

OMNeT++ Community Summit, Zürich,
September 3-4, 2015

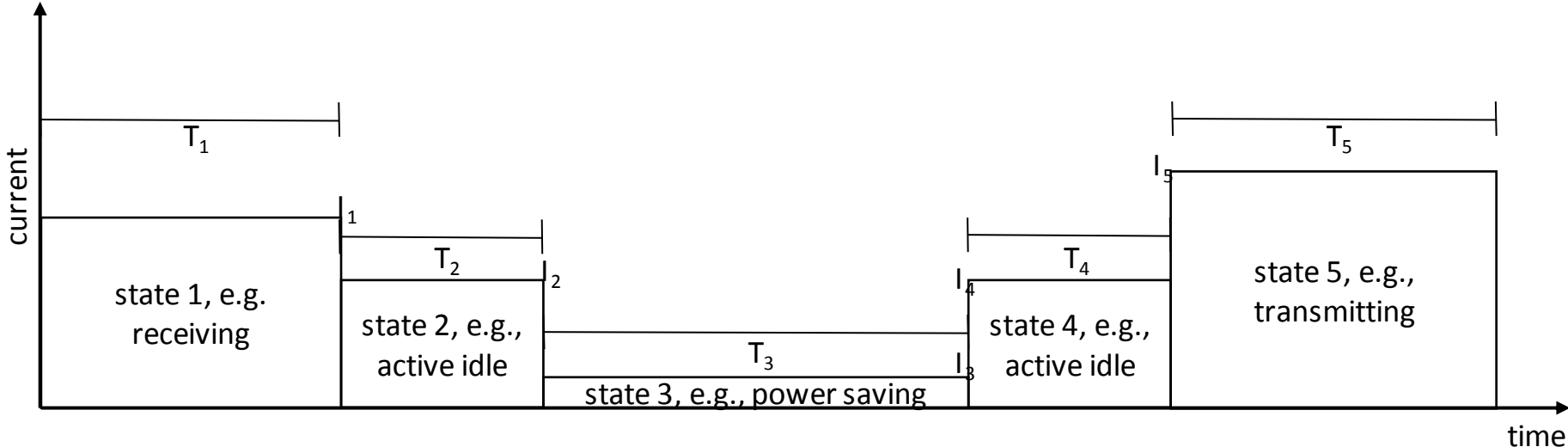
Issues with State-based Energy Consumption Modelling

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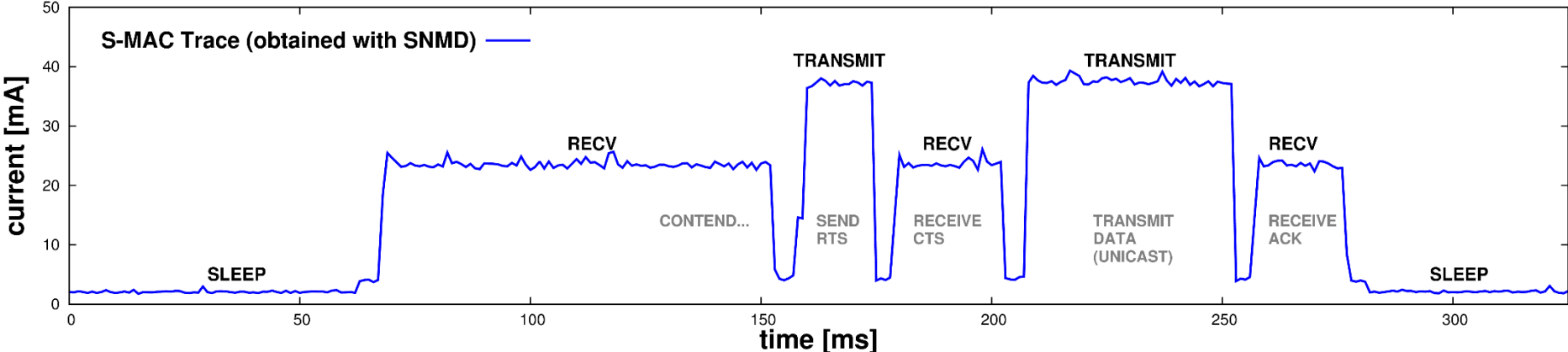
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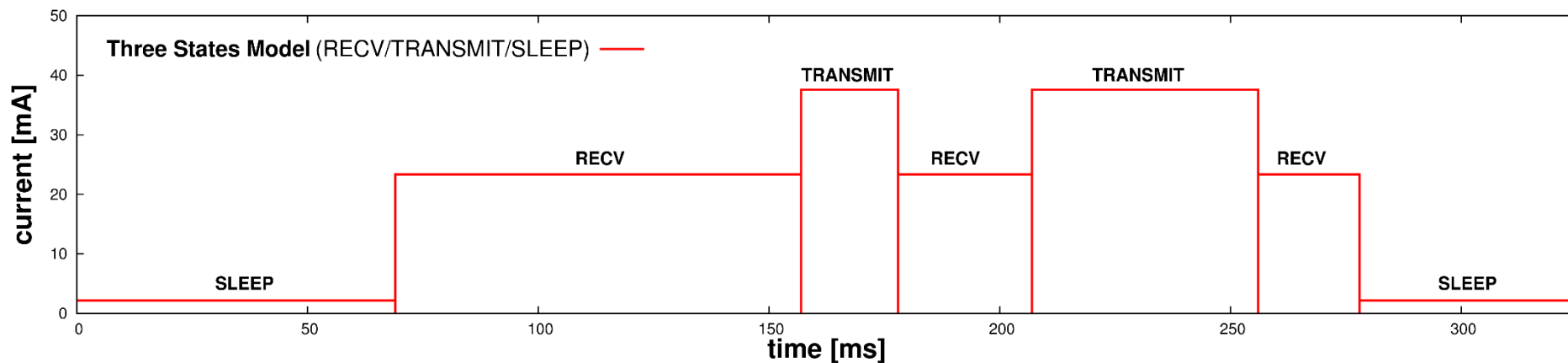
State-based Energy Consumption Model



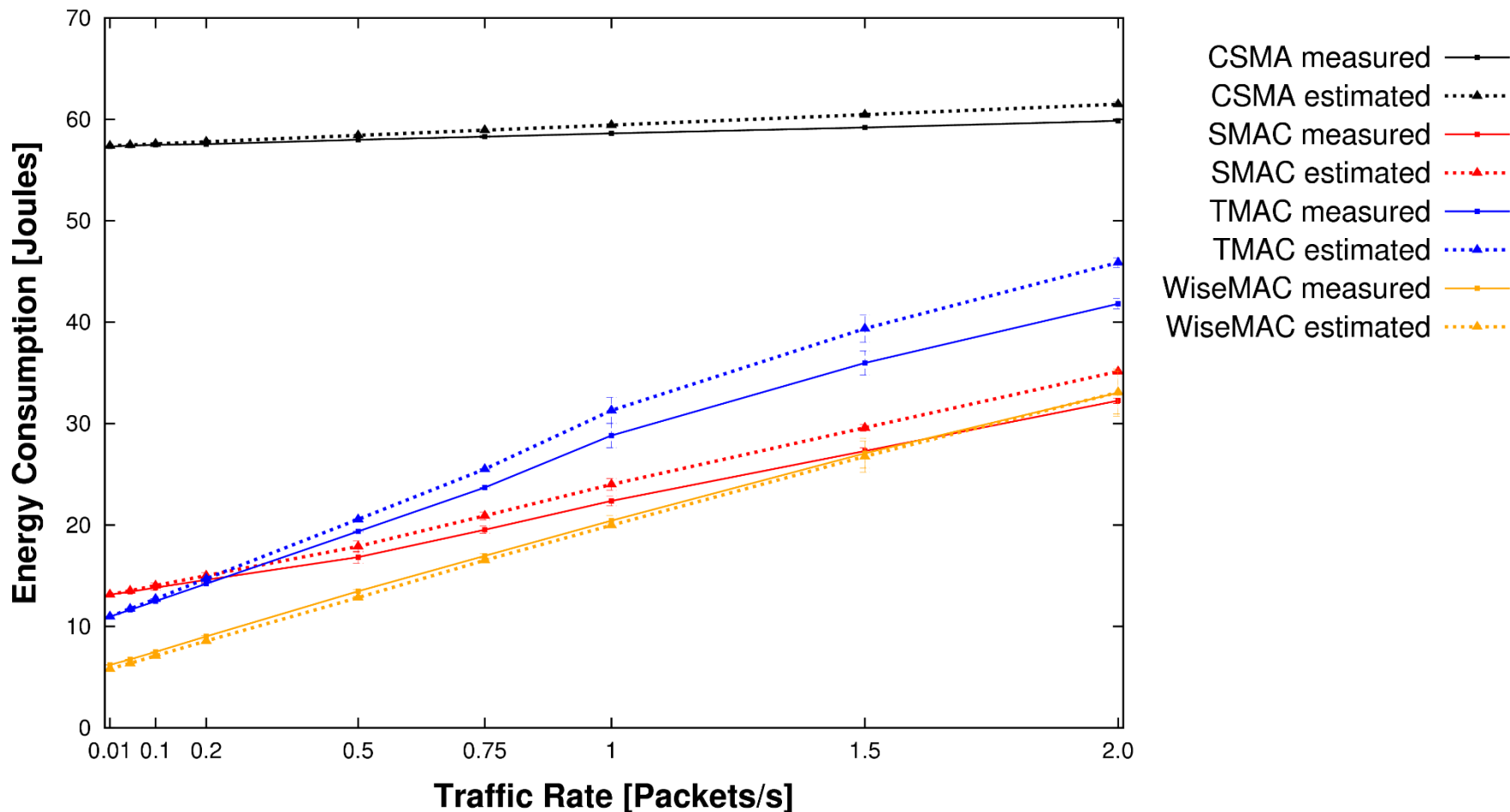
Current Draw of a Sensor Node



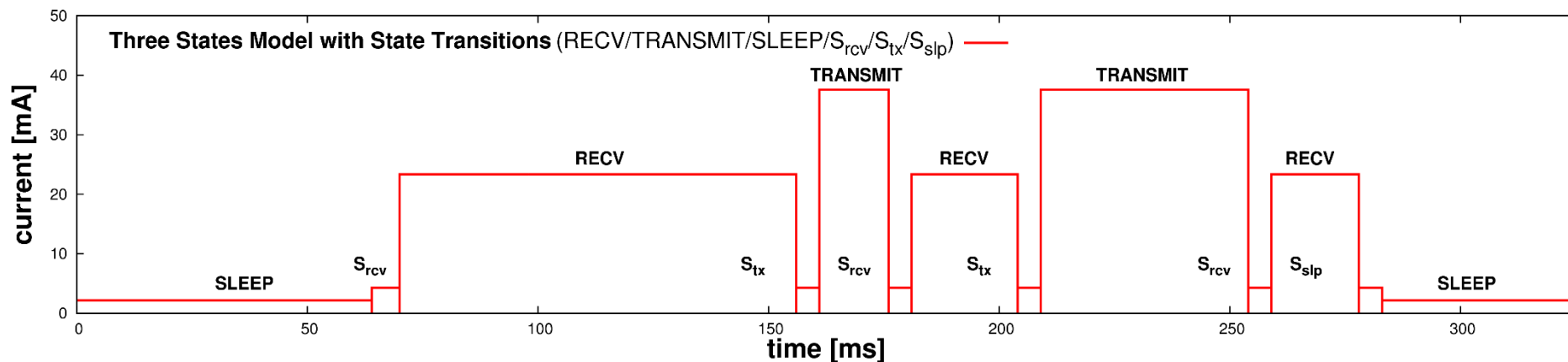
3 States Model for Sensor Node Energy Consumption



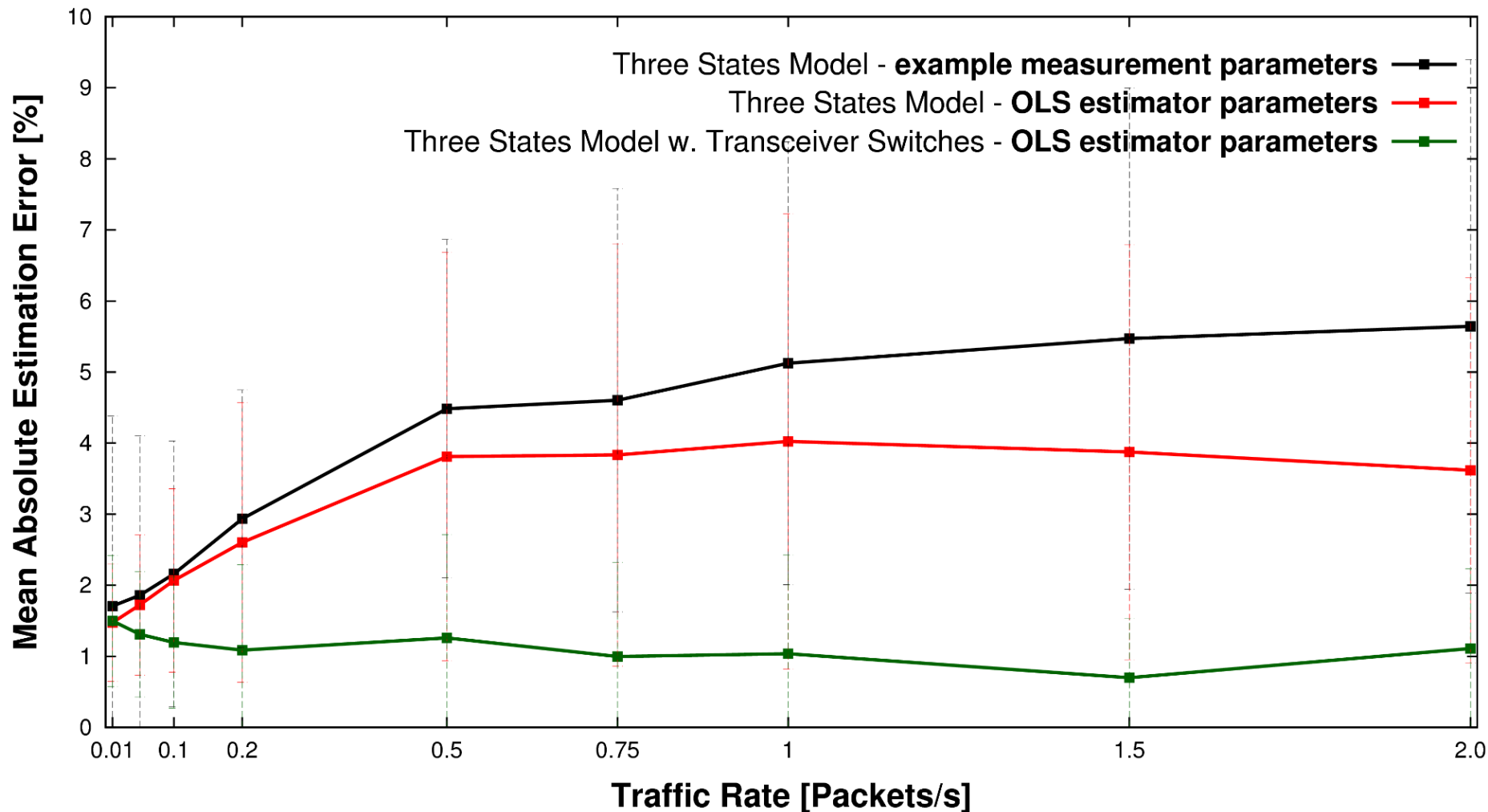
Measured vs. Estimated Energy Consumption



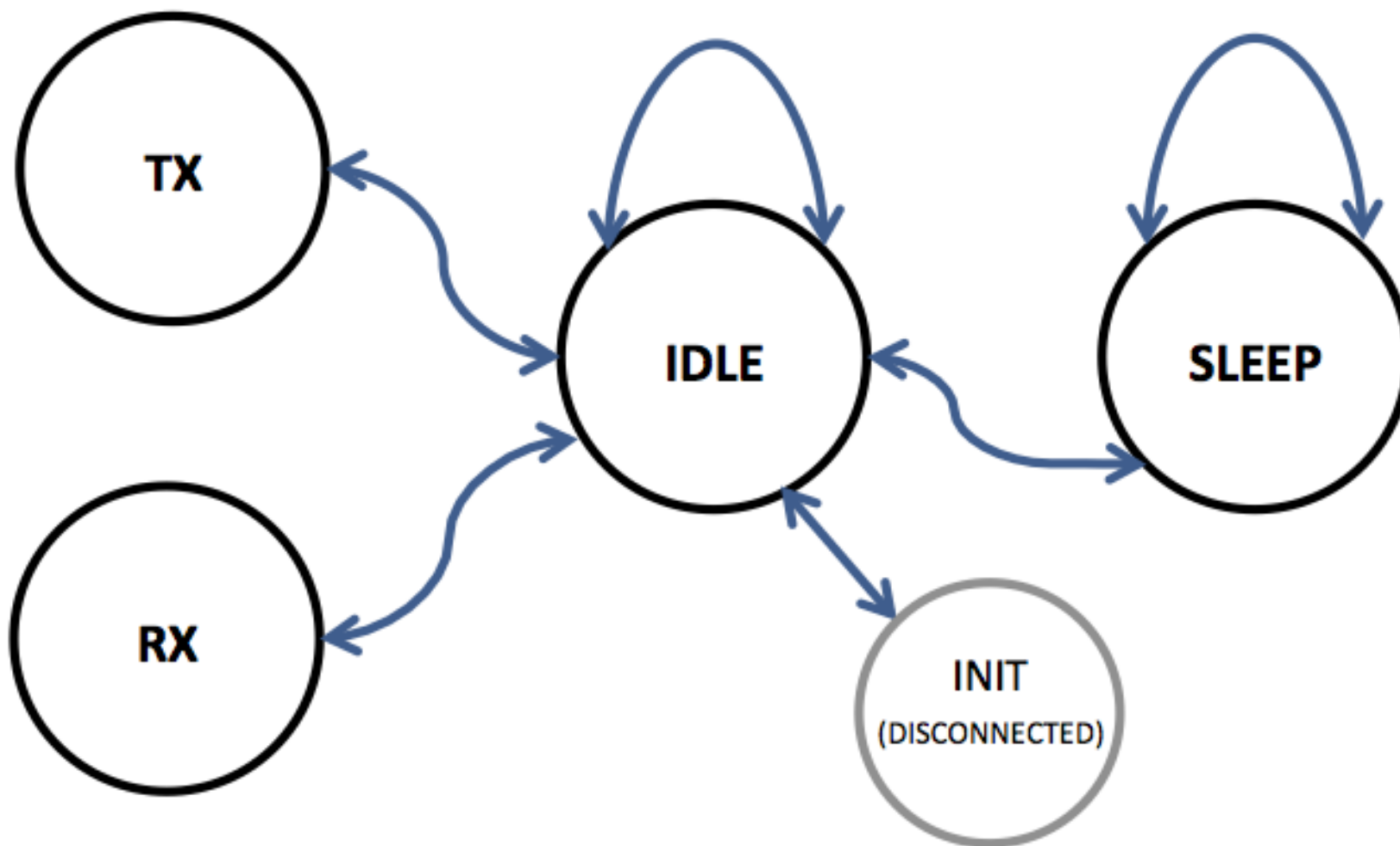
Current modelling by 3 States Model with State Transitions



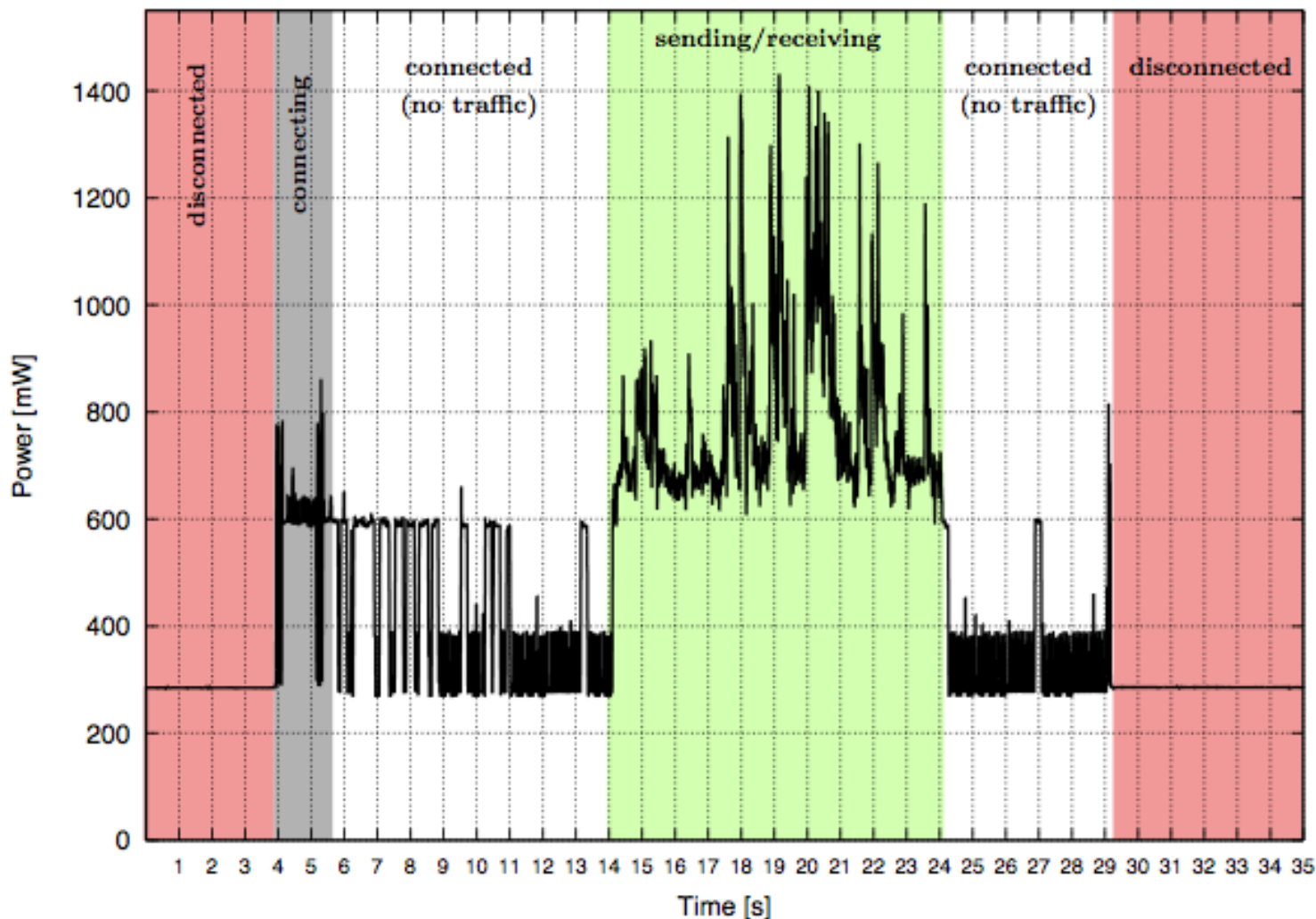
Absolute Mean Estimation Error vs. Traffic Rate



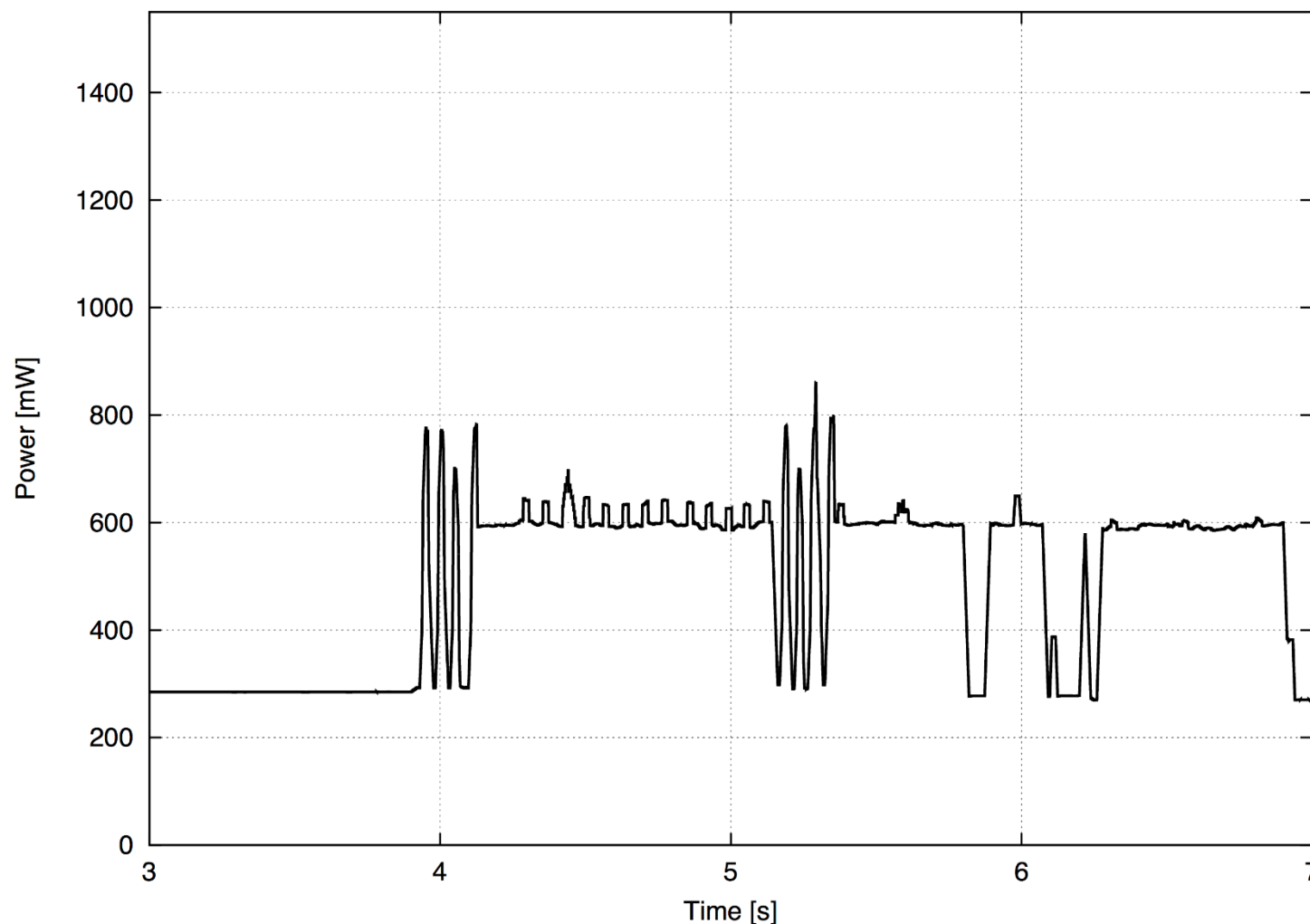
Simplified IEEE 802.11 State Diagram



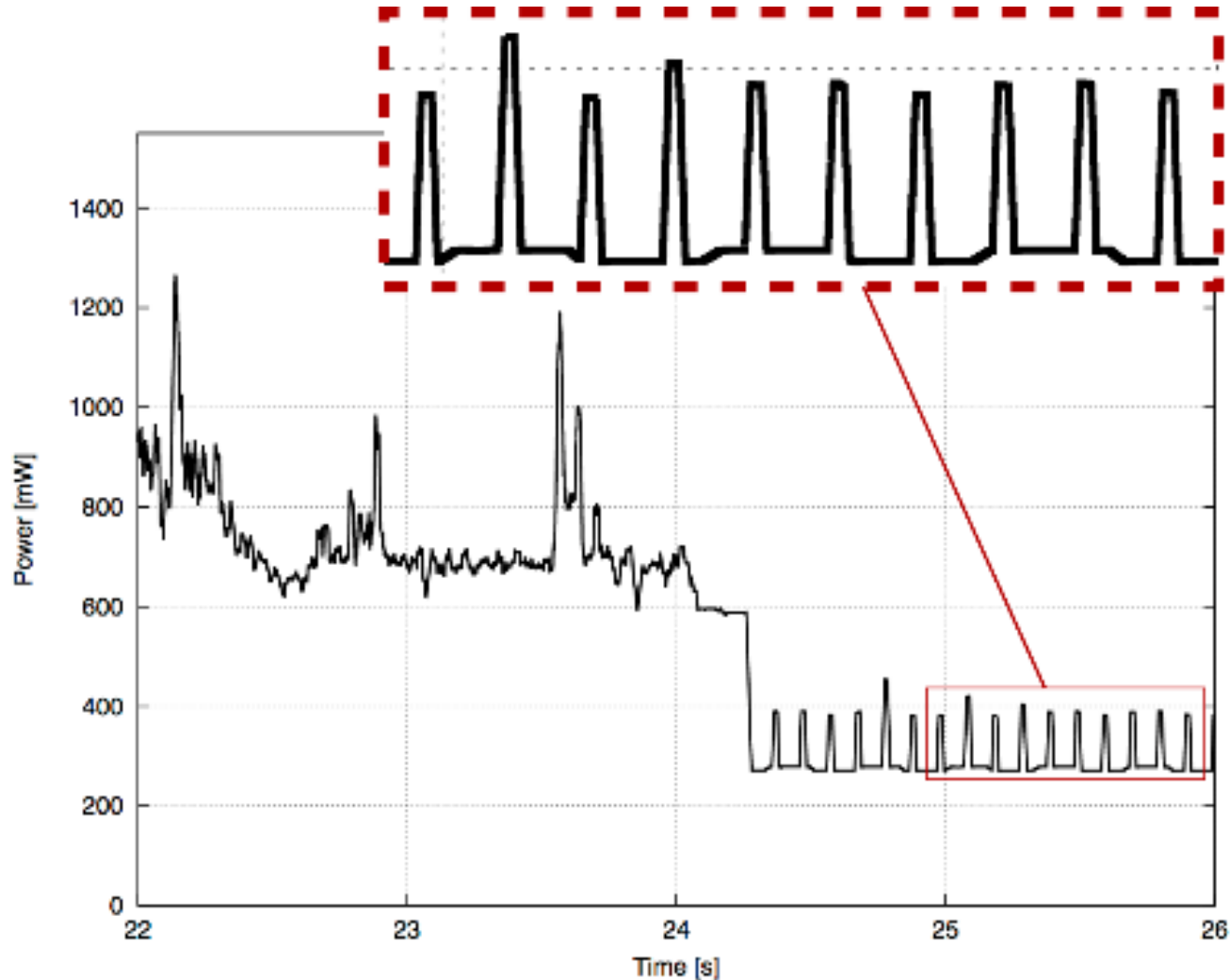
IEEE 802.11 Network Card Power Consumption with Power Management



States Transition Power Consumption Pattern with Power Saving: Connecting



States Transition Power Consumption Pattern with Power Saving: End Transmission/Reception



Discussion and Conclusions

- > Presentation of energy measurements from previous work in wireless sensor / local area networks.
- > Observations
 1. Energy consumption during state transitions can significantly differ from previous and subsequent states.
 2. During active states (e.g., transmitting, receiving, active idle/connected without traffic) energy consumption can vary dependent on current traffic. This includes reception of control messages, e.g., IEEE 802.11 beacons.
- > For accurate evaluation of energy consumption in either software-based energy estimation or simulation, where state-based energy consumption models have been applied previously:
 1. More accurate modelling of state transitions and dynamic fluctuations, e.g., by considering state transition behaviour.
 2. Further improvements by considering other parameters such as number/size of received/transmitted data/control messages.

Thanks for Your Attention!

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