



International Amateur Radio Union Region 1
General Conference - 16th to 21st November 2008 - Cavtat, Croatia



SUBJECT	Increased Amateur Satellite Service 2 Metre Usage		
Society	RSGB	Country:	UK
Committee:	C5	Paper number:	CT08_C5_16
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Introduction

At the interim meeting of IARU Region 1 held in Vienna in 2007 a paper was presented proposing the possible shared use of a section of the 144-146MHz (between 144.325 – 144.365MHz) by the amateur satellite service

During the meeting it was suggested that little EME was now taking place at the very bottom of the band due to interference from computer oscillators. This section is already aligned worldwide and therefore it was considered that this could be a suitable part of the band to be used.

Since the meeting, research has indicated that the bottom 35kHz of the 2 metre band is almost completely unused. It is recognised that occasional brief terrestrial usage does occur - for instance during the IARU Region 1 CW contest (November) and when large scale auroral and tropospheric openings are underway.

The proposal was presented and discussed at the IARU International Satellite Forum which took place in Pittsburgh USA in October 2007 where it was agreed that this part of the band is underused and already globally harmonised..

Current Use

The Amateur Satellite Service has, according to ITU decisions, access to the full allocation of 144-146MHz but, by agreement of all three IARU Regions, currently only uses a section of the allocation on an exclusive basis - namely 145.80 – 146.00 MHz.

It is used for both for satellite uplinks and downlinks. It is the most popular of the Amateur Satellite allocations for the following reasons:

- It is the only band between 30 MHz and 24 GHz that we have primary use and hence some control. The 435 MHz, 1.26, 2.4, 5.6, 5.8, and 10 GHz bands are all shared with either high power users (radars) or large numbers of consumer devices which raise the noise floor.
- 144 MHz is the best band for amateur satellite downlinks due to ease of on board RF power generation and efficiency thereof and the reduced path losses.
- Receiving equipment is widely available; this is an important consideration in many countries where Amateur Satellites are seen as an important tool in encouraging young people to pursue technical self-training.
- Ready availability of launch opportunities where size constraints mean Attitude Control is often not possible. The lack of attitude control mandates the use of simple omni-directional antennas. This in turn means the use of VHF due to the lower path losses.

Although, in theory, our primary status should prevent this, there has been a dramatic increase in levels of unlicensed usage in the 2 metre band in a large number of countries in ALL IARU regions. It is therefore apparent that we should start to use 145.800 – 146.000 primarily for downlinks to overcome the interference that is caused to uplinks. This part of the 2 metre band is presently quite heavily used by Amateur Satellites. In addition, on the International Space Station, there is an Amateur Packet Repeater and Voice operation from the Amateurs onboard are also taking place in this narrow segment.

Future Use Requirements

An area that has been growing rapidly has been the development of Amateur Satellites by university students. Already large numbers of students have been involved in developing Amateur Satellites; this growth activity is beneficial to both the students and the wider Amateur community. The students of today are becoming our successors and supporters of tomorrow.

Already there is a current project for a very small (triple cubesat), university student satellite providing a low power Linear Transponder for CW/SSB use with a bandwidth of 35/40kHz. The uplink is planned for 435 MHz and the downlink on 144 MHz. It is expected that more of these projects will materialise and developments are also taking place to develop DSP based AGC systems for these transponders to remove the “alligator effect” problem.

It is also anticipated that additional and unexpected launch opportunities may occur where this sort of transponder could be quickly/easily incorporated.

There is therefore a need for an additional Satellite segment at 144 MHz that could be used for linear transponder downlinks for CW/SSB operation. Given that these transponders might have a bandwidth of approximately 30 kHz, the use of a segment approximately 35kHz wide would be required to allow for Doppler shift, which can be as great as +/- 3 kHz. This activity would be restricted to satellites in Low Earth Orbit so that signals would not be present for extended periods.

It is noted that many existing regional and national bandplans restrict transmitted bandwidth to 500Hz or to CW only, however the reception of signals from these transponders would not be affected by this restriction.

Recommendations

(1) To permit satellites which are launched into Low Earth Orbit, operating in the Amateur Satellite Service, which incorporate “linear” transponders, which are generally used for narrow band non channelised signals, to use, on a non exclusive basis, the section of the 2 meter band 144.005 – 144.035MHz for downlink (satellite to ground) mode only, by amending the bandplans in each IARU Region.

(2) The presence of interfering non-amateur signals in the 145.80-146.00MHz part of this band, in many parts of the world, is well documented. To prevent the retransmission of interfering terrestrial signals, satellites in the Amateur Satellite Service that plan to use the 2 meter Amateur band for transponders, are encouraged to use this band for downlink (satellite to ground) modes only, regardless of modulation type