

All-In-One A DATV Transceiver

using SDRangel software

HAMRADIO 2022

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SDRangel quesaco ?

TX & RX Software Defined Radio

Open Source Software developed by Edouard Griffiths F4EXB



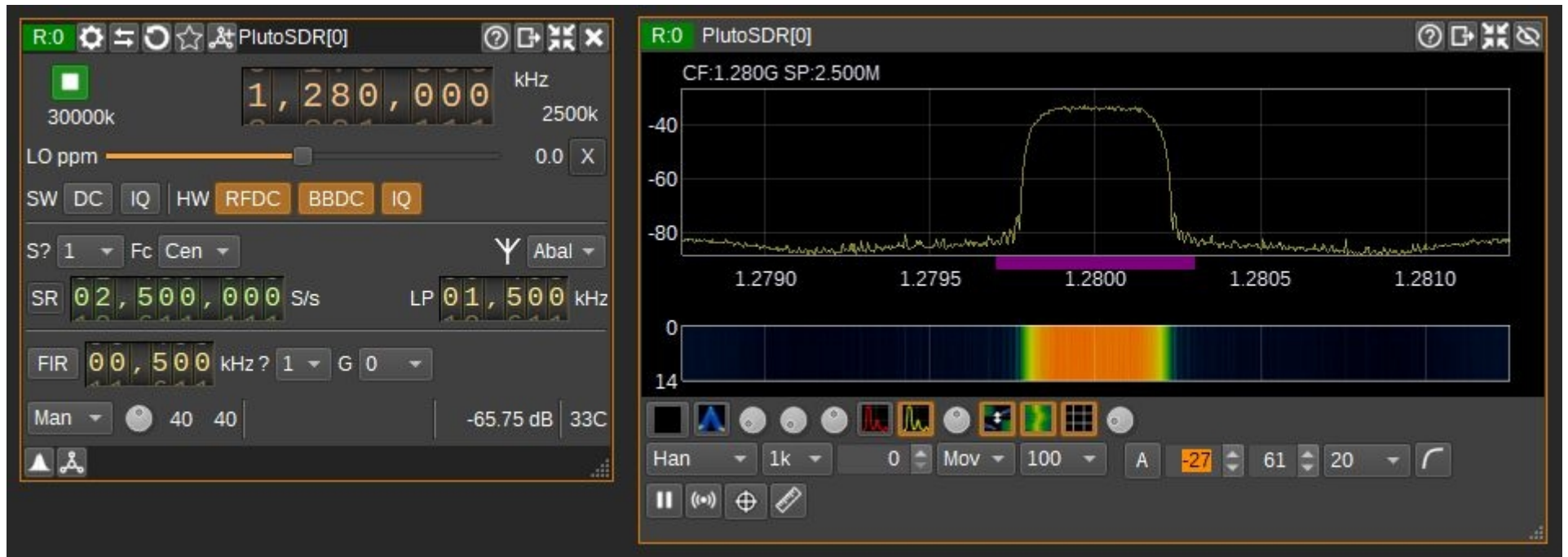
SDRangel

uses **sample source plugins** to collect I/Q samples from a hardware device. Then in the passband returned possibly decimated one or more **channel Rx plugins** can be used to demodulate, decode or analyze some part of this spectrum.

uses **sample sink plugins** to send I/Q samples to a hardware device. One or more **channel Tx plugins** can be used to produce modulated samples that are mixed into a transmission passband with possible subsequent interpolation before being sent to the device.

The UI is organized in workspaces inside which you place the different components: device, main spectrum, channels, features.

Sample source plugin: PlutoSDR



Channel Rx plugin: DATV Demodulator

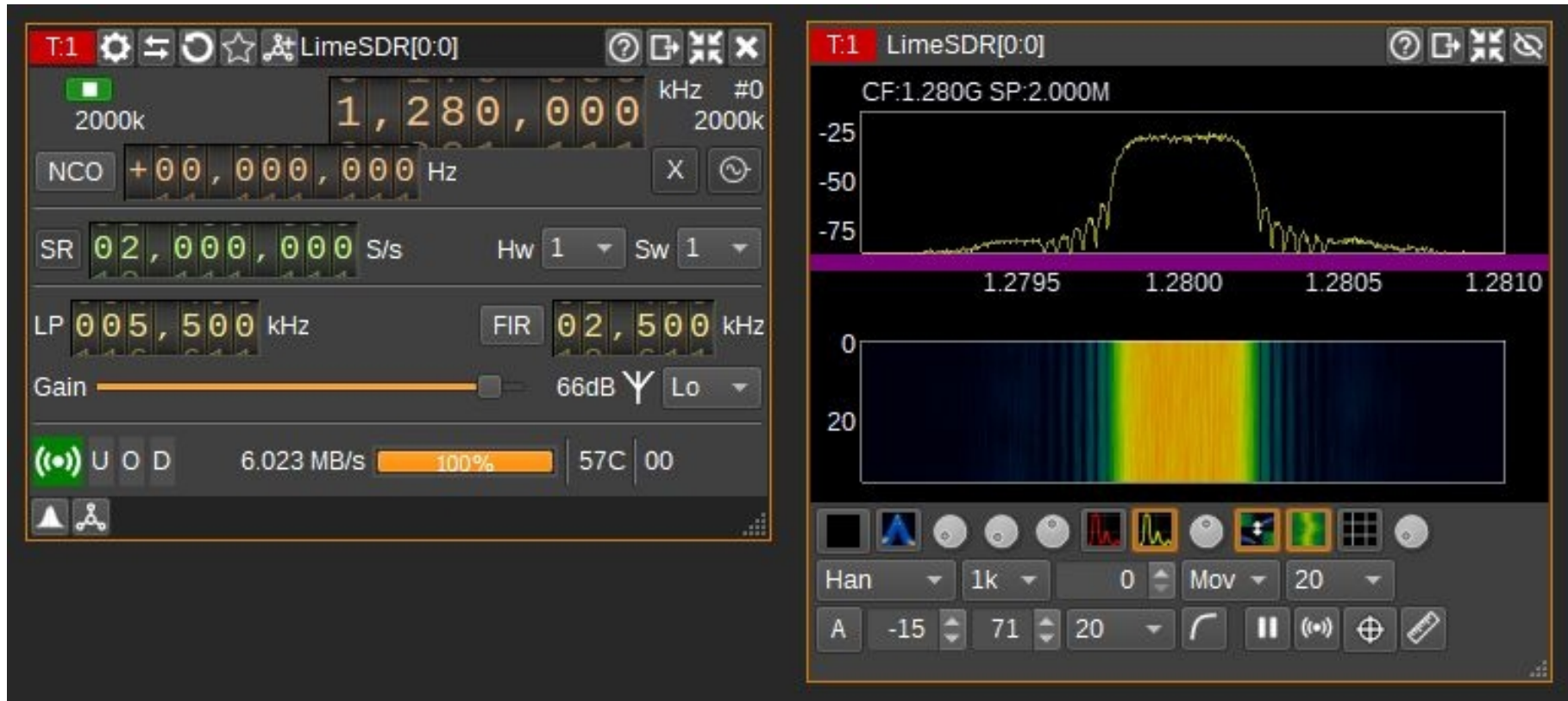
The screenshot shows the DATV Demodulator interface with the following settings:

- RF Settings:** Frequency offset Δf is +00,000,000 Hz, Bandwidth (BW) is 00,600,000 Hz, and gain is -14.6 dB.
- DATV Settings:** DVB-S2, MCOD QPSK 2/3, QPSK, Symbols/s 333000, 2/3, Notch filter 0.
- Advanced Settings:** FAST LOCK, HARD METRIC, SOFT LDPC, ALLOW DRIFT, VITERBI (R), MAX BFL 0.
- FIR RRC:** R.off 35, Exc 10.
- Performance:** Data: 4.2 MB, Speed: 754.9 Kb/s, Buffer: 1%.
- Video:** Video checkbox is checked.
- Metrics:** MER is 21.5, CNR is 18.3.
- UDP:** Addr 127.0.0.1, Port 8882.
- Bottom Bar:** 1 280 000 000.

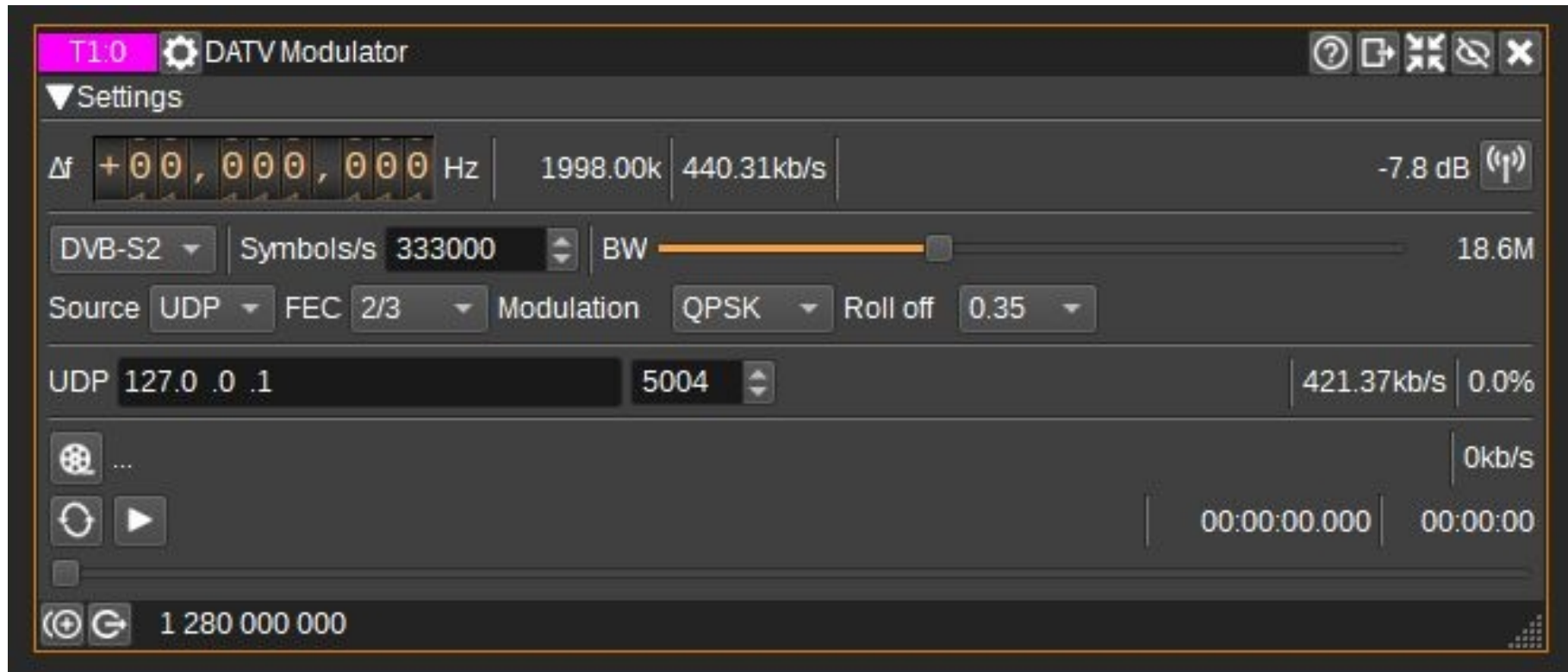
The screenshot shows the DATV Demodulator interface displaying a video stream of a test signal:

- RF Settings:** Frequency offset Δf is +00,000,000 Hz, Bandwidth (BW) is 00,600,000 Hz, and gain is -15.0 dB.
- Video Stream:** Displays a test signal with a color bar and a clock. Text includes "HB9DUG Test Signal", "Ben Galb: NTVF", "Mark Aherton, ZL3VX", "Michel Burnand, HB9DUG", and "DigitalZL, New Zealand".
- VIDEO Stream Info:** PID: 256 - Width: 960 - Height: 540, service_name: HB9DUG, service_provider: 0201, Codec: HEVC (High Efficiency Video Coding).
- Stream Controls:** Data, Transport (checked), Video (checked), and Decoding (checked) are visible.
- Bottom Bar:** 1 280 000 000.

Sample sink plugin: LimeSDR



Channel Tx plugin: DATV Modulator



User interface – Rx PlutoSDR / TX LimeSDR

The screenshot displays the SDRangel software interface, which is used for software-defined radio operations. The interface is divided into several panels:

- PlutoSDR [0] (R:0):** This panel shows the receiver settings for the PlutoSDR. The center frequency is set to 1,280,000 kHz. The LO (Local Oscillator) is set to 30000k ppm. The SW (Software) is set to DC, and the HW (Hardware) is set to RFDC. The SR (Sample Rate) is 02,500,000 S/s, and the LP (Low Pass Filter) is 01,500 kHz. The FIR (Finite Impulse Response) filter is set to 00,500 kHz. The gain is set to -51.00 dB. The plot shows a signal centered at 1.2800 MHz.
- LimeSDR [0:0] (T:1):** This panel shows the transmitter settings for the LimeSDR. The center frequency is set to 1,280,000 kHz. The NCO (Numerically Controlled Oscillator) is set to +00,000,000 Hz. The SR (Sample Rate) is 02,000,000 S/s. The LP (Low Pass Filter) is 005,500 kHz, and the FIR (Finite Impulse Response) filter is 02,500 kHz. The gain is set to 66dB. The plot shows a signal centered at 1.2800 MHz.
- DATV Demodulator (R:0):** This panel shows the settings for the DATV (Digital Audio Television) demodulator. The RF Settings are set to a frequency offset of +00,000,000 Hz, a bandwidth of 00,600,000 Hz, and a gain of 0.3 dB. The DATV Settings are set to DVB-S2, MCOD QPSK 2/3, QPSK, Symbols/s 333000, 2/3, Notch filter 0, FAST LOCK, HARD METRIC, SOFT LDPC, MAX BFL 0, FIR RRC, R.off 35, Exc 10. The Data rate is 16.5 MB, and the Speed is 797.5 Kb/s. The Buffer is 1%. The plot shows a signal centered at 1.2800 MHz.
- DATV Modulator (T:1):** This panel shows the settings for the DATV modulator. The Settings are set to DVB-S2, Symbols/s 333000, BW 18.6M, Source UDP, FEC 2/3, Modulation QPSK, Roll off 0.35. The UDP address is 127.0.0.1, and the Port is 8882. The Data rate is 408.08kb/s, and the Speed is 0.0%. The Buffer is 0.0%. The plot shows a signal centered at 1.2800 MHz.

The interface also includes a menu bar (File, View, Workspaces, Preferences, Help) and a toolbar with various icons for file operations, zooming, and playback. The status bar at the bottom indicates the version (SDRangel 7.3.1) and the date and time (2022-06-17 12:33:48 Europe de l'Ouest (heure d'été)).

User interface – Rx LimeSDR / Tx LimeSDR

The screenshot displays the SDRangel software interface, which is used for controlling LimeSDR hardware. The interface is divided into several main sections:

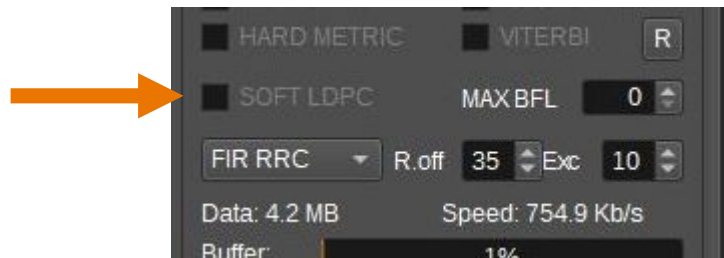
- Top Left (R:0):** Controls for the Rx LimeSDR. It shows a frequency of 1,280,000 kHz, a sample rate of 2,000,000 S/s, and various filter settings (LP, FIR). It also displays a signal strength indicator and a data rate of 6.023 MB/s.
- Top Middle (R:0):** A plot showing the received signal spectrum. The plot title is "CF:1.280G SP:2.000M". The x-axis represents frequency in kHz, ranging from 1.2795 to 1.2810. The y-axis represents power in dB, ranging from -60 to -20. A signal is visible centered at 1.2800 kHz.
- Top Right (T:1):** Controls for the Tx LimeSDR. It shows a frequency of 1,280,000 kHz, a sample rate of 2,000,000 S/s, and various filter settings (LP, FIR). It also displays a gain of 38dB and a data rate of 6.029 MB/s.
- Bottom Left (R:0):** The DATV Demodulator settings. It shows RF Settings (center frequency, bandwidth, gain) and DATV Settings (DVB-S2, MCOD QPSK 2/3, QPSK, Symbols/s, Notch filter, etc.). It also displays a video signal and a MER/CNR plot.
- Bottom Right (T:1):** The DATV Modulator settings. It shows Settings (DVB-S2, Symbols/s, BW, Source, FEC, Modulation, Roll off) and UDP settings (Addr, Port). It also displays a video signal and a timer.

The interface is titled "SDRangel" and includes a menu bar (File, View, Workspaces, Preferences, Help) and a toolbar. The status bar at the bottom indicates the version (7.3.1) and the date/time (2022-06-17 12:39:58 Europe de l'Ouest (heure d'été)).

SDRangel – DATV Demodulator

DVB-S2 specific - Soft LDPC decoder

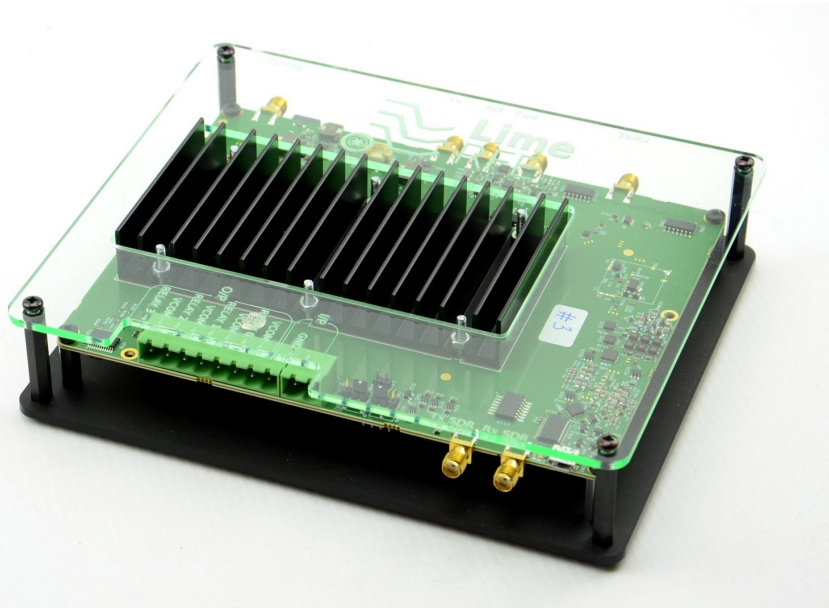
It can be used to decode signals lower than ~ 10 db MER which is the limit of Low Density Parity Check (LDPC) hard decoding.



Details here:

<https://github.com/f4exb/sdrangel/blob/master/plugins/channelrx/demoddatv/readme.md>

SDRangel Features – Lime RFE USB Controller



F:0 Lime RFE

▼Settings

Dev Open Close

to GUI Apply

Rx channel

Wideband 1-1000MHz

Rx port TXRX (J3) Att 0 dB Notch

Tx channel Same as Rx

Wideband 1-1000MHz

Tx port TXRX (J3)

▼Power

Pwr Corr 0.0

Fwd 00.0 | Ref 00.0 | RL 00.0 dB | VSWR 1.000

Abs power 0.0 dBm 0.001 W Avg

▼Control

Mode None RxTx Sync

RX TX Toggle Rx R:0 Tx T:1

SDRangel support

SDRangel is available for download here:

<https://github.com/f4exb/sdrangel/releases>

for:

- Windows 10
- MAC os
- Linux (ubuntu 22.04)
- from source

A online manual is provided for each module by selecting the question mark icon in the top right corner of the window module.



A forum is available:

<https://groups.io/g/sdrangel/>

References

The screenshot displays the homepage of swissATV.ch, a website for the IAPC amateur television group. The header features the site logo, a navigation menu with links for Home, News, Activités, Hardware, Académie, and Labs, a search bar, and a font size control. Below the header, a secondary navigation bar offers filters for All, News, Labs, Tests, Hardware, Software, and Académie, along with sorting options: Default, Title, Date, and Random.

The main content area is a grid of article cards:

- A-Tech 2014 Automne**: 2014-10-22 09:50:46. Includes a photo of a workshop.
- DATV-Express DVB-T 1 MHz**: 2014-10-13 11:10:14. Includes a photo of a green PCB.
- H264 DigiThin**: 2014-10-01 17:23:43. Includes a photo of a circuit board.
- DVB-T2, le standard pour...**: 2014-08-15 12:30:06. Includes a photo of an i-TAB DTV tablet.

Below the grid, a 'Hardware' section features five article thumbnails with 'Read More' buttons:

- SR-Systems
- MK808 Digitale
- BATC DTX1
- AGAF
- Hides USB DVB-T

Good hack !