

# ITU Regional Agreements and Radio Regulations that govern terrestrial services (other than BS)

## ITU-D Regional Development Forum for the Arab Region: "Access to spectrum, including broadcasting services – trends and technologies"

(Tunis, 1-3 June 2009)



David Botha  
BR/TSD/BCD



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## RR and Agreements that govern OPS

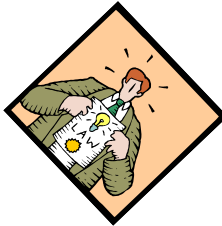
### Overview

- Coordination procedures in the RR
- Plans that govern OPS
- OPS (GE06L) in GE06 Agreement

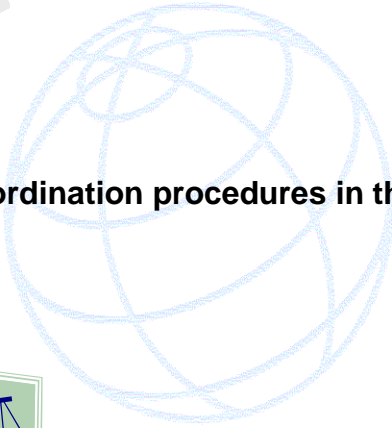


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RR and Agreements that govern OPS

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Coordination procedures in the RR

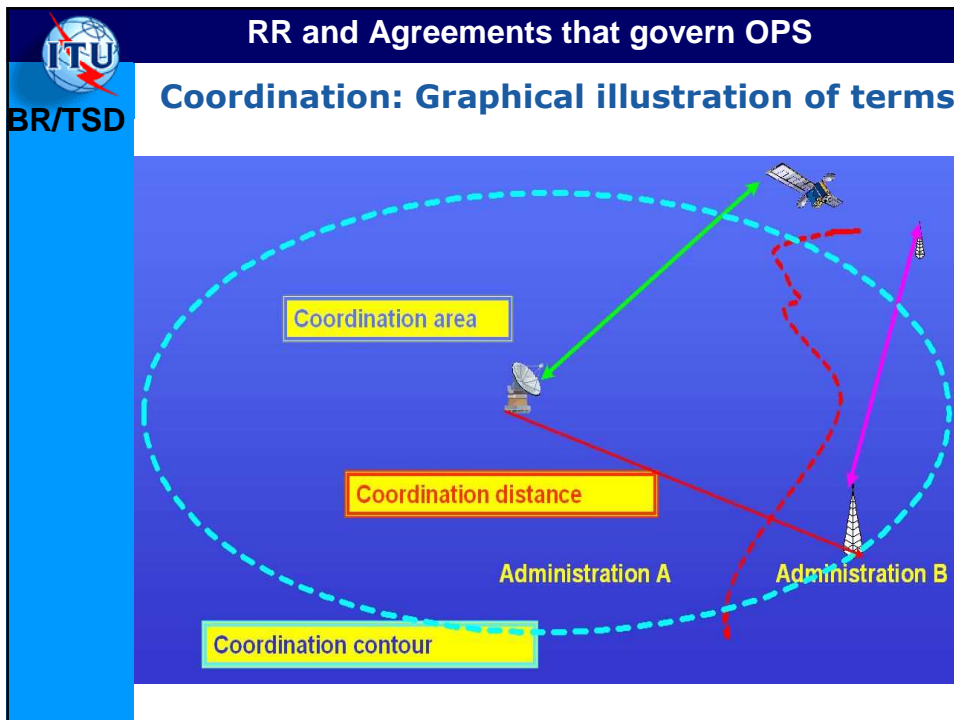




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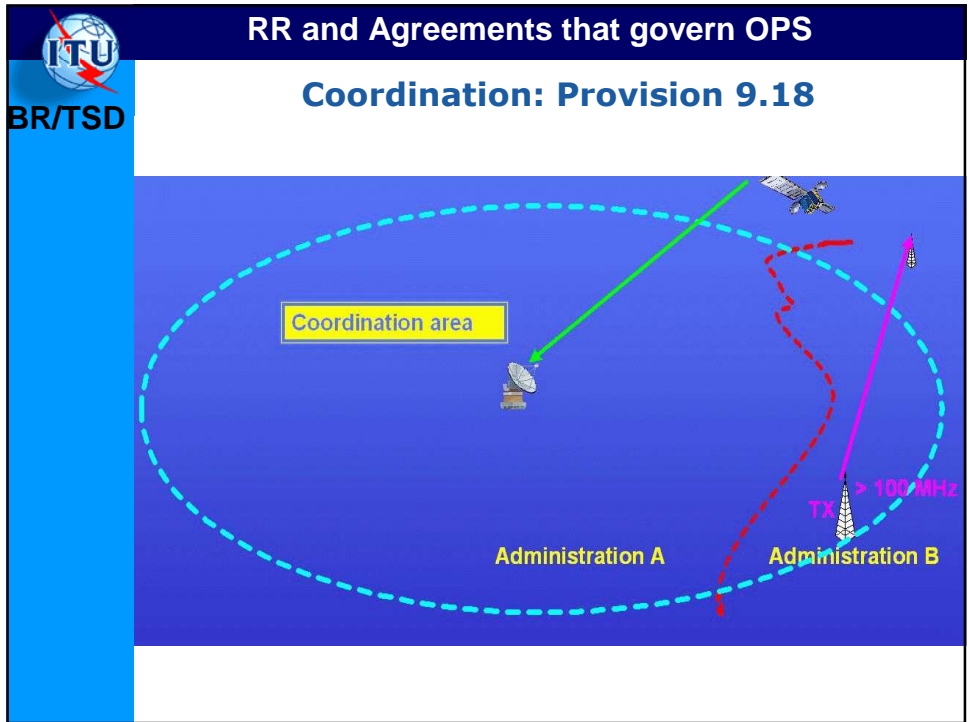
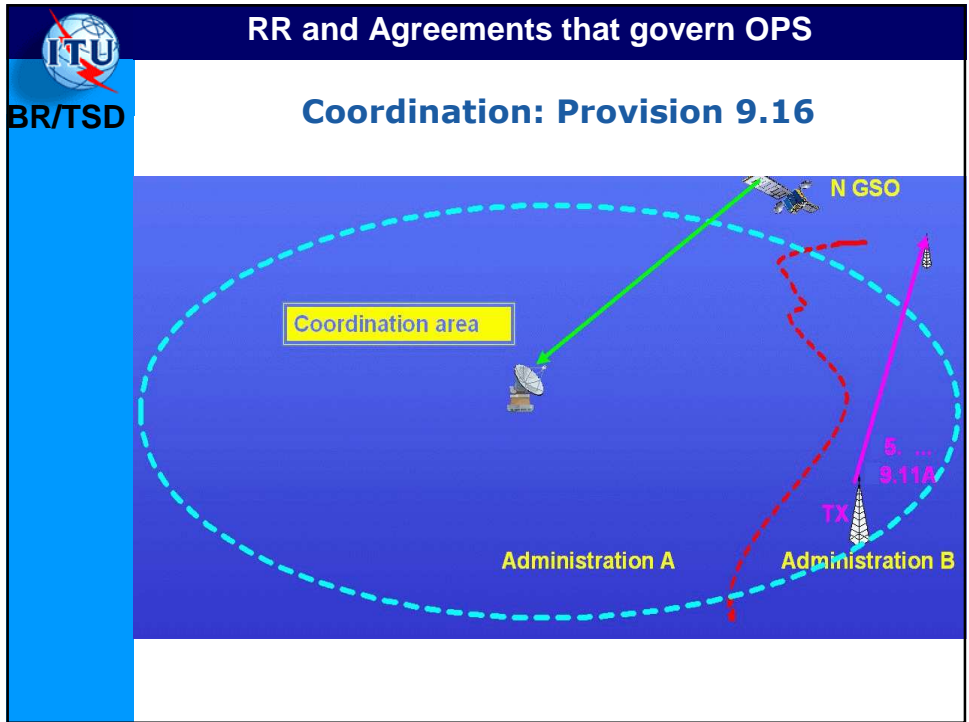
RR and Agreements that govern OPS

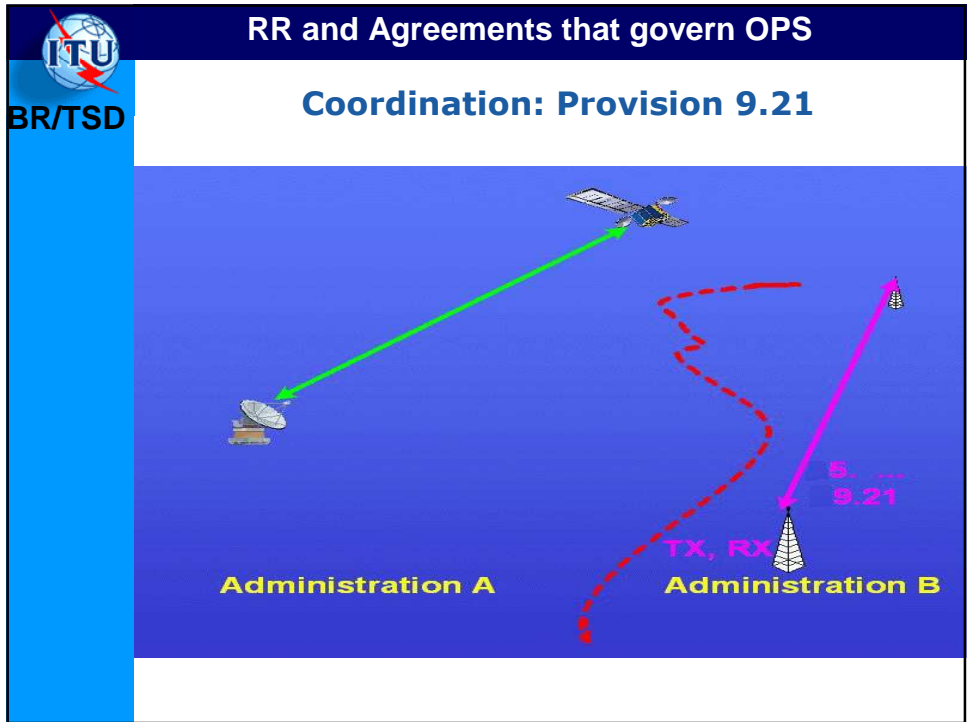
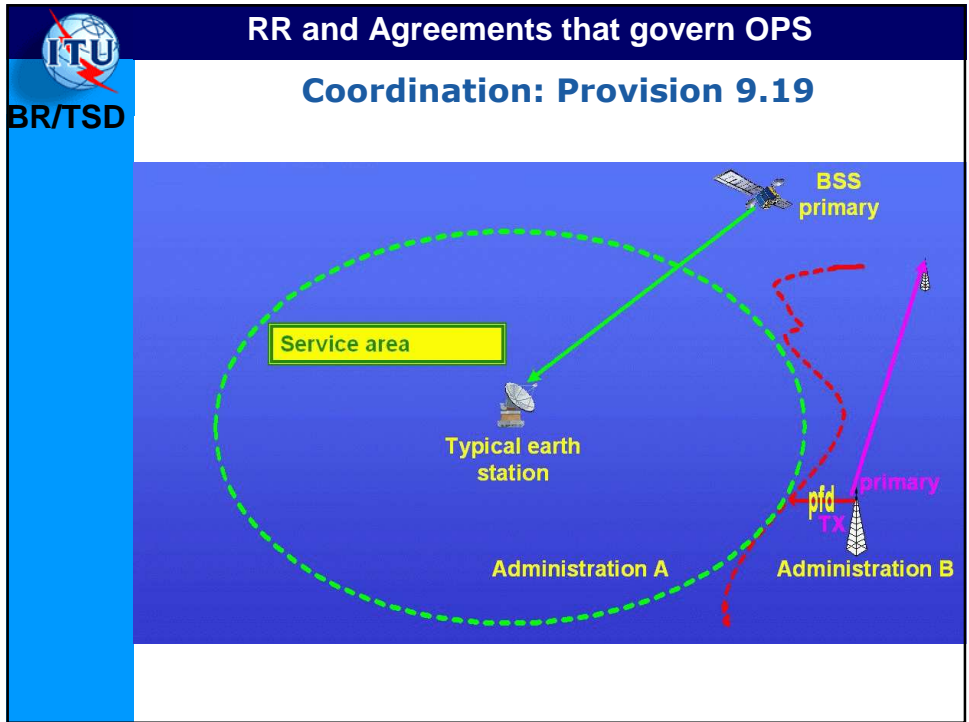
**Coordination aspects**

- Special agreements
  - Shared use of spectrum
  - Administrations coordinate proposed usage of frequency assignments
- Art 6
  - Two or more Member States coordinate use of individual frequencies in any frequency bands covered by Art 5 before notifying frequency assignments concerned, they shall in all appropriate cases inform BR of such coordination
  - RR and ITU-R Recommendations provide guidance to administrations to facilitate coordination



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- ### RR and Agreements that govern OPS
- #### Coordination: Particular provisions of RR
- Art 9 - basic provisions applicable to stations of terrestrial services: 9.16, 9.18, 9.19 and 9.21
  - Frequency assignments to be taken into account in effecting coordination are identified using principles of App 5







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### Coordination: Identifying administrations

- Application of Art. 9.21
- Agreement of an administration may be required with respect to
  - Frequency assignments in same band as planned assignment;
  - Pertaining to same service or to another service to which band is allocated with equal rights or a higher category of service;
  - May affect or be affected, as appropriate, and which are also listed in App 5.
- Level of interference shall be determined by appropriate method referred to in Table 5-1 of App 5



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### Coordination: identifying administrations

- Art. 9 frequency assignment is considered to affect or be affected and coordination required, if:
  - Exceed threshold levels in Table 5-1
  - Condition specified in Table 5-1 is applicable



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### Coordination: Not to be effected (1)

No coordination of a terrestrial assignment in cases:

- when no increase in level of interference above threshold calculated in accordance with Tables 5-1; or
- when characteristics are within limits of those of a frequency assignment which previously coordinated; or
- when changing characteristics so that no increase interference to or from, as appropriate, assignments of other administrations; or



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### Coordination: Not to be effected(2)

No coordination of a terrestrial assignment in cases that bring into use:

- Assignments to terrestrial stations located, in relation to an earth station, outside coordination area of that earth station; or
- Assignments to terrestrial stations within the coordination area of an earth station but outside any receive frequency band of that earth station.



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### Coordination: Calculation of coordination area

- Appendix 7 provides:
  - Method to determine coordination area of a Tx or Rx earth station sharing spectrum in bands 100MHz - 105 GHz with terrestrial services or earth stations operating in opposite direction of transmission
  - Procedures and system parameters to calculate an earth station's coordination area, including predetermined distances.
  - Determination of distances in all azimuthal directions around a Tx or Rx earth station.



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## RR and Agreements that govern OPS

### Notification and recording of assignments

- < 3 years before bringing assignments into use (11.25)
- Types of examinations made by BR:
  - Regulatory examination: conformity with Table of Frequency Allocations including the successful application of No. 9.21, when necessary, and with other provisions of RR as identified and Rules of Procedure (11.31).
  - Coordination examination: conformity with procedures relating to coordination with other administrations applicable to the radiocommunication service and frequency band concerned (11.32).





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## RR and Agreements that govern OPS

### Notification and recording of assignments

- Favourable finding
  - Both examinations result in a favourable finding record assignment in MIFR indicating administrations with which coordination is completed.
- Unfavourable finding
  - If any finding is unfavourable return notice to notifying administration, indicating appropriate action (11.37).



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## RR and Agreements that govern OPS

### Technical criteria and examination aspects

- Terrestrial station can interfere with satellite services that:
  - Transmit from Earth-to-space (up-link);
  - Transmit space-to-Earth (downlink);
  - Transmit in directions from space-to-Earth and from Earth-to-space (bidirectional), including inter-satellite links.



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## RR and Agreements that govern OPS

### Technical criteria: geographical separation

Article 21 provides, *inter alia*, guidance on:

- choice of sites and frequencies
- power limits on terrestrial stations in frequency bands > 1 GHz
- Selection of sites and frequencies considering relevant ITU-R Recommendations and respecting geographical separation between earth stations and terrestrial stations (21.1).



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## RR and Agreements that govern OPS

### Technical criteria: Separation angle

- Select as far as practicable, sites for Tx stations, in FS or MS in frequency bands indicated in Table 21-1 so that:
  - Direction of maximum radiation of any antenna is separated from geostationary-satellite orbit by at least the angle in Table 21-1 taking into account atmospheric refraction (current version Rec. ITU-R SF.765) (21.2).



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### Technical criteria: General power limits

- Frequency bands >15 GHz (except 25.25 - 27.5 GHz)
  - No restriction on angular separation for Tx stations of FS and MS
  - Studied in ITU-R
- Shared bands, general power limit applies:
  - Maximum e.i.r.p. of a FS or MS station < 55 dBW (21.3)



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### Technical criteria: e.i.r.p. limitations

- If compliance with No. 21.2 for frequency bands 1 - 10 GHz is impracticable, maximum e.i.r.p. of FS or MS stations shall not exceed:
  - +47 dBW in any direction within  $0.5^\circ$  of the geostationary-satellite orbit; or
  - +47 to +55 dBW, on a linear dB scale (8 dB per degree), in any direction between  $0.5^\circ$  -  $1.5^\circ$  of geostationary-satellite orbit, taking into account atmospheric refraction (21.4).



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### Technical criteria: Power to the antenna

- Power delivered Tx to antenna of a FS or MS station shall not exceed:
  - +13 dBW in bands 1 - 10 GHz
  - +10 dBW in bands >10 GHz (21.5)
  - Exception: power of each RF carrier frequency at input of each antenna of a FS station in band 18.6-18.8 GHz < -3dBW (21.5A)
- Limits given in Nos. 21.2, 21.3, 21.4, 21.5 and 21.5A apply, where applicable, to services and frequency bands indicated in Table 21-2



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### Technical criteria: Transhorizon systems

- Particular attention to sharing difficulties in application of transhorizon systems
- Systems in 1 700-1 710 MHz, 1 980-2 010 MHz, 2 025-2 110 MHz and 2 200-2 290 MHz bands may exceed limits given in Nos. 21.3 and 21.5, but Nos. 21.2 and 21.4 should be observed.
- Considering difficult sharing conditions with other services limit number of transhorizon systems in these bands (21.7).



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## RR and Agreements that govern OPS

### Keys for achieving successful coordination

- Availability of detailed technical characteristics, detailed terrain data along radio path
- Application of agreed coordination procedures/principles and recommended coordination tools or procedures
- International/regional harmonisation activities
- Frequency assignment data recorded in MIFR
- Approved procedures and regulatory provisions
- ITU Recommendations
- Tools made available to ITU membership
- Bilateral and multilateral activities



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## RR and Agreements that govern OPS

AP25

AP27

AP26

Plans that govern OPS

GE85M

GE85N



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## RR and Agreements that govern OPS

### Frequency allotment plans

- **AP25:** Worldwide frequency allotment plan for **coast radio telephone stations** in 4000 - 27500 kHz
- **AP26:** Worldwide frequency allotment plan for **aeronautical mobile (OR) service** in 3025 – 18030 kHz
- **AP27:** Worldwide frequency allotment plan for **aeronautical mobile (R) service** in 2850 – 22000 kHz
- **GE85-MM-R1:** Frequency allotment plan for national channels in **Digital Selective Calling (DSC)** system in 435-526.5 kHz



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## RR and Agreements that govern OPS

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

- **Scope**
  - Worldwide allotment plan, maritime mobile service (MMS)
  - Coast radiotelephone stations in 4 000 - 27 500 kHz
  - 240 channels; allotment areas
  - Number of “restricted” allotments: limitations on service area, power, hours of operation, etc.
- **Characteristics**
  - 3 kHz channels (separation between reference frequencies)
  - Bandwidth – 2.8 kHz
  - Class of emission - J3E
  - Maximum peak envelope power - 10 kW



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## RR and Agreements that govern OPS

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

Example: use of 8783.4 kHz from AP25 plan



8 783.4	AUS
(8 782)	B
	CHN
(822)	G
	HNG
	HRV
	IRN
	KEN
	MRC
	SUI
	UKR
	USA E
	USA SO
	USA W

Frequency channel on 8783.4 kHz is allotted to geographical area MRC Morocco may assign this channel to coast stations in the allotted area



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## RR and Agreements that govern OPS

### AP25 plan modification procedure (1)

- Plan modification procedure (AP25, Section I) applies when:
  - Administration needs a new allotment (AP25/1.1.1)
  - Administration needs an additional allotment (AP25/1.1.2)
  - Administration intends to replace an allotment by another one in the same band (AP25/1.1.2)



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## RR and Agreements that govern OPS

### AP25 plan modification procedure (2)

- Submission of AP4 information to BR (electronic T15 form)
- Publication of information and apparent incompatibilities in Special Section of BRIFIC
- Coordination with affected administrations
- Possible assistance by the BR at different stages of coordination



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## RR and Agreements that govern OPS

### AP25 plan modification procedure (3)

- Successful coordination - recording in Plan
- Continuing disagreement – additional examination by BR
- Examination results are favourable – Plan update
- Examination results are unfavourable – BR searches for least effected channel and enters it in Plan, if requested by administration



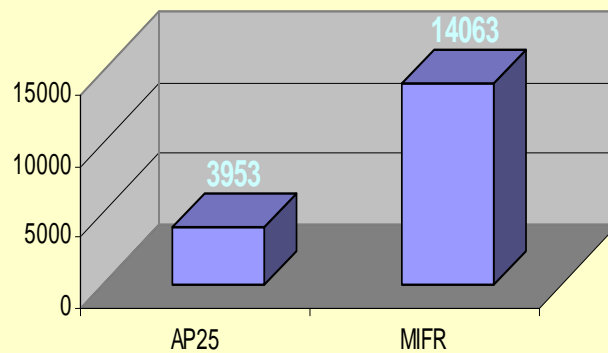


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## RR and Agreements that govern OPS

### AP25 Plan and MIFR statistics

Number of entries in AP25 Plan and related MIFR assignments



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## RR and Agreements that govern OPS

### Regulation of aeronautical mobile service (AMS)

- AMS is subdivided into route (R) and off-route (OR) services
- Worldwide allotment plans of AP26 and AP27
- Coordination procedures through ICAO (AP27)
- RR contains some additional mandatory provisions, e.g. prohibition of public correspondence (nature of Service CP and CR) in exclusive aeronautical bands



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## RR and Agreements that govern OPS

### Allotment plan for aeronautical mobile (OR) service (AP26)

- **Scope**
  - Worldwide plan for aeronautical mobile off-route service
  - Planned band: 3 025 - 18 030 kHz (10 sub-bands)
  - Carrier frequencies, allotment areas
- **Characteristics**
  - 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)



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## RR and Agreements that govern OPS

### Procedure for modification of AP26 Plan

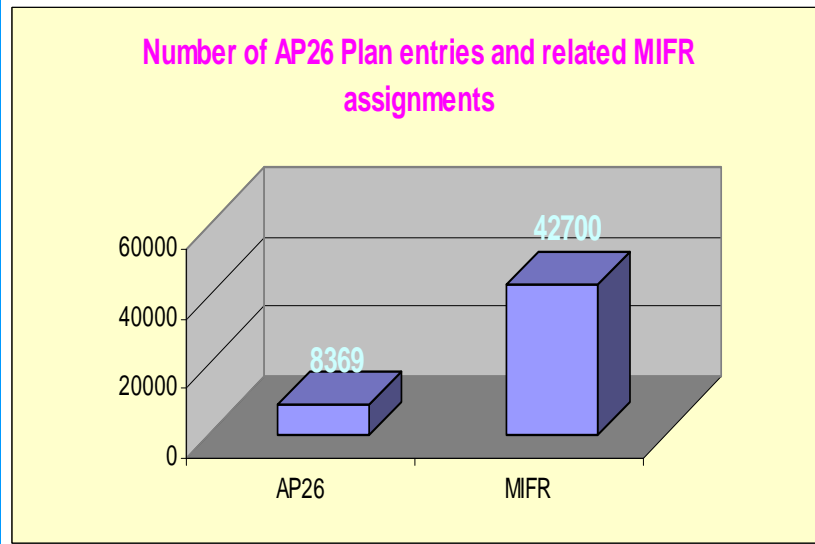
- Requests for a new allotment - BR selects an appropriate allotment and enters it in the Plan
- Requests for an additional allotment - the allotment is entered in the Plan only if it is compatible with remaining allotments
- Requests for suppression of an allotment - BR cancels allotment from allotment arrangement



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## RR and Agreements that govern OPS

### AP26 Plan and MIFR statistics



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## RR and Agreements that govern OPS

### Allotment plan for aeronautical mobile (R) service (AP27)

- Scope
  - Worldwide plan for aeronautical mobile route service
  - Planned band: 2 850 - 22 000 kHz
  - Carrier frequencies, geographical areas (MWARA, RDARA, VOLMET areas)
- Characteristics
  - Classes of emission: J3E; H2B, J7B, J2D, J9X (A1A/A1B) and F1A/F1B
  - Frequency separation - 3 kHz, multiple to 1 kHz
- No plan modification procedure

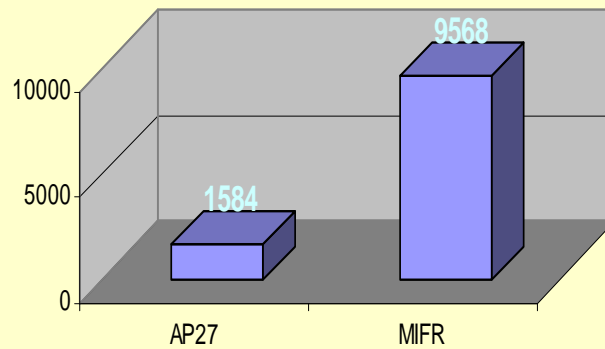


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## RR and Agreements that govern OPS

### AP27 Plan and MIFR statistics

Number of entries in AP27 Plan and related MIFR assignments



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## RR and Agreements that govern OPS

### Allotment plan for aeronautical mobile (R) service (AP27)



Regional and domestic route areas of AP27 Plan in the South America



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## RR and Agreements that govern OPS

### Frequency assignment plans

- **GE85-R1-MAR:** Frequency assignment plan for the **maritime mobile service** in the MF bands in Region 1
- **GE85-R1-AER:** Frequency assignment plan for the **aeronautical radionavigation service** in the MF bands in Region 1
- **GE85-EMA:** Frequency assignment plan for the **maritime radionavigation service** (radiobeacons) for the European maritime area in 283.5 - 315 kHz



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## RR and Agreements that govern OPS

### Frequency assignment plan for maritime mobile service in Region 1 (GE85-R1-MAR)

- Scope
  - Region 1 plan
  - Planned bands: 415 – 495 kHz, 505 - 526.5 kHz, 1606.5-1625 kHz, 1635-1800 kHz, 2045-2160 kHz
  - Takes into account aeronautical radionavigation, fixed, land mobile and radiodetermination services
- Characteristics
  - Classes of emission - A1A, F1B, J3E
  - Chan. spacing: 0.5 kHz (A1A, F1B), 3kHz (J3E)
  - Paired frequencies for coast and ship stations



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## RR and Agreements that govern OPS

### Plan modification procedure for GE85-R1-MAR

- Submission of AP4 information to BR
- Publication of complete information in BRIFIC
- Coordination with affected administrations having:
  - assignments in conformity with Plan
  - assignments of co-primary unplanned services
- Inform BR about results (90 days)
- Successful coordination - recording in Plan
- Disagreement – coordination between administrations

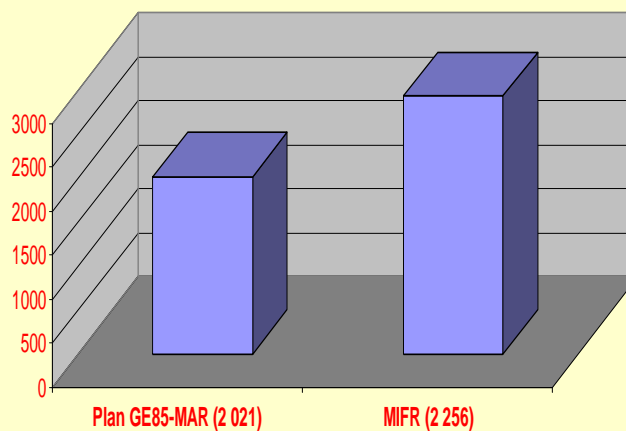


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## RR and Agreements that govern OPS

### GE85-MAR-R1 Plan and MIFR statistics

Entries in GE85-MAR Plan and related MIFR assignments





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## RR and Agreements that govern OPS

### Assignment plan for aeronautical radio navigation service in Region 1 (GE85-R1-AER)

- Scope
  - Region 1 plan
  - Frequency bands: 415 – 435 kHz, 510 – 526.5 kHz
  - Takes into account also maritime mobile service stations
- Characteristics
  - 34 channels
  - Channel spacing - 1 kHz (0.5 kHz exceptionally)
  - Classes of emission – A1A, A2A



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## RR and Agreements that govern OPS

### Plan modification procedure for GE85-R1-AER

- Submission of AP4 information to the BR
- Publication of complete information in BRIFIC
- Coordination with affected administrations having assignments in conformity with Plan
- Inform BR on results (90 days)
- Successful coordination - recording in Plan
- Disagreement – coordination between administrations

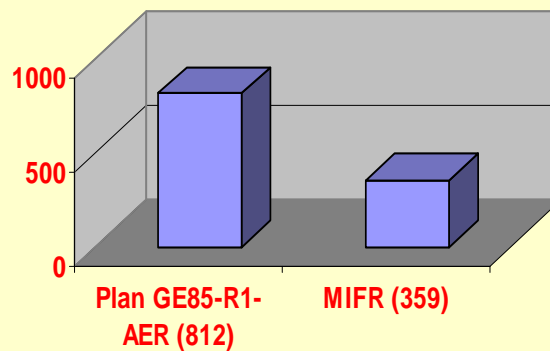


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## RR and Agreements that govern OPS

### GE85-R1-AER Plan and MIFR statistics

Number of entries in GE85-R1-AER Plan and related MIFR assignments



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## RR and Agreements that govern OPS

### Assignment plan for maritime radionavigation service (radiobeacons) (GE85-EMA)

- Scope
  - Plan for European maritime area
  - Frequency bands: 283.5 - 315 kHz
  - Provides for compatibility with ARNS
- Characteristics
  - Class of emission – A1A, F1B, G1D
  - Minimum field strength to be protected:
    - 34 dB( $\mu$ V/m) for stations north of 43 N parallel
    - 37.5 dB( $\mu$ V/m) for stations on and south of 43 N parallel





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## RR and Agreements that govern OPS

### GE85-EMA plan modification procedure (1)

- Plan modification procedure is combined with Art. 11 notification procedure
- Seeking agreement of administrations that could be affected
- Submitting AP4 information to BR - T12 form (>90 days before operation starts)
- BR publishes information in Part 1 of BRIFIC
- BR identifies affected administrations and informs proposing administration



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## RR and Agreements that govern OPS

### GE85-EMA plan modification procedure (2)

- BR records assignment in MIFR with administrations whose agreement has to be obtained
- Proposing adm. informs BR about results of coordination
- All agreements obtained – BR updates Plan
- Agreements not obtained - BR asks proposing adm. to delete assignment from MIFR
- If proposing administration insists, assignment retained in MIFR with unfavorable finding - Plan is not updated



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## RR and Agreements that govern OPS

### Coordination procedures for MMS

- Standard procedure of Article 9
- Res. 339 (Rev.WRC-07): coordination of NAVTEX services on 490 kHz, 518 kHz and 4209 kHz
  - Performed through IMO
  - IMO provides ITU with coordination information
  - ITU publishes information in List IV (List of Coast Stations and Special Services Stations)



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## RR and Agreements that govern OPS

### Coordination procedures in the aeronautical mobile service

- No special procedures, but coordination is desirable
- Role of ICAO and its regional offices: coordination of frequencies for (R) service in exclusive HF bands and in 117.975 - 137 MHz band
- Notification after coordination through ICAO regional office

RR and Agreements that govern OPS			
ITU BR/TSD	Summary		
Plan name	Radiocommunication service	Frequency Band	Geographical Area
Allotment plan of AP25	Maritime Mobile	4000 – 27500 kHz	Worldwide
Allotment plan of AP26	Aeronautical Mobile (OR)	3025 – 18030 kHz	Worldwide
Allotment plan of AP27	Aeronautical Mobile (R)	2850 – 22000 kHz	Worldwide
Allotment plan GE85-MM-R1	Maritime Mobile (DSC)	435 – 2160 kHz	Region 1
Assignment plan GE85-R1-MAR	Maritime Mobile	415 – 2160 kHz	Region 1
Assignment plan GE85-R1-AER	Aeronautical Radionavigation	415 – 526.5 kHz	Region 1
Assignment plan GE85-EMA	Maritime Radionavigation	283.5 - 315 kHz	European Maritime Area

RR and Agreements that govern OPS	
ITU BR/TSD	OPS in GE06

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## RR and Agreements that govern OPS

# Allocation aspects

Region 1	Region 2	Region 3	
460-470	FIXED MOBILE 5.286AA Meteorological-satellite (space-to-Earth) 5.287 5.288 5.289 5.290		<i>Fixed service</i>
470-512 <b>BROADCASTING</b>	470-512 BROADCASTING Fixed Mobile 5.292 5.293	470-585 FIXED MOBILE <b>BROADCASTING</b>	<i>ARNS</i>
	512-608 BROADCASTING 5.297	5291 5.298 585-610 FIXED MOBILE <b>BROADCASTING</b>	<i>Radio astronomy</i>
	608-614 RADIO ASTRONOMY Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)	610-890 FIXED MOBILE 5.313A 5.317A <b>BROADCASTING</b>	<i>Mobile service</i>
	614-698 BROADCASTING Fixed Mobile 5.293 5.309 5.311A		<i>Mobile-satellite</i>
	698-806 BROADCASTING Fixed MOBILE 5.313B 5.317A		
5291 5.294 5.296 5.309 5.302 5.304 5.306 5.311A 5.312	5293 5.309 5.311A		
790-862 FIXED <b>BROADCASTING</b> MOBILE except aeronautical mobile 5.316B 5.317A 5.312 5.314 5.315 5.316 5.316A 5.319	806-890 FIXED MOBILE 5.317A BROADCASTING		

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- ## RR and Agreements that govern OPS
- # RRC-06 activities related to OPS
- Reference Situation for OPS on 23 May 2006
  - Digital BS Plan took OPS into account
  - GE06 Agreement contains specific provisions for OPS
  - List of assignments to OPS (**List**)



## RR and Agreements that govern OPS

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### OPS recorded in GE06L December 2008

	Radiocommunication service		
	Fixed	Land mobile	Aeronautical radionavigation
VHF	13 (IRN)	5609 (G, IRN)	0
UHF	902 (ARS, BEL, IRN, MRC, RUS, UAE)	3500 (ARS, CTI, EGY, F, IRN, ISR, JOR)	986 (AZE, G, GEO, IRN, KAZ, RUS, TJK, UZB)
Total - 11010	915	9109	986



## RR and Agreements that govern OPS

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### Status of the OPS in GE06

- Equal rights with BS
  - Protection of OPS modifications to Plans
  - Similar modification and notification procedures BS Plans and the **List**
- Difference in application between OPS and BS
  - Protection of assignments to **OPS** (country for BS)
  - Bring into operation within 1 year
  - Coordination of Tx **and Rx** stations



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## RR and Agreements that govern OPS

### Coordination and notification of OPS

- Coordination and notification are **obligatory** for assignments to OPS
- The procedures are applied in order

Article 4 → **Coordination** → *The List*

Article 5 → **Notification** → **MIFR**



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## RR and Agreements that govern OPS

### Coordination procedure - General

- Described in Section **4.2** of Art. **4**
- Applied to new or modified OPS assignments
- Consists in coordination of OPS assignment with BS of all affected administrations
- Affected administrations are identified by territory according to Section I of Annex 4
- No coordination OPS vis-à-vis OPS is effected
- Duration of the procedure - up to 24 months



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## RR and Agreements that govern OPS

### Specific features of coordination procedure

- Shortcut, **40 days**, if all agreements are obtained
- No reply within 75 days is considered as **objection** (when no BR assistance required)
- Duration of the procedure up to **24 months**
- Change in parameters leads → re-application of procedure
- Agreement can be for a limited period
- Deletion from **List** if no notification received under Art.11 within **12 months**



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## RR and Agreements that govern OPS

### Notification procedure

- Contained in Section 5.2 of Art.5
- Notification >3 months prior to bringing assignment into operation and
- <12 months after recorded in **List**
- BR performs 2 examinations: regulatory (RR), conformity to **List** (existence and parameters)
- Both findings are favourable → MIFR, if unfavourable → return notice to administration



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## RR and Agreements that govern OPS

### RRC-06 implementation: G11 – G14 notices

- G11 to G14 notice types based on T11 – T14 notices
- Described in “OS-guide”
- For primary and secondary other services in GE06 bands
- Use **electronic** notices only
- Do not use T11 - T14 under GE06



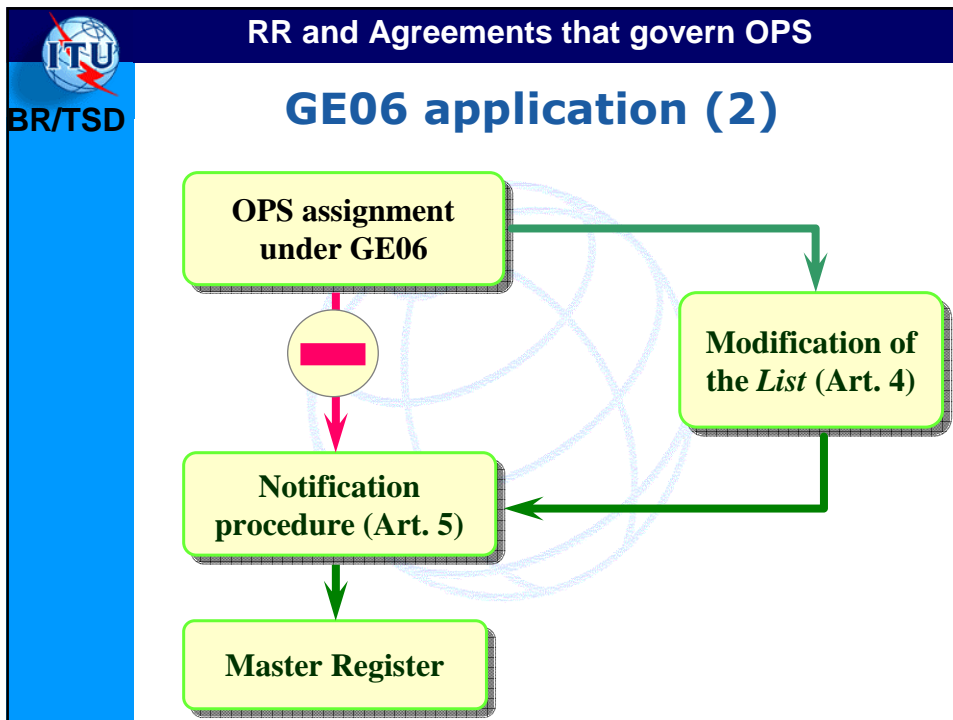
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## RR and Agreements that govern OPS

### Example of GE06 application (1)

- Plan new fixed station in GE06 bands
- Identification of affected administrations – Section I of Annex 4 of GE06 Agreement
- Coordination with affected administrations – GE06 protection criteria, mutually agreed methods
- Submit electronic notice form to BR – Annex 3, “OS-guide”(G11, Fragment “GE06L”)
- Application of coordination procedure – Section 4.2, Art.4





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- ## Example of GE06 application (3)
- Finalise Art. 4 procedure, BR enters FX in **List**
  - Notification of FX assignment - Art.5
    - <1 year after entering the **List**, >3 months prior to bringing into operation
    - Notification under Art.5 – Annex 3, “OS-guide” (G11, Fragment “NTFD\_RR”)
  - Record FX in **List** – protection from future modifications to digital and analogue BS Plans
  - Recording FX in MIFR – assignment in operation

**RR and Agreements that govern OPS**

**Information on OPS on ITU-R web-site**

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- The List "GE06L"
- GE06 Procedures related to OPS
- Electronic notice forms and related software
- "OS - guide"
- BRIFIC Special Sections, etc.

**RR and Agreements that govern OPS**

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**Thank you**

david.botha@itu.int  
V.452  
+22 41 22 730 5548