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SUBJECT	**A New Vision or 23 cms**		
Society	**RSGB**	**Country:**	**UK**
Committee:	**C5**	**Paper number:**	**CT08_C5_19**
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Introduction

This paper proposes a way forward for a subsection of the 23cms bandplan to accommodate attractive emerging technologies and an alternative centre of activity for narrowband operation. It also offers a viable path if Primary Users restrict the actual amount of spectrum available.

Background

The minutes of the 2007 IARU-R1 Interim Meeting at Vienna (VHF Newsletter-45) says:

***B15 on a fallback plan for 23cm**, introduced by G6JYB: Changes into the 1296 MHz band plan need to be made as a contingency plan to create a reserve frequency for narrowband/DX activity and to reflect the possible future changes in Primary User applications. DARC mentioned ATV concerns but also the need look forward post-2012. In addition some discussion occurred on DATV BW – 4MHz vs 6MHz.*

***Action point:** A more detailed proposal for next conference to be generated by G6JYB et al.*

The Vienna B15 Paper was written to raise awareness of a number of issues. In 23cms unlike many other microwave bands, no narrowband reserve frequency was defined; that ATV technology was changing and offered new opportunities; and that prudent planning was needed to better account for Primary Users, including future ones such as Galileo.

It is also very important to remember that Amateur use of 23cms is on a Secondary basis, as we share with Primary Safety-of-life Air Traffic Radar as well as other services. This results in far less actual spectrum being available than the 60MHz wide IARU bandplan would suggest.

Traditional digital modes such as 23cm packet are in terminal decline. In contrast in the past year or two, progress and interest in both Digital TV and Digital Voice developments have increased considerably and need to be accommodated.

Uniquely compared to the other bands, 23cms has potentially enough bandwidth and increasing support from commercial equipment to showcase the best of the newer digital technologies, even though they are not necessarily mature (nor their bandwidths certain). This latter point requires a more innovative and flexible bandplanning approach as it no longer possible to assume a preferred mode or bandwidth for a given application.

Thus a major purpose of this paper is to highlight that whilst Primary User restrictions are unlikely to improve, a plan that uses spectrum far more efficiently can accommodate such issues and enable the amateur community to transform a part of this band into an exciting showcase. We therefore present – **A New Vision for 23cms**

Key points and proposal

Detailed consideration of new technologies from amateurs and commercial suppliers suggest that there is a golden opportunity to provide more services, more attractive services and use the bandplan far more efficiently.

We stress that what follows is an illustrated basis for discussion. It deliberately does not go down to the level of detail that is present in the current 23cm bandplan.

We also stress that this paper does not mandate a 'Digital TV Switchover'. It also does not advocate a withdrawal from other parts of 23cm such as 1296MHz if it is not necessary. Elements of this could be replicated further up the band.

The attachment illustrates an evolution mainly in the 1240-1250MHz range as an example over several years. In creating it we have considered the following:-

- Good bandplanning principles require that weak-signal long distance modes should be a first priority to be harmonised – Narrowband DX, Beacons, EME etc. In contrast other wider bandwidth systems in 23cms tend to be quite short range and need less coordination
- Discussions in the UK indicate that whilst the current 1296 band occupies a full 1MHz of bandplan, a new narrowband reserve elsewhere could be created using 750kHz in total. This is based on 500kHz for operators and 250kHz for Beacons (similar to the new 50+200kHz scheme proposed for microwave beacons in another RSGB paper)
- Any frequency range that is nominated as the narrowband reserve should not have other non-narrowband assignments made in it that would be difficult to re-tune or migrate elsewhere, should the reserve need to be fully activated.
- Wideband digital modes (DV/Data, DATV etc) are most likely to substitute for and eventually replace their older predecessors (FM Voice, FSK Packet, FMATV etc)
- New Digital modes require various bandwidths. For example anywhere between 25 to150kHz for DV/Data, and perhaps between 2 to 6MHz for DATV/Multimedia. It is not easy to predict the long term bandwidth requirements and in fact this may not be desirable in any case. However we do need to plan for these new modes to be used so innovative and exciting developments can occur, whilst using the bandplan efficiently.
- If we have flexible bandwidths then we must have two things:-
  - An easy way to describe the bandwidths needed and where they are
  - Incentives to use them efficiently and leave space free for extra services
- The move to DATV has great potential for spectrum efficiency. Opportunities arise for additional digital channels in the space that a single FMATV channel used to use.
- It is important to recognise that DATV repeater inputs may well take more time to develop than repeater outputs; and that this would also entail significant investment by users.
- It is therefore important that local coordination measures are carefully maintained, so that existing analogue FMATV inputs are not harmed by adjacent digital developments.

Recommendations
Subject to wider discussions before and at conference, the following proposals are made:-

1. That a usage note regarding an alternative or reserve narrowband centre of activity is agreed and added to the 23cm bandplan.

2. That the band 1240.0-1240.75MHz is designated as that alternative centre, based on 500kHz for operators and 250kHz for beacons. Our reasoning is that its position at the bottom of 23cms would match other bandplans, would not obstruct flexibility, is outside of the 'Galileo zone' (1260-1300) and would keep harmonics below the valuable new 3/4G mobile radio band at 2500-2690MHz.

3. That assignments for existing/other uses in this centre be made on a flexible basis to minimise any disruption should it be necessary to activate the reserve frequency and for them to be retuned.

4. That the VHF Handbook and 23cm Bandplan take account of new developments in DATV (which may for example use between ~2-6MHz BW in future), by being more flexible. For example a particular modulation should not be assumed.

5. To accommodate and describe flexible bandwidth use, especially for DATV applications, we propose that the 'block' method commonly used by CEPT and other regulators is adopted:-

5.1. That the available spectrum for DATV is divided into regular discrete blocks

5.2. An operator/repeater may merge a number of the blocks together for their required bandwidth[1] and then use a simple designator for what is actually being used.

5.3. A block edge-mask is used to specify out of band emissions. This is useful as it can describe spectrum re-growth due to power amplifier non-linearity. This is an important issue that can affect adjacent channels and can often occur with digital Tx modes.

5.4. That an agreed method of labelling blocks and merged usage is developed and added to the VHF Handbook.

6. That as ATV increasingly uses digital techniques and less bandwidth than analogue FMATV, that opportunities are explored for accommodating additional services such as digital voice and data to provide a modern attractive overall offering.

7. As 6) gradually occurs, to move from the original analogue centre frequencies as illustrated in the example attached. This maximises the creation of space for extra channels.

8. As DATV repeater inputs will take time to develop, it is important to recognise the need for careful coordination to protect 1248/9 analogue FMATV inputs, prior to releasing 1248-1249 for other applications.

[1] A relevant commercial example of this is the flexibility of the Geneva 2006 agreement for digital broadcasting in VHF Band-III. In CEPT ECC Report-116, Section-3, it shows how a 7MHz wide channel for DVB-T may be split into four compatible 1.75MHz DAB blocks. The principles are not unique to OFDM transmissions and could for example be adapted to QPSK or GMSK

Possible Evolution in the 1240-1250MHz sub-band

Frequency	Time >> Current Usage	Short Term	Medium Term	Long Term	CH-BW	
1240.00						
1240.25	Nodes/Mailboxes	Take care to keep	NarrowBand?	NarrowBand	0.5-3	
1240.50	Mainly FM Packet	Assignments				
1240.75	9k6 typ max	Flexible	Beacons	Beacons	0.5	
1241.00		Legacy / new FM	FM/DV -N	FM/DV -N	25	Inputs
1241.25		DV-N inputs? / FM	DV-N inputs / FM	DV-N	25	
1241.50					25/150	
1241.75		DV/DATA-W?	DV/DATA-W	DV/DATA-W	25/150	Inputs
1242.00			750k tot		25/150	
1242.25				DATV Blocks:-		
1242.50						
1242.75				DATV / Multimedia -2		
1243.00						
1243.25						
1243.50						
1243.75				DATV / Multimedia -3		
1244.00						
1244.25						
1244.50						
1244.75				DATV / Multimedia -4		
1245.00						
1245.25						
1245.50						
1245.75				DATV / Multimedia -5		
1246.00						
1246.25		FMATV sidebands				
1246.50			Start Migration			
1246.75		No Change	to DATV Inputs	DATV / Multimedia -6		
1247.00						
1247.25			and re-centre			
1247.50			frequencies			
1247.75	FMATV sidebands			DATV / Multimedia -7		
1248.00			based on			
1248.25			long term plan			
1248.50						
1248.75				DATV / Multimedia -8		
1249.00						
1249.25					25/150	
1249.50	FMATV Centres	FMATV Centres	Old FMATV Centres	DV/DATA-W	25/150	
1249.75	Repeater Inputs	Repeater Inputs		DV-N	25	Outputs
1250.00			New DV etc	FM/DV -N	25	
1250.25						
1250.50						
1250.75	FMATV sidebands	FMATV sidebands	Reuse if available	DATV / Multimedia -10		
1251.00						
				etc		

Abbreviations:
DV-N = Digital Voice/Data Narrow bandwidth – 25kHz BW typical
DV-W = Digital Voice/Data Wide bandwidth – 150kHz BW typical

Notes:

- The 1240 Narrowband area is an Alternative Centre – 1296 remains the preferred centre
- Full extent of upper FMATV repeater input sidebands and 1298-1300 DV/Data outputs not shown for convenience
- New digital channels could either be Repeater/Gateway I/O or where there is sufficient spare capacity can also be simplex as well. (I/O Direction as per national usage)
- DATV Block numbering is based on the last whole Megahertz digit(s). Dashed lines indicate blocks may be merged. It may also be desirable to subdivide further if necessary. The letter 'L' for L-band (1.3GHz) is suggested to prefix block numbers.