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*WRC-2003 Advisory Committee
IWG-4*

**Update to 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:

The demand for broadband services is increasing. Market research predicts substantial growth in demand for broadband multi-media access, both for residential and business applications. Satellite systems offer an attractive competitive alternative to terrestrial communication systems for providing such access.

High-density systems in the fixed-satellite service (HDFSS systems) may use any orbital type (GSO or non-GSO) consistent with the FSS allocation. As envisioned in technical and operational studies, HDFSS systems incorporate small, ubiquitous, low-cost earth stations that can be deployed rapidly and flexibly. As a consequence of these general characteristics, it is not practicable to coordinate HDFSS earth stations with terrestrial services on an individual, site-by-site basis.

While sharing between Fixed Service (FS) stations and non-ubiquitous FSS earth stations can typically be handled through proven case-by-case coordination procedures, the most effective use of the spectrum within a given country where high-density deployments of FSS stations are involved may be achieved by deploying HDFSS and FS systems separately. 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 regime whereby a large number of earth stations can be deployed without the need for individual earth station site coordination. Such authorization would not relieve an HDFSS network from the ITU requirements to coordinate with fixed service networks on a site-by-site basis, where required, across international borders, nor would it preclude coordination of specific earth stations within HDFSS deployments with fixed service networks.

A number of FSS systems with other characteristics, and with earth stations of types other than those used by HDFSS systems, have already been brought into use, or are planned to be brought into use, including some that use the 17.8–21.2 GHz (space-to-Earth) frequency band. Accordingly, it is essential that existing FSS allocations be retained and that non-HDFSS use of these FSS allocations not be subject to additional regulatory constraints in the Radio Regulations as a result of the HDFSS band identification. Further, identification of spectrum for HDFSS does not relieve an HDFSS network of the ITU requirement to coordinate with other satellite networks.

Consideration of candidate frequency bands for HDFSS identification

A number of frequency bands allocated to the fixed-satellite service are seen as good candidates for HDFSS identification. The 29.5–30.0 GHz and 19.7–20.2 GHz bands are allocated globally to the FSS in the Earth-to-space and space-to-Earth directions, respectively. Since there are no co-primary fixed service allocations in the ITU Table of Frequency Allocations in these bands, a major sharing issue is avoided.

The 28.6–29.1 GHz and 18.8–19.3 GHz frequency bands are allocated globally to the FSS in the Earth-to-space and space-to-Earth directions, respectively. These are the only bands considered for HDFSS where NGSO FSS systems are not subject to No. **S22.2** of the Radio Regulations, 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 have 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.

Many administrations are also planning to use the 18.58–18.8 GHz (space-to-Earth) band and the 28.35–28.6 GHz and 29.25–29.5 GHz (Earth-to-space) bands for HDFSS applications. In the 18.6–18.8 GHz band, the FSS allocation is co-primary with the Earth exploration-satellite service (passive) with restrictions on power and orbit types as described in **S5.522A** and **S5.522B**.

Between 37.5 and 50.2 GHz, many administrations have submitted ITU filings for FSS systems in the 40.0–42.0 GHz (space-to-Earth) and 48.2–50.2 GHz (Earth-to-space) bands and propose to use these bands for global HDFSS. WRC-2000 advised administrations that may be contemplating the use of the 40.5–42 GHz band for high-density applications in the fixed service (HDFS) to take into account constraints to HDFS 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 40.0–40.5 GHz band to take into account that there were a number of proposals to WRC–2000 to identify the band for HDFSS applications.

It is inappropriate to add or remove any fixed-satellite service allocations in the Table of Frequency Allocations under WRC–03 agenda item 1.25. This includes new FSS allocations in bands in which the fixed-satellite service is already allocated in another direction. In particular, new space-to-Earth FSS allocations in the 17.3–17.7 GHz, 21.4–22 GHz and 47.2–50.2 GHz bands, which have been discussed in working party meetings, should be rejected. Studies have shown that the latter band is not suitable for space-to-Earth links because of likely interference with both FSS gateway and HDFSS uplinks.

Description of proposal

This proposal identifies spectrum above 18.58 GHz for high-density systems in the fixed-satellite service without constraining the use of these bands by other FSS applications or other co-primary services. It specifically does not establish priority among the different uses of these bands. The proposal consists of a new footnote **S5.[HDFSS]** to frequency bands identified for high-density FSS

systems, consequential modifications to existing footnote **S5.547**, and a new Resolution [HDFSS] providing guidance to administrations wishing to amend their national rules to implement high-density systems in the fixed-satellite service.

Proposal:

USA/ / 1

MOD

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

27.5–30.0 GHz		
Allocation to services		
Region 1	Region 2	Region 3
27.5–28.5 FIXED S5.5SSS FIXED-SATELLITE (Earth-to-space) S5.484A S5.539 MOBILE S5.538 S5.540 ADD S5.[HDFSS]		

28.5–29.1		
FIXED FIXED-SATELLITE (Earth-to-space) S5.484A S5.523A S5.539 MOBILE Earth exploration-satellite (Earth-to-space) S5.541 S5.540 ADD S5.[HDFSS]		
29.1–29.5		
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 ADD S5.[HDFSS]		
29.5–29.9	29.5–29.9	29.5–29.9
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 ADD S5.[HDFSS]	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 ADD S5.[HDFSS]	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 ADD S5.[HDFSS]
29.9–30.0		
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 ADD S5.[HDFSS]		

40.0–42.0 GHz		
Allocation to services		
Region 1	Region 2	Region 3
40-40.5		
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) ADD S5.[HDFSS]		
40.5–41	40.5–41	40.5–41
FIXED FIXED SATELLITE (space-to-Earth) BROADCASTING BROADCASTING-SATELLITE Mobile MOD S5.547 ADD S5.[HDFSS]	FIXED FIXED-SATELLITE (space-to-Earth) BROADCASTING BROADCASTING-SATELLITE Mobile Mobile-satellite (space-to-Earth) MOD S5.547 ADD S5.[HDFSS]	FIXED FIXED-SATELLITE (space-to-Earth) BROADCASTING BROADCASTING-SATELLITE Mobile MOD S5.547 ADD S5.[HDFSS]

41-42 FIXED FIXED SATELLITE (space-to-Earth) BROADCASTING BROADCASTING-SATELLITE Mobile MOD S5.547 S5.551G ADD S5.[HDFSS]	41-42 FIXED FIXED-SATELLITE (space-to-Earth) BROADCASTING BROADCASTING-SATELLITE Mobile MOD S5.547 S5.551G ADD S5.[HDFSS]	41-42 FIXED FIXED-SATELLITE (space-to-Earth) BROADCASTING BROADCASTING-SATELLITE Mobile S5.551F MOD S5.547 S5.551G ADD S5.[HDFSS]
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47.2-50.2 GHz	
Allocation to services	
47.2-50.2	FIXED NOC FIXED-SATELLITE (Earth-to-space) S5.552 MOBILE S5.149 S5.340 S5.552A S5.555 ADD S5.[HDFSS]

Reasons:

1. Consequential: see reasons associated with USA/xx/2 and USA/xx/3.
2. 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. Accordingly, it is proposed that there be 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/ /2
ADD

S5.[HDFSS] The space-to-Earth fixed-satellite service 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 fixed-satellite service 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 fixed-satellite service applications or by other co-primary services allocated in these bands and does not establish priority among users of the bands in the Radio Regulations.

Reasons: The identification of appropriate frequency bands for high-density applications in the fixed-satellite service can help administrations and HDFSS satellite system operators in deployment of HDFSS earth stations. This footnote will also inform administrations of those specific bands intended for deployment of HDFSS systems in all regions of the world, while specifying that the use of these bands for HDFSS applications does not preclude their use by other co-primary services or by other FSS applications.

USA/ /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/ /4
ADD

RESOLUTION [HDFSS] (WRC-03)

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

The World Radiocommunication Conference (Geneva, 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 and having common technical characteristics;
- g) that due to the large number and nature of terminals involved, it is not practicable for HDFSS earth stations to implement burdensome interference mitigation techniques,

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 this identification does not preclude the use of these bands by other co-primary services or by other fixed-satellite service applications, and does not establish priority among users of the bands in the Radio Regulations;
- c) that in some of the bands listed in *noting a)* above, the FSS allocations are co-primary with fixed and mobile service allocations;
- d) that in the band 18.6-18.8 GHz, the FSS allocation is co-primary with the Earth exploration-satellite service (passive) with the restrictions of **S5.522A** and **S5.522B**.
- e) that radio astronomy observations of an important spectral line are carried out in the 48.94-49.04 GHz portion of the 47.2-50.2 GHz band, and that such observations require continued protection wherever they occur worldwide;
- f) 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]**;
- g) that HDFSS stations in these bands are expected to be deployed in large numbers over urban, suburban and rural areas of large geographical extent;
- h) 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 difficult and may be a rather long process 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**, including any ITU requirements to coordinate with fixed service networks across international borders, and the provisions of Articles **S21** and **S22**;
- b) that Article **S21** contains power flux density limits that protect fixed service receivers operating on a co-primary basis in the fixed-satellite service space-to-Earth bands identified in No. **S5.[HDFSS]**, thereby ensuring that transmissions from fixed-satellite service satellites will not cause unacceptable interference to fixed service 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) consider using a single authorization for a large number of earth stations having common technical characteristics and associated with a given satellite system;
- b) consider taking into account the relevant 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, and not constrain, other existing and planned fixed-satellite service systems having different characteristics, particularly those that use the frequency band 17.8-21.2 GHz (space-to-Earth),

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 other services to which these bands are allocated, as well as other types of fixed-satellite service applications.

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.
