in **AP27/60**.
- SUP Res. **429 (WRC-19)**.



# Aeronautical issues (WRC-23 agenda item 1.10)

Studies 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 (Non-safety AMS allocations)



► **Res. 430 (WRC-19)**

WRC-23 made allocation to the AM(OR)S:

- in the frequency band 15.41-15.7 GHz on a secondary basis in Region 1 by the Table of Frequency Allocations and in one country in Region 3 by No. **5.511H (5.A110)**,
- in the frequency band 22-22.2 GHz on a primary basis in Region 1 by the Table of Frequency Allocations and subject to **RR9.21** and in five countries of Region 3 on a non-interference basis by No. **5.531E (5.G110)**.
- technical conditions imposed on the allocation and aircraft stations to protect the existing services, i.e., limitations on category of service (primary/secondary), non-interference basis, non-safety application and technical restrictions on aeronautical stations and aircraft stations on an altitude up to 15 km above ground level by footnotes, i.e. Nos. **5.511G (5.AA110)**, **5.511H (5.A110)**, **5.531A (5.B110)**, **5.531B (5.C110)**, **5.531C (5.D110)**, **5.531D (5.F110)**, **5.531E (5.G110)**, and **5.531F (5.E110)**.
- Appendix 4 has been modified accordingly.
- Sup Res. **430 (WRC-19)**.

# Aeronautical issues (WRC-27 agenda item 1.9)

Studies to review Appendix **26** of the Radio Regulations and consider appropriate regulatory actions and updates based on ITU-R studies (Review of Appendix **26** )

▶ **Res. 411 (WRC-23)**

Res. 411 *resolves* to invite the ITU-R to study

- on the introduction of new technologies, including, but not limited to, new classes of emission, wideband systems, etc., to the AM(OR)S systems in the frequency ranges between 3 025 kHz and 18 030 kHz considered in Appendix **26**;
- the definition of the relevant technical and operational characteristics and conduct sharing and compatibility studies with existing AM(OR)S systems and with other incumbent services that are allocated on a primary basis in the same or adjacent frequency bands;
- based on studies, the identification of any potential modifications to Appendix **26**, without modifying the existing area allotments, and while taking into account that the current use of the narrowband systems shall remain unchanged and shall not be impacted nor precluded by the revision of Appendix **26**.

# Summary

- **ITU-R provides spectrum resources for all radiocommunication systems, including aeronautical systems**
- **ITU-R ensures interference-free operation of different radio equipment and its compatibility with other terrestrial systems (through compatible allocations, channeling arrangements, technical limitations)**
- **ITU-R standardizes radio equipment ensuring their interoperability**

# Thank you!

# Aeronautical frequency bands (1)

Band	Service*	Aviation applications*
130–535 kHz exclusively allocated in some bands	ARNS	NDB
2 850–22 000 kHz exclusively allocated in AP27	AM(R)S	Air-ground communications (HF voice and data)
3 025–18 030 kHz exclusively allocated in AP26	AM(OR)S	Air-ground communications (HF voice and data)
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1 030 and 1 090 MHz	ARNS	SSR/ACAS/ADSB
1 087.7-1 092.3 MHz	AMS(R)S	ADS-B
1 164–1 215 MHz	ARNS/RNSS	DME/GNSS

# Aeronautical frequency bands (2)

Band	Service*	Aviation applications*
1 215–1 400 MHz	RLS/ RNSS ARNS	GNSS Primary surveillance radar
1 525–1 559 MHz	MSS (S-E)**	Satellite communications
1 559–1 626.5 MHz	ARNS/RNSS/ MSS	GNSS
1 626.5–1 660.5 MHz	MSS (E-S)**	Satellite communications
2 700–3 300 MHz	ARNS/RNS/ RLS	Primary surveillance radar
4 200–4 400 MHz	ARNS/ AM(R)S	Radio altimeter WAIC
5 000–5 091 MHz	ARNS AM(R)S AMS(R)S	MLS/UAS command and non-payload communication/airport surface communication
5 091–5 250 MHz	ARNS AM(R)S AMS(R)S	MLS command and non-payload communication/airport surface communication
5 350–5 470 MHz	ARNS	Airborne weather radar
8 750–8 850 MHz	ARNS/RLS	Airborne Doppler radar
9 000–9 500 MHz	ARNS/RLS/RNS	Precision approach radar/ airborne weather radar/ ASDE
13.25–13.4 GHz	ARNS	Airborne Doppler radar
15.4–15.7 GHz	ARNS/RLS	ASDE/other systems
24.25–24.65 GHz	RNS (Regions 2 and 3)	ASDE
31.8–33.4 GHz	RNS	ASDE/airborne radar enhanced flight vision system (EFVS)

# Aeronautical frequency bands (3)

- \*AM(R)S: Aeronautical mobile (route) service
- AMS(R)S: Aeronautical mobile-satellite (route) service
- ARNS: Aeronautical radionavigation service
- MSS: Mobile-satellite service RLS: Radiolocation service
- RNS: Radionavigation service RNSS: Radionavigation-satellite service
- ACAS: Airborne collision avoidance system
- DME: Distance measuring equipment
- GBAS: Ground-based augmentation system
- ILS: Instrument landing system
- LDACS: L-band data aeronautical communication system
- MLS: Microwave landing system
- NDB: Non-directional radio beacon
- SSR: Secondary surveillance radar
- VDL: VHF data link
- VOR: VHF omnidirectional radio range
- UAS: Unmanned aircraft system
- UAT: Universal access transceiver
- WAIC: Wireless avionics intra-communication systems

\*\* In the frequency bands 1 545–1 555 MHz and 1 646.5–1 656.5 MHz (and also in the band 1 555-1 559 MHz and 1 656.5-1 660.5 MHz in the United States under RR 5.362A), priority is to be given to accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service providing transmission of messages with priority 1 to 6, as defined in Article 44 of the Radio Regulations; no allocation to AMS(R)S has been made in this frequency band.

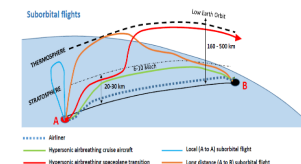
# Aeronautical issues (WRC-23 agenda item 1.6)

## Studies to consider **regulatory provisions** to facilitate radiocommunications for **sub-orbital vehicles** ► **Resolution 772 (WRC-19)**

- Fly below and above 100 km, as aircraft and as spacecraft
- Require spectrum for voice/data, navigation, surveillance, telemetry, tracking and command
- AI started at WRC-19, different views on regulations, challenge of communications blackout

### Methods currently available in the CPM Report

- **Method A:** NOC
- **Method B:** A new **WRC Resolution** containing the provisions for sub-orbital vehicles. Three alternative approaches were considered:
  - **Approach A:** Providing definitions of sub-orbital flight and sub-orbital vehicles; Listing minimum required frequency bands;
  - **Approach B:** Referring to Report ITU-R M.2477 for definitions; to use the existing allocations instead of listing the specific frequency bands;
  - **Approach C:** Providing definition of stations on a sub-orbital vehicle; to identify the specific services to be used by such stations.
  - **Approach D:** The same as Approach C but The RR No. 4.4 shall be applied when the services are used by stations on board sub-orbital vehicles beyond the major portion of the atmosphere.
- **Method C:** A Revision to Resolution 772 (WRC 19). To clarify the list of possible interference scenarios as well as the compatibility studies to extend the study after WRC-23.



Report [ITU-R M.2477](#) and [WD PDN Rep. on \[suborbital vehicles studies\]](#) ([Doc. 32B/731](#) Annex 14)

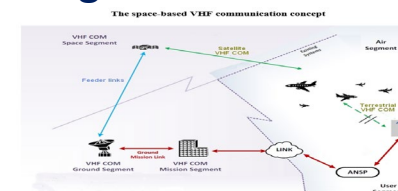


# Aeronautical issues (WRC-23 agenda item 1.7)

## Spectrum needs, new allocations and regulations for the aeronautical mobile service for non-safety applications ► Resolution 428 (WRC-19)

**Methods** currently available in the CPM Report

- **Method A:** NOC
- **Method B:** New allocation to the **AMS(R)S** in the frequency band **117.975-137 MHz**. There are four different Method B considered.
  - **Method B1:** ICAO existing plan procedure; requirement of the protection of adjacent band services operating above 137 MHz by limitation of unwanted emissions;
  - **Method B2:** to apply RR No. **9.11A** coordination procedures (including RR No. **9.14**, applying coordination threshold  $-140 \text{ dB(W/(m}^2 \cdot 4 \text{ kHz))}$ ) and non-protection from AM(R)S and AM(OR)S ; requirement of the protection of adjacent band services operating above 137 MHz by limitation of unwanted emissions
  - **Method B3:** New allocation to the **AMS(R)S** in the frequency band **117.975-136.8 MHz**. The coordination procedures under RR No. **9.11A** applies to both space and terrestrial stations (AM(R)S and M(OR)S).
  - **Method B4:** New allocation to the **AMS(R)S** in the frequency band **117.975-136 MHz**. In-band coexistence between the AMS(R)S and AM(R)S will be ensured through RR No. **9.11A** coordination through ITU-R and operational frequency planning and coordination in ICAO to protect AM(R)S designated operational coverage of 480 kilometres from a country's border.

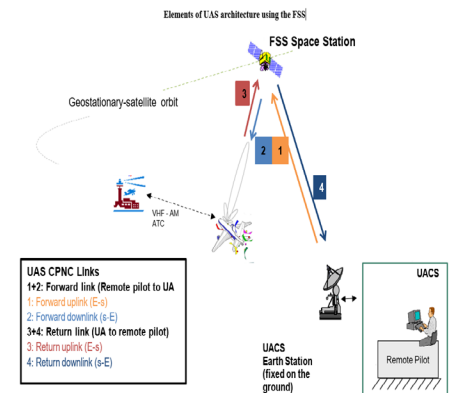


# Aeronautical issues (WRC-23 agenda item 1.8)

Studies to consider, appropriate regulatory actions, a view to reviewing, if necessary, revising **Resolution 155 (Rev.WRC-19)** and **No. 5.484B** to accommodate the use of FSS networks by control and non-payload communications of unmanned aircraft systems. (Use of FSS networks by UAS CNPC ) ► **Resolutions 171 (WRC-19) & 155 (Rev.WRC-19)**

**Methods** currently available in the CPM Report

- **Method A:** To suppress RR No. **5.484B** together with **Resolution 155 (Rev.WRC-19)** as well as **Resolution 171 (WRC-19)**.
- **Method B:** To revise **Resolution 155 (Rev.WRC-19)** in accordance with **Resolution 171 (WRC-19)**; the revision of RR No. **5.484B** as an option; no interference and no protection from terrestrial service
  - **Method B1:** to clearly separate between the responsibilities of ICAO and ITU, to ensure the safety of flight applying RR No. **4.10** and provide a process to treat cases of interference caused by UA earth station.
  - **Method B2:** require that the FSS frequency bands shall not be used for the UAS CNPC links before the issue of safety of life referred to in RR No. **4.10** is solved and agreed in ITU-R framework.
  - **Method B3:** clearly separate between the responsibilities of ICAO and ITU; confirm that the provisions of RR No. 4.10 shall not apply to the use of UAS CNPC links through FSS networks



[ITU-R M.2171](#), [ITU-R M.2233](#)

# Aeronautical issues (WRC-23 agenda item 1.9)

Studies to review **Appendix 27** of the Radio Regulations and consider appropriate regulatory actions and updates based on ITU-R studies (Review of Appendix 27 )

► **Res. 429 (WRC-19)**

- **Introducing wideband digital technologies in AP27 currently limited to 2.8 kHz channels**

**Methods** currently available in the CPM Report

- **Method A:** NOC

It may be considered that the current version of Appendix 27 does **not preclude** the **digital HF communication** for the relevant type of classes.

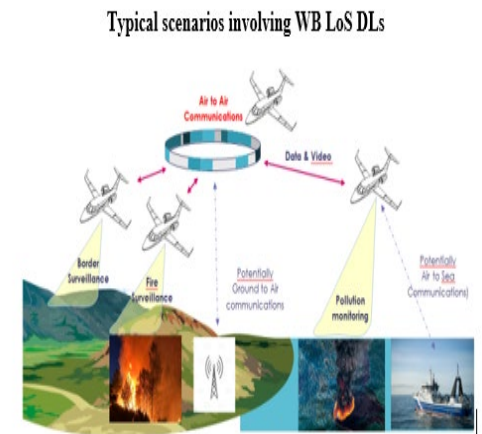
- **Method B:** Inclusion of the relevant part of the Rules of Procedure relating to RR Appendix 27 into the RR and the introduction into RR Appendix 27 of other provisions related to wideband digital communications, e.g., to replace JXX by J2B, J2D, J7B, J7D, J9B, J9D.

# Aeronautical issues (WRC-23 agenda item 1.10)

Studies 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 (Non-safety AMS allocations) ▶ **Res. 430 (WRC-19)**

## Methods currently available in the CPM Report

- **Method A:** NOC
- **Method B:** AM(OR)S allocation in **15.4-15.7 GHz** band with an associated footnote
- **Method C:** AM(OR)S allocation in **22-22.21 GHz** band with an associated footnote
- **Method D:** Combination of Methods B and C
- **Method E:** Combination of Methods B and C with 10 MHz guardbands



WD to PDN Report ITU-R M.[NON-SAFETY AMS CHARACTERISTICS AND SHARING STUDIES] ([Doc. 5B/731 Annex 15](#))