

*WRC-2003 Advisory Committee  
IWG-4*

**Draft U.S. Proposal on  
WRC-03 Agenda Item 1.25**

**United States of America**

**DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE**

**Agenda Item 1.25:** *"to consider, with a view to global harmonization to the greatest extent possible, having due regard to not constraining the development of other services, and in particular of the fixed service and the broadcasting-satellite service, regulatory provisions and possible identification of spectrum for high-density systems in the fixed-satellite service above 17.3 GHz, focusing particularly on frequency bands above 19.7 GHz"*

**Background information**

This proposal addresses WRC-2003 agenda item 1.25 concerning high-density applications in the Fixed Satellite Service (HDFSS). The fundamental task requested of WRC-2003 by WRC-2000 concerning agenda item 1.25 is the consideration of regulatory provisions and identification of specific fixed-satellite service (FSS) bands to facilitate high-density applications in the FSS (HDFSS). With that objective in mind, the following USA proposal to WRC-2003 has been developed to identify some specific FSS frequency bands that are particularly appropriate for HDFSS use through addition of a footnote in Article S5 of the Radio Regulations that also refers to a WRC-03 Resolution describing guidelines for administrations in implementing HDFSS.

The demand for broadband services is increasing. Leading market research groups project substantial growth in broadband multi-media satellite access. This growth is projected for both residential and business purposes. Provision of broadband services by satellites provides an attractive competitive alternative to terrestrial communication systems. Satellite systems typically require a much longer lead time than do terrestrial systems to develop and implement; therefore, some regulatory assurances that terminal deployment will be commercially viable are essential.

A High Density application in the Fixed Satellite Service (HDFSS) is one that operates on a system in the FSS, deploying a large number of small earth stations. Satellite systems can be of any orbital type, as GSO or non-GSO, and using any of the available technologies.

High-Density FSS applications are generally characterized as follows:

- flexible, rapid and ubiquitous deployment of earth stations (terminals);
- highly efficient frequency reuse;
- small terminal antenna size;
- low-cost terminals.

As a consequence of these general characteristics, it is not practicable to coordinate HDFSS earth stations on an individual site-by-site basis. Because of the large number and nature of terminals involved, regulations should not be imposed that would subject HDFSS earth stations to major cost and complexity implications.

Sharing between Fixed Service (FS) stations and non-ubiquitous FSS earth stations can be handled through case-by-case coordination procedures, which have already proved to work successfully. Where high-density deployments of FSS stations are involved, the most effective use of the spectrum within a given country can be achieved by deploying HDFSS and FS systems in separate spectrum. This enables both types of systems to provide the most efficient, least constrained, highest quality and lowest cost service to the greatest number of users.

Effective HDFSS earth station deployment is very difficult to achieve when site-by-site coordination between FS stations and HDFSS earth stations is required. Therefore, it is appropriate for administrations to authorize HDFSS earth stations under a set of guidelines whereby a large number of earth stations can be deployed without the need for individual earth station site coordination. This would not relieve an HDFSS network from the ITU requirements to coordinate with FS networks, where required, across international borders.

The U.S. does not support the removal or addition of any allocations in the existing International Table of Frequency Allocations under WRC-03 agenda item 1.25. Specifically, the U.S. does not support identification of any bands for HDFSS that are not currently allocated to the FSS, in the indicated direction, such as the bands 17.3-17.7 GHz (space-to-Earth), 21.4-22 GHz (space-to-Earth), and 47.2-50.2 GHz (space-to-Earth).

With respect to sharing within the FSS, identification of spectrum for HDFSS does not eliminate the need for coordination between satellite networks or require the imposition, in the ITU Radio Regulations, of additional regulatory constraints on the FSS, (i.e., the current rights of GSO and non-GSO FSS systems should be maintained).

**Proposal:**

USA/xx/nn

**MOD**

ARTICLE S5		
GHz 18.4-20.2		
Allocation to Services		
Region 1	Region 2	Region 3
<b>18.4-18.6</b> FIXED FIXED-SATELLITE (space-to-Earth) S5.484A MOBILE <u><b>ADD S5.[HDFSS]</b></u>		
<b>18.6-18.8</b> EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) S5.522B MOBILE except aeronautical mobile Space research (passive) S5.522A S5.522C <u><b>ADD S5.[HDFSS]</b></u>	<b>18.6-18.8</b> EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) S5.522B MOBILE except aeronautical mobile SPACE RESEARCH (passive) S5.522A <u><b>ADD S5.[HDFSS]</b></u>	<b>18.6-18.8</b> EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) S5.522B MOBILE except aeronautical mobile Space research (passive) S5.522A S5.522 <u><b>ADD S5.[HDFSS]</b></u>
<b>18.8-19.3</b> FIXED FIXED-SATELLITE (space-to-Earth) S5.523A MOBILE <u><b>ADD S5.[HDFSS]</b></u>		
<b>19.7-20.1</b> FIXED-SATELLITE (space-to-Earth) S5.484A Mobile-satellite (space-to-Earth) S5.524 <u><b>ADD S5.[HDFSS]</b></u>		
<b>19.7-20.1</b> FIXED SATELLITE (space-to-Earth) S5.484A MOBILE-SATELLITE (space-to-Earth) S5.524 S5.525 S5.526 S5.527 S5.528 S5.529 <u><b>ADD S5.[HDFSS]</b></u>		
<b>19.7-20.1</b> FIXED SATELLITE (space-to-Earth) S5.484A Mobile-satellite (space-to-Earth) S5.524 <u><b>ADD S5.[HDFSS]</b></u>		
<b>20.1-20.2</b> FIXED SATELLITE (space-to-Earth) S5.484A MOBILE SATELLITE (space-to-Earth) S5.524 S5.525 S5.526 S5.527 S5.528 <u><b>ADD S5.[HDFSS]</b></u>		

ARTICLE S5		
GHz 27.5–30.0		
Allocation to Services		
Region 1	Region 2	Region 3
<b>27.5–28.5</b>	FIXED S5.5SSS FIXED-SATELLITE (Earth-to-space) S5.484A S5.539 MOBILE S5.538 S5.540 <b><u>ADD S5.[HDFSS]</u></b>	
<b>28.5–29.1</b>	FIXED FIXED-SATELLITE (Earth-to-space) S5.484A S5.523A S5.539 MOBILE Earth exploration-satellite (Earth-to-space) S5.541 S5.540 <b><u>ADD S5.[HDFSS]</u></b>	
<b>29.1–29.5</b>	FIXED FIXED-SATELLITE (Earth-to-space) S5.523C S5.523E S5.535A S5.539 S5.541A MOBILE Earth exploration-satellite (Earth-to-space) S5.541 S5.540 <b><u>ADD S5.[HDFSS]</u></b>	
<b>29.5–29.9</b> FIXED SATELLITE (Earth-to-space) S5.484A S5.539  Earth exploration-satellite (Earth-to-space) S5.541  Mobile-satellite (Earth-to-space)  S5.540 S5.542 <b><u>ADD S5.[HDFSS]</u></b>	<b>29.5–29.9</b> FIXED-SATELLITE (Earth-to-space) S5.484A S5.539  MOBILE-SATELLITE (Earth-to-space)  Earth exploration-satellite (Earth-to-space) S5.541 S5.525 S5.526 S5.527 S5.529 S5.540 S5.542 <b><u>ADD S5.[HDFSS]</u></b>	<b>29.5–29.9</b> FIXED-SATELLITE (Earth-to-space) S5.484A S5.539  Earth exploration-satellite (Earth-to-space) S5.541  Mobile-satellite (Earth-to-space)  S5.540 S5.542 <b><u>ADD S5.[HDFSS]</u></b>
<b>29.9–30.0</b>	FIXED-SATELLITE (Earth-to-space) MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) S5.541 S5.543 S5.525 S5.526 S5.527 S5.538 S5.540 S5.542 <b><u>ADD S5.[HDFSS]</u></b>	

ARTICLE S5		
GHz 40.0-42.0		
Allocation to Services		
<b>Region 1</b>	<b>Region 2</b>	<b>Region 3</b>
<p><b>40-40.5</b> EARTH EXPLORATION-SATELLITE (Earth-to-space)            FIXED            FIXED-SATELLITE (space-to-Earth)            MOBILE            MOBILE-SATELLITE (space-to-Earth)            SPACE RESEARCH (Earth-to-space)            Earth exploration-satellite (space-to-Earth)  <u><b>ADD S5.[HDFSS]</b></u></p>		
<p><b>40.5-41</b>            FIXED            FIXED SATELLITE            (space-to-Earth)            BROADCASTING            BROADCASTING-SATELLITE            Mobile  <u><b>MOD</b></u> S5.547 <u><b>ADD S5.[HDFSS]</b></u></p>	<p><b>40.5-41</b>            FIXED            FIXED-SATELLITE            (space-to-Earth)            BROADCASTING            BROADCASTING-SATELLITE            Mobile            Mobile-satellite (space-to-Earth)  <u><b>MOD</b></u> S5.547 <u><b>ADD S5.[HDFSS]</b></u></p>	<p><b>40.5-41</b>            FIXED            FIXED-SATELLITE            (space-to-Earth)            BROADCASTING            BROADCASTING-SATELLITE            Mobile  <u><b>MOD</b></u> S5.547 <u><b>ADD S5.[HDFSS]</b></u></p>
<p><b>41-42</b>            FIXED            FIXED SATELLITE            (space-to-Earth)            BROADCASTING            BROADCASTING-SATELLITE            Mobile  <u><b>MOD</b></u> S5.547 S5.551G  <u><b>ADD S5.[HDFSS]</b></u></p>	<p><b>41-42</b>            FIXED            FIXED-SATELLITE            (space-to-Earth)            BROADCASTING            BROADCASTING-SATELLITE            Mobile  <u><b>MOD</b></u> S5.547 S5.551G  <u><b>ADD S5.[HDFSS]</b></u></p>	<p><b>41-42</b>            FIXED            FIXED-SATELLITE            (space-to-Earth)            BROADCASTING            BROADCASTING-SATELLITE            Mobile            S5.551F <u><b>MOD</b></u> S5.547            S5.551G <u><b>ADD S5.[HDFSS]</b></u></p>
ARTICLE S5		
GHz 47.2-50.2		
Allocation to Services		
<p><b>47.2-50.2</b> FIXED  <u><b>NOC</b></u> FIXED-SATELLITE (Earth-to-space) S5.552            MOBILE            S5.149 S5.340 S5.552A S5.555  <u><b>ADD S5.[HDFSS]</b></u></p>		

**Reasons: 1.** The U.S. proposes identification of the following existing FSS frequency bands for HDFSS on a global basis, for the following reasons:

- The bands 29.5-30.0 GHz and 19.7-20.2 GHz are allocated globally to the FSS in the Earth-to-space and space-to-Earth directions, respectively. There is no co-primary FS allocation in the ITU Table of Frequency Allocations in these bands.
- The bands 28.6-29.1 GHz and 18.8-19.3 GHz are allocated globally to the FSS in the Earth-to-space and space-to-Earth directions, respectively. Furthermore, these are the only bands considered for HDFSS where NGSO FSS systems are not subject to No. S22.2 and therefore represent the best opportunity for ubiquitously deployed NGSO FSS user terminals. In these two bands, some administrations in all Regions have planned for HDFSS and adopted regulatory provisions for terrestrial systems in order to facilitate HDFSS. Some HDFSS systems are already in development in these bands and there are other filings for HDFSS type systems.
- The bands 18.58-18.8 GHz (space-to-Earth), and 28.35-28.6 GHz and 29.25-29.5 GHz (both Earth-to-space), are also planned for use by many administrations for HDFSS applications.
- In the 37.5-50.2 GHz range, many administrations have submitted ITU filings for FSS systems in the bands 40.0-42.0 GHz (space-to-Earth) and 48.2-50.2 GHz (Earth-to-space) and propose to use these bands for global HDFSS. WRC-00 advised administrations that may be contemplating HDFSS use of the band 40.5-42 GHz to take into account constraints to HDFSS due to the potential deployment of high-density applications in the FSS. Further, Resolution **84 (WRC-2000)** urges administrations considering regulatory provisions relating to the band 40.0-40.5 GHz to take into account that there were a number of proposals to WRC-2000 to identify the band for HDFSS applications. As a consequence of actions at WRC-2000, the 40.5-42.0 GHz band could be identified for HDFSS use through new Radio Regulation S5.[HDFSS], but would also require a modification of existing Radio Regulation No. S5.547 (see proposal USA/xx/3 below).

2. The U.S. proposes specifically that WRC-03 not make additional FSS allocations in the 47.2-50.2 GHz band to accommodate possible HDFSS use. In this regard, as studies have shown that HDFSS uplinks and HDFSS downlinks cannot share the same spectrum, and there are interference concerns about FSS gateway uplinks and HDFSS downlinks, the U.S. proposes no change to the FSS allocation directions in the 47.2-50.2 GHz band. The FSS allocation in this band is to be retained for uplink use only.

**USA/xx/2**  
**ADD**

**S5.[HDFSS]** The space-to-Earth FSS bands 18.58-18.8 GHz, 18.8-19.3 GHz, 19.7-20.2 GHz, and 40.0-42.0 GHz and the Earth-to-space FSS bands 28.35-28.6 GHz, 28.6-29.1 GHz, 29.25-29.5 GHz, 29.5-30.0 GHz and 48.2-50.2 GHz, are identified for use by high-density applications in the fixed satellite service (HDFSS) in accordance with **Resolution [HDFSS] (WRC-03)**. This identification does not preclude the use of these bands by other FSS applications or by other co-primary services allocated in these bands and does not establish priority in the Radio Regulations. Administrations should take this identification into account when considering regulatory provisions in relation to these bands.

**Reasons:** The identification of appropriate frequency bands for high-density applications in the FSS, and the adoption of approved guidelines to facilitate the deployment of HDFSS earth terminals, can help administrations and HDFSS satellite system operators in such earth station deployment. This footnote will also inform administrations of those specific bands intended for deployment of HDFSS systems in all regions of the world.

**USA/xx/3**  
**MOD**

**S5.547** The bands 31.8-33.4 GHz, 37-40 GHz, 40.5-43.5 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz are available for high-density applications in the fixed service (see Resolutions **75 (WRC-2000)** and **79 (WRC-2000)**). Administrations should take this into account when considering regulatory provisions in relation to these bands. Because the band 40.5-42 GHz is identified for use by high-density applications in the fixed satellite service (see No. **S5.[HDFSS]** and Resolution **[HDFSS] (WRC-03)**), and thus is available for these applications, ~~Because of the potential deployment of high-density applications in the fixed satellite service in the bands 39.5-40 GHz and 40.5-42 GHz,~~ administrations should further take into account ~~potential-appropriate~~ constraints to high-density applications in the fixed service when considering regulatory provisions in relation to the latter type of applications in the same band, ~~as appropriate~~ [(see Resolution **84 (WRC-2000)**)]].

**Reasons:** Consequential to the addition of No. **S5.[HDFSS]** to the 40.5-42.0 GHz band, and the non-identification of 39.5-40.0 GHz for HDFSS use. *NOTE: The square brackets reflect that the fate of Resolution 84 has not yet been determined.*

USA/xx/4  
ADD

## RESOLUTION [HDFSS] (WRC-03)

### Implementation of High-Density Applications in the Fixed Satellite Service in Frequency Bands Identified for HDFSS

The World Radiocommunication Conference (Caracas, 2003),

*considering*

- a) that demand has been increasing steadily for broadband communications services throughout the world;
- b) that this demand for ubiquitous broadband communications services can be met in part through the use of high-density applications in the fixed-satellite service (HDFSS);
- c) that HDFSS is an advanced broadband communications applications concept that enables telecommunications services to be provided on a flexible, wide-scale basis through standardized, relatively low-cost earth terminal equipment;
- d) that HDFSS will provide users with access to a wide range of broadband telecommunications services supported by fixed telecommunications networks (including the Internet) and thus will complement other telecommunications systems;
- e) that HDFSS offers great potential for developing countries to establish their telecommunications infrastructure more rapidly;
- f) that HDFSS systems are characterized by flexible, rapid deployment, high frequency reuse, and ubiquitous deployment of large numbers of Earth stations employing small antennas;
- g) that HDFSS Earth stations should not be subject to major cost and complexity implications in consideration of the large number and nature of terminals involved;

*noting*

- a) that No. **S5.[HDFSS]** identifies the space-to-Earth FSS bands 18.58-18.8 GHz, 18.8-19.3 GHz, 19.7-20.2 GHz, and 40.0-42.0 GHz and the Earth-to-space FSS bands 28.35-28.6 GHz, 28.6-29.1 GHz, 29.25-29.5 GHz, 29.5-30.0 GHz and 48.2-50.2 GHz, for high-density applications in the fixed satellite service (HDFSS);
- b) that in some of the bands listed in *noting a)* above, the FSS allocations are co-primary with fixed and mobile service allocations;
- c) that a number of FSS systems with other types of earth stations and characteristics have already been brought into use or are planned to be brought into use in some of the frequency bands identified for HDFSS in No. **S5.[HDFSS]**;
- d) that HDFSS stations in these bands are expected to be deployed in large numbers over urban, suburban and rural areas of large geographical extent;
- e) that harmonized worldwide bands for HDFSS would facilitate the implementation of HDFSS and maximize the extent to which users in administrations around the world would be able to benefit from global access and economies of scale,

*recognizing*

- a) that as a consequence of their general characteristics, it is not practicable to coordinate HDFSS Earth stations on an individual site-by-site basis;



- b) that the single authorization of a large number of FSS earth stations associated with a given satellite system, without the need for individual site coordination, would greatly facilitate the ability of fixed-satellite services to reach large numbers of users within a geographic area;
- c) that such an authorization would minimize the administrative burden for administrations to individually authorize a large number of earth stations,

*recognizing further*

- a) that FSS networks and systems implementing HDFSS applications are subject to all applicable provisions of the Radio Regulations, such as coordination and notification pursuant to Articles **S9** and **S11** and limits in Articles **S21** and **S22**;
- b) that Article **S21** contains power flux density limits that protect FS receivers operating in the FSS space-to-Earth bands identified in No. **S5.[HDFSS]**, thereby insuring that transmissions from FSS satellites will not cause interference to FS receivers operating in these same bands;

*resolves*

to urge administrations implementing HDFSS in some or all of the corresponding frequency bands in No. **S5.[HDFSS]** to:

- a) use a single authorization for a large number of earth stations having similar characteristics and associated with a given satellite system;
- b) take into account the relevant international technical characteristics, as identified by ITU-R Recommendations (e.g., Recommendations ITU-R S.524-7 and [doc. 4/70]);
- c) take into account that continued assignment of spectrum to or deployment of terrestrial stations in bands identified for HDFSS within the same geographical area could impede the introduction or development of HDFSS and reduce or eliminate the benefits that such applications offer;
- d) ensure compatibility with other existing and planned FSS operations having different characteristics,

*invites administrations*

to give due consideration to the benefits of harmonized utilization of the spectrum for HDFSS on a global basis, taking into account the use and planned use of these bands by all services to which these bands are allocated.

**Reasons:** Many administrations are currently in the process of determining how to appropriately provide for HDFSS services in their countries. Some of these administrations are looking to the ITU for guidance on spectrum management issues concerning the FS and HDFSS and this Resolution provides that guidance.