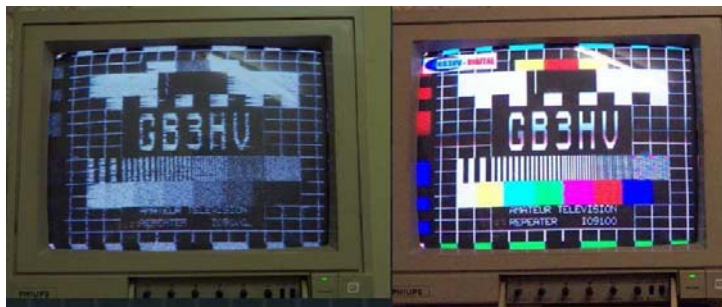


# TechTalk121

## DATV-Express on Windows using Express\_DVB-S\_Transmitter software

by Ken W6HHC

The old technology of analog-ATV suffers from susceptibility to snow and multi-path ghost images. Digital-ATV (DATV) using new technologies like digital modulation, and Forward Error Correction (FEC) can result in robust video reception where analog-ATV fails, as well as providing more narrow bandwidths on the ham bands. **Figure 01** shows the difference between receiving weak signals on analog-ATV and Digital-ATV using the same RF power amplifier and the same antennas.

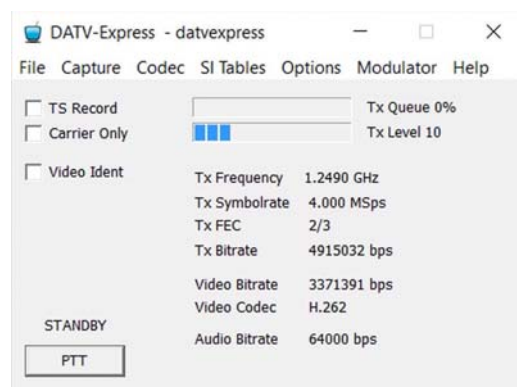


**Fig 01 - Comparison of analog ATV video and DATV video using the same antennas with weak sigs (courtesy of G8GTZ & GB3HV)**

The DATV-Express Digital-ATV exciter board was introduced in January 2014 to provide a more-affordable product for hams to transmit DATV. The original DATV-Express software product ran on LINUX operating system...a very useful OS, but 95% of hams do **NOT** use LINUX...and most of those hams do **NOT WANT to learn** a new OS!!

### Express\_DVB-S\_Transmitter software

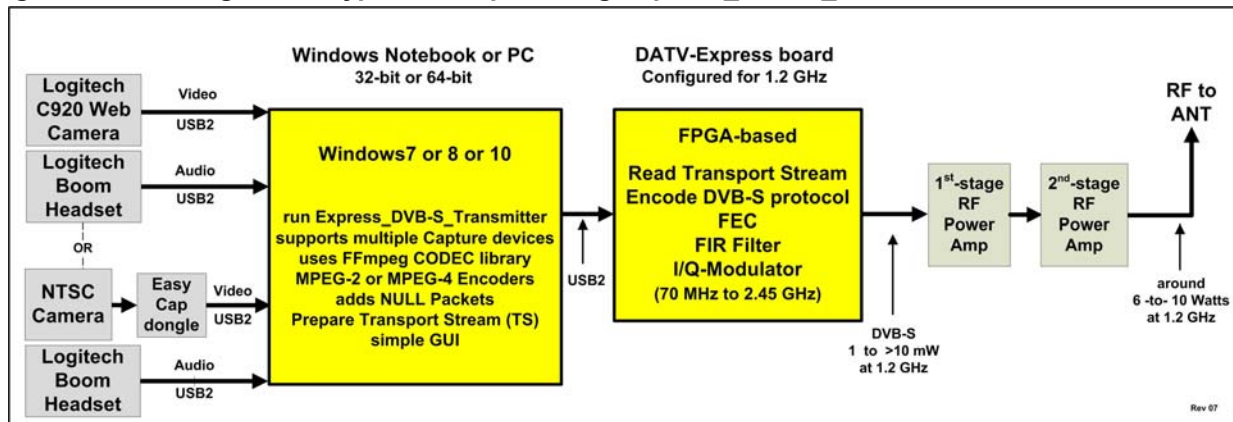
The new **Express\_DVB-S\_Transmitter** software was written by Charles G4GUO to allow the DATV-Express transmitter board to operate in Windows (Win7, Win8, and Win10). A block diagram of a typical set-up is shown in **Figure02**. An important feature of this new software is that the video-capture-to-encoder function no longer needs to be performed on a Hauppauge video-capture board. The Express\_DVB-S\_Transmitter software uses the FFMPEG CODEC library that is available in a Windows environment to perform the video encoding/compression (no more Hauppauge unit needed!).



**Fig 03 - The Main screen of Express\_DVB-S\_Transmitter software**

The Main screen of the Express\_DVB-S\_Transmitter software displays all of the settings that the owner has made - as shown in **Figure03**. There are seven tabs across the top of the Main screen that control the actual settings for the DATV transmission. For example: the **CAPTURE Tab** allows selecting the video and audio device and the **MODULATOR Tab** allows selection of frequency, Symbol Rate, FEC, etc.

**Fig 02 – Block Diagram for typical set-up running Express\_DVB-S\_Transmitter software on Windows**



### Choice of Cameras and Microphones

One big improvement made by this new Windows software for the DATV-Express hardware board is that there are many more camera models that can be used. Use a USB-based web-camera such Logitech C920 and HD hand-cameras as well as using your old NTSC hand-camera through a video-capture dongle like EasyCap (USB-based). Even the camera and microphone on your notebook computer can be selected.

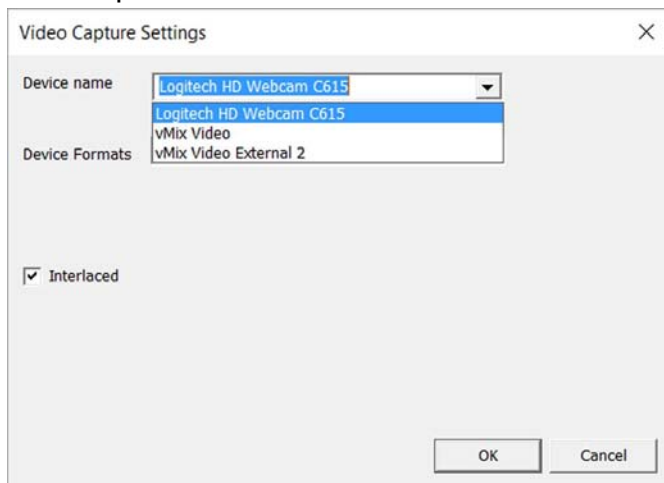


Fig 04 – CAPTURE Tab allows you to choose among cameras attached to the Windows PC

### Choice of CODEC

A CODEC is a compression encoder. The CODECs Tab allows you to send H.264 (MPEG-4) video as the video-payload even though the software is using DVB-S protocol. In the commercial DTV world, the DVB-S protocol does NOT transmit H.264 CODEC, but DVB-S2 and DVB-T2 do transmit H.264.

The radio buttons along the top of the **Figure05** allow you to select one of three different CODEC VIDEO encoding technologies for your transmission.

- **H.262** is the standard MPEG-2 video encoding that is used by commercial DVB-S DTV transmissions. It works well but does not compress as efficiently as H.264 or H.265. H.262 is more compatible on older SetTopBox receivers (such as FTA before MPEG-4 was introduced).
- **H.264** is the newer MPEG-4 video compression that is used by commercial DVB-S2 HDTV transmissions. H.264 encoding provides higher bit stream compression efficiency than H.262, but may have a little longer latency (video delay)

than H.262. The good news is that H.264 CODEC can be used as the “payload” video stream inside the DVB-S protocol...as long as the receiver is capable of receiving both DVB-S and H.264...such as a DVB-S2 STB. Another advantage of the H.264 CODEC is that it works better (than H.262) in low Symbol-Rate environments under 1M Symb/sec. The significantly better low-SR video quality seen on the receiver is due to H.264 design using a more suitable macro block size. One caution is that if you insist on using HDTV quality video as an input, then the video bitrate will be very large and may require a 6 MHz BandWidth on the spectrum to receive that quality. Hams can tweak the video capture format and SR and frame-rate (FPS) to achieve acceptable BW and video quality as the RB-DATV hams do on 2 Meters and have shown to reduce DATV spectrum bandwidth requirements on other ham bands like 70 CM and 10 GHz.

- **H.265** is a more recent video compression encoder that is also known as High Efficiency Video Coding (HEVC) can encode 4Kp60/10-bit video in real-time (with hardware encoder). H.265 can compress 480-line video with 50% more reduction and 1080-line video is reduced by 60% (both compared to H.264 CODEC). H.265 software encoding is very computer intensive and typically results in latencies nearly 10 seconds.

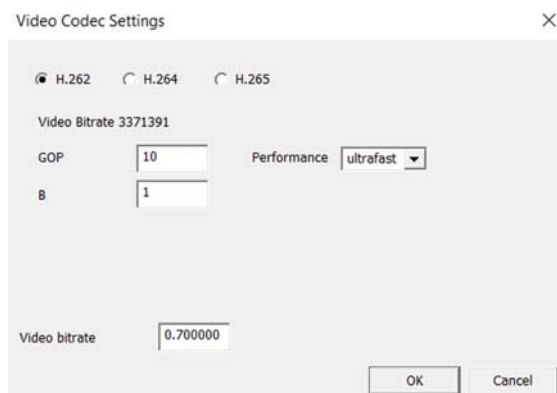


Fig 05 – The CODEC Tab allows selecting H.262 or H.264 or H.265 encoding.

### Simple Call Letters Overlay

Another new feature introduced in this Window software application is a simple video overlay for your call letters. This feature can be enabled by “checking” the VIDEO IDENT box on the

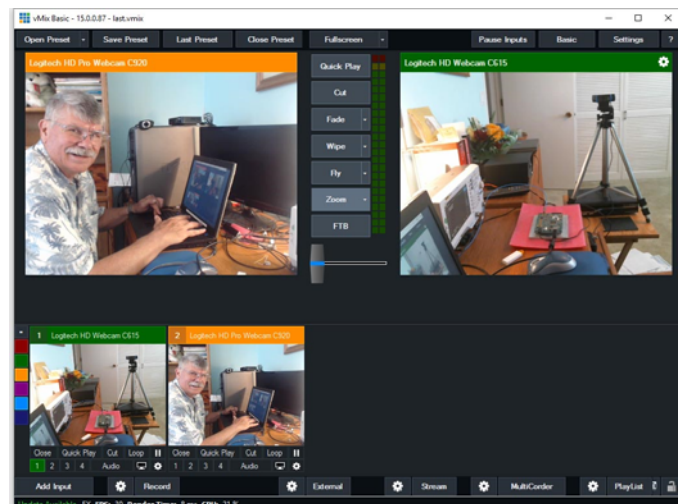
Main window. **Figure06** shows how the video overlay field appears (shown as the call **W6HHC**) on the receiver's screen.



**Figure 06** – The VIDEO IDENT feature can be enabled to display your call letters on the received transmission

### Adding optional vMix Video software

vMix is a great optional companion software tool. vMix Basic is a free video-editor software package for SDTV format video (Standard Definition) is available from vMix.com. There are more-professional HDTV products of vMix available for sale, including the vMix Basic HD for US\$60. The free video-managing software allows you to control multiple cameras and audio microphones, create call letter overlays, create blue-screen and green-screen tricks, and perform fades-between-cameras. You can capture any video that you can get onto your Windows computer via USB, Firewire, ASI, or HDMI (using a HDMI-USB capture card). When running, vMix will display as one of the available devices under CAPTURE – Video Devices and CAPTURE – Audio Devices.



**Fig 07** - Typical window for vMix Basic optional software can control multiple cameras and also create “green screen” video effects.

### Downloading Software and Manual

The Express\_DVB-S\_Transmitter software is currently available (and free) as a “BETA release” of v1.11. This beta software does already have many successful users around the world and is expected to be “production released” by September. The software install package, a beta-grade Users Guide for Windows and a readme file, called NOTES.txt can all be downloaded from the **www.DATV-Express.com** web site on the **DOWNLOADS** page. Installation instructions are included in the Users Guide for Windows. The instructions also explain how to use the ZADIG free tool to easily install a Windows device driver for the DATV-Express hardware board.

Finally, a reminder that you can order the DATV-Express hardware board for US\$300 + shipping on the **PURCHASE** page....but you have to be registered and logged-in to the web site in order to make the PayPal purchase.

### Useful URLs

- British ATV Club - Digital Forum – see [www.BATC.org.UK/forum/](http://www.BATC.org.UK/forum/)
- CQ-DATV online (free monthly) e-magazine – see [www.CQ-DATV.mobi](http://www.CQ-DATV.mobi)
- DATV-Express Project for Digital-ATV (User Guide and downloads) – see [www.DATV-Express.com](http://www.DATV-Express.com)
- G4GUO github for DATV-Express source code – see [https://github.com/G4GUO/datvexpress\\_gui.git](https://github.com/G4GUO/datvexpress_gui.git)
- Chris MWØLLK discussions on vMix and FFMPEG software on Windows to create transport stream – see <http://www.tannet.org.uk/using-ffmpeg-to-generate-a-transport-stream-more-details-and-how-to-add-text-overlays/>
- Orange County ARC entire series of newsletter DATV articles and DATV presentations – see [www.W6ZE.org/DATV/](http://www.W6ZE.org/DATV/)
- vMix Basic free optional video software tool download – see [www.vMix.com](http://www.vMix.com)
- Yahoo Group for Digital ATV - see [groups.yahoo.com/group/DigitalATV/](http://groups.yahoo.com/group/DigitalATV/)