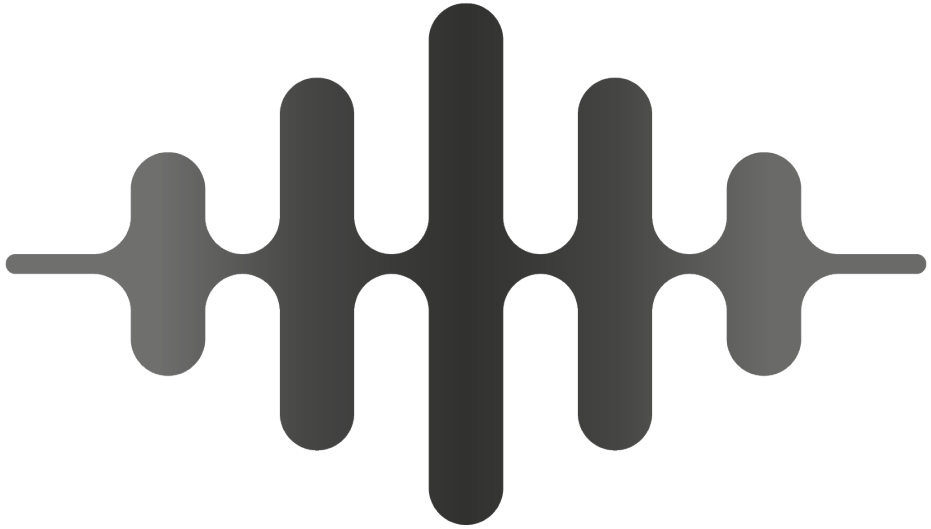


ITU WRS GENEVA2024

2–6 December 2024
Geneva, Switzerland

Frequency plans and coordination procedures for fixed and mobile services Cross-border coordination issues for fixed and mobile services

ITU BR/TSD

Contents

1. FXM frequency plans
2. General aspects of coordination
3. Mandatory Coordination of FXM assignments
   - Coordination under Nos. 9.16 & 9.18
   - Coordination under No. 9.19
   - Coordination under other provisions of the RR
4. Voluntary Coordination of FXM assignments
5. Conclusions

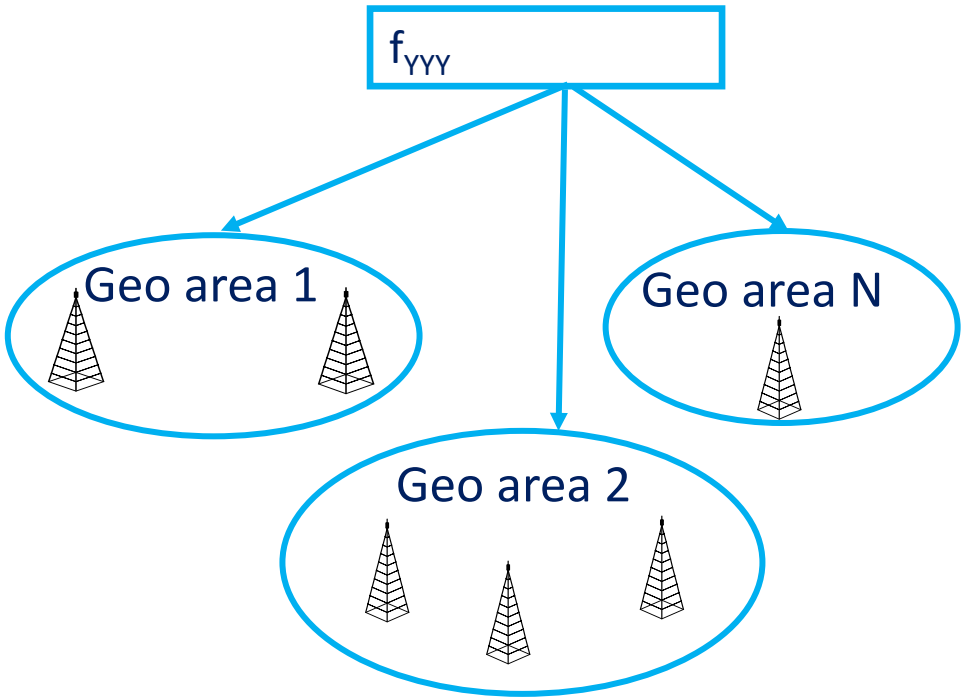
Frequency plans for FXM services

Allotment Plans ◀▶ Assignment Plans

Allotment

⬇

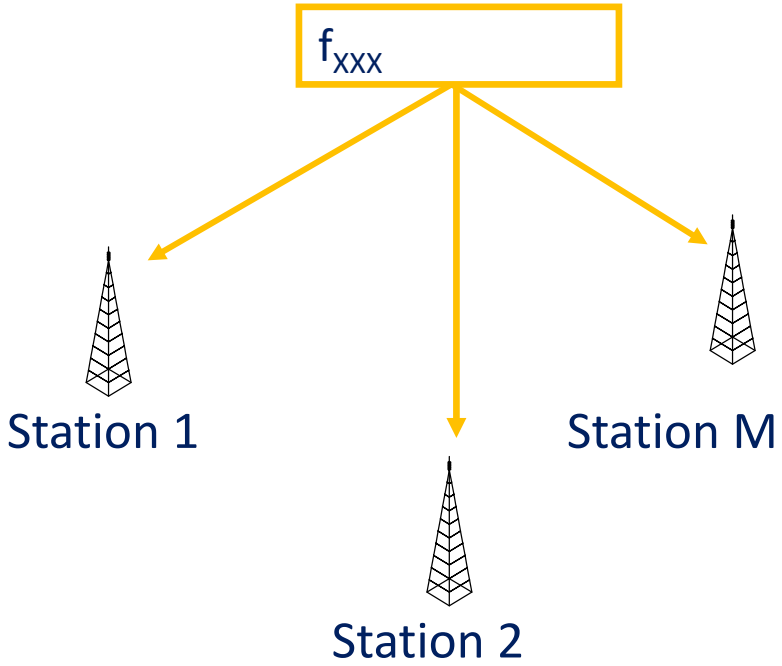
to geographical areas



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)

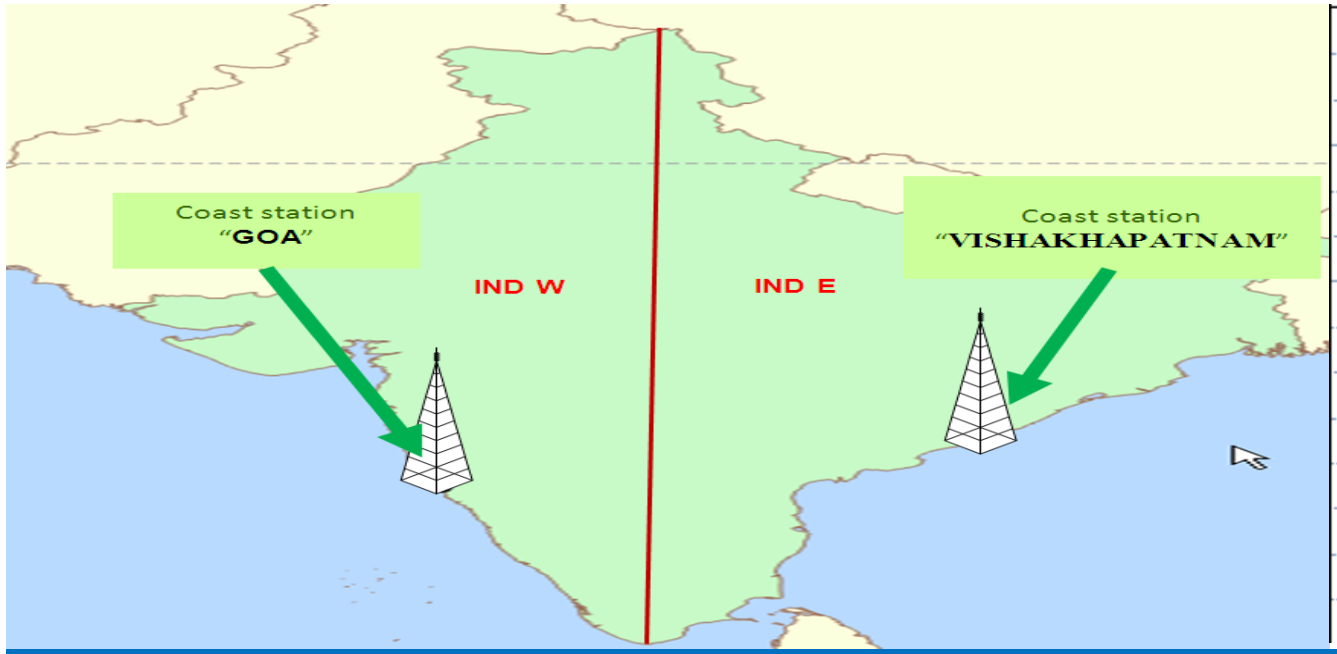
Regional frequency allotment plan

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



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

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

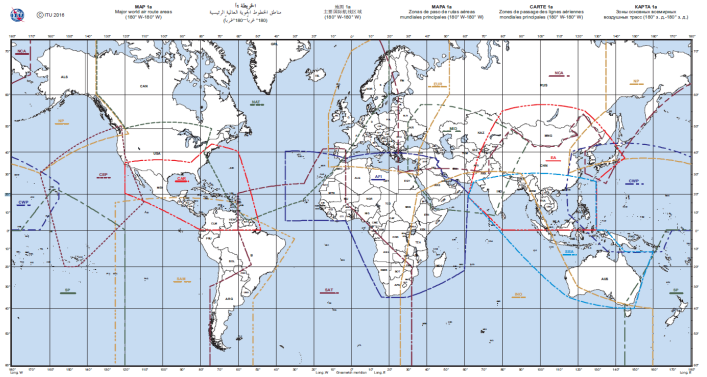
  - Maximum bandwidth - 2.8 kHz, Classes of emission - J3E; A1A; A1B; F1B(A,H)2(A,B); (R,J)2(A,B,D); J(7,9)(B,D,X)
  - Mean effective radiated power: 1 kW (aeronautical stations)
    50 W (aircraft stations)



- 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 AP**27/60**, e.g. (e.g. J3E, H2B, J7B, J7D, J9B etc.): 6 kW (aeronautical stations)
    400 W (aircraft stations)



Frequency assignment plans for FXM services

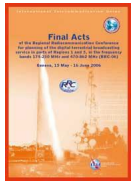
Regional frequency assignment plans

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

Region 1



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**

GE06 Planning Area

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

Mandatory coordination under other provisions
- Worldwide frequency allotment plan of AP25

- **25/1.1 1** Before notifying to the Radiocommunication Bureau or bringing into use at any coast radiotelephone station a frequency assignment not covered by an allotment in the Frequency Allotment Plan contained in Section II of this Appendix, an administration which intends to establish a coast radiotelephone station and has no allotment in the Plan, or

- **25/1.1.2** intends to expand its coast radiotelephone service and requires an additional allotment,

shall send the information listed in Appendix **4** to the Bureau

T15

<HEAD>

t_adm = RUS

t_char_set = ISO-8859-1

</HEAD>

<NOTICE>

t_notice_type = T15

t_fragment = AP25

t_action = ADD

t_adm_ref_id = FC-103-2011

t_chn_pref = 604

t_stn_cls = FC

t_bdwdth_cde = 2K80

t_emi_cls = J3E--

t_zone_id = RUS EO

t_op_hh_fr = 00:00

t_op_hh_to = 24:00

t_d_adm_ntc = 2011-04-27

t_d_inuse = 2011-10-25

t_nat_srv = CP

t_prov = AP25/1.1.2

t_traffic = 200

<ANTENNA>

t_ant_dir = ND

t_dist_max = 1500

t_gain_max = 2.7

t_gain_type = D

t_pwr_ant = 30

t_pwr_xyz = X

<RX_STATION>

t_geo_type = ZONE

t_zone_id = MAR01

</RX_STATION>

<RX_STATION>

t_geo_type = ZONE

t_zone_id = MAR03

</RX_STATION>

<RX_STATION>

t_geo_type = ZONE

t_zone_id = MAR05

</RX_STATION>

</ANTENNA>

<COAST_STATION>

t_lat = +594142

t_long = +1500935

t_site_name = RADUZHNIY MAG

</COAST_STATION>

<PEAK_HOURS>

t_peak_hh_fr = 00:00

t_peak_hh_to = 24:00

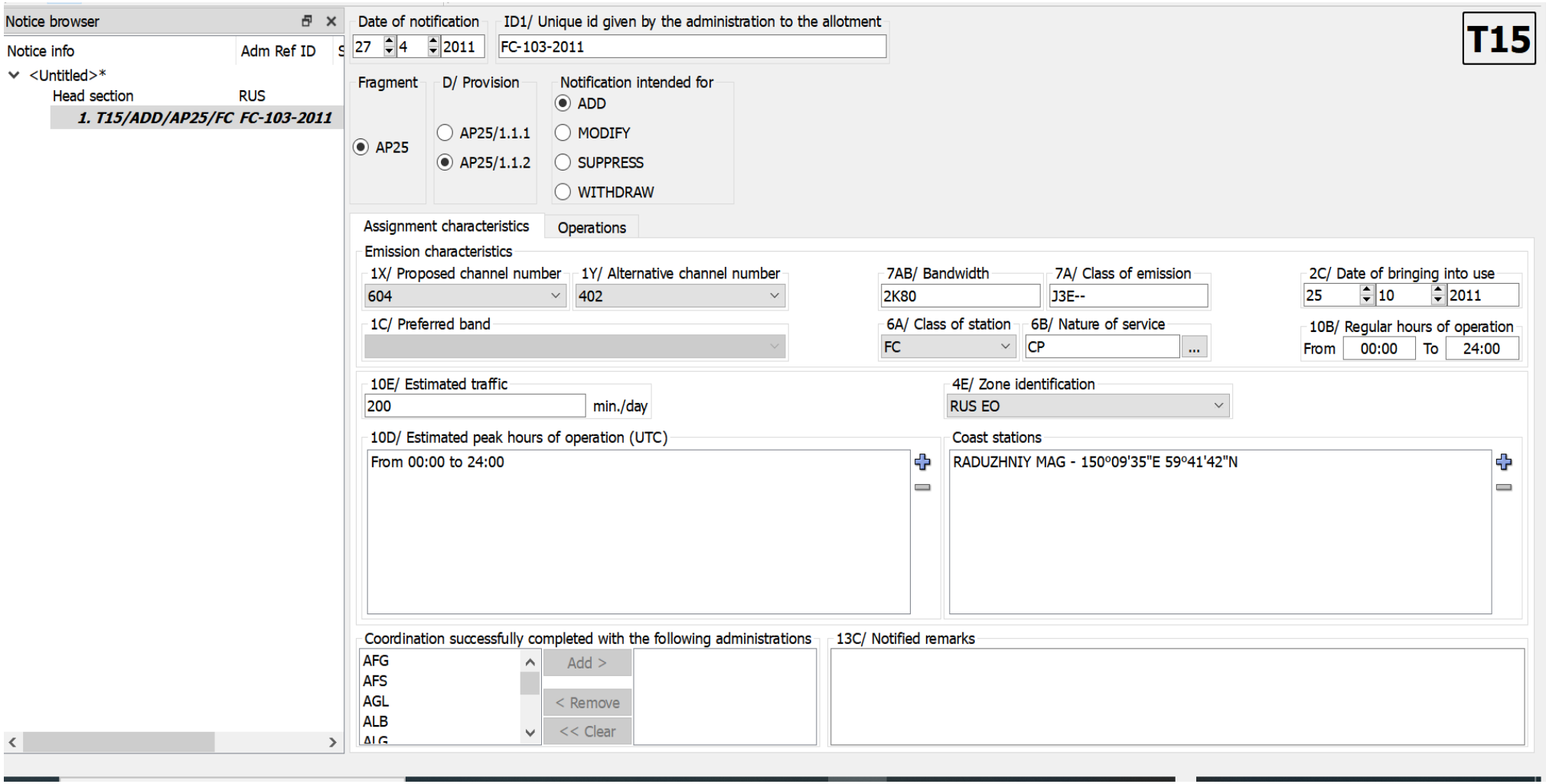
</PEAK_HOURS>

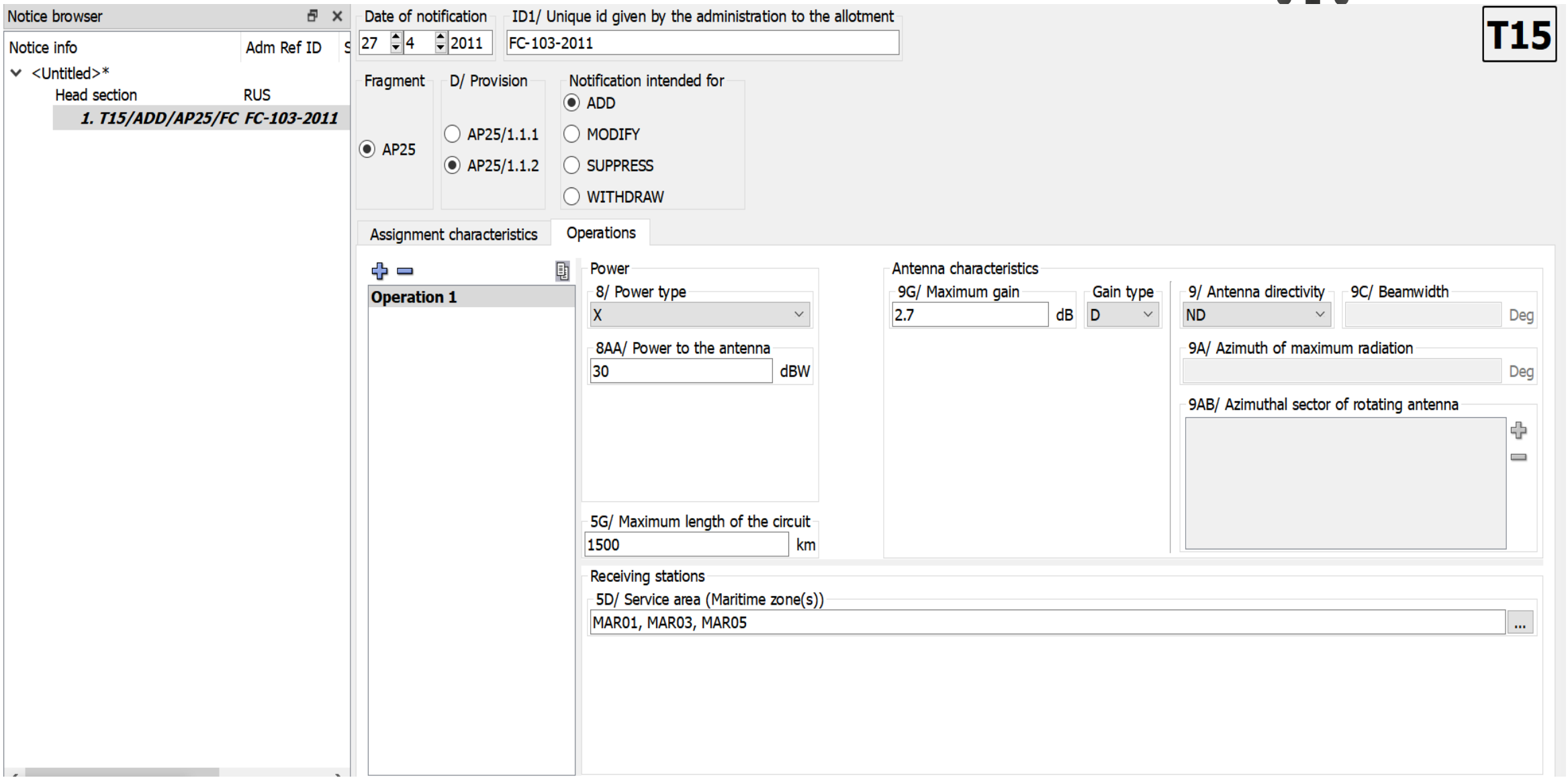
</NOTICE>

<TAIL>

t_num_notices = 1

</TAIL>


Notice browser
Notice info
Adm Ref ID
<Untitled>*
Head section
RUS
1. T15/ADD/AP25/FC FC-103-2011
Date of notification
27 4 2011
ID1/ Unique id given by the administration to the allotment
FC-103-2011
T15
Fragment
AP25
D/ Provision
AP25/1.1.1
AP25/1.1.2
Notification intended for
ADD
MODIFY
SUPPRESS
WITHDRAW
Assignment characteristics
Operations
Emission characteristics
1X/ Proposed channel number
604
1Y/ Alternative channel number
402
7AB/ Bandwidth
2K80
7A/ Class of emission
J3E--
2C/ Date of bringing into use
25 10 2011
1C/ Preferred band
6A/ Class of station
FC
6B/ Nature of service
CP
10B/ Regular hours of operation
From 00:00 To 24:00
10E/ Estimated traffic
200
min./day
4E/ Zone identification
RUS EO
10D/ Estimated peak hours of operation (UTC)
From 00:00 to 24:00
Coast stations
RADUZHNIY MAG - 150°09'35"E 59°41'42"N
Coordination successfully completed with the following administrations
AFG
AFS
AGL
ALB
Add >
< Remove
<< Clear
13C/ Notified remarks


Notice browser
Notice info
Adm Ref ID
<Untitled>*
Head section
RUS
1. T15/ADD/AP25/FC
FC-103-2011
Date of notification
27
4
2011
ID1/ Unique id given by the administration to the allotment
FC-103-2011
T15
Fragment
AP25
D/ Provision
AP25/1.1.1
AP25/1.1.2
Notification intended for
ADD
MODIFY
SUPPRESS
WITHDRAW
Assignment characteristics
Operations
Operation 1
Power
8/ Power type
X
8AA/ Power to the antenna
30
dBW
5G/ Maximum length of the circuit
1500
km
Antenna characteristics
9G/ Maximum gain
2.7
dB
Gain type
D
9/ Antenna directivity
ND
9C/ Beamwidth
Deg
9A/ Azimuth of maximum radiation
Deg
9AB/ Azimuthal sector of rotating antenna
Receiving stations
5D/ Service area (Maritime zone(s))
MAR01, MAR03, MAR05

TerRaBench - PROD
User: bogens

Examination for:

Assignment ID: 111047221
Administration: RUS
Administration's unique ID: FC-103-2011
Fragment: AP25
Provision: AP25/1.1.2
Notice type: T15 / ADD
Date Rcv: 28 avr. 2011
Date In Use: 25 oct. 2011
Stage: INIT PUB
Last processed by: [REVQ]\BOGENS **on** 24 mai 2011 - 14:49:59

Preferred Channel: 601
Class of station: FC

Examination results:

Plan examination

- **Status:** REVIEW
- **Executed on:** 25-05-2011 14:38:51 **Duration:** 1min 46s
- **Information:**
  1. Number of resulting requirements: 1 - Number of successfully analyzed requirements: 1
  2. Preferred Channel: 601 - No Affected Allotments - Affecting Allotments: ALS ; CAN W ; CHN ; GUM ; HWA ; INS ; KAZ
  3. Least Loaded Channel (111047221.001): 607 - No Affected Allotments - Affecting Allotments: CHN
  4. Reference Threshold Values: (IPTot)max = 1.140 ; (QCTot)max = 1.200 ; (CF)max = 2.340 ; (IP)max = 0.220

Affected/Affecting allotments:

Channel No	Affected allotments	Affecting allotments
601		ALS, CAN W, CHN, GUM, HWA, INS, KAZ
602		ALS, CAN W, GUM, HWA, INS, KAZ
603		ALS, CAN NO, CAN W, GUM, HWA, INS
604		ALS, CAN W, CHN, GUM, HWA, INS
605		ALS, CAN W, GUM, HWA, INS
607		CHN
608		ALS, CHN, GUM, HWA

Requirement 111047221.001: Allotment's channels

Channel No	IP	QC	CF	Channel items							
				Requirement ID	Adm	Allot. Name	Received IP	Caused IP	Is affected	Is affecting	Stage
601	0.7906	1.1173	1.9079	088100574.000	USA	ALS	0.163	0.371	FALSE	TRUE	R
				088100581.000	CAN	CAN W	0.157	0.236	FALSE	TRUE	R
				088100584.000	CHN	CHN	0.148	0.278	FALSE	TRUE	R
				088100591.000	USA	GUM	0.156	0.223	FALSE	TRUE	R
				088100592.000	USA	HWA	0.156	0.234	FALSE	TRUE	R
				088100594.000	INS	INS	0.125	0.236	FALSE	TRUE	R
				092102076.000	KAZ	KAZ	0.138	0.235	FALSE	TRUE	R

6 502.4 (6 501) (601)	ALG	
	ALS	
	ARG CL	
	ARG SO	
	ARS	
	AZE	
	CAN NO	ADD
	CAN W	
	CHL CL	
	CHL NO	
	CHN	
	COG	
	CZE	
	D1	
	EST	
	GEO	
	GRC	
	GUM	
	HNG	
	HRV	
	HWA	
	I	ADD
	INS	
	IRN	
	IRQ	
	ISL	
	J	
	KAZ	
	LBY	
	LTU	
	LVA	
	MLA	ADD
	MLD	ADD
	MNE	
	NCL	
	NZL	
	PTR	
	ROU	
	RUS AS	
	RUS SW	
	RUS W	
	SVK	
	TKM	
	UKR	
	USA CL	
	USA E	
	USA SO	
	USA W	

INTERNATIONAL TELECOMMUNICATION UNION
RADIOCOMMUNICATION BUREAU

BR IFIC / DATE	2696/14.06.2011	SPECIAL SECTION No.	AP25/143

Procedure for bringing up to date the Frequency Allotment Plan for Coast Radiotelephone Stations operating in the Exclusive Maritime Mobile Bands between 4000 and 27500 kHz of Appendix 25 to the Radio Regulations (AP 25)

For the explanation of symbols and abbreviations, reference should be made to the Radio Regulations (RR) and to the Preface to the "BR International Frequency Information Circular" (BR IFIC)

This Special Section consists of the Parts indicated below by an x in the relevant box

[X] *Part A* - Characteristics of the proposed allotments

[ ] *Part B* - Characteristics of the allotments entered in the Plan (as a result of the application of the procedure of Section I of AP **25**)

[ ] *Part C* - Allotments deleted from the Plan

Prov. AP 25/	1x	1y	1z	2e	4e	5d	5g	6b	7a	8a	9	9a	9c	9g	10b	10d	10e	13ca
1.1.2	601	-	-	25.10.2011	RUS EO	01 03 05	1500	CP	J3E--	30.0	ND	-	-	2.7	0000-2400	0000-2400	200	-

13cb
B1 / *
B2 / ALS CAN W CHN GUM HWA INS KAZ

EXPIRY DATE FOR THE RECEIPT OF COMMENTS:	14.08.2011

13ca * Nil

13cb Comments and recommendations of the Bureau

B1/B2/ The Bureau, applying the technical criteria and calculation method of IFRB Circular-letter 843 of 31 October 1990, examined the proposed allotment against the allotments of other administrations on the same channel. For this purpose, the Bureau used the characteristics of the existing allotments already recorded in the AP25 Plan and the characteristics of proposed allotments published in a Special Section in accordance with No. 25/1.2, for which the procedure of AP 25/Section I is currently in progress. The results of this examination show that there are apparent incompatibilities between the proposed allotment and allotments appearing in AP 25 (existing allotments) or published in accordance with No. 25/1.2 (proposed allotments) on the channel in question for the following allotment areas (designated by the symbols following the oblique stroke):

B1/ The proposed allotment could cause harmful interference to the existing or projected allotments of the following allotment areas:

B2/ The proposed allotment could suffer harmful interference from the existing or projected allotments of the following allotment areas:

INTERNATIONAL TELECOMMUNICATION UNION
RADIOCOMMUNICATION BUREAU

BR IFIC / DATE 2742/16.04.2013	SPECIAL SECTION No. AP25/151

Procedure for bringing up to date the Frequency Allotment Plan for Coast Radiotelephone Stations operating in the Exclusive Maritime Mobile Bands between 4000 and 27500 kHz of Appendix 25 to the Radio Regulations (AP25).

For the explanation of symbols and abbreviations, reference should be made to the Radio Regulations (RR) and to the Preface to the "BR International Frequency Information Circular" (BR IFIC).

This Special Section consists of the Parts indicated below by an x in the relevant box

☐ *Part A* - Characteristics of the proposed allotments

☒ *Part B* - Characteristics of the allotments entered in the Plan (as a result of the application of the procedure of Section I of AP25)

☐ *Part C* - Allotments deleted from the Plan

Partie B (suite) / Part B (continued) / Parte B (continuación)

Prov. AP 25/	1x	1y	1z	2c	4e	5d	5g	6b	7a	8a	9	9a	9c	9g	10b	10d	10e	13ca
1.21	604	-	-	25.10.2011	RUS EO	01 03 05	1500	CP	J3E–	30.0	ND	-	-	2.7	0000-2400	0000-2400	200	-

1x	13ca	13cb															
604	*	C1 /	AP25 /	143 /	2696 /	14.06.2011											
		C2 /	ALG	ARG CL	ARG SO	ARS	AZE	CAN W	CHL CL	CHL NO	CHN	CZE	D1	EST	GRC	HNG	
			I	INS	ISL	J	LTU	LVA	MNE	NZL	ROU	SVK	UKR				
		C3 /	IRN														
		C4 /	COG	GEO	HRV	IRQ	KAZ	LBY	MLA	MLD	F (NCL)	TKM					
		C5 /	601														

13cb Explanation of symbols

C1/ The particulars of the allotment were published in accordance with AP**25**/1.2 in Part A of Special Section, the reference of which is given by the figures following the symbol, AP25 / Special Section / BR IFIC / date of the BR IFIC.

C2/ The Administrations responsible for the allotment of the allotment areas represented by the symbols following the slant stroke have communicated their agreement, in accordance with AP**25**/1.8.

C3/ As a result of the examination required under AP**25**/1.20, the Bureau reached a favourable finding with respect to the assignments of the allotment areas represented by the symbols following the slant stroke.

C4/ The Administrations responsible for the allotment of the allotment areas represented by the symbols following the slant stroke have failed to give their decision concerning this allotment. Each of these Administrations has been informed that the provisions of AP**25**/1.16.1 and AP**25**/1.16.2 will be applied to the assignment covered by this allotment.

C5/ As a result of the examination required under AP**25**/1.20, the Bureau reached an unfavourable finding, it determined the channel which is the least affected one and the administration concerned requested the Bureau to enter the proposed allotment in this channel, replacing the channel number following the slant stroke published in the Special Section indicated under C1/.

* Nil

2. 4 Mandatory coordination under other provisions (9)

- Worldwide aeronautical frequency allotment plans of AP26 and AP27

Administrative Data		Emission Characteristics	
Source notice type	T12	Assigned frequency	15.0744 MHz
Date of notice	06/04/2016	Reference (carrier) frequency	15.073 MHz
Date notice received	06/04/2016	Class of emission	J3E--
		Nature of service	CO
Notifying Administration	LTU		
Identifier assigned by the BR	116083813	Bandwidth	2.8 kHz
Unique identifier given by the Administration		Bandwidth code	2K80
Amendment type	RECORDED	Frequency deviation	
Modification type	NOT MODIFY	Energy dispersal	
Date of entry into the MIFR	06/04/2016		
Fragment	NTFD_RR	Channel number	
		Preferred band	
Provision	RR11.2	Preferred channel	
Operating agency		Alternative channel	
Address code	A	Traffic	
Date of bringing into use	15/05/2016		
Regular hours of operation	From To 00:00 24:00		
Examination category	P26		

- No allotment of the frequency 15.073 MHz to LTU in AP26 Plan

15 073	REGY	ATA(ARG)
	REG1	BHR(USA) COG D DJI(F) E F GEO GRC(USA) ISL MDG MNG RUS SEN TUN UKR
	REG2	ALS ARG BER(USA) CAN HWA JON MDW PNR PTR USA
	REG3	AUS CHN GUM IND J MHL(USA) NCL OCE WAK

2. 4 Mandatory coordination under other provisions (9)

- Worldwide aeronautical frequency allotment plans of AP26 and AP27

➢ AP26: protection of technical criteria (provision AP26/6.1)

Frequency band (kHz)	Repetition half-distance (km)			
	Northern hemisphere		Southern hemisphere	
	North-South	East-West	North-South	East-West
3 025- 3 155	550	600	550	600
3 900- 3 950	650	650	650	650
4 700- 4 750	725	775	725	775
5 680- 5 730	1 175	1 325	1 150	1 300
6 685- 6 765	1 350	1 600	1 225	1 425
8 965- 9 040	2 525	3 525	2 225	3 075
11 175-11 275	3 375	5 575	2 675	3 925
13 200-13 260	4 550	6 650	3 475	5 625
15 010-15 100	5 050	7 450	4 800	7 100
17 970-18 030	5 750	8 250	5 675	7 475

➢ Examination result:

Finding type	nding stat	Finding	Date of update	Source
CONFORM PLAN	FINAL	UNFAVORABLE	12/05/2016	[TerRaPub]\rosap
REX	FINAL	FAVORABLE	12/05/2016	[TerRaPub]\rosap
TEX	FINAL	UNFAVORABLE	12/05/2016	[TerRaPub]\rosap

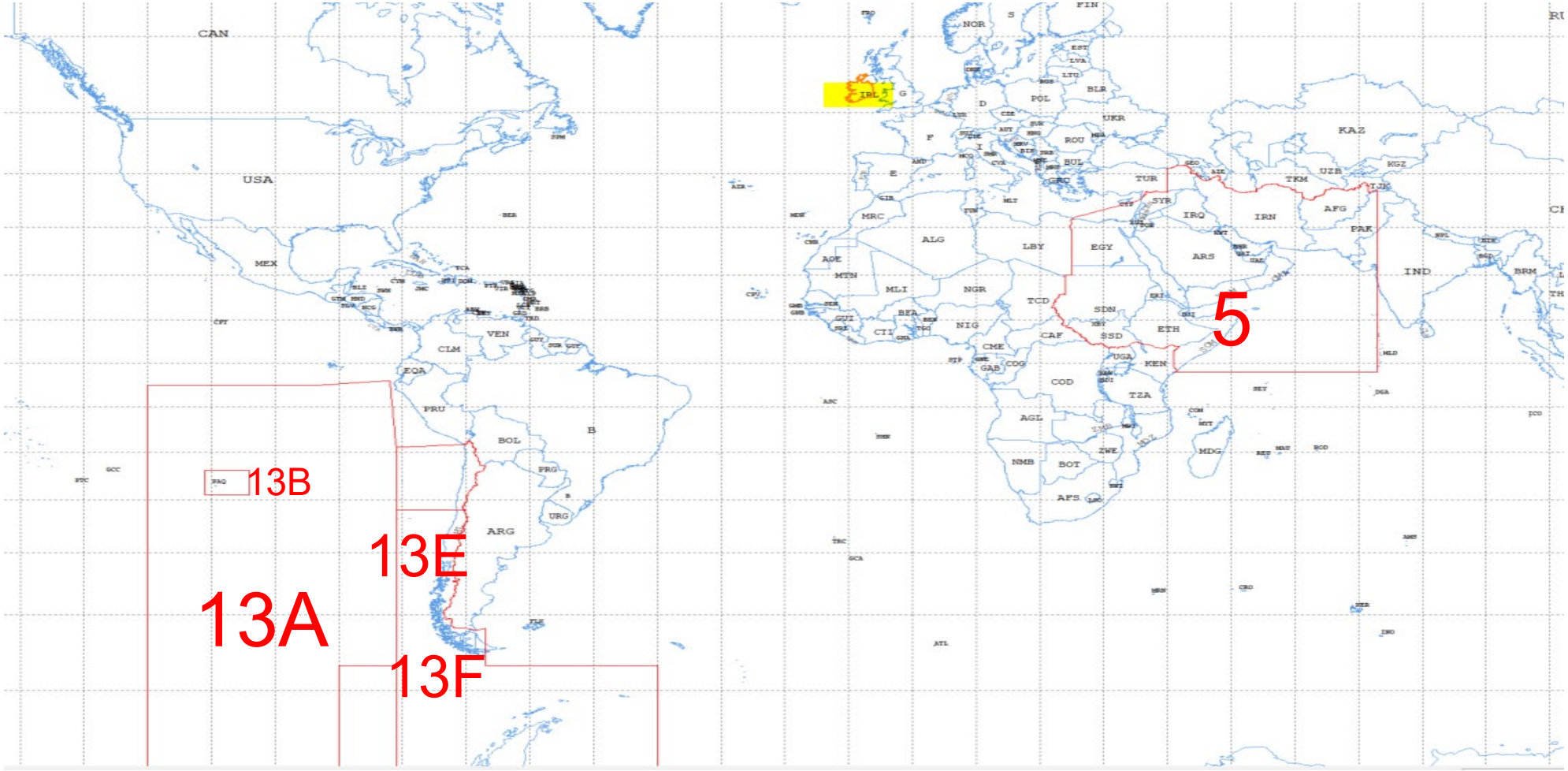
Finding observation	H
Finding reference	X/AP26
Finding action	

AP27:

Source notice type	T12	Assigned frequency	17.9684 MHz
Date of notice	26/08/2002	Reference (carrier) frequency	17.967 MHz
Date notice received	13/09/2002	Class of emission	J2DEN
		Nature of service	CO
Notifying Administration	IRL		
Identifier assigned by the BR	102075741	Bandwidth	2.8 kHz
Unique identifier given by the Administration	8895	Bandwidth code	2K80
Amendment type	RECORDED	Frequency deviation	
Modification type		Energy dispersal	
Date of entry into the MIFR	13/09/2002		
Fragment	NTFD_RR	Channel number	
		Preferred band	
Provision	RR11.2	Preferred channel	
Operating agency		Alternative channel	
Address code	A	Traffic	
Date of bringing into use	30/07/2002		
Regular hours of operation	From To		
	00:00 24:00		
Examination category	P27		

The frequency 17.967 MHz is allocated to the following allotment areas.

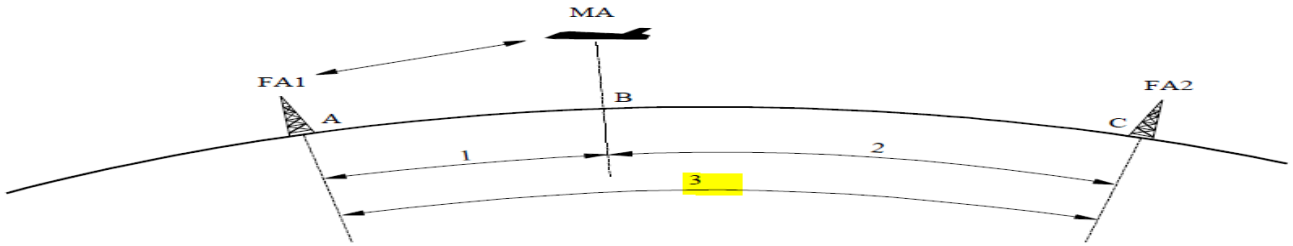
17 967	R 5 13A 13B 13E 13F	CC 13A 13B 13E 13F


13B
13E
13A
13F
5

AP27:

- 15 dB protection ratio, between the wanted signal at an aircraft station at the limit of **the service range** and the signal from a potentially **interfering aeronautical station** operating on **the same frequency**.
- **The repetition distance is determined by this value.**

FIGURE 1
Service range, interference range, repetition distance



FA1 : aeronautical station in communication with aircraft station MA
FA2 : aeronautical station in communication with aircraft stations other than MA
MA : aircraft station in communication with aeronautical station FA1
1 : service range AB
2 : interference range CB
3 : repetition distance AC

AP27-01

AP27

- for the **13 MHz** band, the **repetition factor** at least 3
- for the **18 and 22 MHz** bands, the **repetition factor** is 4. The longitudinal separation might be decreased to allow for a repetition of 4 (at **13 MHz)** and 6 (at **18 and 22 MHz**).
- for the **bands 3 to 11.3 MHz**: **method of use of the transparencies** to determine the **coordination contour**. A transmitter located at any point inside the contour will result in a protection ratio of less than 15 dB.

4.1 Frequency bands between 3 and 11.3 MHz

27/35 4.1.1 The transparencies are constructed on the basis of the following sharing conditions:

Areas	Bands between (MHz)	Sharing conditions
MWARA or VOLMET area to MWARA or VOLMET area	3 and 6.6 9 and 11.3	Night propagation Day propagation NOTE – 6.6 MHz and 5.6 MHz sharing conditions are considered to be the same.
MWARA or VOLMET area to RDARA	3 and 5.6 6.6 and 11.3	Night propagation Day propagation
RDARA to RDARA	3 and 4.7 5.6 and 11.3	Night propagation Day propagation

AP27:

Finding type	nding stat	Finding	Date of update	Source
CONFORM PLAN	FINAL	UNFAVORABLE	05/12/2003	[TerRaPub]\eichenba
REX	FINAL	FAVORABLE	05/12/2003	[TerRaPub]\eichenba
TEX	FINAL	UNFAVORABLE	05/12/2003	[TerRaPub]\eichenba

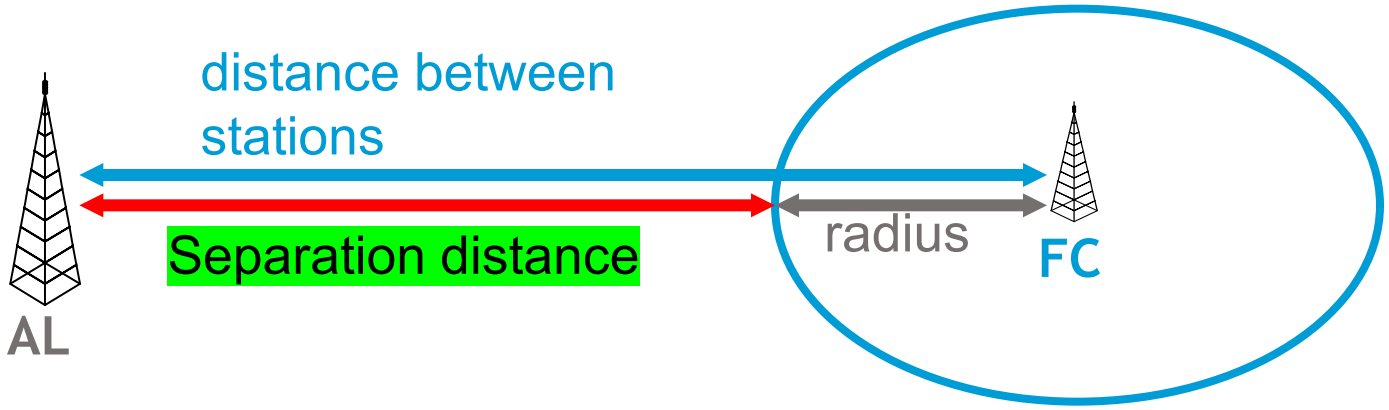
Finding observation	H
Finding reference	X/AP27
Finding action	

Regional frequency assignment plan of GE85M (Notice form type T16)

- **GE85-R1-MAR:** plan for the **maritime mobile service** in the MF bands in Region 1
  - ✓ Region 1 plan in bands: 415 – 495 kHz, 505 - 526.5 kHz, 1606.5-1625 kHz, 1635-1800 kHz, 2045-2160 kHz
  - ✓ **Takes into account ARNS, FS, LMS and RDS**
- **GE85-R1-AER:** plan for the **aeronautical radionavigation service** in the MF bands in Region 1
  - ✓ Region 1 plan in bands: 415 – 435 kHz, 510 – 526.5 kHz
  - ✓ **Takes into account also maritime mobile service stations**

Calculation of the separation distance between the station and service areas of the assignments to be protected

- **Separation distance** is determined by deducting the radius of the service area of the protected station from the calculated distance. Attention: for FC service area is limited to the sea



Separation Distance = distance between stations - radius

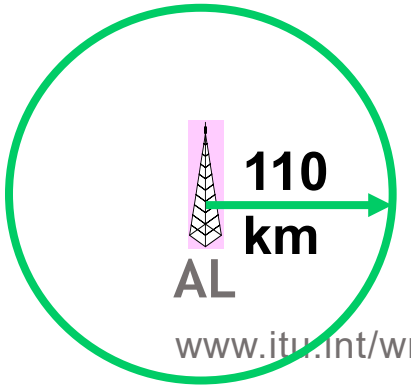
Example of determination of the coordination distance (AL station, 430 kHz, at 19E41/ 46N41, 2K14, A2A, Radius = 111 km, BR ID 109058531)

Δf, kHz	For protection of ARNS stations				For protection of MMS stations			
	E_{min} dB(μV/m)	PR dB	ΔP dB	E_{lim} dB(μV/m)	E_{min} dB(μV/m)	PR dB	ΔP dB	E_{lim} dB(μV/m)
0	37	15	29	51	31.5	8	29	52.5
0.5	37	15	29	51	31.5	2	29	58.5
1	37	9	29	57	31.5	-38	29	98.5
1.5	37	2	29	64	31.5	-44	29	104.5
2	37	-5	29	71	31.5	-68	29	128.5
2.5	37	-12.5	29	78.5				
3	**37**	**-20**	**29**	**86**				

limiting interfering field strength

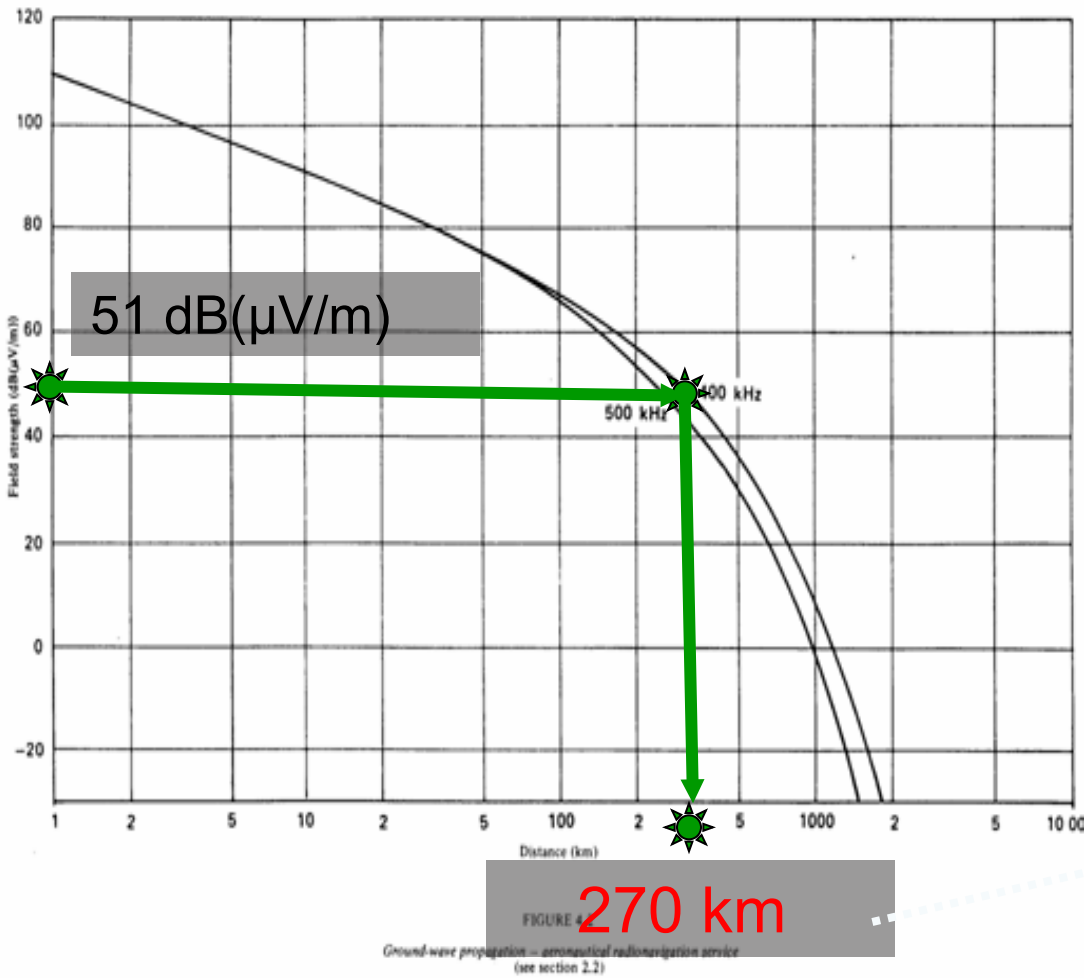
Emin - minimum field strength to be protected, (Annex 4)
PR – protection ratio, dB (Annex 4)
ΔP = Pref (30dBW)– Pused, power correction factor

Elim = Emin – PR + ΔP



Calculation of the coordination distance

- Using the propagation curve, the values of limiting interfering field strength are converted into the coordination distances



Δf, kHz	For protection of ARNS stations				For protection of MMS stations			
	E_{min} dB(μV/m)	PR dB	ΔP dB	E_{lim} dB(μV/m)	E_{min} dB(μV/m)	PR dB	ΔP dB	**E_{lim} dB(μV/m)**
0	37	15	29	51	31.5	8	29	**52.5**
0.5	37	15	29	51	31.5	2	29	**58.5**
1	37	9	29	57	31.5	-38	29	**98.5**
1.5	37	2	29	64	31.5	-44	29	**104.5**
2	37	-5	29	71	31.5	-68	29	**128.5**
2.5	37	-12.5	29	78.5				
3	**37**	**-20**	**29**	**86**				

Δf, kHz	For protection of ARNS		For protection of MMS	
	E_{lim} dB(μV/m)	Coordination Distance, km	E_{lim} dB(μV/m)	**Coordination Distance, km**
0	51	**270**	52.5	**260**
0.5	51	**270**	58.5	**190**
1	57	**205**	98.5	**4.5**
1.5	64	**122**	104.5	**2**

Comparison of separation distance with coordination distance and identification of affected stations

- For each protected assignment in the Plan (**recorded in the MIFR),** the **separation distance** is compared with the **coordination distance** of every assignment.
- If the separation distance is less than the coordination distance, the assignment **is considered as affected**
- Otherwise, assignment is considered as not affected

Mandatory coordination under other provisions

- Regional frequency assignment plan of GE85N (Notice form type T12)

- GE85-EMA: plan for the Maritime Radionavigation Service (Radiobeacons) in the MF bands in European Maritime Area
- in band: 283.5 - 315 kHz
- takes into account ARNS
- the maximum service area radius is 280 km.

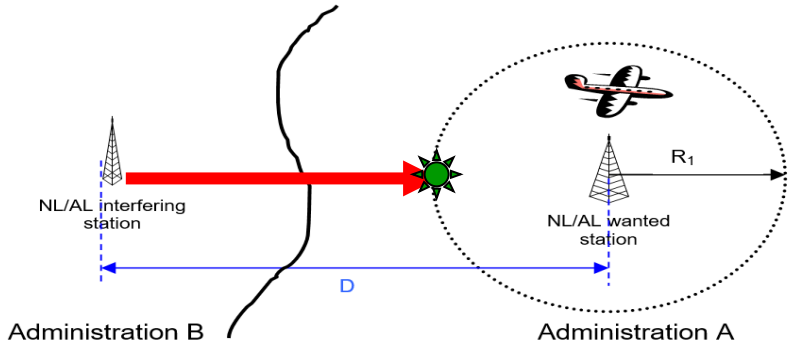
Identification of potentially affected administrations

- The criteria is defined by signal-to-interference ratio (S/I).

- The method of identification of potentially affected administrations consists in four steps.
  - To calculate the interfering field strength produced by a new station **at test points**.
  - To calculate the wanted field strength from a "victim" station at the same test points.
  - To calculate the signal-to-interference ratio (S/I) for each test point, i.e., the difference between wanted signal field strength and interfering field strength.

    (S/I, see RoP Part B4)
  - The worst-case (minimum S/I) value is retained and compared with the protection ratio.

* ground-wave propagation conditions



The computer program package for the establishment of the Plan applies.

On the basis of the calculations at **the test points** above, the list of potentially affected administrations is established.

GE85-EMA Conformity to Plan Exam Results (Production Database, 28-Nov-2024 17:03:09)

Assignment ID 102059822

Adm: G
Assigned Freq: 285.5 kHz
Site Name: STIRLING
Class: NL
Date Received: 16-Apr-2002
Coordinates: 004°04'00"W 56°04'00"N
Nature of Service: RC
Bandwidth: 500H
Class of Emission: G1D--
Recorded Assignment
Operation 1: Antenna Power:
Operation 1: Radiated Power: 6 dBW
Operation 1: Radius: 280 km

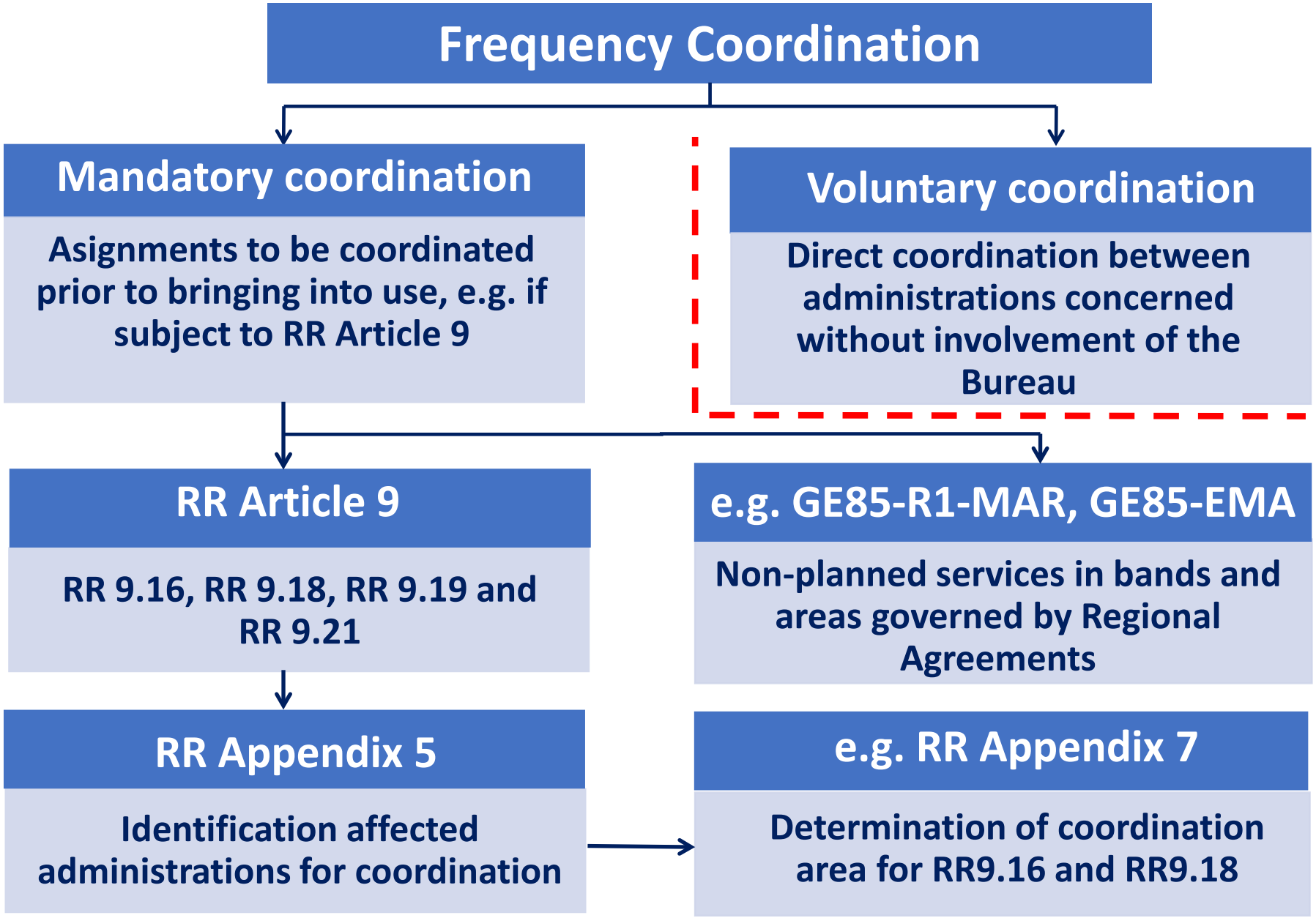
Coordination Summary:

All required coordinations (if any) have been completed.

Maritime Recorded Assignments (within 1000 km) which were considered:

Exam Summary	Site-to-Site Distance (km)	Required Protection Ratio (dB)	Assignment ID	Fragment	Intent	Adm	Assigned Freq (kHz)	Site Name	Class	Bandwidth	Received	Coordinates	Radius (km)	Rad Power (dBW)
Too far away	637	-60.0	092005856	GE85N	RECORDED	IRL	284	MIZEN HEAD LSTN	NL	500H	22-Jun-2001	009°49'00"W 51°27'00"N	277	
Too far away	706	-39.0	085070488	GE85N	RECORDED	BEL	285	NIEUWPOORT PHARE	NL	100H		002°43'E 51°09'N	10	
Too far away	686	-39.0	085070409	GE85N	RECORDED	NOR	285	SLAATTEROEY	NL	100H		005°04'E 59°54'N	20	

Coordination of FXM assignments

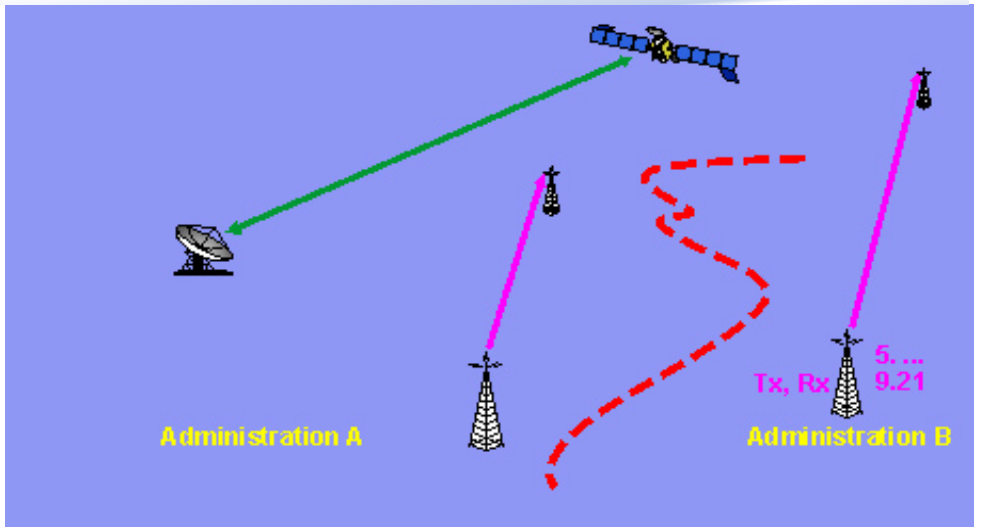


Coordination of FXM assignments

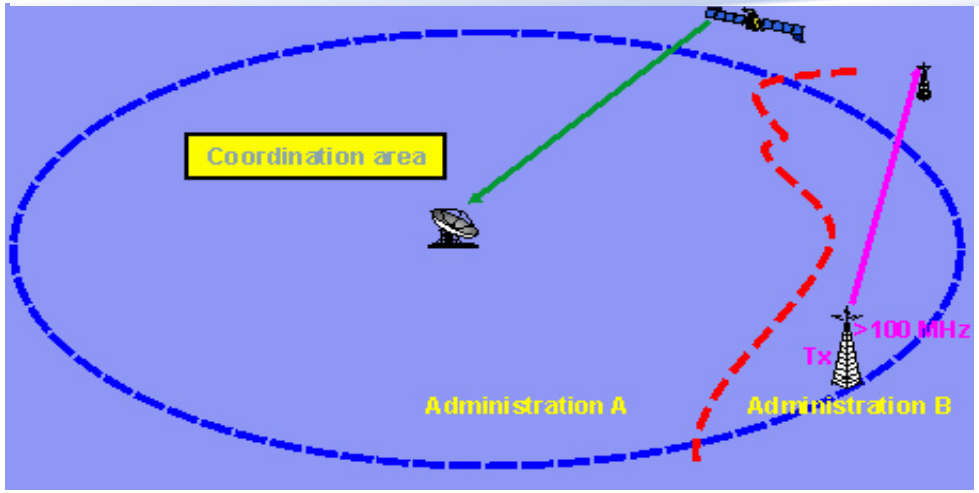
Mandatory coordination cases under RR Article 9

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

2. General aspects of coordination

Goals of frequency coordination

- ✓ To ensure interference-free operation in border areas
- ✓ To assist in long-term planning of frequencies
- ✓ To promote efficient spectrum utilization
- ✓ To help to resolve interference between neighboring countries

Parameters for coordination are defined in Nos. 1.166 - 1.176 of the Radio Regulations (RR), e.g.

- ✓ Interference
  - Permissible interference, Accepted interference, Harmful interference
- ✓ Coordination
  - Coordination distance, Coordination contour, Coordination area

General aspects of coordination

Methods to facilitate frequency sharing

Freq. separation	Spatial separation	Time separation	Signal separation*
Channelling plans Band segmentation Frequency division multiple access (FDMA) Control of emission characteristics	Geographical site separation Space diversity Antenna characteristics: - polarization/ pattern discrimination Physical barriers and site shielding	Time division multiple access (TDMA) Duty cycle control Dynamic real-time frequency assignment Etc.	Coded modulation: e.g. CDMA system Interference power/bandwidth adjustments - Power control - Low power, SRD Adaptive signal processing: e.g. SDR

*These techniques may also be applied together with the technologies of former separations. See Rec. ITU-R SM.1132

General aspects of coordination

- Initiation
  - ✓ On planning stage
    - based on calculated values
  - ✓ On operating stage
    - based on measured values
- Steps of coordination
  - ✓ Identification of potentially affected countries
    - using agreed characteristics and the worst-case assumption
  - ✓ Coordination
    - using real parameters, environmental data including terrain elevation data and agreed methods

General aspects of coordination

- Coordination criteria (coordination trigger) is given in a form of
  - ✓ interference-to-noise ratio (I/N) (e.g. I/N = 6 dB for mobile service)
  - ✓ Permissible field strength (E) (e.g. E = 25 dBµV/m in GE06)
  - ✓ Permissible power-flux density (pfd) (e.g. pfd = -154.5 dB(W/(m2.4 kHz)) in No. **5.431B**)
  - ✓ Distance separation (e.g. d=175 km in Res. **749 (Rev.WRC-19)** and **760 (Rev.WRC-19);** 1200 km in RoP on No. **9.19**)
  - ✓ Coordination contour/area (e.g. earth station coordination contour, Non-planned BSS service area)
- The conversion among the form of the criteria (E, I and pfd) is possible referring to Recommendation ITU-R P.525
- Coordination point
  - ✓ At the border (e.g. with respect Non-planned BSS area)
  - ✓ At a station (e.g. FSS earth station in Appendix **7**)

3. Mandatory Coordination of FXM assignments

Article 9: Frequency assignments to be taken into account in effecting coordination are defined using Appendix 5 (No. **9.27**)

3.1 Coordination under Nos. 9.16 & 9.18 (1)

Reference of Article 9	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Remarks
No. **9.16** Terrestrial	Frequency bands for which a footnote refers to No. **9.11A**	Transmitting terrestrial station is situated within the coordination area of a receiving earth station of Non-GSO	The coordination area of the affected earth station has already been determined using the calculation method of Appendix **7**
No. **9.18** Terrestrial	Any frequency band allocated to a space service	Transmitting terrestrial station is situated within the coordination area of a receiving earth station of GSO	The coordination area of the affected earth station has already been determined using the calculation method of Appendix **7**

Coordination under Nos. 9.16 & 9.18 (2)

➢Example (1)

BR ID: 120107812
Administration: E
Administration's unique ID: VIZZ-0100009 fr 2020
Fragment: NTFD_RR
Provision: RR11.2
Notice type: T11 / ADD
Date Rcv: 07 Apr 2020
Date In Use: 17 Dec 2019
Stage: RETURNED
Publication history: NTFD_RR/1/2919, NTFD_RR/3/2932
Last processed by: [PUB]\landeryo **on** 21 Oct 2020 - 15:47:09

Assigned frequency: 11.605 GHz
Bandwidth: 40M0
Examination category: SBB
Class of station: FX
Geographic area: E
Site name: JAIZKIBEL
Coordinates: 1°51'27"W - 43°20'38"N
Coordinates: -1.8575° ; 43.3439°

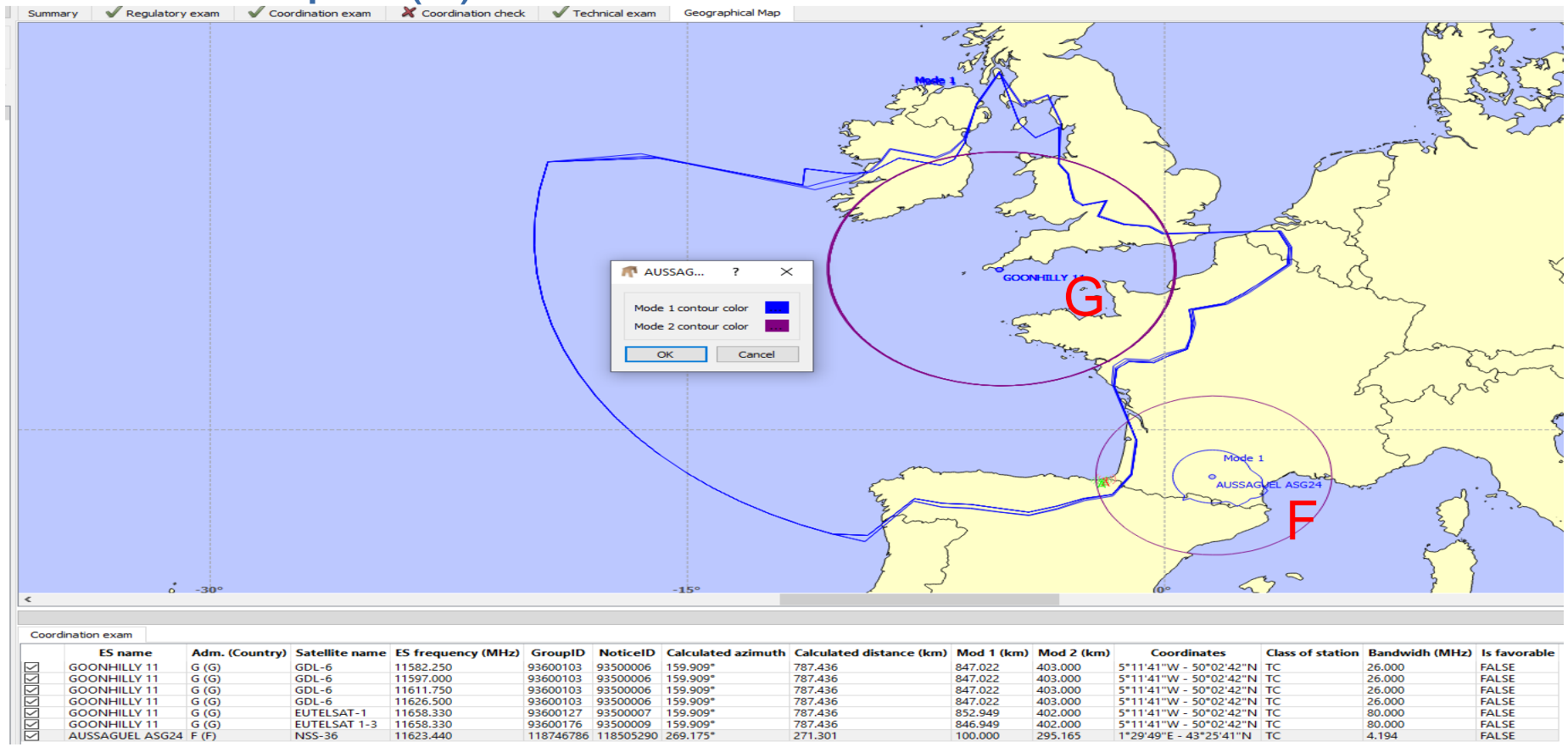
Administrations of UK and F were identified as affected.

✓ **6 earth stations of UK**

✓ **1 earth station of F**

Coordination under Nos. 9.16 & 9.18 (3)

➢Example (1)



Coordination exam

ES name	Adm. (Country)	Satellite name	ES frequency (MHz)	GroupID	NoticeID	Calculated azimuth	Calculated distance (km)	Mod 1 (km)	Mod 2 (km)	Coordinates	Class of station	Bandwidth (MHz)	Is favorable
GOONHILLY 11	G (G)	GDL-6	11582.250	93600103	93500006	159.909°	787.436	847.022	403.000	5°11'41"W - 50°02'42"N	TC	26.000	FALSE
GOONHILLY 11	G (G)	GDL-6	11597.000	93600103	93500006	159.909°	787.436	847.022	403.000	5°11'41"W - 50°02'42"N	TC	26.000	FALSE
GOONHILLY 11	G (G)	GDL-6	11611.750	93600103	93500006	159.909°	787.436	847.022	403.000	5°11'41"W - 50°02'42"N	TC	26.000	FALSE
GOONHILLY 11	G (G)	GDL-6	11626.500	93600103	93500006	159.909°	787.436	847.022	403.000	5°11'41"W - 50°02'42"N	TC	26.000	FALSE
GOONHILLY 11	G (G)	EUTELSAT-1	11658.330	93600127	93500007	159.909°	787.436	852.949	402.000	5°11'41"W - 50°02'42"N	TC	80.000	FALSE
GOONHILLY 11	G (G)	EUTELSAT 1-3	11658.330	93600176	93500009	159.909°	787.436	846.949	402.000	5°11'41"W - 50°02'42"N	TC	80.000	FALSE
AUSSAGUEL ASG24	F (F)	NSS-36	11623.440	118746786	118505290	269.175°	271.301	100.000	295.165	1°29'49"E - 43°25'41"N	TC	4.194	FALSE

SNS: https://www.itu.int/sns/database.html

https://www.itu.int/go/ITUSpaceExplorer

3.2 Coordination under No. 9.19 (1)

➢Coordination criteria (Appendix 5)

Reference of Article 9	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Remarks
No. **9.19** Terrestrial	11.7-12.7 GHz (see Article **6** of Appendix **30**) 12.5-12.75 GHz (terrestrial services in Nos. **5.494** and **5.496** as well as in Regions 2 and 3 in respect of BSS allocation in Region 3) 17.7-17.8 GHz (terrestrial services in all three Regions in respect of BSS allocation in Region 2)	i) Necessary bandwidths overlap; and ii) the power flux-density (pfd) of the interfering station at the edge of the BSS service area exceeds the permissible level	Check by using the assigned frequencies and bandwidths (See also Article 6 of Appendix **30**)

Coordination under No. 9.19 (2)

Coordination criteria (Appendix 5)

Reference of Article 9	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Remarks
No. **9.19** Terrestrial	1 452-1 492 MHz 2 310-2 360 MHz (terrestrial services in all three Regions in respect of BSS allocation in No. **5.393**) 2 520-2 670 MHz (see No. **5.416**) 40.5-42.5 GHz 74-76 GHz	i) Necessary bandwidths overlap; and ii) the power flux-density (pfd) of the interfering station at the edge of the BSS service area exceeds the permissible level	Check by using the assigned frequencies and bandwidths (See also RoP on No. **9.19**)

Coordination under No. 9.19 (3)

➢Rules of Procedure 9.19

- ✓ For transmitting IMT stations notified with nature of service "IM" in the frequency band 1 452-1 492 MHz, in Regions 1 and 3: frequency overlap and the power flux-density of −154 dB(W/(m^2 · 4 kHz)) at the edge of the service area of non-planned BSS, is calculated using Recommendation ITU-R P.452-16 for 20 % of time;

- ✓ For **all non-IMT stations in the frequency band 1 452-1 492 MHz**, as well as for transmitting terrestrial stations **in other non-planned BSS frequency bands**: frequency overlap and the distance from the location of the terrestrial station to the national border of any country included in the service area of the BSS assignment is **less than 1 200 km.**

Coordination under No. 9.19 (4)

➢Example 1

BR ID: 118010749
Administration: F
Administration's unique ID: 1085719
Fragment: NTFD_RR
Provision: RR11.2
Notice type: T11 / ADD
Date Rcv: 28 Feb 2018

Assigned frequency: 1485 MHz
Bandwidth: 1M00
Examination category: NBSS
Class of station: FX
Geographic area: GUF
Site name: REGINA5
Coordinates: 52°7'42"W - 4°32'2"N

Administration	Coordination provision(s)	Status(es)
B	RR9.19	COORD REQUIRED
GUY	RR9.19	COORD REQUIRED
SUR	RR9.19	COORD REQUIRED
TRD	RR9.19	COORD REQUIRED
VEN	RR9.19	COORD REQUIRED

Coordination under No. 9.19 (5)

- Non-Planned BSS exam is applicable.
  - ✓ Coordination distance: 1200 km.
  - ✓ The following Administrations of space networks are involved : ARS, HOL, ISR, JOR, LUX, MLA, S, UAE, USA.
  - ✓ The following Administrations of countries in the service areas are involved : B, GUY, SUR, TRD, VEN.

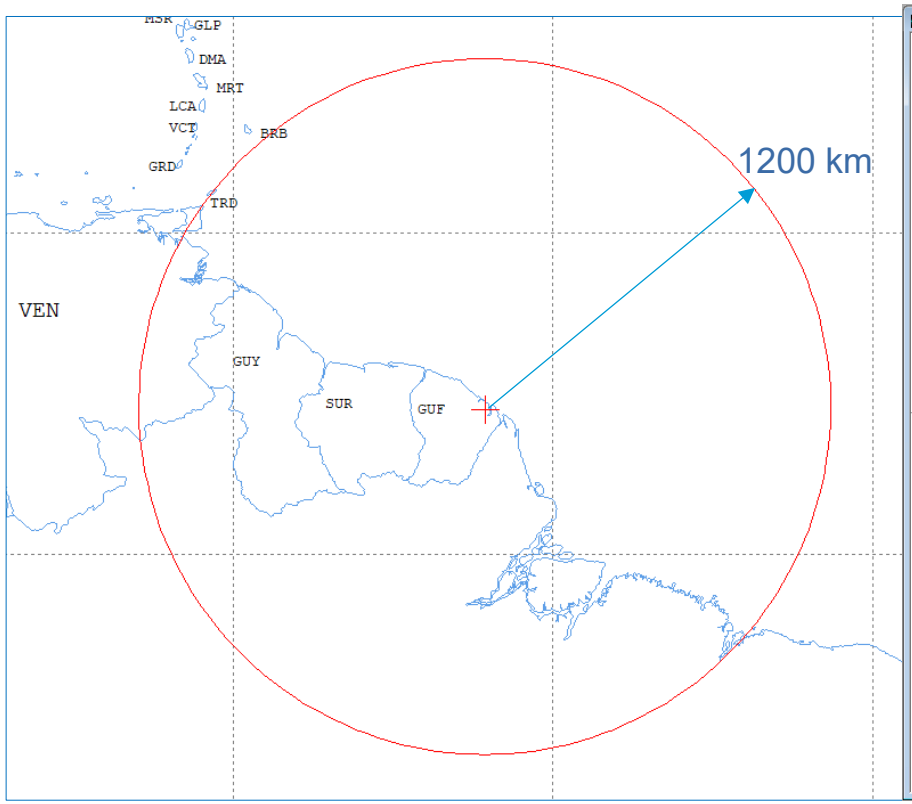
- The following BSS networks are involved.

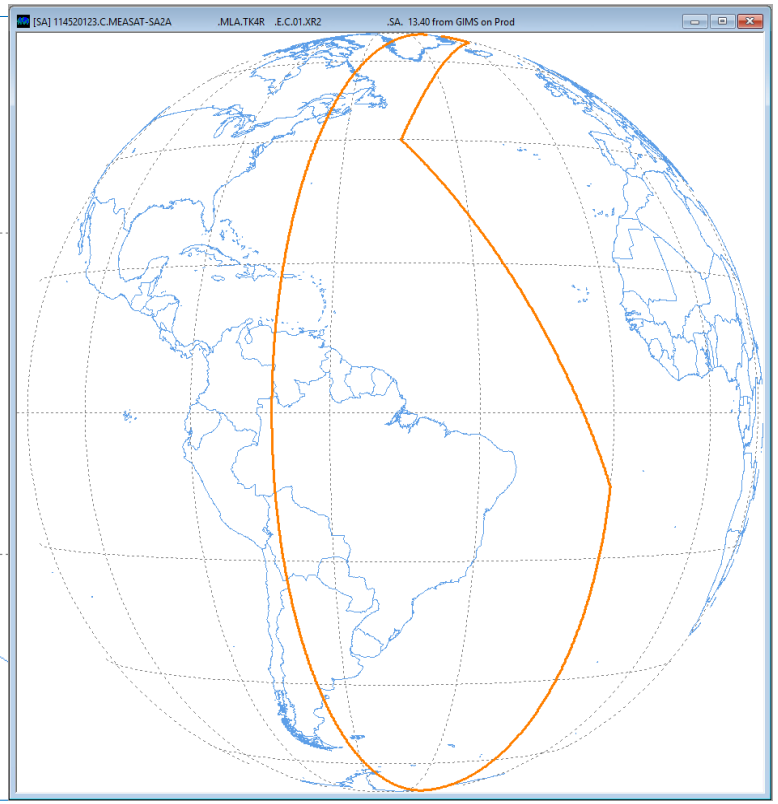
AFRIBSS	LUX-G12-1	MEASAT-SA2B
AMS-B7-13	LUX-G7	MEASAT-SA3C
ARABSAT-9L-1E	LUX-G9-10	MEASAT-SA4B
EMARSAT-12F	LUX-G9-37	MEASAT-SA4C
FUTURA-4	LUX-G9-38	NSS-G5-13
JORSAT-11E	LUX-G9-42	NSS-G6-10
LUX-G10-5	LUX-G9-49	NSS-G6-14
LUX-G10-7	LUX-G9-5	NSS-G6-7
LUX-G10-8	LUX-G9-6	NSS-G7
LUX-G11-2	LUX-G9-7	NSS-G7-131W
LUX-G11-49	LUX-G9-8	NSS-G7-50
LUX-G11-5	LUX-G9-9	NSS-G7-83W
LUX-G11-7	MEASAT-LA1B	NSS-G8-137W
LUX-G11-8	MEASAT-SA2A	SIRIUS-5E-8

Coordination under No. 9.19 (6)

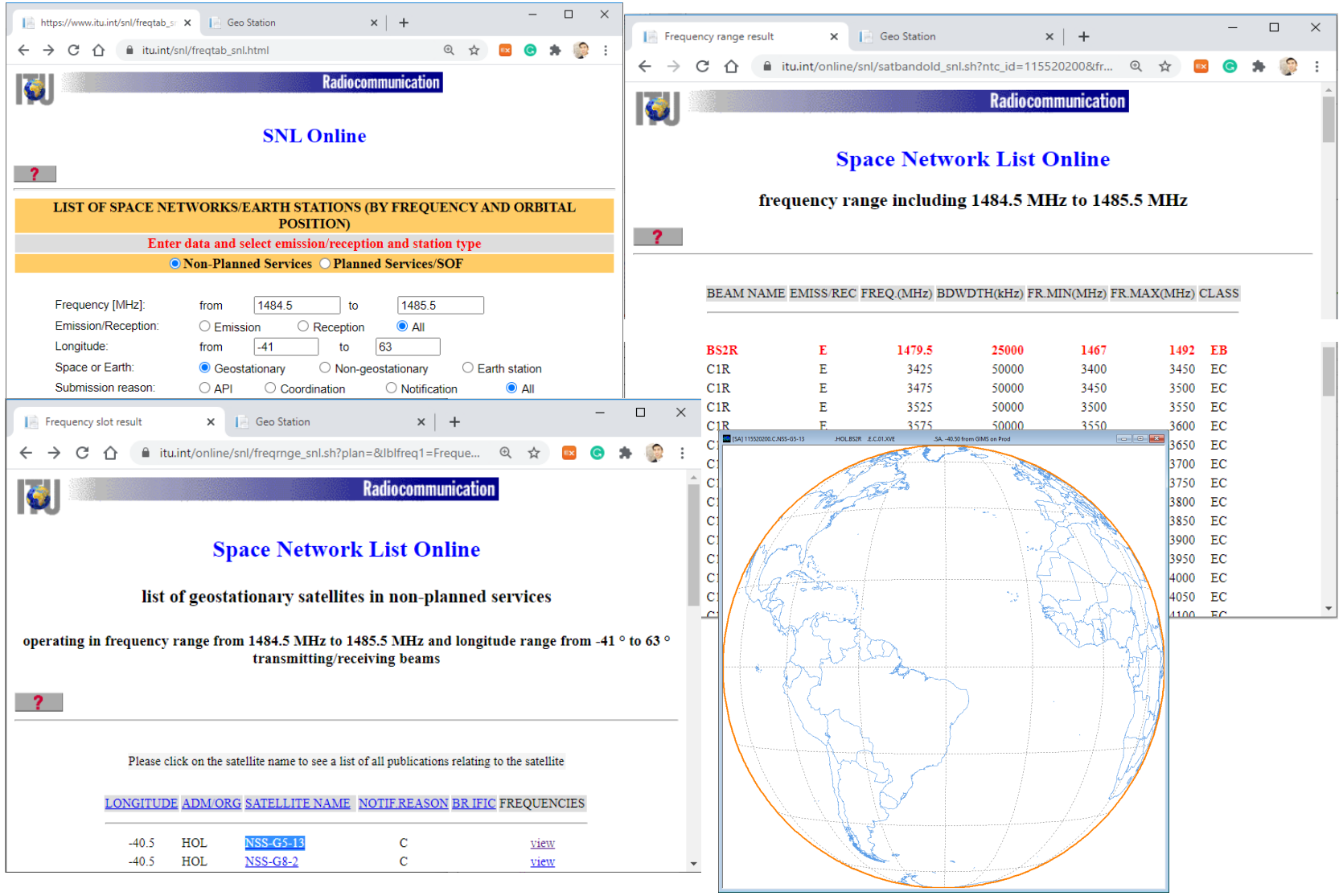
- Example 1
  - ✓ Coord area

- Service area of MEASAT-SA2B





Coordination under No. 9.19 (7)



https://www.itu.int/snl/freqtab_snl.html

2.5 Mandatory coordination under other provisions (1)

- Coordination required by some WRC Resolutions
  - ✓ e.g. Resolution 612 (Rev.WRC-12) as well as Resolution 150 (WRC-12), Resolution 221 (Rev.WRC-23) and Resolution 168 (Rev.WRC-23) governing HIBS, HAPS.

2. 4 Mandatory coordination under other provisions (2)

➢Coordination criteria (Res. **612 (Rev.WRC-12)**)

Reference	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition
No. **5.132A** No. **5.145A** No. **5.161A** Res. **612 (Rev. WRC-12)**	4 438-4 488 kHz 5 250-5 275 kHz 9 305-9 355 kHz (R1, R3) 13 450-13 550 kHz 16 100-16 200 kHz 24 450-24 600 kHz (R1, R3) 24 450-24 650 kHz (R2) 26 200-26 350 kHz (R1, R3) 26 200-26 420 kHz (R2) 39-39.5 MHz (R1) 39.5-40 MHz (R3) 41.015-41.665, 43.35-44 MHz (No. **5.161A**) 42-42.5 MHz (R1)	*resolves 6* of Resolution **612 (Rev. WRC-12) -** that the separation distances between an oceanographic radar and the border of other countries shall be greater than the distances specified in the following table, unless prior explicit agreements from affected administrations are obtained

2. 4 Mandatory coordination under other provisions (3)

➢Coordination criteria (Res. 612 – *resolves 6*)

Frequency (MHz)	Land path (km)		Sea or mixed path (km)	
	Rural	Quiet rural	Rural	Quiet rural
5 (± 1 MHz)	120	170	790	920
9 (± 1 MHz)	100	130	590	670
13 (± 1 MHz)	100	110	480	520
16 (± 1 MHz)	80	100	390	450
25 (± 3 MHz)	80	100	280	320
42 (± 3 MHz)	80	100	200	230

✓ RoP **5.312A, 5.145A** and **5.161A**:

- As the Bureau has no means for the identification of rural or quiet rural areas, the Board decided that for examination of the notified frequency assignment to a station in the radiolocation service from the view point of its conformity with *resolves* 6 of Resolution **612** (Rev.WRC-12) **the Bureau shall use the separation distances for quiet rural paths listed in Columns 3 and 5, as appropriate, of the Table of *resolves* 6.**

2. 4 Mandatory coordination under other provisions (4)

➢ Coordination criteria (Footnote for HIBS)

Reference	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition
Resolution **221 (Rev.WRC-23)** (No. **5.388A**)	1 710-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz (Regions 1 and 3) 1 710-1 980 MHz and 2 110-2 160 MHz (Region 2) 1710-1 785 MHz in Regions 1 and 2, and 1 710-1 815 MHz in Region 3: ground-to- HIBS direction 2 110-2 170 MHz: HIBS-to-ground direction	HIBS operating in the frequency band **1 780-1 850 MHz** within **1 135 km** of the border of the territory of other administrations **shall obtain agreement** with all affected administrations **prior to implementation of HIBS** unless otherwise agreed between the administrations concerned; this condition **does not** apply in the countries within the African Broadcasting Area, as described in Nos. **5.10**, **5.11**, **5.12** and **5.13**, and Algeria, Egypt, Libya and Morocco in Region 1, per *Resolves* 1.7 of Resolution **221 (Rev.WRC-23)**

2. 4 Mandatory coordination under other provisions (5)

➢ Coordination criteria (Resolutions for HAPS)

Footnote	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition
Resolution **150 (WRC-12)** (No. **5.457**)	6 440-6 520 MHz (HAPS-to-ground direction) and 6 560-6 640 MHz (ground-to-HAPS direction)	The use of HAPS gateway links in these bands requires explicit agreement with other administrations whose territories are located **within 1 000 km** from the border of an administration intending to use the HAPS gateway links as defined in No.**5.457**. Resolution **150 (WRC-12)**
Resolution **168 (Rev.WRC-23)** (No. **5.550D**)	38-39.5 GHz	*Resolves* 6 and 8 of Resolution **168 (Rev.WRC-23)**

4. Voluntary Coordination of FXM assignments (1)

- When to coordinate?
  - ✓ Foreseen received interference > Permissible interference
- Initiation of the coordination
  - ✓ planning
  - ✓ operating
- General procedure
  - ✓ 1st stage: Coordination between operators
  - ✓ 2nd stage: Coordination between administrations
  - ✓ 3rd stage: Coordination with BR's assistance

Voluntary Coordination of FXM assignments (2)

- Generic coordination criteria (e.g. IMT-2000 base station)

Item	Formular	1800 MHz band	900 MHz band
Bandwidth (B)		5 MHz	
Temperature (K)		290	
Boltzmann Coefficient (k)		1.38 x 10^{-23}	
Noise temp. (No)	=10 log(kTB)	-137 dBW	
Noise figure (Nf)		5 dB	
Protect. criteria (I/N)		-6 dB	
Permissible interference (Ip)	= No+Nf+I/N	-138 dBW	
Permissible field stren. (Ep)	= Ip+20*log(f)+77.2	34.3 dBµV/m	28.3 dBµV/m

- ✓ IMT-2000 receiving base station (UTRA FDD Macro) according to ITU-R M.2039

Voluntary Coordination of FXM assignments (3)

- What to include in a special agreement?
  - ✓ **Frequency range and frequency categories** defined when coordinating or planning (e.g. channeling arrangement)
  - ✓ **Radiocommunication services and systems** concerned, e.g. fixed or mobile service
  - ✓ **Permissible interference level**
    - Open called as **coordination triggering level**, e.g. Etrigger, pfd
    - Usually decided based on internationally, regionally, bi-directionally **agreed documents** (RR, ITU-R Recommendations, regional standard documents)
  - ✓ **Propagation model and interference calculation method** (to be used in the planning stage), e.g. ITU-R P.525, ITU-R P.1546, ITU-R P.452, etc. agreed between the countries concerned

Voluntary Coordination of FXM assignments (4)

- What to include in a special agreement?
  - ✓ Coordination **procedure method** (preferential frequencies, channeling separations, protection at the border, protection of specific stations)
  - ✓ **Exchange of** appropriate spectrum management **information**
  - ✓ **Measurement method** (to be used in the operation stage)
  - ✓ A means of resolving instances of **unexpected harmful interference**
    - Contact points in Administrations
    - Contact points in Operators
    - Time limit for reporting/resolving the instances
  - ✓ Others agreed

5. Conclusions

- The radio **signal spillover** is unavoidable.
- **Mandatory** (Article **9**, Plans, Resolutions or Article 5) or **Voluntary** (Article **6** special agreement applies) coordination are required.
- The best solution is to **have an agreement on channeling arrangement** between the administrations concerned.
- For frequencies not having channeling arrangements the practical solution is to coordinate between administrations taking into account **the agreed criteria and methods**.
- In accordance with No. **6.7** of Article **6** (special agreement) of Radio Regulations, if two or more Member States coordinate the use of individual frequencies in any of the frequency bands covered by Article **5**, before notifying the frequency assignments concerned, **they shall in all appropriate cases inform the Bureau of such coordination**.

Thank you!

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Questions to brmail@itu.int or brfmd@itu.int

ITU-R references for voluntary coordination

- Rules of Procedure, Part B4 – coordination distances for protection of FS/MS vs. FS/MS in the bands 9kHz-28000kHz
- ITU-R Handbook on Guidance for bilateral/multilateral discussions on the use of frequency range 1 350 MHz – 43.5 GHz by fixed service systems
- Rec. ITU-R SM.1049 A method of spectrum management to be used for aiding frequency assignment for terrestrial services in border area
- Rec. ITU-R SM.1132 General principles and methods for sharing between radiocommunication services or between radio stations