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Title	Wireless HUMAN System Coexistence with Other Systems in the U-NII MID-BAND	
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Re:	Responding to Call for Contributions on coexistence Strategies	
Abstract	The contribution lists a number of local and global industry constrains for the 5250-to-5350MHz band that the Wireless HUMAN specification has to give timely considerartion to as they impact some of the current TG4 specification efforts	
Purpose	That TG4 give early consideration to the TG4 specification constrains that are identified by the listed considerata, as they will play a key role in enabling systems based on the TG4 Standard to share the 5250 to 5350 MHz band with Wireless/Radio LANs and, EESS and SRS systems, and liaise with ITU-R to assure that ITU-R studies for WRC 2003 include consideration of Wireless Human based FWA Systems.	
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# Wireless HUMAN System Coexistence with Other Systems in the U-NII MID-Band

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## BACKGROUND

### 1.1 U-NII 5250-5350MHz SPECTRUM ALLOCATION CONSIDERATIONS

On January 9, 1997 the United States FCC Report and Order amended Part 15 and made available 300 MHz in the 5150-5350 and 5725-5825MHz bands to Unlicensed-National Information Infrastructure (U-NII) devices. The objective of the Part 15 amendments was to encourage innovation by specifying minimum technical requirements for U-NII devices. The key U-NII band-by-band requirements are that

1. In the 5150-5250MHz devices are restricted to indoor operation, with an EIRP limit of 200mw and a power spectral density limit 10mw/MHz.
2. In the 5250-5350MHz devices can operate outdoor, with an EIRP limit of 1000mw and a power spectral density limit 50mw/MHz.
3. In the 5725-5825MHz devices can operate outdoor, with an EIRP limit of 4000mw and a power spectral density limit 200mw/MHz.
4. If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmitted power and the peak power spectral density shall be reduced by the amount of dB that the directional gain of the antenna exceeds 6dBi. For the 5725-to-5825 MHz band, fixed point-to-point U-NII transmitters that employ a directional antenna gain greater than 23 dBi , a 1dB reduction in peak transmitted power and peak power spectral density for each 1 dB of antenna gain in excess of 23dBi would be required.
5. The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified in this paragraph) shall not exceed 13 dB across any 1 MHz or the emission bandwidth whichever is less.

The reaction by the USA industry to these Part 15 changes was quick. Manufacturers and service providers were quick to develop products and services (e.g., Point-to-Multipoint Fixed Broadband Wireless Access) for these bands that can give timely and cost-effective high speed internet services to educational institutions, health care providers, libraries, business and home users. A number of these users in the USA are currently being served by 5250-5350MHz PMP FBWA systems.

### GLOBAL 5250-5350MHz SPECTRUM ALLOCATION CONSIDERATIONS

In 1997 the World Radiocommunications Conference (WRC '97) allocated the 5250-5350MHz and 5350-5460 MHz bands on a world wide-primary basis to the radiolocation service. Thus this band is currently also allocated on a world wide-primary basis to active space-borne sensors, including Synthetic Aperture Radars (i.e., SAR 1-4).

In 2000 the WRC '00 resolved that on proposals from administrations and taking into account the results of studies in ITU-R and the Conference Preparatory Meeting, {WRC 2003} should consider:

1. Allocations of frequencies to the mobile service in the bands of 5.150 -5.350GHz, while fully protecting the worldwide Earth exploration-satellite (active) and the space research (active) services;
2. A possible allocation in Region 3 to the fixed service in the band 5.25-5.35 GHz, while fully protecting the worldwide Earth exploration-satellite (active) and the space research (active) services;
3. Additional primary allocations for the worldwide Earth exploration-satellite (active) and the space research(active) in the frequency range of 5.460-5.570GHz;
4. Review, with a view to upgrading, of the status of frequency allocations to the radiolocation service in the frequency range 5.350-5.650GHz,

*invited* ITU-R

to conduct and complete in time for the [WRC 2003], the appropriate studies leading to technical and operational recommendations to facilitate sharing between the services referred to in the *resolves* and existing services.

## 2.0 KEY COEXISTENCE CONSIDERATA FOR THE TG4 FWA SYSTEM

that the frequency band 5250-5350MHz is allocated to the Earth Exploration Satellite Services (EESS)(active) and Space Research Services(SRS)(active) on a primary basis;

that the allocation in the frequency band 5250-5350MHz will be reviewed by WRC 2003 under agenda Item 1.5 with a view to allocate this band to mobile service, and for Region 3 to fixed wireless access(FWA);

that currently in USA the 5250-5350MHz band is part of the Unlicensed National Information Infrastructure(U-NII) that permits operation of FWA devices and that large number of proprietary PMP FWA systems are currently in service;

that some administrations have proposed using the 5250-5350MHz band for broadband radio local area networks (RLANs) in the mobile services;

that the broadband RLANs in the mobile services are proposed to be deployable in the 5250-5350MHz band world wide as unlicensed devices, making regulatory control of their deployment density non-feasible;

that ITU-R studies indicate that to meet the interference requirements of the EESS (active) and SRS (active) systems, there is a need for RLANs that use this band to be constrained ( e.g., RLANs used indoors only, limit their density and their E.I.R.P, and restrict operationally), and that other wireless access transmitters (e.g., FWA) in this band also need to limit their EIRP so that the total interference does not exceed the EESS or SRS systems' threshold of allowable interference; Worst case consideration indicate that interference from a single RLAN operating indoor at 200 mw peak radiated power will exceed the SAR4 interference threshold.

that as the repeat period for the sensitive Synthetic Aperture Radar (SAR 4) is 8-10 days, and as the SAR is not necessarily active for every repeat pass, a given area of the earth would be illuminated by the SAR beam( footprint of 57.6Kmsq and Bandwidth 46 MHz) no more often than .5-1.0 second every 8-10 days

that wireless LANs (WLANs) standard groups are currently seeking ways for WLANs detecting the arrival of a SAR illumination and stop transmitting at the bird's frequency.

that FWA devices can minimize their interference to EESS (active) and SRS(active) through the permanent positioning of high directivity antennas, and their back-off on the peak transmitted power and the peak power spectral density reduction by the amount of dB that the directional gain of the antenna exceeds 6dBi, and using modulation techniques with low peak to average ratio;

that RLANs using omni-directional antennas are likely to be deployable in the 5250-5350MHz band world wide as unlicensed devices, the regulatory control of their indoor/outdoor deployment is not-feasible;

that the excess path loss (provided by building structures has been estimated based on preliminary studies to be on the average 15 dB ) is beneficial to the sharing of the 5250-5350MHz frequency band among EESS (active), SRS (active), FWA, and RLANs;

## 1.3 PROPOSAL

It is proposed that

- TG4 give early consideration to the TG4 specification constraints that are identified by the listed considerata, as they will play a key role in enabling systems based on the TG4 Standard to share the 5250 to 5350 MHz band with Wireless/Radio LANs and, EESS and SRS systems, and
- liaise with ITU-R to assure that its studies for WRC 2003 include consideration of IEEE 802.16.4 interest in the 5250 to 5350 MHz band for Wireless HUMAN standard-based FWA systems. More specifically the current ITU-R Joint Rapporteurs Group s 8A-9B sharing studies should consider the protection of EESS (active) and SRS (active) based systems when in a Region both FWA and RLANs are operated in the 5250-5350MHz band.