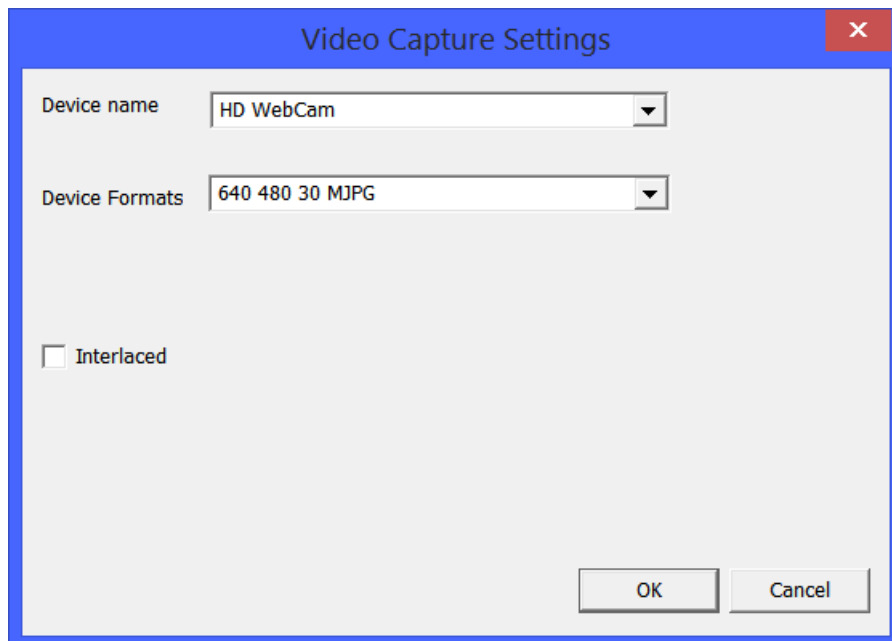
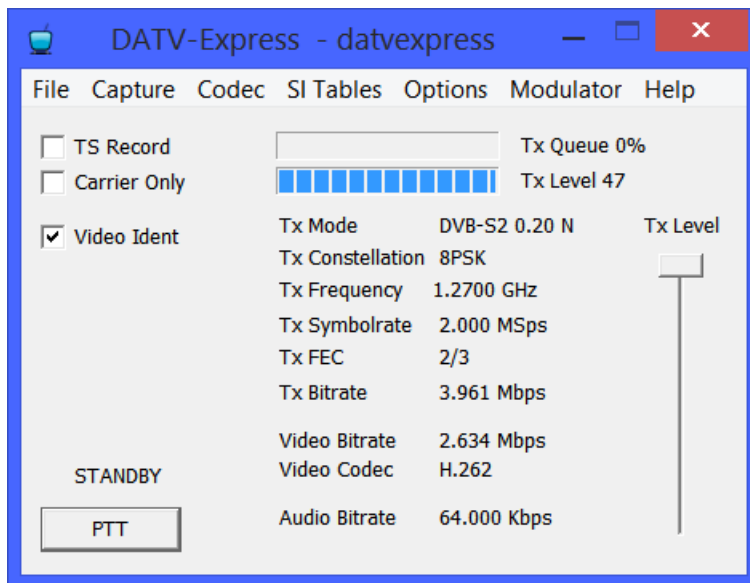


Transmitting DATV signals with the LimeSDR

Matthias DD1US, November 24th 2018, rev1

As EsHail-2 was launched successfully and will hopefully soon start its operation, I am looking for a suitable transmitter for DATV. Today I was successful in getting the software DATV-Express working with my LimeSDR. The software can be found here: <https://www.datv-express.com/>

Here are the settings I used during my first tests, to transmit a DVB-S2 signal on 1270 MHz using the LimeSDR TX port TX1L:



Video Capture Settings

Device name

Device Formats

Interlaced

Video Codec Settings

H.262 H.264 H.265

Video Bitrate 2633759

GOP

B

Video bitrate

Audio Codec Settings

Mpeg 1 Layer II AAC

32K (Mono) 64K (Stereo) 192K (Stereo)

Enable Audio

OK Cancel

SI Table Settings

Video Pid	<input type="text" value="256"/>	PMT Pid	<input type="text" value="4095"/>	Network ID	<input type="text" value="1"/>
Audio Pid	<input type="text" value="257"/>			Stream ID	<input type="text" value="4095"/>
PCR Pid	<input type="text" value="256"/>			Service ID	<input type="text" value="4095"/>
Provider Name	<input type="text" value="DD1US"/>			Program	<input type="text" value="4095"/>
Service	<input type="text" value="Digital TV"/>				
Event Title	<input type="text" value="Ham Radio Now"/>	Event Duration mins	<input type="text" value="60"/>		
Event Text	<input type="text" value="Program about Amateur Radio"/>				

OK Cancel

Output Format ✕

Transmitted (on air) format

Aspect Ratio 1:1 4:3 16:9

IQ Calibration ✕

Enable IQ Calibration

I Channel -21

Q Channel -39

Add Noise ✕

Enable Noise

Signal to Noise Level

Express Settings ✕

Tx Frequency

Tx Symbol

Tx Level

TxMode DVB-S DVB-S2 DVB-T

PTT Port A Port B Port C Port D

SDR HW EXPRESS LIME PLUTO FCOMMS

SDR IP

DVB-S2 Settings ✕

Constellation QPSK 8PSK 16APSK 32APSK


Roll Off 0.35 0.25 0.20

Frame Normal Short

FEC 1/4 1/3 2/5 1/2 3/5 2/3
 3/4 4/5 5/6 8/9 9/10

Pilot ON OFF

About ExpressCaptureServer ✕

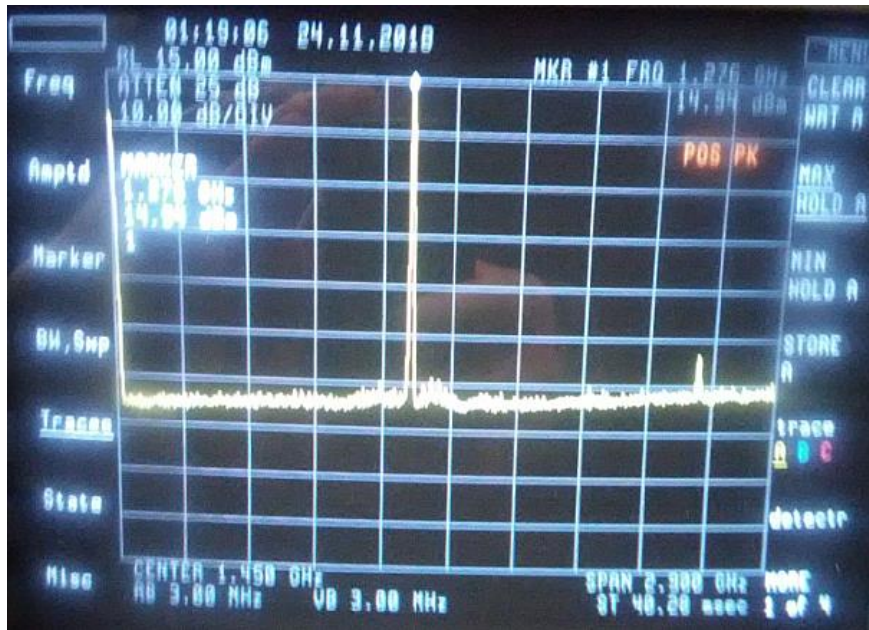


Express DVB-S/S2/T Transmitter
Version 1.25p11

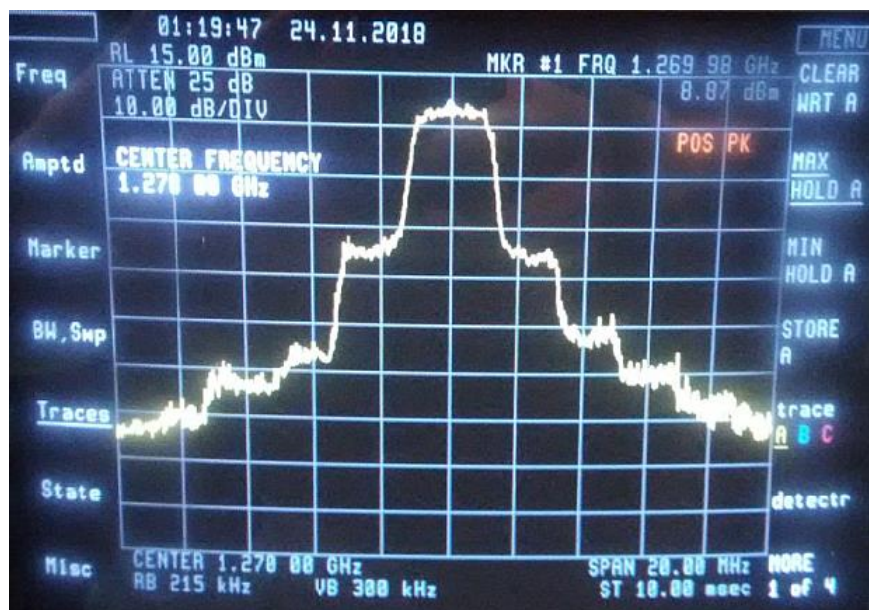
This software uses libraries from the FFmpeg project under the LGPLv2.1

It also uses various other GPL libraries.
Consult the README file for further details
and how to obtain the relevant source code.

Here is the output spectrum at 1270 MHz using maximum output power (TX level = 47):

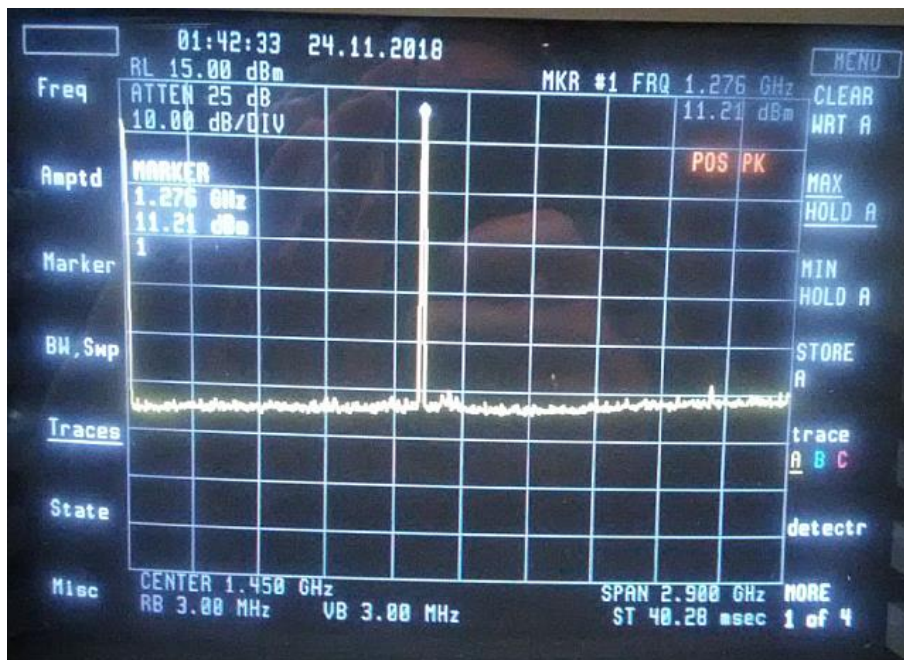


The measured output power at 1270 MHz with 3 MHz RBW is +15dBm. The 2nd harmonic at 2540 MHz is approx.. 53dB lower.

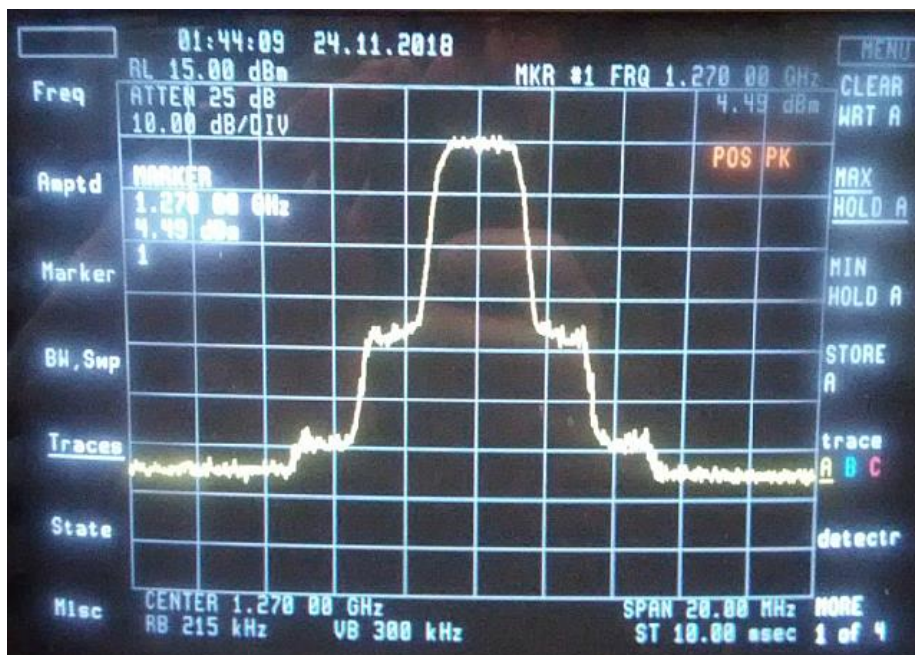


Looking at the signal with the span of the spectrum analyser reduced to 20 MHz one can see the typical DVB-S2 signal shape. The measurement was done in max. hold mode. The “shoulders” of the DVB-S2 signals are quite high (-25dBc) i.e. the transmitter is not operating linear enough.

In the next measurement the output power level was reduced to TX level = 44

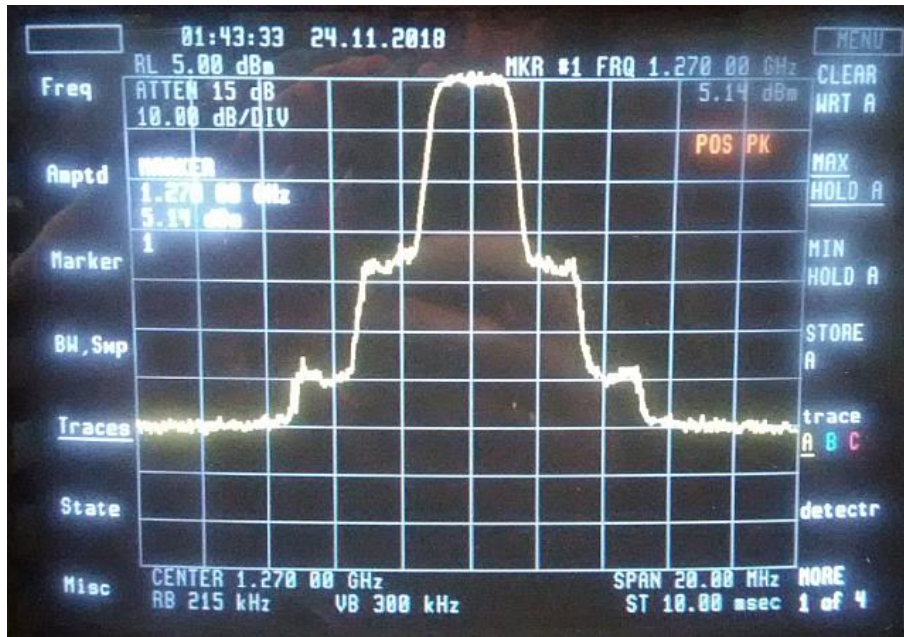


The measured output level at 1270 MHz with 3 MHz RBW is now down 3.7dB to 11.2 dBm.



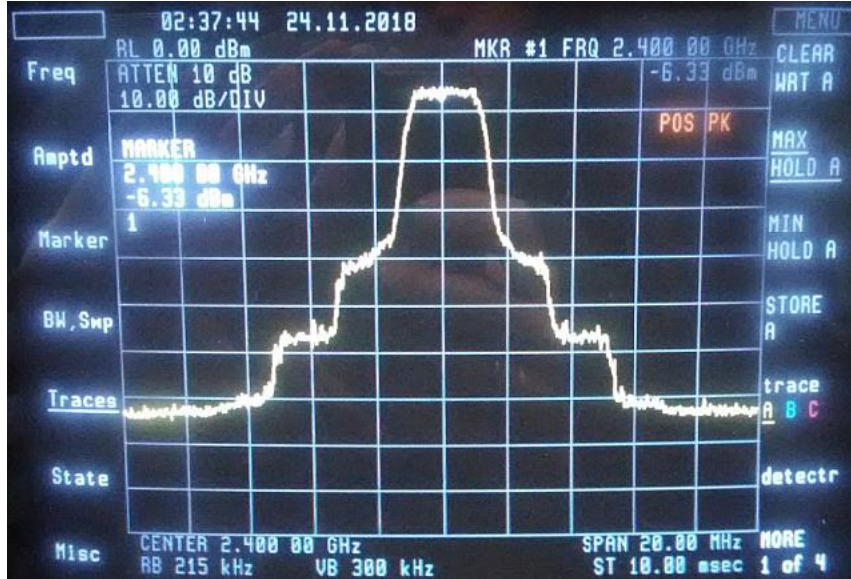
The “shoulders” of the DVB-S2 signals are now down to -35dBc. This is still not sufficient, hence the output power has to be reduced some more.

Here is another screenshot with the reference level of the spectrum analyser down to +5dBm.



Next, I tested the TX mode in the 13cm band using the LimeSDR output port TX1H. Using maximum output power (TX level = 47) I measured +2.8 dBm at 2350 MHz and -0.7dBm at 2400 MHz.

Here is a spectrum at 2400 MHz using TX level = 47:



The “shoulders” are down by approx. 30dB.

Here is a spectrum at 2400 MHz using TX level = 44:



The “shoulders” are now down to approx. 45dBc.

Many more measurements will have to follow including a check of more power levels at different frequencies as well as trying the various modulation parameters.

I want to thank very much Charles G4GUO, the author of DATV-Express, for providing such an excellent software to the Ham Radio community free of charge.

Feedback is always very welcome. Please send it to the Email address given below.

Best regards

Matthias DD1US

Email: dd1us@amsat.org

Homepage: www.dd1us.de