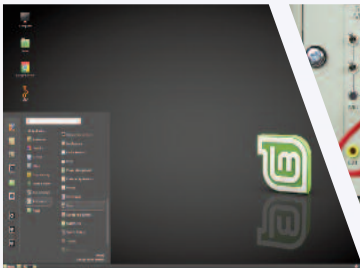


EMONA tims

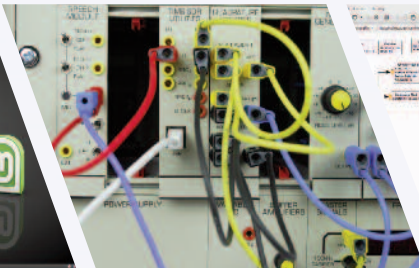
SOFTWARE DEFINED RADIO

Set up the complete GNU Radio
& run SDR in minutes

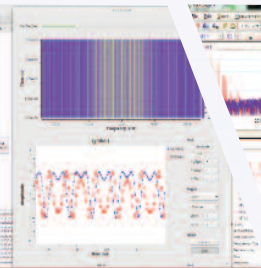
LINUX MINT



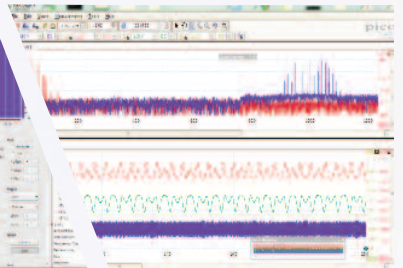
REAL HARDWARE



GNU RADIO



LIVE SIGNALS



The TIMS solution:
Real Hardware plus
full LINUX and GNU
Radio on a USB STICK

TIMS SDR UTILITIES USB

with LINUX Mint OS

Plug-and-Play boot PC from this USB

EMONA tims



SDR for Education: TIMS explodes the common
"black box" implementation of SDR

✓ *TIMS-SDR "DESIGNED FOR TEACHING"*

TIMS-451 SDR UTILITIES SOLUTION



The Hardware

The TIMS module at the heart of TIMS-SDR

- Standard, single-slot, plug-in module for the TIMS-301C
- SDR UTILITIES MODULE interfaces to GNU Radio via USB port
- Dual I and Q baseband analog outputs
- Dual I and Q baseband analog inputs for IQ receiver
- Dual, variable cut-off RRC Low Pass Filters for reconstruction or receiver application

TIMS EXPLODES THE SDR "BLACK-BOX" FOR STUDENTS

Students build -

- 1) An **SDR transmitter** using the TIMS-SDR Module together with standard TIMS hardware modules to output real modulated signals.
- 2) An **SDR Receiver** using the TIMS-SDR Module together with TIMS hardware modules to input real modulated signals.
- 3) A **SDR Transmitter-Receiver implementation**, together with TIMS hardware modules, with the real modulated signal passing through a real TIMS hardware signal channel.



TIMS-451 SDR UTILITIES module

And the Software

A Complete, Turn-key Solution - running in just 4 steps

1. Plug USB flash drive into PC
2. Boot the PC from the USB port
3. Linux Mint launches
4. Run GNURadio

STUDENTS IMMEDIATELY START RUNNING GNU Radio

TIMS-SDR Kit is a zero-install, plug-and-play, hardware and software package which enables the student to quickly and easily experiment with the graphical GNU Radio Companion software tools in the TIMS telecommunications platform with real signals.

**NO INSTALL
REQUIRED**



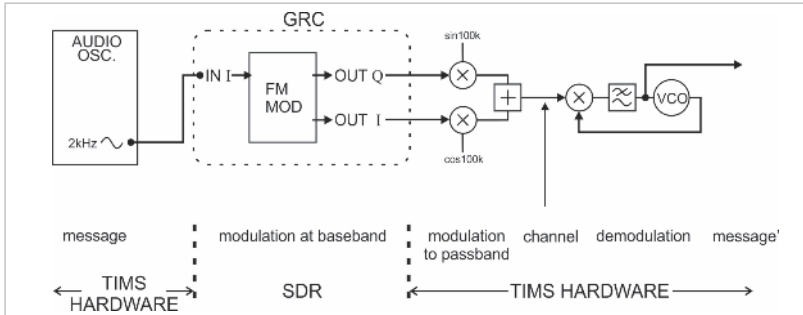
TIMS-SDR plug-and-play USB Stick

Insightful GNU Radio and SDR Implementations

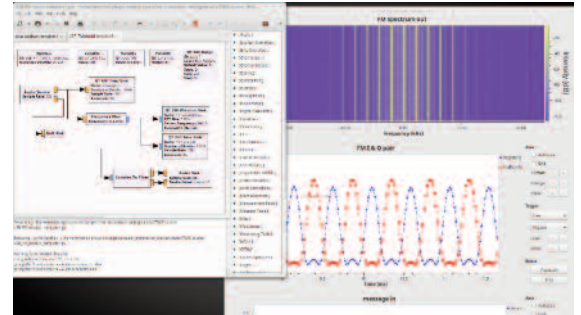


a) GNU Radio Modulator and TIMS Hardware Demodulator

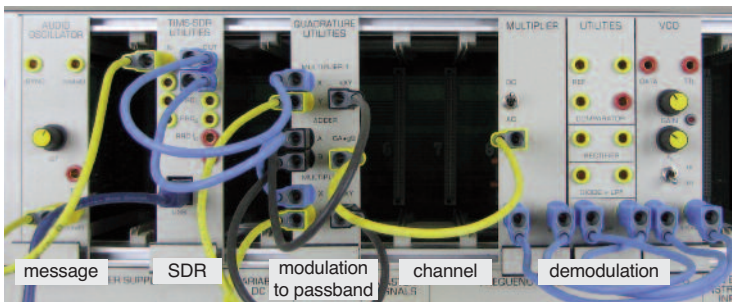
- SDR Software implementation of FM modulator generating I/Q baseband output signals
- TIMS Hardware modules translate I/Q output to TIMS passband signal
- TIMS Hardware modules implement the FM demodulator



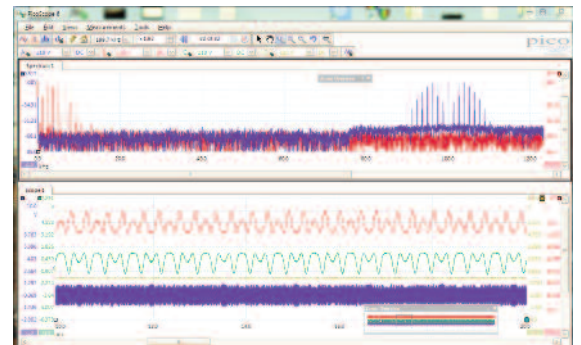
GNU Radio FM modulator + TIMS hardware demodulator



GNU Radio FM modulator



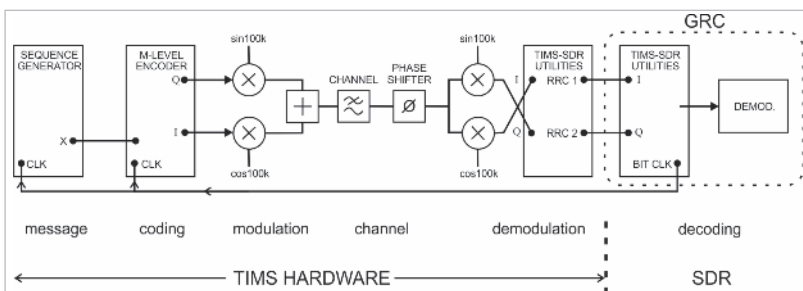
TIMS hardware implementation of the FM mod/demod



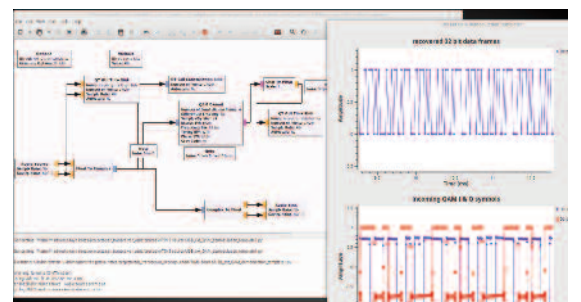
Real FM signals generated by TIMS-SDR

b) TIMS Hardware Modulator and GNU Radio Demodulator

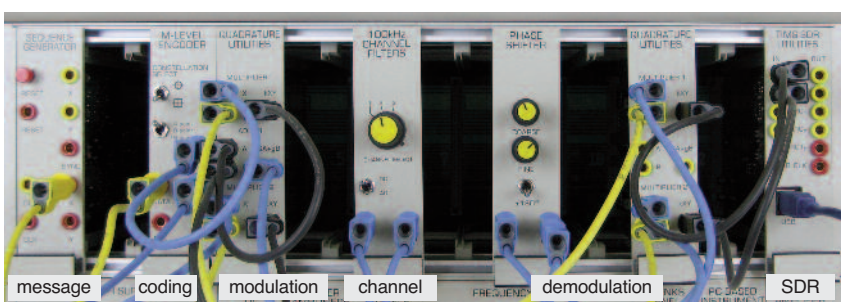
- TIMS Hardware modules generate passband QAM signal and implement the channel
- TIMS Hardware modules translate passband signal to baseband I/Q input to TIMS-SDR input
- SDR Software implementation of QAM demodulator generating recovered data



TIMS hardware QAM mod + GNU Radio QAM demod



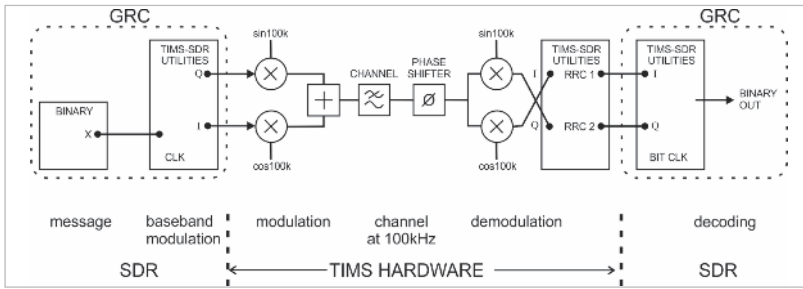
GNU Radio QAM demodulator



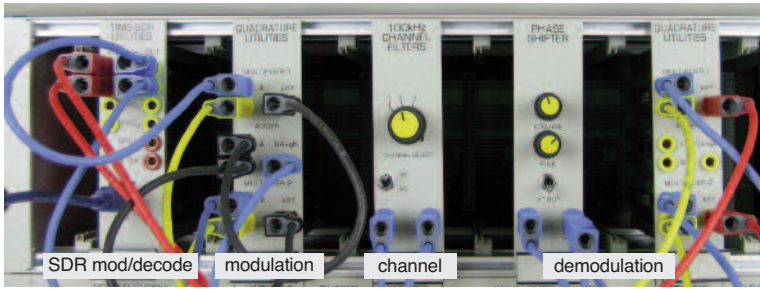
TIMS hardware implementation of the QAM modulation and SDR demodulation

GNU Radio and SDR Implementations (continued)

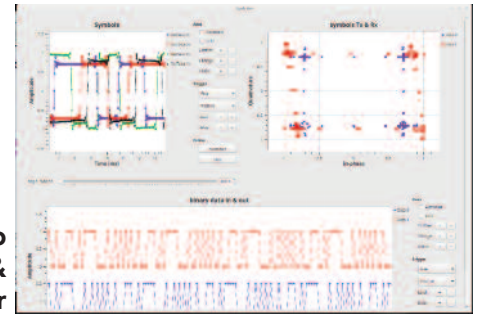
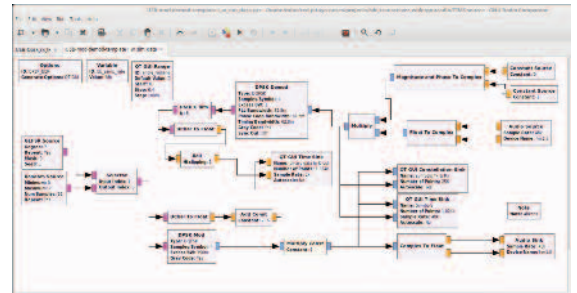
c) GNU Radio Modulator & Demodulator with TIMS Hardware



TIMS GNU Radio mod & demod with a real hardware channel

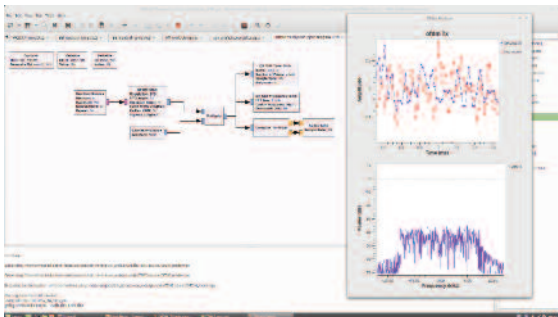


GNU Radio modulator & demodulator

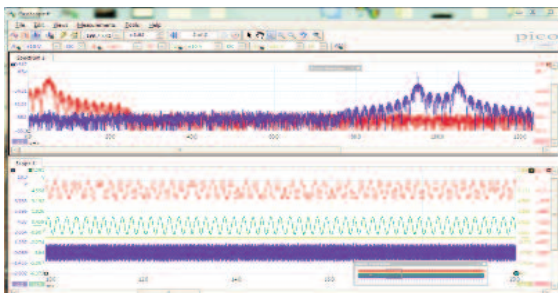


Comprehensive GNU Radio Experiments

GNURadio applications on the TIMS-SDR USB Flash Drive



GNU Radio implementing OFDM



TIMS generating real SDR signals from GNU code

- 1. FAMILIARIZATION WITH SDR SOFTWARE** - Familiarization with LINUX and GNU Radio.
- 2. FAMILIARIZATION WITH SDR HARDWARE** - Interfacing GNU Radio with TIMS-SDR hardware module. Sources and Sinks in GNU Radio. Running a loop-back program with the TIMS-SDR module.
- 3. TX with SDR, RX with TIMS HARDWARE** - Create FM Modulation in GNU Radio with an external message, and demod using TIMS hardware modules.
- 4. EXPLORING SAMPLING & RESAMPLING** - Discovering Resampling and Multi-Rate Techniques in SDR: Interpolation and Decimation.
- 5. TX with TIMS HARDWARE, RX with SDR** - Demodulating QAM in SDR in a noisy bandlimited channel.
- 6. TX and RX with SDR** - Modulation and demodulation with a TIMS hardware channel.
- 7. EXPLORING DIGITAL MODULATION SCHEMES** - BPSK, QPSK, MSK, FSK, OFDM, and more

Available from:

Emona Instruments Pty Ltd
 78 Parramatta Road
 Camperdown NSW 2050 AUSTRALIA
 Tel: +61-2-9519-3933 Fax: +61-2-9550-1378
 URL: www.emona-tims.com
 Email: sales@emona-tims.com

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