RBTemp
Routerboard-Digitemp

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Goals

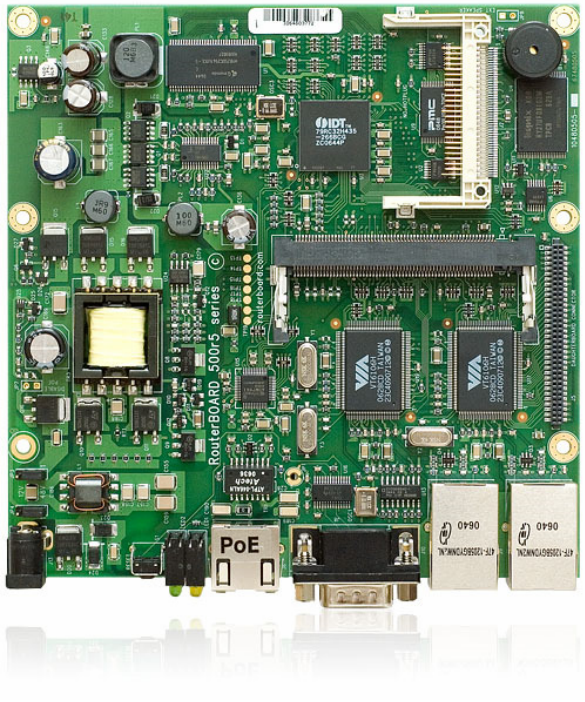
- Real-time Temperature measurement via Embedded Linux
- Distributed Communi-cation over Wlan
- Use of Real-time open-source software
- Appropriate Real-time Use-Cases for Temperature Monitoring

Challenges

- Board Setup
  - SDK-PC
  - Implementation of Openwrt on RB
- Digitemp-Test
- RT-Kernel-Patch
- Network Connections

Hardware

Mikrotik Routerboard 532A

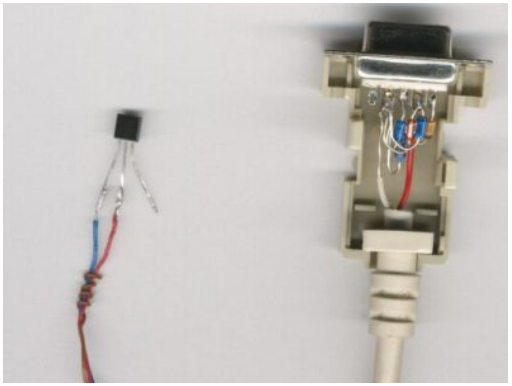


- Mikrotik RouterOS 2.9 // Openwrt 2.6
- 400 MHz MIPS-Processor
- 128 MB Nand
- 64 MB DDR Flash
- RouterBOOT

Mikrotik Routerboard Interface R52

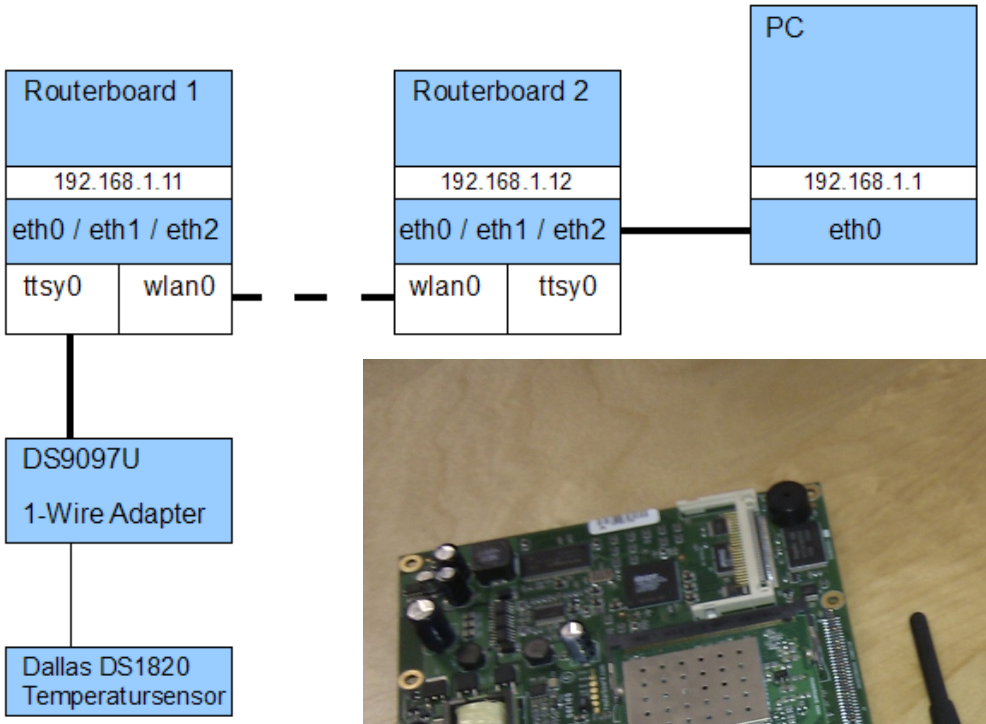
- Atheros-AR5414-Chipset
- 2.312-2.499 GHz and 4.920-6.100 GHz

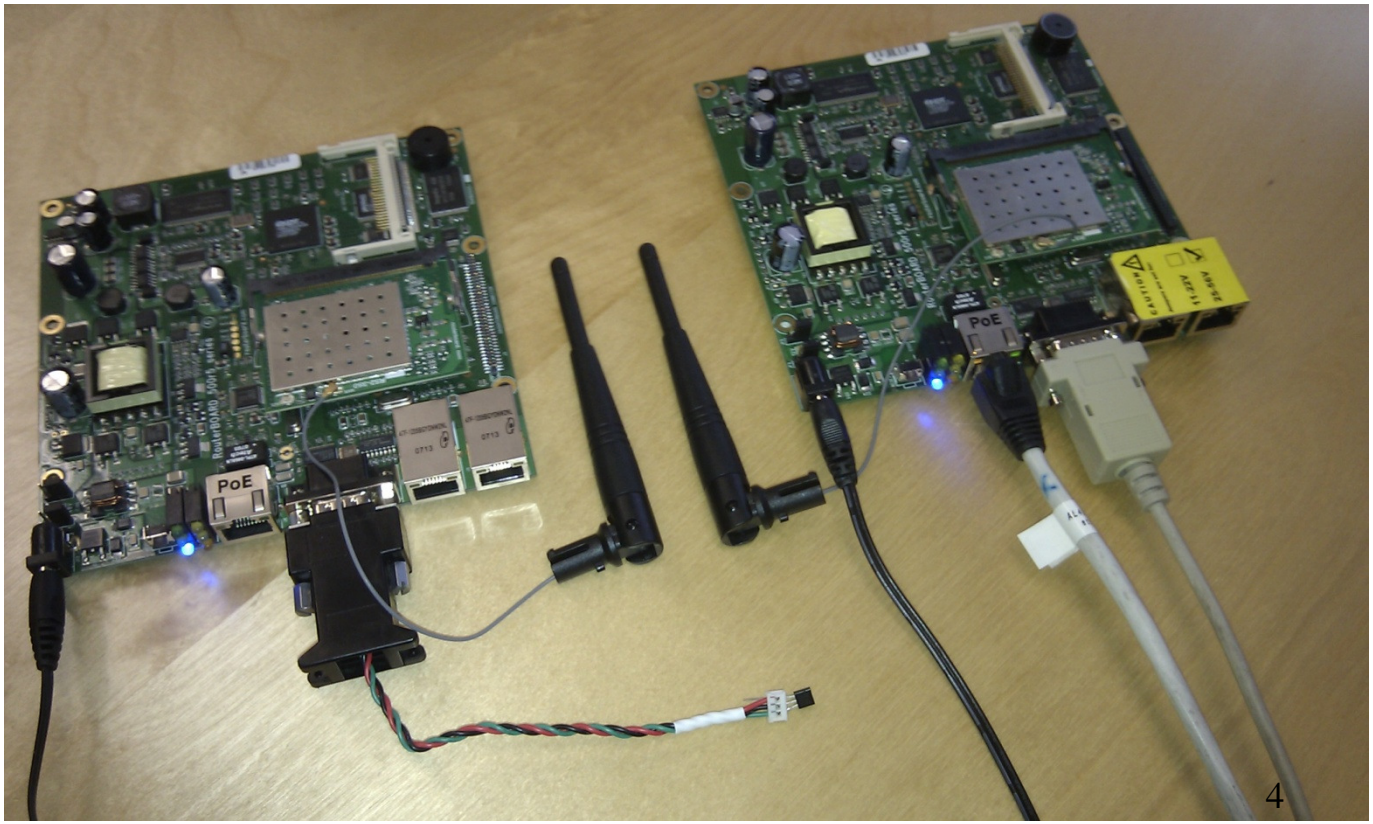
Digitemp Temp-Sensor



- DS9097U – 1 Wire Adapter
- Dallas DS1820 Temperature Sensor

Measurement Architecture





Work Timeline

- Load suitable Openwrt Images
- Install Packages on Routerboard via OPKG-Package-Manager
- Try RT-Patch on Opwrt-SDK
- Test Digitemp Sensor
- Test RT-Features of Openwrt-Kernel 2.6.30

RT Improvements in the mainline Kernel

- Since the beginning of 2.6
  - O(1) scheduler
  - Kernel preemption
  - Better POSIX

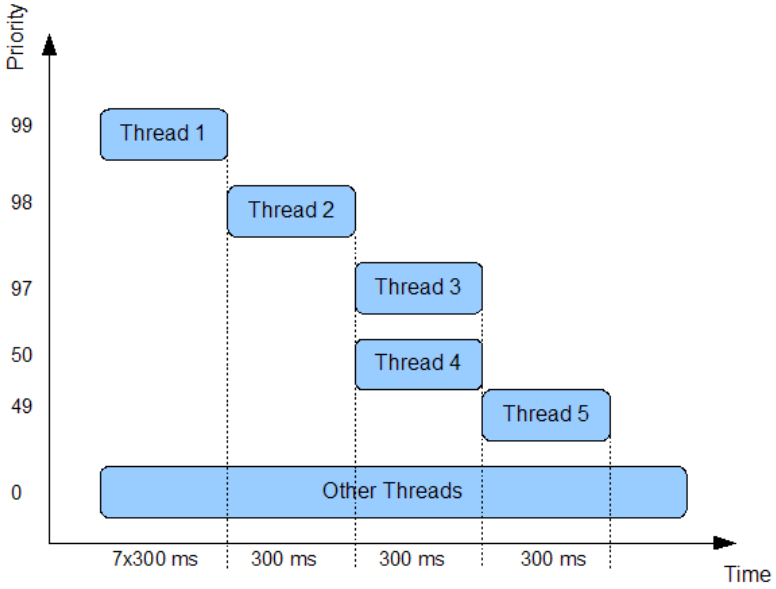
  real-time API support
- Since 2.6.18
  - Priotiy inheritance support

  for mutexes
- Since 2.6.21
  - High-resolution timers
- Since 2.6.30
  - Threaded interrupts
- Since 2.6.33
  - Spinlock annotations

Kernel **2.6.30** RT Features: (!= Standard-Openwrt-Kernel)
- Deterministic Scheduler (Normal; FiFo; RR)
- Preemption support
- PI Mutexes (Priority Inversion)
- HRT (High-Resultion Timer)
- Preemptive Read-Copy Update
- IRQ Threads

Conclusion

- Interesting Challenge with Embedded Linux
- Real Use-Cases for RT-Temp-Measurement



- RT-Linux Development in constant Time?

Thank you for your Attention

http://www.routerboard.com/rb500.html

http://www.digitemp.com/

http://openwrt.org/

https://rt.wiki.kernel.org/index.php/Main_Page