

WRC-2003 Advisory Committee
Informal Working Group-4

IWG-4 PRELIMINARY VIEWS
ON WRC-03 AGENDA ITEM 1.32

WRC-2003 Agenda Item 1.32b: 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)**.

ISSUES: 1. How to achieve the successful co-existence of the fixed service (“FS”) (including high-density applications in the FS), the fixed-satellite service (“FSS”) (including high-density applications in the FSS), the mobile-satellite service (“MSS”) and the broadcasting-satellite service (“BSS”) within the 37.5 - 42.5 GHz frequency range.

2. How to ensure that FSS satellites that operate in clear sky conditions in the 37.5 – 40.0 GHz and 42.0 - 42.5 GHz bands at reduced power flux-density (“PFD”) levels use downlink fade compensation to overcome fading conditions in the least intrusive way practicable.

3. How to ensure that ubiquitously-deployed FSS terminals in the 40.0 – 42.0 GHz band will be protected from interference caused by co-frequency FS transmitters.

BACKGROUND: 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:

1. A framework for a comprehensive sharing arrangement for terrestrial and satellite services in the 37.5 - 43.5 GHz band was established, based on each service using some portions of the band more intensively than others.
 - (a) The 40.5 - 42.5 GHz band allocation for FSS was harmonized across all three ITU Regions.

- (b) The 37.5 - 40.0 GHz and the 40.5 - 43.5 GHz bands, among others, were identified for HDFS applications in footnote **S5.547**, noting the potential deployment of HDFSS applications in the bands 39.5 - 40.0 GHz and 40.5 - 42.0 GHz and the constraints such deployments may impose on use by HDFS.
 - (c) PFD limits were established in Article **S21** (Table **S21-4**) for the FSS (space-to-Earth) in the bands 37.5 - 40.0 GHz and 42.0 - 42.5 GHz, and for the MSS (space-to-Earth) in the band 39.5 - 40.0 GHz, which are favorable to high-density applications in the FS, but which also permit “gateway”-type FSS operations. The PFD limits in the bands 40.0 - 40.5 GHz and 40.5 – 42.0 GHz are favorable for high density applications in the FSS.
 - (d) In the bands 37.5 – 40.0 GHz and 42.0 - 42.5 GHz, footnote **S5.551AA** provides that non-GSO FSS systems should employ power control or other methods of downlink fade compensation, on the order of 10 dB, to reduce the level of interference to the FS while ensuring that the satellite systems are at power levels required to meet the desired link performance.
 - (e) With regard to the consideration of regulatory provisions for the band 40.0 - 40.5 GHz, Administrations were urged to take into account that WRC-2000 received a number of proposals to identify the band 40.0 - 40.5 GHz for high-density applications in the FSS.
 - (f) ITU-R is to study 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.
 - (g) WRC-2000 established provisional PFD limits on BSS satellites in the band 40.5 - 42.5 GHz and requested the ITU-R to study technical and operational characteristics of BSS and to review the provisional PFD limits.
2. HDFS deployments in the 37.0 - 40.0 GHz band in ITU Region 2 were provisionally afforded greater protection from interference from FSS systems than they are in ITU Regions 1 and 3. In Region 2, prior to WRC-03, before an Administration brings into use a frequency assignment for a GSO FSS network in the 37.5 – 40.0 GHz band, it shall seek the agreement of any Administration in Region 2 on whose territory the PFD produced exceeds the values in Table **S21-4** minus 12 dB.
 3. ITU-R is to conduct studies to determine whether the PFDs in Article **S21** in the bands 37.5 – 40.0 GHz and 42.0 – 42.5 GHz will adequately protect the FS from FSS and MSS transmissions (39.5 – 40.0 GHz only), taking into account the need to ensure a proper balance in terms of the impact on both the FS and space services sharing the same band.
 4. ITU-R is to conduct studies to determine whether the PFDs in Article **S21** in the band 40.5 – 42.0 GHz band will adequately protect systems in the FS, taking into account the

requirements of the FSS and recognizing that some Administrations plan to deploy FSS systems using ubiquitous very small aperture terminals in the 39.5 – 42.0 GHz band.

5. In the bands 37.5 – 40.0 GHz and 42.0 – 42.5 GHz, ITU-R is to study the nominal clear sky PFD levels, and the percentage of time during which they may be exceeded to overcome fading conditions for FSS, in order to protect the FS while permitting operation of FSS using coordinated large antennas.
6. ITU-R is to study the use of mitigation techniques to improve sharing conditions between the space services and FS systems, taking account of the impact on systems of all affected services.

PRELIMINARY VIEWS:

The U.S. continues to fully support the comprehensive sharing arrangement that the CITEL countries took into WRC-2000. This approach is equitable, and allows the competing needs of the FS and the FSS in the 37.5 – 43.5 GHz band to be satisfied.

The unique characteristics of some HDFS networks in the 37.5 – 40.0 GHz band, which include links across a very wide range of elevation angles, makes them much more sensitive to satellite downlink interference than more traditional FS networks or HDFS networks with smaller concentrations of high elevation angle links. The PFD limits established in Article **S21** (Table **S21-4**) for the FSS (space-to-Earth) in the bands 37.5 - 40.0 GHz and 42.0 - 42.5 GHz, and for the MSS (space-to-Earth) in the band 39.5 - 40.0 GHz should be maintained, and should be used for validation purposes. When GSO and non-GSO satellites operate in these bands under clear-sky conditions, their operational PFD levels should be reduced to the levels in Table **S21-4** minus 12 dB.

The U.S. supports a policy that allows FSS satellites operating at the nominal clear-sky levels (Table **S21-4** minus 12 dB) under clear-sky conditions in the bands 37.5 – 40.0 GHz and 42.0 - 42.5 GHz to increase PFD by up to 12 dB to compensate for fading conditions between the satellite and one or more geographically separated Earth stations. The U.S. is currently participating in ITU-R studies that will determine the appropriate percentage(s) of time during which satellite networks and systems will need to use downlink fade compensation, and any associated conditions that are appropriate to minimize the impact of such use on affected HDFS links.

The PFD limits in the bands 37.5 - 40.0 GHz and 42.0 - 42.5 GHz should still be adequate to permit “gateway”-type FSS operations. FS operations in the 40.0 - 42.0 GHz band should be able to be accommodated subject to constraints that would be imposed due to deployment of high-density applications in the FSS.