Contiki Programming Experiences

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Contiki Programming Experiences

Technology moves forwards.
It's no news but sometimes a leap.

MCU microncontrollers
Radio & Antennas
Operating system
Networking
Sensor technology
Energy effiency

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Technology moves forwards.
It's no news but sometimes a leap.

Not only legacy IP networking

Keyword: Connectivity (rather than bandwidh)

Communication to solve new problems:

- Environmental
- Health, buildings, home
- Agricultural, industri
- etc

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Technology moves forwards.
It's no news but sometimes a leap.

Connectivity without impacting world
- Resources, energy or health

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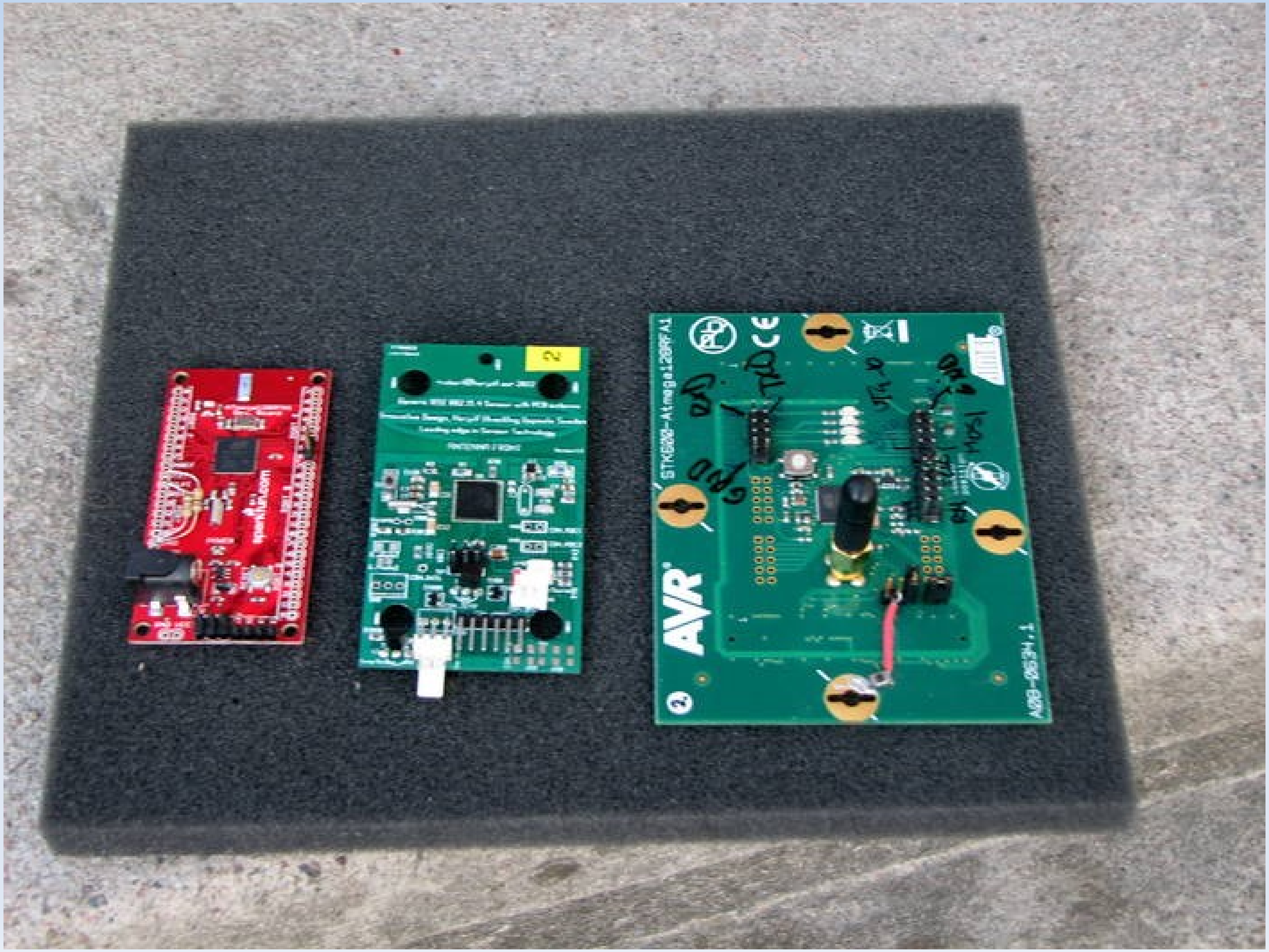
MCU boards w. Builtin IEEE202.15.4 radio tranceiver



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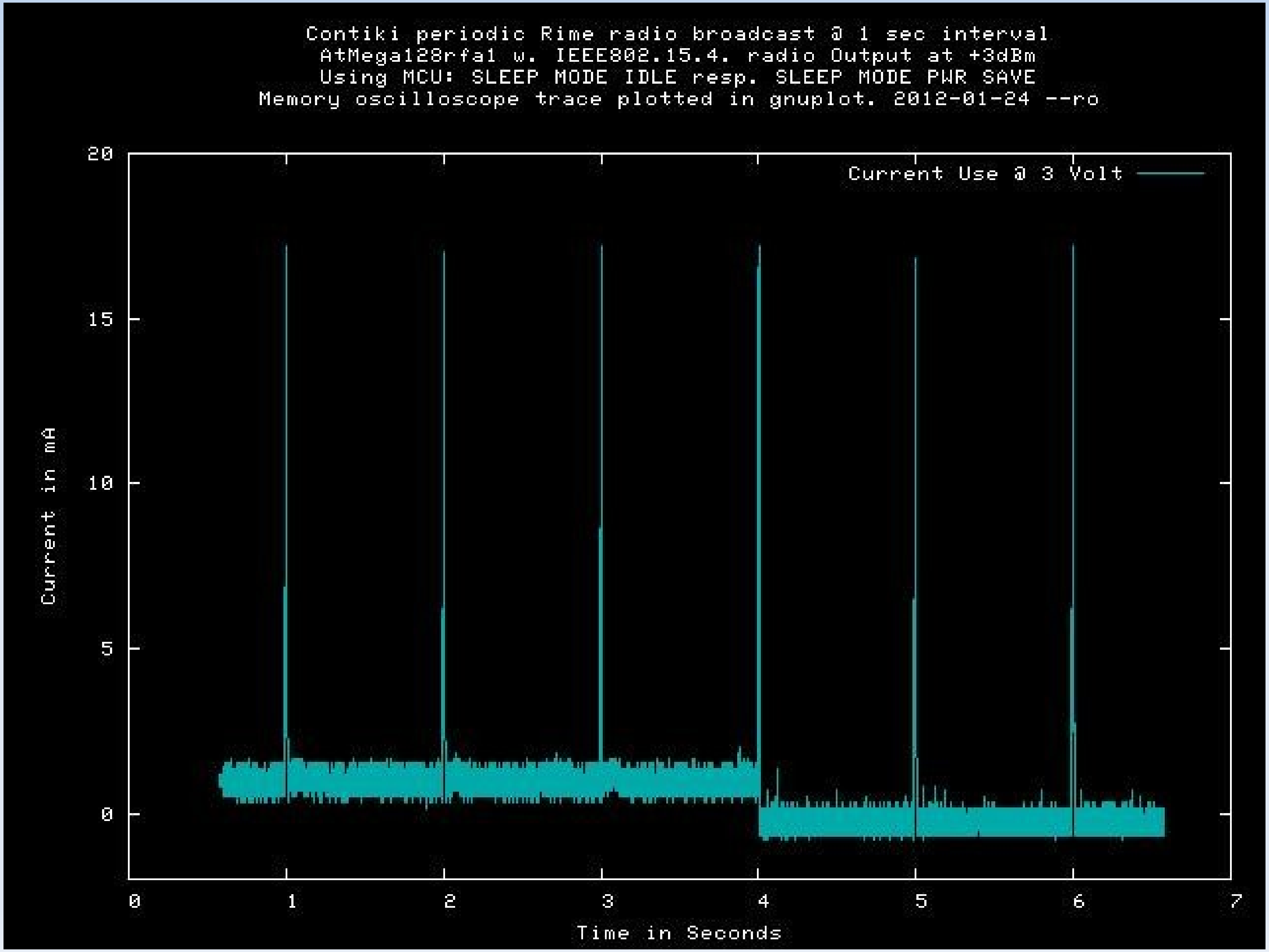
Hacked version contiki rime broadcast program
Radio broast every sec. Current monitored.



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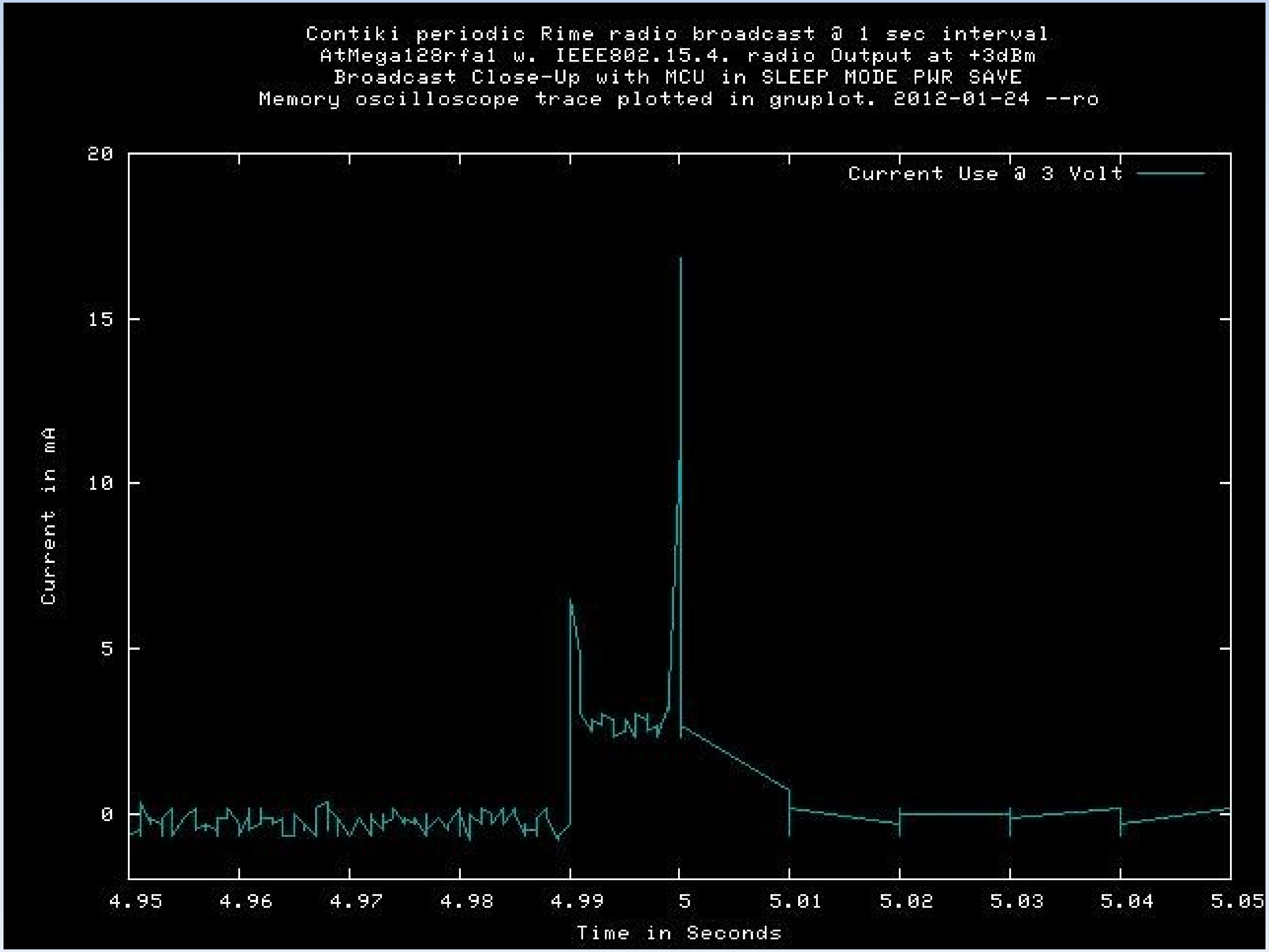
Radio broast every sec. Current monitored.



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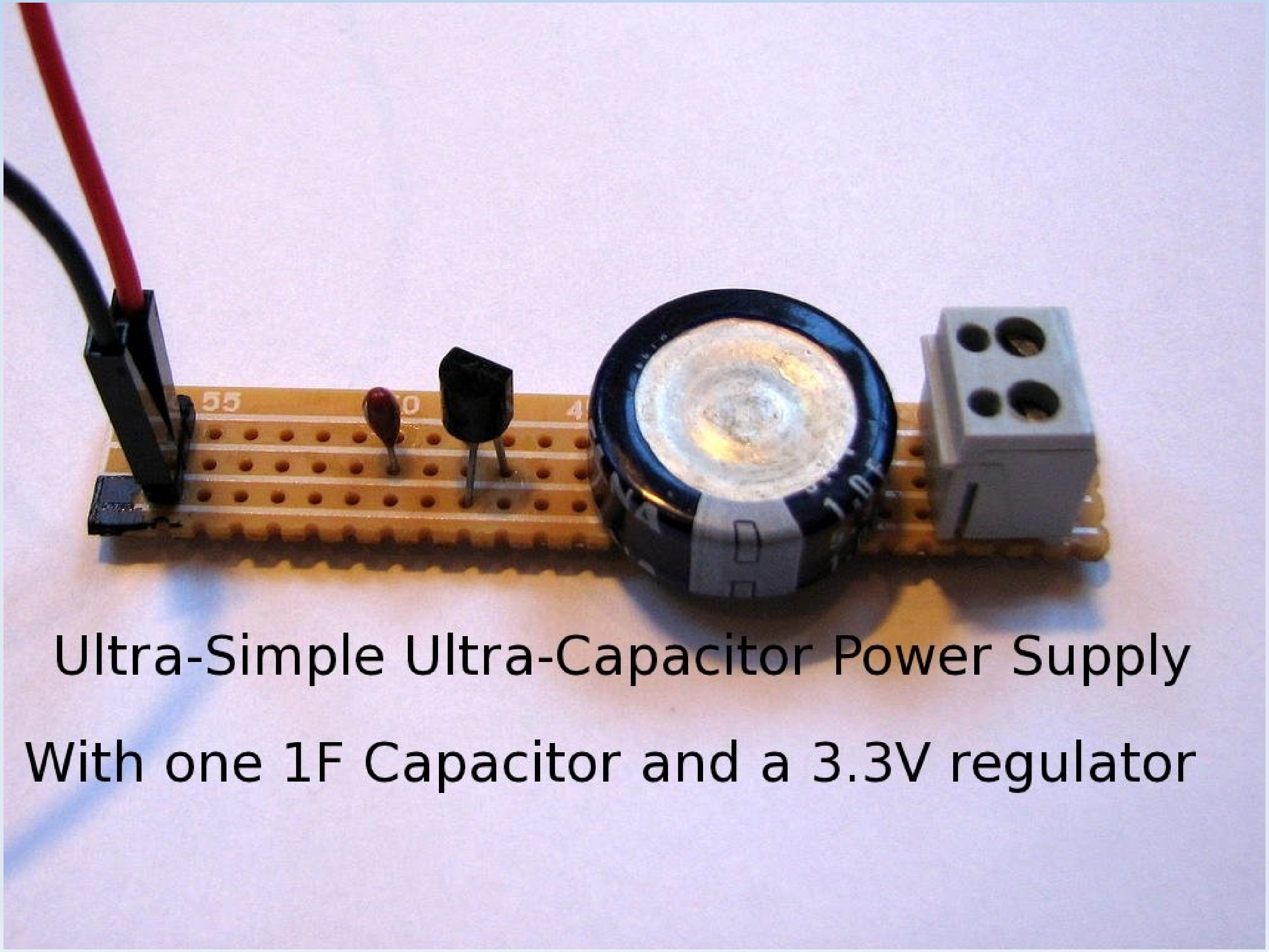
Capcitor experiment.



Ultra-Simple Ultra-Capacitor Power Supply

With one 1F Capacitor and a 3.3V regulator

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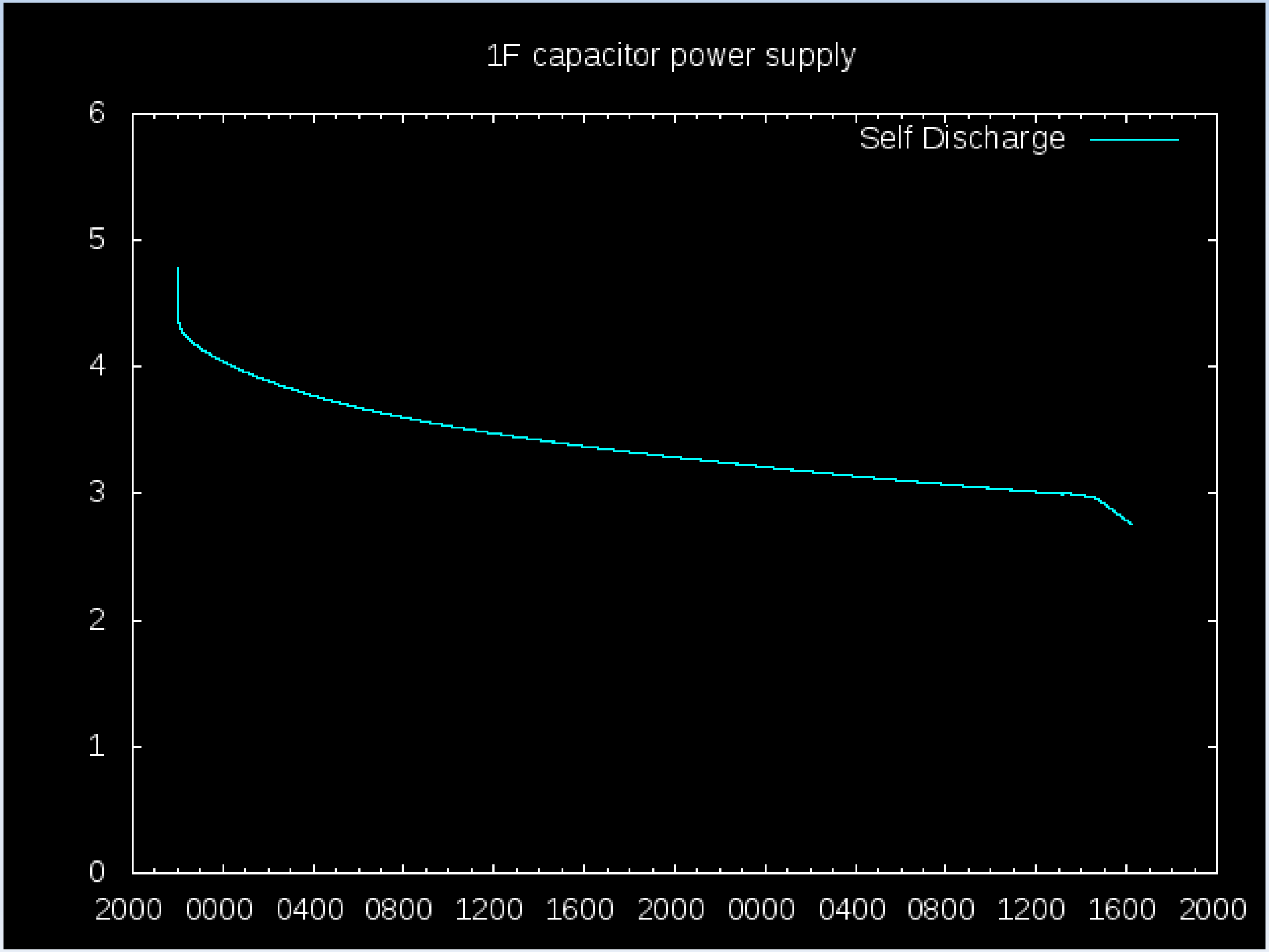
Capacitor Power Supply Self Discharge.



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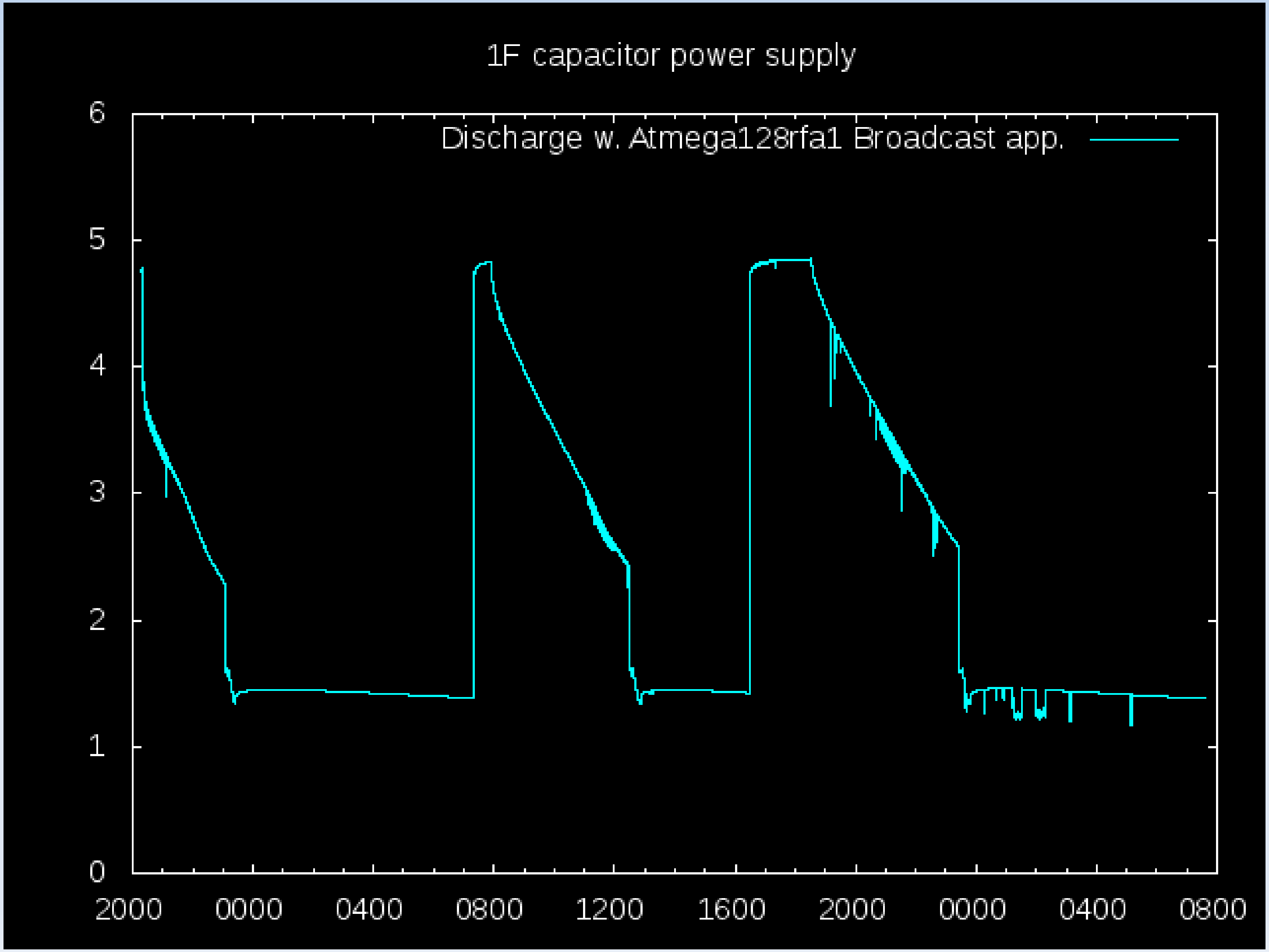
Hacked version contiki rime broadcast program
Radio broast every sec. Capacitor test.



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Contiki – OS
Summary

SICS, Adam Dunkels and others.
gcc for different MCU's ARM, AVR etc
Open source code an ”free”

Major parts:
uIp from SICS
Protothreads abstraction
Lot's of code for different MCU, and examples

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```
PROCESS(example_process, "Examle process");

PROCESS_THREAD(example_process, ev, data)
{
  static struct etimer et;
  PROCESS_BEGIN();

  PROCESS_YIELD_UNTIL( 11 );
  etimer_set(&et, CLOCK_SECOND * 2);
  PROCESS_WAIT_EVENT_UNTIL(etimer_expired(&et));
  etimer_set(&et, CLOCK_SECOND * 4);
  PROCESS_WAIT_EVENT_UNTIL(etimer_expired(&et));

  PROCESS_END();
}
```

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```
/* gcc Preprocessor expansion ----------------------------*/

static char process_thread_example_process(struct pt *process_pt,
                          process_event_t ev, process_data_t data);
struct process example_process = { ((void *)0),
                     "Examle process", process_thread_example_process };

static char process_thread_example_process(struct pt *process_pt,
                          process_event_t ev,
                          process_data_t data)
{
  static struct etimer et;
  {
    char PT_YIELD_FLAG = 1;
    switch((process_pt)->lc)  {

    case 0:;
      PT_YIELD_FLAG = 0;
      (process_pt)->lc = 17;

    case 17:;
      if((PT_YIELD_FLAG == 0) || !(11))
        return 1;

      etimer_set(&et, 128 * 2);
      PT_YIELD_FLAG = 0;
      (process_pt)->lc = 19;
```

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uIP Summary

Small
API: pt/raw, psock
One buffer
Retransmit by app.
TCP one pkt in flight / stop-and-go
 Not for Performance
Delayed ACK can make things worse.
25 kb/sec → 4 kb/sec

Have heard 59kpps 32bit on SPARC/FPGA

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gcc toolchain

Included in many distros for avr etc. Ubuntu.

But it's easy to make an own toolchain. There are also some building scripts floating around.

Option??

Instant Contki. A Virtual Environment. Version 2.4
Not tested...

```
make example-abc TARGET=avr-atmega128rfa1
```

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Brief overview src tar archieve.

```
contiki-2.5$ ls -1

apps
core
cpu          [Avr, ARM, STM32, x86 etc]
doc
examples
Makefile.include
platform   [Boards w. MCU's etc]
README
README-BUILDING
README-EXAMPLES
Tools
```

platform/avr-atmega128rfa1/contiki-main.c

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Referenser:

www.contiki-os.org

http://www.sics.se/~adam/contiki/docs/

www.tslab.ssvl.kth.se/csd/files/wsn/index.html