DATV Systems

Dave G8GKQ
Michel HB9DUG
Topics

- Digital ATV Transmit Systems
- Portsdown 2019
- Portsdown 2019 on LimeNet Micro
- The Future – The Jetson Nano?
- Receive Systems
- Questions
Commercial Solutions

SR Systems

– Current equipment limited to a minimum of 2 Mbits/s video encoding.

Ex-broadcast Equipment

– Normally limited to a Minimum of 1 MS
DATV Express Solutions

- DATV Express hardware
  - With PC DATV Express Software (DVB-S/S2)
  - With Portsdow Software (DVB-S only)

- DATV Express software (DVB-S/S2)
  - DATV Express Hardware
  - LimeSDR Mini and USB
  - Pluto
F5OEO derived Solutions

- DigiLite (MPEG-2, DVB-S)
- Portsdown 2018 (MPEG-2 & H264 DVB-S)
  - Hardware Filter/Modulator board
- Portsdown 2019 (DVB-S and DVB-S2)
  - LimeSDR Mini or USB
- Jetson Nano (H264 and H265)
  - LimeSDR
  - Hardware H265 encoding
Portsdown 2019

Heritage – Portsdown 2018

– Take F5OEO’s code and make a user-friendly DATV transmitter (an appliance)

Portsdown 2019 uses the same codebase, but expanded to drive the LimeSDR

Now a “no-solder” solution
Portsdown 2019
Portsdon 2019 Limitations

- Max Symbol Rate 1 MS
- Current software has problems with some sources and SRs
Portsdown 2019 Strengths

- Ideal for QO-100 (DVB-S2 and low SRs)
- Output directly at 2400 MHz
- Implements delayed PA Switching for LimeSDR calibration
- Can be driven from OBS or vMix for video effects
- Active online community support
Portsdown on LimeNet Micro

- All-in-One!
- LimeSDR Mini like
- Integrated GPS
- RPI Compute Module CM3
- RPI 7” Touchscreen and Camera
- RJ45 Ethernet (POE) or 5 V DC Power
- 1st basic tests with Portsdown 2019 OK!
Portsdown on LimeNet Micro

Block Diagram

- Compute module (Raspberry CM3(U))
- USB Hub and Ethernet controller
- Clock Network (XO, DAC, GNSS, Phase detector)
- T. Sensor, EEPROM, Flash, buzzer
- Power Supply
- 5x RG LEDs, 2x Ethernet LEDs
- FPGA_SW [3:0], FPGA_BTN

FPGA (Intel MAX10 10M16SAU169C8G)

- RF Transceiver (LMS7002M)
- RF Matching Network & Duplexers
- EEPROM
- RF Connectors
- GNSS receiver
- RF Connector
- GPIO[7:0] headers, fan control

LimeNET Micro block diagram
The NVIDIA Jetson Nano

- Similar to RPi
- Hardware H264 and H265
- Will take RPi Camera V2
- No touchscreen interface
- £101 + SD Card + PSU + Fan
- Use LKV373A V3 (£20) for HDMI HD input
- Configuration details on BATC Wiki
Portsdown Control

Jetson Configuration Menu (44)

Set Jetson Username
Set Jetson Password
Set Jetson Root PW
Set Jetson IP address
LKV373 UDP port
LKV373 UDP IP
Exit

Shutdown Jetson
Reboot Jetson
Portsdown Control

Output Device Menu (42)

Jetson
Lime
Portsdown
Ugly
Comp Vid
DTX1
Express
IPTS out
Lime USB
Lime Mini
BATC Stream
Cancel
Portsdown Control

Encoding Selection Menu (12)

MPEG-2  H264  H265  IPTS in  TS File  Cancel
## Portsdown Control

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TX ON</strong></td>
<td><strong>RX</strong></td>
<td><strong>M2</strong></td>
<td><strong>M3</strong></td>
<td></td>
</tr>
<tr>
<td>Modulation</td>
<td>Encoder</td>
<td>Output to</td>
<td>Format</td>
<td>Source</td>
</tr>
<tr>
<td>S2QPSK</td>
<td>H265</td>
<td>Jtsn Lime</td>
<td>4:3</td>
<td>Webcam</td>
</tr>
<tr>
<td>Freq</td>
<td>Sym Rate</td>
<td>FEC</td>
<td>Band/Tvtr</td>
<td>Lime Gain</td>
</tr>
<tr>
<td>437 MHz</td>
<td>125</td>
<td>9/10</td>
<td>70_cm</td>
<td>88</td>
</tr>
<tr>
<td>EasyCap</td>
<td>Caption</td>
<td>Audio</td>
<td>Atten</td>
<td></td>
</tr>
<tr>
<td>Comp Vid</td>
<td>On</td>
<td>Auto</td>
<td>NONE</td>
<td></td>
</tr>
<tr>
<td>Preset 1</td>
<td>Preset 2</td>
<td>Preset 3</td>
<td>Preset 4</td>
<td>Store</td>
</tr>
<tr>
<td>146.5_333</td>
<td>437_1MS</td>
<td>1255_HD</td>
<td>437-Ugly</td>
<td>Preset</td>
</tr>
</tbody>
</table>
H265 Encoding
Receive Systems

- MiniTiouner
- LeanDVB
- DVB-S2 GUI
- SDR Angel
DVB-S2 GUI

- Windows software DVB-S/S2 demodulator!
- Limited to QPSK mode and SR < 2000 ks/s
- Support LimeSDR Mini and Airspy products
- Use VLC Media Player to display
- Developed by Marcel Kröner
- Info and link to the soft are on the ASMAT-DL Forum under: Software DVB-S Demodulator (SWL-marko92)
DVB-S2 GUI
SDRAngel

- Windows and linux software DVB-S/S2 demodulator
- Based on leandvb from Pascal F4DAV
- Limited to QPSK mode and SR < 2000 ks/s
- Support Lime, Airspy, Pluto and RT-SDR products
- Info and link to the soft are on: https://github.com/f4exb/sdrangel/releases
SDRAngel
Questions

Portsdown: https://wiki.batc.org.uk/Portsdown_2019

DVB-S2 GUI:

SDRAngel: https://github.com/f4exb/sdrangel/releases