

WRC-2003 Advisory Committee

IWG-4

Draft U.S. Proposal on WRC-03 Agenda Item 1.32 (Resolution 84)

United States of America

DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda Item 1.32 *To consider technical and regulatory provisions concerning the band 37.5-43.5 GHz, in accordance with Resolutions 128 (Rev.WRC-2000) and 84 (WRC-2000);*

Background information

Various segments of the 37.5 - 43.5 GHz band are allocated to the FS, FSS, BSS and MSS on a co-primary basis. Segments of this band are being used or planned for high-density applications in the FS ("HDFS"), and other segments of the band are planned for deployment of high-density applications in the FSS ("HDFSS"). Co-frequency sharing is not feasible between HDFS and HDFSS systems, but sharing situations where only one of the services operates with ubiquitously deployed small terminals may be practicable.

Significant actions were taken at WRC-2000 with respect to the 37.5 - 43.5 GHz band. Among other things, WRC-2000 adopted provisional power flux-density (pfd) limits for geostationary and non-geostationary satellites in the fixed-satellite service (FSS), in the broadcasting-satellite service (BSS), and in the mobile-satellite service (MSS) in this frequency range. WRC-2000 also called for study of the criteria and techniques to address interference from transmitters of FS into earth station receivers in high-density applications in the FSS in the bands 39.5 - 40.0 GHz and 40.5 - 42.0 GHz intended to operate in the same geographic area.

The ITU-R has now completed its study of the provisional pfd limits adopted for satellites of the FSS, BSS, and MSS in the 37.5-42.5 GHz range, and has concluded that the provisional pfd limits can be confirmed at their current values. In so doing, the ITU-R noted the position of some Region 2 administrations that, to protect certain sensitive FS links in the 37.5-40 GHz band, it would be necessary for a GSO FSS satellite providing service on their territory to reduce the pfd levels that are produced during clear-sky operation by 12 dB from the respective levels in Table 21-4 of Article 21. The ITU-R also acknowledged that these pfd values may constrain the FSS to the use of only large coordinated earth stations in this band. Nevertheless, for both GSO and non-GSO FSS satellites, the ITU-R concluded that it was appropriate to maintain the pfd values in Table 21-4 of Article 21. The confirmation of the provisional pfd limits would provide satisfactory closure to a complex and difficult set of issues that has been intensively studied within the ITU-R for more than five years.

The ITU-R, however, did not complete its study of the criteria and techniques for addressing interference from transmitters of the fixed service into earth station receivers in high-density applications in the bands 39.5-42 GHz and intended for operation in the same geographic area. This aspect of Resolution 84 (WRC-2000) formed an essential part of the overall arrangement between the FSS and the FS in the 37.5-42.5 GHz range. Although study of the pfd-related elements of sharing in the 37.5-42.5 GHz range has been completed and regulations on the subject are able to be finalized at WRC-03, the ITU-R should continue the studies called for in *invites* 6 of Resolution 84 regarding means of addressing interference from transmitters of the FS into earth station receivers in high-density applications in the 40-42 GHz portion of the 39.5-42 GHz band.

Proposals of the United States to implement the conclusions reached by the ITU-R in its studies under Resolution 84, as well to reflect the ITU-R's identification of the area where further study still is needed, are provided below:

**Proposals:
USA/1.32/1
MOD**

TABLE 21-4 (continued)

Frequency band	Service*	Limit in dB(W/m ²) for angle of arrival (δ) above the horizontal plane			Reference bandwidth				
		0°-5°	5°-25°	25°-90°					
37.5-40 GHz	Fixed-satellite (non-geostationary-satellite orbit) Mobile-satellite (non-geostationary-satellite orbit)	-120 ^{10, 16, 17}	-120 + 0.75(δ - 5) ^{10, 16, 17}	-105 ^{10, 16, 17}	1 MHz				
37.5-40 GHz	Fixed-satellite (geostationary-satellite orbit) Mobile-satellite (geostationary-satellite orbit)	-127 ^{16, 17}	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">5°-20°</td> <td style="width: 50%; text-align: center;">20°-25°</td> </tr> <tr> <td style="text-align: center;">-127 + (4/3)(δ - 5) ^{16, 17}</td> <td style="text-align: center;">-107 + 0.4(δ - 20) ^{16, 17}</td> </tr> </table>	5°-20°	20°-25°	-127 + (4/3)(δ - 5) ^{16, 17}	-107 + 0.4(δ - 20) ^{16, 17}	-105 ^{16, 17}	1 MHz
5°-20°	20°-25°								
-127 + (4/3)(δ - 5) ^{16, 17}	-107 + 0.4(δ - 20) ^{16, 17}								
40-40.5 GHz	Fixed-satellite	-115	-115 + 0.5(δ - 5)	-105	1 MHz				
40.5-42 GHz	Fixed-satellite (non-geostationary-satellite orbit) Broadcasting-satellite (non-geostationary-satellite orbit)	-115 ^{10, 16, 17, 18}	-115 + 0.5(δ - 5) ^{10, 16, 17, 18}	-105 ^{10, 16, 17, 18}	1 MHz				
40.5-42 GHz	Fixed-satellite (geostationary-satellite orbit) Broadcasting-satellite (geostationary-satellite orbit)	-120 ^{16, 17, 18}	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">5°-15°</td> <td style="width: 50%; text-align: center;">15°-25°</td> </tr> <tr> <td style="text-align: center;">-120 + (δ - 5) ^{16, 17, 18}</td> <td style="text-align: center;">-110 + 0.5(δ - 15) ^{16, 17, 18}</td> </tr> </table>	5°-15°	15°-25°	-120 + (δ - 5) ^{16, 17, 18}	-110 + 0.5(δ - 15) ^{16, 17, 18}	-105 ^{16, 17, 18}	1 MHz
5°-15°	15°-25°								
-120 + (δ - 5) ^{16, 17, 18}	-110 + 0.5(δ - 15) ^{16, 17, 18}								
42-42.5 GHz	Fixed-satellite (non-geostationary-satellite orbit) Broadcasting-satellite (non-geostationary-satellite orbit)	-120 ^{10, 16, 17, 18}	-120 + 0.75(δ - 5) ^{10, 16, 17, 18}	-105 ^{10, 16, 17, 18}	1 MHz				
42-42.5 GHz	Fixed-satellite (geostationary-satellite orbit) Broadcasting-satellite (geostationary-satellite orbit)	-127 ^{16, 17, 18}	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">5°-20°</td> <td style="width: 50%; text-align: center;">20°-25°</td> </tr> <tr> <td style="text-align: center;">-127 + (4/3)(δ - 5) ^{16, 17, 18}</td> <td style="text-align: center;">-107 + 0.4(δ - 20) ^{16, 17, 18}</td> </tr> </table>	5°-20°	20°-25°	-127 + (4/3)(δ - 5) ^{16, 17, 18}	-107 + 0.4(δ - 20) ^{16, 17, 18}	-105 ^{16, 17, 18}	1 MHz
5°-20°	20°-25°								
-127 + (4/3)(δ - 5) ^{16, 17, 18}	-107 + 0.4(δ - 20) ^{16, 17, 18}								

Reasons: On the basis of its studies under Resolution 84 (WRC-2000), the ITU-R has confirmed the pfd values for FSS, MSS, and BSS satellites in the 37.5-42.5 GHz range. As a result, it is appropriate to remove the provisional status that was placed on these limits by WRC-2000.

USA/1.32/2

SUP

¹⁶ ~~21.16.11~~ Except to the extent provided in No. ~~21.16.12~~, these values are provisional and shall be applied subject to Resolution ~~84 (WRC-2000)~~. (WRC 2000)

Reasons: Consequential to proposal USA/1.32/1.

USA/1.32/3

SUP

¹⁷ ~~21.16.12~~ In the bands 37.5-40 and 40.5-42.5 GHz, notwithstanding any further studies, the power flux density limits in this table shall be applied to stations in the fixed satellite service for which complete coordination (geostationary satellite orbit) or notification information (non-geostationary satellite orbit), as appropriate, has been received by the Bureau after 2 June 2000 and before the end of WRC-03. (WRC 2000)

Reasons: Consequential to proposal USA/1.32/1.

USA/1.32/4

SUP

¹⁸ ~~21.16.13~~ The values given for the broadcasting satellite service are provisional and need review by a future conference. (WRC 2000)

Reasons: Consequential to proposal USA/1.32/1.

USA/1.32/5

MOD

5.551AA In the bands 37.5-40 GHz and ~~40.52~~-42.5 GHz, the power flux-density at the Earth's surface from any FSS space station should be at the level(s) non-geostationary satellite systems in the fixed satellite service should employ power control or other methods of downlink fade compensation of the order of 10 dB, such that the satellite transmissions are at power levels required to meet the desired FSS link availability and performance objectives of the subject applications, but no greater than the relevant power flux-density limits in Table 21-4, while addressing the sharing conditions with while reducing the level of interference to the fixed service. ~~The use of downlink fade compensation methods are under study by the ITU-R (see Resolution 84 (WRC-2000)). (WRC 2000)~~

Reasons: Even with the confirmation of the provisional pfd levels pursuant to ITU-R studies under Resolution 84 (WRC-2000), it is important to the sharing conditions with the FS that the satellite pfd be only at the level required to meet link availability and performance objectives.

**USA/1.32/6
MOD**

40.5-51.4 GHz

Allocation to services		
Region 1	Region 2	Region 3
40.5-41 FIXED FIXED-SATELLITE (space-to-Earth) <u>MOD 5.551AA</u> BROADCASTING BROADCASTING-SATELLITE Mobile 5.547	40.5-41 FIXED FIXED-SATELLITE (space-to-Earth) <u>MOD 5.551AA</u> BROADCASTING BROADCASTING-SATELLITE Mobile Mobile-satellite (space-to-Earth) 5.547	40.5-41 FIXED FIXED-SATELLITE (space-to-Earth) <u>MOD 5.551AA</u> BROADCASTING BROADCASTING-SATELLITE Mobile 5.547

Reasons: Consequential to inclusion of 40.5-42 GHz band in No. S5.551AA, as proposed to be modified in Proposal No. USA/1.32/5 above.

**USA/1.32/7
ADD**

RESOLUTION BSA (WRC-2003)

Means to address interference from transmitters of the fixed service into earth station receivers in high-density applications in the FSS having allocations in the band 40-42 GHz and intended for operation in the same geographic area

The World Radiocommunication Conference (Caracas, 2003),

considering

- a) that this Conference has established power flux-density (pfd) limits for the fixed-satellite service (FSS) (space-to-Earth) in the bands 37.5-40.0 GHz and 40.5-42.5 GHz, and the mobile-satellite service (MSS) (space-to-Earth) in the band 39.5-40 GHz;
- b) that, in the band 37.5-42.5 GHz, Recommendation ITU-R SF.1484-1 recommends maximum pfd levels for non-geostationary (non-GSO) FSS satellites and Recommendation ITU-R SF.[4-9S/BL/3] recommends maximum pfd levels for geostationary (GSO) FSS satellites;
- c) that, although sharing is feasible between FSS earth stations and terrestrial stations provided that appropriate coordination procedures and/or operational techniques are employed, sharing may in practice become difficult when high geographic densities of such stations are deployed in bands heavily used by either service;

- d) that, within the range 40-42 GHz, many administrations plan to deploy FSS systems using ubiquitous very small aperture terminals;
- e) that WRC-2000 invited the ITU-R to undertake, as a matter of urgency, studies on the appropriate criteria and techniques for addressing interference from transmitters of the fixed service into earth station receivers in high-density applications in the FSS having allocations in the bands 39.5-40 GHz and 40.5-42 GHz and intended for operation in the same geographic area;
- f) that the ITU-R has not yet completed the studies described in *considering e)* above;

resolves to invite the ITU-R

1 to undertake, as a matter of urgency, studies on the appropriate criteria and techniques for addressing interference from transmitters of the fixed service into earth station receivers in high-density applications in the FSS having allocations in the band 40-42 GHz and intended for operation in the same geographic area;

2 to report on the results of these studies in time for WRC-06,

recommends

that WRC-06 take appropriate action based on the results of these studies.

Reasons: Work was not completed on *invites 6* from WRC-2000 Resolution 84. This is important work in the overall sharing arrangements for FSS and FS in the 37.5-42.5 GHz frequency range, and should be completed within the interval between WRC-03 and WRC-06. The band under consideration for these studies should be concentrated on the 40-42 GHz band.

USA/1.32/8
SUP

~~RESOLUTION 84 (WRC 2000)~~

~~Power flux-density limits in the bands 37.5-42.5 GHz for the fixed-satellite service, broadcasting-satellite service and mobile-satellite service~~

Reasons: Consequential to the confirmation of the power flux-density levels within the 37.5-42.5 GHz band pursuant to ITU-R study, and the capture in new Resolution BSA of the holdover point from *invites 6* of Resolution 84 (WRC-2000).