Subject	**Usage of DATV in the 70 cm Band**		
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Usage of DATV in the 70 cm Band

Introduction

Television Transmissions have been carried out by Radio Amateurs around the world since the 1950s. Analogue, with Vestigial SideBand Modulation (VSB), has been used in the 70 cm band while Frequency Modulation is preferred in the GHz range. In particular the 70 cm band is very suited for ATV-DX contacts. The technical challenges of building the equipment are very exciting as well as tropospheric propagation tests under various conditions. According to the IARU recommendation (Noordwijkerhout 1987) ATV transmissions should take place in the segment 434 - 440 MHz (in reality 433 – 440 MHz).

Experiments with Digital Amateur Television (DATV) on 70 cm were first carried out in the 1990s. DATV signals feature a compact frequency spectrum with a near rectangular or Gaussian shape and need less bandwidth than VSB and FM transmissions. Also less transmission power is necessary compared to analogue ATV. However, as DATV signals suffer from multipath propagation resulting in severe distortions at the receiver, special, error correction, measures are required.

Background

Digital video and sound transmissions enable a significant data reduction. Currently the MPEG 2 standard is mainly used allowing a broadcast TV quality with 4 - 6 Mb/s, but a reasonable quality is possible with about 2 Mb/s. Digital modulation schemes often used are QAM, QPSK, OFDM and GMSK. All digital transmissions use Forward Error Correction (FEC).

Using broadcast standards like DVB-S (QPSK) or DVB-T (OFDM) has the advantage that cheap receivers (Set-Top Box) are available, but on the transmitter side highly linear power amplifiers are necessary to avoid spectrum re-growth. On the other hand, GMSK is a constant envelope modulation and can be amplified by a nonlinear power amplifier with high efficiency but this requires a special receiver.

In late 1994, a group of radio amateurs at the University of Wuppertal started the development of a DATV transmitter and receiver. The very first tests were carried out on 434 MHz with GMSK over a distance of more than 100 km followed by a test on 1 255 MHz with DVB-S in the Cologne area with a large number of receiving stations.

To boost DATV the Wuppertal group produced 100 MPEG encoders and exciters (434 MHz) featuring both GMSK and DVB-S and allowing the choice of various sym-

bol rates and FECs for experimental purposes; the boards were shipped world-wide. The Wuppertal group further developed an exciter for DVB-T and the American ATSC system and also 70 cm / 23 cm and 70 cm / 13 cm up-converters as well as a special 70 cm GMSK receiver that converts the received GMSK signal into a DVB-S signal such that this can be decoded by a cheap digital satellite set-top box.

Other groups and small companies in Germany and in other European countries have also developed DATV hardware and further software to encode and decode DATV signals using unmodified PCs.

In the footnote “m” in the 430-440 MHz band plan in chapter 2.1 can be read:

m. Experiments using wide band digital modes may take place in the 435 MHz band in those countries that have the full 10 MHz allocation. These experiments should be in the all modes section around a frequency of 434 MHz, use horizontal polarisation and the minimum power required. (Tel Aviv 1996)

This footnote gives some hints about the recommended frequency (keeping in mind, that this was 18 years ago!), but there are more parameters which should be discussed.

Recommendation

To discuss all aspects of DATV and a way ahead on the 70 cm band.