UU-discussion

Robert Olsson

ULL seminar
Paper input
Project sync

So far

SLU
 Research data centre
 Data collection, Barrskogen ekologi, PDP11 etc
 Fiber/Campus – First fiber Ethernet in Sweded
 SS1
 Routing BGP/Mbgp/Zebra
 Setting up, UU, SLU, ftp.sunet,
 SUNET Tech.BOARD
 Linux, Founder Bifrost Distro
 Linux kernel, Intel
 NAPI, PKTGEN, LC-TRIE, TRASH

So far 2

UU
 LAB, routing TRASH, Stefan Nilsson,
 Olof H. KTHNOC

KTH
 CSD Internet Africa, LowPower, SuperCaps,
 DCDC IoT-grid. WSN-deployment.

Start-Up
 WSN, Elcctronics, MCU's

Design of commercial WSN device and ecosystem 1

Electronic design MCU trade-off
RF Filter etc
Antenna PCB
EMC
PCB
Testing
CE
RoHS

Design of commercial WSN device and ecosystem 2

Manufacture
WEEE
Default Firmware/Contiki/RIME
sensd GW TCP w. Jens Låås
App Android Read-Sensors w. Olof H
IoS App. Per Lindgren
FOSS Contiki port. CSD students
Arduino?

Design of commercial WSN device and ecosystem 3

Pilot installations
Issues
Radio challenges
Power challenges
Physical installation
Security??

WSN IEEE 802.15.4 Sensor Node

PCB antenna

RESET button

P1 pulse header

P0 pulse connector

I2C Pin header

ON/OFF Current Tap

Ext. temp sens

USB-TTL 6-pin cable

EUI-64 MAC address

Light sensor

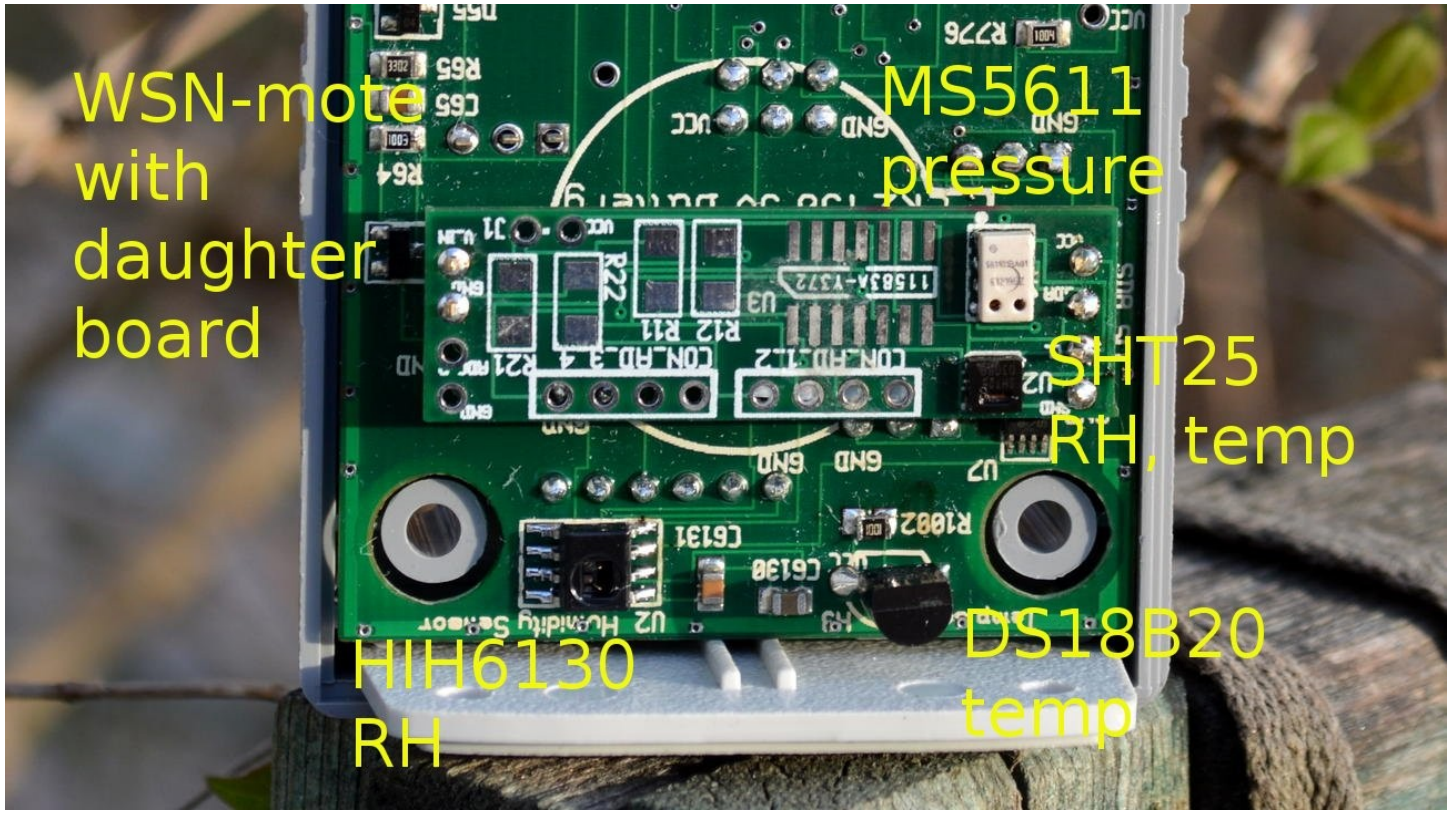
LED red
LED yellow

ADC1 w. program pwr

Pin header with ADC2

DC-input 3.5-25V

I2C add-on boards



DIT Dar es Salaam Inst of Tech. 1

DIT Dar es Salaam Inst of Tech. 2

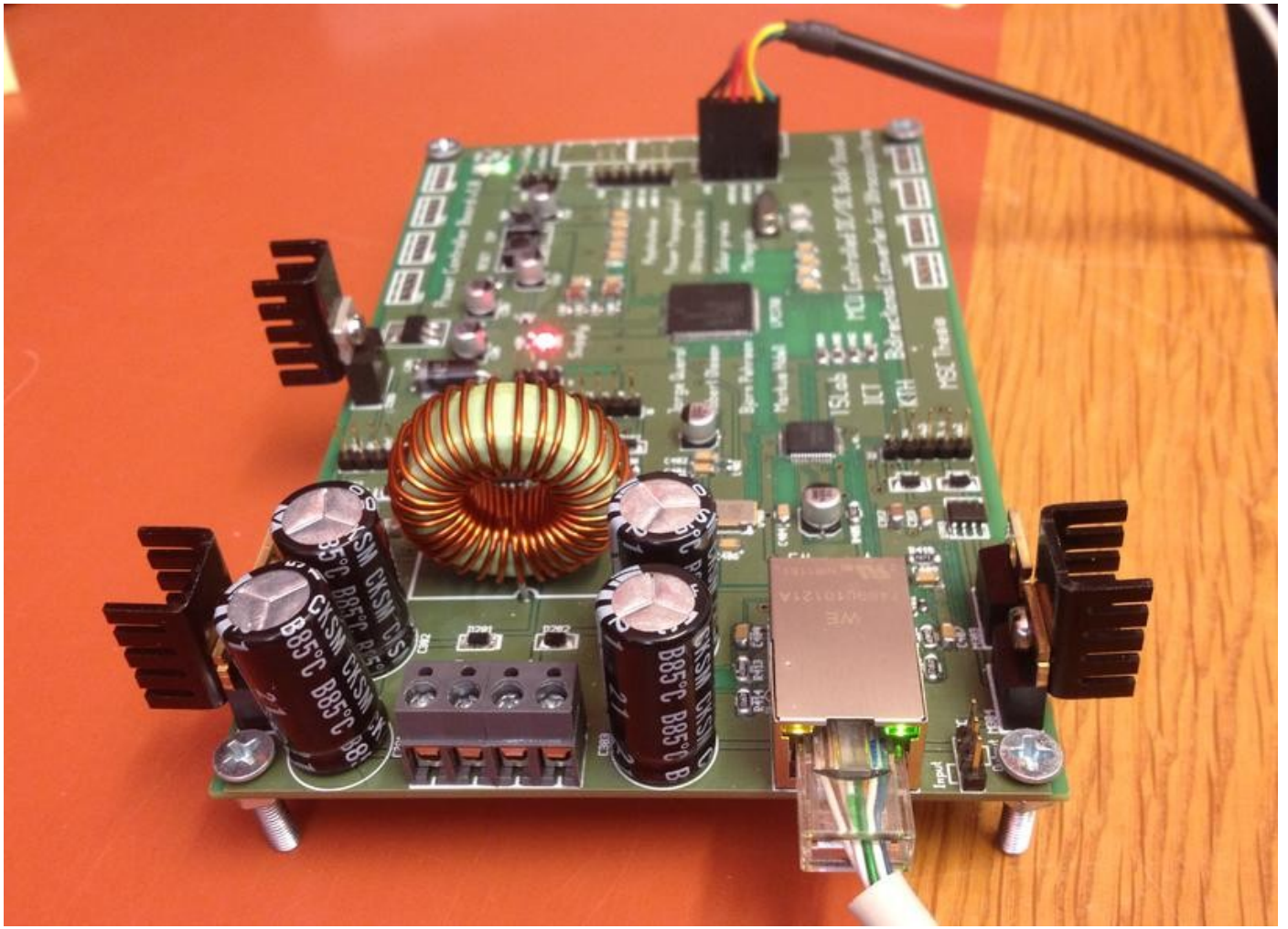
Tz. Bunda Power Station. Insolation.

Univ. of Lagos Nigeria. Weather st.

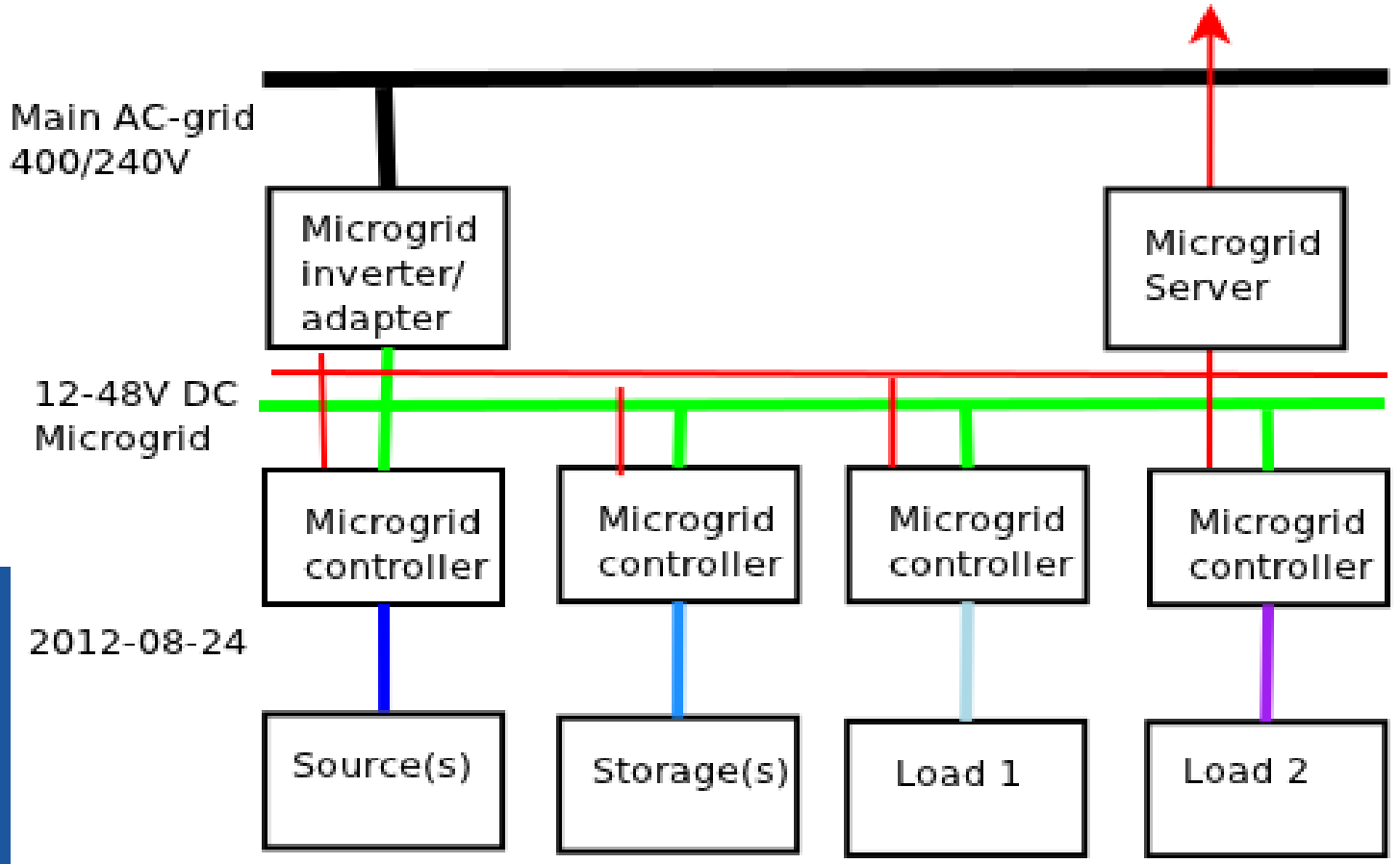
SMHI test

IoT-grid control unit

ARM Bidir. Step-Up/down-DC-DC converter/Contiki/CoAP/Ethetnet



IoT-grid/CoAP app.



22Watt/DC router/700kpps/4SFP

Low-power rugged router w. passive cooling and power options

Made in Sweden, Powered by Bifrost/Linux

1.3W DC router 2SFP

Low-power rugged router w. passive cooling and power options

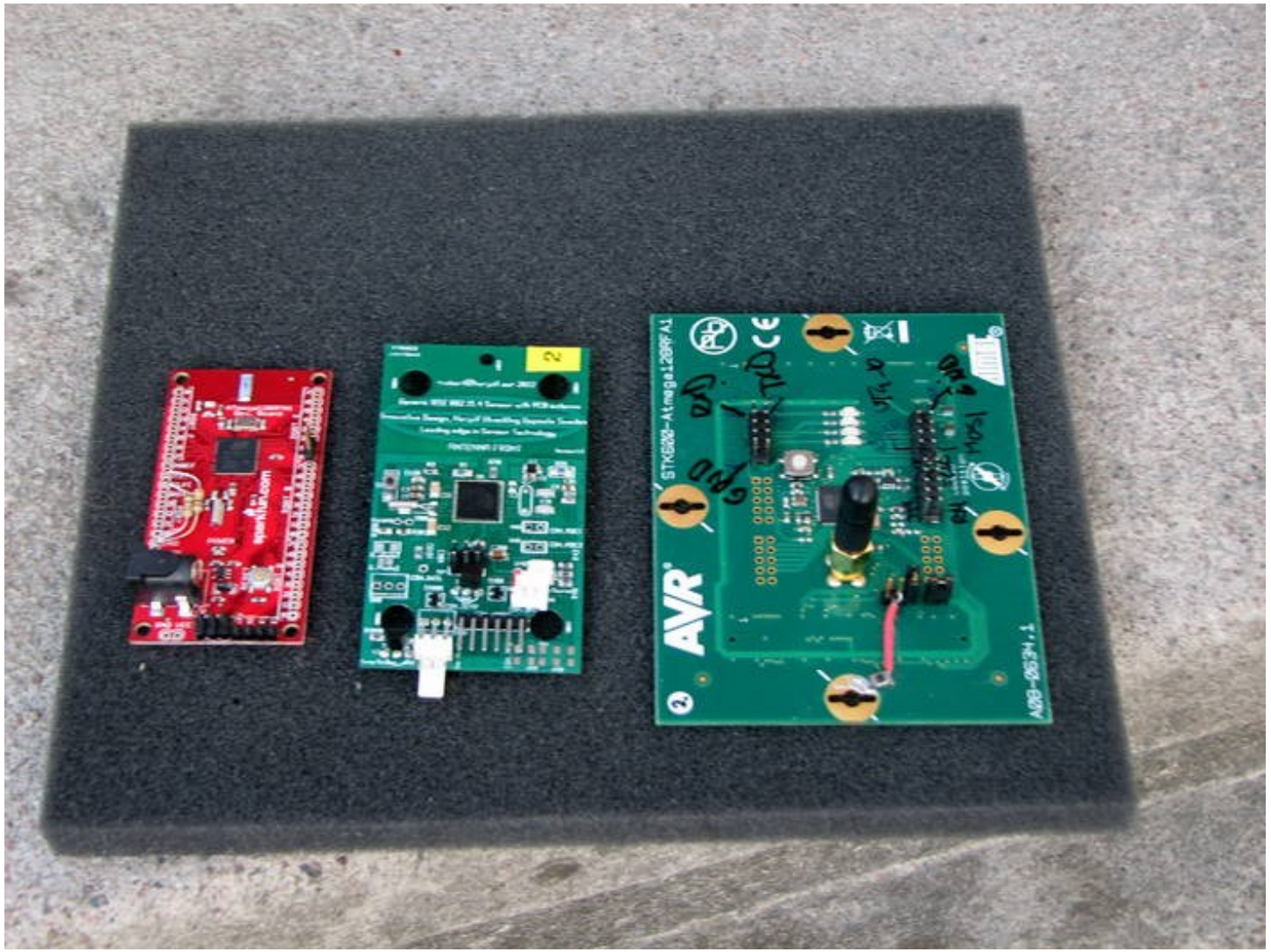
Made in Sweden, Powered by Bifrost/Linux

Ultracapacitor Effort

Ultra-Capacitor bank with 16 caps @ 3000 Farad

Contiki Programming Experiences

MCU boards w. Builtin IEEE202.15.4 radio tranceiver



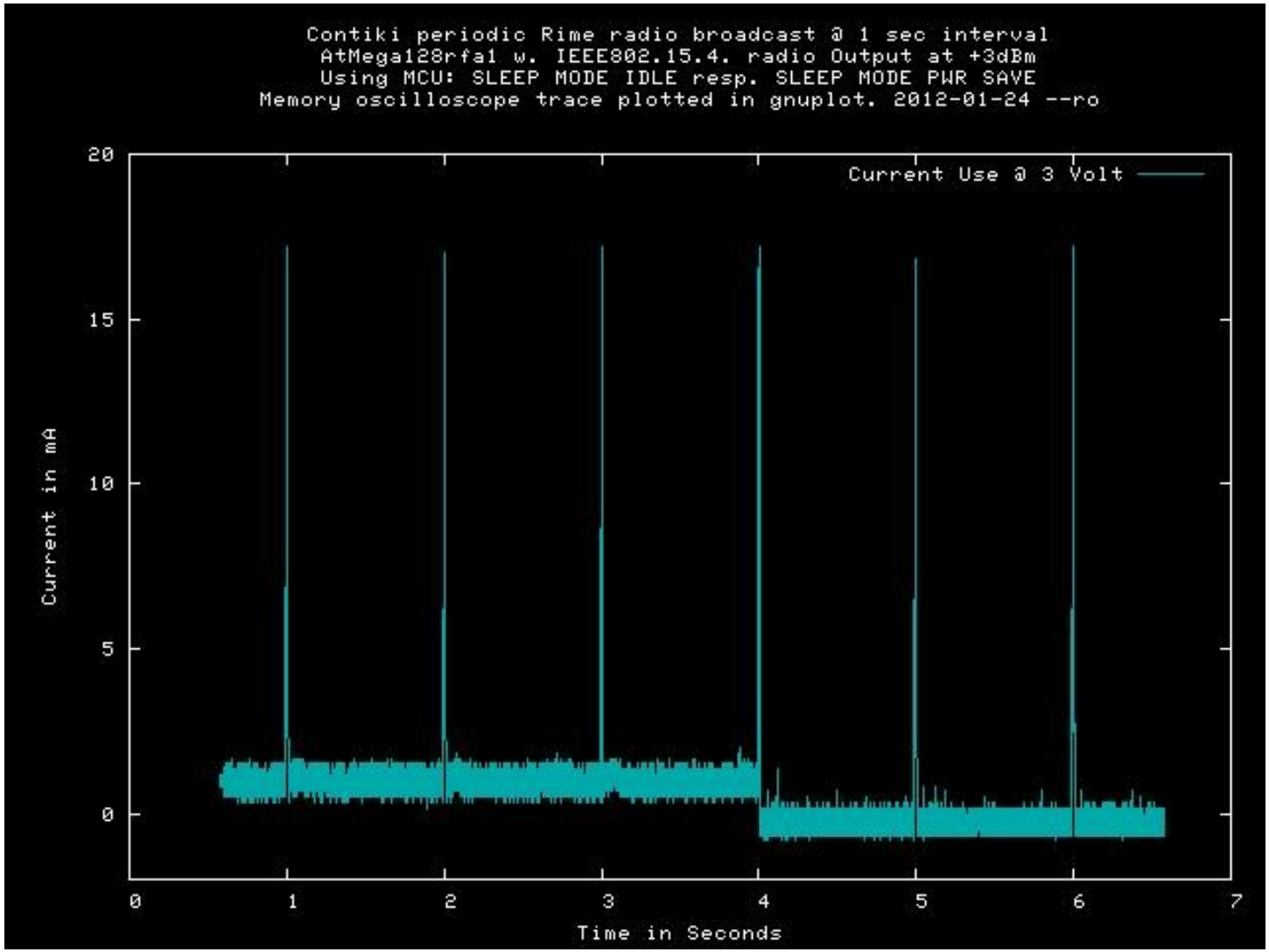
Powering Nodes

Application
Network size
Network topology
RDC

Coding
Sleep modes
External wakeup ADC/Comparator chips

Contiki Programming Experiences

Hacked version contiki rime broadcast program
Radio broast every sec. Current monitored.



Contiki Programming Experiences

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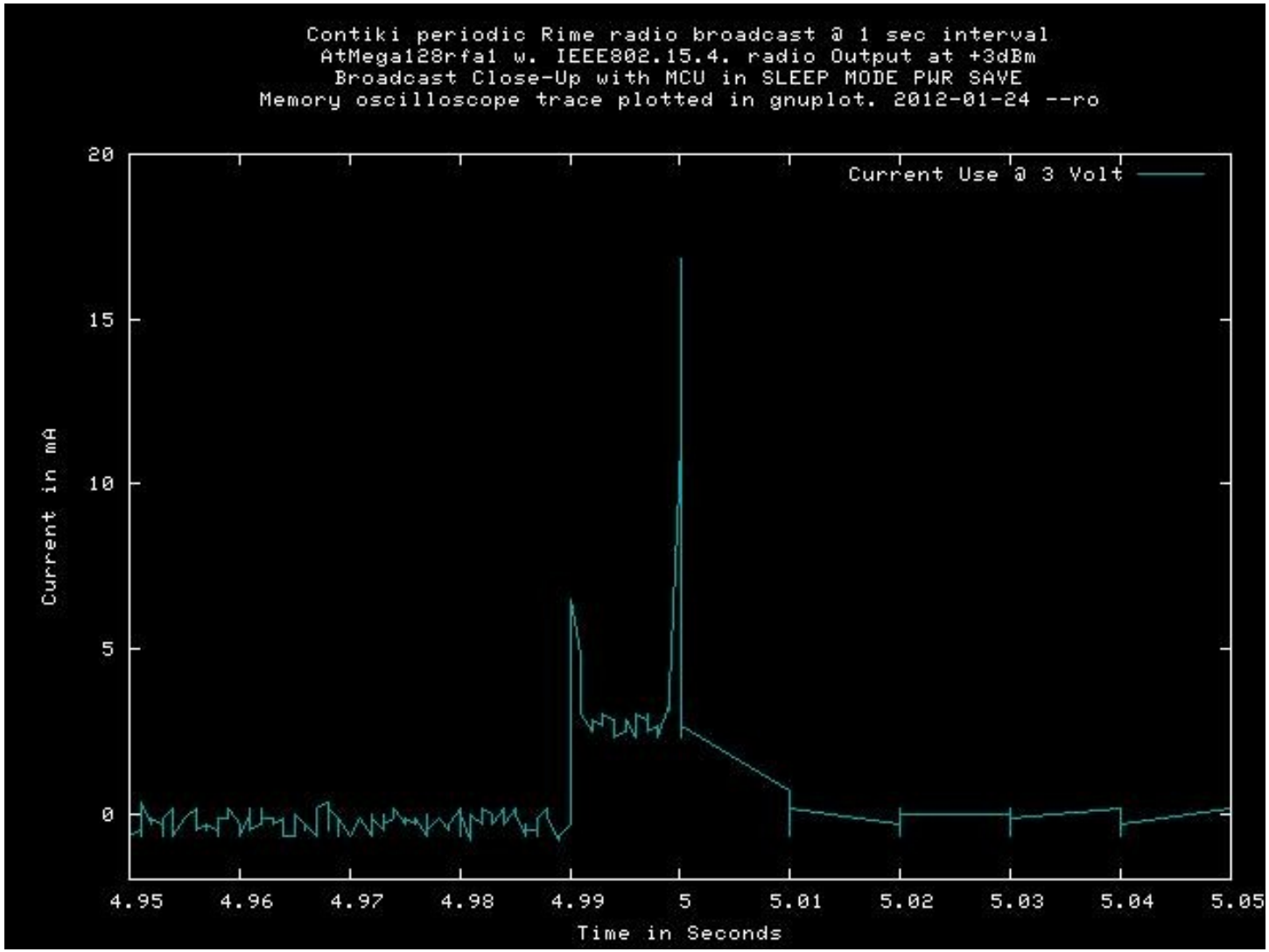
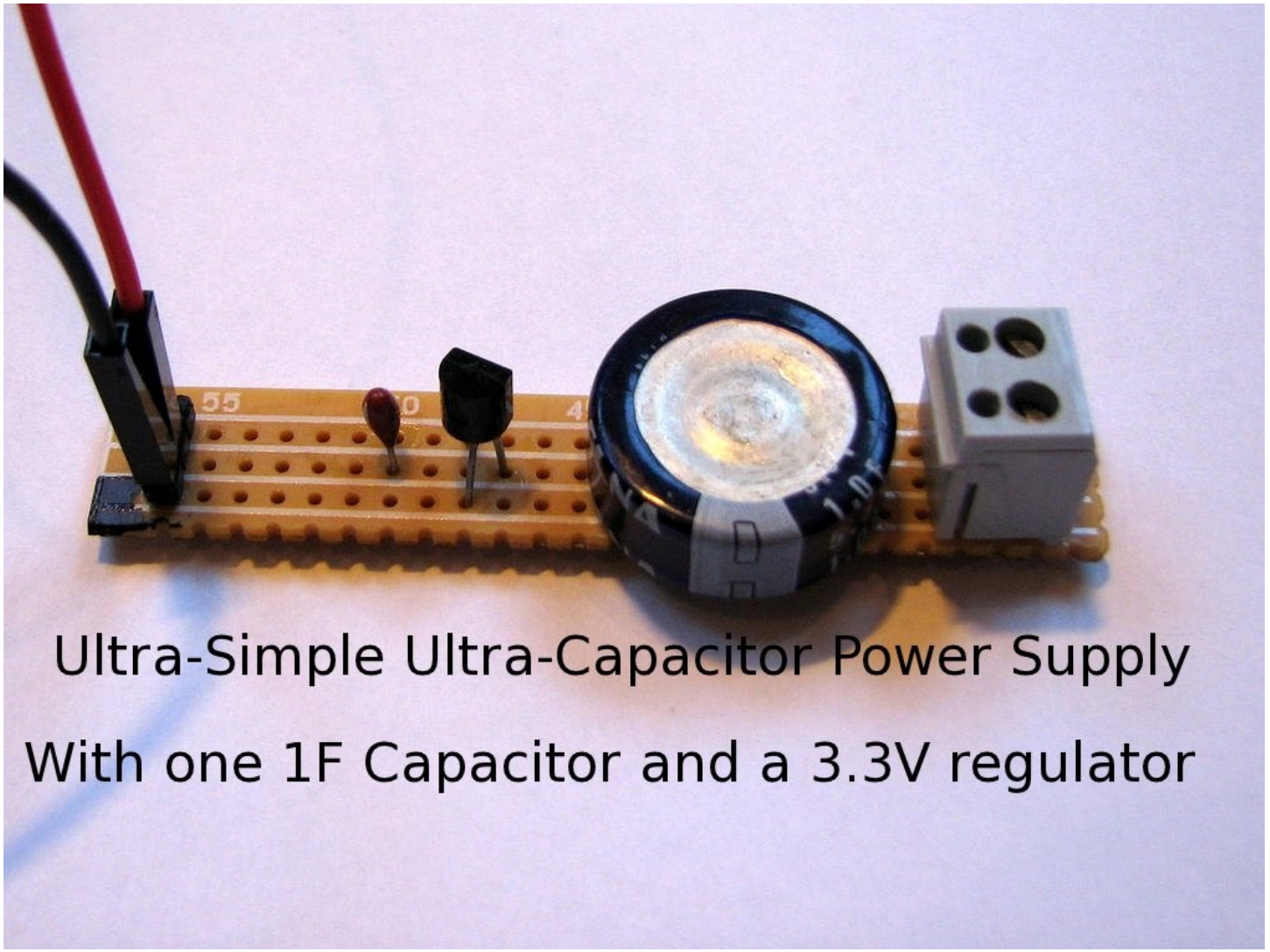


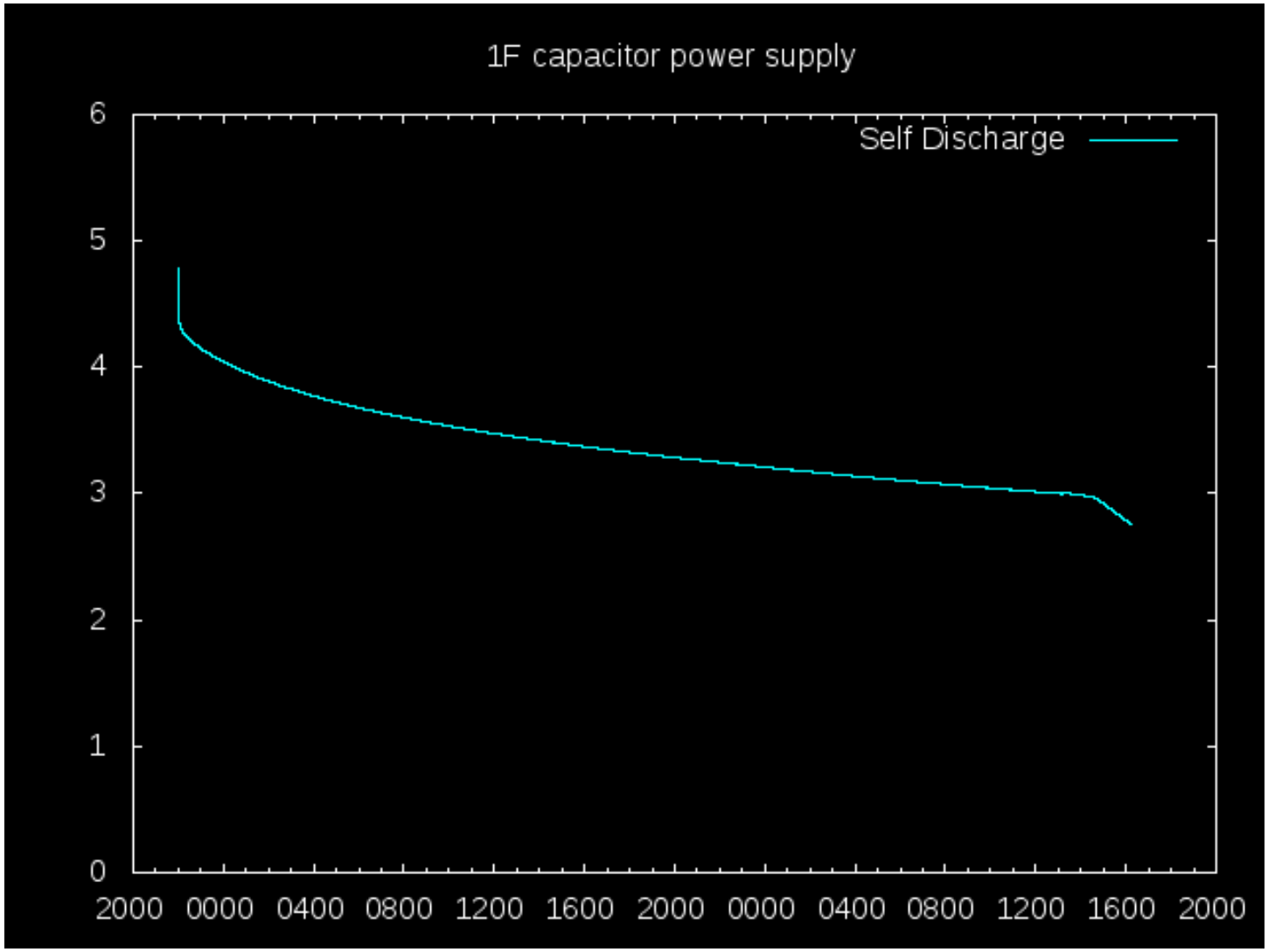
Contiki Programming Experiences

Capcitor experiment.



Contiki Programming Experiences

Capacitor Power Supply Self Discharge.



Contiki Programming Experiences

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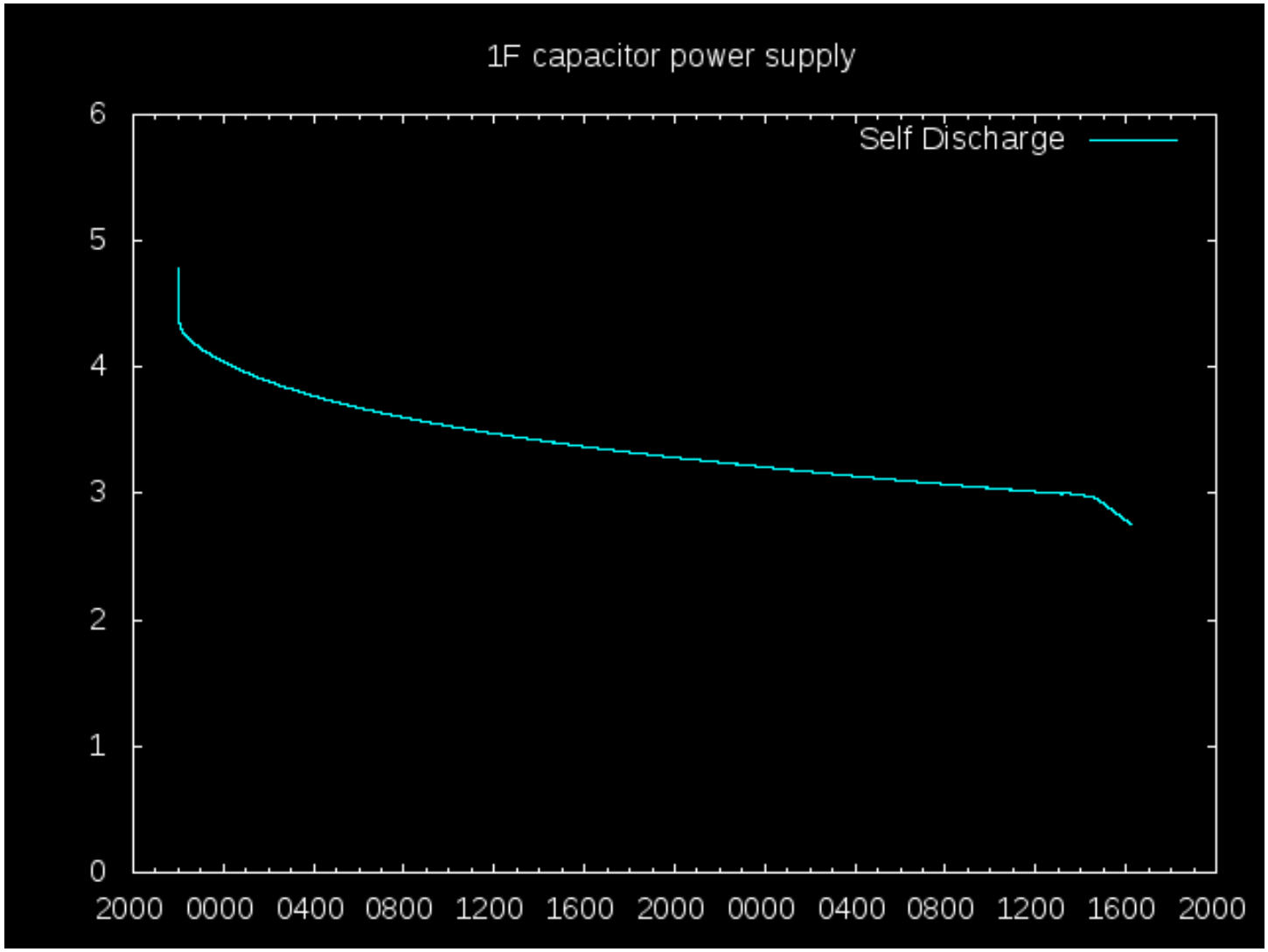


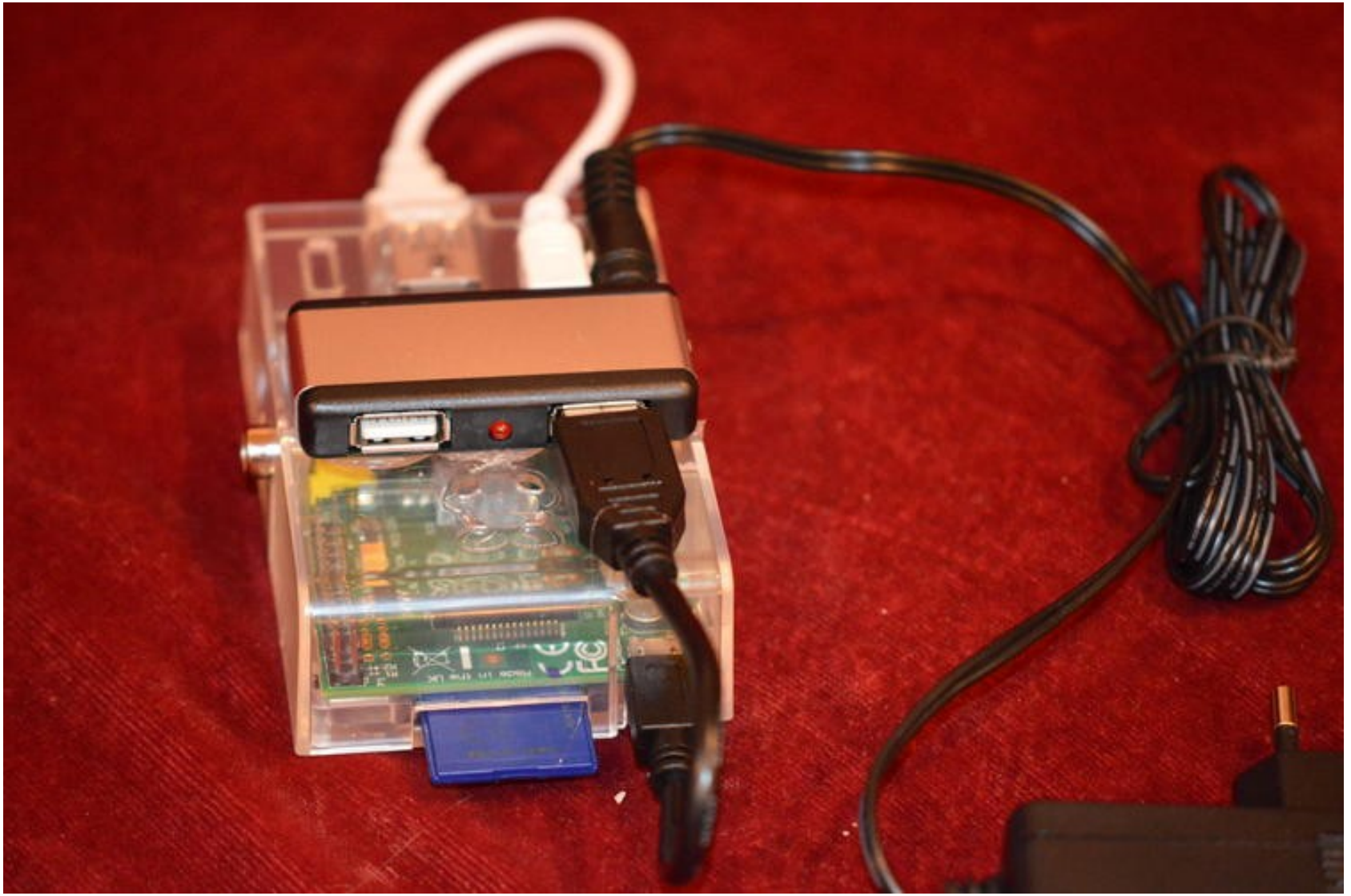
DC-DC Supercap Solar Unit

Router upgrade/Serengeti

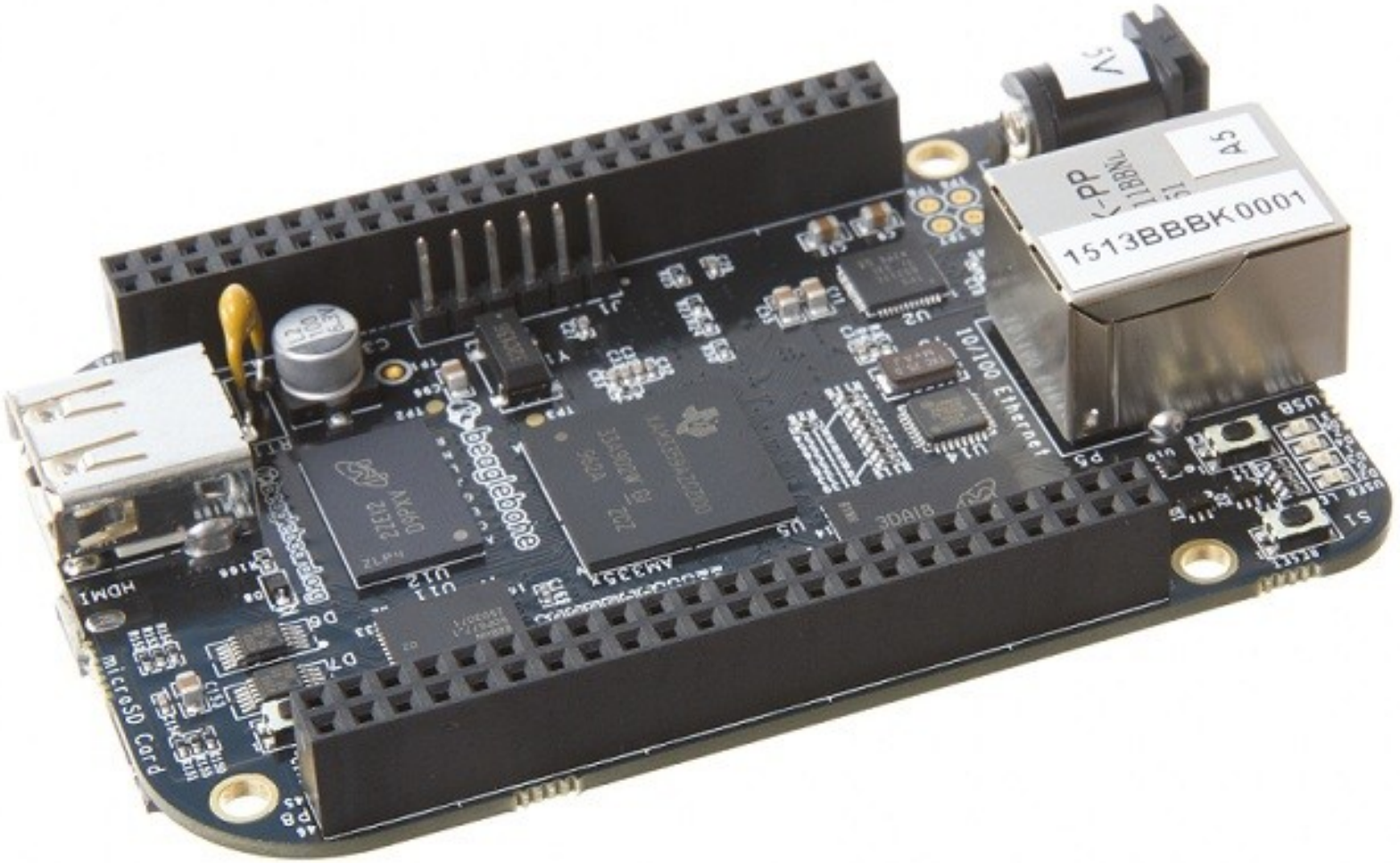
WSN GW and uplinks

- Wired/WiFI
- 3G/4G/SMS
- UHF/VHF
- Other

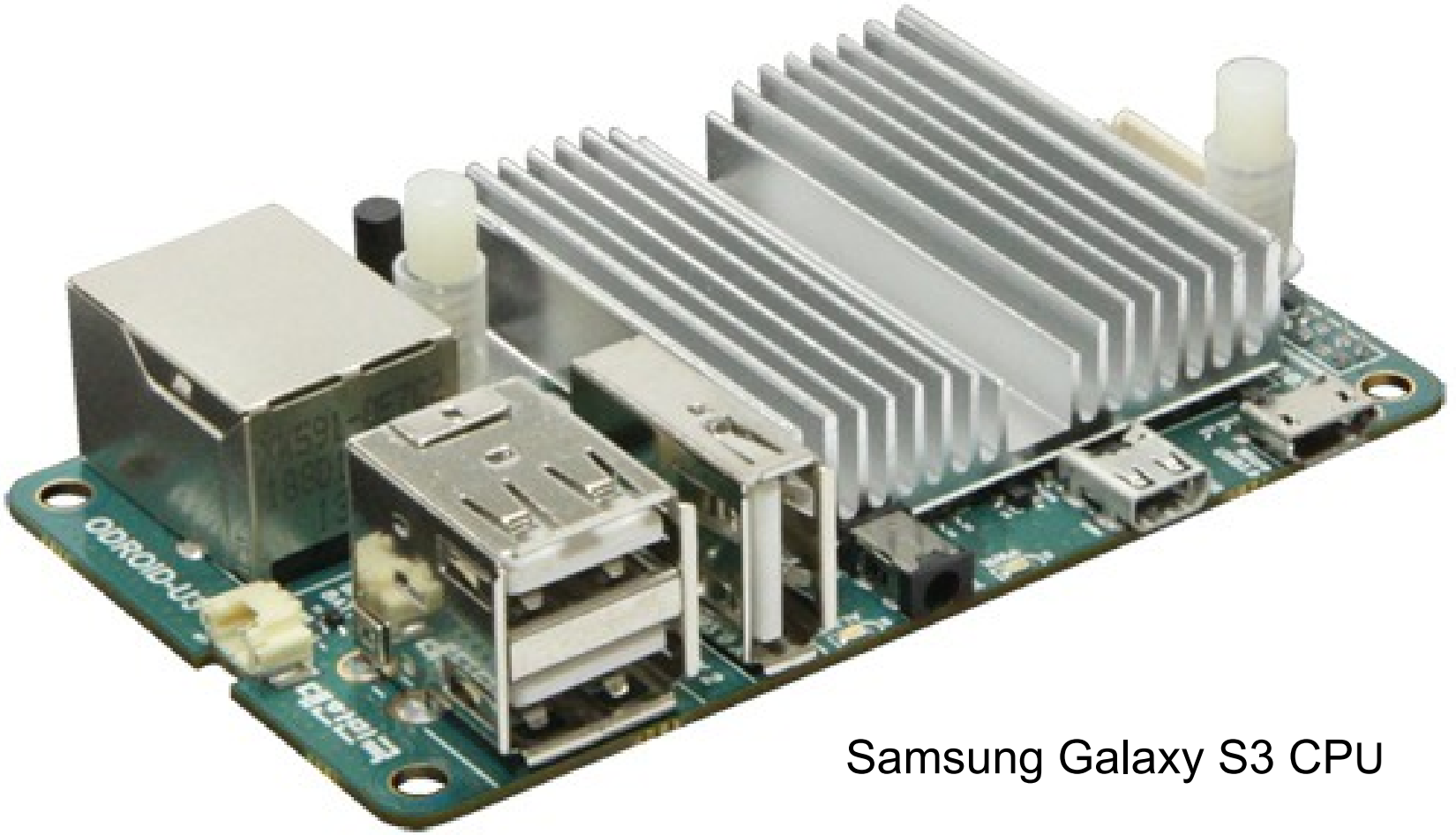
RPI & USB hub unit



Beaglebone Black, TI SoC



Odroid 1.7 GHz 4 cores



Samsung Galaxy S3 CPU

power efficiency benchmarking proposal

Sever performance. The general clause:

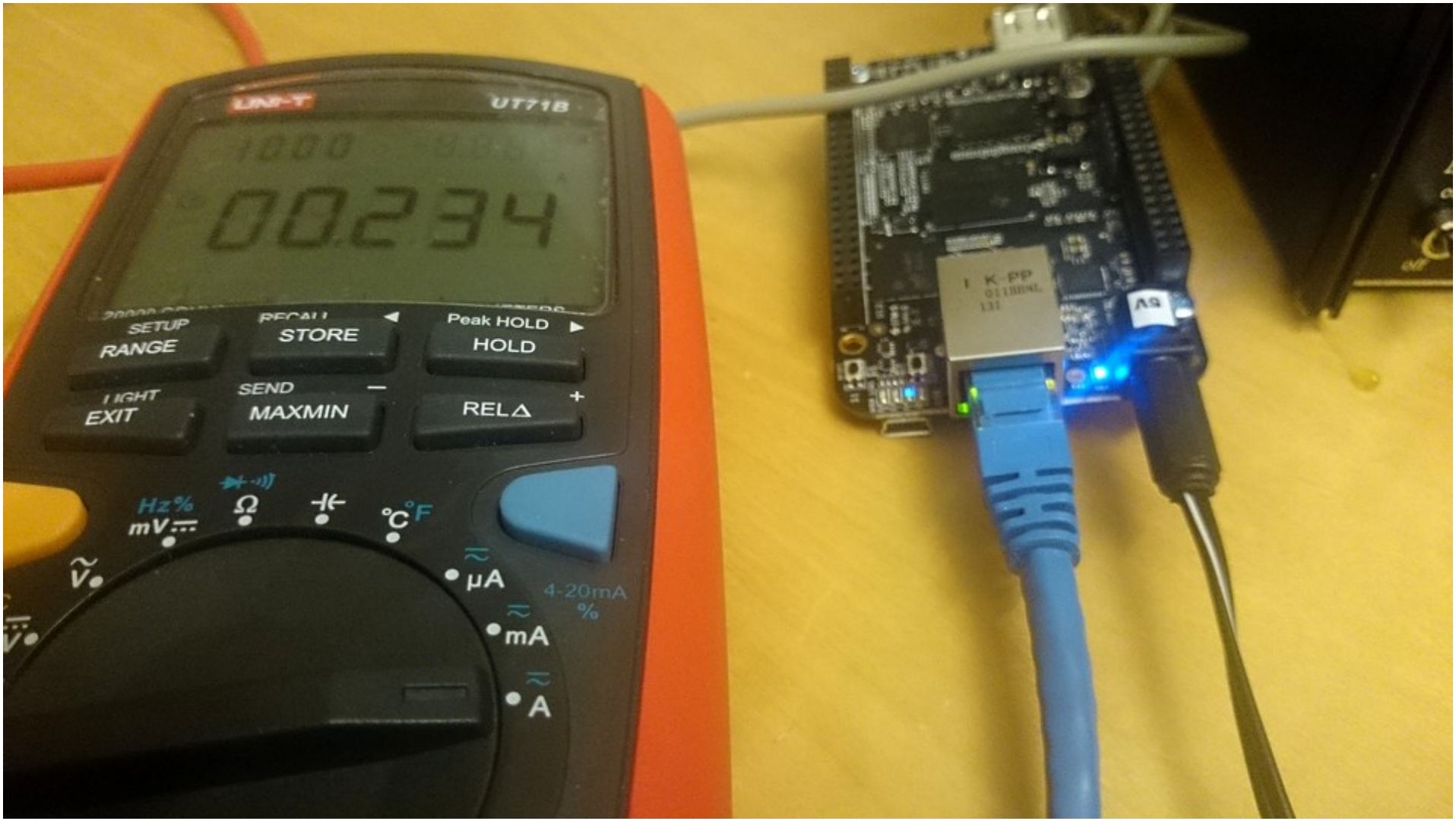
Mb(Class,TCPX) / Watt

Number of Mbit/s per Watt for fixed number of TCP flows, 1 , 10, 100, 1000 etc

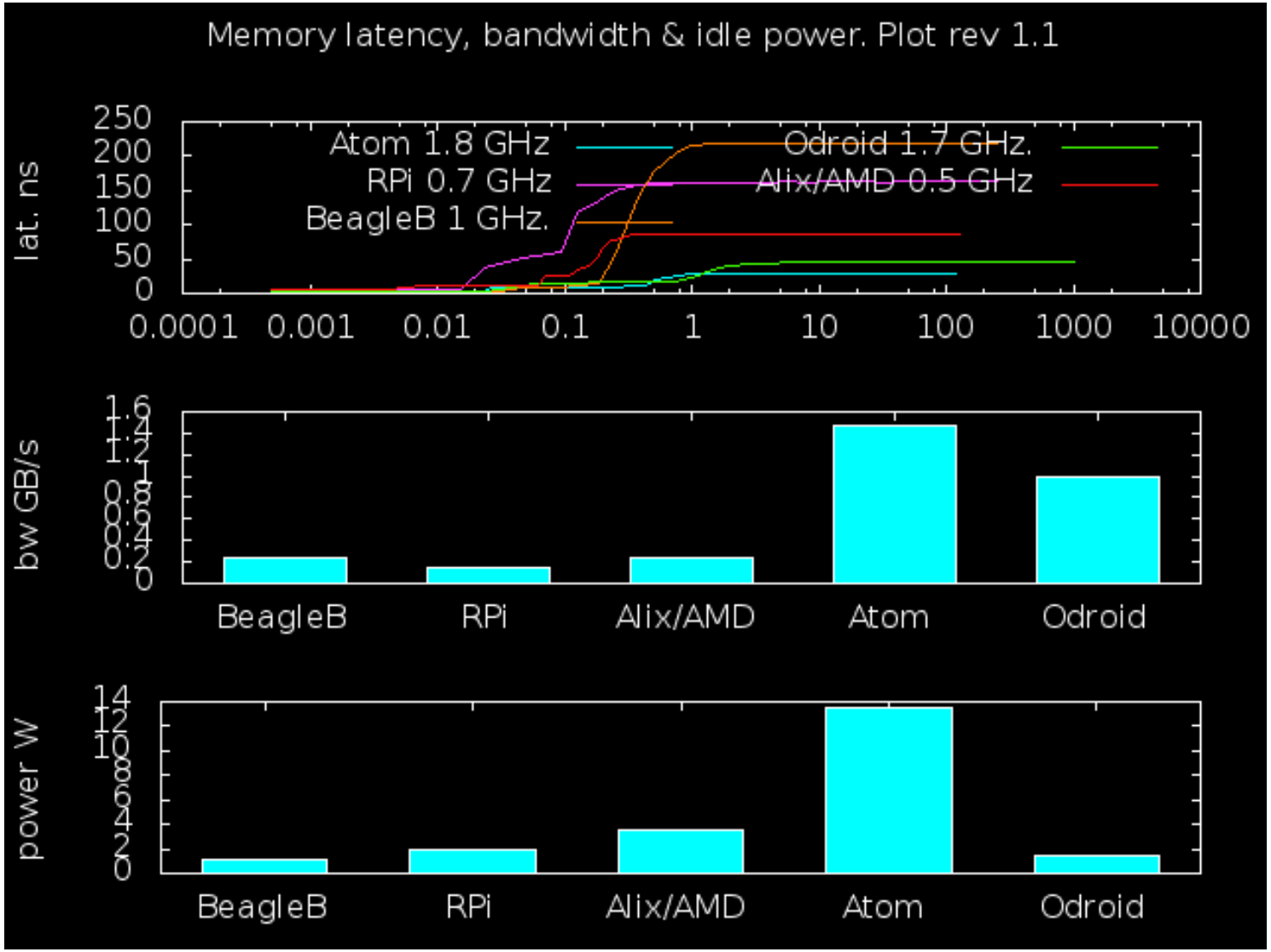
Example:
MB(100, TCP10) = 20

Iperf is a usable tool. Server side runs on DUT.

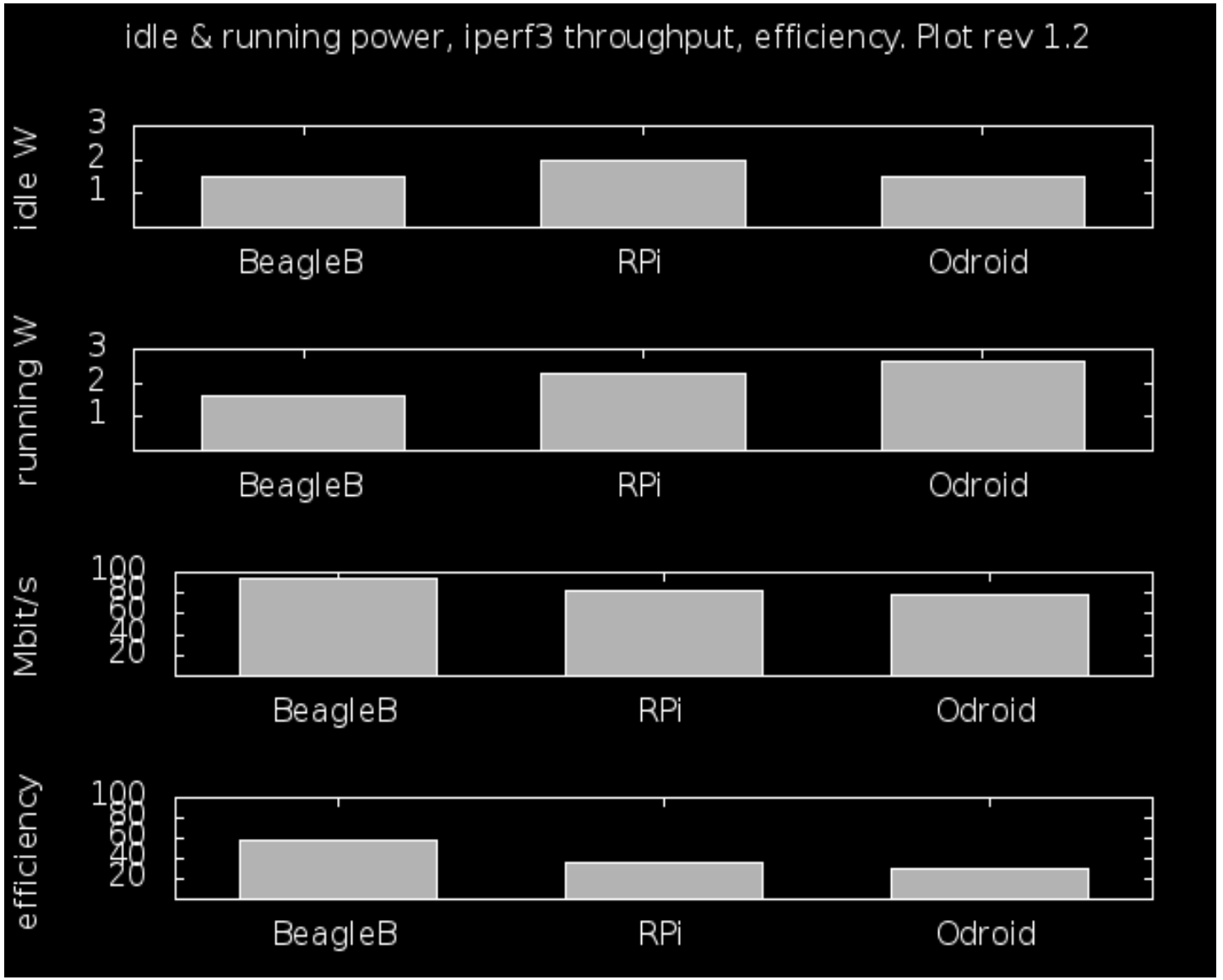
BB Idle power 5V@0.234A = 1.17W



System performance comparison



Power efficiency/Server TCP



UU project
Marsta wind. Upgrade to WSN?

Paper input

Temp drift control
 OSC control
 Check CAP temp variance vs temp

Band pass filter
 Channel 11-26
 2405 – 2480 MHz
 Different centre freq.
 Dual filter

Rain references

TESLA

Rain check long links

Different vendor?

Uplink/Longer-dist >300m test?

New Atmel chips biased to ch 25, ch26

Links/References

https://github.com/herjulf/sensd
https://github.com/herjulf/Read-Sensors
https://github.com/CSD-WSN-2013/contiki-pluto
http://radio-sensors.com/
http://herjulf.se/products/WSN/sensors/wsn_practical_guide.html