

# ITU World Radiocommunication Seminar

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## Frequency plans and coordination procedures for non-broadcasting services

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Terrestrial Services Department,  
Radiocommunication Bureau*

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# Scope and outline of presentation

## ■ Scope of terrestrial services other than broadcasting

### FXM

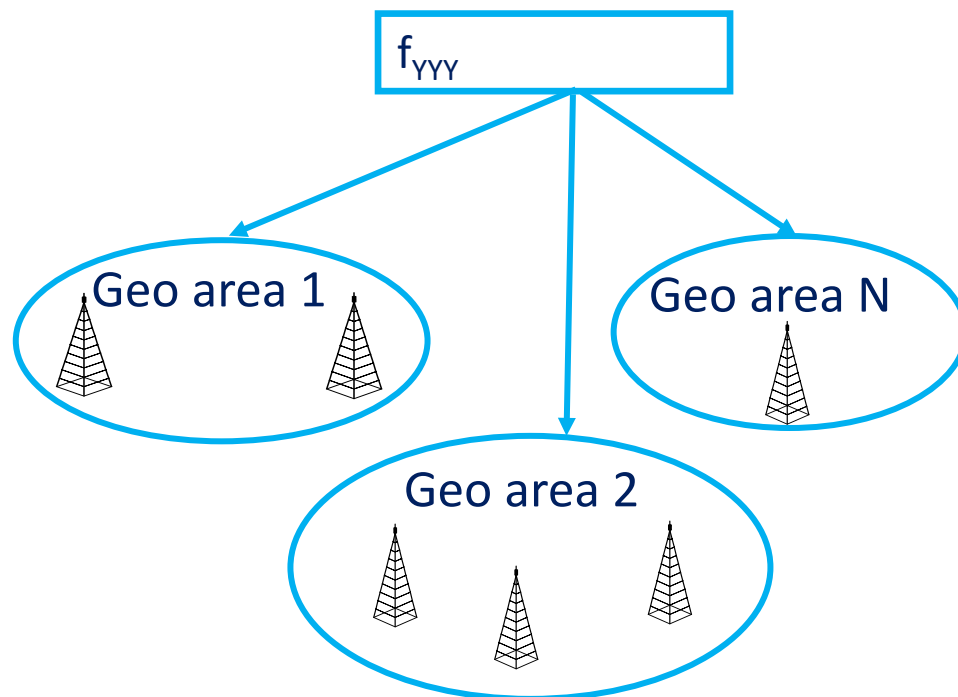
- Fixed service
- Mobile services (land, aeronautical and maritime mobile)
- Radionavigation services (aeronautical and maritime radionavigation services)
- Radiolocation, meteorological aids, standard frequency and time signal

## ■ Outline of presentation:

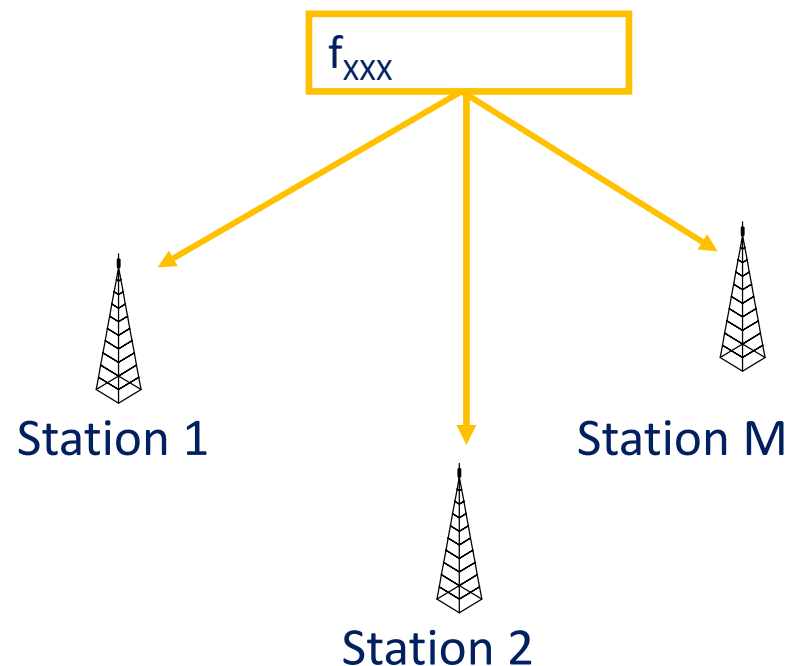
- Frequency allotment and assignment plans for FXM
- Coordination of FXM assignments
- Examination of FXM assignments under RR Article 11

## Allotment Plans ◀ ▶ Assignment Plans

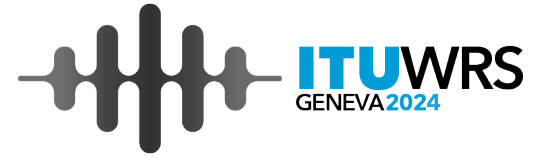
Allotment  
↓  
to geographical areas



Assignments  
↓  
to stations



# Frequency allotment plans for FXM services



## Worldwide frequency allotment plans



**AP25** - Plan for maritime mobile service, HF  
(4000 – 27 500 kHz)



**AP26** - Plan for aeronautical mobile (off-route)  
service, HF (3025 – 18030 kHz )



**AP27** - Plan for aeronautical mobile (route)  
service, HF (2850 – 22000 kHz)



## Regional frequency allotment plan

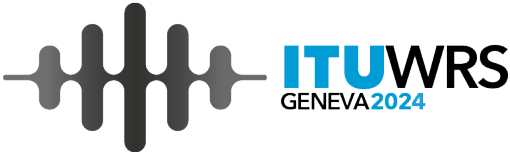


GE85-MM-R1: Frequency allotment plan for national channels in Digital  
Selective Calling (DSC) system in bands  
435-526.5 kHz and 1 606.5 - 2 160 kHz

### Region 1



# Allotment plan for the maritime mobile service (AP25 to RR)



- Worldwide allotment plan, maritime mobile service, 4000-27500 kHz
  - 240 channels; allotment areas, channel bandwidth – 2,8 kHz, class of emission - J3E or J2D, maximum peak envelope power - 10 kW



Channel 1813 is allotted to allotment areas IND E and IND W . Administration of India can assign this channel to any coast station located in allotment areas IND E and IND W.

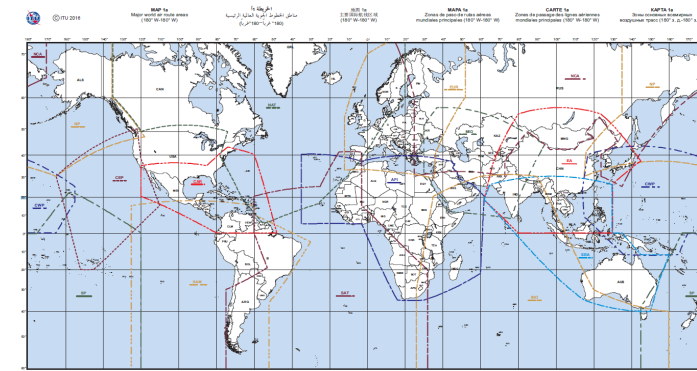
# Allotment plans for the aeronautical mobile services (AP26/AP27 to RR)



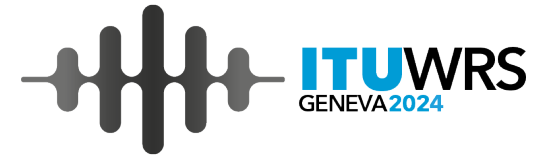
- Worldwide plan for aeronautical mobile off-route service  
**3 025 - 18 030 kHz** / 10 sub-bands/ Carrier frequencies /allotment areas
  - Maximum bandwidth - 2.8 kHz, Classes of emission - J3E; A1A; A1B; F1B(A,H)2(A,B); (R,J)2(A,B,D); J(7,9)(B,D,X)
  - Mean effective radiated power: 1 kW (aeronautical stations)  
50 W (aircraft stations)



- Worldwide plan for aeronautical mobile route service  
**2 850 - 22 000 kHz** / Carrier frequencies / geographical areas (MWARA, RDARA, VOLMET areas)
  - Classes of emission: J3E, H2B, J7B, J2D, J9X (A1A/A1B) and F1A/F1B, Frequency separation - 3 kHz, multiple to 1 kHz
  - Maximum peak envelope power in AP27/60, e.g. (J3E, H2B, J7B, JXX):  
6 kW (aeronautical stations)  
400 W (aircraft stations)



# Aeronautical issues (WRC-23 agenda item 1.9)

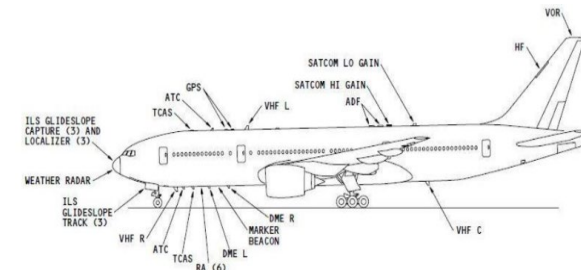


Studies to review Appendix **27** of the Radio Regulations and consider appropriate regulatory actions and updates based on ITU-R studies (Review of Appendix **27** )

► **Res. 429 (WRC-19)**

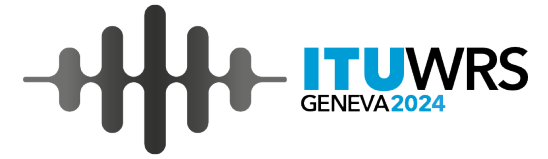
WRC-23 modified the technical basis of the aeronautical frequency Plan AM(R)S in HF bands contained in RR Appendix **27** as follows:

- 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/**  
**AP27/58** and concerning the 100% modulation in **AP27/60**.
- SUP Res. **429 (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 (WRC-23)** *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**.



# Frequency assignment plans for FXM services

## Regional frequency assignment plans



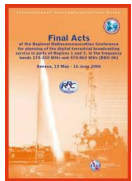
**GE85-R1-MAR:** Plan for maritime mobile service, MF bands



**GE85-R1-AER:** plan for aeronautical radionavigation service, MF bands



**GE85-EMA:** plan for maritime radiobeacons, European maritime area 283.5 - 315 kHz



**The List** of frequency assignments for primary terrestrial services other than broadcasting in the planning area and bands (174-230 MHz/ 470-862 MHz) governed by the **Regional Agreement GE06**

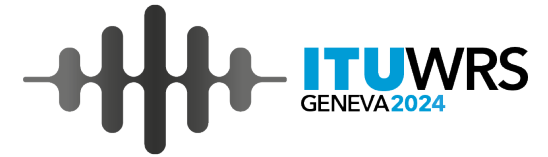
Region 1



GE06 Planning Area



# Frequency assignment plan GE85-R1-AER



## ■ Scope

- Plan for aeronautical radionavigation service in Region 1
- Frequency bands: 415 – 435 kHz, 510 – 526.5 kHz
- Takes into account also maritime mobile service stations

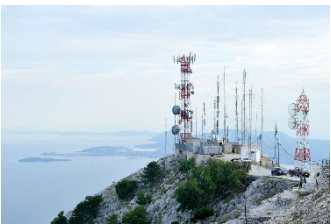
## ■ Characteristics

- 34 channels, spacing - 1 kHz (0.5 kHz exceptionally)
- Classes of emission – A1A, A2A

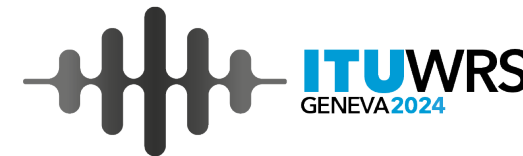
## ■ Coordination procedure

- Submission of AP4 information to the BR, publication of the complete information in BR IFIC
- Coordination with affected administrations having assignments in conformity with the Plan
- Informing the BR about the results (90+15 days)
- Successful coordination - recording in the Plan



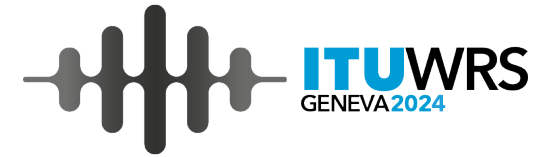


# FXM frequency plans (summary)



Plan Name/Type	Radiocommunication service	Planned bands	Planning area
AP 25 (Allotment)	Maritime mobile (Coast radiotelephone stations)	4000 - 27500 kHz	Worldwide
AP26 (Allotment)	Aeronautical Mobile (OR)	3025 - 18030 kHz	Worldwide
AP27 (Allotment)	Aeronautical Mobile (R)	2850 - 22000 kHz	Worldwide
GE85-MM-R1 (Allotment)	Maritime Mobile (DSC)	435 - 526.5 kHz 1 606.5 - 2 160 kHz	Region 1
GE85-R1-MAR (Assignment)	Maritime Mobile	415 - 495 kHz 505 - 526.5 kHz 1 606.5 - 1 625 kHz 1 635 - 1 800 kHz 2 045 - 2 160 kHz	Region 1
GE85-R1-AER (Assignment)	Aeronautical Radionavigation	415 - 435 kHz 505 - 526.5 kHz	Region 1
GE85-EMA (Assignment)	Maritime Radionavigation	283.5 - 315 KHz	European Maritime Area
GE06 List (Assignment)	e.g. Fixed / Mobile / Radionavigation etc.	174-230 MHz 470-862 MHz	In parts of Regions 1 and 3

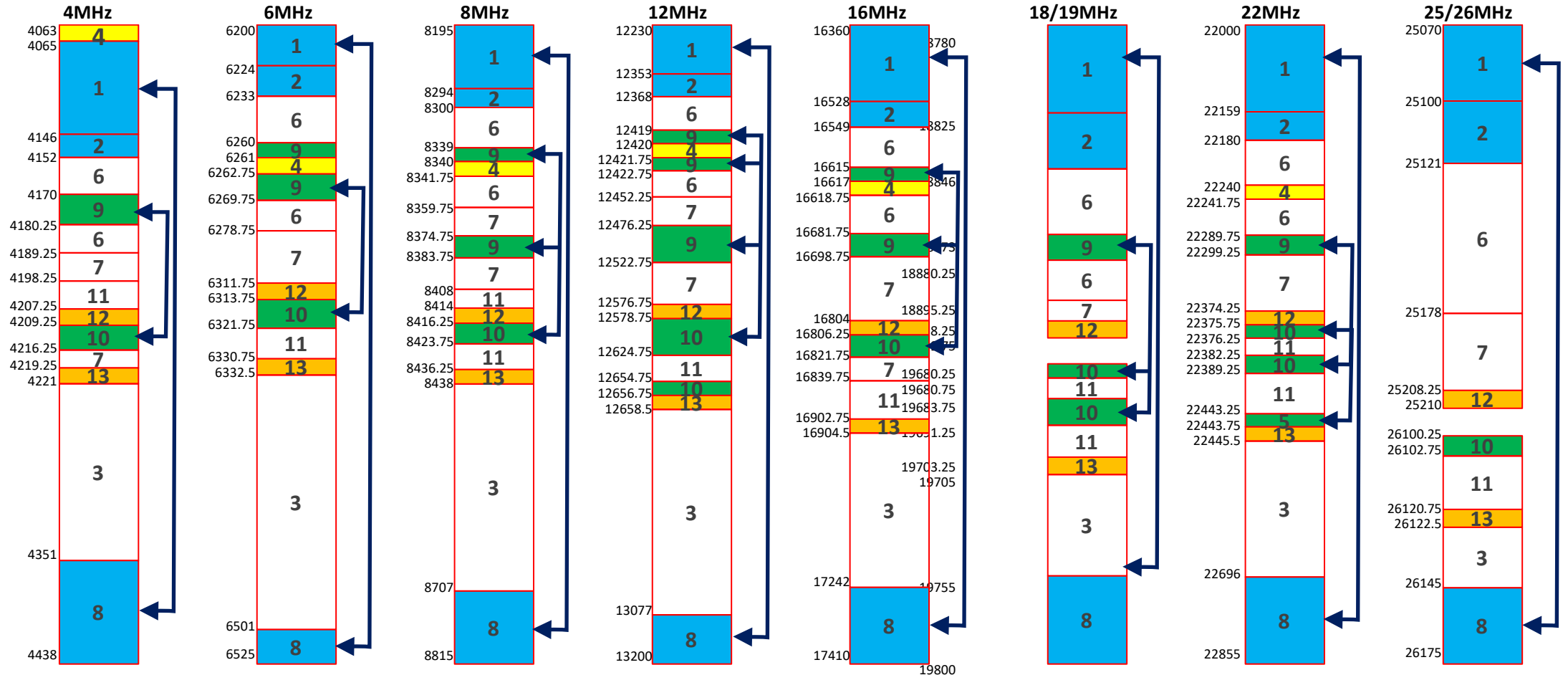
# Maritime mobile service frequencies and channelling arrangements in HF RR AP 17



- MMS in the bands between 4000 and 27500 kHz.
- Sub-divisions of the exclusive frequency bands at 4, 6, 8, 12, 16, 18/19, 22 and 25/26 MHz.
- Channels to be used by ship stations (MS) and coast stations (FC).
- Facilitate the working of duplex radiotelephone equipment on board ship.
- Frequencies (paired and non-paired) for NBDP (narrow-band direct printing) telegraphy systems.
- MOD by WRC-12 - designating bands for data transmissions in digital format
- MOD by WRC-19 - 6 channels between 4 221 kHz and 22 455.5 kHz for use by Navigational Data for broadcasting maritime safety and security related information (NAVDAT)
- Each sub-band elaborately planned in order to make maximum use of the available spectrum.

# Maritime mobile service frequencies and channelling arrangements in HF RR AP 17

Sub-division of the exclusive maritime mobile bands between 4 000 kHz and 27 500 kHz



1 Radiotelephony (MS, duplex)  
2 Radiotelephony (MS, FC, simplex)

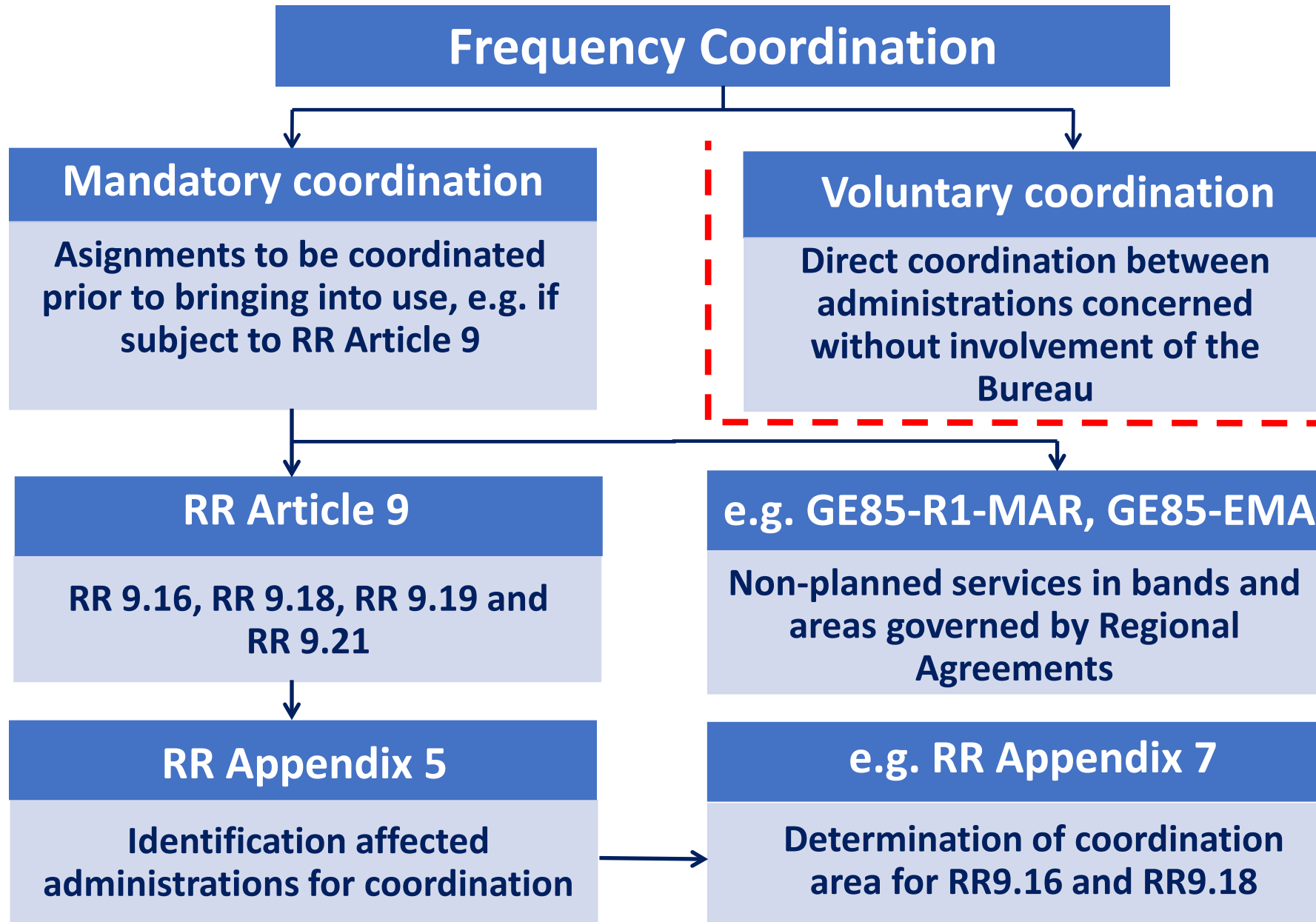
3 wide-band data transmission  
4 oceanographic data transmission (OGD)  
5 narrowband direct-printing (NBDP) (FC, non-paired)

6 data transmission (MS)  
7 data transmission (MS, FC)  
8 Radiotelephony (FC, duplex)

9 narrowband direct-printing (NBDP) (MS, paired and non-paired)  
10 narrowband direct-printing (NBDP) (FC, paired and non-paired)

11 data transmission (FC)  
12 digital selective calling (DSC) (MS)  
13 digital selective calling (DSC) (FC)

# Coordination of FXM assignments

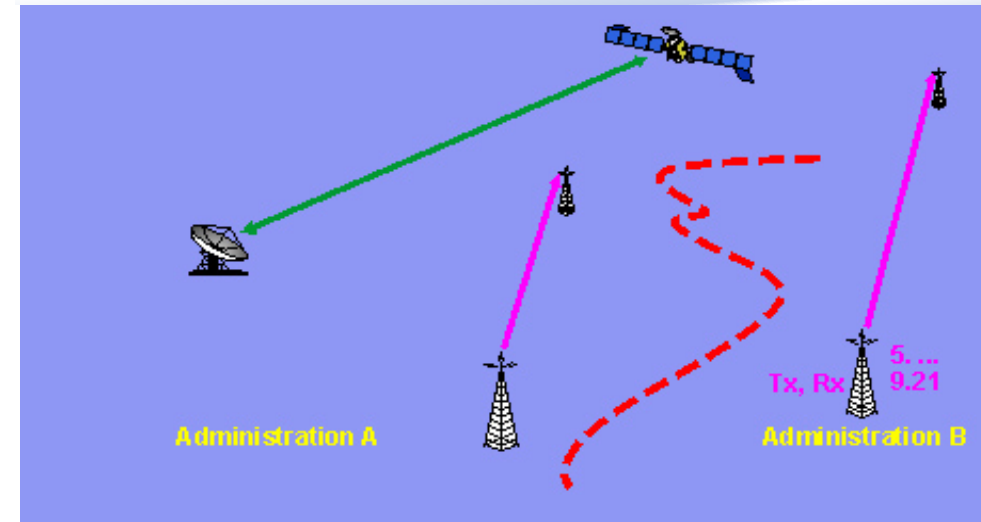




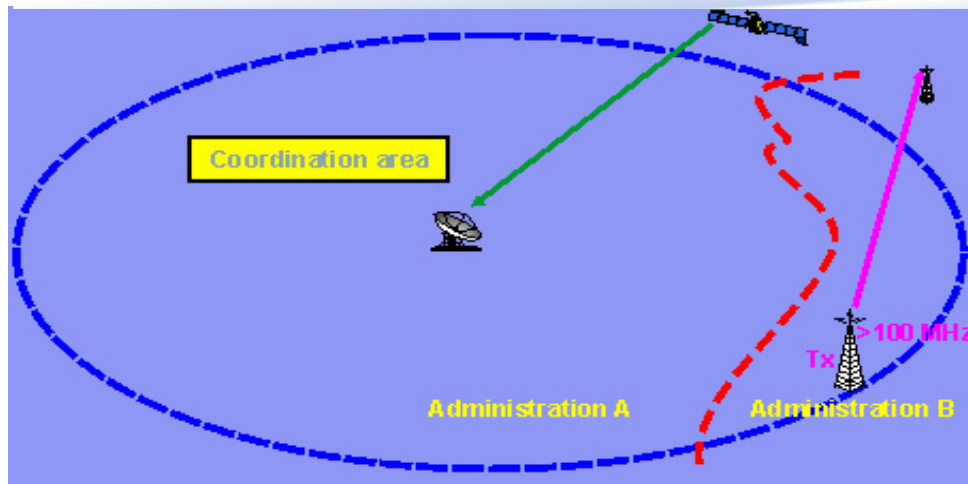
# Coordination of FXM assignments

## Mandatory coordination cases under RR Article 9 RR 9.16, RR 9.18, RR 9.19 and RR 9.21

### RR 9.21

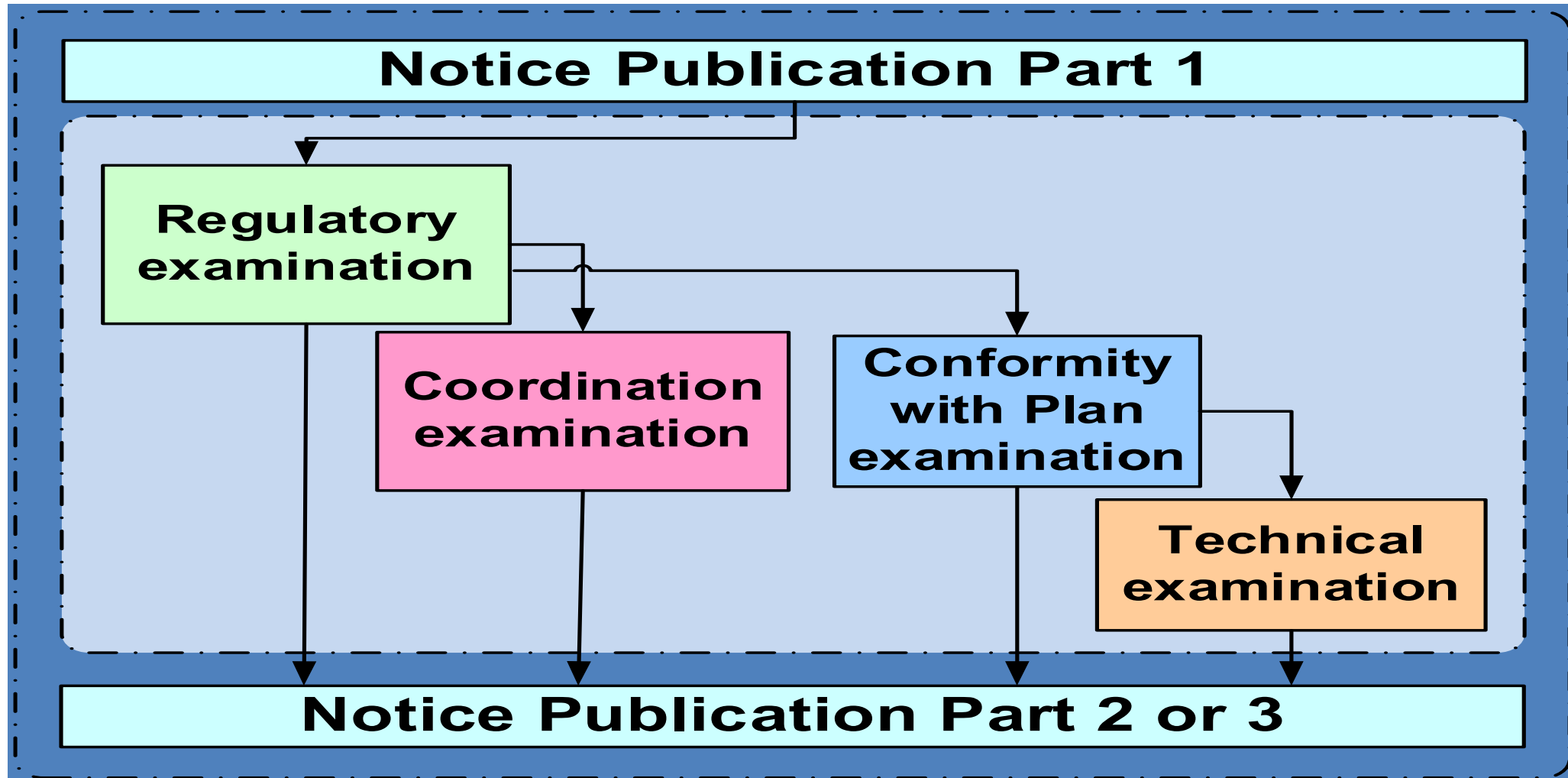


### RR 9.16/RR 9.18



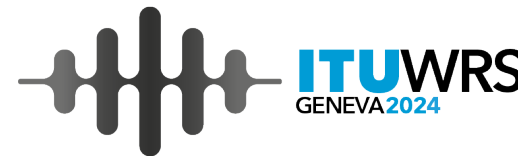
### RR 9.19







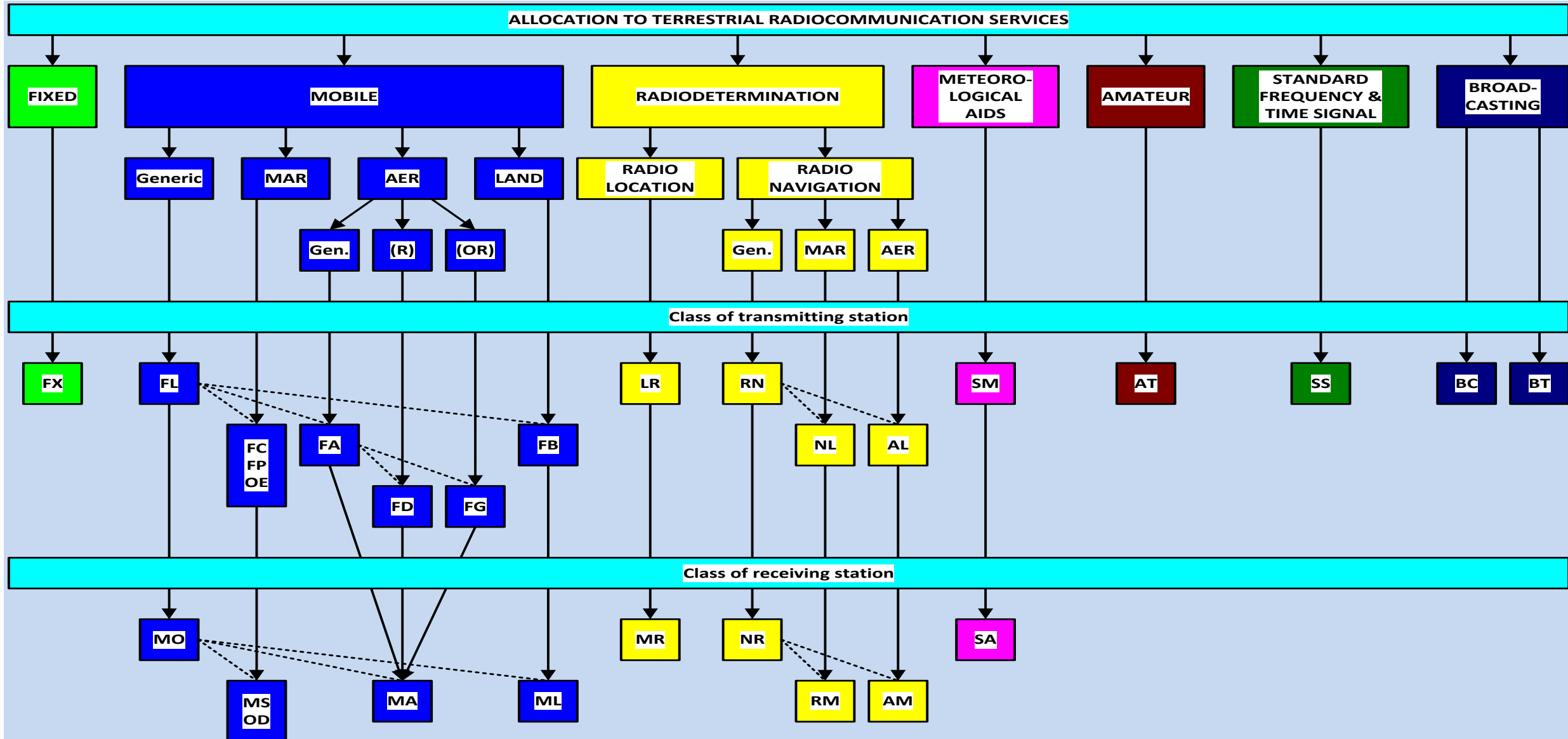
# Regulatory examination RR 11.31 (1)



- **Table of frequency allocations, including footnotes:**
  - Notified band within the band allocated to the service
  - Receiving point is in country where allocation exists
  - Category of allocation: primary or secondary
  - Successful application of RR **9.21** (RR **11.31.1** )
    - ✓ for allocations to mobile service and/or identifications for IMT subject to RR **9.21** (470-694/698 MHz, 694 – 790 MHz (Region 1), 1427-1518 MHz, 3300-3400 MHz, 3400-3700 MHz and 4800 – 4990 MHz)
    - ✓ RoP (e.g. RR **5.316B**, RR **5.341A**, Section **B6** etc.)
    - ✓ **CR/391, CR/467** Nature of Service **IM** – IMT station in the mobile service (to enable the examination of the conditions associated with IMT)
- **Other RR provisions:**
  - Power limits RR **21.3** – RR **21.5A**
  - Specific requirements for services (e.g. classes of emission, channeling arrangements, power limits for MMS in HF bands)

# Regulatory examination (2)

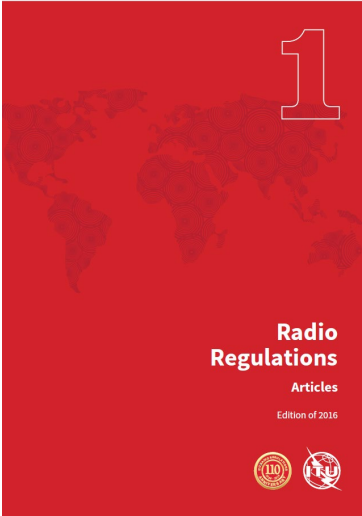
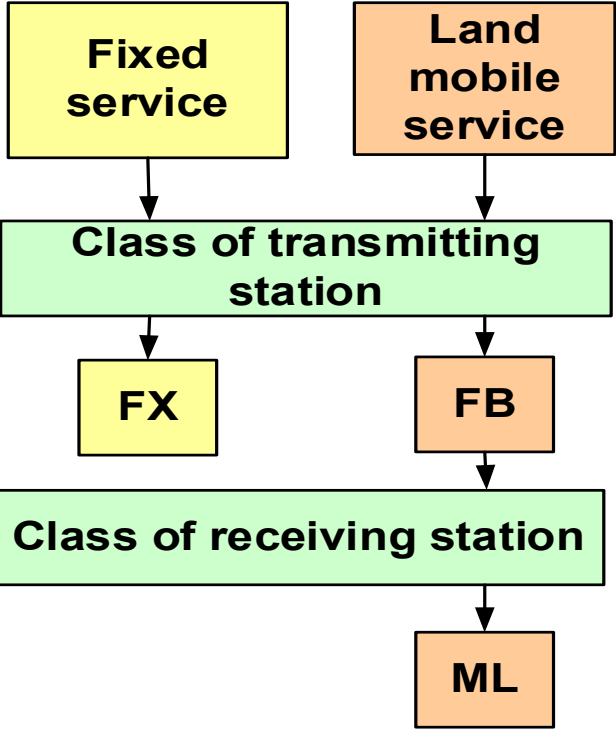
## Relation between radio services and classes of stations



# Regulatory examination (3)

## Permitted classes of station

Allocation to services		
Region 1	Region 1	Region 1
24 000-24 450	FIXED LAND MOBILE	



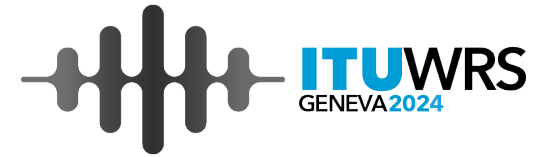
CHAPTER II – Frequencies RRR-7

Section IV – Table of Frequency Allocations  
(See No. 2.3.)

R-5-010 table

Allocation to services		
Region 1	Region 2	Region 3
Below 8.3	(Not allocated)	
8.3-9	METEOROLOGICAL AIDS 1.54A, 1.54B, 1.54C	
9-11.3	METEOROLOGICAL AIDS 1.54A	
11.3-14	RADIONAVIGATION	
14-14.85	FIXED MARITIME MOBILE 1.57	
14.85-15	FIXED MARITIME MOBILE 1.57	
15-15.5	STANDARD FREQUENCY AND TIME SIGNAL (S.F. & T.S.)	
15.5-16	FIXED MARITIME MOBILE 1.57	
16-16.7	FIXED MARITIME MOBILE 1.57	
16.7-17	FIXED MARITIME MOBILE 1.57	
17-17.2	FIXED MARITIME MOBILE 1.57	
17.2-17.3	FIXED MARITIME MOBILE 1.57	
17.3-17.4	FIXED MARITIME MOBILE 1.57	
17.4-17.5	FIXED MARITIME MOBILE 1.57	
17.5-17.6	FIXED MARITIME MOBILE 1.57	
17.6-17.7	FIXED MARITIME MOBILE 1.57	
17.7-17.8	FIXED MARITIME MOBILE 1.57	
17.8-17.9	FIXED MARITIME MOBILE 1.57	
17.9-18	FIXED MARITIME MOBILE 1.57	
18-18.1	FIXED MARITIME MOBILE 1.57	
18.1-18.2	FIXED MARITIME MOBILE 1.57	
18.2-18.3	FIXED MARITIME MOBILE 1.57	
18.3-18.4	FIXED MARITIME MOBILE 1.57	
18.4-18.5	FIXED MARITIME MOBILE 1.57	
18.5-18.6	FIXED MARITIME MOBILE 1.57	
18.6-18.7	FIXED MARITIME MOBILE 1.57	
18.7-18.8	FIXED MARITIME MOBILE 1.57	
18.8-18.9	FIXED MARITIME MOBILE 1.57	
18.9-19	FIXED MARITIME MOBILE 1.57	
19-19.1	FIXED MARITIME MOBILE 1.57	
19.1-19.2	FIXED MARITIME MOBILE 1.57	
19.2-19.3	FIXED MARITIME MOBILE 1.57	
19.3-19.4	FIXED MARITIME MOBILE 1.57	
19.4-19.5	FIXED MARITIME MOBILE 1.57	
19.5-19.6	FIXED MARITIME MOBILE 1.57	
19.6-19.7	FIXED MARITIME MOBILE 1.57	
19.7-19.8	FIXED MARITIME MOBILE 1.57	
19.8-19.9	FIXED MARITIME MOBILE 1.57	
19.9-20	FIXED MARITIME MOBILE 1.57	
20-20.1	FIXED MARITIME MOBILE 1.57	
20.1-20.2	FIXED MARITIME MOBILE 1.57	
20.2-20.3	FIXED MARITIME MOBILE 1.57	
20.3-20.4	FIXED MARITIME MOBILE 1.57	
20.4-20.5	FIXED MARITIME MOBILE 1.57	
20.5-20.6	FIXED MARITIME MOBILE 1.57	
20.6-20.7	FIXED MARITIME MOBILE 1.57	
20.7-20.8	FIXED MARITIME MOBILE 1.57	
20.8-20.9	FIXED MARITIME MOBILE 1.57	
20.9-21	FIXED MARITIME MOBILE 1.57	
21-21.1	FIXED MARITIME MOBILE 1.57	
21.1-21.2	FIXED MARITIME MOBILE 1.57	
21.2-21.3	FIXED MARITIME MOBILE 1.57	
21.3-21.4	FIXED MARITIME MOBILE 1.57	
21.4-21.5	FIXED MARITIME MOBILE 1.57	
21.5-21.6	FIXED MARITIME MOBILE 1.57	
21.6-21.7	FIXED MARITIME MOBILE 1.57	
21.7-21.8	FIXED MARITIME MOBILE 1.57	
21.8-21.9	FIXED MARITIME MOBILE 1.57	
21.9-22	FIXED MARITIME MOBILE 1.57	
22-22.1	FIXED MARITIME MOBILE 1.57	
22.1-22.2	FIXED MARITIME MOBILE 1.57	
22.2-22.3	FIXED MARITIME MOBILE 1.57	
22.3-22.4	FIXED MARITIME MOBILE 1.57	
22.4-22.5	FIXED MARITIME MOBILE 1.57	
22.5-22.6	FIXED MARITIME MOBILE 1.57	
22.6-22.7	FIXED MARITIME MOBILE 1.57	
22.7-22.8	FIXED MARITIME MOBILE 1.57	
22.8-22.9	FIXED MARITIME MOBILE 1.57	
22.9-23	FIXED MARITIME MOBILE 1.57	
23-23.1	FIXED MARITIME MOBILE 1.57	
23.1-23.2	FIXED MARITIME MOBILE 1.57	
23.2-23.3	FIXED MARITIME MOBILE 1.57	
23.3-23.4	FIXED MARITIME MOBILE 1.57	
23.4-23.5	FIXED MARITIME MOBILE 1.57	
23.5-23.6	FIXED MARITIME MOBILE 1.57	
23.6-23.7	FIXED MARITIME MOBILE 1.57	
23.7-23.8	FIXED MARITIME MOBILE 1.57	
23.8-23.9	FIXED MARITIME MOBILE 1.57	
23.9-24	FIXED MARITIME MOBILE 1.57	
24-24.1	FIXED MARITIME MOBILE 1.57	
24.1-24.2	FIXED MARITIME MOBILE 1.57	
24.2-24.3	FIXED MARITIME MOBILE 1.57	
24.3-24.4	FIXED MARITIME MOBILE 1.57	
24.4-24.5	FIXED MARITIME MOBILE 1.57	
24.5-24.6	FIXED MARITIME MOBILE 1.57	
24.6-24.7	FIXED MARITIME MOBILE 1.57	
24.7-24.8	FIXED MARITIME MOBILE 1.57	
24.8-24.9	FIXED MARITIME MOBILE 1.57	
24.9-25	FIXED MARITIME MOBILE 1.57	
25-25.1	FIXED MARITIME MOBILE 1.57	
25.1-25.2	FIXED MARITIME MOBILE 1.57	
25.2-25.3	FIXED MARITIME MOBILE 1.57	
25.3-25.4	FIXED MARITIME MOBILE 1.57	
25.4-25.5	FIXED MARITIME MOBILE 1.57	
25.5-25.6	FIXED MARITIME MOBILE 1.57	
25.6-25.7	FIXED MARITIME MOBILE 1.57	
25.7-25.8	FIXED MARITIME MOBILE 1.57	
25.8-25.9	FIXED MARITIME MOBILE 1.57	
25.9-26	FIXED MARITIME MOBILE 1.57	
26-26.1	FIXED MARITIME MOBILE 1.57	
26.1-26.2	FIXED MARITIME MOBILE 1.57	
26.2-26.3	FIXED MARITIME MOBILE 1.57	
26.3-26.4	FIXED MARITIME MOBILE 1.57	
26.4-26.5	FIXED MARITIME MOBILE 1.57	
26.5-26.6	FIXED MARITIME MOBILE 1.57	
26.6-26.7	FIXED MARITIME MOBILE 1.57	
26.7-26.8	FIXED MARITIME MOBILE 1.57	
26.8-26.9	FIXED MARITIME MOBILE 1.57	
26.9-27	FIXED MARITIME MOBILE 1.57	
27-27.1	FIXED MARITIME MOBILE 1.57	
27.1-27.2	FIXED MARITIME MOBILE 1.57	
27.2-27.3	FIXED MARITIME MOBILE 1.57	
27.3-27.4	FIXED MARITIME MOBILE 1.57	
27.4-27.5	FIXED MARITIME MOBILE 1.57	
27.5-27.6	FIX	

# Regulatory examination (4)



Allocation to services		
Region 1	Region 2	Region 3
322-328.6 MHz	FIXED MOBILE RADIO ASTRONOMY 5.149  <b>Example for FIXED service with <u>Favourable</u> finding</b> <b>Class of station FX</b> <b>Assigned frequency: 327.0 MHz / fmin: 325.5 MHz/ fmax: 328.5 MHz</b> <b>Bandwidth 3 MHz</b>	
328.6-335.4 MHz	AERONAUTICAL RADIONAVIGATION 5.259  <b>Example for FIXED service with <u>Unfavourable</u> finding</b> <b>Class of station FX</b> <b>Assigned frequency 328.0 MHz / fmin: 326.5 MHz/ fmax: 329.5 MHz</b> <b>Bandwidth 3 MHz</b> <b>Reason for unfavorable finding: <u>bandwidth overlaps with non-allocated band</u></b>	

# Regulatory examination (5)

## Protection of space services in uplink (RR Article 21 power limits on transmitters in fixed and mobile services):

RR21.3: e.i.r.p.  $\leq 55$  dBW

RR21.4 (protection of GSO): e.i.r.p.:

$\leq 47$  dBW within  $0.5^\circ$  of GSO

$\leq 47 - 55$  dBW

between  $0.5^\circ$  and  $1.50^\circ$  of GSO

RR21.5: Power to antenna:

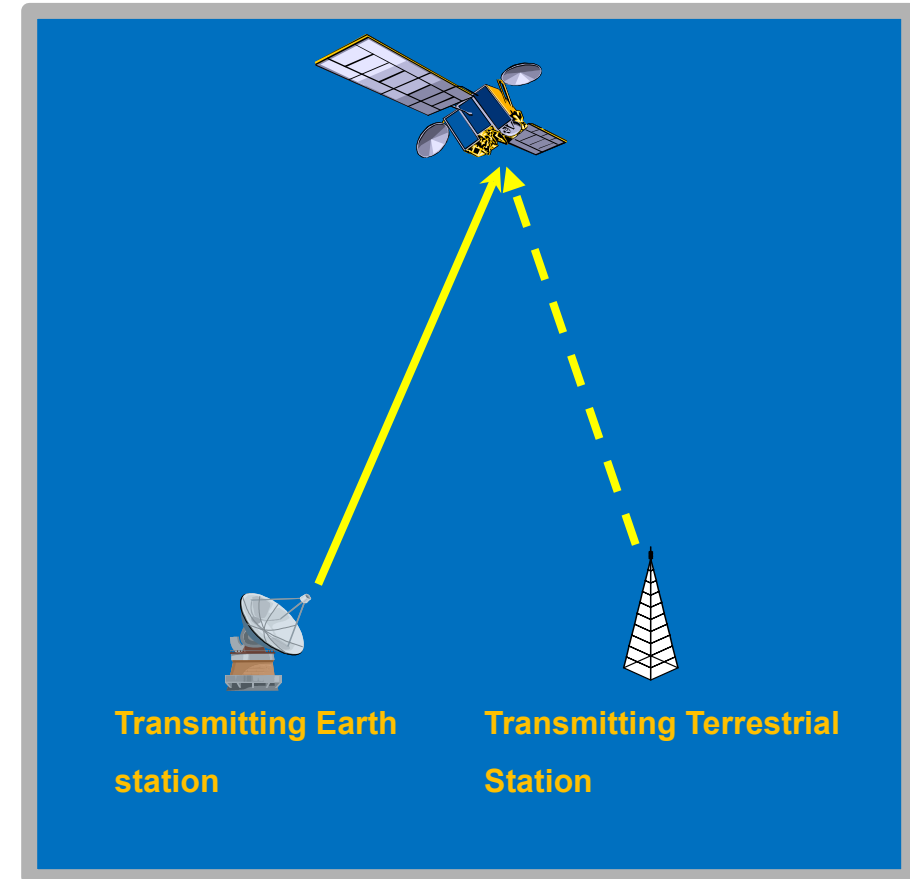
$\leq 13$  dBW in bands 1- 10 GHz

$\leq 10$  dBW above 10 GHz

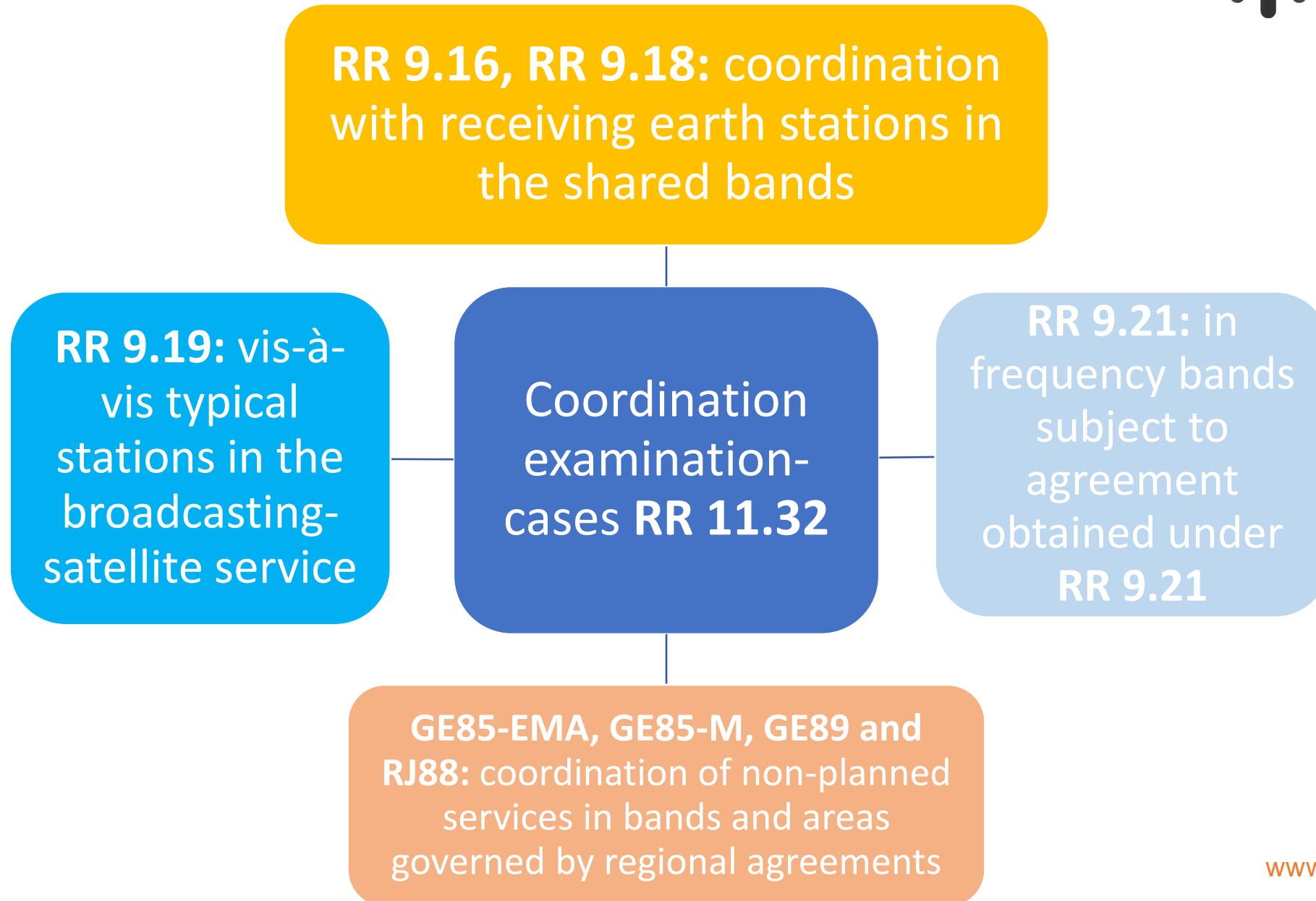
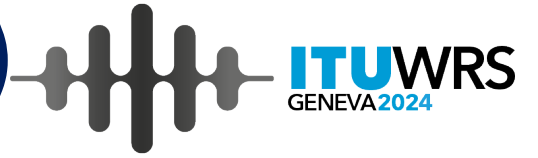
RR21.5A: Power to antenna

$\leq -3$  dBW for FS in 18.6- 18.8 GHz

RR21.3 – RR21.5A: in bands of Table 21-2



# Coordination examination-cases RR 11.32 (1)



# Coordination examination (2)

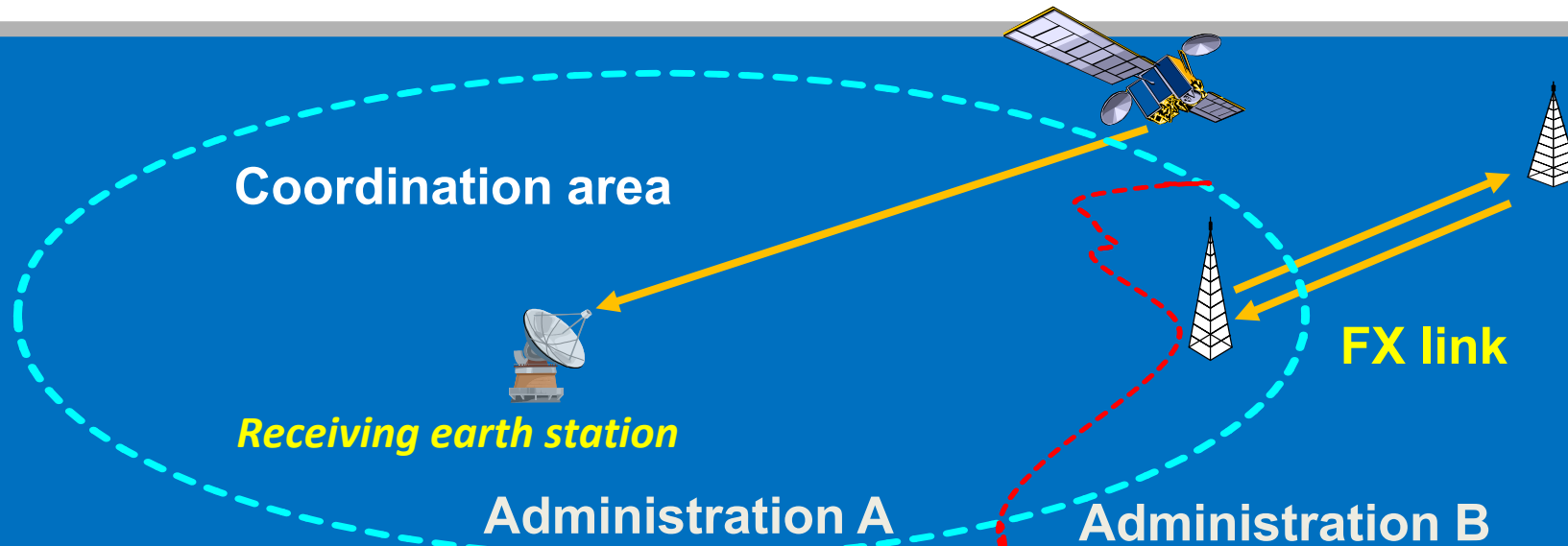
- **Sharing between terrestrial and space services**
  - More than 60 frequency bands above 100 MHz allocated with equal rights to terrestrial and space services
- **Protection of space services from terrestrial services:**
  - Protection of receiving *earth* stations and BSS typical receiving earth stations from terrestrial transmitters (downlink) -> coordination

7 250-8 500 MHz

Allocation to services		
Region 1	Region 2	Region 3
8 025-8 175	EARTH EXPLORATION-SATELLITE (space-to-Earth) FIXED FIXED-SATELLITE (Earth-to-space) MOBILE 5.463 5.462A	

# Coordination examination (3)

- **Protection of space services in downlink**
  - Protection of specific receiving earth station:  
coordination of terrestrial transmitters located within coordination area of an earth station (RR9.16, RR9.18)
  - Protection of BSS typical receiving earth stations: coordination of terrestrial transmitters vs. BSS service area (RR9.19)



Coordination of terrestrial transmitter with receiving earth station is necessary if there is frequency overlap and terrestrial station is located within coordination area



# Conformity with Plan examination

Worldwide allotment plans for maritime mobile and aeronautical mobile services (AP25, AP26 and AP27)

Notified frequency is  
in allotted channel  
listed in the Plan

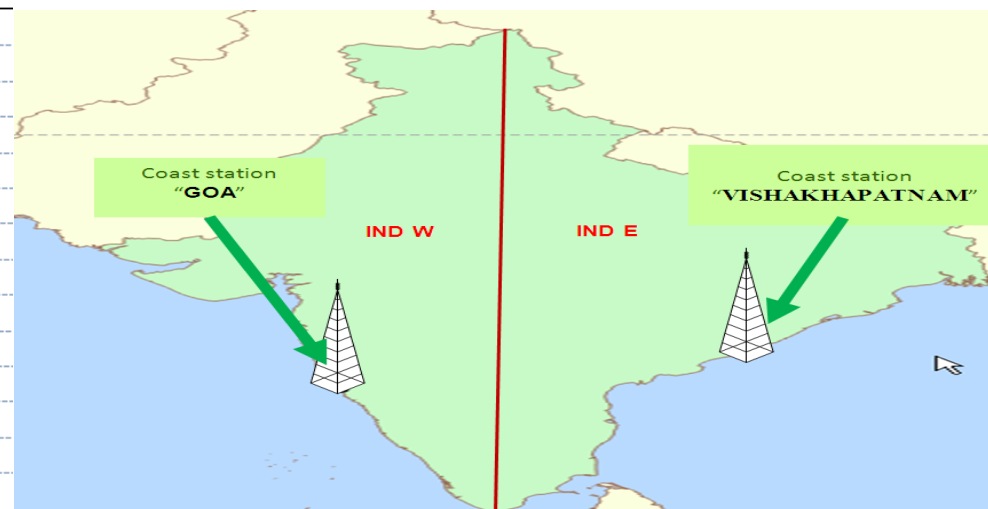
Notified geographical  
area corresponds to a  
Plan allotment

Receiving area is  
within the allotment  
area

AP25



19 792.4 (19 791)	ALS CHN E F HWA INDE INDW	
(1813)	J PTR S TUR USAE USA SO USA W	ADD



Applies to AP26 and AP27 - if a notice is in conformity with the technical principles of allotment plan, but not in conformity with the allotment plan

AP26 - notice is examined with respect to the allotments in Part III of AP26 (RR 11.39C)

AP27 - notice is examined whether the protection specified in AP27 is afforded to the allotments in the Plan and to assignments already recorded in the Master Register with a favourable finding (RR 11.39A)

# RR provisions for use of assignments to terrestrial service stations

**Article 4:** general rules for assignment and use of frequencies

**Article 5:** frequency allocations - assignments should be in conformity with Table of Frequency Allocations and footnotes

**Article 9:** coordination procedures - assignments should be coordinated prior to bringing into use, if subject to Article 9

**Appendix 5:** identification affected administrations for coordination

**Appendix 7:** determination of coordination area (for RR9.16, RR9.18)

**Article 11:** notification and recording of assignments

**Appendix 4:** characteristics of assignments to be notified for recording in the Master Register or used in coordination

**Article 8:** status of assignments recorded in the Master Register

**Article 21:** sharing between terrestrial and space services – power limits on transmitters in fixed and mobile services

**Other provisions:** Art. 24 (FS), Art. 43 (AMS), Art. 51, 52 (MMS), AP25 (MMS), AP26 (AM(OR)S), AP27 (AM(R)S), etc.

# Thank you!

ITU – Radiocommunication Bureau

Questions to [brmail@itu.int](mailto:brmail@itu.int)