

SystemSens:

A Tool for Monitoring Usage in
Smartphone Research Deployments

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MobiArch
June 28, 2011

What was going on?

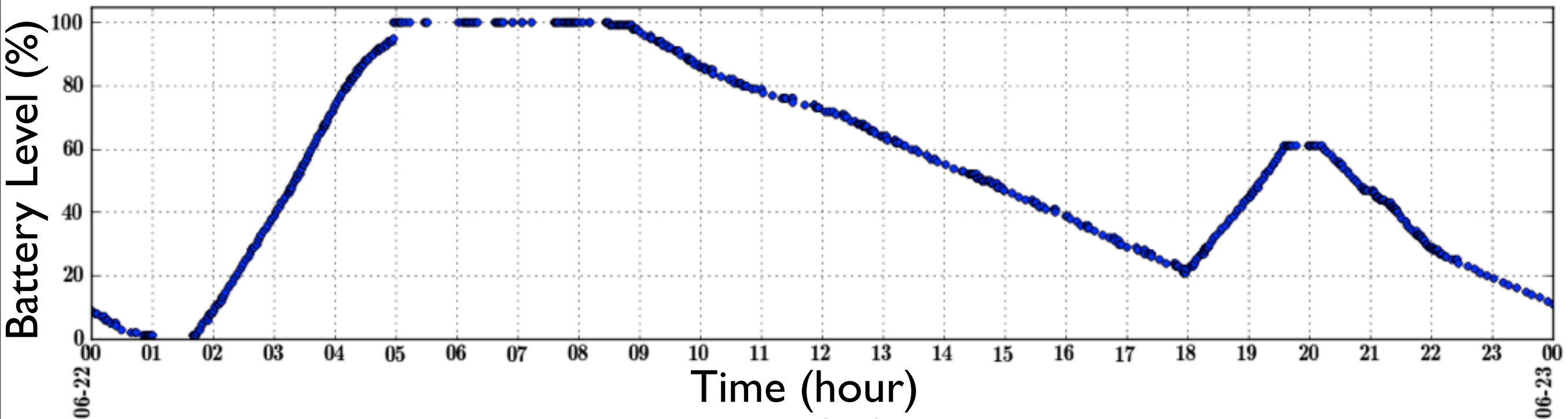


What was going on?

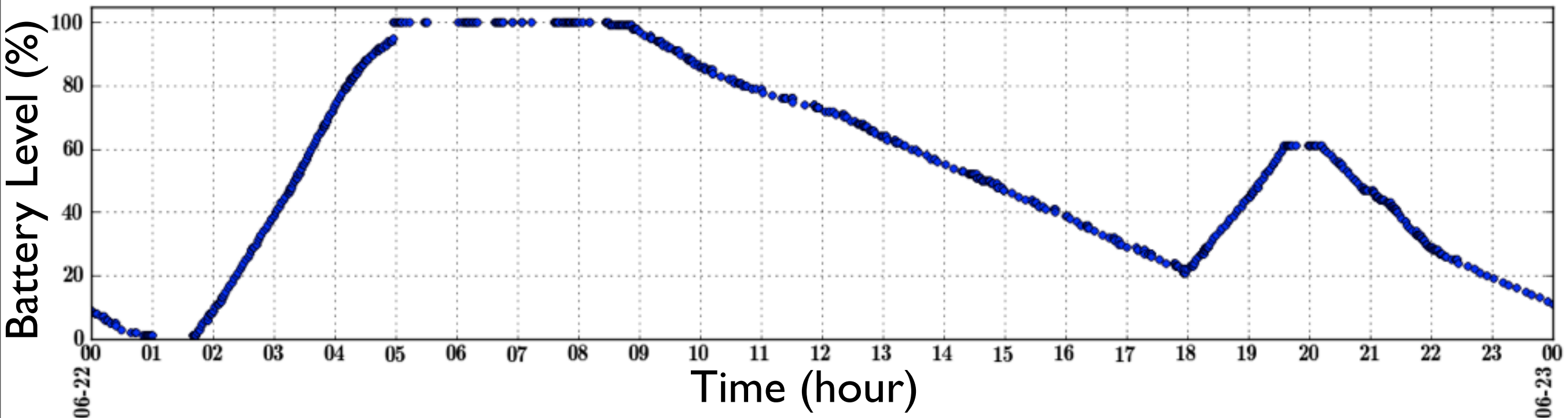


We need a “black box” on smartphones in research deployments.

Unexpected behavior

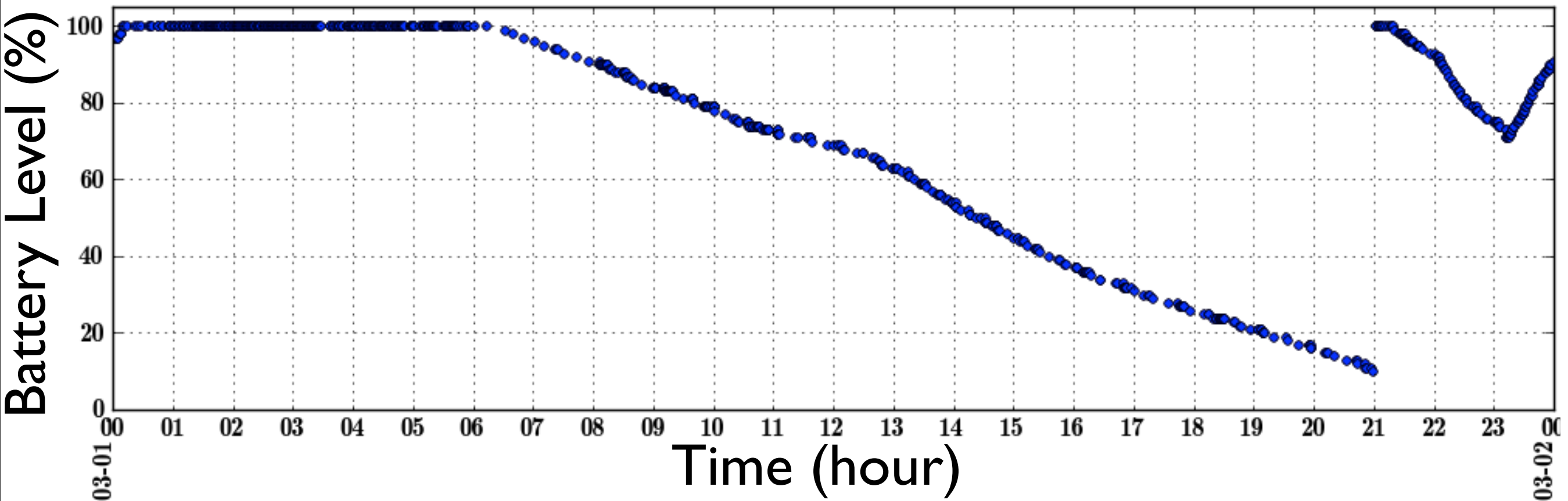


Unexpected behavior



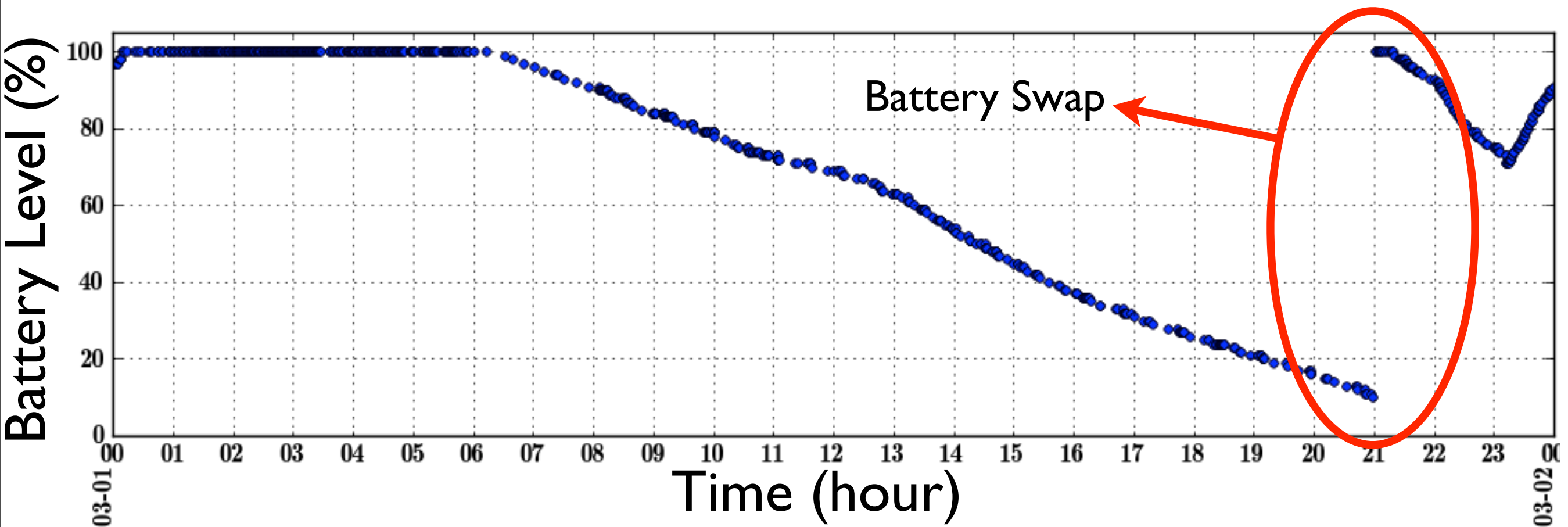
We assumed batteries would only charge or discharge

Unexpected behavior



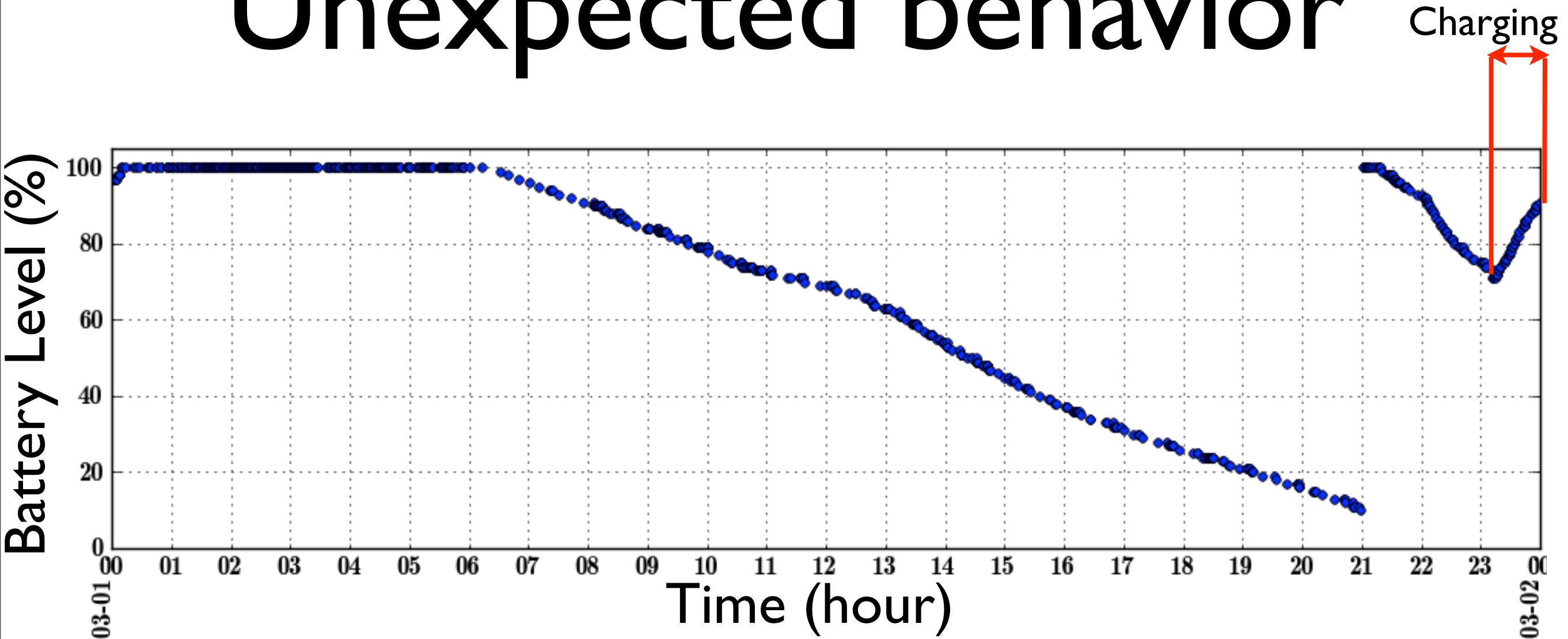
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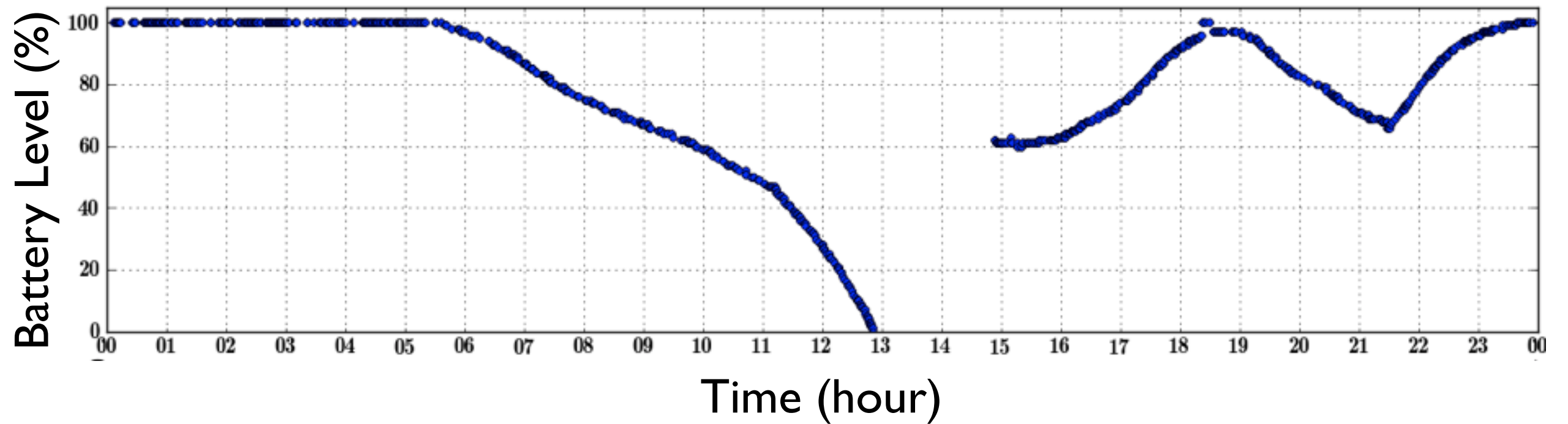
Unexpected behavior



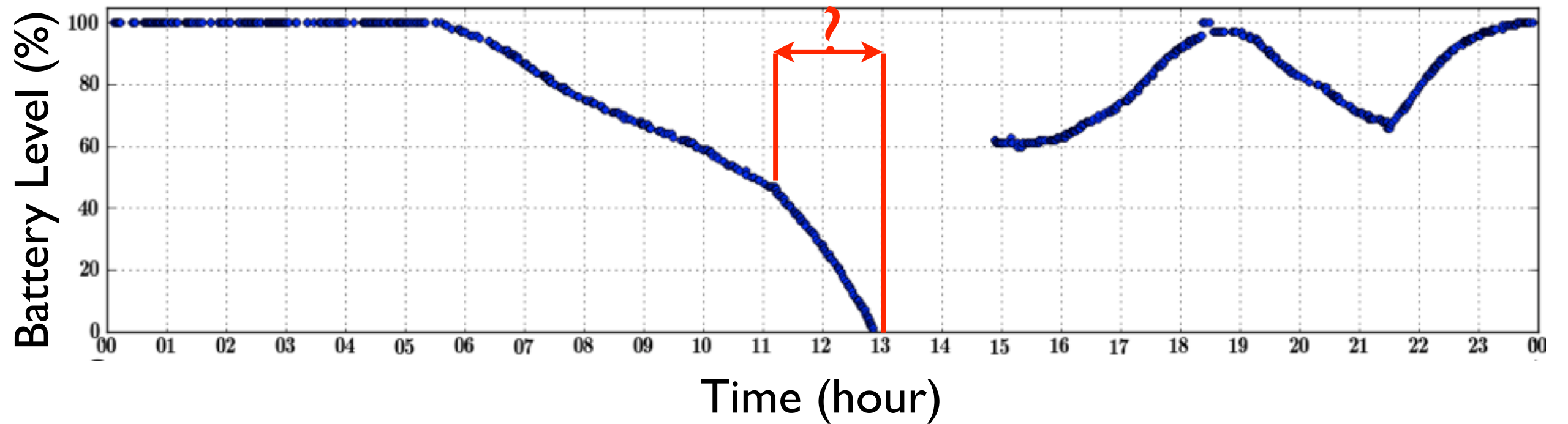
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Unexpected problems

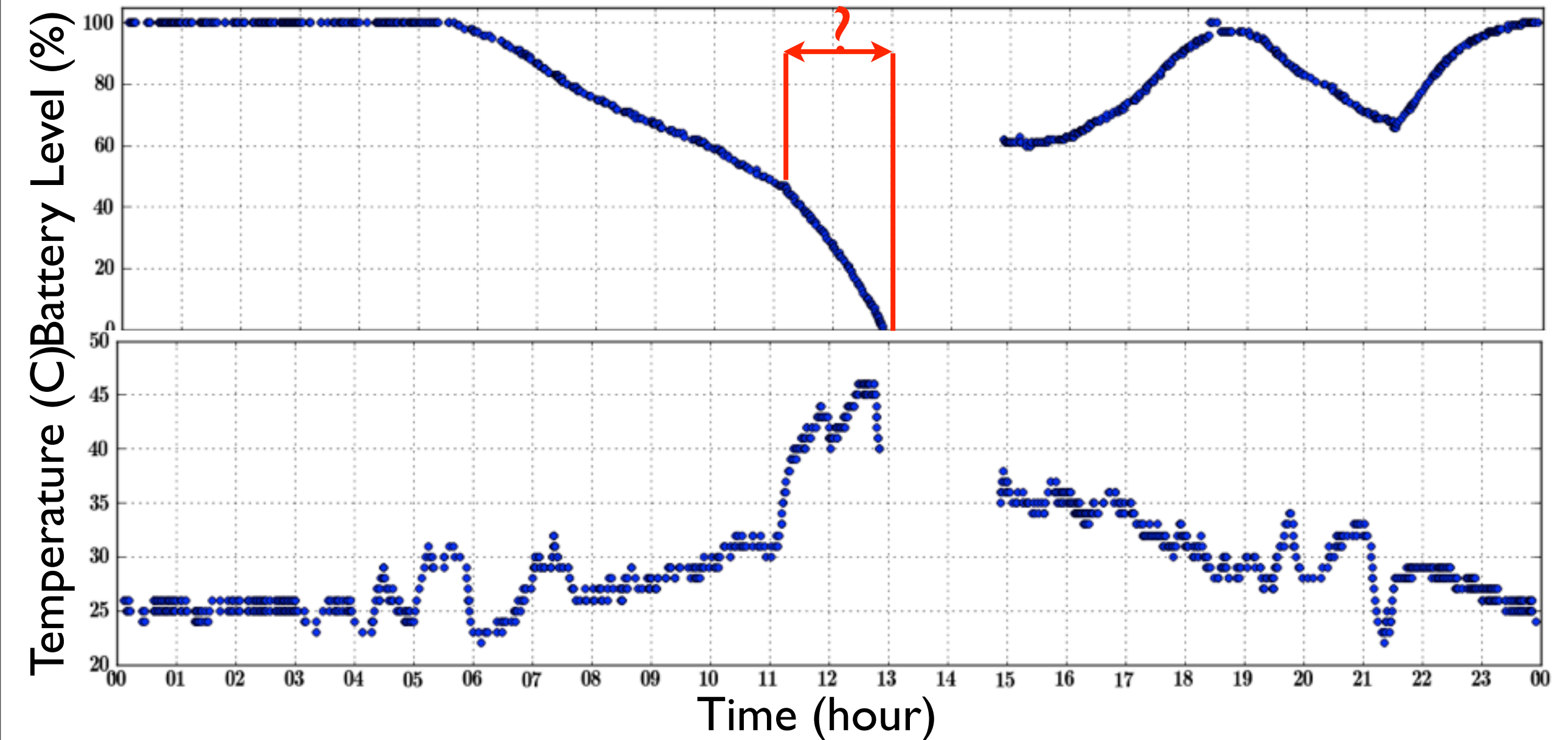
Unexpected problems



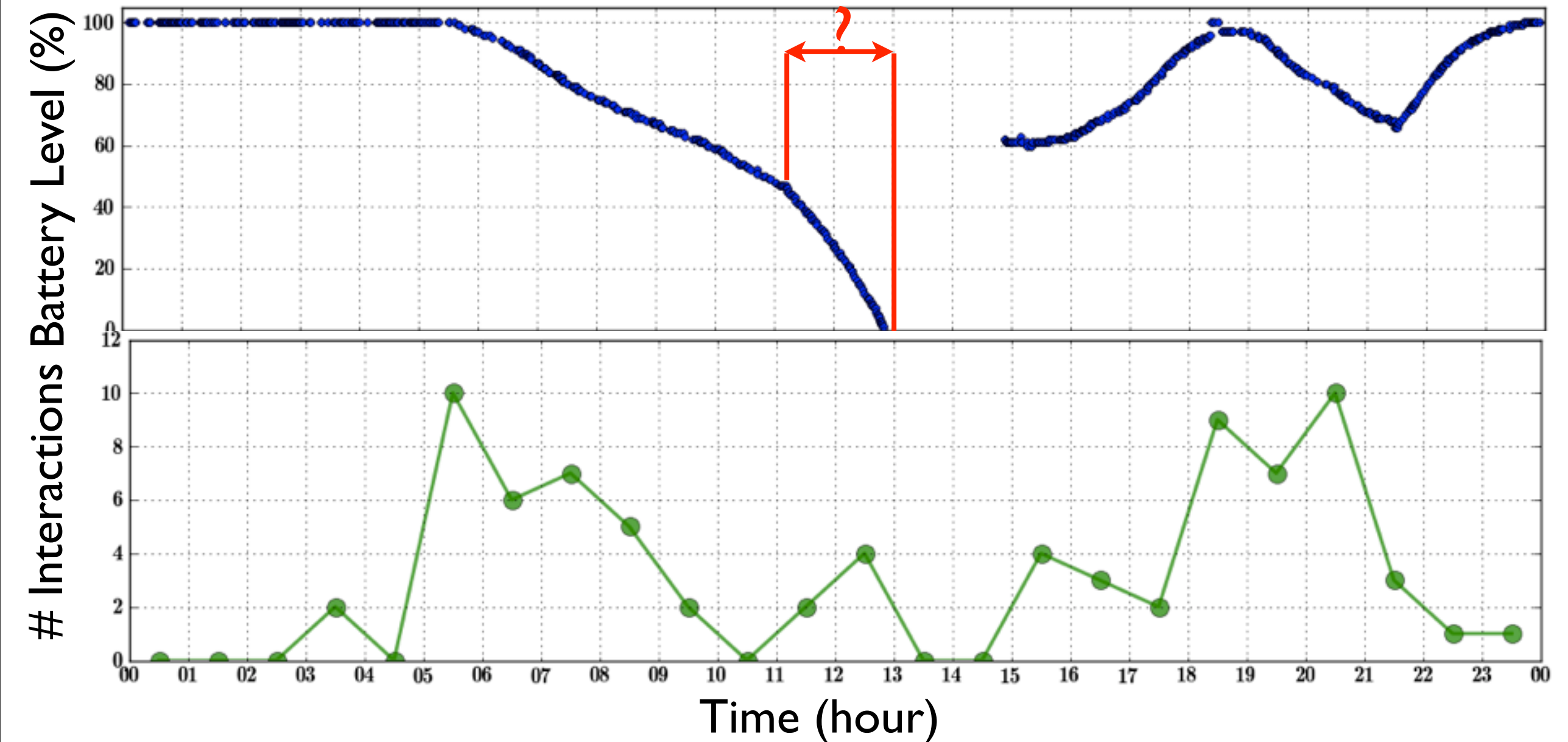
Unexpected problems



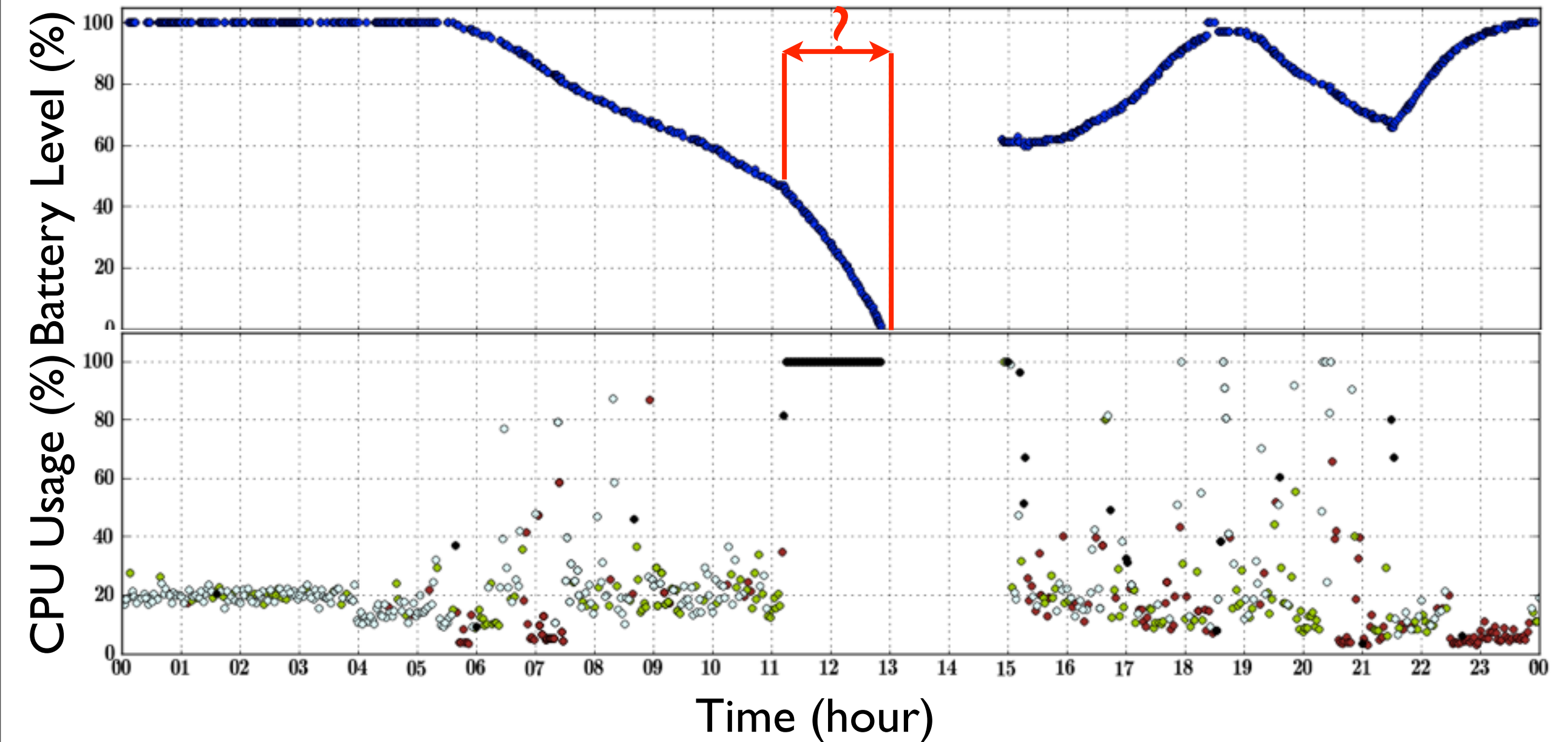
Unexpected problems



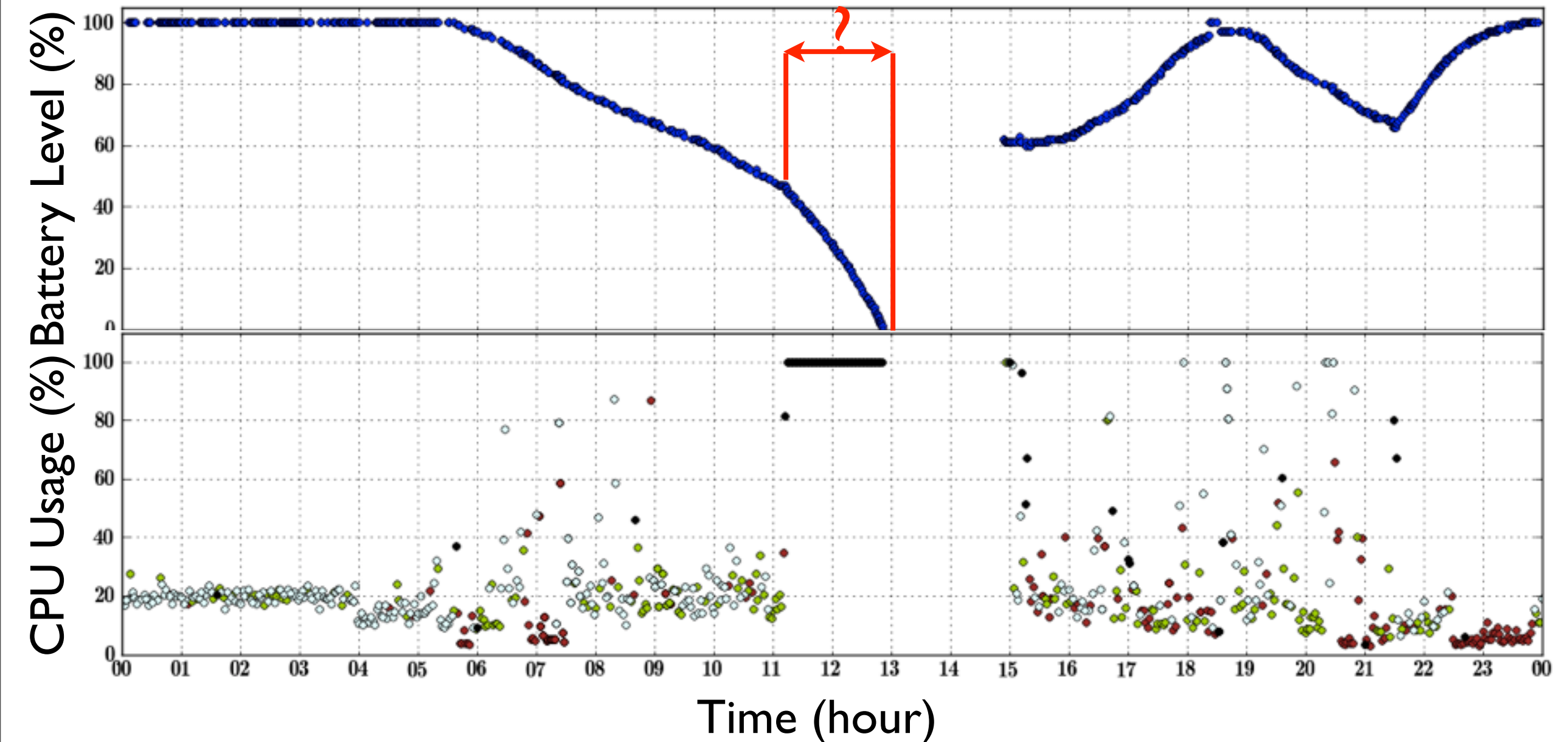
Unexpected problems



Unexpected problems



Unexpected problems



This was a bug in the GPS driver

Need for a generic tool

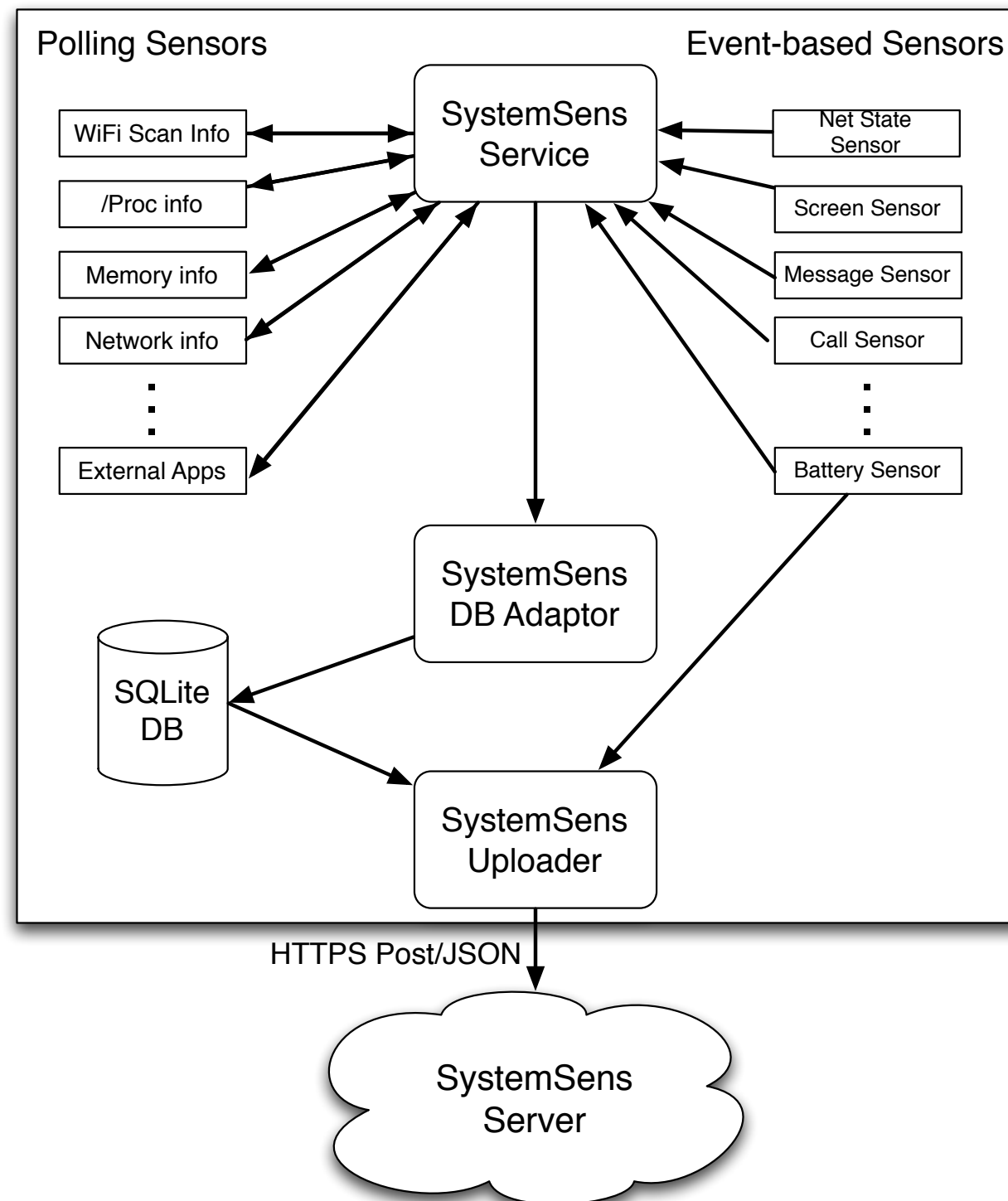
Need for a generic tool

1. Developers might miss information and dependencies
2. Avoiding deploying multiple logging tools on the same phone (wasting power and resources)

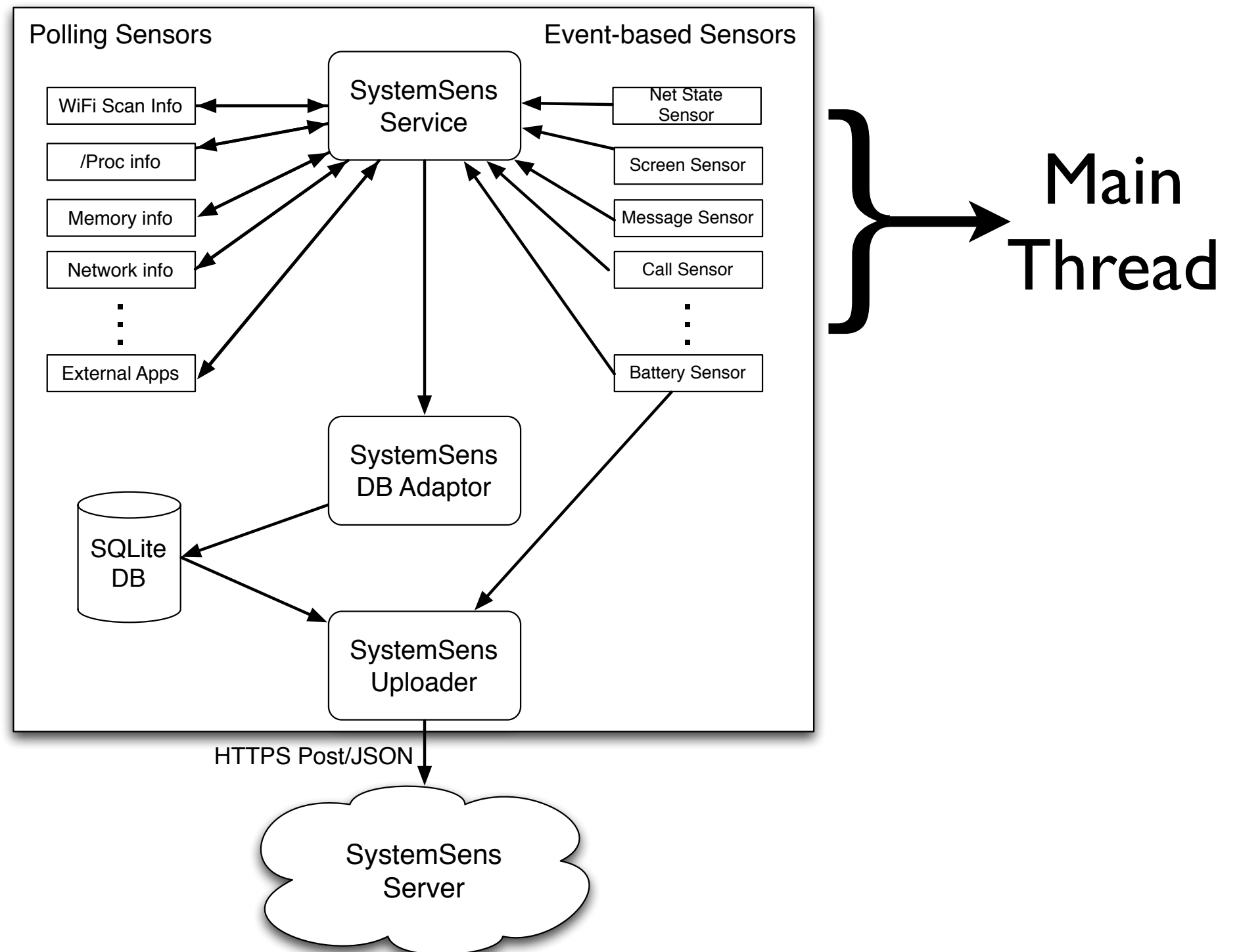
Need for a generic tool

1. Developers might miss information and dependencies
 - ☒ Design & Architecture
2. Avoiding deploying multiple logging tools on the same phone (wasting power and resources)
 - ☒ Evaluation
 - ☒ Demo

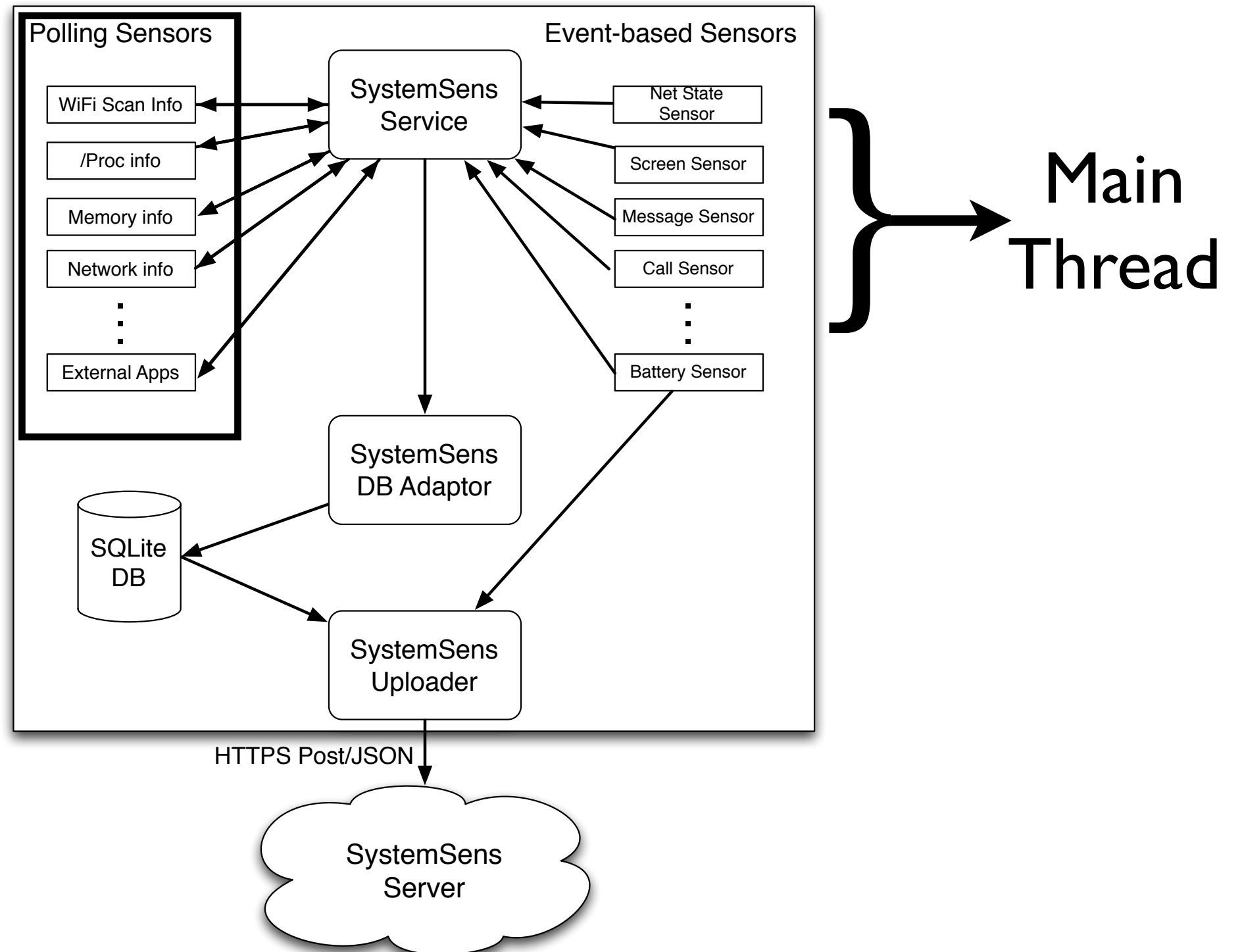
Client Architecture



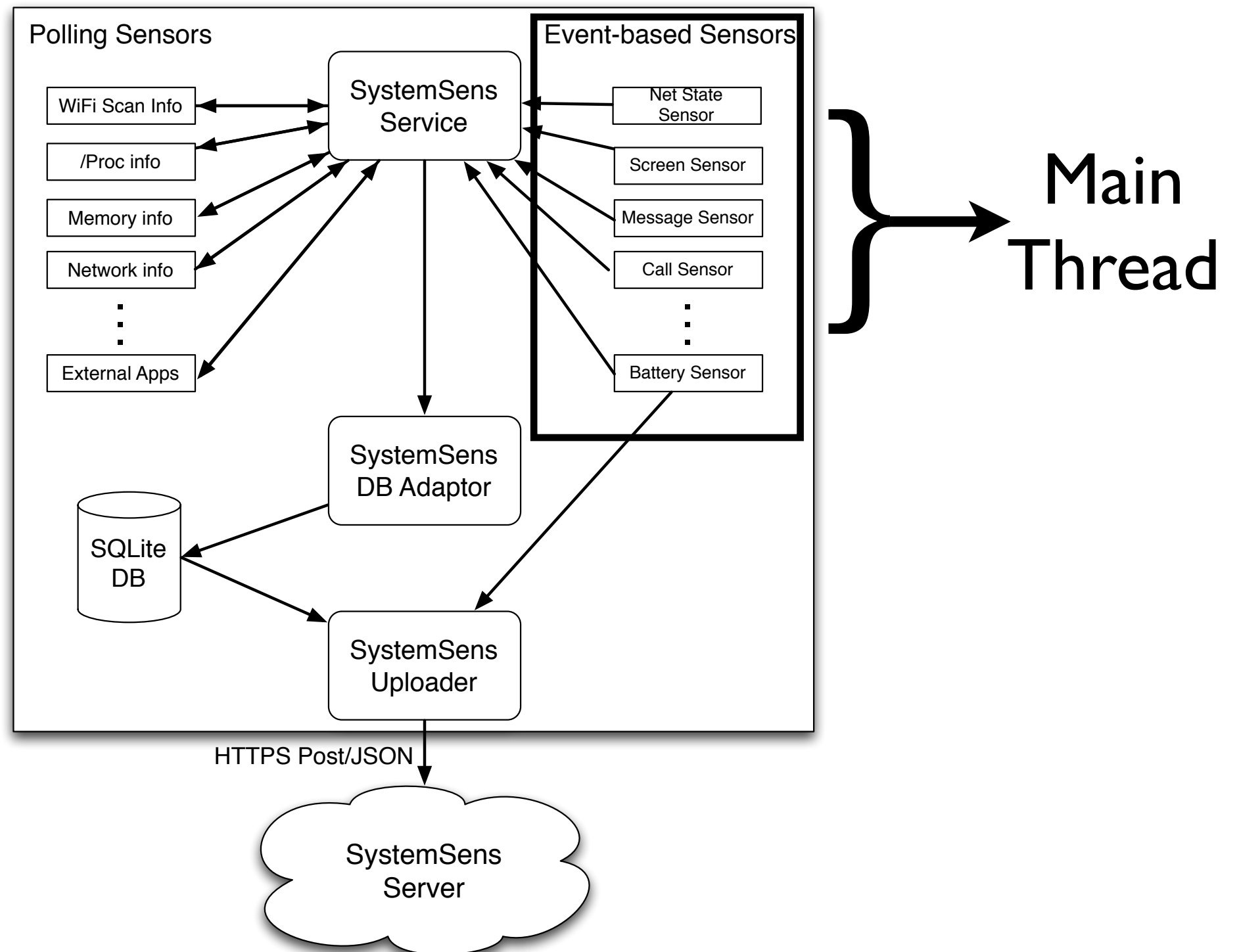
Client Architecture



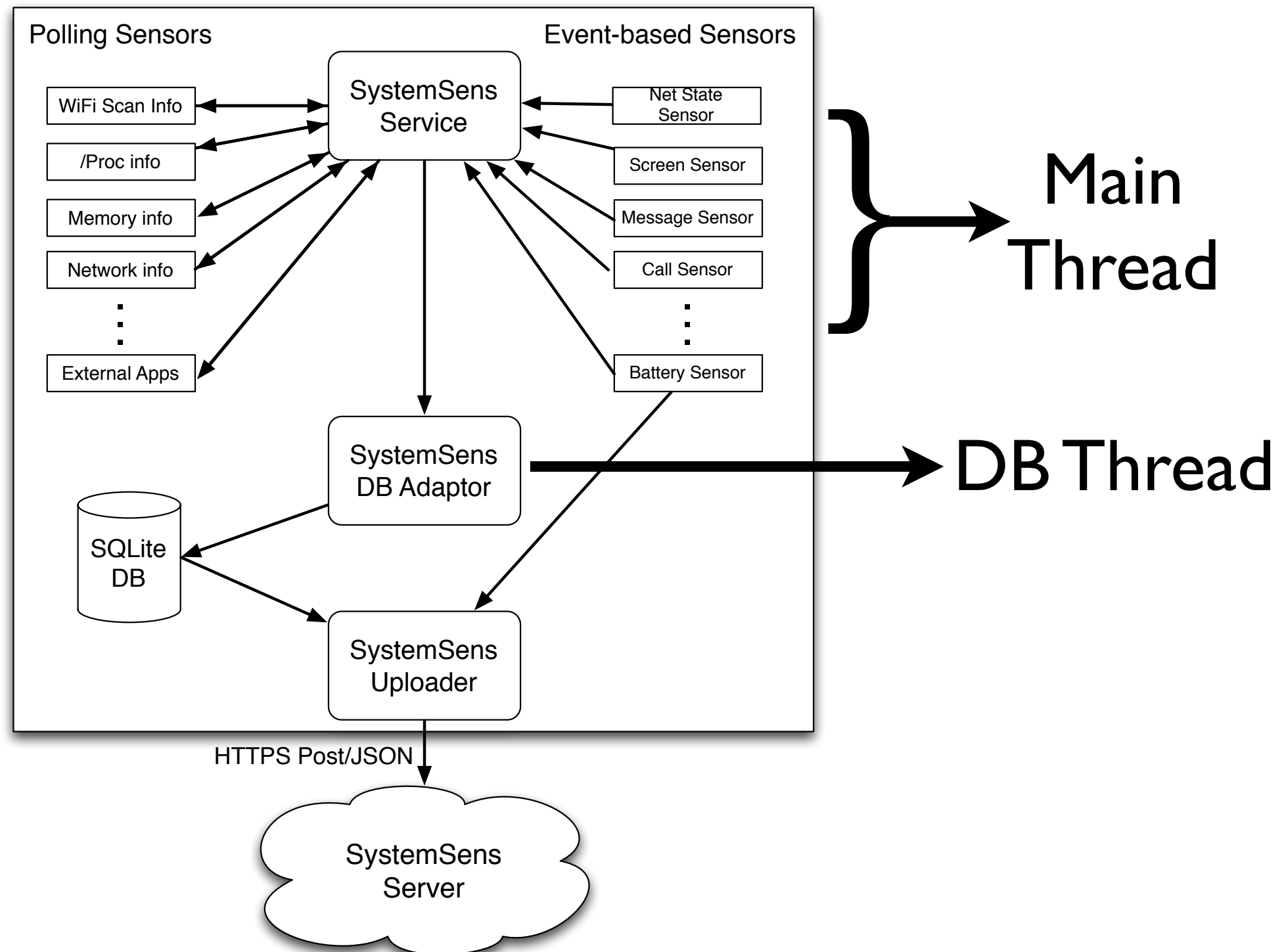
Client Architecture



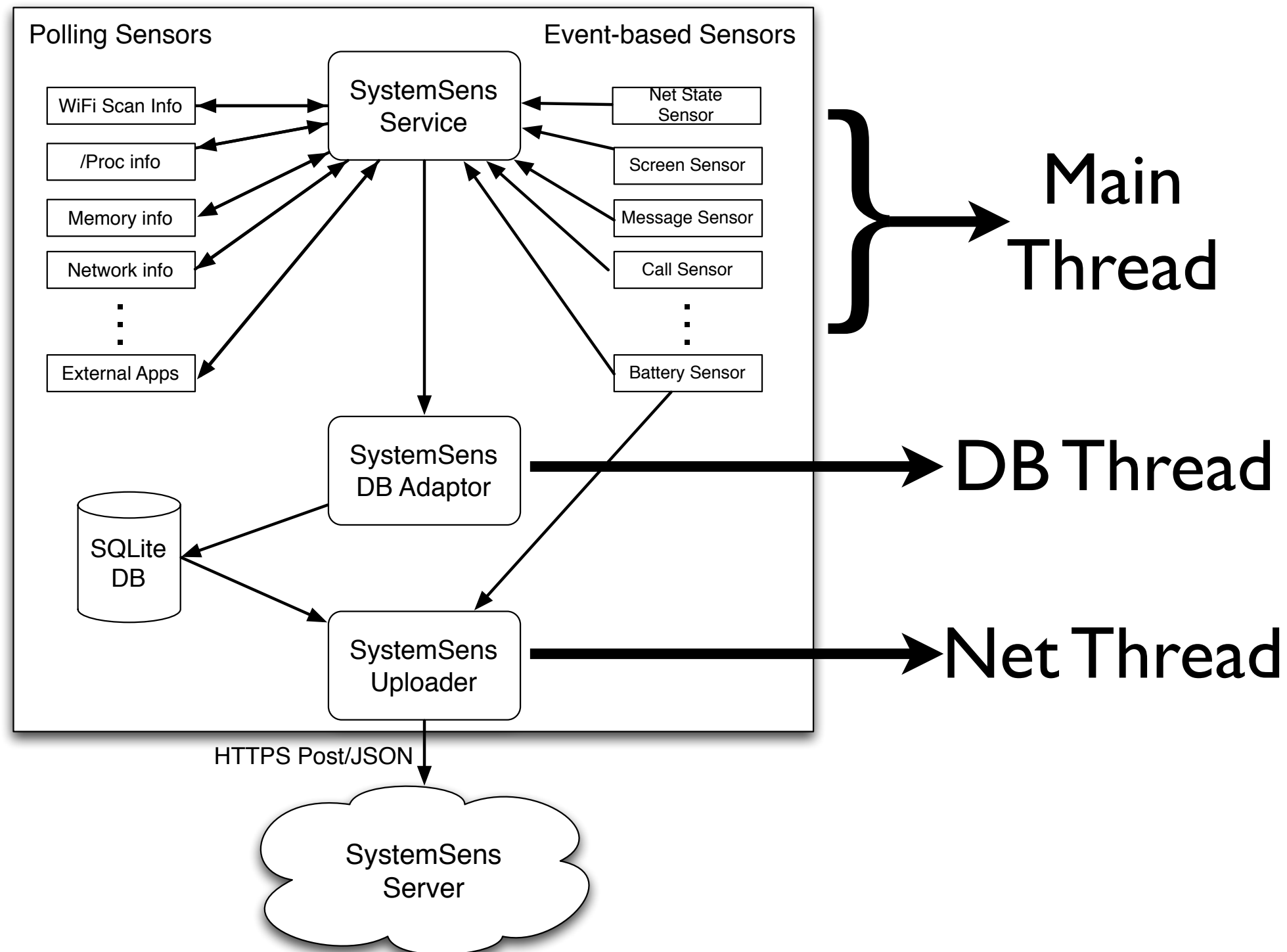
Client Architecture



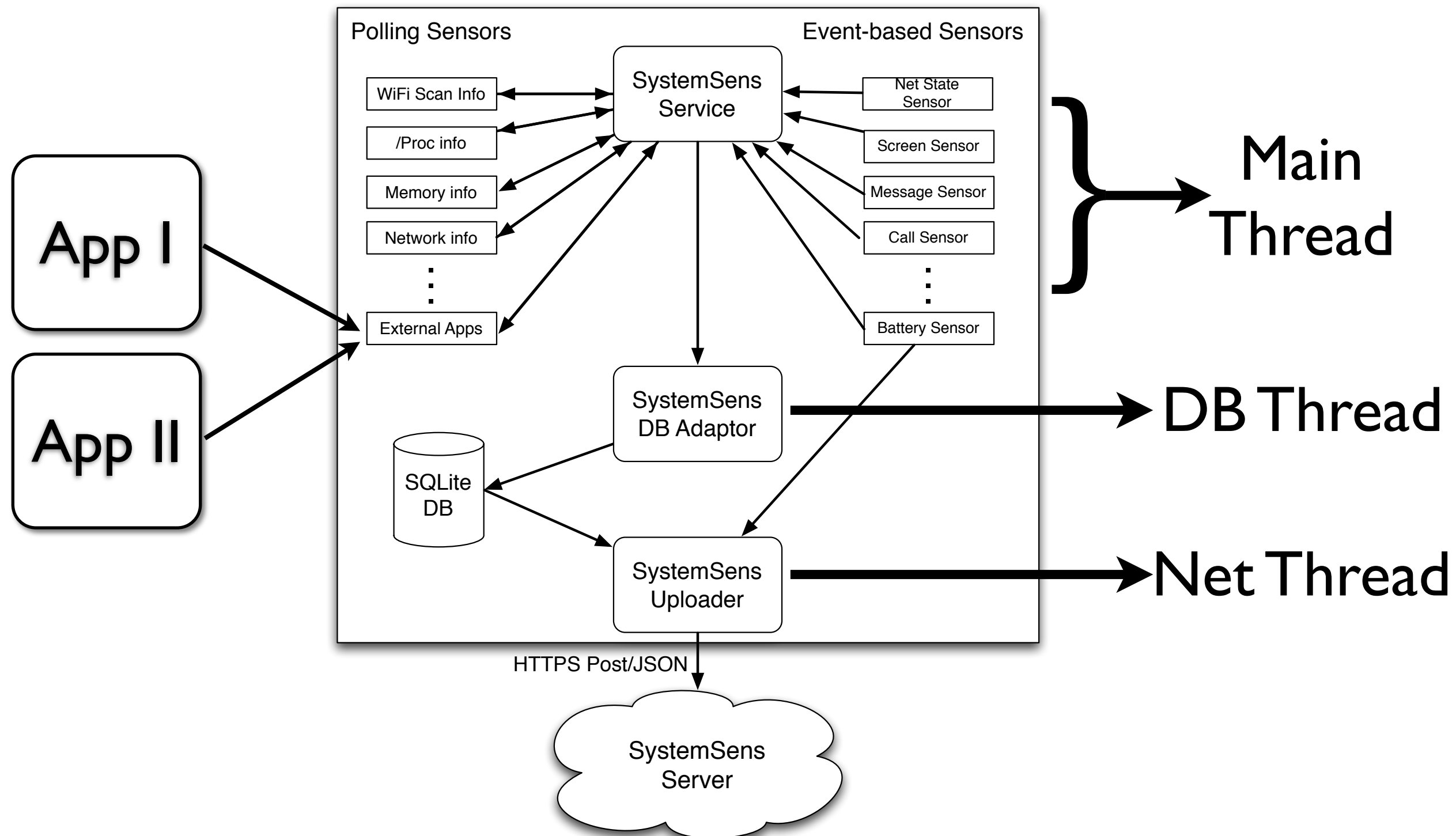
Client Architecture



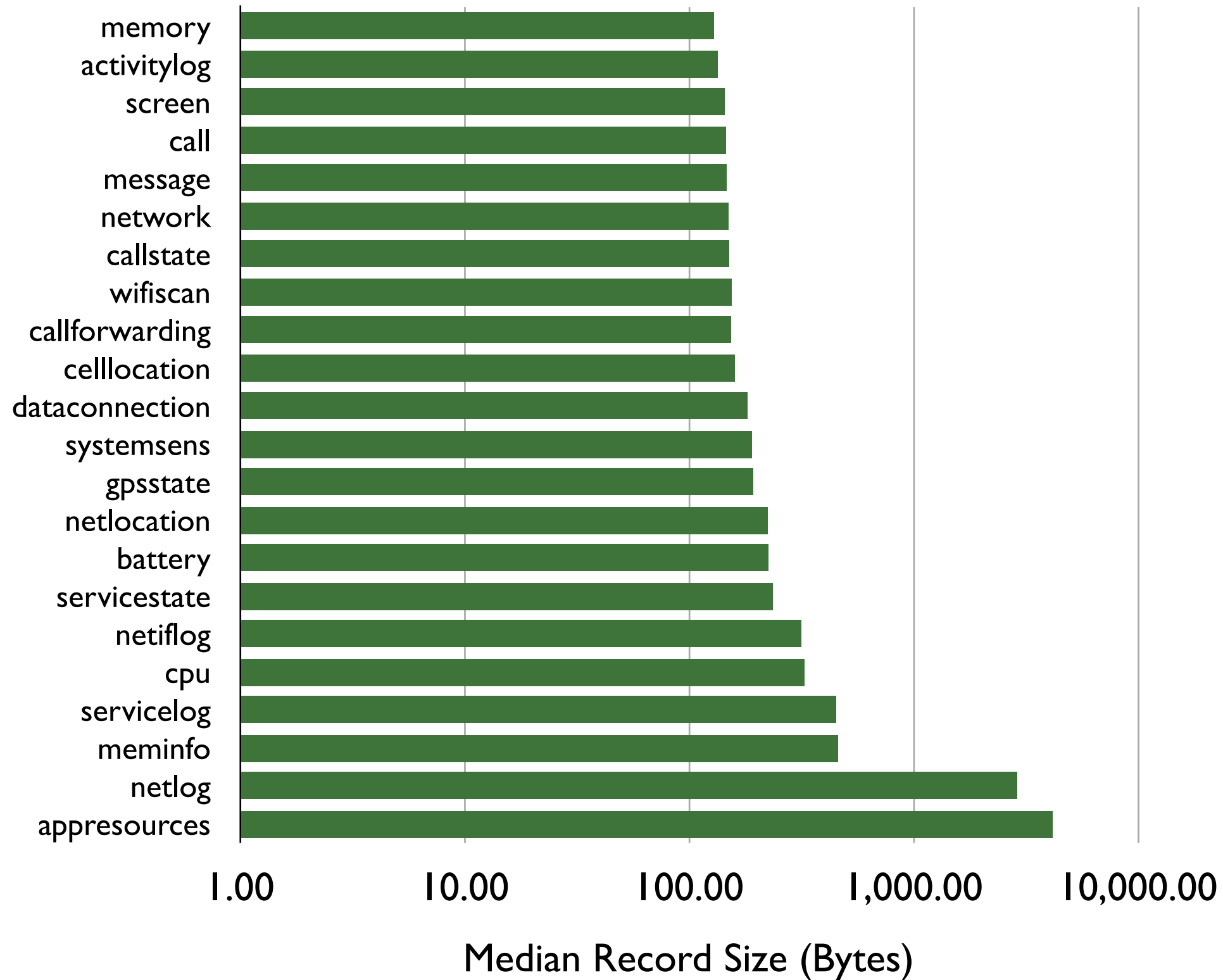
Client Architecture



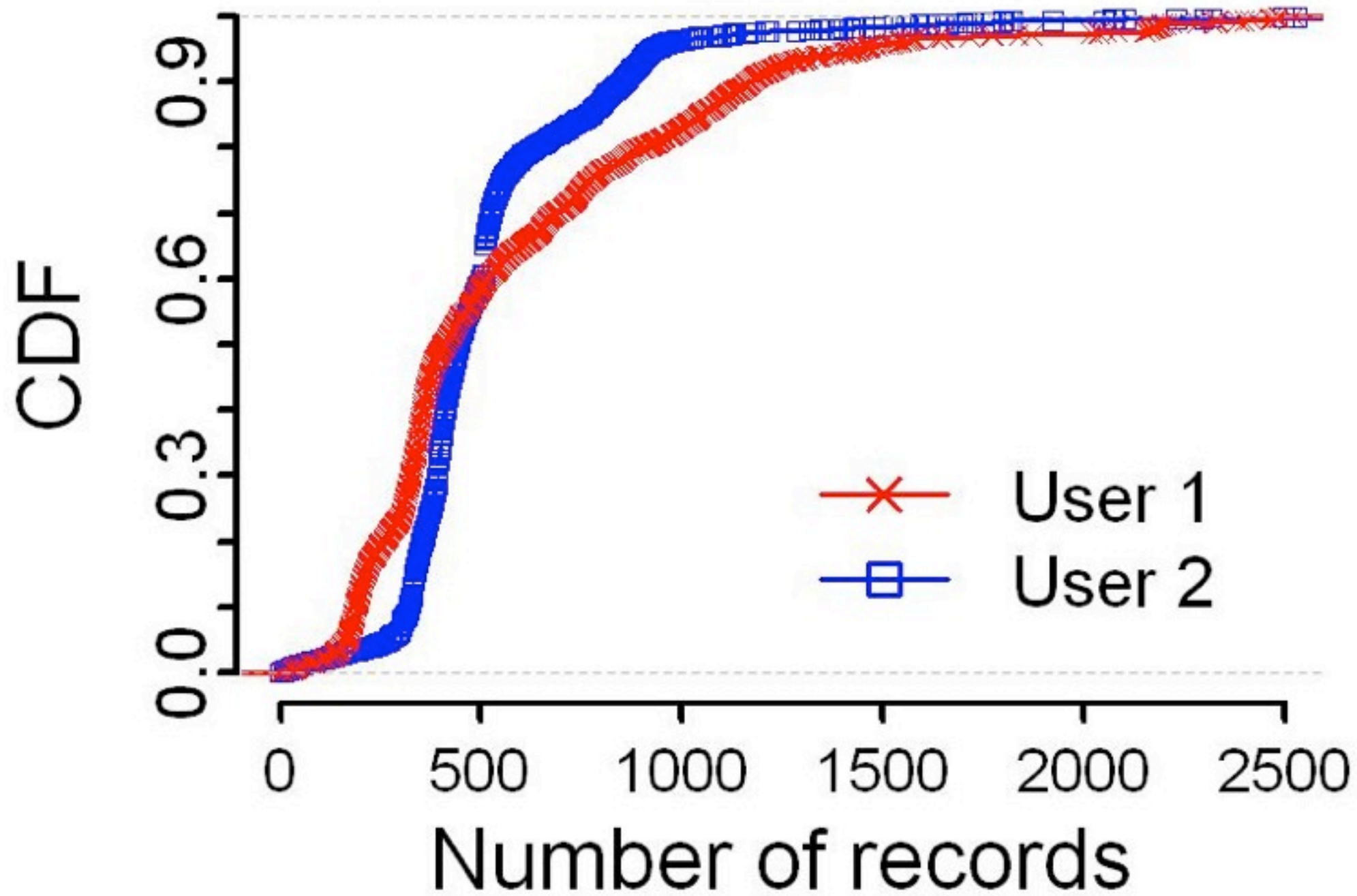
Client Architecture



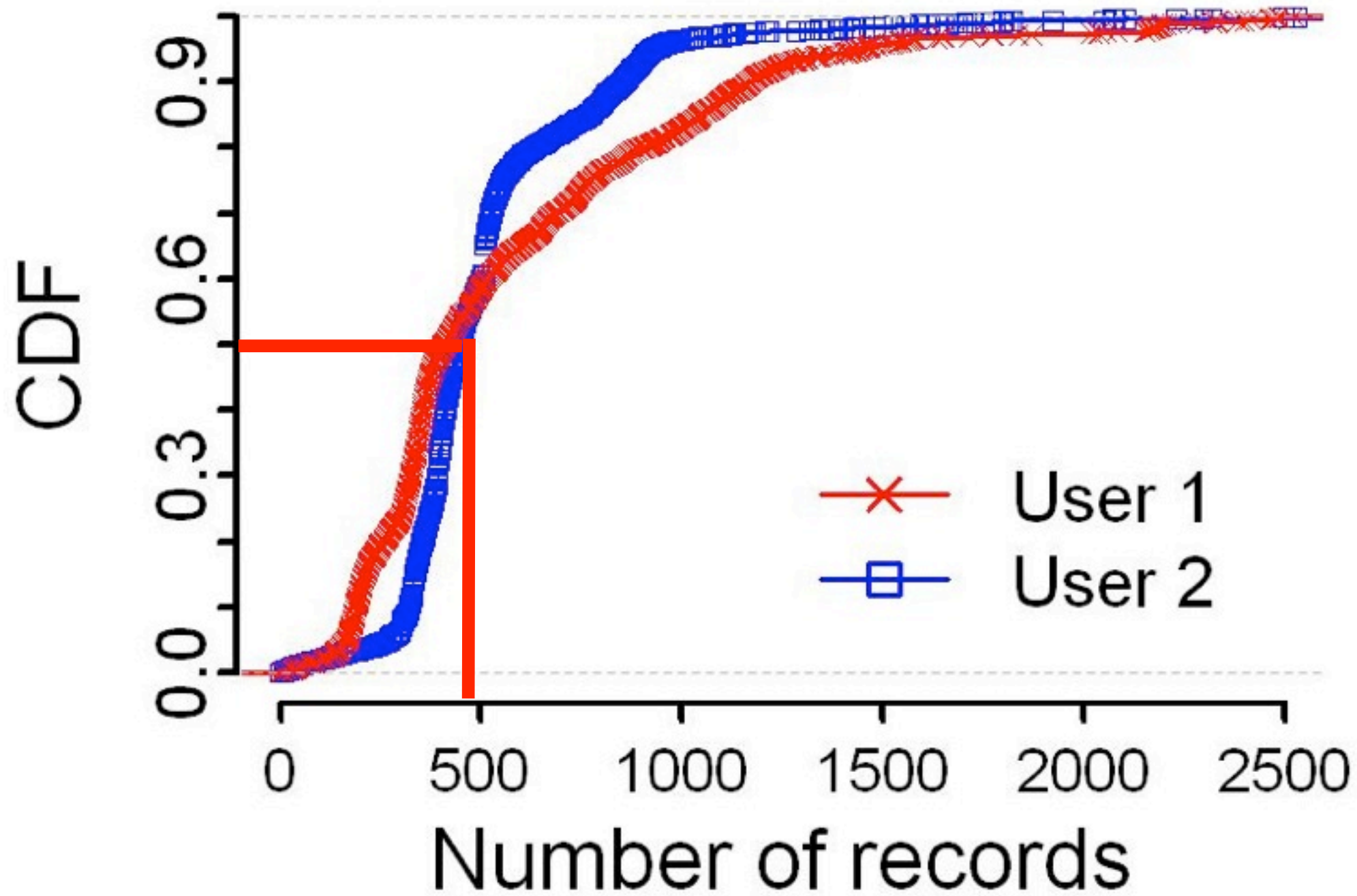
Record Size



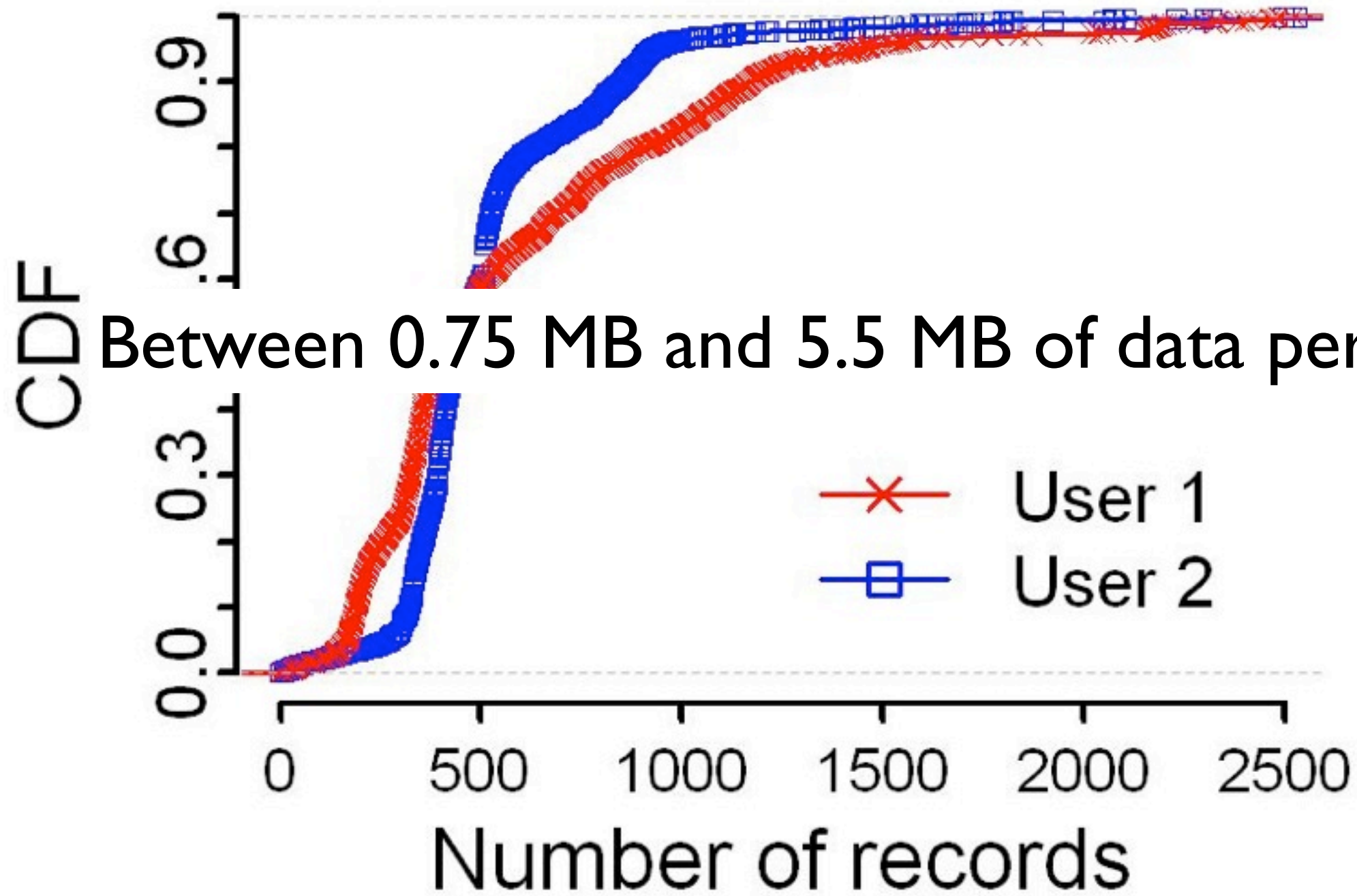
Records per hour



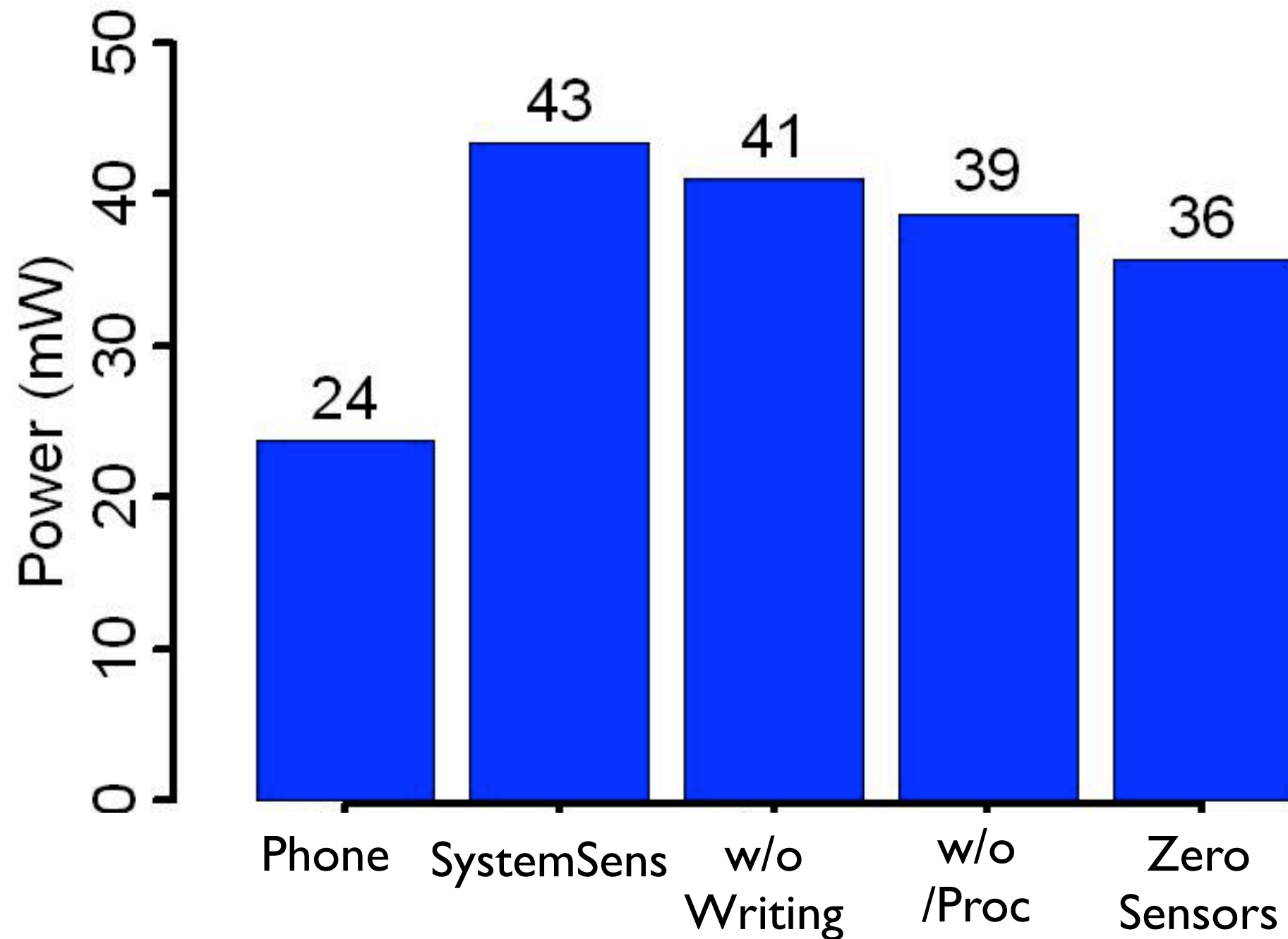
Records per hour



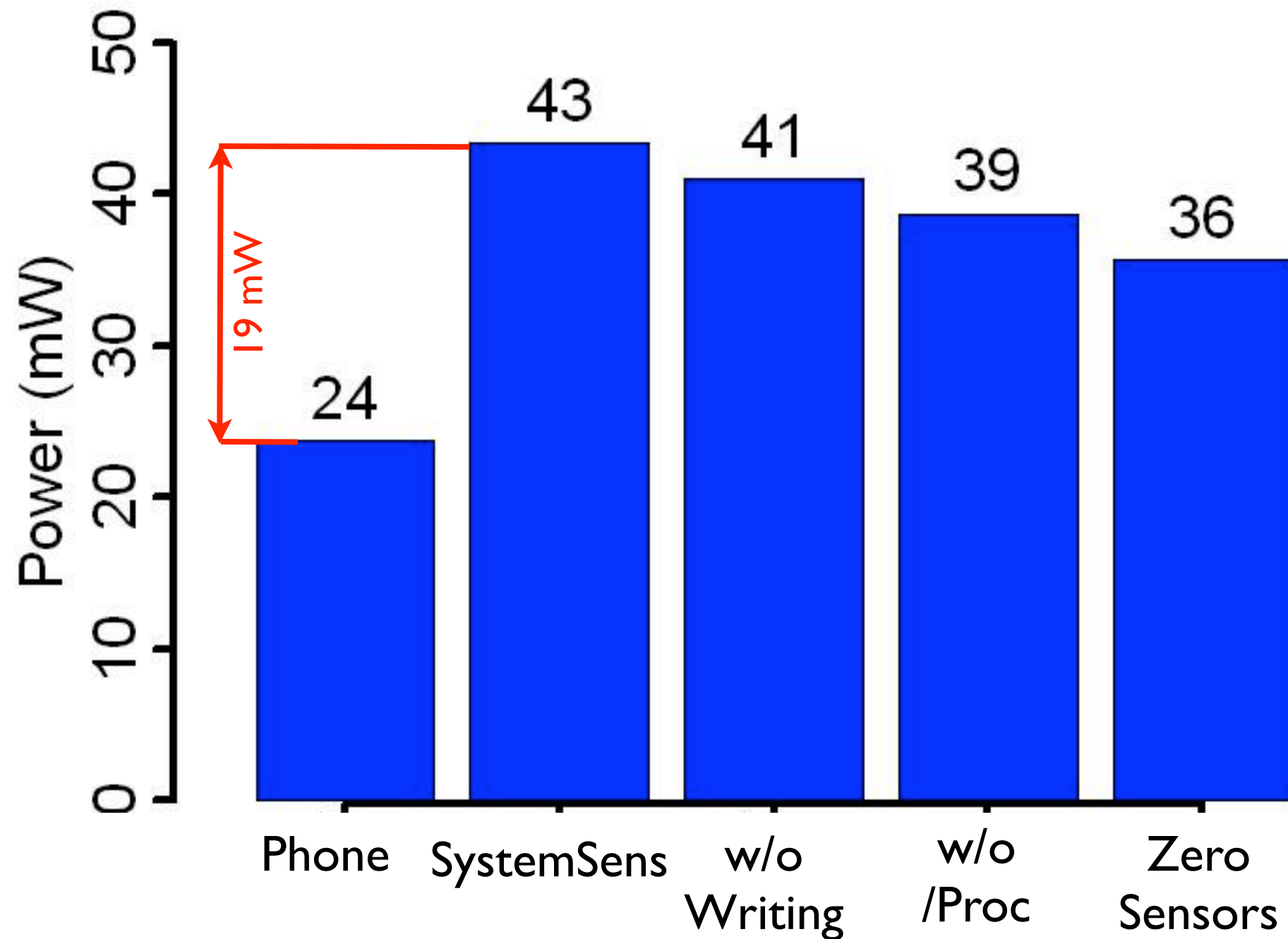
Records per hour



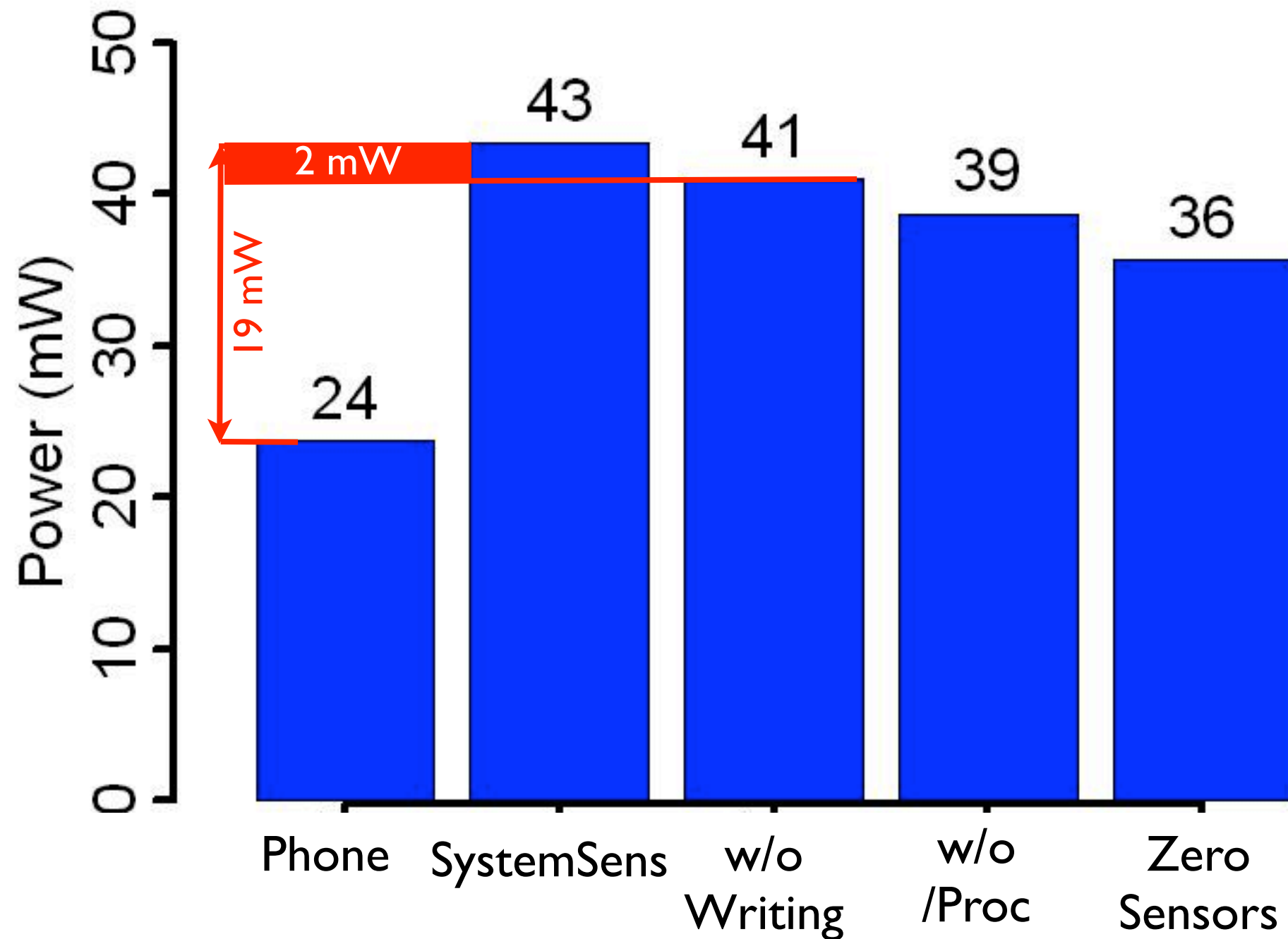
Power Consumption



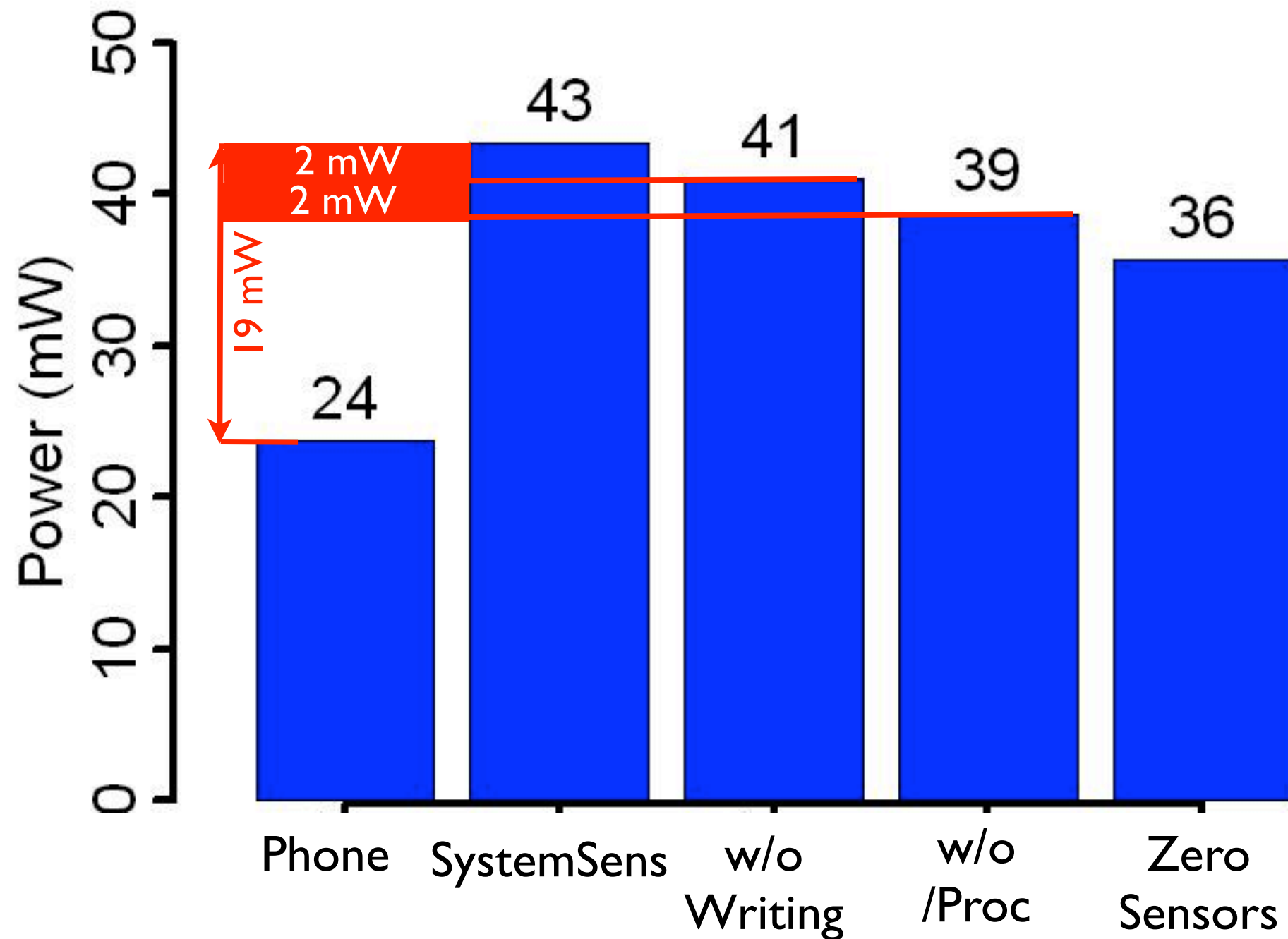
Power Consumption



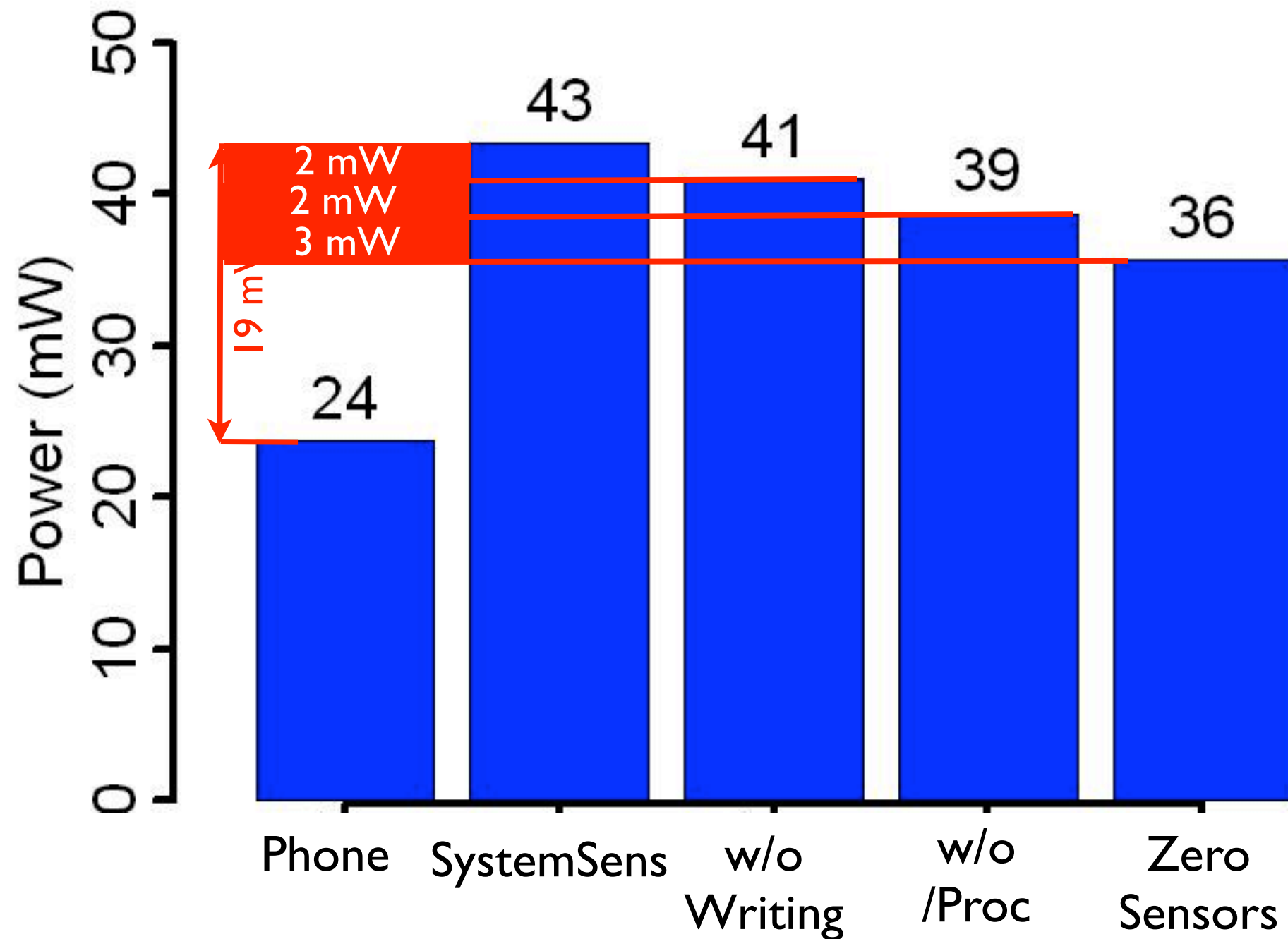
Power Consumption



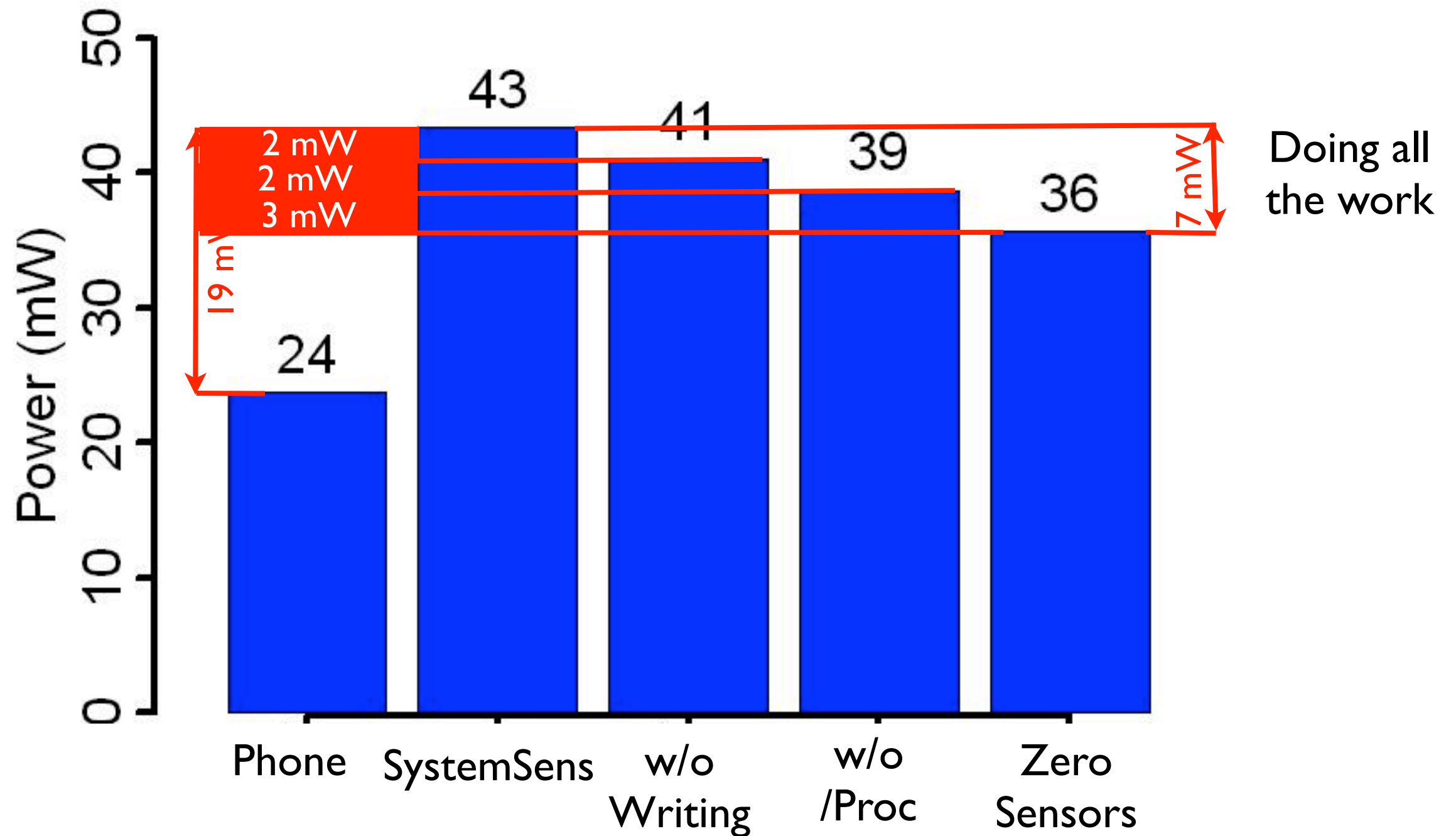
Power Consumption



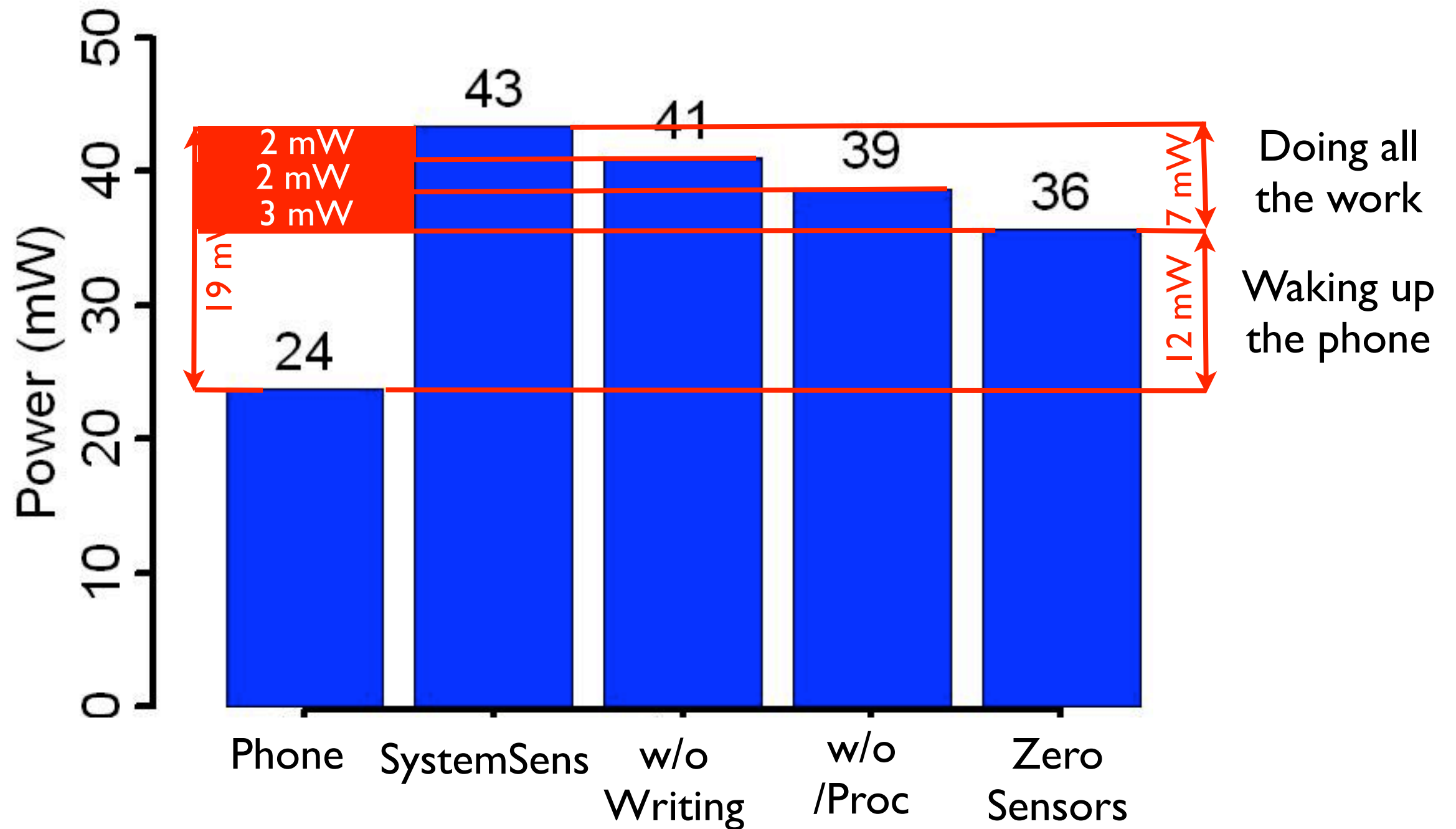
Power Consumption



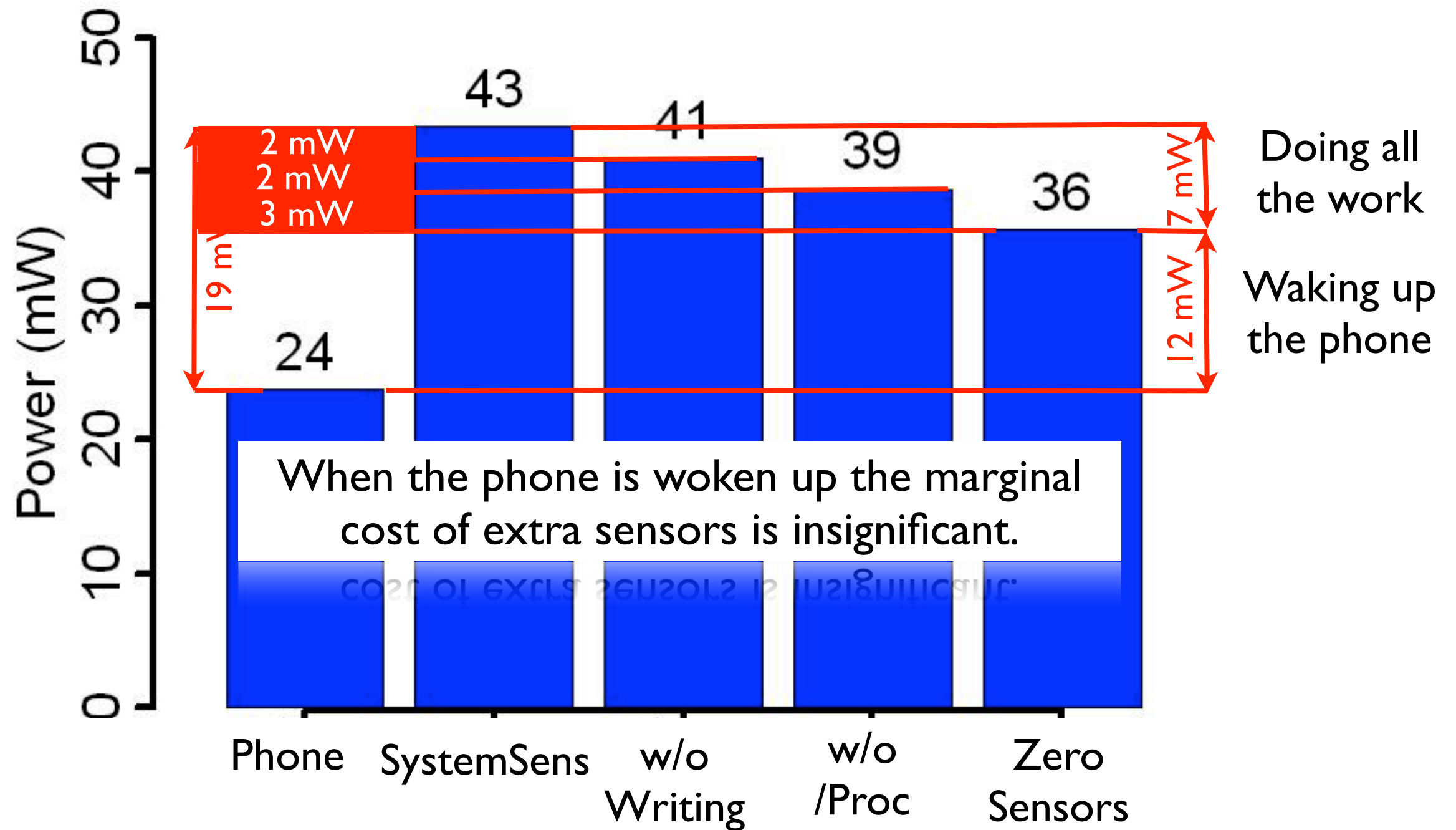
Power Consumption



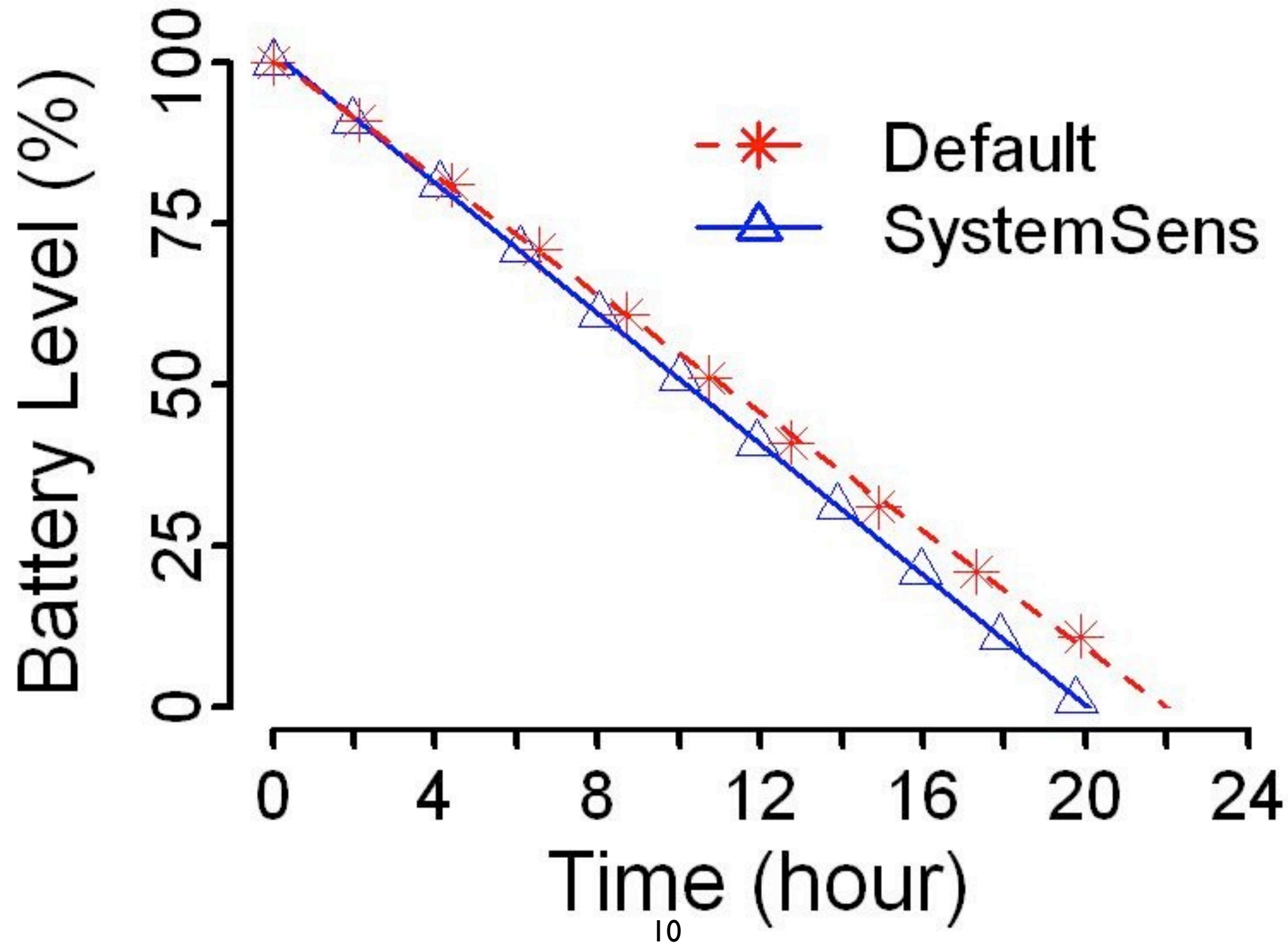
Power Consumption



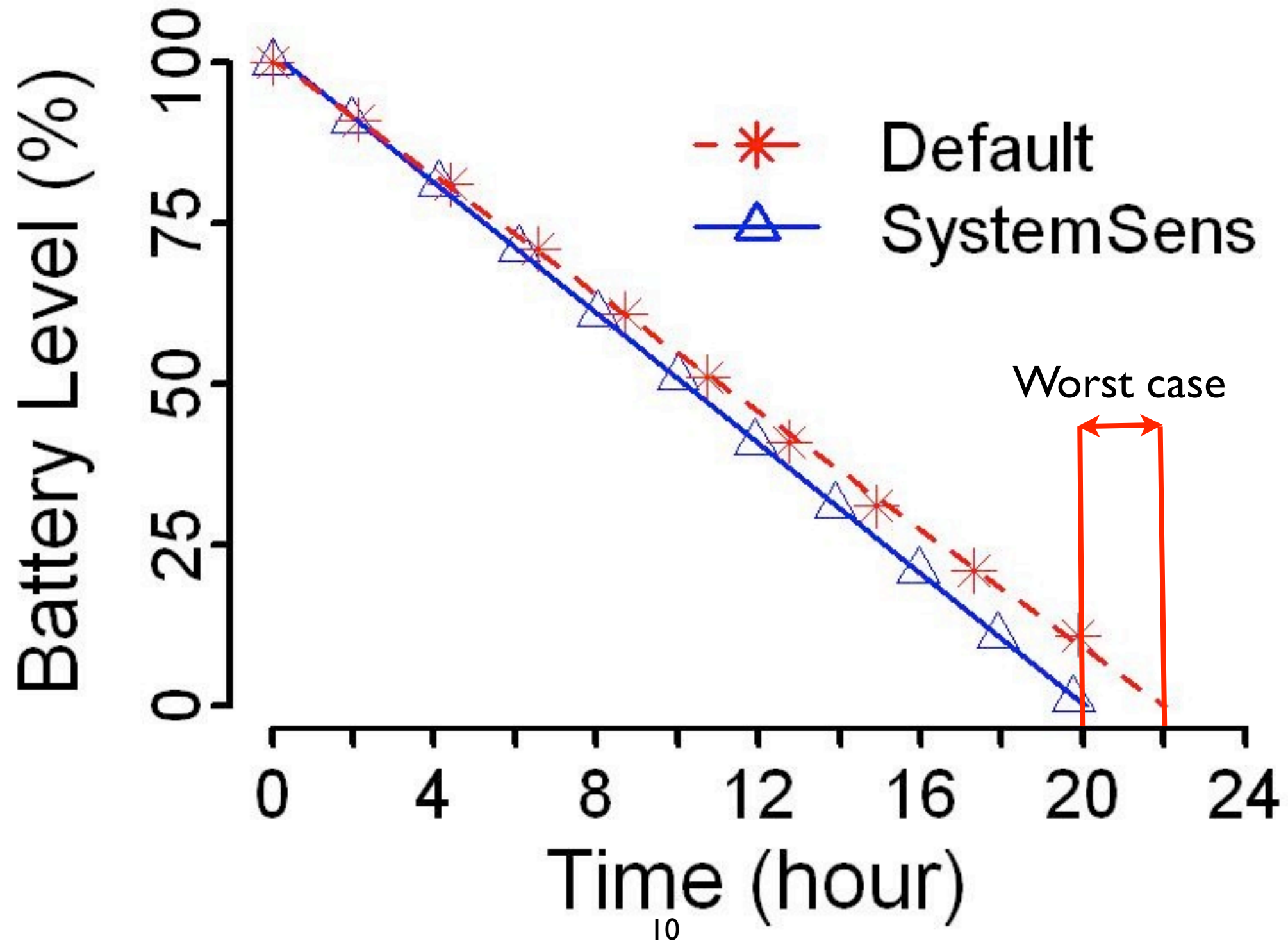
Power Consumption



Battery Life



Battery Life



Demo

Conclusions

- Research deployments should log usage and context more broadly
- Minimize battery cost by minimizing waking up the phone

SystemSens users

1. Aruna Balasubramanian, University of Washington
2. Jiang Zhu, CMU Silicon Valley
3. Martin Lukac, NexLeaf Analytics
4. Tingshao Zhu, Chinese Academy of Sciences, Cyber Psychology
5. Murtuza Chhatriwala, Qualcomm
6. Birjodh Tiwana, University of Michigan, Ann Arbor
7. Hamed Soroush, University of Massachusetts, Amherst
8. Hakbong Kim, Seoul National University
9. Zohair Ihsan, University Technology Malaysia
10. Marwan Omar, Colorado Technical University
11. Byeong-Gyu Park, Sungkyunkwan University, Korea
12. Hao Liu, Tsinghua University, China
13. Mohd Fikri Azli, Chonnam National University, Korea
14. Rui Guo, University of California, Irvine

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