Technische Universität Braunschweig

IBR

QoS-AODV6E

An Energy-Balancing QoS Routing Scheme for WSNs

Wolf-Bastian Pöttner, Oliver Wellnitz, Lars Wolf

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Motivation

- Applications for WSNs become more demanding
  - Communication between arbitrary nodes
    - Sensor to actuator communication
  - Guaranteed minimum network service quality
    - Latency, Reliability, Bandwidth
  - Mobile Nodes
  - Long lifetimes with limited energy supply
  - Sparsely populated networks
  - Internet Protocol (IP) as basis

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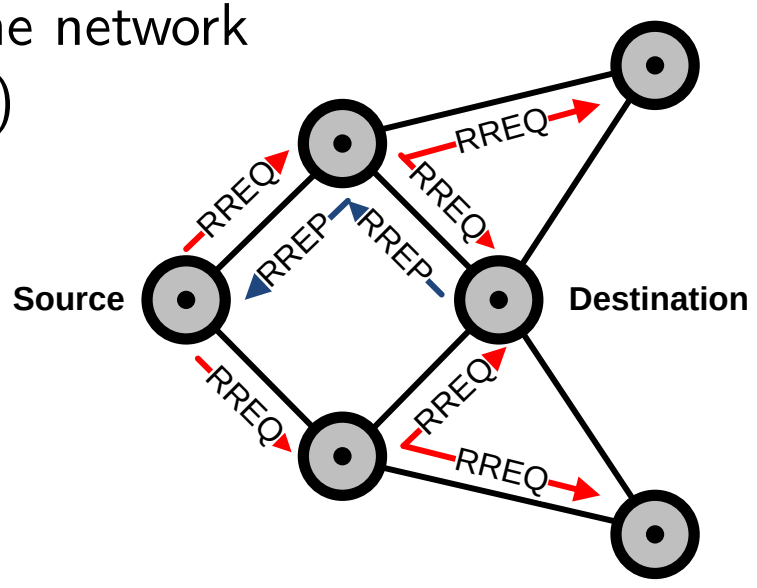
  - Internet Protocol (IP) as basis
- Our approach
  - Use IP routing protocol and adapt it to WSNs
  - Add energy-awareness and support for QoS

Ad-hoc On-demand Distance Vector Protocol (AODV)

- General idea
  - Flood route request (RREQ) into the network
  - Receive unicast route replys (RREP)



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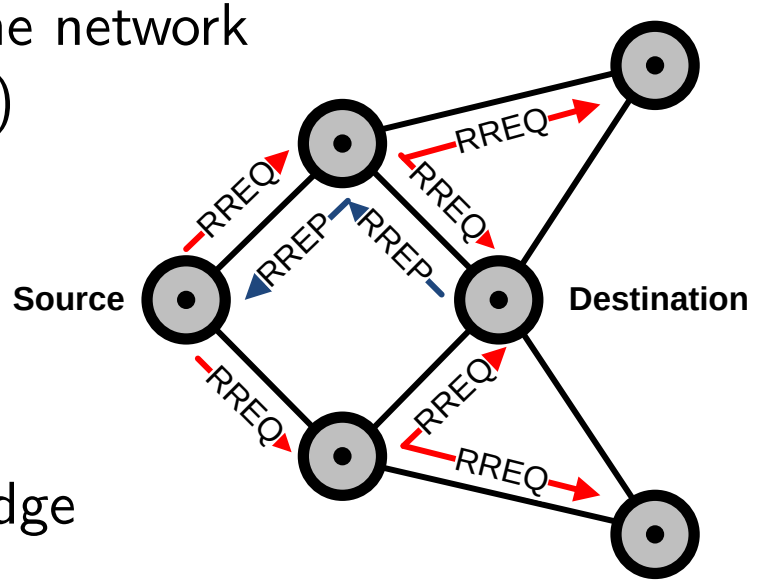

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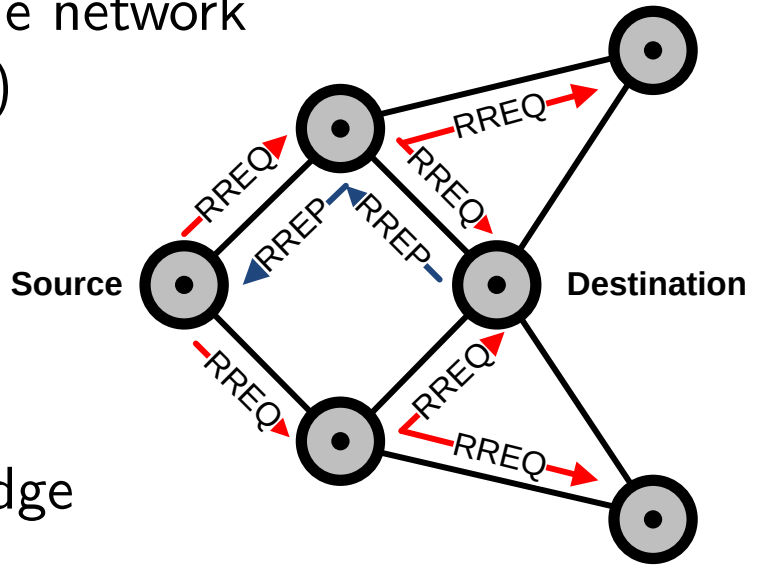

- Our contributions
  - AODV enhancements for IPv6, QoS and energy-awareness
  - Energy-Aware routing metric
  - Implementation for Contiki
  - Simulations and experimental evaluation

Energy-Aware AODV

- Motivation
  - In sparsely populated networks, every node is important
  - WSNs are dynamic, routes may change
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- Concept
  - Discover paths with the minimum hop count
  - Use the first discovered path
  - Change route, if path with higher minimum residual lifetime is found
  - Constantly adapt to changing energy situation

QoS based AODV

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  - Applications depend on the network
  - Network should provide a specified minimum service quality
  - Metrics are
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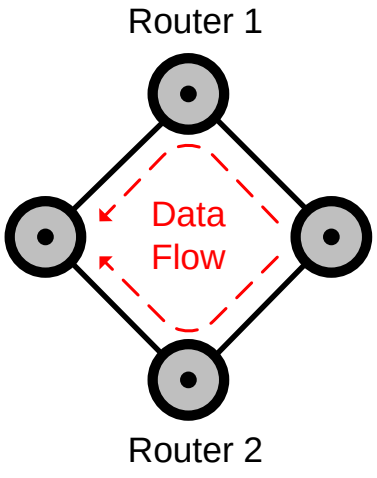
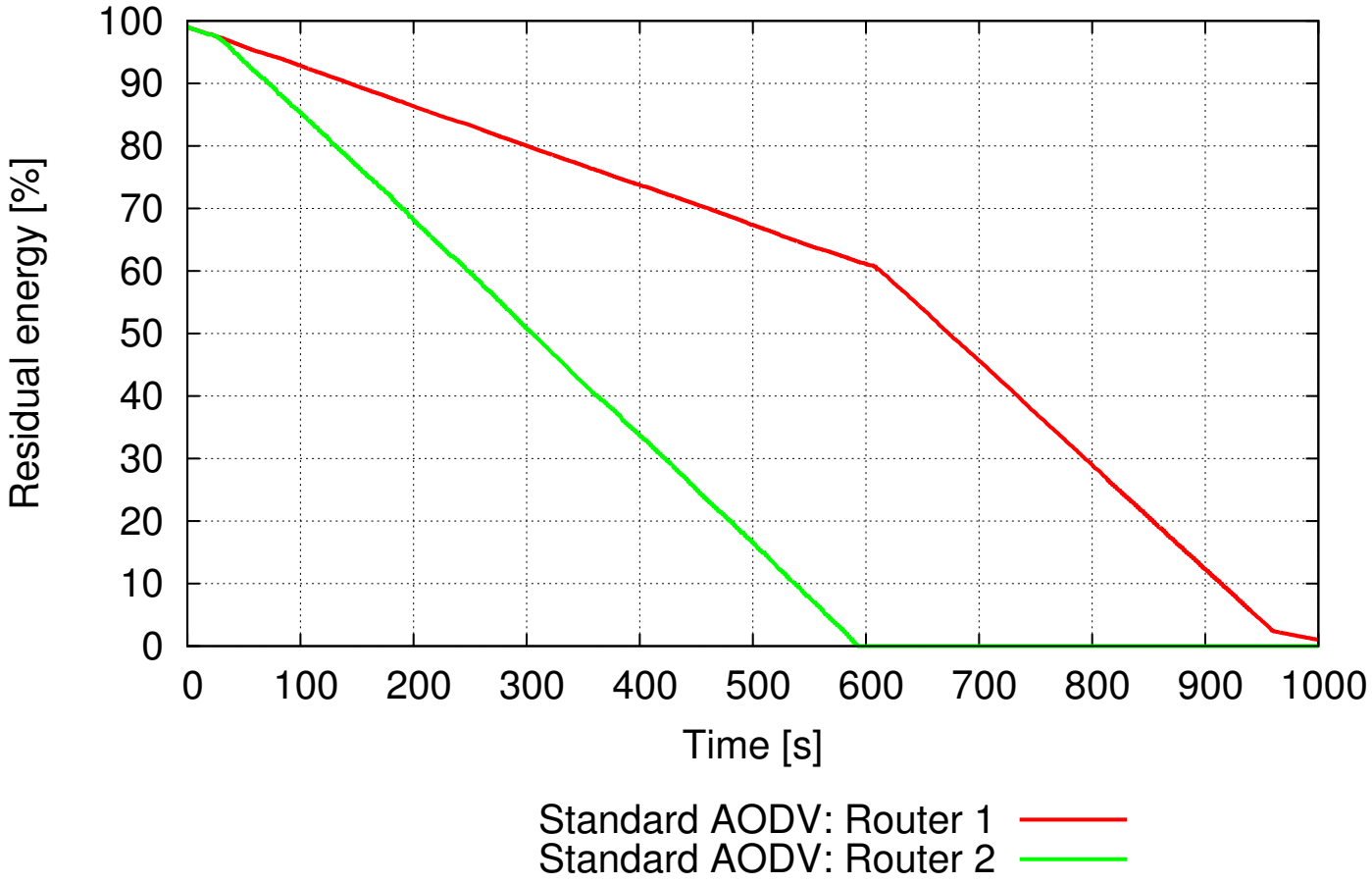
- Concept
  - Integration of QoS specification in route discovery
    - Extended RREQ messages
  - Intermediate node discard message if requirements are too high
    - Distributed admission control

Energy-aware AODV (Measurement)





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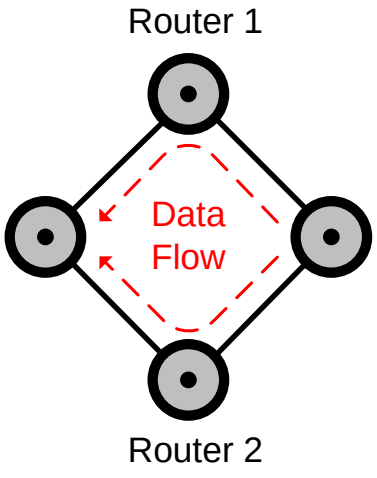
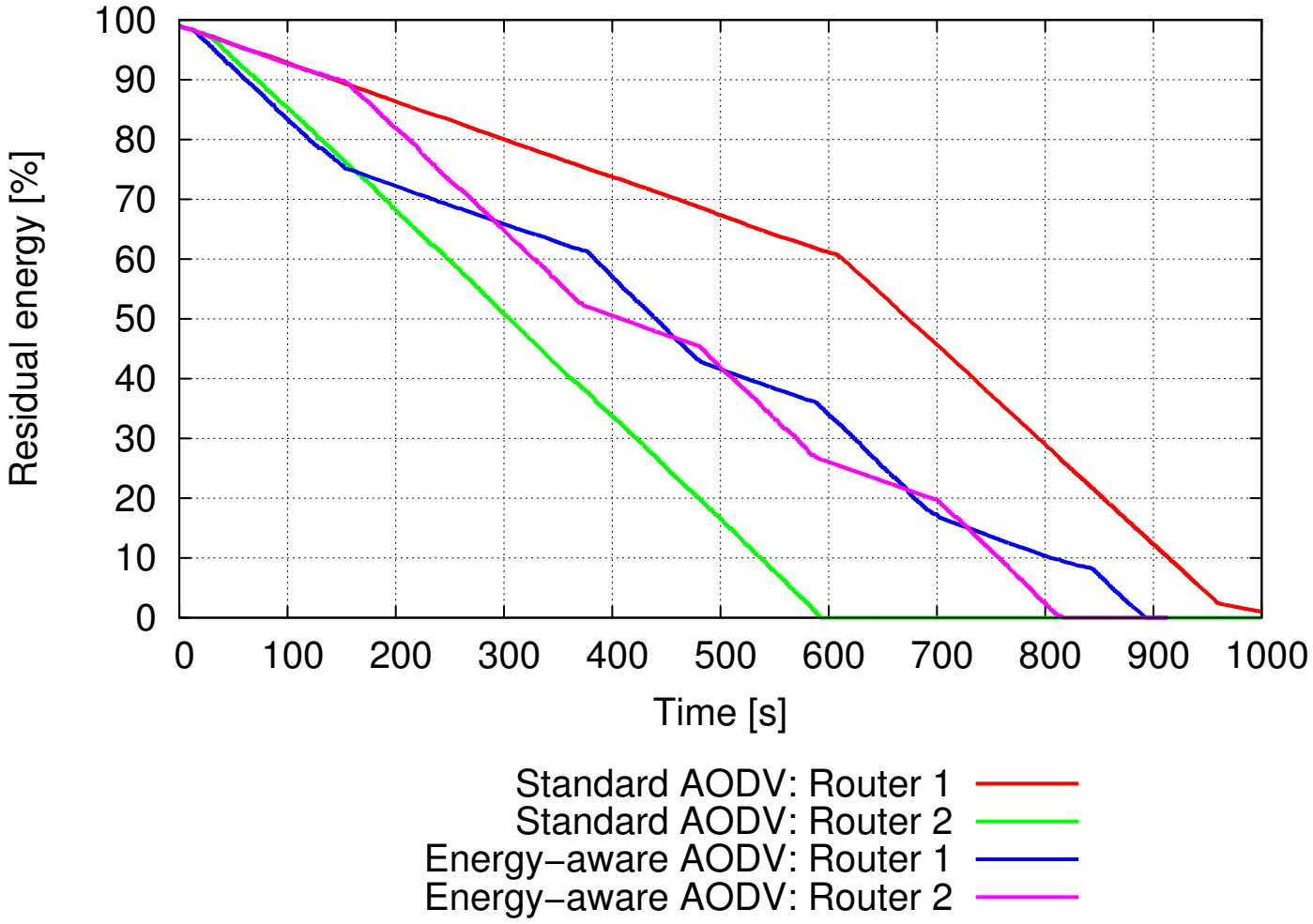
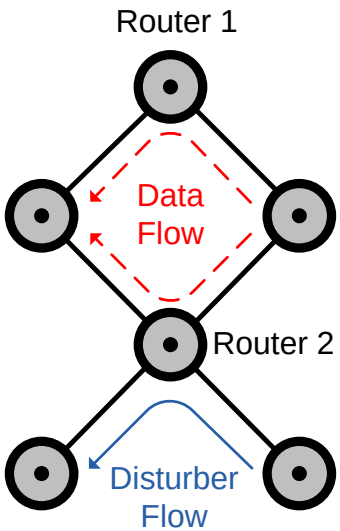
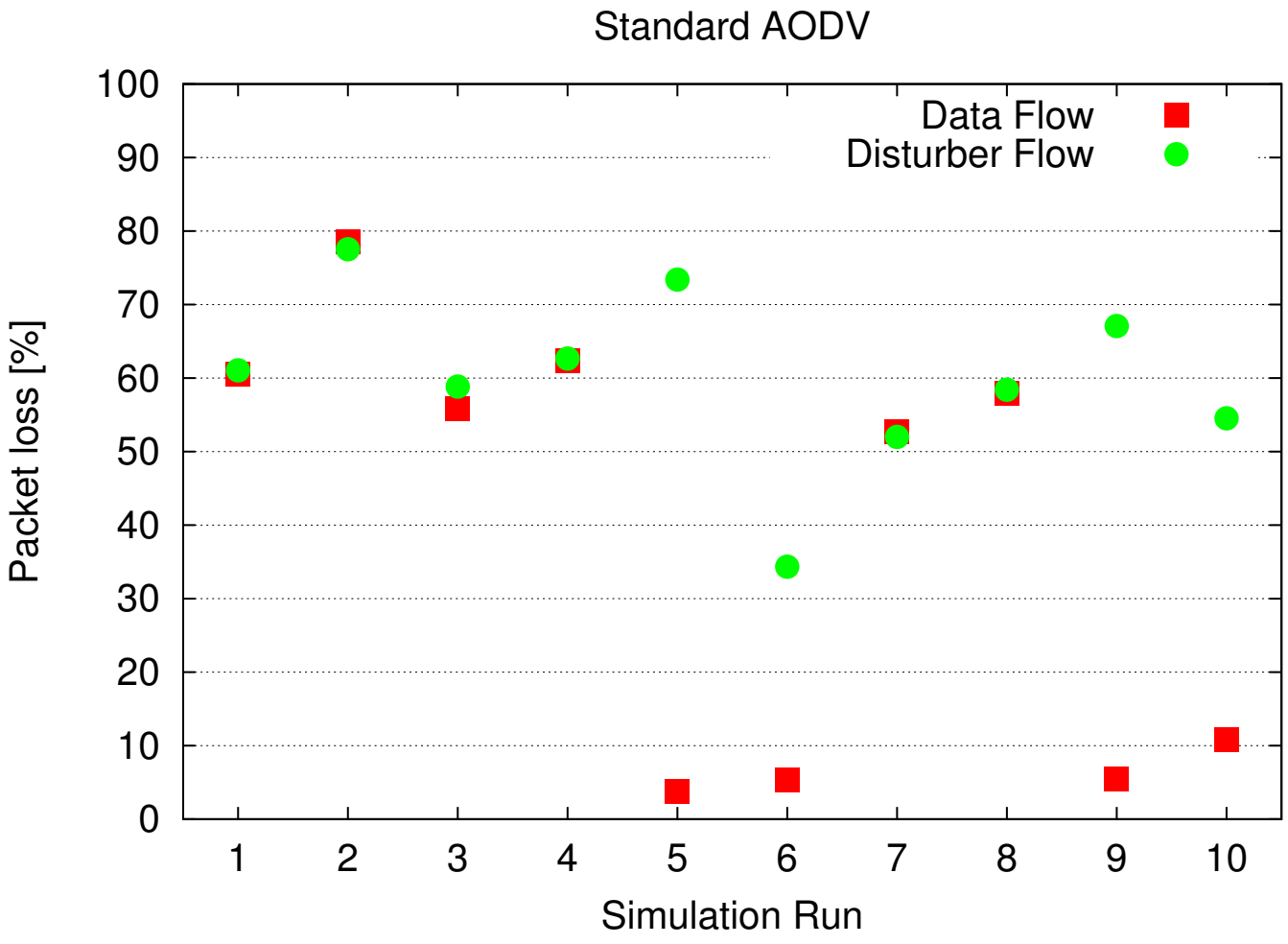




QoS based AODV (Simulation)





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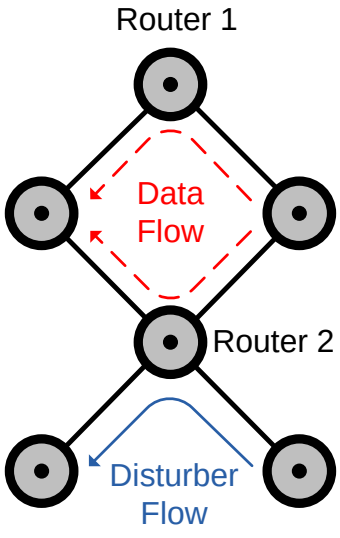

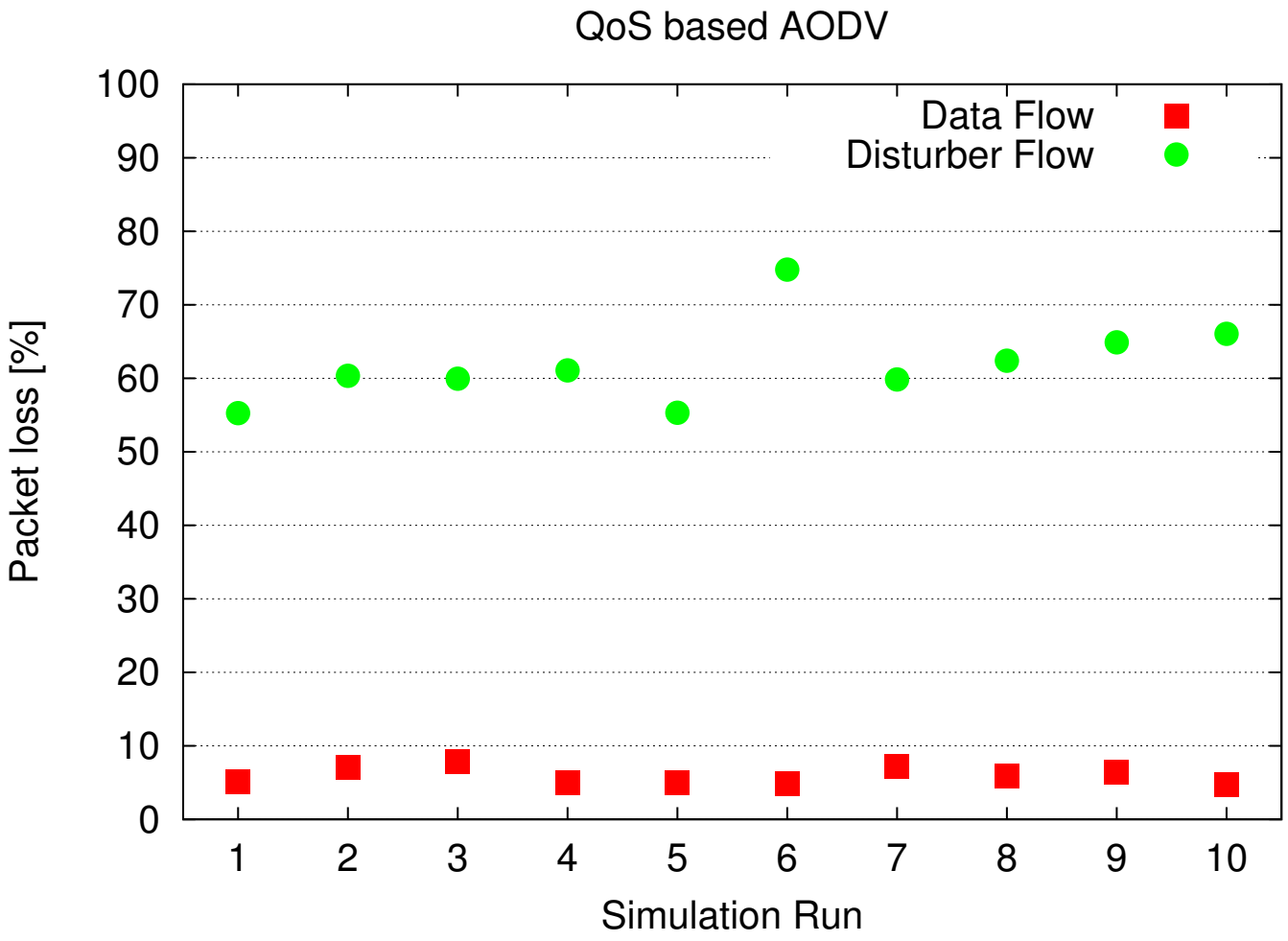

Conclusion

- QoS-AODV6E
  - Based on Ad-hoc On-demand Distance Vector protocol
  - Energy-aware and QoS based Routing
  - Implementation for Contiki
- Results
  - Energy-aware routing prolongs network lifetime
  - QoS based routing selects suitable paths and increases service quality
- More details in the paper!

Thank You for Your Attention!

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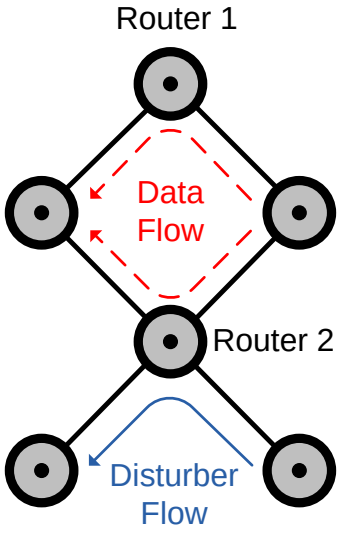

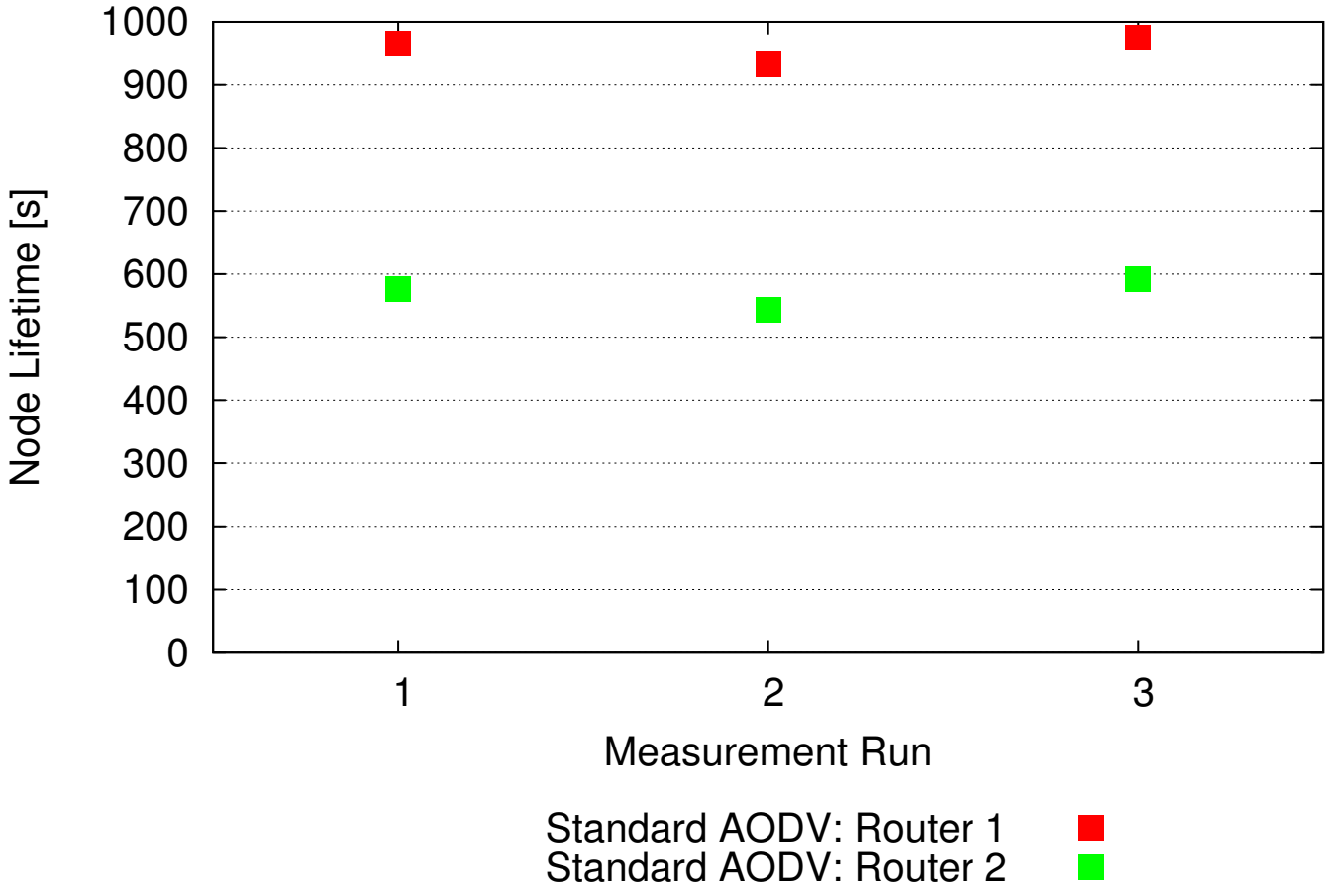

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