INTERIM MEETING OF THE IARU REGION 1 VHF/UHF/MICROWAVE COMMITTEE
VIENNA 19.- 21. April 2013

| | |
|---|---|
| Document | VIE13_C5_05 |
| Subject | Recommendations for DATV Transmission |
| Society | RSGB |
| Contact | Murray G6JYB murray.niman@rsgb.org.uk |
| Status | Proposal |

**Introduction**
Digital Amateur TV (DATV) offer benefits for picture quality, spectrum efficiency and promotion of the amateur service. DATV developments should be recognised by the incorporation of new recommendations into the IARU-R1 VHF Managers Handbook.

**Background**
The current IARU-R1 recommendations for ATV are based on analogue standards and the relatively large bandwidth used by FMATV. However most consumer television in Europe is now Digital and it is important that the amateur equivalent keeps pace and can also be used to promote the hobby.

Amateur TV (ATV) operators have been experimenting with Digital TV (DATV) transmissions for over ten years, initially using equipment obtained by those working in the broadcast industry. The first DATV experiments were used to determine performance differences between single carrier DVB-S (QPSK) and the wider bandwidth 7- 8 MHz multi-carrier (OFDM) DVB-T modes. Experiments over typical ATV paths using narrow beamwidth antennas, showed no significant multi-path benefits of DVB-T over DVB-S for ATV links.

It has been found that for ATV applications, acceptable video quality performance can be achieved with video bit rates between 2 and 4 Mbit/s. These bit rates mean that, even when used with high Forward Error Correction (FEC) rates, a very high quality robust ATV signal could be transmitted using DVB-S modes in an approximate 4 MHz bandwidth (4 MBit/s, ½ FEC, 4 Msymbols).

The results obtained with these new DATV experiments compares very favourably to the much wider 16MHz bandwidth analogue ATV signal. Benefits include significant spectrum efficiency over current analogue operations, and better sharing with Primary Users. As a result, DVB-S, as defined in ETSI EN 300-421, along with MPEG-2 audio and video encoding, is now adopted as the standard for DATV operation in the UK.

Results have not only been obtained for microwave bands, but also at 437MHz where DX reception of Digital Colour ATV has also occurred –a significant development.

ETSI EN 300-421 has been adopted, along with the use of the DVB compliant service information (SI), as defined in ETSI EN 300 468. The call sign is always transmitted as service name, for station identification compliance. Use of ETSI standards enables decoding and identification of the signal by any consumer decoder without the need for special hardware or software.

**Proposals**
It is proposed that ETSI EN 300-421 and EN 300 468 standards, along with a subset of operating and frequency planning parameters, are adopted to ensure interoperability between DATV operators.

The spectrum efficiency of DATV has enabled new activity to occur in the 430MHz band using 2Ms/s. Advice from the IARU- R1 Satellite Coordinator has been to centre this at 437.0MHz in order to optimise sharing with the Amateur Satellite Service. This is already a feature of the RSGB 430 MHz band plan.

**Future Developments**

Whilst DVB-S and MPEG-2 have been adopted for mainstream DATV operation, further projects are underway to investigate the use of MPEG-4 video coding to enable the use of lower symbol rate / narrower bandwidth DVB-S2 signals and the carriage of HD in 4 MHz bandwidths. This work may result in the potential of 'narrow bandwidth' (sub 1 MHz) DATV being possible on bands at 430 MHz and below where spectrum availability and band plans permit. As with the DVB-S developments, one of the main hurdles to overcome, apart from spectrum, has been the availability of suitable encoders

However, it is proposed that future DATV operation should continue to use the evolving open industry standards to enable reception of the signals on readily available consumer hardware.

**Recommendations**

To initiate the modernisation of the IARU-R1 Handbook for ATV based on the following:-

- Incorporate a DVB-S based DATV standard, using the parameters as detailed in the Appendix.
- That the 430MHz band plan be amended to indicate that DATV should be centred at 437.0MHz, with a recommended maximum of 2M Symbols/s
- Future Proofing: Relevant ATV developments (spectrum, standards and band plans) should be kept under review to accommodate further updates for the VHF Managers Handbook
- That future DATV operation should continue to use the evolving open industry standards to enable reception of the signals on readily available consumer hardware

## Appendix - Recommendations for Digital Amateur Television (DATV)

DATV using DVB-S is recommended based on the following parameters:-

| Frequency Band | Symbol Rate (Msymbols/s) | FEC | Maximum Bandwidth | *Comments on UK Usage Information* |
|---|---|---|---|---|
| 432 MHz | 1.66<br>2.00 | ½ or ¾ | 2 MHz | *UK adopted 437 MHz – proposed as international working frequency* |
| 1.3 GHz Repeater i/p & simplex | 2.00<br>4.00 | ½ or ¾ | 4 MHz | *FM and DATV mixed operation currently used due to cost & availability of equipment* |
| 1.3 GHz Repeater o/p | 4.00 | ½ or ¾ | 4 MHz | *UK sub band 1300 – 1325 MHz* |
| 2.3 GHz | 4.00 | ½ or ¾ | 4 MHz | *No DATV operation at present* |
| 3.4 GHz | 2.00 | ½ or ¾ | 2 MHz | *Restricted sub-band 3404 – 3410 requires 2 Msymbol operation* |
| 5.6 GHz | 4.00 | ½ or ¾ | 4 MHz | *Mixed mode (FM & DVB-S) wireless cameras* |
| All bands above 5.6 GHz | 4.00 | ½ or ¾ | 4 MHz | *4 Msymbol DVB-S on UK 10GHz ATV repeaters* |

**Notes**

ETSI EN 300-421 and EN 300 468 standards, along with a subset of operating and frequency planning parameters, should be adopted to:-

- Ensure interoperability between DATV operators
- Ensure compatibility with readily available consumer hardware