PUBLIC NOTICE

Federal Communications Commission
445 12th St., S.W.
Washington, D.C. 20554

News Media Information 202 / 418-0500
Fax-On-Demand 202 / 418-2830
TTY 202 / 418-2555
Internet: http://www.fcc.gov
ftp.fcc.gov

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THE FCC'S ADVISORY COMMITTEE FOR THE 2003 WORLD RADIOCOMMUNICATION CONFERENCE APPROVES DRAFT PROPOSALS

On June 4, 2002, the World Radiocommunication Conference Advisory Committee (WRC-03 Advisory Committee) adopted recommendations to the Commission on numerous issues that the 2003 World Radiocommunication Conference (WRC-03) will address. The WRC-03 Advisory Committee was established by the Commission in January 2001 to assist it in the development of proposals for WRC-03. To that end, the WRC-03 Advisory Committee has forwarded the recommendations it has developed since the beginning of 2001 to the Commission for consideration. We have attached to this Public Notice the WRC-03 Advisory Committee's recommendations, which are in the form of recommended draft proposals to the WRC-03. We appreciate the substantial amount of work that the WRC-03 Advisory Committee has put into developing its recommendations. This Public Notice requests comments on all of these recommendations.

Based upon our initial review of the recommendations forwarded to the Commission, the International Bureau, in coordination with other Commission Bureaus and Offices, tentatively concludes that we can generally support all of the proposals recommended by the WRC-03 Advisory Committee. We do, however, have some reservations about the proposals reflected in documents WAC/113 and WAC/115. We also take note of the concerns expressed by some WRC-03 Advisory Committee participants on the proposals in document WAC/115. We seek comment on the recommendations that appear in all of the WRC-03 Advisory Committee documents and on our tentative conclusions.

In addition, the National Telecommunications and Information Administration (NTIA) has submitted letters to the Commission containing draft proposals that have been developed by the Executive Branch Agencies. We also request comment on these draft proposals, which are attached hereto as well.

The FCC will consider the draft proposals and comments provided in its upcoming consultations with the U.S. Department of State and NTIA in the development of U.S. proposals to WRC-03. Once agreed by these agencies of the U.S. Government, proposals will be used by U.S. delegations at bilateral, regional and international meetings. The draft proposals attached to this Public Notice may evolve as we approach WRC-03 and during the course of interagency discussions. Therefore, they do not constitute the final national position on these issues.

The complete texts of these draft proposals are also available in the FCC's Information Reference Center, Room CY-A257, 445 12th Street, SW, Washington, DC 20554 and by accessing the FCC's WRC-03 world wide web site at http://www.fcc.gov/wrc-03. To comment on the proposals, please submit an original and one copy of your comments to the Office of the Secretary, Federal Communications Commission, 445 12th Street, SW, Washington, DC 20554 and provide a courtesy copy to Alex Roytblat, FCC WRC-03 Director, Room 6-B505. Comments should refer to specific proposals by document number. The deadline for comments on the draft proposals and NTIA letters is **July 12, 2002**.

I. Informal Working Group 2: Mobile-Satellite Service including GPS

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Doc. WAC/109(04.06.02)

(Joint IWG-2/IWG-3 Draft Proposal)

WRC-03 Agenda Item 1.8.2: to consider issues related to unwanted emissions: consideration of the results of studies, and proposal of any regulatory measure regarding the protection of passive services from unwanted emissions, in particular from space service transmissions, in response to Recommends 5 and 6 of Recommendation **66 (Rev. WRC-2000)**;

Background Information

Recommends 5 and 6 of Recommendation 66 (Rev. WRC-2000) state:

"5. study those frequency bands and instances where for technical or operational reasons, more stringent spurious emission limits than the general limits in Appendix 3 may be required to protect safety services and passive services such as radio astronomy, and the impact on all concerned services of implementing or not implementing such limits;

6. study those frequency bands and instances where for technical or operational reasons, out-of-band limits may be required to protect safety services and passive services such as radio astronomy, and the impact on all concerned services of implementing or not implementing such services."

The lead responsibility for carrying out the referenced studies was Task Group 1/7. It developed a methodology for analyzing compatibility between a passive service and an active service allocated in different bands and providing guidance on possible solutions. These are reflected in Draft New Recommendation ITU-R SM.[BbB]. This DNR identifies passive service bands where it could be technically and/or economically difficult for active services to meet the passive protection criteria. In such cases, specific band-by-band studies have been carried out and are documented in this DNR. The actual impact on all concerned services of implementing or not implementing such limits are taken into account.

The studies were conducted in over 20 band pairs where compatibility concerns had been raised. The methodology and rationale for these studies are given in Recommendation ITU-R SM.[BbB]. In a certain number of these band pairs, incompatibilities between existing or planned active and passive systems were identified under the given operational conditions. Other band pairs

were found to be compatible under conditions specific to each band pair. Within the bands considered, not all studies have been completed.

The CPM text reflects three methods for solving this agenda item. The first has three variations and envisions inclusion of limits in the Radio Regulations. The second is a consultative process between concerned administrations. The third includes no modification of the Radio Regulations. The DNR indicated above is a comprehensive evaluation of the problem areas associated with this agenda item.

All but one of these methods involves incorporation of some or all unwanted emission limits identified in the DNR into the Radio Regulations, or modification of the Radio Regulations to provide for the consultative process. Up to now, the only Radio Regulations which generally deal with unwanted emissions are Appendix 3, and No. 4.6.

Inclusion of explicit unwanted emission provisions directly in the radio regulations would place a burden on administrations to confirm that satellites are compliant with these regulations. There would be additional cost, project delays, and further burden on manufacturers.

Putting mandatory measures in the Radio Regulations is less responsive to technical advances and mitigation methods, and could preclude effective consultation between active and passive services. Also, the results of the band-by-band study would be ignored and effective co-existence between the services would suffer.

Proposals:

USA/1.8.2/l

NOC

Reason: The United States endorses Method 3 of the CPM text. This method would not require a change to any part of the Radio Regulations, e.g. Articles 5, 21, 29 and Appendix 3, and would rely on the application of ITU-R Recommendations, such as RA.769, SA.1029, SM[BbB]. These provide guidance to Administrations who wish to use them as to how to protect the passive services.

Under this method, administrations have full flexibility to implement which ITU-R Recommendations they consider appropriate. Revision of such Recommendations in order to adapt to changing technology can be achieved more easily than mandatory limits. Such mandatory limits could only be changed at WRCs, and consequently would probably be continuously on the agenda.

USA/1.8.2/2

SUP

~~Recommendation 66 (Rev/WRC-2000)~~

~~Studies of the Maximum Permitted Levels of Unwanted Emissions.~~

Reason: The studies called for by this Recommendation have been essentially completed. Any additional needs of the passive services can be dealt with through modification of appropriate Recommendations. There is no reason to keep this topic on future agendas.

MODIFICATIONS TO DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Doc. WAC/110(04.06.02)

Proposal for Resolution 605

WRC-03 Agenda Item 1.15a: to review the results of studies concerning the radionavigation-satellite service in accordance with Resolutions **604 (WRC-2000)**, **605 (WRC-2000)** and **606 (WRC-2000)**;

Background Information: WRC-2000 introduced new allocations in the band 1 164-1 215 MHz for use by the radionavigation-satellite service (RNSS) (space-to-space) and (space-to-Earth) with a provisional aggregate power-flux-density (pfd) limit of -115 dB (W/m^2) in any 1 MHz band produced at the Earth's surface by all space stations within all RNSS systems and for all angles of arrival. It also stated in **5.328A** of the Radio Regulations that the provisions of Resolution **605 (WRC-2000)** apply. There was extensive discussion at WRC-2000 with regard to the need for a pfd limit and the value needed to protect aeronautical radionavigation service (ARNS) systems (including Distance Measuring Equipment (DME)). Resolution **605 (WRC-2000)** requested the ITU-R to study the technical, operational, and regulatory aspects of compatibility between RNSS and ARNS in the band 9 60-1 215 MHz, including an assessment of the need for an aggregate pfd limit. If such a need exists, the ITU-R was requested to revise, if necessary the provisional pfd limit given in **5.328A** concerning the operation of RNSS systems in the frequency band 1 164 – 1 215 MHz.

The ITU-R has determined that ARNS systems require protection from the aggregate of emissions from RNSS systems and networks that collectively exceed –116.8 dB (W/m^2) in any 1 MHz produced at the Earth's surface. There is, however, no reliable way for the Radiocommunication Bureau (BR) to validate compliance by all RNSS systems with an aggregate pfd limit. Studies within the ITU-R reveal that there are a number of profound technical and regulatory reasons why establishment of the regulatory device of a permanent aggregate pfd limit on RNSS emissions in the 1 164-1 215 MHz band would fail to provide the protection to ARNS systems that is required and intended under **No. 5.328A** of the Radio Regulations. It would significantly and unduly constrain the development and implementation of RNSS systems in this band.

Addressing Resolution **605 (WRC-2000)**, the United States has a strong need for both use of the RNSS spectrum and the continued operation of ARNS systems in the 1 164-1 215 MHz band. Furthermore, the U.S. is committed to protecting current and future ARNS systems operating in the same band as RNSS from harmful interference. This protection needs to be provided without unnecessarily delaying or hindering the implementation and provision of RNSS (space-to-Earth).

Based on its studies, the ITU has identified a single regulatory approach for achieving the meaningful protection of the ARNS without unduly constraining RNSS development and operation. This approach mandates the provision of aggregate interference protection at the level identified in ITU-R studies, but commits enforcement of the requirement to those administrations that actually operate and actually intend to operate RNSS systems. The approach manages the total amount of interference caused by these systems through the collaborative agreement on the part of administrations proposing and operating the RNSS systems. In this manner, there is no additional regulatory burden for the BR (which will not be tasked to validate compliance with the protection criterion); there will be a need for coordination among RNSS operators (both formal in an Article **9** sense and informal thereafter pursuant to the provisions of the proposed new resolution and associated provisions in the Radio Regulations); and neither ARNS systems nor RNSS operators are faced with artificial or insufficient

regulations that could leave them exposed to interference or forced to make unnecessary adjustments that inhibit the efficient use of the orbital/spectrum resource. The approach also takes account of the Radio Regulations Board (RRB) concern about having multiple inconsistent regulations applicable to the same band.

Proposal:

USA/ /1
(MOD)

960-1 215 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
960-1 215	AERONAUTICAL RADIONAVIGATION 5.328 **MOD** 5.328A	

Reasons: Consequential change.

USA/ /2
NOC

5.328

Reasons: The current text is adequate.

USA/ /3
MOD

5.328A *Additional allocation:* the band 1 164-1 215 MHz is also allocated to the radionavigation-satellite service (space-to-Earth) (space-to-space) on a primary basis. ~~The aggregate power flux-density produced by all the space stations of all radionavigation-satellite systems at the Earth's surface shall not exceed the provisional value of –115 dB(W/m^2) in any 1 MHz band for all angles of arrival.~~ Stations in the radionavigation-satellite service in the band 1 164-1 215 MHz shall ~~not cause harmful interference to, nor claim protection from, stations of the aeronautical radionavigation service~~operate in accordance with the provisions of Resolution **RNSS (WRC-03)** ~~**605 (WRC-2000)**~~ and shall not claim protection from stations in the aeronautical-radionavigation service. **No. 5.43A** does not apply. Use of the band 1 164-1 215 MHz by the radionavigation-satellite service is subject to the application of the provisions of Nos. **9.12**, **9.12A**, and **9.13**. The provisions of **No. 21.18** apply.

Reasons: The suppression of the second and modification of the third sentence reflect the incorporation into new Resolution **RNSS (WRC-03)** and associated Radio Regulations (see below) of the mechanisms for ensuring the protection of ARNS against harmful interference from RNSS (space-to-Earth) systems.

By making non-geostationary (non-GSO) RNSS systems subject to Article **9** coordination obligations with respect to each other and with geostationary (GSO) RNSS systems (**Nos. 9.12** and **9.12A**), and by making GSO RNSS systems coordinate with non-GSO RNSS systems under **No. 9.13**, the Radio Regulations will provide an early start on discussions between administrations operating or planning to operate RNSS systems. This will help ensure that the objective of assuring compliance with the aggregate protection criterion for ARNS in new Resolution **RNSS (WRC-03)** (see below) is met. GSO RNSS systems are already obliged to coordinate with each other under **No. 9.7**.

Discussions between RNSS administrations, both during formal coordination and after, are critical to the success of the regulatory determination to commit to administrations the obligation to ensure that the aggregate protection criterion of the ARNS is satisfied. Thus, the new provision in new **No. S21.18** (see below) is specifically referenced.

USA/ /4
ADD

Section VI – Protection of aeronautical radionavigation service systems from aggregate emissions of space stations of radionavigation-satellite service systems in the 1 164-1 215 MHz band

21.18 § 7 Administrations operating or planning to operate radionavigation-satellite service systems or networks in the 1 164-1 215 MHz frequency band, for which complete coordination or notification information, as appropriate, was received by the Bureau after 2 June 2000, shall, in accordance with *resolves* 2 of Resolution **RNSS (WRC-03)**, take all necessary steps to ensure that the actual aggregate interference into aeronautical radionavigation service systems caused by such RNSS systems or networks operating co-frequency in these frequency bands does not exceed the aggregate power level shown in *resolves* 1 Resolution **RNSS (WRC-03)**.

Reasons: Article **21** of the Radio Regulations addresses sharing between terrestrial and space services in frequency bands above 1 GHz. Placement of this provision in a new Section **VI** of Article **21** brings into the Radio Regulations the critical elements from new Resolution **RNSS (WRC-03)** (see proposal below) that make mandatory the collective obligation of administrations operating RNSS systems at 1 164-1 215 MHz to ensure that the aggregate protection criterion from *resolves* 1 of Resolution **RNSS** is not exceeded, as well as the requirement to reduce emissions if administrations operating ARNS systems identify excess emission levels.

USA/ /5
ADD

RESOLUTION RNSS (WRC-2003)

Protection of aeronautical radionavigation service systems from the aggregate power flux-density produced by radionavigation-satellite service networks and systems in the 1 164-1 215 MHz frequency band

The World Radiocommunication Conference (Caracas, 2003),

considering

a) that the band 960-1 215 MHz is allocated on a primary basis to the aeronautical radionavigation service (ARNS) in all Regions;

b) that the band 1 164-1 215 MHz is also allocated on a primary basis to the radionavigation-satellite service (RNSS), subject to the condition in **No. 5.328A** that operation of RNSS systems shall be in accordance with this Resolution;

c) that protection of the ARNS from harmful interference can be achieved if the value of the equivalent power flux-density (epfd) produced by all the space stations of all RNSS (space-to-Earth) systems in the band referred to in *considering* a) does not exceed the level of –121.5dB(W/m^2) in any 1 MHz band;

d) that WRC-2000 adopted Resolution **605 (WRC-2000)** to provide for implementation of a provisional aggregate power flux-density limit during the period between WRC-2000 and WRC-2003, and requested ITU-R studies on the need for an aggregate pfd limit, and revision, if necessary, of the provisional pfd limit given in No. **5.328A**;

e) that only a limited number of RNSS systems are expected to be deployed in the 1 164-1 215 MHz band, and only a few of these systems at most would have overlapping frequencies;

f) that ARNS systems can be protected without placing undue constraints on the development and operation of RNSS systems in this band;

g) that to achieve the objectives in *considering* f), administrations operating RNSS systems will need to agree cooperatively to achieve the level of protection for ARNS systems that is stated in *considering* c);

h) that it may be appropriate for representatives of administrations operating ARNS systems to be involved in determinations made pursuant to *considering* g);

resolves

1 that, in order to protect ARNS systems, administrations shall ensure, without validation by the Radiocommunication Bureau pursuant either to **No. S11.31** or **S9.35** of the Radio Regulations, that the equivalent pfd level produced by all space stations of all RNSS systems does not exceed the level, –121.5 dB(W/m^2) in any 1 MHz band;

2 that administrations operating or planning to operate in the 1 164-1 215 MHz frequency band RNSS systems or networks for which complete coordination or notification information, as appropriate, was received by Radiocommunication Bureau after 2 June 2000, in collaboration, shall take all necessary steps, including by means of appropriate modifications to their systems or networks, to ensure that the aggregate interference into ARNS systems caused by such RNSS systems or networks operating co-frequency in these frequency bands does not exceed the level of the aggregate protection criterion given in *resolves* 1 above;

3 that administrations, in carrying out their obligations under *resolves* 1 and 2 above, shall take into account only those RNSS systems with frequency assignments in the band 1 164-1 215 MHz that have met all of the milestones listed in the Annex to this Resolution;

4 that no single RNSS system shall be permitted to use up the entire interference allowance specified in *resolves* 1 above in any 1 MHz of the 1164-1215 MHz band;

5 that administrations shall communicate to the Bureau the results of any aggregate sharing determinations made in application of *resolves* 2 above, without regard to whether such determinations result in any modifications to the published characteristics of their respective systems or networks;

6 that administrations operating ARNS systems in the 1 164-1 215 MHz band should participate, as appropriate, in discussions and determinations relating to the resolves above,

invites the ITU-R

to continue to develop, as a matter of urgency a suitable methodology for calculating the epfd produced by all RNSS systems operating or planning to operate co-frequency in the 1 164-1 215 MHz frequency band into ARNS systems, which may be used by administrations to determine whether the systems are in compliance with the epfd levels given in *resolves* 1 above.

ANNEX
Milestone Criteria for Application of Resolution RNSS

1. Submission of appropriate ITU Advance Publication, and Coordination or Notification documentation.

2. Entry into satellite manufacturing or procurement agreement:

   The RNSS system or network operator should possess clear evidence of a binding agreement for the manufacture or procurement of its satellites. The agreement should identify the contract milestones leading to the completion of manufacture or procurement of satellites required for the service provision. The Notifying Administration is responsible for authenticating the evidence of agreement and providing such evidence to other interested administrations in furtherance of its obligations under this Resolution.

3. Entry into satellite launch agreement:

   The RNSS system or network operator should possess clear evidence of a binding agreement to launch its satellites. The agreement should identify the launch date, launch site, and launch service provider. The Notifying Administration is responsible for

authenticating the evidence of agreement and providing such evidence to other interested administrations in furtherance of its obligations under this Resolution.

Reasons: This resolution and annex, along with incorporating provisions in Articles **5** (MOD **5.328A**) and **21** (ADD Section VI), provides the mechanism by which administrations operating or planning to operate RNSS systems, all of which also operate co-frequency ARNS systems, will undertake the responsibility for ensuring the protection of ARNS systems. The resolution recognizes that there is a need for discussions between and among administrations operating RNSS systems to ensure compliance with the obligation to protect ARNS systems, and that such discussions may involve administrations operating ARNS systems. Resolution **RNSS** thus provides a basis for managing the total aggregate interference caused to ARNS systems by real RNSS systems.

USA/ /6
SUP

~~RESOLUTION 605 (WRC-2000)~~

Reasons: This resolution is no longer needed because of the changes made to **5.328A,** the addition of Section **VI** to Article **21** and the addition of Resolution **RNSS**.

USA/ /7
MOD

TABLE 5-1 (*continued*)

Reference of Article 9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **9.7** GSO/GSO (*cont.*)		3) 17.7-20.2 GHz, and 27.5-30 GHz	i) Bandwidth overlap, and ii) any network in the FSS with a space station within an orbital arc of ±8° of the nominal orbital position of a proposed network in the FSS	Appendix **8**	the network of this administration will not be affected because value of $\Delta T/T$ calculated by the method in § 2.2.1.2 and 3.2 of Appendix **8** do not exceed 6%. When the Bureau, at the request of an administration, studies this information pursuant to No. **9.42**, the calculation method given in § 2.2.1.2 and 3.2 of Appendix **8** shall be used
		4) 1 164 – 1 215 MHz	Bandwidth overlap		
		5) All frequency bands, other than those in § 1), 2) and 3), allocated to a space service, and the bands in § 1), 2) and 3) where the radio service of the proposed network or affected networks is other than the FSS, or in the case of coordination of space stations operating in the opposite direction of transmission	Value of $\Delta T/T$ exceeds 6%		

Reasons: Consequential.

II. Informal Working Group 3: Fixed-Satellite Service/Broadcasting Satellite Service

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Doc. WAC/109(04.06.02)

(Joint IWG-2/IWG-3 Draft Proposal)

WRC-03 Agenda Item 1.8.2: to consider issues related to unwanted emissions: consideration of the results of studies, and proposal of any regulatory measure regarding the protection of passive services from unwanted emissions, in particular from space service transmissions, in response to Recommends 5 and 6 of Recommendation **66 (Rev. WRC-2000)**;

[Presented in Section I as a joint IWG-2/IWG-3 Draft Proposal]

MODIFICATION TO DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Doc. WAC/111(04.06.02)

WRC-03 Agenda Item 1.37: to consider the regulatory and technical provisions for satellite networks using highly elliptical orbits (HEOs);

Background information

The ITU-R has been considering the sharing aspects of HEO satellite systems (occasionally referred to as "quasi-geostationary" systems) in a number of contexts over the last several years.

A subcategory of non-geostationary (non-GSO) systems, HEO systems are intended for operation or are already operational in several fixed-satellite service (FSS) bands above 3 GHz. In certain configurations, HEO systems potentially facilitate the introduction of large numbers of co-frequency non-GSO FSS systems and promote successful co-existence with GSO networks and terrestrial systems.

To date, several categories of orbits that are encompassed within the term "highly-elliptical" have been identified within the ITU-R. All highly-elliptical orbits, however, are non-geostationary orbits, and all HEO systems are non-geostationary systems. In this regard, recent studies in certain frequency bands between 10 and 30 GHz resulted in a series of new regulations in Articles **21** and **22** that were adopted at the 1997 and 2000 WRCs, including pfd limits on non-GSO FSS systems to protect terrestrial systems and epfd limits on non-GSO FSS systems to protect GSO FSS and broadcasting-satellite service (BSS) networks. The pfd and epfd limits and associated provisions that were imposed on non-GSO FSS systems in the applicable segments of the 10-30 GHz band apply to non-GSO FSS systems in highly-elliptical orbits.

Five of the six following proposals under agenda item 1.37 are intended to avoid any potential confusion regarding the applicability of regulations in Articles **21** and **22** that were adopted at WRC-2000 to all non-GSO systems, including those employing highly-elliptical orbits, and to confirm the ITU-R conclusion that no change is needed to Article **1** or Article **5** in order to accommodate the introduction of non-GSO systems using highly-elliptical orbits. The sixth proposal, for pfd limits at 3.7-4.2 GHz for non-GSO satellites, results from the fact that studies of the pfd values that adequately protect the FS in the 3.7-4.2 GHz band from satellites in highly-elliptical orbits are of sufficient maturity in the ITU-R to enable pfd limits to be established that would protect the FS from HEO emissions, as well as from other types of non-GSO FSS satellite emissions.

Proposals:
USA/ /1
NOC

ARTICLE 1

Terms and definitions

Reasons: Satellite networks using HEOs should continue to be considered as non-GSOs so there is no need to modify the terms and definitions in the Radio Regulations to accommodate HEO-type non-GSO operations.

USA/ /2
NOC

ARTICLE 5

Frequency allocations

Reasons: Satellite networks using HEOs should continue to be considered as non-GSOs and these networks should continue to be considered to have the same regulatory standing as other types of non-GSOs, such as MEOs and LEOs.

USA/ /3
MOD

TABLE **21-4** (WRC-2000)

Frequency band	**Service***	**Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane**			**Reference bandwidth**
		0°-5°	**5°-25°**	**25°-90°**	
* * *					
3 400-4 200 MHz 4 500-4 800 MHz 5 670-5 725 MHz (Nos. **5.453** and **5.455**) 7 250-7 850 MHz	Fixed-satellite (space-to-Earth, geostationary-satellite orbit) Meteorological-satellite (space-to-Earth) Mobile-satellite Space research	–152	–152 + 0.5(δ – 5)	–142	4 kHz
3 700-4 200 MHz	Fixed-satellite (space-to-Earth, non-geostationary-satellite orbit)	–160	–160 + 0.5(δ – 5)	–150	4 kHz
* * *					

Reasons: The FS in the 3.7-4.2 GHz band would be adequately protected by the adoption of limits on pfd produced by highly-elliptical orbit non-GSO satellites. As the levels would also adequately protect the FS from other types of non-GSO satellites, they are proposed for application to all non-GSO FSS satellites, in order to avoid having to introduce a definition of HEO satellites or otherwise subcategorize non-GSO satellites. The levels for non-GSO FSS satellites have been converted to a 4 kHz reference bandwidth from the levels of –126/–136 dB(W/m²) in 1 MHz that are reflected in the CPM Report.

USA/ /4
NOC

TABLE **21-4** *(continued)*

Frequency band	Service*	Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
* * *					
10.7-11.7 GHz	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	–126	–126 + 0.5(δ – 5)	–116	1 MHz
11.7-12.5 GHz (Region 1) 12.5-12.75 GHz (Region 1 countries listed in Nos. **5.494** and **5.496**) 11.7-12.7 GHz (Region 2) 11.7-12.75 GHz (Region 3)	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	–124	–124 + 0.5(δ – 5)	–114	1 MHz
* * *					
17.7-19.3 GHz 7, 8	Fixed-satellite (space-to-Earth) Meteorological-satellite (space-to-Earth)	–115 12*bis* or –115 – *X* 12	–115 + 0.5(δ – 5) 12*bis* or –115 – *X* + ((10 + *X*)/20)(δ – 5) 12	–105 12*bis* or –105 12	1 MHz
* * *					

Reasons: The current limits and associated provisions in Section V of Article 21 that were finalized at WRC-2000 for all non-GSO FSS systems in certain bands between 10 and 30 GHz apply in full to non-GSO FSS systems in highly-elliptical orbits. No additional regulatory provisions are needed for HEO systems in these bands.

USA/ /5
NOC

ARTICLE 22

Space services[1]

Section II – Control of interference to geostationary-satellite systems

Reasons: The current limits and associated provisions in Section II of Article 22 that were finalized at WRC-2000 for all non-GSO FSS systems in certain bands between 10 and 30 GHz apply in full to non-GSO FSS systems in highly-elliptical orbits and are necessary for the protection of co-frequency GSO FSS and

BSS systems. No additional regulatory provisions are needed for HEO systems in these bands, and no lessening of the protection required by GSO systems in the same bands should be considered.

USA/ /6
NOC

RESOLUTION 76 (WRC-2000)

Protection of geostationary fixed-satellite service and geostationary broadcasting-satellite service networks from the maximum aggregate equivalent power flux-density produced by multiple non-geostationary fixed-satellite service systems in frequency bands where equivalent power flux-density limits have been adopted

Reasons: The current provisions in Resolution **76 (WRC-2000)** for protection of GSO FSS and BSS networks from the maximum aggregate epfd produced by multiple non-GSO FSS systems in certain bands between 10 and 30 GHz apply in full to non-GSO FSS systems in highly-elliptical orbits and are necessary for the protection of co-frequency GSO FSS and BSS systems. No additional regulatory provisions are needed for HEO systems in these bands, and no lessening of the protection required by GSO systems in the same bands should be considered.

III. Informal Working Group 4: Fixed Service/Fixed-Satellite Service Sharing

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Doc. WAC/112(04.06.02)

(*Additional Draft Proposals on Agenda Item 1.26)*

WRC-03 Agenda Item 1.26: to consider provisions under which earth stations located on board vessels could operate in fixed satellite networks, taking into account the ITU-R studies in response to Resolution **82 (WRC-2000)**;

Background Information:

The Conference Preparatory text for WRC-03 provides information on 1) Analysis of studies; 2) Methods to Satisfy the agenda and 3) Regulatory and Procedural Considerations. In the first, the text notes that "to ensure the protection of the FSS networks, ESVS would also have to comply with off-axis limits given in Recommendation ITU-R S.524; these limits should be met under normal operating conditions."

In the last section it is also noted "by some administrations that under current Radio Regulations, the class of station and the category of allocation of both and space stations need to be matched with each other.

The paragraphs below are intended to address these issues. The first proposal is parallel to that in No. 1.68. In the second proposal the values for the band 5925-6425 MHz are taken from Recommendation ITU-R S.524, and the values for the band 14.0-14.5 GHz are taken from Recommendation ITU-R S.728.

Proposal

USA/1.26/7

ADD Article 1, Section IV

1.68 bis: earth station on board a vessel: An earth station operating in certain bands of the fixed satellite service located on board a vessel and intended to be used while in motion or during halts at unspecified points.

Reason: Adding this definition will ensure that the class of station and the category of allocation of both earth and space stations will be matched to each other.

A consequence of this definition may be the need to make reference to ESV in the definition of the FSS in No. 1.21.

USA/1.26/8

ADD Footnote **5.ESV**

5.ESV

For earth stations on board vessels (see 1.68 bis) operating in the 5925-6425 MHz band, at any angle φ specified below, off the main-lobe axis of an earth-station antenna, the maximum e.i.r.p. in any direction within 3° of the GSO shall not exceed the following values:

Angle off-axis	*Maximum e.i.r.p. per 4 kHz band*
$2.5° \leq \varphi \leq 7°$	(32 – 25 log φ) dB(W/4 kHz)
$7° < \varphi \leq 9.2°$	11dB(W/4 kHz)
$9.2° < \varphi \leq 48°$	(35 – 25 log φ) dB(W/4 kHz)
$48° < \varphi \leq 180°$	– 7 dB(W/4 kHz)

For earth stations on board vessels (see 1.68 bis) operating in the 14.0-14.5 GHz band, at any angle φ specified below, off the main-lobe axis of an earth-station antenna, the maximum e.i.r.p. in any direction within 3° of the GSO shall not exceed the following values:

Angle off-axis	*Maximum e.i.r.p. in any 40 kHz band*
$2° \leq \varphi \leq 7°$	33 – 25 log φ dBW
$7° < \varphi \leq 9.2°$	12 dBW
$9.2° < \varphi \leq 48°$	36 – 25 log φ dBW
$\varphi > 48°$	– 6 dBW

Coordination agreements between fixed-satellite service networks under Article 9, may result in lower off-axis e.i.r.p. levels.

Reason: In order to ensure that the off axis e.i.r.p. performance of ESVs operating in FSS networks is consistent with that of earth stations already operating in these networks in these bands, and to ensure efficient use of the GSO.

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Doc. WAC/113(04.06.02)

*(WRC-03 Agenda Item 1.32 (Resolution **84**))*

WRC 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 pfds 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/m²) 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~~	**5°-20°**: –127 + (4/3) (δ – 5) ~~16, 17~~ **20°-25°**: –107 + 0.4 (δ – 20) ~~16, 17~~	–105 ~~16, 17~~	1 MHz
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~~	**5°-15°**: –120 + (δ – 5) ~~16, 17, 18~~ **15°-25°**: –110 + 0.5 (δ – 15) ~~16, 17, 18~~	–105 ~~16, 17, 18~~	1 MHz
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~~	**5°-20°**: –127 + (4/3) (δ – 5) ~~16, 17, 18~~ **20°-25°**: –107 + 0.4 (δ – 20) ~~16, 17, 18~~	–105 ~~16, 17, 18~~	1 MHz

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 40.5~~2~~-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 pfds 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) MOD 5.551AA BROADCASTING BROADCASTING-SATELLITE Mobile 5.547	**40.5-41** FIXED FIXED-SATELLITE (space-to-Earth) MOD 5.551AA BROADCASTING BROADCASTING-SATELLITE Mobile Mobile-satellite (space-to-Earth) 5.547	**40.5-41** FIXED FIXED-SATELLITE (space-to-Earth) MOD 5.551AA 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).

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Doc. WAC/114(04.06.02)

*(WRC-03 Agenda Item 1.32 (Resolution **128**))*

WRC-03 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

The band 42.5 - 43.5 GHz is allocated to the Radioastronomy (RA) service on a co-primary basis, while the frequency bands immediately below 42.5 GHz are allocated to the FSS and BSS (both space-to-Earth) on a co-primary basis with each other and with terrestrial services. To protect operating RA stations, WRC-2000 established a new footnote, No. **5.551G**, which contains a provisional PFD limit - not to exceed -167 dB(W/m^2) in any 1 MHz band at the site of a radio astronomy station for more than 2% of the time - on emissions produced into the 42.5 - 43.5 GHz band by non-GSO FSS or BSS systems operating in the 41.5 - 42.5 GHz band. A similar limit was imposed on emissions that GSO FSS or BSS satellites operating in the 42.0 - 42.5 GHz band may produce at the sites of RA stations operating in the 42.5 - 43.5 GHz band.

Pursuant to Resolution **128 (Rev. WRC-2000)**, the ITU-R was to conduct studies to review these provisional PFD limits; to identify technical and operational measures in the band 41.5 – 42.5 GHz, including possible mitigation techniques to protect RA operations; and to propose measures that may be implemented to reduce the susceptibility of stations in the RA to harmful interference. Issues to be addressed included:

- Adequacy of provisional limits on power flux-density (PFD) produced into the sites of radio astronomy service (RAS) stations operating in the band 42.5 - 43.5 GHz by non-GSO satellites operating in the space-to-Earth direction in the fixed-satellite service (FSS) or broadcasting-satellite service (BSS) in the band 41.5 - 42.5 GHz, and by GSO FSS or BSS satellites operating in the space-to-Earth direction in the band 42.0 - 42.5 GHz.

- Identification of technical and operational measures that FSS/BSS satellite networks can take to protect RA operations in the 42.5 - 43.5 GHz band, and of measures that may be implemented by RA service users to reduce the susceptibility of stations in the RA service to harmful interference.

The U.S. is of the view that, in order to protect radio astronomy observations in the 42.5-43.5 GHz band from out-of-band emissions from FSS and BSS satellites in the adjacent bands below 42.5 GHz and simultaneously providing the maximum opportunities for satellites, the preferred approach is to establish interference thresholds in the Radio Regulations for GSO satellites and non-GSO satellites operating in the 42-42.5 GHz band. If the thresholds would be exceeded for more than 2% of the time, the satellite administration would have to enter into bilateral arrangements with affected radio astronomy administrations to resolve the excess interference. The process for reaching such arrangements would be specified in a new Resolution XXX.

Proposals to reflect these views are provided below:

Proposals:

USA/1.32/A
MOD

5.551G The interference threshold in terms of the aggregate power flux-density ~~in the 42.5-43.5 GHz band~~ produced by all the space stations in any non-GSO FSS (space-to-Earth) or BSS (space-to-Earth) system operating in the 42~~1.5~~-42.5 GHz band shall be –137 dB (W/m^2/GHz) for continuum observations in the 42.5-43.5 GHz band, and –153 dB(W/m^2/500 kHz) for spectral line observations in the 42.78-43.5 GHz band, ~~not exceed –167 dB (W/m^2) in any 1 MHz band~~ at the site of a radio astronomy station where single-dish radiotelescope observations are being conducted in the 42.5-43.5 GHz band. ~~station for more than 2% of the time.~~ The interference threshold in terms of the power flux-density in the band 42.5-43.5 GHz produced by any GSO FSS (space-to-Earth) or BSS (space-to-Earth) station operating in the band 42.0-42.5 GHz shall be –137 dB (W/m^2/GHz) for continuum observations in the 42.5-43.5 GHz band, and –153 dB(W/m^2/500 kHz) for spectral line observations in the 42.78-43.5 GHz band, at the site of a radio astronomy station where single-dish radiotelescope observations are being conducted in the 42.5-43.5 GHz band. If an administration determines that the thresholds above would be exceeded for more than 2% of the time, bilateral arrangements between affected administrations would be required. The provisions of Resolution XXX (WRC-03) shall apply.~~not exceed –167 dB (W/m^2) in any 1 MHz band at the site of a radio astronomy station. These limits are provisional and will be reviewed in accordance with Resolution **128 (Rev.WRC-2000)**~~.

Reasons: Studies in the ITU-R have shown that unwanted emissions from FSS and BSS satellites operating below 42 GHz are not a potential difficulty for radio astronomy observations in the 42.5-43.5 GHz band. Studies have also shown that unwanted emissions from FSS and BSS satellites in the 42-42.5 GHz band are not a potential difficulty for VLBI observations by radio astronomy stations in the 42.5-43.5 GHz band. As for single dish telescopes conducting observations on the spectral lines mentioned in Recommendation ITU-R RA.314-8, there is the potential for interference from FSS and BSS satellites operating in the 42-42.5 GHz band. In the latter cases, however, the number of single-dish radiotelescope stations operating around the world is small enough, and the characteristics of the FSS and BSS downlink transmissions are such, that it is preferable to manage such potential interference cases through bilateral arrangements conducted pursuant to a process that is established in new Resolution XXX (see proposal USA/1.32/B below).

USA/1.32/B
ADD

RESOLUTION XXX (WRC-03)

Process for assuring the protection of single-dish radiotelescopes in the radio astronomy service conducting spectral line and continuum observations within the 42.5-43.5 GHz band

The World Radiocommunication Conference (Caracas, 2003),

considering

a) that there are primary allocations to the fixed-satellite service (FSS) (space-to-Earth) and to the broadcasting-satellite service (BSS) in the 40.5-42.5 GHz band;

b) that because propagation impairments in the 40 GHz band are severe in bad weather, most satellite systems, in order to achieve their desired link availability and high data rates, propose to operate with high gain satellite antennas (the 3 dB beamwidths of the 40 GHz transmit and the receive antennas are in a range from 0.3° to 0.65° for GSO satellites and in a range of 0.6º to 1.8º for non-GSO satellites);

c) that there are limits on the power flux-density (pfd) produced by FSS and BSS stations and systems in the 40.5-42.5 GHz band, with the most restrictive limits on pfd being found in the 42-42.5 GHz band, and that satellite systems in this frequency range would operate at clear-sky levels significantly lower than the pfd limits for all but very short periods of time during fading conditions;

d) that due to satellite weight and power constraints, the area covered by the beams active at any instant in all proposed FSS and BSS systems that plan to operate in the band 40.5-42.5 GHz will be very small, typically representing less than 5% of the satellite field of view;

e) that the FSS/BSS band at 40.5-42.5 GHz is adjacent to the band 42.5-43.5 GHz which is allocated, *inter alia,* to the radio astronomy service (RAS);

f) that radio astronomy stations in the band 42.5-43.5 GHz (including both single dish radiotelescopes and very long baseline interferometry (VLBI) facilities) are used to conduct continuum and spectral line observations using one of approximately 30 sites located around the world;

g) that the threshold level of detrimental interference to the RAS in the 42.5-43.5 GHz band is −153 dB (W/m^2/500 kHz) for spectral line observations, −137 dB (W/m^2/GHz) for continuum observations, and −116 dB (W/m^2/500 kHz) for VLBI RAS stations;

h) that results of studies indicate that the unwanted emission levels of GSO FSS and BSS systems operating in the 42.0-42.5 GHz band, and of non-GSO FSS and BSS systems operating in the 41.5-42.5 GHz band, meet the detrimental interference threshold for VLBI RAS stations operating in the 42.5-43.5 GHz band;

j) that unless technical or operational measures are taken, the detrimental interference thresholds for a single dish radiotelescope, for continuum observations and for spectral line observations, may not be met by unwanted emissions from a GSO FSS or BSS satellite or by unwanted emissions from a non-GSO FSS or BSS system in the 42-42.5 GHz band;

k) that because there are relatively few RAS sites operating with single dish telescopes in the 42.5-43.5 GHz band, it may be feasible to employ technical or operational measures, including but not limited to such interference mitigation techniques as geographical isolation, time sharing, better RAS antenna roll-off, etc., in order to reduce the potential for detrimental interference to the RAS receiver sites operating in this band;

l) that, taking into account the above *considerings*, it is feasible to rely on arrangements between concerned FSS/BSS and RAS administrations to ensure that the unwanted emissions for FSS and BSS satellites and systems at 42-42.5 GHz do not cause detrimental interference to RAS stations conducting continuum and spectral line observations within the 42.5-43.5 GHz band;

recognizing

a) that WRC-2000 established provisional power flux-density limits for out-of-band emissions from BSS and FSS stations in accordance with No. **5.551G**,

b) that WRC-2000 resolved that the provisional power flux-density limits in No. **5.551G** shall be applied to BSS and FSS stations for which complete coordination (GSO) or notification (non-GSO) information, as appropriate, has been received by the Bureau after the end of WRC-2000 and before the end of WRC-03;

c) that because the current protection criteria given in No. **5.551G** do not take into account the reference bandwidth and the type of observations being conducted at the radio astronomy station, adjustments regarding both of these criteria and the associated percentage of time that unwanted satellite emissions may exceed the criteria have been made by this Conference to No. **5.551G**,

d) that the flexibility of satellite networks and systems to accommodate changes in frequency plans and beam patterns diminishes as progress on implementation of the networks and systems advances, with operational or near operational networks and systems having very limited, if any, flexibility to accommodate such changes,

resolves

1 that if the unwanted emission level produced by a GSO FSS or BSS satellite or by a non-GSO FSS or BSS system operating in the band 42-42.5 GHz for more than 2% of the time would exceed the applicable interference threshold from No. **5.551G** at the site of a RAS station where single-dish telescope observations are being conducted, administrations operating such satellites and systems shall enter into discussions with the administration operating the affected RAS station to determine steps that can be taken to keep the unwanted emissions at or below the applicable interference threshold;

2 that administrations operating FSS or BSS satellites and systems, in carrying out their obligations under *resolves* 1 above, shall take into account only those RAS stations for which complete notification materials have been received by the BR as of the date on which complete coordination or notification materials (as appropriate) for the subject satellite network or system are received by the BR;

3 that, notwithstanding *resolves* 2 and taking into account *recognizing d)*, administrations operating FSS or BSS satellites and systems, in carrying out their obligations under *resolves* 1 above, are urged to take into account later-notifying RAS stations to the extent reasonably practicable;

4 that the obligations on administrations under *resolves* 1 and 2 above shall apply to all FSS or BSS networks and systems for which complete coordination (GSO) or notification (non-GSO) has been received after June 3, 2000,

urges administrations

that plan FSS or BSS networks or systems in the 42-42.5 GHz band to take all reasonably practical steps, early in the design phase of implementation, to avoid exceeding the interference thresholds in No. **5.551G** at the site of a RAS station where single-dish radiotelescope observations are being conducted in the 42.5-43.5 GHz band,

invites ITU-R

to facilitate the ability of administrations to meet the obligations of *resolves* 1 above by identifying technical and operational measures in the band 42-42.5 GHz, including possible mitigation techniques, that administrations may implement to protect concerned radio astronomy stations operating in the bands referenced in No **5.551G**, as well as measures that may be implemented by single-dish radiotelescopes conducting continuum and spectral line observations in the same bands to reduce their susceptibility to harmful interference from satellite networks and systems,

instructs the Director, BR

to review, on the basis of this Resolution and the modification to No. **5.551G** made by this Conference, any findings made pursuant to No. **5.551G (WRC-2000)** and Resolution **128 (Rev. WRC-2000)** in the interval between the end of WRC-2000 and the end of WRC-03.

USA/1.32/C
SUP

~~RESOLUTION 128 (Rev.WRC-2000)~~

~~**Protection of the radio astronomy service in the 42.5-43.5 GHz band**~~

Reasons: Consequential to the conclusion that RAS is adequately protected if out-of-band emissions from FSS and BSS satellites in the 42-42.5 GHz band are limited in the manner proposed in No. **MOD5.551G** and Resolution **XXX** above.

IV. Informal Working Group 5: Public Protection and Other Issues

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Doc. WAC/115(04.06.02)

WRC-03 Agenda Item 1.5: To consider, in accordance with Resolution **736** (WRC-2000), regulatory provisions and spectrum requirements for new and additional allocations to the mobile, fixed, Earth exploration-satellite and space research services, and to review the status of the radiolocation service in the frequency range 5150-5725 MHz with a view to upgrading it, taking into account the results of ITU-R studies;

Background: At WRC-2000 there were several proposals for items to be placed on the WRC-03 Agenda dealing with spectrum in the 5 GHz range. These items included new allocations to the mobile service (for Wireless Access Systems (WAS), including Radio Local Area Networks (RLAN)) and to the fixed service (for Fixed Wireless Access (FWA) in Region 3). In addition, revisions to allocations for the Earth exploration-satellite and (active) and space research (active) services and the radiolocation service will be considered at WRC-03. These matters were combined into one agenda item, since possible additional allocations or revisions to existing allocations for any one of these services would affect the potential allocation of one or more of the other services within the 5 GHz frequency range.

One of few recent telecommunications success stories has been the rapid growth of broadband access through the use of wireless access systems, including RLANs. The technology supporting the majority of these applications is for low-power, short-range devices that permit users to communicate inexpensively. Technology has evolved to the point where wireless networks can be readily and inexpensively deployed to support a wide variety of applications including service to businesses and their customers, educational and health care institutions, and even broadband access provided to private citizens in their homes. These devices are becoming widely used in some parts of the world, particularly in North America and Europe.

Most administrations are aware of the growth of RLAN devices in the 2.4 GHz range and the attendant benefits to users and economies. In the United States and in other administrations frequencies in the 5 GHz range have been set aside for similar wireless broadband access service. The 5 GHz RLAN arena will be the next growth area for inexpensive wireless broadband access; devices are already coming to market.

The United States Federal Communications Commission's rules[1] allow for the use of RLAN and FWA devices without a requirement for individual licenses, on a non-protected, non-interference basis in the 5150-5350 and 5725-5825 MHz bands. These devices have power level and antenna gain restrictions on them to protect the existing allocated services and can neither claim protection from nor cause interference to the existing services in these bands. Thus, in the United States, an RLAN system meeting the power level and antenna gain restrictions must still remedy any interference that it causes. Europe has also provided for the use of these devices in similar

[1] *See* 47 C.F.R. Part 15, Subpart E.

spectrum, but on a co-primary allocation basis with technical restrictions designed to assure the protection of pre-existing primary services.

A globally harmonized allocation for such devices, as is clearly contemplated in Resolution **736** (WRC-2000), would greatly enhance the utility and benefit to society of these devices by facilitating roaming, reducing manufacturing and end-user costs, and providing a greater degree of regulatory certainty as to the future value of investments in this technology as well as the long-term utility for users.

Because 5 GHz wireless access systems, including RLANs, will share spectrum with services allocated on a primary basis, it is essential that such devices be able to coexist with those other services. In the ITU, studies are underway to ensure that mitigation techniques, such as dynamic frequency selection ("DFS"), that are being developed by RLAN industry standards bodies will allow wireless access systems, including RLANs, to detect and avoid other primary users of 5 GHz spectrum.[2] Consequently, in addition to proposing an allocation for 5 GHz wireless access systems, including RLANs, the United States also proposes regulatory measures to ensure the continued protection of other co-primary 5 GHz services.

The United States believes that 5 GHz wireless access systems, including RLANs, have the potential to greatly enhance the roll-out of broadband services globally. Key factors for successful broadband access on a global basis are the continued ability to deploy these devices ubiquitously without a requirement for individual licenses and also the harmonization globally of spectrum available for such uses. In addition, these devices must protect other critical users of 5 GHz spectrum. In the United States today these devices operate in 5 GHz spectrum while protecting other users at 5 GHz. The United States believes this operating situation can be extended worldwide.

[2] IEEE 802.11 TGh has done significant work in developing extensions to the 802.11 standard for DFS and TPC, with a Draft Standard nearing completion. Furthermore, both ETSI BRAN and WECA are currently working on sharing studies, based on detailed knowledge and realistic assumptions about how RLANs actually work.

Proposal:

USA/1.5/1
ADD

5.xxxY Use of this band by the mobile service is intended for use by wireless access systems, including RLANs (see ITU-R Recommendation M.1450). Other forms of mobile service usage shall not be permitted in this band.

Reason: To clarify that the mobile allocations proposed for addition to the table of allocations are restricted to WAS/RLAN device usage only and are not "generic" mobile allocations open to other forms of usage.

USA/1.5/2
ADD

5.xxxZ In the bands 5150-5350 MHz and 5470-5725 MHz, stations in the mobile service shall not cause harmful interference to other stations operating under existing primary allocations. When permitting the use of wireless access systems, including RLANs, in these frequency bands, administrations should take note of the availability of mitigation techniques such as those in the most recent version of ITU-R Recommendation M.xxxx "Dynamic Frequency Selection and Transmit Power Control in 5 GHz RLANs," which describes means to significantly reduce or eliminate potential interference. Administrations should strongly encourage the use of such techniques.

Reason: To provide regulatory measures for the protection of the existing co-primary services from harmful interference from wireless access systems, including RLANs, authorized under the proposed (restricted) mobile allocation.

USA/1.5/3
MOD

5 150-5 725 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
***		
5 150-5 250	AERONAUTICAL RADIONAVIGATION FIXED-SATELLITE SERVICE (Earth-to-space) 5.447A **ADD <u>MOBILE</u> <u>5.xxxY</u>** 5.446 5.447 5.447B 5.447C **ADD <u>5.xxxZ</u>**	

5 250-5 255	EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION SPACE RESEARCH 5.447D **ADD MOBILE 5.xxxY** 5.448 5.448A **ADD 5.xxxZ**
5 255-5 350	EARTH EXPLORATION- SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) **ADD MOBILE 5.xxxY** 5.448 5.448A **ADD 5.xxxZ**
5 350-5 460	EARTH EXPLORATION- SATELLITE (active) 5.448B AERONAUTICAL RADIONAVIGATION 5.449 Radiolocation
5 460-5 470	RADIONAVIGATION 5.449 Radiolocation
5 470-5 650	MARITIME RADIONAVIGATION Radiolocation **ADD MOBILE 5.xxxY** 5.450 5.451 5.452 **ADD 5.xxxZ**
5 650-5 725	RADIOLOCATION **ADD MOBILE 5.xxxY** Amateur Space research (deep space) 5.282 5.451 5.453 5.454 5.455 **ADD 5.xxxZ**
	***

Reason: Provide globally harmonized spectrum for wireless access systems, including RLANS, fulfilling the need recognized in Agenda Item 1.5 and Resolution 736, WRC-2000.

USA/1.5/4

SUP *resolves* 1 of RESOLUTION 736 (WRC-2000)

…

resolves

that, on proposals from administratons and taking into account the results of studies in ITU-R and the Conference Preparatory Meeting, WRC-03 should consider:

~~1 allocation of frequencies to the mobile service in the bands 5 150-5 350 MHz and 5 470-5 725 MHz for the implementation of wireless access systems, Including RLANS;~~

… [the disposition of the remainder of the resolves (2, 3, 4) of RESOLUTION 736 (WRC-2000) are beyond the scope of this proposal]

Reason: If the provisions of this proposal are adopted, *resolves* 1 of RESOLUTION 736 (WRC-2000) and the relevant part of Agenda Item 1.5 (WRC-03) will have been satisfied and this section will no longer be required.

Concerns on the draft proposal for WRC-03 Agenda Item 1.5 expressed by participants on the WRC-03 Advisory Committee:

1) American Radio Relay League (ARRL):

----- Original Message -----
From: Sumner, Dave, K1ZZ <dsumner@arrl.org
To: <don@jansky-barmat.com
Sent: Friday, May 31, 2002 9:23 AM
Subject: ARRL IWG-5 statement

Don, here is the ARRL statement for inclusion as a minority view along with the majority recommendation on Agenda item 1.5.

I appreciate the sensitivity with which you chaired the discussion of the issue on Wednesday.

David Sumner
Chief Executive Officer, ARRL

The American Radio Relay League (ARRL) - The National Association for Amateur Radio - maintains its objection to the proposed primary mobile allocation in the band 5650-5725 MHz because of an existing secondary allocation to the amateur service and an allocation by footnote 5.282 to the amateur-satellite service of 5650-5670 MHz limited to the Earth-to-space direction.

The ARRL is concerned about the future utility of the amateur secondary allocation in the band 5650-5725 MHz. Amateurs enjoy a compatible and stable sharing relationship with the primary radiolocation service and secondary space research (deep space). The addition of WAS and RLAN to this band would add another application that its proponents expect to be widely deployed, and we expect such systems to be co-located or adjacent to amateur stations. The amateur service has secondary allocations in bands immediately above 5725 MHz. However, they too have seen recent additions of other ubiquitous systems of Unlicensed National Information Infrastructure (U-NII) in the band 5725-5825 MHz and Dedicated Short-Range Communications (DSRC) at 5850-5925 MHz.

Our objection could be removed by proposing NOC (no change) for the band 5650-5725 MHz or deleting it entirely from the document. The ARRL prefers a proposal of NOC (no change) in this band.

ARRL is interested in following the development of dynamic frequency selection (DFS) protocols and participating in studies related to this mitigation technique.

2) Globalstar:

Globalstar

Washington Technical Office
10004 Lewisdale Road
Ijamsville, MD
21754

3 June 2002

Mr. Brian Fontes, Chairman
FCC WRC-2003 Advisory Committee
c/o Cellular Telecommunications and Internet Association
1250 Connecticut Avenue, N.W.
Washington, D.C. 20036

Dear Mr. Fontes,

This letter is in reference to the draft proposal in Document IWG-5/028r3 (05-29-02), which calls for primary allocations on a worldwide basis for use by Wireless Access Systems (WAS) including Radio Local Area Networks (RLANs) in bands around 5 GHz. The purpose of this letter is to advise you that Globalstar, an ITU Sector Member and active participant in WRC-03 Advisory Committee activities, strongly objects to the inclusion in this proposal of the band 5150-5250 MHz.

The rationale offered for proposing a primary allocation in the document is the harmonization of bands on a global basis for RLANs and

> "… providing a greater degree of regulatory certainty as to future value of investments in this technology as well as long-term utility for users."

As this technology is permitted in the USA under Part 15 of the FCC Rules and, to the best of our knowledge, is foreseen in the rest of the world to be implemented on a license exempt and non-interference basis, there would seem to be no rational basis consistent with past regulatory policy to accord such an application primary status in the international Table of Allocations.

An underlying principle of services sharing a frequency allocation on a primary basis is that the services be able to coordinate their operation in order to prevent or mitigate mutual interference. The main reason for allowing license exempt usage of the spectrum is to permit deployment of transmission devices without the requirement of record keeping or registration as would be done for a licensed usage. The two approaches to regulation are

mutually exclusive. In other words, the ability to coordinate operation is inconsistent with deployment of a service without registration.

Recalling the Report and Order (FCC 97-5, 9 January 1997) that amended the Part 15 Rules to include Unlicensed-National Information Infrastructure (U-NII) devices, the FCC noted that

> "… the current record does not provide a compelling reason to believe that such devices require higher or more protected status than we have provided for low power unlicensed devices in the past."

Providing a primary allocation for RLANs would contradict the decision of the FCC in Report and Order FCC 97-5 and would, therefore, be counter to established U.S. policy.

The RLANs proposal could be accommodated through a footnote. For example, at WRC 2000, harmonization of bands for use by IMT-2000 systems was sought. This harmonization was accomplished through a footnote to the Table of Allocations that indicated that administrations wishing to implement IMT-2000 systems could do so in bands identified in the footnote. A similar designation could be made for Wireless Access Systems, including RLANs, through a footnote, thus avoiding an allocation where none is warranted.

In summary, Globalstar opposes the inclusion of the band 5150-5250 MHz in the proposal given in Document IWG-5/028r3 for primary allocations to the mobile service in bands around 5 GHz. Globalstar further believes that, based on Report and Order FCC 95-7, a primary allocation for RLAN applications would be improper and unlawful under current FCC Rules. Finally, Globalstar believes that frequencies for Wireless Access Systems, including RLANs, can be harmonized through the use of a suitable footnote to the Table of Allocations.

Globalstar stands ready to work with the members of IWG-5 to create a proposal for WRC-03 Agenda Item 1.5 that will serve all of the users of the 5150-5250 MHz band and be successful at WRC 2003.

Very truly yours,

David E. Weinreich
Spectrum Manager

V. Informal Working Group 6: Public Protection and Other Issues

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Doc. WAC/116(04.06.02)

WRC-03 Agenda Item 1.23: to consider realignment of the allocations to the amateur, amateur-satellite and broadcasting services around 7 MHz on a worldwide basis, taking into account Recommendation **718 (WARC-92)**;

ISSUE: The need for a worldwide exclusive spectrum allocation for the amateur and amateur-satellite services in the three ITU Regions.

BACKGROUND:

Studies in response to Recommendation **718 (WARC-92)** have been ongoing in ITU-R for a number of years.

The purpose of carrying out a realignment of the bands around 7 MHz is to remedy the long-standing difficulties experienced by the amateur service and the limitations placed on the broadcasting service as a result of the changes made to the frequency bands around 7 MHz at the Atlantic City WARC in 1947.

Historically until the 1938 Cairo Conference the band 7 000-7 300 kHz was allocated exclusively to the amateur service. Conditions in Europe and Asia lead to the reduction to 7 000-7 150 kHz in ITU Regions 1 and 3. A final reduction to 7 000–7 100 kHz took place at WARC-59. The Region 2 allocation remained unchanged at 7 000-7 300 kHz amateur exclusive.

For the amateur service, the usefulness of the allocations around 7 MHz for worldwide links is limited because only 100 kHz of spectrum between 7 000 and 7 100 kHz is common to Region 2 and Regions 1 and 3. The 7 100-7 300 kHz band is allocated exclusively to the broadcasting service in Regions 1 and 3, and exclusively to the amateur service in Region 2. Given the large disparity in signal levels between the two services, broadcasting transmissions cause interference to the sensitive receivers used in the amateur service during periods of good propagation between Regions 1 and 2. The degree of interference experienced in Region 2 varies with time-of-day, season, solar activity and distance from broadcasting stations in other regions.

Prior to WARC-92, CCIR JIWP 10-6-8-9 carried out extensive studies of HF sharing including the bands around 7 MHz. Its October 1990 report, *"Compatibility considerations arising from the allocation of spectrum to HF broadcasting"* formed Section 5 of the CCIR Report to WARC-92. The information is still valid and was reproduced in the Report of the Director to WRC-2000 in response to Resolution **29 (WRC-97)** (Attachment 1 to Document CMR-2000/5). The study concludes, inter alia, that:

> the sharing of frequency bands by the amateur and broadcasting services is undesirable and should be avoided, because of system incompatibility between broadcasting and amateur services

Analysis of the results of studies

The following factors were identified during the studies as conditioning the search for a viable solution:

1) the fixed, land mobile and amateur allocations around 7 MHz support many important national and international applications, including those with a humanitarian and disaster relief dimension, which are particularly suited to the propagation characteristics of these bands;

2) any solution requiring sharing of spectrum between amateur and broadcasting services is not desirable, since experience has shown that this is unacceptable in the long run;

3) the entire 300 kHz is required in Region 2 for the amateur service;

4) some movement in frequency of the allocation to the amateur services around 7 MHz may be acceptable;

5) a reduction of the amount of contiguous spectrum allocated to the broadcasting service in the 7 MHz band is unacceptable to broadcasters because of existing and anticipated congestion, but there is flexibility with regard to the actual location of this band;

6) attention should be given to the spectrum requirements of the land mobile service below 7 MHz;

7) spectrum allocated to the maritime mobile, aeronautical mobile (OR), and aeronautical mobile (R) services should not be considered for reallocation;

8) the band 6 765-7 000 kHz has been identified as essential for supporting fixed service operations of all types and it is not feasible to relocate certain types of operations to higher bands because of propagation considerations;

9) sharing between the amateur service and the fixed and mobile services may be possible;

10) the realignment should involve the minimum necessary shift in allocation blocks in order to limit the economic impact on users.

PROPOSALS:

USA/1.23/1 Stage 1 to be implemented on or before 1 April 2007

kHz
6 765-7 450

	Allocation to services		
	Region 1	**Region 2**	**Region 3**
MOD	**6 765-7 000**	FIXED ~~Land Mobile~~MOBILE except aeronautical mobile (R)	
NOC	**7 000-7 100**	AMATEUR AMATEUR-SATELLITE	
SUP	~~**7 100-7 300**~~ ~~BROADCASTING~~	~~**7 100-7 300**~~ ~~AMATEUR~~	~~**7 100-7 300**~~ ~~BROADCASTING~~
MOD	**7 100-7 ~~3~~2~~0~~0**	AMATEUR	
MOD	**7 ~~1~~2~~0~~0-7 300** BROADCASTING	**7 ~~1~~2~~0~~0-7 300** AMATEUR	**7 ~~1~~2~~0~~0-7 300** BROADCASTING
MOD	**7 300-7 ~~3~~4~~5~~0**	BROADCASTING	
MOD	**7 ~~3~~4~~5~~0-8 100**	FIXED Land Mobile	

USA/1.23/2 Stage 1 to be implemented on or before 1 April 2007

MOD 5.142 The use of the band 7 ~~1~~200-7 300 kHz in Region 2 by the amateur service shall not impose constraints on the broadcasting service intended for use within Region 1 and Region 3.

USA/1.23/3 Stage 2 to be implemented on or before 1 April 2010

kHz
6 765-7 550

	Allocation to services		
	Region 1	**Region 2**	**Region 3**
MOD	**6 765-7 000**	FIXED ~~Land Mobile~~MOBILE except aeronautical mobile (R)	
NOC	**7 000-7 100**	AMATEUR AMATEUR SATELLITE	
SUP	~~**7 100-7 300**~~ ~~BROADCASTING~~	~~**7 100-7 300**~~ ~~AMATEUR~~	~~**7 100-7 300**~~ ~~BROADCASTING~~
MOD	**7 100-7 300**	AMATEUR	
MOD	**7 300-7 ~~3~~5~~5~~0***	BROADCASTING	
MOD	**7 ~~3~~5~~5~~0-8 100**	FIXED Land Mobile	

USA/1.23/4 Stage 2 to be implemented on or before 1 April 2010

SUP 5.142

Reasons:

Achieves global harmonization of the allocations consistent with the factors identified as conditioning the search for a viable solution. In particular, essential fixed service operations between 6 765 and 7 000 kHz are not affected, and additional flexibility is afforded to complementary mobile operations in this band.

In order to reduce the impact of the changes to the broadcasting, fixed and land mobile services, this modification would be introduced over several years in two stages, as follows:

Stage 1

6 765-7 000 kHz	Fixed and mobile (except aeronautical mobile (R)) co-primary
7 000-7 100 kHz	Amateur and amateur-satellite co-primary (NOC)
7 100-7 200 kHz	Amateur primary
7 200-7 300 kHz	Broadcasting primary Regions 1 and 3, amateur primary Region 2 (NOC)
7 300-7 450 kHz	Broadcasting primary

Stage 2

6 765-7 000 kHz	Fixed and mobile (except aeronautical mobile (R)) co-primary (NOC with respect to Stage 1)
7 000-7 100 kHz	Amateur and amateur-satellite co-primary (NOC)
7 100-7 300 kHz	Amateur primary
7 300-7 550 kHz	Broadcasting primary

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Doc. WAC/117(04.06.02)

WRC-03 Agenda item 1.38: to consider provision of up to 6 MHz of frequency spectrum to the Earth exploration-satellite service (active) in the frequency band 420-470 MHz, in accordance with Resolution **727** (Rev.WRC-2000);

ISSUE The use of the frequency band 420-470 MHz by the earth exploration-satellite service (EESS)(active) without causing interference to incumbent services, such as radiolocation and the amateur services.

BACKGROUND

A similar agenda item was debated at WRC-97 resulting in a decision not to adopt proposed allocations for EESS (active) in the band 420-470 MHz. The need for forest monitoring was emphasized at the United Nations Conference on Economic Development (UNCED) (Buenos Aires - 1992). Since that Conference, Recommendation ITU-R SA.577 established requirements for the operation of spaceborne synthetic aperture radars (SAR) at a frequency near 400 MHz to measure soil moisture, tropical biomass, Antarctic ice thickness, and for documentation of geological history and climate change. Studies performed by the EESS community have identified a minimum bandwidth requirement of up to 6 MHz to satisfy mission objectives.
As a result of studies prior to WRC-97, consideration of the potential use of the band 410-470 MHz by active spaceborne sensors was limited to 430-440 MHz due to sharing considerations with other services. Studies since WRC-97 have examined the range 420-470 MHz, and the conclusions regarding sharing with other services have been updated accordingly. A number of studies were conducted by various administrations leading to a draft revision of Draft Revised Recommendation ITU-R SA.1260, sharing criteria between active spaceborne sensors and other services in the range 420-470 MHz.

Sharing with the amateur and amateur-satellite services

In the band 430-440 MHz, amateur services have allocations on a co-primary basis in Region 1 and on a secondary basis in Regions 2 and 3 (except in countries listed in No. **5.278**, where it is primary). Further, in accordance with No. **5.282** the amateur-satellite service may operate in part of this band (435-438 MHz) subject to not causing harmful interference to other services operating in accordance with the Radio Regulations.

Studies leading to the draft revision of Recommendation ITU-R SA.1260 determined that there would likely be periods where SAR transmissions would have some impact on reception by amateur services. One study indicates that there may be the potential for significant interference during periods of visibility of some high power SAR satellites to amateur and amateur-satellite services. Another study of a low power, low sidelobe SAR indicates that for a low sensitivity, low-resolution mode the average pfd could be lower than acceptable pfd levels in the amateur services.

It appears that the SARs and the amateur services could coexist if, and only if, the technical and operational constraints given in Draft Revised Recommendation ITU-R SA.1260 are met by EESS (active). Until the characteristics of EESS SARs are more clearly defined, the amateur community remains concerned about the potential for interference to amateur operations in the band 430-440 MHz and especially in the portion of the band 435-438 MHz.

Sharing with radiolocation service

Airborne, shipborne, and land-based radars operate in the frequency band 420-450 MHz. Studies prior to WRC-97 concentrated on the very large aperture antenna radar systems used for space object tracking in the band 420-450 MHz. Studies since WRC-97 have included consideration of the compatibility of spaceborne SARs with the other types of radars operating in the band 420-450 MHz.

The ITU-R has determined that there is a potential for unacceptable interference from spaceborne SARs to a limited number (around ten worldwide) of terrestrial space object tracking radars operating in the frequency band 420-450 MHz if a SAR is within line-of-sight of these radars. It has been determined that the degree of compatibility is highly dependent upon the characteristics (and associated mission) of the spaceborne SARs, and that a spaceborne SAR intended for certain missions can be designed such that the compatibility situation is considerably improved. Field-testing may be required on a case-by-case-basis to confirm compatibility with specific systems.

The ITU-R has concluded that, taking into account the SAR processing gain; the interference to SARs caused by terrestrial radars is acceptable.

Operation by geographical separation (that is, spaceborne SAR operation beyond line-of-sight to the terrestrial radars) has been studied. Observation of significant portions of the landmass in the northern hemisphere will be denied to the spaceborne sensors under such a restriction. However, it does appear that if the SARs are limited to operations beyond line-of-sight of terrestrial radars an appreciable portion of the tropical forests or Antarctic ice sheets can still be observed, which are primary missions for active sensors at these frequencies.

Studies of the compatibility of spaceborne SARs with airborne and shipborne terrestrial radars have produced results that are quite similar to those for the land-based radars: a potential for significant interference (i.e. with regard to the likelihood and duration of interference events) exists for some of the SARs studied, but that the potential is highly dependent upon the characteristics of the SARs (orbits, transmitter power, antenna sidelobe characteristics). SAR design and operation in compliance with Recommendation ITU-R SA.1260 would greatly improve compatibility.

In addition to the terrestrial radars that operate in the 420-450 MHz band as addressed in the preceding paragraphs, a radar is located in Arecibo, Puerto Rico (United States) that is used for important atmospheric research programmes. It is an upward looking radar and there is a potential for interference from a spaceborne SAR. There will be a need to coordinate operations of the spaceborne SAR and the Arecibo radar. Such coordination is feasible since schedules for operation of the radar are known several weeks in advance, as are the times that the SAR will be visible and its planned operations.

Wind profiler radars operate in the radiolocation service in the range 440-450 MHz unless compatibility cannot be achieved with existing services, in which case the bands 420-435 MHz and 438-440 MHz could be considered for use by wind profiler radars in accordance with Resolution

217 (WRC-97). Operation in separate frequency bands may be necessary for spaceborne SARs and wind profiler radars in order to preclude interference to the SARs.

Sharing with fixed and mobile services

The frequency ranges 410-430 MHz and 440-470 MHz are allocated to the fixed and mobile services on a primary basis in all three Regions. The frequency range 430-440 MHz is allocated to the fixed service in over 40 countries on a primary basis, by footnotes to the Radio Regulations.

Draft new Recommendation ITU-R F. [Document 9/47] gives channel arrangements for digital radio systems operating in the frequency range 406.1-450 MHz. General guidance on the performance characteristics of FS systems in the band 420-470 MHz are available in Recommendation ITU-R [F.758 (9/131)].

The fixed service protection criteria to be applied is a Fractional Degradation of Performance (FDP) of 10% (which is equivalent to I/N = −10 dB in case of permanent interference) from a primary service, and 1% FDP (equivalent to I/N = −20 dB in case of permanent interference) from a secondary service. The pfd derived from this criterion should not be exceeded. Recommendation ITU-R F.758 provides the receiver thermal noise as −143 dBW in a 3.5 MHz IF bandwidth.

A design of some low power, low-side lobe, spaceborne SARs has been considered that may produce power flux-densities at the surface of the Earth lower than the levels imposed in frequency bands near 400 MHz allocated to the fixed and mobile services in order to protect fixed and mobile operations.

In the range 450-470 MHz, interference to land mobile receivers used for critical purposes is unacceptable if any interruption occurs, even for a brief period of time, as the interference could impact protection of life and property. It is essential that the pfd of any interference to the land mobile service from EESS be less than the level specified in Table 1 of the annex to the Draft Revised Recommendation ITU-R SA.1260.

The maritime mobile service may use some frequencies within the band 457-467 MHz for on-board communications stations (No. **5.287**). Receiver characteristics are similar to those of land mobile equipment listed in Recommendation ITU-R M.1174-1.

Sharing with Space operation service (range safety command receivers)

Range safety command receivers are used to send arm, destruct, and safe commands to an airborne missile or drone, as well as to launch vehicles. Terrestrial missile and drone operations are accomplished at all flight altitudes (from just above ground level up to maximum flight altitudes). Commands to space launch vehicles may need to be sent from nearly ground level (just after lift-off) up or approaching early parking orbit altitudes of 100 km or so (e.g. to send a final "safe" command).

Studies conducted within the ITU-R have demonstrated the potential for interference from spaceborne SARs operating in the EESS into launch vehicle range safety command receivers. Considering the safety implications of interference into range safety command receivers from SARs operating in the EESS, co-frequency sharing is not feasible during a launch window. Launch vehicle range safety command destruct receivers operate in the band 449.75-450.25 MHz (No. **5.286**), as well as at 420-430 MHz and 440-445 MHz with a 600 kHz bandwidth in the United States, and, in the band 433.75-434.25 MHz in India on a primary basis and certain countries in

Region 2 on a secondary basis (No. **5.281**). Compatibility could be achieved by frequency avoidance or other interference avoidance measures.

PROPOSAL

USA/1.38/1

NOC ARTICLE 5

Frequency allocations

410-470 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
420-430	FIXED MOBILE except aeronautical mobile Radiolocation 5.269 5.270 5.271	
430-440 AMATEUR RADIOLOCATION 5.138 5.271 5.272 5.273 5.274 5.275 5.276 5.277 5.280 5.281 5.282 5.283	**430-440** RADIOLOCATION Amateur 5.271 5.276 5.277 5.278 5.279 5.281 5.282	
440-450	FIXED MOBILE except aeronautical mobile Radiolocation 5.269 5.270 5.271 5.284 5.285 5.286	
450-455	FIXED MOBILE 5.209 5.271 5.286 5.286A 5.286B 5.286C 5.286D 5.286E	
455-456 FIXED MOBILE 5.209 5.271 5.286A 5.286B 5.286C 5.286E	**455-456** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.286A 5.286B 5.286C 5.209	**455-456** FIXED MOBILE 5.209 5.271 5.286A 5.286B 5.286C 5.286E
456-459	FIXED MOBILE 5.271 5.287 5.288	

459-460 FIXED MOBILE 5.209 5.271 5.286A 5.286B 5.286C 5.286E	**459-460** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) 5.286A 5.286B 5.286C 5.209	**459-460** FIXED MOBILE 5.209 5.271 5.286A 5.286B 5.286C 5.286E
460-470	FIXED MOBILE Meteorological-Satellite (space-to-Earth) 5.287 5.288 5.289 5.290	

Reasons: The U.S. does not support an allocation to EESS (Active) in the band 420-470 MHz unless measures are in place to protect existing services. Further study is needed to determine the duration and rate of recurrence of interference between the earth exploration-satellite service and other services in this band.

VI. Draft Proposals Approved by the National Telecommunications and Information Administration (NTIA)

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Included in Doc. WAC/106(04.06.02)

WRC-03 Agenda Item 1.5: to consider, in accordance with Resolution **736 (WRC-2000)**, regulatory provisions and spectrum requirements for new and additional allocations to the mobile, fixed, Earth exploration-satellite and space research services, and to review the status of the radiolocation service in the frequency range 5 150 – 5 725 MHz, with a view to upgrading it, taking into account the results of ITU-R studies;

Background Information: At WRC-2000 there were several proposals for items to be placed on the WRC-03 agenda dealing with spectrum in the 5 GHz range. These items included new allocations to the mobile service for Wireless Access Systems (WAS) including Radio Local Area Networks (RLAN) and the fixed service for Fixed Wireless Access (FWA) in Region 3, an additional allocation to the Earth exploration-satellite service (active) and space research service (active), and an upgrade of the radiolocation allocation in the 5 350 – 5 650 MHz band. These were combined under one agenda item since the possible allocation to any one of these services would affect the potential allocation of one or more of the other services within this frequency range.

Technology has evolved to the point where wireless local area networks can be readily and inexpensively deployed to support the businessman or student that is in a campus environment. These devices are becoming widely used in some parts of the world, particularly in North America and Europe. The U.S. domestic allocation table allows for the use of WAS devices on an unlicensed, non-interference basis in the 5 150 – 5 350 and 5 725 – 5 825 MHz bands. These devices have power level and antenna gain restrictions placed on them to protect the existing services, which have been successfully sharing these bands. It is also expected that similar restrictions on FWA systems would be necessary to protect the existing services. For example, studies show that the presence of outdoor wireless access system transmitters can cause significant interference to spaceborne active sensors that operate in the EESS and SRS. Furthermore, European and ITU-R studies have also shown that these WAS devices will interfere with certain radiolocation systems that operate in the 5 250 – 5 350 MHz band. Recognizing this incompatibility, the European Radiocommunications Office (ERC) decided in Decision ERC 99(23) that both Dynamic Frequency Selection (DFS) and Transmitter Power Control (TPC) were required elements in implementing WAS use in these bands in order to protect the existing allocated services. The ITU-R has concluded that restrictions are also necessary to protect the MSS feederlinks in the 5 150 – 5 250 MHz band. It should be noted that studies on the effectiveness of DFS to protect existing services are ongoing in the ITU-R and that no decision on an allocation to the mobile service for use by WAS in these bands should be made until studies are completed. Lastly, preliminary ITU-R studies of radiolocation sharing with FWA have shown that large separation distances or other mitigation techniques such as receiver standards or error-correction coding are required to prevent mutual interference.

Active microwave sensors on board spacecraft are an increasingly important tool for monitoring the Earth's environment and oceans through the determination of wave height and oceanic currents as well

as for radar imaging of the Earth's surface. The need for an additional 110 MHz of spectrum adjacent to the current international allocation from 5 250 – 5 460 MHz is well documented within the ITU-R. The member space agencies of the Space Frequency Coordination Group (SFCG) have reviewed requirements for the various active sensor measurements, including TOPEX/POSEIDON and JASON. They have recognized the requirement for an extension of the existing allocated primary band (5 250 – 5 460 MHz) for enhanced vertical resolution for spaceborne altimeters and enhanced horizontal resolution for synthetic aperture radars (SARs). Studies and past operational experience has shown that operation in bands allocated to the radiolocation, radionavigation, maritime radionavigation and aeronautical radionavigation services has proven to be feasible in the 5 460 – 5 570 MHz band.

WRC-97 first considered the possibility of an allocation upgrade for the radiolocation service in the 2 900 – 3 400 MHz and 5 350 – 5 650 MHz bands by placing this matter on the draft WRC-2001 Agenda. A need for 600 MHz of additional primary radiolocation spectrum for radiolocation systems has been determined. Changes in technology are driving the need for larger bandwidth in order to be able to pick smaller and less reflective radar targets out of background clutter. Experience and studies have shown that the radiolocation service can successfully share the band 5 350 – 5 650 MHz with radionavigation and EESS/SRS active systems. In fact, studies of sharing between the radiolocation service and EESS (active) carried out for CPM-97 by JWP-7-8R support such sharing.

Proposal:

Article S5
Frequency Allocations

5 150-5 350 MHz

	Allocation to services		
	Region 1	**Region 2**	**Region 3**
USA/ / 1 **NOC**	**5 150-5 250**	AERONAUTICAL RADIONAVIGATION FIXED-SATELLITE SERVICE (Earth-to-space) 5.447A 5.446 5.447 5.447B 5.447C	
USA/ / 2 **MOD**	**5 250-5 255**	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH 5.447D 5.448 ~~5.448A~~	
USA/ / 3 **MOD**	**5 255- 5 350**	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) 5.448 ~~5.448A~~	

Reasons: The deletion of the footnote **5.448A** is justified based on the sharing situation between the earth exploration-satellite (active) and the space research (active) services and the radiolocation service in the band 5 250 – 5 350 MHz. These two services were found to be compatible in ITU-R studies for the band 5 250 – 5 350 MHz making footnote **5.448A** unnecessary.

The band 5 150 – 5 350 MHz should not be allocated to the mobile service for the implementation of wireless access systems including RLANs**.** Initial studies indicate that sharing between these systems and existing services in this band is not be feasible unless Dynamic Frequency Selection (DFS) proves to be an effective interference mitigation technique for the wireless systems in order to protect existing

services. These studies are not complete and further study in the ITU-R is required before such an allocation can be considered. Similarly, the band 5 250 – 5 350 MHz should not be allocated to the fixed service for the implementation of fixed wireless access systems at this time.

5 350-5 725 MHz

	Allocation to services		
	Region 1	**Region 2**	**Region 3**
USA/ / 4 **MOD**	**5 350-5 460**	AERONAUTICAL RADIONAVIGATION 5.449 EARTH EXPLORATION-SATELLITE (active) ~~5.448B~~ RADIOLOCATION SPACE RESEARCH (active) ~~Radiolocation~~ **ADD** 5.USA1 **ADD** 5.USA2	
USA/ / 5 **MOD**	**5 460-5 470**	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION 5.449 SPACE RESEARCH (active) ~~Radiolocation~~ **ADD** 5.USA1 **ADD** 5.USA2	
USA/ / 6 **MOD**	**5 470- 5 570**	EARTH EXPLORATION-SATELLITE (active) MARITIME RADIONAVIGATION RADIOLOCATION SPACE RESEARCH (active) ~~Radiolocation~~ 5.450 5.451 5.452 **ADD** 5.USA1	
USA/ / 7 **MOD**	**5 570-5 650**	MARITIME RADIONAVIGATION RADIOLOCATION ~~Radiolocation~~ 5.450 5.451 5.452	
USA/ / 8 **NOC**	**5 650-5 725**	RADIOLOCATION Amateur Space research (deep space) 5.282 5.451 5.453 5.454 5.455	

Reasons: The existing allocation of the band 5 350 – 5 650 MHz to the radiolocation service on a secondary basis should be upgraded to primary status as studies have shown that the radiolocation service is compatible with existing primary services in this frequency range.

The band 5 350 – 5 460 MHz should be allocated to the space research service (active) on a primary basis as the sharing situation is identical to that of the previously allocated earth exploration-satellite service (active) and this band is needed to make a contiguous allocation for the space research service (active). The band 5 460 – 5 570 MHz should be allocated to the earth exploration-satellite service (active) and the space research service (active) on a primary basis as studies have shown that spaceborne active sensors operating in these services can share the band with the radars operating in the radionavigation, maritime radionavigation and radiolocation services as long as the active sensors meet the design criteria and utilize the mitigation techniques given in Recommendation ITU-R SA.1280. Footnote 5.USA1 is added in order to ensure the protection of these services in their various allocated bands.

The band 5 470 – 5 725 MHz should not be allocated to the mobile service for the implementation of wireless access systems including RLANs. Initial studies indicate that sharing between these systems

and existing services in this band is not be feasible unless Dynamic Frequency Selection (DFS) proves to be an effective interference mitigation technique for the wireless systems in order to protect existing services. These studies are not complete and further study in the ITU-R is required before such an allocation can be considered.

USA/ / 9 SUP

5.448A

Reasons: There is no technical justification for this footnote that was enacted at WRC-97 and that make the EESS (active) and SRS (active) de facto secondary services in the band 5 250 – 5 350 MHz. This footnote should be suppressed.

USA/ / 10 SUP

5.448B

Reasons: This footnote should be replaced with the new footnote **5.USA1** that clarifies the sharing situation between EESS (active), SRS (active), and the other allocated services in these bands.

USA/ / 11 ADD

5.USA1 The Earth exploration-satellite (active) and space research (active) services operating in the frequency range 5350-5470 MHz shall not cause harmful interference to, or claim protection from harmful interference from operations in accordance with **5.449**. Additionally, the Earth exploration-satellite (active) and space research (active) services operating in the frequency range 5460-5570 MHz shall not cause harmful interference to the radiolocation service in the frequency range 5460-5570 MHz, and maritime-radionavigation service in the frequency range 5470-5570 MHz and should take into account Recommendation ITU-R SA.1280.

Reasons: If spaceborne active sensors operating in the EESS (active) and SRS (active) adhere to the design considerations and mitigation techniques found in Recommendation ITU-R SA.1280, the radiolocation, aeronautical radionavigation, maritime radionavigation and radionavigation services will be protected from harmful interference and will not be constrained in any manner.

USA/ / 12 ADD

5.USA2 in the frequency band 5350-5470 MHz, stations in the radiolocation service shall not cause harmful interference to, or claim protection from stations in the aeronautical-radionavigation service operating in accordance with **5.449**.

Reasons: This footnote defines the aeronautical-radionavigation service operations as having priority over the radiolocation service in the 5350-5470 MHz band. The radiolocation operations cannot cause interference to aeronautical-radionavigation systems, nor can the radiolocation service claim protection from the aeronautical-radionavigation service operating in accordance with **5.449**.

USA/ /13 NOC

5.452 Between 5 600 MHz and 5 650 MHz, ground-based radars used for meteorological purposes are authorized to operate on a basis of equality with stations of the maritime radionavigation service.

Reasons: Many administrations use the band 5 600 – 5 650 MHz for these meteorological radars and this usage should be preserved.

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Included in Doc. WAC/108(04.06.02)

WRC-03 Agenda Item 1.12 (c): to consider allocations and regulatory issues related to the space science services in accordance with Resolution **723 (Rev. WRC-2000)** and to review all Earth exploration-satellite service and space research service allocations between 35 and 38 GHz, taking into account Resolution **730 (WRC-2000)**;

Background Information: Resolution **723 (Rev. WRC-2000)** *resolves 4,* recommends that WRC-03 consider a review of existing allocations to space science services near 15 GHz and 26GHz, with a view to accommodating wideband space-to-Earth space research applications. This *resolves* is in response to a need for allocations to support planned high data rate space research missions requiring bandwidths up to 400 MHz. Satellites for these missions will carry telescopes and/or other passive instruments to measure phenomenon such as the Earth's magnetosphere and solar flares. These missions will be limited in number with an estimated three to five satellites per year worldwide, and will generally be in an equatorial orbit with some at geostationary altitudes and others at the L1 or L2 libration points.

The 15 GHz band has a number of unique advantages that make it extremely useful for high data rate space research service **(**SRS) missions. One advantage of the 15 GHz band, over higher frequency bands, is improved link performance in the presence of rain. This becomes a significant advantage for power-constrained missions required to transmit high rate data from altitudes beyond low earth orbit.

A second advantage of the 15 GHz band for high rate SRS missions is the availability of existing low-latitude ground station assets, including the 11m antennas at the three Deep Space Network (DSN) sites in Australia, Spain and the USA, and a 14m antenna at the National Radio Astronomy Observatory in Green Bank, West Virginia with demonstrated capability to support Space Very Long Baseline Interferometry (SVLBI) missions. The use of the existing mid-latitude 15 GHz ground station resources can result in substantial cost and schedule benefits for international space agencies implementing high rate SRS missions. The availability of mid-latitude ground assets makes the 15 GHz band desirable for SRS missions operating in low to mid inclination orbits, geostationary orbits, or sun/Earth libration point (L1/L2) orbits. The majority of future high data rate SRS missions will operate in these types of orbits.

Also, the ability of SRS missions to receive backup support through the NASA Tracking and Data Relay Satellite System (TDRSS) Ku-band Single Access Return service provides added flexibility to missions. In the 15 GHz band, a full complement of TDRSS spacecraft are currently operational in a three-node constellation providing near continuous coverage to low-earth orbiting spacecraft.

Additionally, it should be noted that a number of ITU-R and Space Frequency Coordination Group (SFCG) recommendations indicate 15 GHz as a preferred band for SRS missions. Recommendation ITU-R SA.1344 identifies the 15 GHz band as preferred from a technical standpoint for wideband SRS (space VLBI) missions. Specifically, Recommendation ITU-R SA.1344 recommends the use of the 14.5 to 15.35 GHz for space-to-earth telemetry transmissions with a typical RF bandwidth of 300-500 MHz. Similarly, Recommendation ITU-R SA.364-6 recommends the use of the 12-20 GHz band for SRS missions in the space-to-earth direction.

The 14.5-15.35 GHz band is currently allocated to the fixed and mobile services on a primary basis, and to the space research service on a secondary basis. In addition, the 14.5-14.8 GHz portion of this band is also allocated to the fixed-satellite service (FSS) on a primary basis. However, the FSS allocation is limited by No. **5.510** to feeder links for the broadcasting-satellite service (BSS) and is reserved for countries outside Europe. These feeder links are subject to the BSS plan contained in Appendix **30A**. The band 15.2-15.35 GHz is allocated to the space research service (passive) and to the Earth exploration-satellite service (passive) on a secondary basis by No. **5.339**.

ITU-R studies have demonstrated the feasibility of sharing between the space research service and other services currently allocated on a primary basis in the 14.8-15.35 GHz band.
With respect to coordination and notification procedures, the current provisions of Articles 9 and 11 and the proposed sharing criteria will continue to apply among the fixed, mobile and space research services in the band 14.8-15.35 GHz.

Proposal:

14.5-15.35 GHz

	Allocation to Services		
	Region 1	**Region 2**	**Region 3**
USA/ /1 **MOD**	14.8-15.35	FIXED MOBILE ~~Space research~~ SPACE RESEARCH 5.339	

Reasons: To upgrade the SRS to a primary allocation to satisfy requirements for high data rate space science missions.

USA/ /2 MOD

Appendix 7

ANNEX 7

TABLE 8C

Parameters required for the determination of coordination distance for a receiving earth station

Receiving space radiocommunication service designation			**Space Research**
Frequency band (GHz)			14.8-15.35
Transmitting terrestrial service designations			Fixed, mobile
Method to be used			§ 2.1, § 2.2
Modulation at earth station (1)			N
Earth station Interference Parameters and criteria	p_0 (%)		0.1
	n		2
	p (%)		0.05
	N_L (dB)		0
	M_S (dB)		1
	W (dB)		0
Terrestrial	E (dBW) in B (2)	A	25 (5)
		N	-8

Station Parameters	P_t (dBW) in B	A	-20(5)
		N	-53
	G_x (dBi)		45
Reference band-width(6)	B (Hz)		1
Permissible interference power	P_r (p) (dBW) in B		-216

Reasons: Add characteristics of SRS earth stations to Table 8c of Appendix 7 for use in coordination. Provides the characteristics of the receiving SRS earth station in the 14.8-15.35 GHz band for coordination with transmitting fixed and mobile service stations.

USA/ /3 NOC

Notes to Table 8c:

Reasons: No changes to the notes to Table 8c are required.

Table 21-4

	Frequency band	Service	Limit in dB(W/m2) for angle of arrival (δ) above the horizontal plane			Reference bandwidth
			0°-5°	5°-25°	25°-90°	
USA/ /4 MOD	14.8-15.35 GHz	Space Research, geostationary-satellite orbit	-126	-126 + (δ – 5)/2	-116	1 MHz
USA/ /5 MOD	14.8-15.35 GHz	Space Research, non-geostationary-satellite orbit	-124	-124 + (δ – 5)/2	-114	1 MHz

Reasons: Sharing studies have concluded that these proposed power flux density limits on the space research service are necessary and sufficient to protect the fixed and mobile services from harmful interference.

DRAFT PROPOSAL FOR THE WORK OF THE CONFERENCE

Included in Doc. WAC/107(04.06.02)

WRC-03 Agenda Item 1.24: to review the usage of the band 13.75-14 GHz, in accordance with Resolution **733 (WRC-2000)**, with a view to addressing sharing conditions;

Background Information: At WARC-92, and as modified at WRC-95, WRC-97 and WRC-2000, Nos. **5.502** and **5.503** were added to the Table of Frequency Allocations to facilitate compatibility between the existing applications of the radio services in the 13.75-14 GHz band. It was agreed that any modifications to either of these footnotes in order to accommodate new technology, new requirements and applications of the FSS, should consider the overall interference environment in the 13.75-14 GHz band and be undertaken with great care in order to avoid upsetting the delicate balance previously achieved between the services. The constraints in the footnotes are based on the planned use of the band by gateway earth stations operating with GSO satellites in the FSS and are intended to limit the number of FSS earth stations to the point where sharing is possible. The present operational constraints, that satisfy the protection criteria of current operational applications and technology in the band 13.75-14 GHz, are found in No. **5.502** and **5.503 (WRC-2000)**.

Studies that led to the development of **5.502** and **5.503** did not account for non-geostationary-satellite orbit fixed-satellite service systems (non-GSO FSS). With the introduction of non-GSO FSS into this band at WRC-97, Resolution **130 (WRC-97)** was, among other things, drafted to focus attention on the need to reexamine the sufficiency of these footnotes in maintaining the delicate balance between the services sharing the 13.75-14 GHz band. At WRC-2000 Resolution **733 (WRC-2000)** was developed to review the constraints in **5.502** regarding the minimum antenna diameter of GSO FSS earth stations, the e.i.r.p limits imposed on the radiolocation service, and to identify possible alternative sharing situations to those inherent to **5.502** and **5.503** in time for WRC-03.

The introduction of non-GSO FSS earth station transmitters in the band at WRC-2000 created a potential sharing issue with the space research service (space-to-space). Footnote **5.503** was modified at WRC-2000 to include an e.i.r.p. density limit on non-GSO FSS earth stations transmitters to accompany the limit on GSO FSS earth station transmitters. It was understood that review of the minimum antenna diameter limit in **5.502** called for in Resolution 733 was only in regard to GSO FSS earth stations and not in regard to non-GSO FSS earth stations. Only limited modifications to **5.502** and **5.503** could be made while continuing to retain the delicate sharing balance between the allocated services.

Studies conducted since WRC-97 and WRC-2000 have shown several salient facts:

a) radiolocation services are already receiving interference from existing FSS earth stations, despite the small number that have been deployed.

b) that RR No. **5.502** maintains the delicate sharing balance between the radiolocation or radionavigation service and the fixed-satellite service only by limiting the number of FSS earth stations. In particular, studies have shown that sharing with radiolocation systems is significantly more difficult for non-GSO FSS systems than for GSO FSS systems, and that if requirements for the minimum antenna diameter of the FSS earth station were relaxed, the deployment of a large number of low data rate earth stations would collectively significantly

reduce the performance of radiolocation and radionavigation systems, both airborne and shipborne.

c) The feasibility of sharing between the space research service and the fixed-satellite service depends on limiting the number of FSS earth stations through RR No. **5.502** and by limiting the maximum power spectral density of each FSS earth station through RR No. **5.503**.

d) That there is no practical means for protecting airborne radiolocation systems from FSS earth station emissions, and that the current situation is tolerable only because the number of earth stations is limited by the 5.502 limitations on dish diameter.

e) ITU-R studies conducted in preparation for WRC-03, show that sharing between radiolocation systems and FSS earth stations with antennae smaller than 4.5 meters is not possible without the FSS operators employing mitigation techniques, and that current technology does not allow radar systems to mitigate interference from FSS earth stations. Mitigation techniques involving separation distance or percentage of time are neither practical nor enforceable, and no sharing proposals have been proposed that are enforceable by ITU regulations.

f) ITU studies thus far show that separation distances of greater than 50 km are required to protect maritime radiolocation systems from VSAT earth station transmissions. However, the technique of distance separation is not effective for protecting airborne radars or space science satellite systems from harmful interference by VSAT earth stations.

g) Studies conducted in preparation for WRC-03 show that the maximum allowable power spectral densities for FSS earth station antennae smaller than 4.5 meters, needed to ensure protection of space research operations, will not allow practical FSS VSAT implementations.

The concept of a separation distance to mitigate interference and promote sharing has been directed at using FSS earth station e.i.r.p. reductions and placing the VSAT terminals a specified distance inland from the coast. The reverse of this would be to restrict the radars a certain distance out to sea from the coast, or some combination of these approaches. Locating VSAT terminals well inland from coastlines would be the only solution that would allow maritime radiolocation systems to maintain operations close to shore. However, the enforceability of this approach is very questionable given the market needs to have VSATs placed without restrictions and noting that many population centers are located close to coasts. Requiring maritime radar systems to remain a significant distance from shore would impose severe restrictions on the ability of their host platforms to protect themselves during essential and routine operations. Therefore, the application of separation distance as a mitigation technique to protect shipborne radars against interference from VSAT earth stations is not feasible and thus it cannot be supported. Furthermore, such an approach would have no affect on protecting airborne radiolocation systems, or space science platforms.

Proposal:

USA/ /1 SUP

Resolution 733 (WRC-2000)

Reasons: Studies completed in accordance with agenda item 1.24 and Resolution **733** have not determined an effective method of preventing FSS systems operating with earth stations with antennae smaller than 4.5 meters from creating harmful interference to other services in the 13.75-14.0 GHz band. Therefore Resolution **733 (WRC-2000)** no longer applies to **5.502** and can be suppressed.

USA/ /2 (MOD)

5.502: In the band 13.75-14 GHz, an earth station in the fixed-satellite service shall have a minimum antenna diameter of 4.5 m and the e.i.r.p. of any emission should be at least 68 dBW and should not exceed 85 dBW. In addition the e.i.r.p., averaged over one second, radiated by a station in the radiolocation or radionavigation services shall not exceed 59 dBW. The protection of assignments to receiving space stations in the fixed-satellite service operating with earth stations that, individually, have an e.i.r.p. of less than 68 dBW shall not impose constraints on the operation of the radiolocation and radionavigation stations operating in accordance with the Radio Regulations. No. **5.43A** does not apply. ~~See Resolution **733 (WRC-2000)**~~.

Reasons: Consequential, we propose *No Change* (**NOC**) to the text contained in **5.502** other than the removal of the reference to Resolution **733**.

USA/ /3 NOC

5.503

Reasons: Footnotes **5.502** and **5.503** are integrally related in maintaining the delicate sharing balance between the radiolocation, radionavigation, space research and fixed-satellite services in the 13.75-14 GHz band. Maintaining these footnotes in their current form will ensure that all services can continue to share the band in a compatible manner.

-FCC-