Using the WiseNodes as low power wireless communication and wake-up modules

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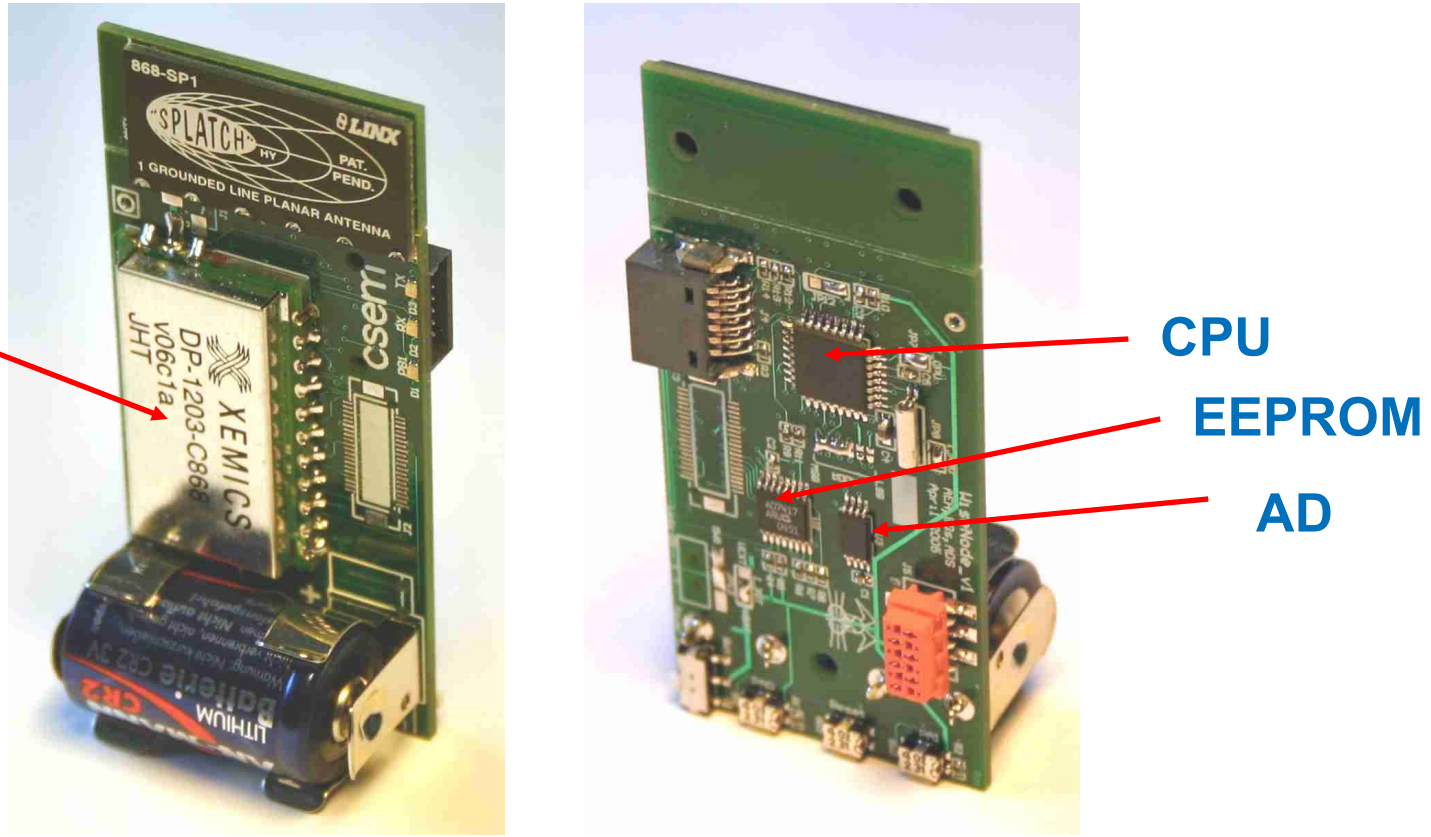
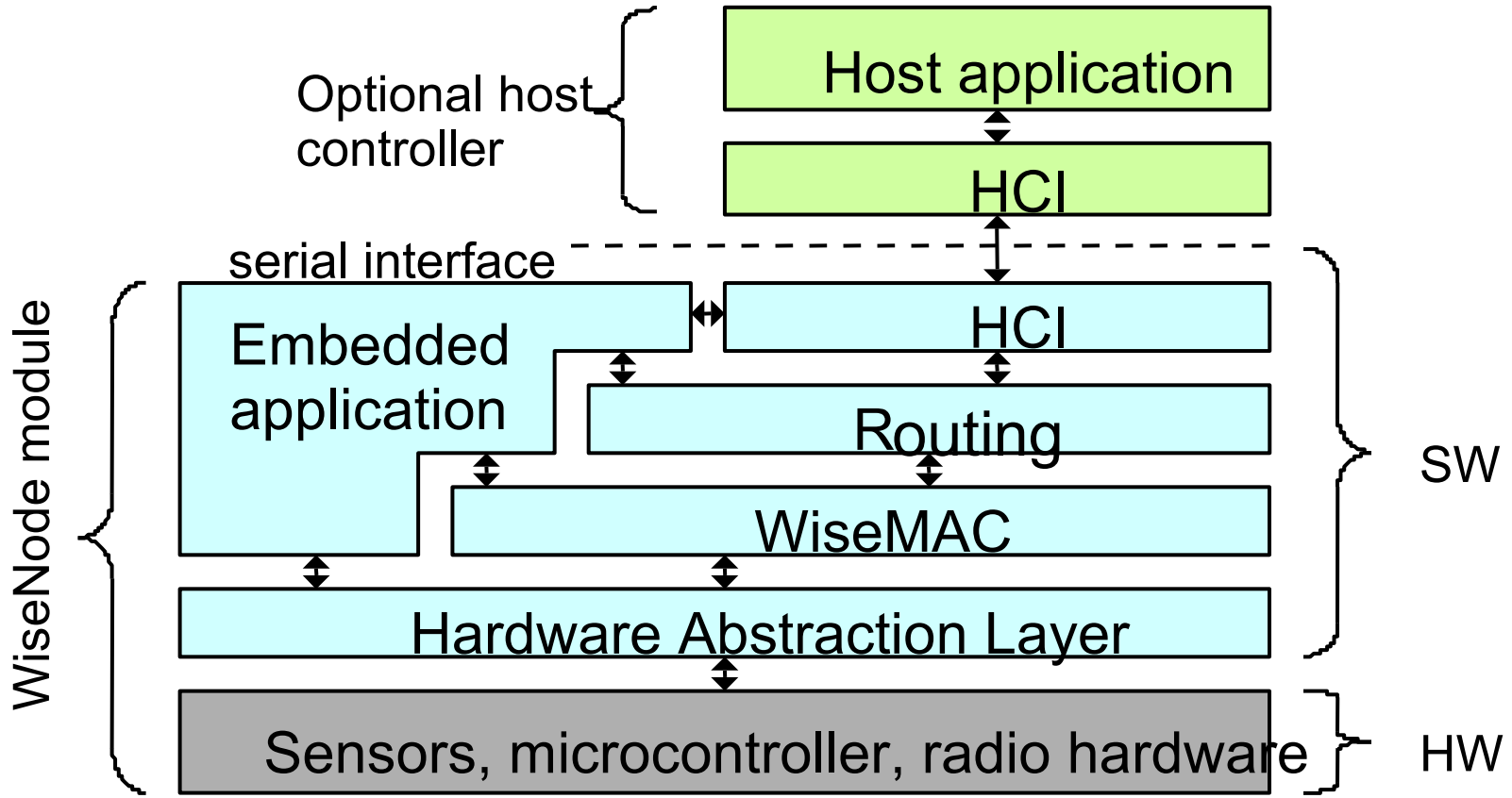
WiseNodes as a low-power radio module

- What are the WiseNodes ?
  - Hardware architecture
  - Software architecture
- What performance can we get from the WiseNodes ?
  - Choosing the right wake-up period
  - Comparing to other protocols
- What can we do with these modules ?
  - Using the WiseNodes as a platform
  - Using the WiseNodes as a wake-up module
  - Using the WiseNodes as a low-power radio module

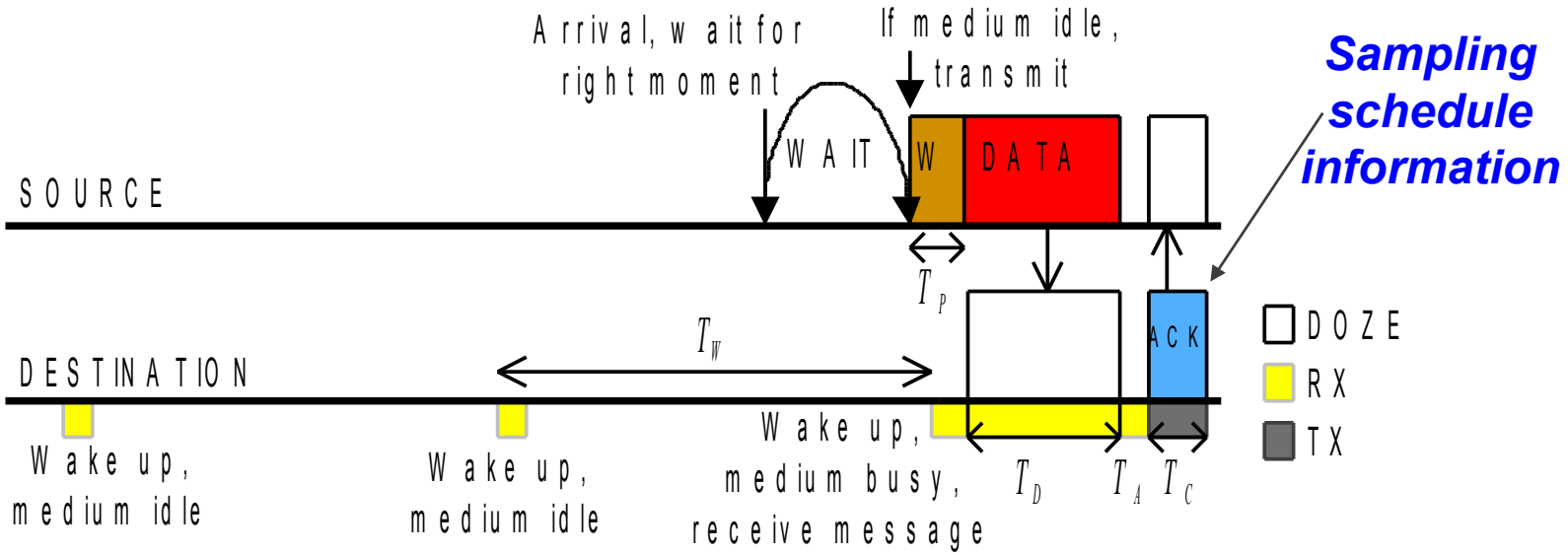
WiseNode Hardware

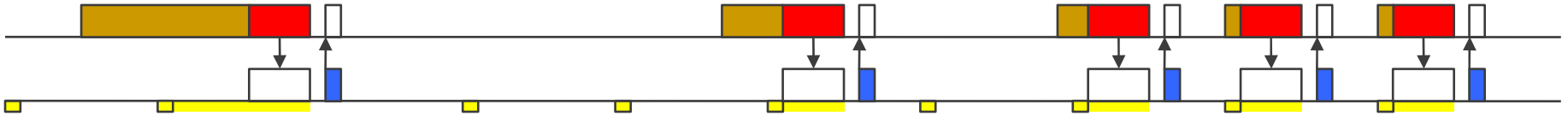


WiseNode Software

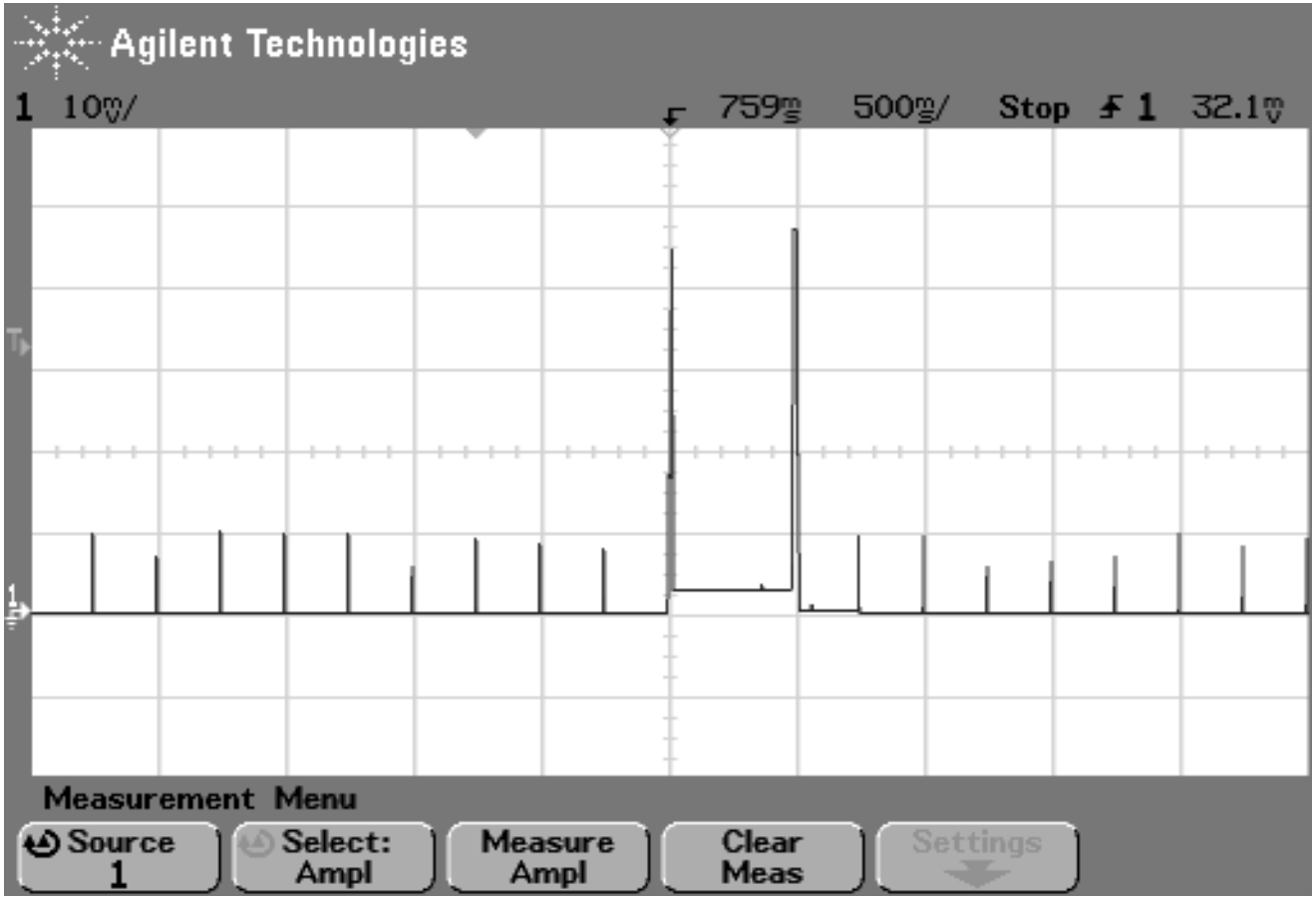


WiseMAC (Wireless Sensor MAC)



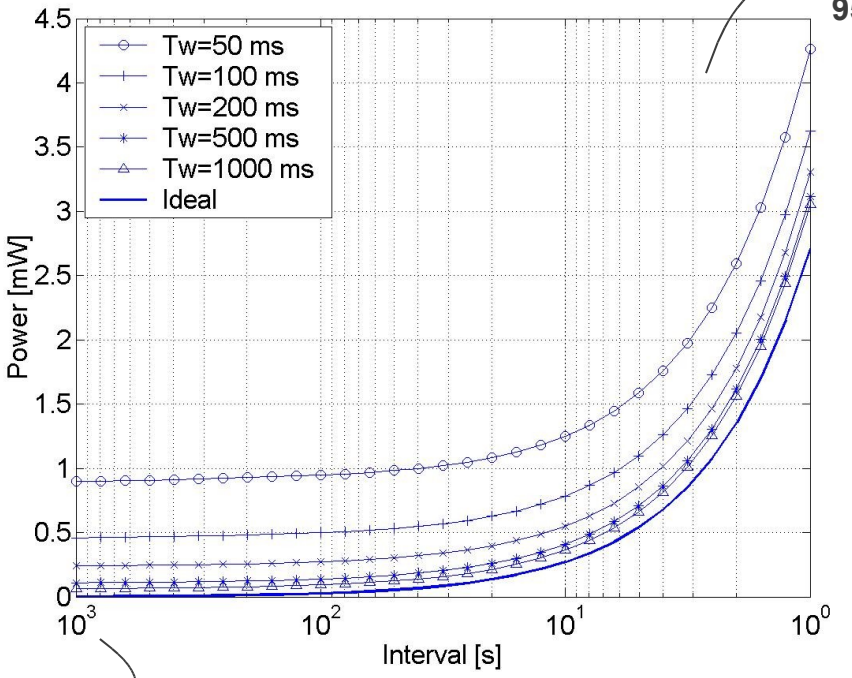


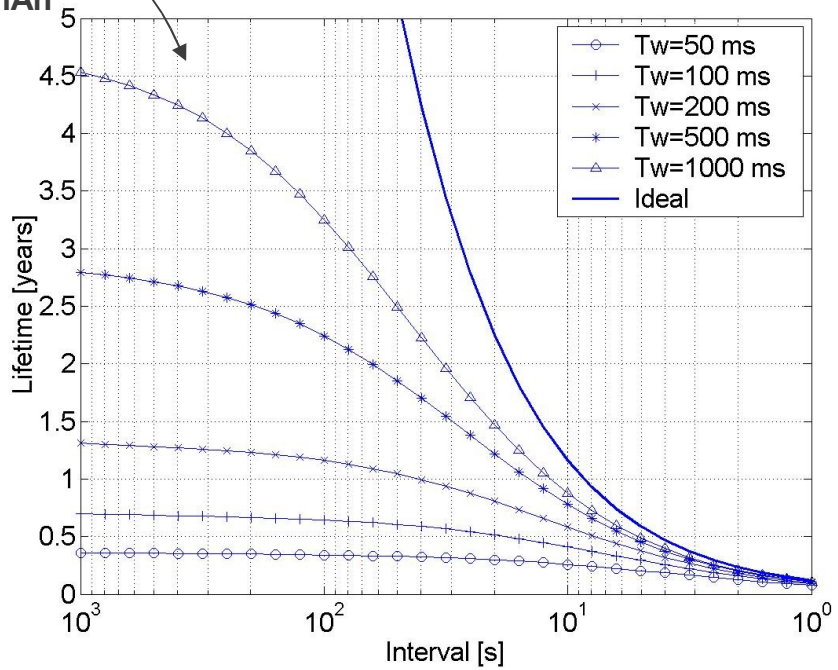
Sampling, packet reception and forwarding



Performance

CR2 3V
Lithium
950 mAh





10 bytes payload/packet

0.08 0.8 8 bits/s 80 bits/s

Performance

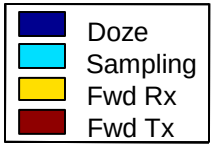
Forwarding a 32 bytes packet every 30 seconds in a multi-hop network

Same wake-up period (T_w = 250 ms), same hardware (XE1203).

WiseMAC

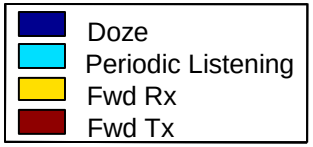
Total 278 uW (92 uA)

14 months

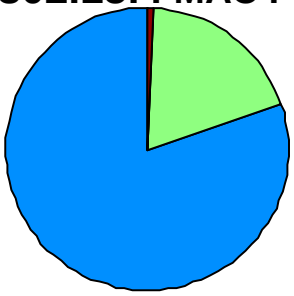


S-MAC

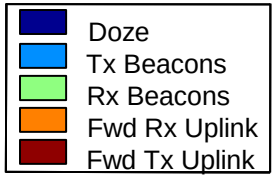
Total 2462 uW (x 8)



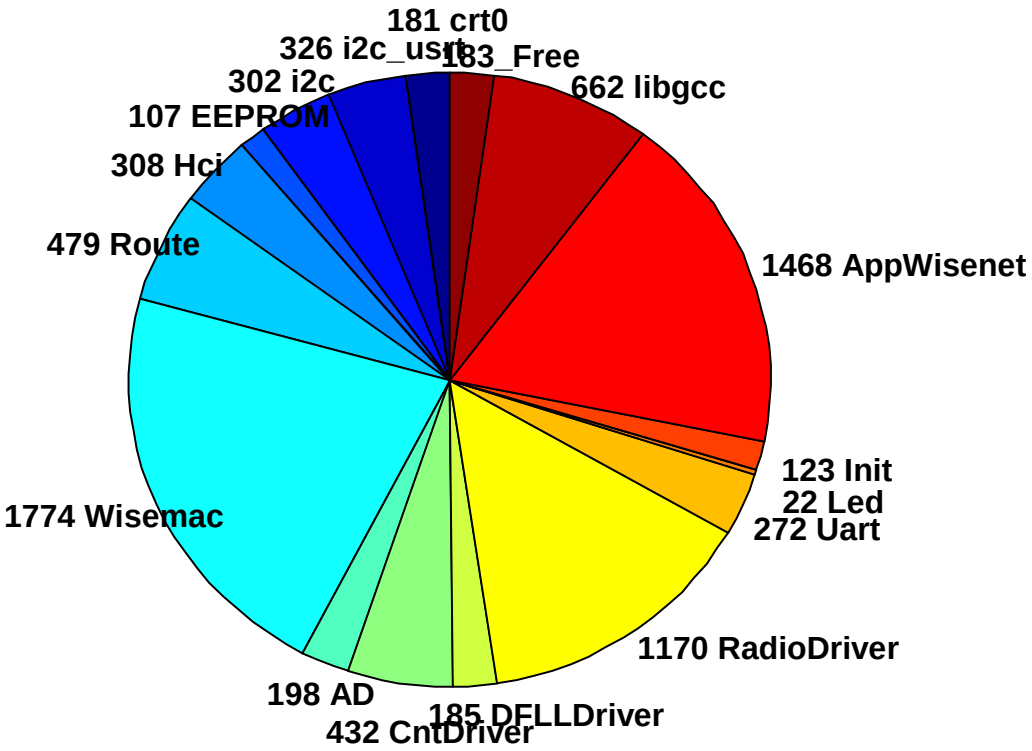
IEEE 802.15.4 MAC Protocol



Total 7836 uW (x 28)



Memory usage



- 183 instructions left from 8 k instructions program memory
- About 10 bytes left from 512 bytes data memory

- **Not much space for MICS partners to experiment with routing and applications direcly on the on-board CPU**

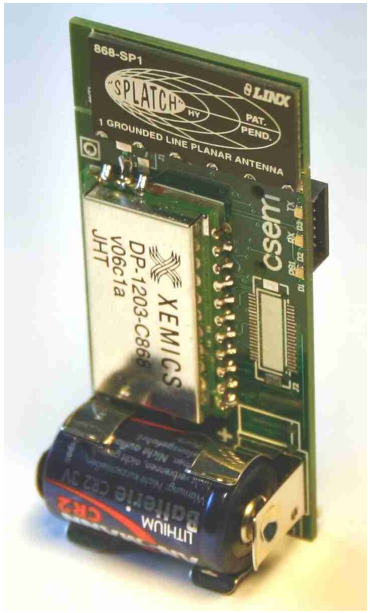
Proposal: Using WiseNodes as a Low Power Communication and/or Wake-up Module

Application board with sensors and CPU

Wake-up pin

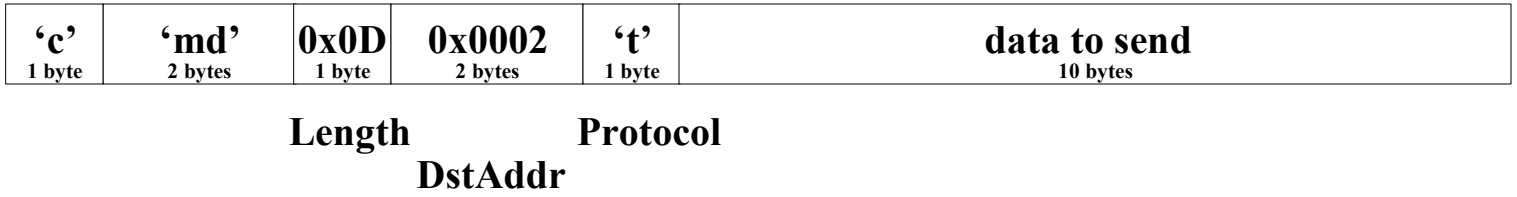
HCI over UART

Data Len

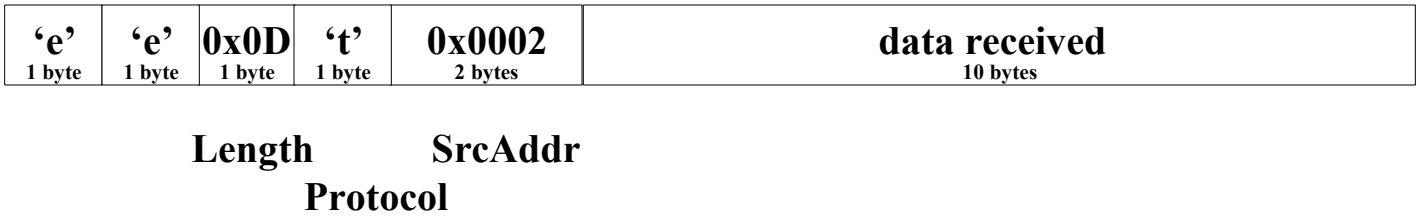


Host Controller Interface

- Command (From Controller to MAC)
  For example, send a data packet of 10 bytes to nodes 0x0002



- Event (From MAC to Controller)
  For example, receive a data packet of 10 bytes sent by node 0x0003



Thank you for your attention.