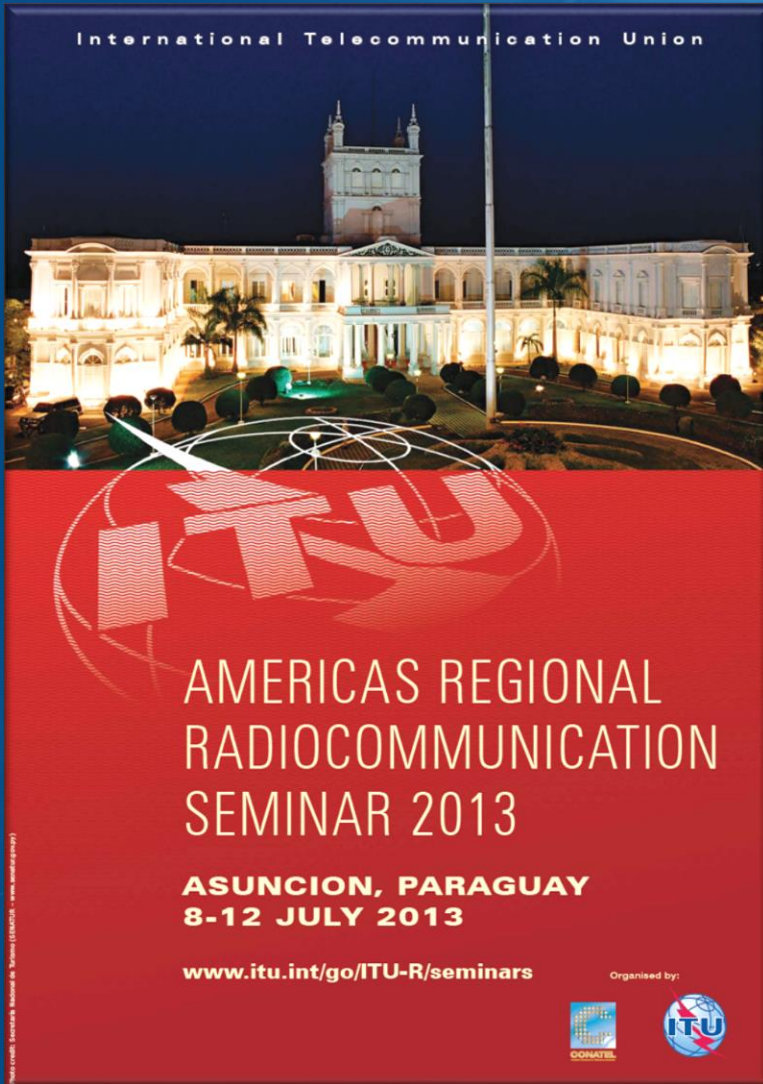


International Telecommunication Union





**AMERICAS REGIONAL  
RADIOCOMMUNICATION  
SEMINAR 2013**

**ASUNCION, PARAGUAY  
8-12 JULY 2013**

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Organised by:



# RJ81 and RJ88 Terrestrial Broadcasting Plans

Miroslav Cosic – BR/IAP/TAS

# Agenda



- Overview of bands allocated to terrestrial broadcasting in the MF bands in Region 2
- RJ81 Broadcasting Agreement and Plan
- RJ88 Broadcasting Agreement and Plan
- Open issues and future developments

# MF Bands Allocated to Broadcasting

Table of  
Frequency  
Allocations  
(RR 5)



Allocation to services
<b>Region 2</b>
<b>525-535</b> BROADCASTING 5.86 AERONAUTICAL RADIONAVIGATION
<b>535-1 605</b> BROADCASTING
<b>1 605-1 625</b> BROADCASTING 5.89 5.90
<b>1 625-1 705</b> FIXED MOBILE BROADCASTING 5.89 Radiolocation 5.90

Broadcasting limited to  
low power stations:  
- max. 1 kW daytime  
- max. 250 W nighttime  
(RR 5.86)

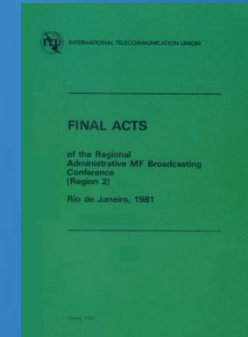
# MF Bands Allocated to Broadcasting (cont'd)



Table of  
Frequency  
Allocations  
(RR 5)



Allocation to services
<b>Region 2</b>
<b>525-535</b> BROADCASTING 5.86 AERONAUTICAL RADIONAVIGATION
<b>535-1 605</b> BROADCASTING
<b>1 605-1 625</b> BROADCASTING 5.89 5.90
<b>1 625-1 705</b> FIXED MOBILE BROADCASTING 5.89 Radiolocation 5.90



Band governed  
by the RJ81  
Agreement

# MF Bands Allocated to Broadcasting (cont'd)



Table of  
Frequency  
Allocations  
(RR 5)



Allocation to services
<b>Region 2</b>
<b>525-535</b> BROADCASTING 5.86 AERONAUTICAL RADIONAVIGATION
<b>535-1 605</b> BROADCASTING
<b>1 605-1 625</b> BROADCASTING 5.89 5.90
<b>1 625-1 705</b> FIXED MOBILE BROADCASTING 5.89 Radiolocation 5.90

## FINAL ACTS

of the Regional Administrative  
Radio Conference to Establish  
a Plan for the Broadcasting Service  
in the Band 1 605 - 1 705 kHz in Region 2  
Rio de Janeiro, 1988

Bands governed  
by the RJ88  
Agreement  
(RR 5.89)

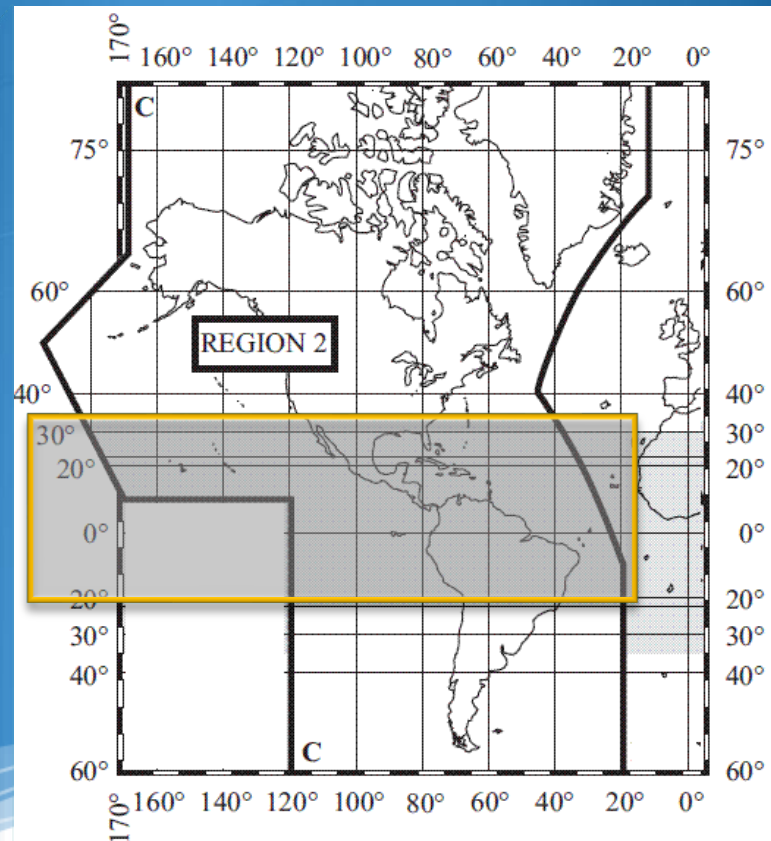
# MF Bands Allocated to Broadcasting (cont'd)



Allocation to services
<b>Region 2</b>
2 300-2 495
FIXED
MOBILE
BROADCASTING 5.113

Broadcasting in this band is restricted to the Tropical Zone, and station power is limited to max. 50 kW (RR 5.113, RR 23.5 – RR 23.10)

Table of  
Frequency  
Allocations  
(RR 5)



# RJ81 Agreement and Plan

- RJ81 is an assignment Plan (frequency channel is assigned to a station in given location)
- Plan characteristics:

Band limits	535 – 1605 kHz	
Carrier frequencies	540, 550 ... 1600 kHz 10 kHz channel spacing (up to 20 kHz is possible) 107 channels	
Class of emission	A3E: double-sideband Amplitude Modulation with full carrier	
Protection ratio	co-channel	26 dB
	1st adjacent channel	0 dB
	2nd adjacent channel	-29.5 dB

- Three classes of stations:

Class	Coverage	Power limit
A	Extensive primary (ground-wave) and secondary (sky-wave) service area	100 kW (Day) 50 kW (Night)
B	Covers rural areas in its primary service area	50 kW (Day/Night)
C	Covers a city or town and contiguous suburban areas in its primary service area	1 kW (Day in Noise Zone 1) 5 kW (Day in Noise Zone 2) 1 kW (Night)

# RJ81 Agreement and Plan (cont'd)



## References for planning and technical examination:

<b>Eu (Nominal usable field strength)</b>	Value of the minimum field strength to provide satisfactory reception
<b>Protected contour</b>	Set of points around a station where the ground- or sky-wave field strength = Eu
<b>Protected value</b>	Field strength value at a given point on the protected contour not to be exceeded by the interference (otherwise, objectionable interference occurs and protected assignment is considered to be affected)

## Statistics of Special Sections and the RJ81 Plan:

Special Section Number	BR IFIC	Date of Publication	Number of Notices in Part A	Number of Notices in Part B
RJ81/88	2721	12.06.2012	-	504
RJ81/87	2698	12.07.2011	508	20
RJ81/86	2697	28.06.2011	-	158
RJ81/85	2684	14.12.2010	158	-
RJ81/84	2682	16.11.2010	-	19
RJ81/83	2675	10.08.2010	19	11

	Original Plan	Current Status
<b>Daytime Operations</b>	11347	12264
<b>Nighttime Operations</b>	8875	9905
<b>Total</b>	<b>20222</b>	<b>22169</b>



# RJ81 Agreement and Plan (cont'd)

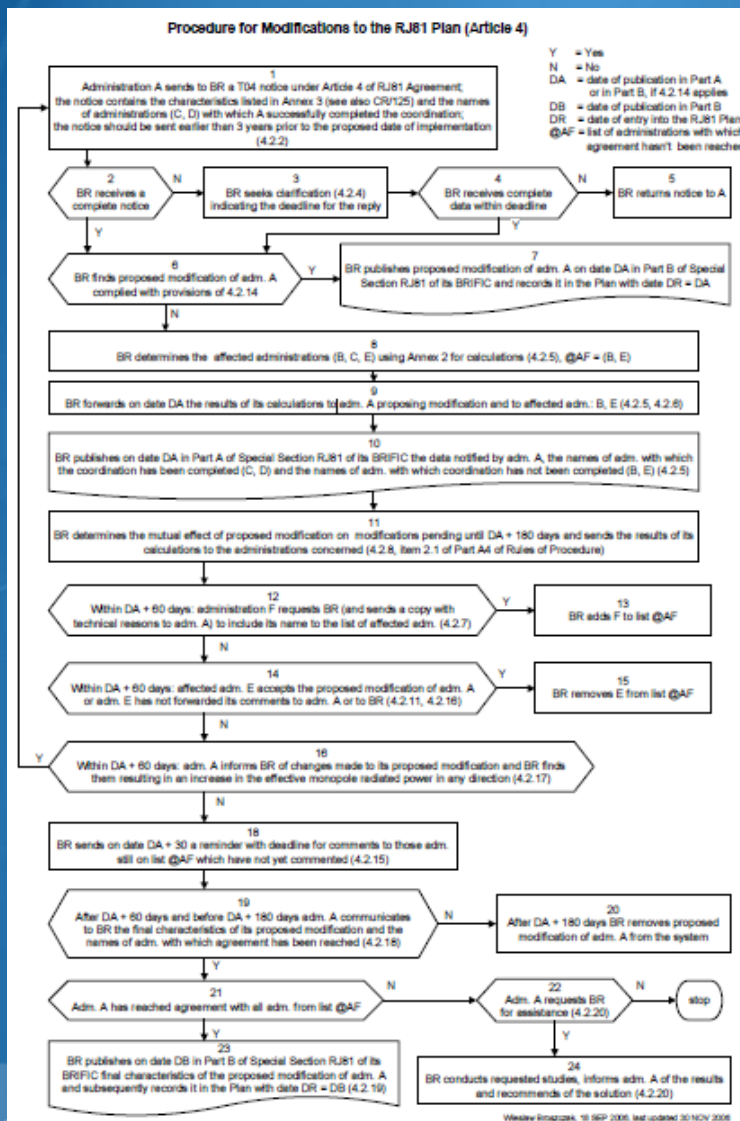


- Modification to the RJ81 Plan (regular procedure):
  1. Publication in Part A of Special Section RJ81:
    - Complete notified data and list of coordinated administrations
    - List of administrations considered to be affected
    - Expiry date for comments (no comment => agreement)
  2. If there are assignments already published in Part A and pending for less than 180 days, their mutual effect with respect to new proposed modifications is examined and the results communicated (i.e. the effect of a modification pending for more than 180 days is not considered)
  3. After the date for comments has passed, and if there are no objections, the administration may request publication of the notice in Part B of Special Section RJ81 (equivalent to entry into the Plan)
  4. If Plan assignments are not brought into service within five years of their entry into the Plan => cancellation  
(4.6 + Rule of Procedure)

# RJ81 Agreement and Plan (cont'd)



[http://www.itu.int/ITU-R/terrestrial/broadcast/plans/rj81/flowchartsrj81/RJ81\\_Art4.pdf](http://www.itu.int/ITU-R/terrestrial/broadcast/plans/rj81/flowchartsrj81/RJ81_Art4.pdf)



# RJ81 Agreement and Plan (cont'd)



- Modification to the RJ81 Plan (short procedure):
  - No agreement is required (4.2.14) for the modification of an existing Plan entry:
    - No change in frequency
    - No increase in radiation in any direction
    - Site change  $< 3$  km or  $< 5\%$  of the distance to nearest border (max. 10 km)
    - No ground-wave contour overlap

# RJ81 Agreement and Plan (cont'd)



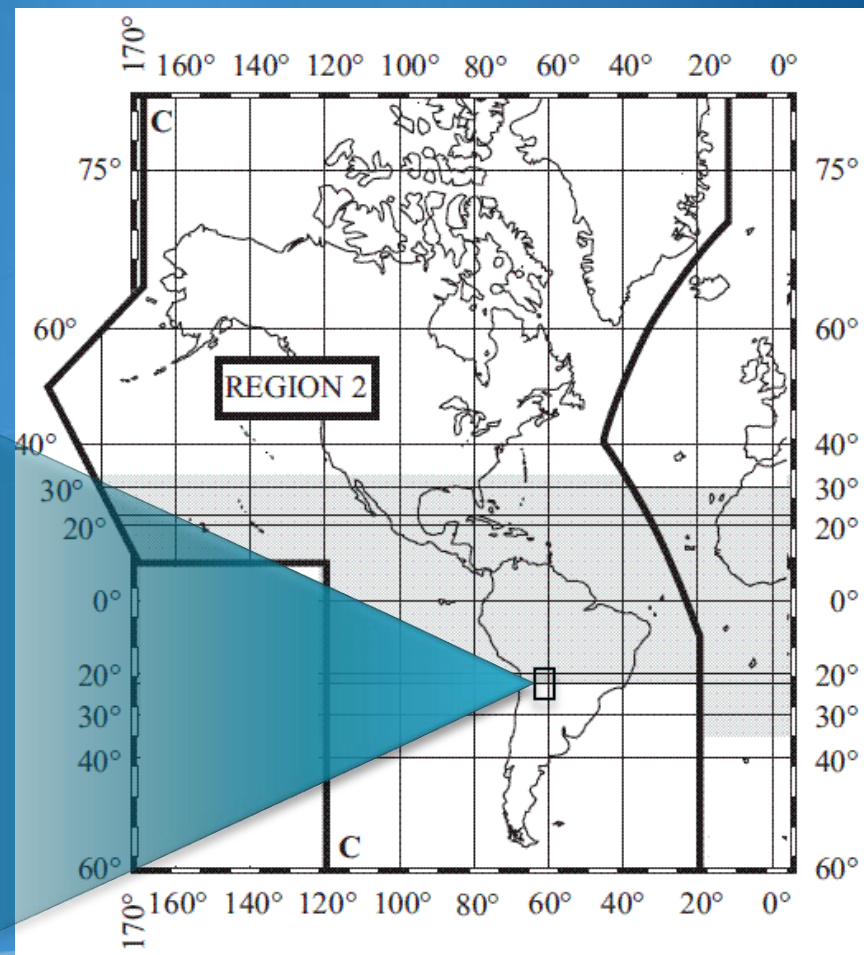
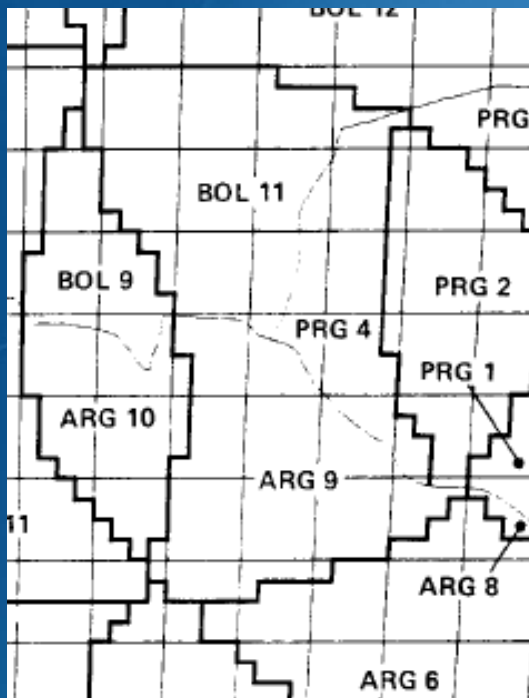
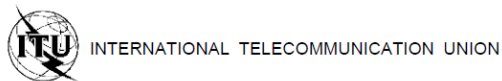
- Notification of an assignment to the MIFR:
  1. BR publishes notified assignment in Part I of the BR IFIC
  2. BR examines the assignment for conformity to the corresponding entry in the RJ81 Plan
  3. If assignment is in CONFORMITY with the RJ81 Plan, the BR:
    - Publishes the notice in Part II of the BRIFIC
    - Records it in the MIFR with date of recognition equal to the date of receipt of complete notification
  
- Otherwise, the BR:
  - Publishes the notice in Part III of the BR IFIC
  - Returns the notice to the administration

# RJ88 Agreement and Plan



## FINAL ACTS

of the Regional Administrative  
Radio Conference to Establish  
a Plan for the Broadcasting Service  
in the Band 1 605 - 1 705 kHz in Region 2  
Rio de Janeiro, 1988



# RJ88 Agreement and Plan (cont'd)

- RJ88 is an allotment Plan (frequency channels are allotted to a given allotment area)
- Plan characteristics:

Band limits	1605 - 1705 kHz	
Carrier frequencies	1610, 1620,... 1700 kHz 10 kHz channel spacing (up to 20 kHz is possible) 10 channels	
Class of emission	A3E: double-sideband Amplitude Modulation with full carrier (Other classes are allowed conditionally)	
Protection ratio	co-channel	26 dB
	1st adjacent channel	0 dB
	2nd adjacent channel	-29.5 dB

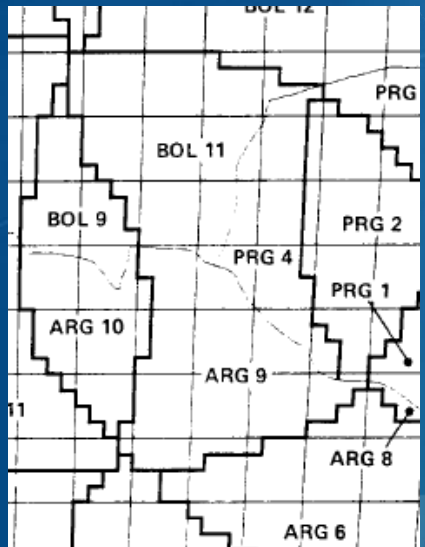
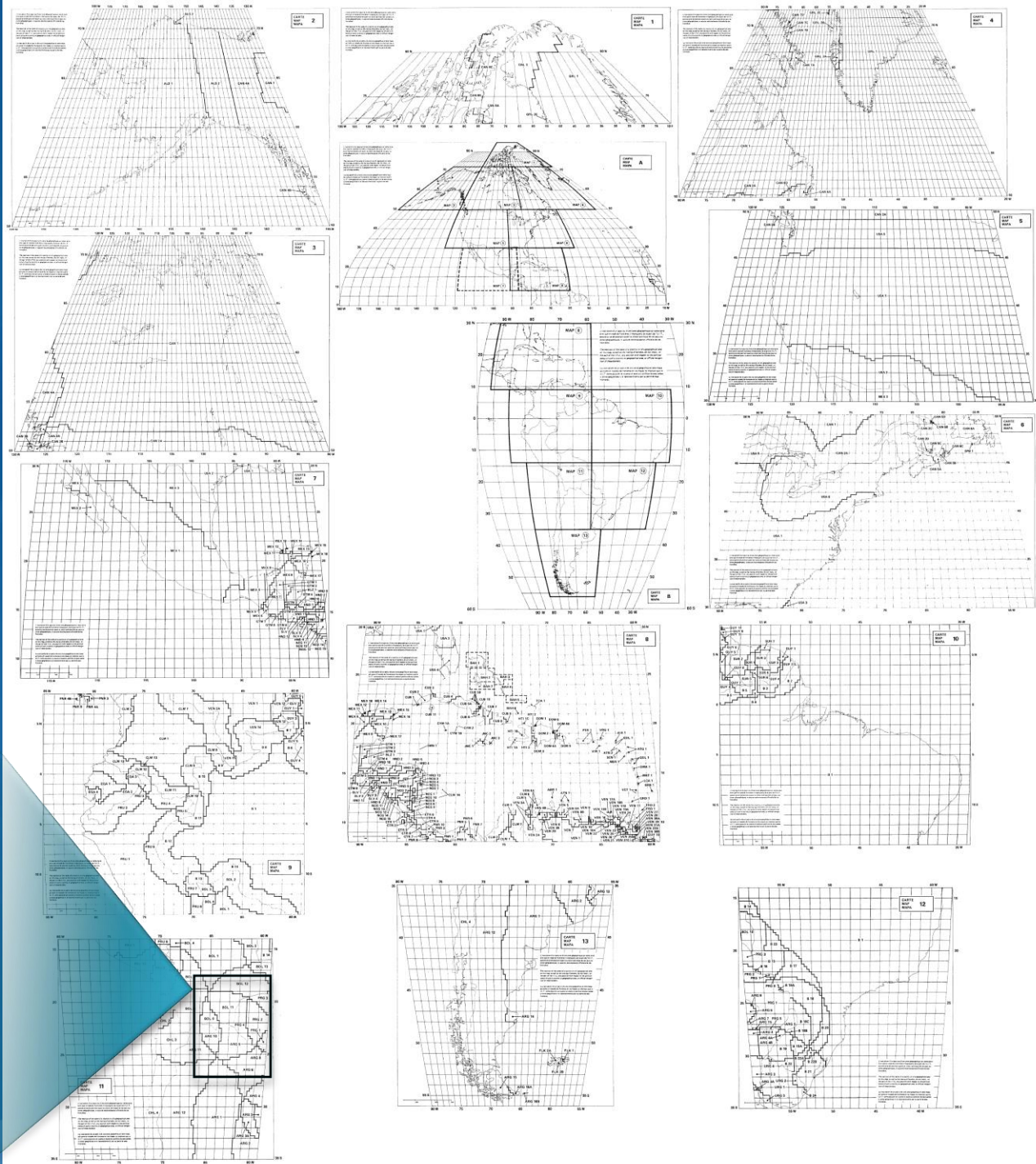
- Normalized station characteristics:

Eu (Nominal usable field strength)	310 mV/m at 1 km
Antenna height	Lambda/4 = 90 deg.
Power	1 kW

- Max. possible power: 10 kW

There has never been a request to modify the Plan under Article 4

The Plan is still as contained in Annex 4 of the Final Acts of the RJ88 Agreement



# RJ88 Agreement and Plan (cont'd)



- Col. No. 1: *Allotment Area* : This column contains the symbol designating the country or the geographical area using symbols indicated in Table B1 of the Preface to the International Frequency List followed by the symbol number designating the allotment area given in Part B.
- Col. No. 2: *Allotment(s)* : This column contains the channel number(s) (see Table 1 showing channel number and corresponding frequencies to be assigned), which may be used for one or more assignments in the allotment area.
- Col. No. 3: *Remarks*.

(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
PRG 4	1		PRU 8	4		SUR 3	6	3/ F
PRG 4	2		PRU 8	5		SUR 4	4	
PRG 4	4		PRU 8	6		SUR 4	5	
PRG 4	5		PRU 9	2		SUR 4	6	3/ F
PRG 5	4		PRU 9	3		SUR 5	4	
PRG 5	5		PRU 9	4		SUR 5	5	
PRG 6	3		PRU 9	5		SUR 5	6	
PRG 6	4		PRU 10	2		SUR 6	4	
PRG 6	5		PRU 10	3		SUR 6	5	
PRG 6	9		PRU 10	4		SUR 6	6	
PRG 6	10		PRU 10	5		SUR 6	7	
PRG 7	3		PRU 10	7		SUR 6	8	3/ B
PRG 7	4		PRU 10	8		SUR 6	10	3/ B

1/: The use of this allotment is subject to the agreement of the administrations listed in this remark. However, such agreement is not required when the allotment is used with lower radiated power in the direction of the allotment area concerned, in such a way that the limits specified in Section 3 of Annex 2 are met.

2/: The use of this allotment beyond 17.5 km from the border concerned with the administration listed in the Remarks column does not require the agreement of the listed administration.

3/: The use of this allotment is not subject to first adjacent channel coordination with the administration listed in the Remarks column.



# RJ88 Agreement and Plan (cont'd)

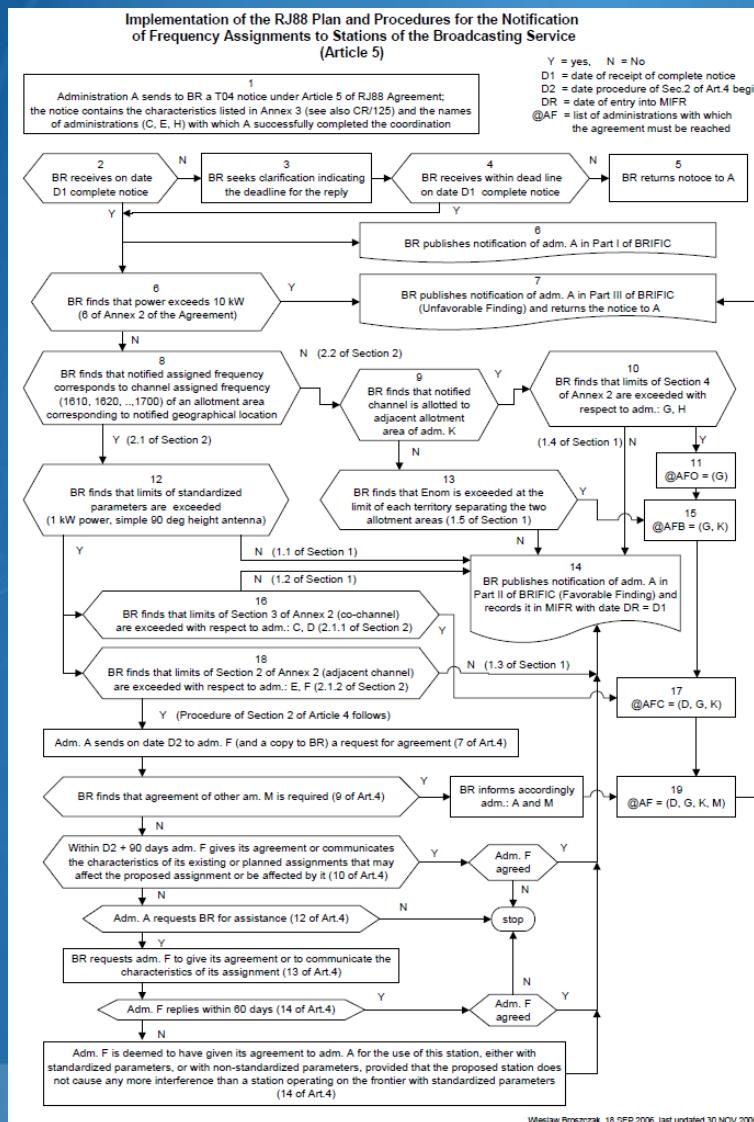


- Notification of an assignment to the MIFR:
  1. BR publishes notified assignment in Part I of the BR IFIC
  2. BR examines the assignment for conformity to the corresponding allotment in the RJ88 Plan
  3. If assignment is in CONFORMITY with the RJ88 Plan, the BR:
    - Publishes the notice in Part II of the BRIFIC
    - Records it in the MIFR with date of recognition equal to the date of receipt of complete notification
  
- Otherwise, the BR:
  - Publishes the notice in Part III of the BR IFIC
  - Returns the notice to the administration

# RJ88 Agreement and Plan (cont'd)



[http://www.itu.int/ITU-R/terrestrial/broadcast/plans/rj88/flowchartsrj88/RJ88\\_Art5.pdf](http://www.itu.int/ITU-R/terrestrial/broadcast/plans/rj88/flowchartsrj88/RJ88_Art5.pdf)



# RJ88 Agreement and Plan (cont'd)



- In Region 2, frequency band 1625 – 1705 kHz is also allocated on a primary basis to FIXED and MOBILE services
- Notification and use of fixed and mobile services in this shared band must take into account allotments and assignments to the broadcasting service
- Applicable regulations:
  - Article 7 and Resolution 1 of RJ88 Agreement
  - Part A7 of Rules of Procedure

# RJ88 Agreement and Plan (cont'd)



- Since the entry into force of the RJ88 Agreement, two administrations (Paraguay and USA) have notified a total of 84 broadcasting assignments for recording in the MIFR under Art. 5

# Open Issues and Future Developments



- RJ81 List B
- Introduction of digital modulation
- Update and review of RJ81 and RJ88

- The RJ81 Plan consists of two separate lists (see Resolution 2 of the Agreement):
  - List A: includes only the assignments whose caused and received interference are both accepted
  - List B: includes all the assignments which are not included in List A
- Resolution 2 “strongly urges administrations whose stations appear in List B to make every effort to resolve the incompatibilities relating to their stations as quickly as possible”

## RJ81 List B (cont'd)

- At the end of the conference there were a total of 1203 entries in List B (day-time + night-time)
- As of July 2013, there are still 912 entries (177 daytime and 735 night-time) in List B
- Assignments can be moved from List B to List A following the procedure in Annex 2 to Res. 2 (see also Rules of Procedure Part A4)
- Upon request, the BR could develop a software tool to display caused and received interference for entries in List B

# Introduction of Digital Modulation

- ITU-R Question 60/6 “Digital broadcasting at frequencies below 30 MHz” (1995-1999)
- ITU-R Recommendation BS.1514-2 (2001-2011)
  - Digital Radio Mondiale (DRM)
  - In-band on-channel digital sound broadcasting (IBOC DSB)
- Other relevant recommendations:
  - ITU-R P.1321-2 (1997-2009) – Propagation factors affecting systems using digital modulation at LF and MF
  - ITU-R BS.1615-1 (2003-2011) – Planning parameters for digital sound broadcasting below 30 MHz



# Introduction of Digital Modulation (cont'd)



- BR Circular Letter CCRR/20 (2002):
  - Analyzing whether RJ81 and RJ88 allow for digital modulation:
  - RJ81:
    - Rule of procedure not possible; new conference is needed
  - RJ88:
    - DRM: Mode A3 or B3 may be implemented if conditions of Annex 2 are satisfied
    - IBOC DSB (hybrid or full digital): Rule of procedure may be possible after completion of studies on protection ratios

# Introduction of Digital Modulation (cont'd)



- ITU-R Question 120/6 (2006): “What are the necessary technical conditions which would allow the introduction of digitally modulated emissions in the RJ81 Agreement?”
- ITU-R Report BS.2144 (2009): Planning parameters and coverage for Digital Radio Mondiale (DRM) broadcasting at frequencies below 30 MHz
  - Reconfirming the conclusions of CCRR/20

# Introduction of Digital Modulation (cont'd)



- Study Group 6 Working Party 6A (Nov 2012):
  - Rapporteur group on developing a united recommendation for digital terrestrial broadcasting
- Study Group 6 Working Party 6A (Apr 2013):
  - Rapporteur group to study digital sound broadcasting systems, implementation cases, and transition policies
  - Working document towards a preliminary draft new report on digital terrestrial broadcasting systems

# Update and Review of RJ81 and RJ88



- CITEEL Permanent Consultative Committee II: Radiocommunications including Broadcasting
  - Working Group on Broadcasting is tasked with discussing the update and review of the RJ81 and RJ88 agreements

# Update and Review of RJ81 and RJ88 (cont'd)



- August 2012 meeting: PCC.II adopted RES. 83 (XIX-12):
  - Establish rapporteurship on updating and revision of RJ81 and RJ88, to allow for gradual transition from analogue to digital
  - Send questionnaire to administrations: calculation criteria, updated maps of ground conductivity, software, proposals
  - Request technical assistance from Terrestrial Services Department of the BR

# Update and Review of RJ81 and RJ88 (cont'd)



- April 2013 meeting: PCC.II decided to:
  - Ask administrations to complete the questionnaire from RES. 83 (XIX-12) by end of August 2013
  - Include additional questions:
    - Practical problems with enforcing RJ81 and RJ88 agreements
    - Priorities for the update and review from each administration's point of view
  - Ask rapporteurship to prepare a report to enable the Working Group to “consider the possible preparation of an action plan”

# Update and Review of RJ81 and RJ88 (cont'd)



- Administrations that have replied to the first questionnaire (as of April 2013) are:
  - Argentina, Brazil, Canada, Chile, Colombia, Dominican Republic, Ecuador, Mexico and Paraguay
- Next meeting of PCC.II: November 4 – 8, 2013
  - Expecting a report from the rapporteurship
  - To be used as a basis for a document to be submitted to ITU-R Study Group 6 with a formal request for support in resolving issues related to updating and reviewing RJ81 and RJ88

# Final Remarks

- MF broadcasting in Region 2 is mostly governed by two regional agreements and plans: RJ81 and RJ88
- In the case of RJ81 (10 times as many channels and 10 times greater max. transmitter powers than RJ88) it is not possible to implement digital broadcasting without revising the agreement
- Activities are on-going:
  - ITU-R Study Group 6 Working Party 6A: introducing digital modulation for broadcasting in the MF bands
  - CITELE PCC.II Working Group on Broadcasting: updating and revising the two Agreements and Plans, to enable a gradual transition to digital broadcasting
- Administrations are strongly encouraged to participate actively in these groups
- The BR is ready to offer assistance in this process, including developing software tools





Thank you