

ITUWRS
ONLINE2020

Coordination Requests Examination (GIBC/PFD)

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Space Services Department, Radiocommunication Bureau



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UNION INTERNATIONALE DES TÉLÉCOMMUNICATIONS
BUREAU DES RADIOCOMMUNICATIONS

INTERNATIONAL TELECOMMUNICATION UNION
RADIOCOMMUNICATION BUREAU

UNIÓN INTERNACIONAL DE TELECOMUNICACIONES
OFICINA DE RADIOCOMUNICACIONES

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RÉSEAU À SATELLITE SATELLITE NETWORK RED DE SATÉLITE		IOMSAT-132E		SECTION SPÉCIALE N° SPECIAL SECTION No. SECCIÓN ESPECIAL N.º	CR/C/5266
STATION TERRIENNE EARTH STATION ESTACIÓN TERRENA		---		BR IFIC / DATE BR IFIC / DATE BR IFIC / FECHA	2927 / 18.08.2020
ADM. RESPONSABLE RESPONSIBLE ADM. ADM. RESPONSABLE	G	LONGITUDE NOMINALE NOMINAL LONGITUDE LONGITUD NOMINAL	132 E	NUMÉRO D'IDENTIFICATION IDENTIFICATION NUMBER NÚMERO DE IDENTIFICACIÓN	120520021
RENSEIGNEMENTS REÇUS PAR LE BUREAU LE / INFORMATION RECEIVED BY THE BUREAU ON / INFORMACIÓN RECIBIDA POR LA OFICINA EL					07.02.2020

Cette demande de coordination, reçue par le Bureau des radiocommunications en vertu du numéro 9.30 du Règlement des radiocommunications, a été examinée au titre des numéros 9.35 et 9.36 et est publiée conformément au numéro 9.38. Elle est subordonnée au type de coordination indiqué dans la colonne de gauche par un X dans la case pertinente.

This request for coordination, received by the Radiocommunication Bureau pursuant to No. 9.30 of the Radio Regulations, has been examined under Nos. 9.35 and 9.36 and is published in accordance with No. 9.38. It is subject to the form of coordination indicated in the left-hand column by an X in the relevant box

Esta solicitud de coordinación, recibida por la Oficina de Radiocomunicaciones de conformidad con el punto N° 9.30 del Reglamento de Radiocomunicaciones, se ha examinado de conformidad con los N° 9.35 y 9.36 y se publica de conformidad con el N° 9.38. Está sujeta al formulario de coordinación indicado en la columna de la izquierda con una X en la casilla correspondiente.

Type de coordination mentionné dans le Tableau I / Form of coordination referred to in Table I / Forma de coordinación mencionada en el cuadro I

<input checked="" type="checkbox"/> 9.7 <input type="checkbox"/> 9.7A <input type="checkbox"/> 9.7B <input type="checkbox"/> AP30#7.1 <input type="checkbox"/> AP30A#7.1 <input type="checkbox"/> RS539 <input type="checkbox"/> RS33#3	Conformément aux numéros 9.50 à 9.52 du Règlement des radiocommunications, les Administrations identifiées dans le Tableau I ci-après sont priées de communiquer leur décision à l'Administration responsable et au Bureau avant la date limite indiquée ci-dessous.	In accordance with Nos. 9.50-9.52 of the Radio Regulations, the Administrations identified in Table I below are requested to communicate their decision to the Responsible administration and the Bureau by the deadline indicated below.	De conformidad con los N° 9.50-9.52 del Reglamento de Radiocomunicaciones, se solicita a las administraciones señaladas en el cuadro I a continuación que comuniquen su decisión a la administración responsable y a la Oficina antes del plazo indicado más abajo.
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Type de coordination mentionné dans le Tableau II / Form of coordination referred to in Table II / Formulario de coordinación remitido al cuadro II

<input type="checkbox"/> 9.11 <input type="checkbox"/> 9.11A <input type="checkbox"/> 9.12 <input type="checkbox"/> 9.12A <input type="checkbox"/> 9.13 <input type="checkbox"/> 9.14 <input type="checkbox"/> 9.21/A <input type="checkbox"/> 9.21/B <input type="checkbox"/> 9.21/C <input type="checkbox"/> RS33#2.1	Les Administrations, énumérées ou non-énumérées dans le Tableau II ci-après, qui n'acceptent pas la demande de coordination au titre des numéros 9.11 à 9.14, 9.21 et RS33#2.1, sont priées de communiquer leurs observations à l'Administration responsable et au Bureau avant la date limite indiquée ci-dessous. Toute Administration qui ne réagira pas au titre du numéro 9.52 avant cette date limite sera considérée comme n'étant pas défavorablement influencée et, dans les cas couverts par les numéros 9.11 à 9.14 et RS33#2.1, les dispositions des numéros 9.48 et 9.49 s'appliqueront.	Administrations listed or not listed in Table II below, which do not agree to the request for coordination under Nos. 9.11 to 9.14, 9.21 and RS33#2.1 are requested to communicate their comments to the responsible administration and the Bureau by the deadline indicated below. Any administration not responding under No. 9.52 within this deadline shall be regarded as unaffected and, in the cases of Nos. 9.11 to 9.14 and RS33#2.1, the provisions of Nos. 9.48 and 9.49 shall apply.	Se invita a las administraciones, enumeradas o no en el cuadro II, que no estén de acuerdo con la solicitud de coordinación de conformidad con los N° 9.11 a 9.14, 9.21 y RS33#2.1 que comuniquen sus observaciones a la administración responsable y a la Oficina dentro del plazo indicado más abajo. Se considerará que toda administración que no responda de conformidad con el N° 9.52 dentro del plazo señalado, no está afectada y, en el caso de los N° 9.11 a 9.14 y RS33#2.1, se aplicarán las disposiciones de los N° 9.48 y 9.49.
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DATE LIMITE POUR LA DÉCISION / EXPIRY DATE FOR DECISION / FECHA LÍMITE PARA LA DECISIÓN

18.12.2020

Expectation

OBSERVATIONS DU BUREAU DES RADIOCOMMUNICATIONS

Relatives à la Conclusion conformément au
Nº 11.31

FAVORABLE pour toutes les assignations de
fréquence.

无线电通信局的意见

根据第11.31款的审查结果

所有频率指配均合格。

RADIOCOMMUNICATION BUREAU COMMENTS

Relating to the Findings with respect to
No. 11.31

FAVOURABLE for all frequency assignments.

ЗАМЕЧАНИЯ БЮРО РАДИОСВЯЗИ

Относительно Заключения по п. 11.31

БЛАГОПРИЯТНОЕ для всех частотных
присвоений.

OBSERVACIONES DE LA OFICINA DE RADIOCOMUNICACIONES

Relativas a la Conclusión según N.º 11.31

FAVORABLE para todas las asignaciones de
frecuencia.

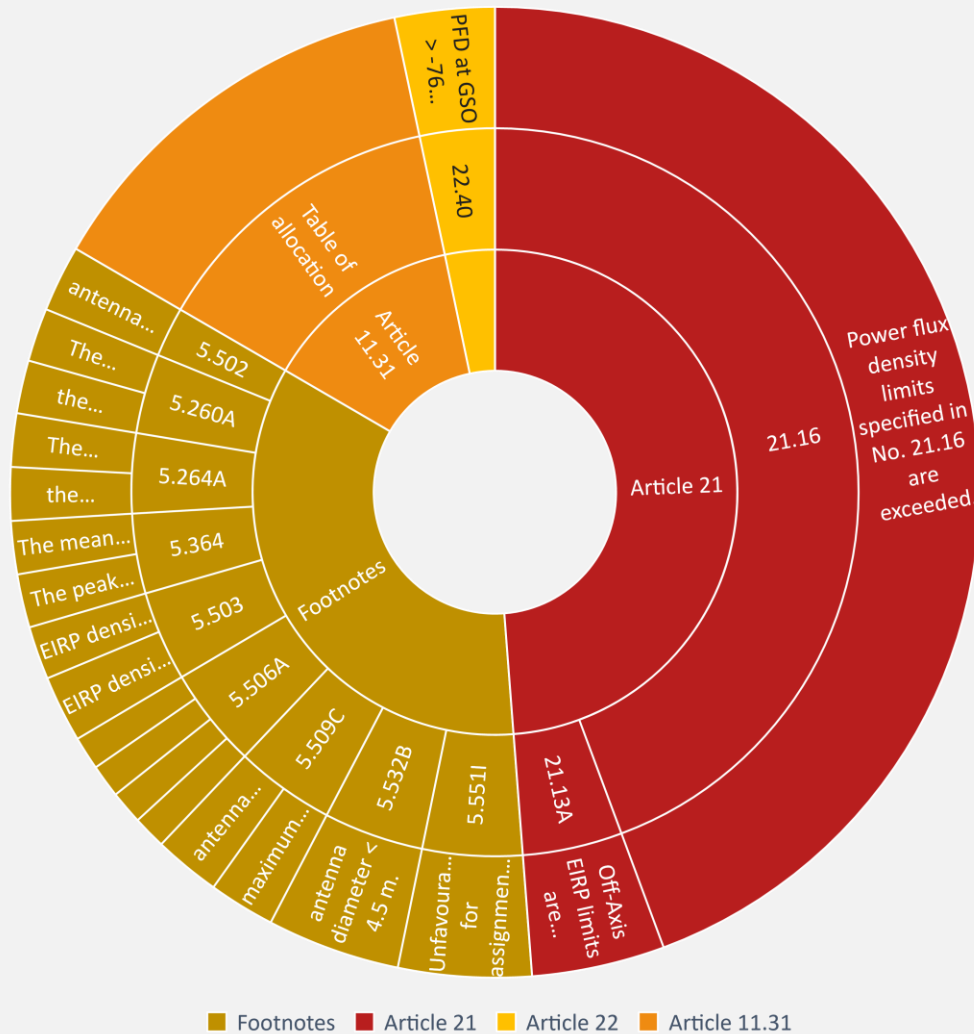
تعليقات مكتب الاتصالات الراديوية

المتعلقة بالنتيجة وفقاً للرقم 31.11

مواتية لجميع تخصيصات التردد.

How to avoid unfavourable findings?

Unfavourable Findings



Frequency assignment 14 235 MHz to transmitting ship earth station KU-0M45 (class of station TG) with e.i.r.p. greater than 21 dBW.

UNFAVOURABLE

Not in accordance with No. 5.506A (WRC-03)

- Antenna diameter < 1.2 m
- Maximum peak power ≥ -4 dBW

UNFAVOURABLE

Not in accordance with No. 5.503

- e.i.r.p. density > 58.4 dB(W/40 kHz) in the 13.77 – 13.78 GHz band.

Frequency assignments 13 822, 13 825, 13 978 MHz to transmitting earth station TYPICAL 1.2 with maximum power density ≤ -46 dBW/Hz and maximum peak power ≥ 11 dBW

UNFAVOURABLE

Not in accordance with No. 21.13A

- Off-axis EIRP limits are exceeded

FAVOURABLE for all other frequency assignments.

Frequency assignment 42 GHz

UNFAVOURABLE for assignments with PFD in any 500 kHz of the 42.5 - 43.5 GHz band produced at the site of any radio astronomy station registered as a single-dish telescope exceeds the limit stated in No.5.551I.

Steerable beams QT1 and QT2, with assigned frequencies 37.5 – 40, 40 – 40.5, 40.5 – 42 GHz with maximum power density ≥ -45.9 dBW/Hz and maximum peak power ≥ 34.4 dBW

UNFAVOURABLE

The power flux density limits specified in No. 21.16 are exceeded.

There are no positions of the steerable beams where the applicable PFD limits are met.

**Satellite
Networks**



RADIO FREQUENCY SPECTRUM



Satellite Networks



Inter-satellite



Space Research

Earth Observation



Meteorological-satellite

Standard frequency & time
signal-satellite



Radiodetermination-satellite
Radionavigation-satellite

Broadcasting-
satellite (sound)



Broadcasting-
satellite (TV)



Mobile-satellite



Fixed-satellite



Telemetry,
Tracking,
Command

3313

GSO Satellite
Networks



Operate in an
INTERFERENCE FREE
environment

**POTENTIAL FOR
INTERFERENCE**

1454

Non-GSO Satellite
Systems



2+ million
Terrestrial



REC

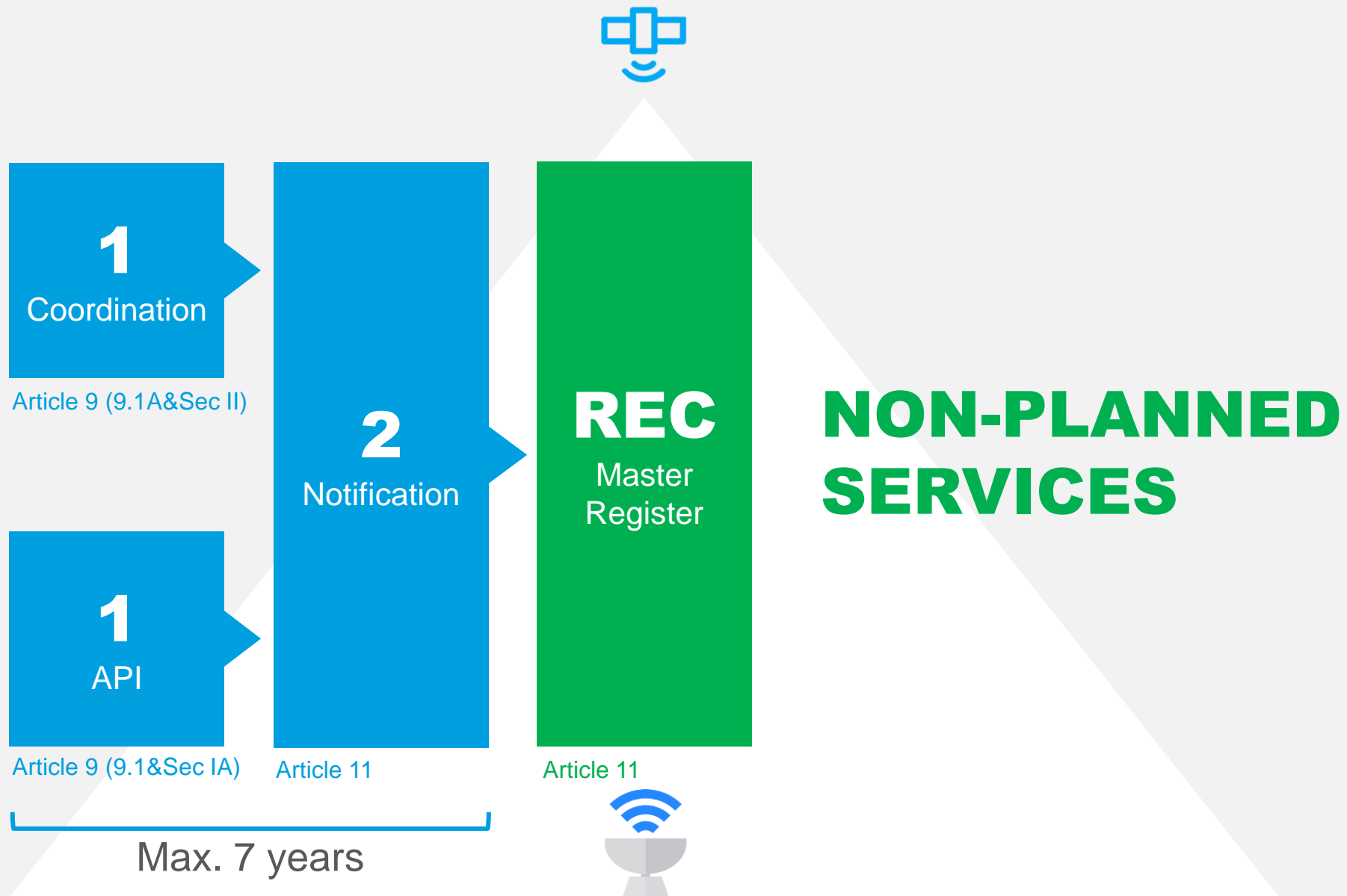
Master
Register

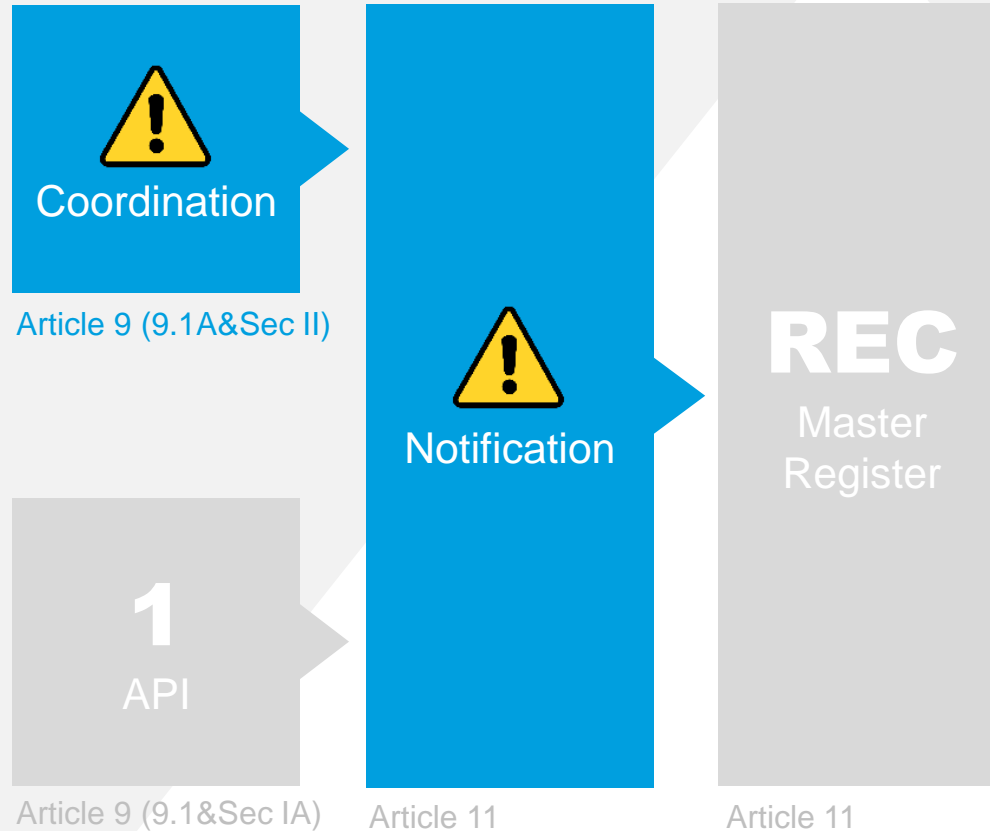
“... international recognition
... to avoid harmful interference”

No. 8.3 of Article 8

Article 11







CONFORMITY EXAM

Nos. 9.35 or 11.31

Table of Frequency Allocations

Including Article 5 footnotes & Res. or Rec.

Other Provisions (“Hard Limits”)

PFD, EIRP, Off-axis EIRP, PFD at GSO, EPFD etc.
(Rules of Procedure on No. 11.31)

Radio Regulations

Articles

Edition of 2020

1

tions

2

ions

3

tions

dations
eference

4



The WRC revisits the ITU's Radio Regulations

335.4-410 MHz

Allocation to services					
Region 1	Region 2		Region 3		
399.9-400.05	MOBILE-SATELLITE (Earth-to-space)		5.209	5.220	5.260A 5.260B

5.260A In the frequency band 399.9-400.05 MHz, the maximum e.i.r.p. of any emission of earth stations in the mobile-satellite service shall not exceed

RESOLUTION 761 (REV.WRC-19)

Coexistence of International Mobile Telecommunications and the broadcasting-satellite service (sound) in the frequency band 1 452-1 492 MHz in Regions 1 and 3

resolves

1 that the pfd at the Earth's surface produced by emissions from a geostationary space station in the BSS (sound) in the frequency band 1 452-1 492 MHz shall not exceed

RR21-10

CHAPTER VI – Provisions for services and stations

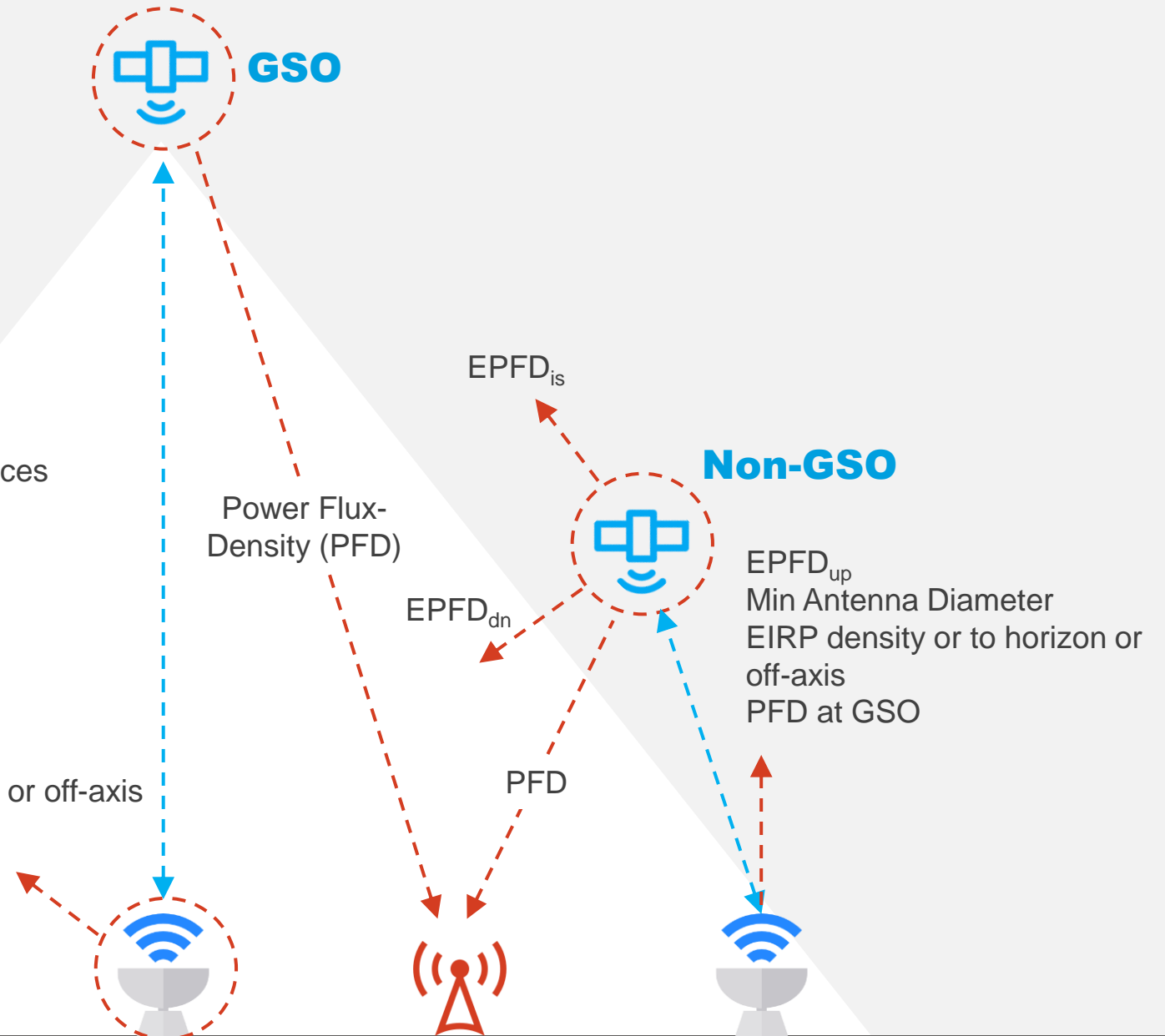
TABLE 21-4 (continued) (Rev.WRC-19)

Frequency band	Service*	Limit in dB(W/m ²) for angles of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
40-40.5 GHz	Fixed-satellite Mobile-satellite	-115	-115 + 0.5(δ - 5)	-105	1 MHz

“Hard Limits”

Commitments & Compliances

Min Antenna Diameter
EIRP density or to horizon or off-axis
PFD at GSO



Terrestrial



UNFAVOURABLE FINDING

Nos. 9.35 or 11.31



No date of protection



Record for info only (No. 8.4)



No international recognition (No. 8.3)



Cannot cause or claim protection
from harmful interference (No. 4.4)



SUBMISSION



DATE OF RECEIPT



COST RECOVERY FEE



Radio Regulations

International Telecommunication Union

Radio Regula

International Telecommunication

Radio R Articles

Edition o

Article Edition of 2

Radio Regulations Articles

Edition of 2020

Radio Regula

1

Articles
Edition of 2001

Regula

Edition of 2016

GIBC/PFD (terrestrial serv.)

<https://www.itu.int/en/ITU-R/software/Pages/gibc.aspx>

GIBC SNS V9 - Graphical Interface for Batch Calculations

Appendix 30B | Appendix 30 30A | EPFD | Appendix 8
Power Control | Tools / Options | PFD NGSO
PFD (terrestrial serv.) | PFD (space serv.) | Appendix 7

1 Network 2 Start 4

3 Examination Options
Examination Hard Limits
Power Control (dBW)
☒ Worst Case Only

Before "Examination"
☐ Perform "Before" Comparisons
☐ Appendix 30 Art.4.1.11
Add
Delete
Clear All

Messages Filter
☒ Progress ☒ Warning ☐ Debug

Message

< >

Calculation Results

< >
Open Database View Log File Open Folder Open Report 5

Version
1.0.0.0 PFD (Terrestrial Services) View Notes

EXIT Help

Hard Limits

- ✓ GSO only
- ✓ PFD hard limits¹
- ✓ EIRP density or to horizon or off-axis limits²
- ✓ PFD limit at GSO³
- ✓ Minimum antenna diameter⁴
- ✓ Commitment or Compliance checks⁵

¹ Table 21-4 of Art. 21, Nos. 5.268, 5.407, 5.418, 5.446, 5.462A, 5.493, 5.556A, 5.558A, 5.562C, 5.562H, Res903 (REV.WRC-19) & 761 (REV.WRC-19)

² Nos. 5.264A, 5.364, 5.503, 5.506A, 5.538, 21.8 (Warning), 21.13A

³ No. 22.40

⁴ Nos. 5.502, 5.532B, 5.506A, 5.509C, 5.555C

⁵ Ap4 - A.16.a, A.16.c, A.17.a, A.17.b.1, A.17.b.2, A.17.d, A.17.e.2, A.18.a, A.19.b, [A.20.a, A.21.a, A.22.a – in v9.1]

GIBC SNS V9 - Graphical Interface for Batch Calculations

Appendix 30B | Appendix 30 30A | EPFD | Appendix 8

Power Control | Tools / Options | PFD NGSO | Appendix 7

PFD (terrestrial serv.) | PFD (space serv.)

Network Start

Examination Options

Examination **Hard Limits**

Power Control (dBW)

☒ Worst Case Only

Messages Filter

☒ Progress ☒ Warning ☐ Debug

Before "Examination"

☐ Perform "Before" Comparisons

☐ Appendix 30 Art.4.1.11

Add

Delete

Clear All

Message

Calculation Results

Open Database View Log File Open Folder **Open Report**

Version

1.0.0.0 PFD (Terrestrial Services) View Notes

EXIT Help

Triggers

- ✓ GSO only
- ✓ No. 9.11 - BSS vs terrestrial stations
- ✓ No. 9.14 - GSO vs terrestrial stations
- ✓ No. 9.21/C - Seeking agreement wrt terrestrial stations

Rec. 608

- ✓ GSO only
- ✓ PFD limit of Rec. 608 (REV.WRC-07) for RNSS in 1164-1215 MHz

GIBC SNS V9 - Graphical Interface for Batch Calculations

Appendix 30B | Appendix 30 30A | EPFD | Appendix 8
Power Control | Tools / Options | PFD NGSO
PFD (terrestrial serv.) | PFD (space serv.) | Appendix 7

Network: Start Cancel

Examination Options

Examination: **Triggers** (dropdown menu)
Power Control: **Triggers** (dropdown menu)
Worst Case Only: ☐

Before "Examination"

☐ Perform "Before" Comparisons
☐ Appendix 30 Art.4.1.11

Add

Delete
Clear All

Messages Filter

☒ Progress ☒ Warning ☐ Debug

Message

< >

Calculation Results

< >

Open Database View Log File Open Folder Open Report

Version

1.0.0.0 PFD (Terrestrial Services) View Notes

EXIT Help

Does **NOT** check

- ✗ Aggregate PFD or PFD with % of time¹
- ✗ PFD in adjacent band²
- ✗ Limits covered by commitment or compliance in Appendix 4³
- ✗ Station keeping & Pointing accuracy⁴
- ✗ Rules of Procedure on No. 21.16
- ✗ Table of Frequency Allocation⁵

¹ e.g. 5.379C, 5.443B, 5.502, 5.549A

² e.g. 5.443B, 5.551I, 5.555B

³ e.g. 5.379C, 5.443B, 5.502, 5.509D, 5.509E, 5.549A, 5.551I, 22.26 to 22.28, 22.32, Res609, Res741 etc. except A.17.d (9900-10400 MHz EESS)

⁴ e.g. Nos. 22.8, 22.13, 22.17 and 22.19

⁵ Article 5

The screenshot shows the 'GIBC SNS V9 - Graphical Interface for Batch Calculations' window. It features a tabbed interface with tabs for 'Appendix 30B', 'Appendix 30 30A', 'EPFD', and 'Appendix 8'. The 'Appendix 30 30A' tab is active, showing sub-tabs for 'Power Control', 'Tools / Options', and 'PFD (space serv.)'. The 'Power Control' sub-tab is selected, displaying a 'Network' dropdown menu, 'Start' and 'Cancel' buttons, and an 'Examination Options' section. The 'Examination Options' section includes a dropdown for 'Examination' (set to 'Hard Limits'), a text field for 'Power Control (dBW)', and a checked checkbox for 'Worst Case Only'. To the right, the 'Before "Examination"' section has checkboxes for 'Perform "Before" Comparisons' and 'Appendix 30 Art.4.1.11', an 'Add' button, and a list area with 'Delete' and 'Clear All' buttons. Below this is a 'Messages Filter' section with checkboxes for 'Progress', 'Warning', and 'Debug'. A 'Message' text area is positioned below the filter. The 'Calculation Results' section includes a text area and buttons for 'Open Database', 'View Log File', 'Open Folder', and 'Open Report'. At the bottom, the 'Version' section displays '1.0.0.0 PFD (Terrestrial Services)' and a 'View Notes' button. The window concludes with 'EXIT' and 'Help' buttons at the bottom right.

GIBC SNS V9 - Graphical Interface for Batch Calculations

Appendix 30B	Appendix 30 30A	EPFD	Appendix 8
Power Control	Tools / Options	PFD NGSO	
PFD (terrestrial serv.)	PFD (space serv.)	Appendix 7	

Network: Start Cancel

Examination Options

Examination:

Power Control (dBW):

☒ Worst Case Only

Before "Examination"

☐ Perform "Before" Comparisons

☐ Appendix 30 Art.4.1.11

Add:

Delete

Clear All

Messages Filter

☒ Progress ☒ Warning ☐ Debug

Message

< >

Calculation Results

< >

Open Database View Log File Open Folder **Open Report**

Version

1.0.0.0 PFD (Terrestrial Services) View Notes

EXIT Help

“HARD LIMITS” REPORT

Satellite Network

└ Beam(s)

└ Group(s)

└ Frequency assignment(s) & **RESULTS**
(Frequency & emission)

Contains list of assignments have
exceeded hard limits

“HARD LIMITS” REPORT

Beam | Tx. Direction |
Steerable or Fixed | Maximum Gain

Group ID | Class of Station |
Bandwidth | Date of Protection

QT1	E	STEERABLE	GAIN MAX: 50.0 DBi	POINTING ACC. 0.10 DEG
-----	---	-----------	--------------------	------------------------

120630210	EC	1000000 KHZ	2D DATE: 15.01.2020 (DR)
-----------	----	-------------	--------------------------

N-

38.00000 GHZ 1000000 KHZ EMISS: 120MG2W-- PEP MAX: 34.7 DBW PWR DS MAX: -45.9 DBW/HZ

PROV: (56) / RR 21.16 SRV: FSS

PROT AREA: ALL WORLD

REF.BW: 1.000 MHz

WORST CASE: 011E2038 02N0700/ 5.0 GAB

GAIN:	44.0	DB	PFD:	-105.2	PFDL:	-127.0	PFDX:	21.8	FINDING:	N-	X/21.16
-------	------	----	------	--------	-------	--------	-------	------	----------	----	---------

Ref. to applicable limits | Service | Worst case location
e.g. 21.16, 5.503, 21.13A, 22.40, 5.509C etc.

Frequency assignment with excess

(Frequency | Bandwidth | Emission | Total Peak Power | Maximum Power Density)

Gain | PFD at worst case | PFD Limit | **Max Excess** | Provision

STEERABLE BEAMS

A satellite antenna beam that can be repositioned

Favourable finding under No. 21.16 if:

One position where pfd limits are met

Description of method to meet pfd limits

Position to be identified by BR

Position 2

Higher elevation angle
PFD limits usually less stringent

Position 1

Low elevation
PFD limits usually more stringent

STEERABLE BEAMS

A satellite antenna beam that can be re-pointed



$$\text{PFD} = P_t + G_t(\theta) - 10\log(4\pi R^2)$$

R is longer

R is shorter

Worst case
Most stringent

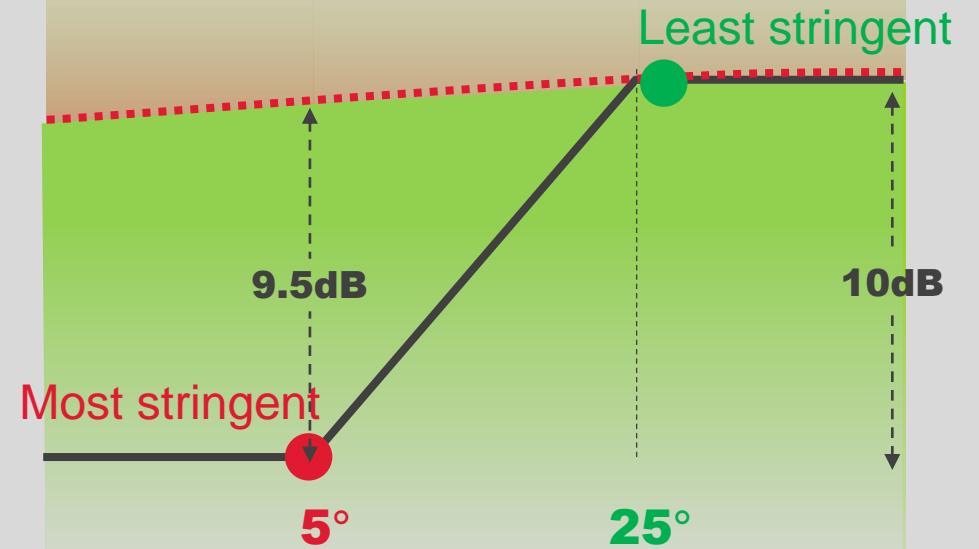
5°

Best case
Least stringent

~25°

Typical PFD Limits Curve

Table 21-4 of Article 21
e.g. C, Ku, Ka-bands FSS GSO



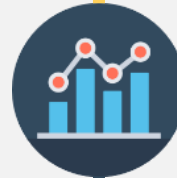
General Rule: For globally steerable beam with worst case location at 5° elevation, max tolerable excess is **9.5 dB**

HARD LIMITS vs TRIGGER

GIBC “Hard Limits” option

To establish findings under
Nos. 9.35/11.31

Excess = Unfavourable (except for
steerable beams, conditions apply)



GIBC “Trigger” option

To identify coordination
requirements under No. 9.36

Excess = Coordination may be
required, Aff Adm needs to confirm,
CR/D

Provisions: 9.14, 9.11, 9.21/C

“TRIGGER LIMITS” REPORT

Satellite Network

└ Beam(s)

└ Group(s)

└ Frequency assignment(s) & **RESULTS**
(Frequency & emission)

Contains list of ALL countries
where PFD trigger is exceeded

“TRIGGER LIMITS” REPORT

```
KU2R      E  STEERABLE      GAIN MAX:  38.5 DBi  POINTING ACC.  0.15 DEG

120641081  EC      250000 KHZ  2D DATE: 06.05.2020 (DP)      A-
11.82500 GHZ      250000 KHZ  EMISS: 27MOG7W--      PEP MAX:  19.9 DBW  PWR DS MAX: -52.1 DBW/HZ
PROV: (22) RR 5.486      SRV: FSS      PROT AREA: ALL WORLD EXCEPT MEX AND USA      REF.BW: 1.000 MHZ
WORST CASE: 111W1926 72N4421/  5.0  CAN      GAIN:  38.5 DB  PFD: -116.9  PFDL: -124.0  PFDX:  7.1  FINDING: N-  9.14

BEN      1.6  BFA      0.9  CAN      7.1  CTI      0.7  DNK/FRO  5.3  DNK/GRL  7.1  F      2.1
G  /FLK   1.8  G      4.7  G  /GCA  2.3  G  /SHN  1.5  G  /TRC  1.0  GHA      1.4  GNE      3.2
IRL      4.0  ISL      6.8  KIR      0.4  MLI      0.5  NGR      0.9  NIG      2.6  STP      2.7
TGO      1.4
```

List of ALL countries where PFD trigger is exceeded | PFD excess in the country

KEY POINTS



RUN

Run GIBC/PFD, check what “hard limits” are exceeded



FIX

Fix before submitting to BR e.g. total power, max power density, antenna diameter, commitment/compliance etc.

For steerable beams, select “B3b1b Method in An1 RoP21.16”

Check (manually) with Table of Frequency Allocation



FAVOURABLE FINDINGS

Record in Master Register for international rights and recognition

Thank you!



cessy.karina@itu.int
ng@itu.int



<https://bit.ly/GIBCPFD>