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Motivation

- Flow scheduling with different QoS requirements
- Facilitate network-wide management and control

Current Solutions

- Limited scalability [WirelessHART]
- Incomplete network topology models [Hydro]

Contribution

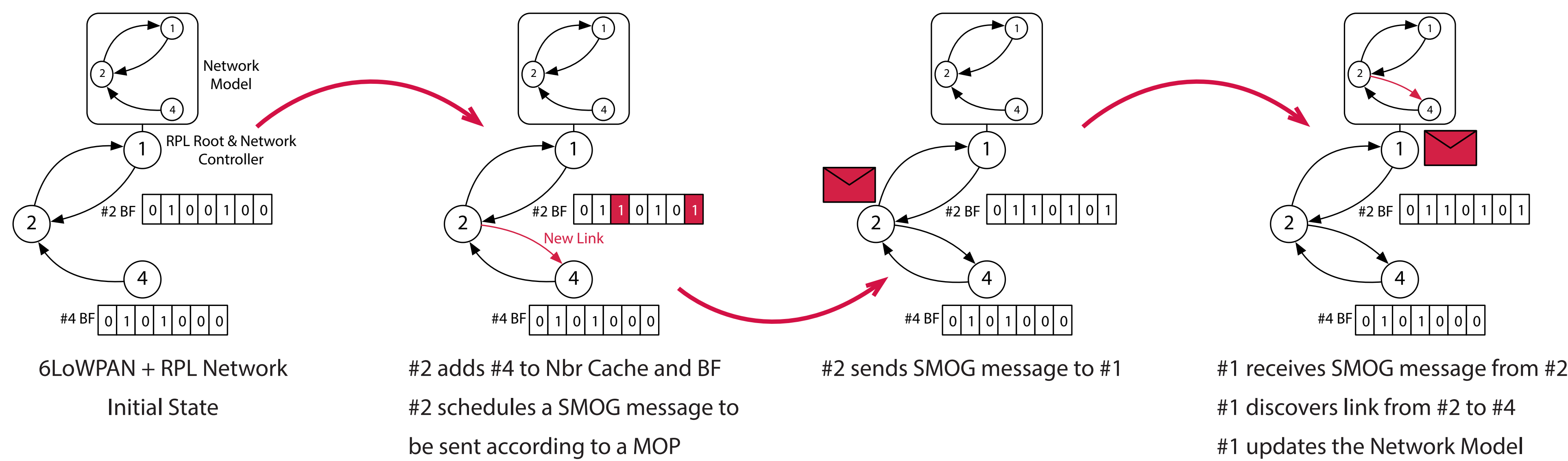
- A mechanism to build and maintain a centralised full network topology model:
 - accurate, reactive, and scalable
 - usage of probabilistic data structures
- Extensive analysis in simulations and a testbed

Centralised Network Control

SMOG

SMOG Design

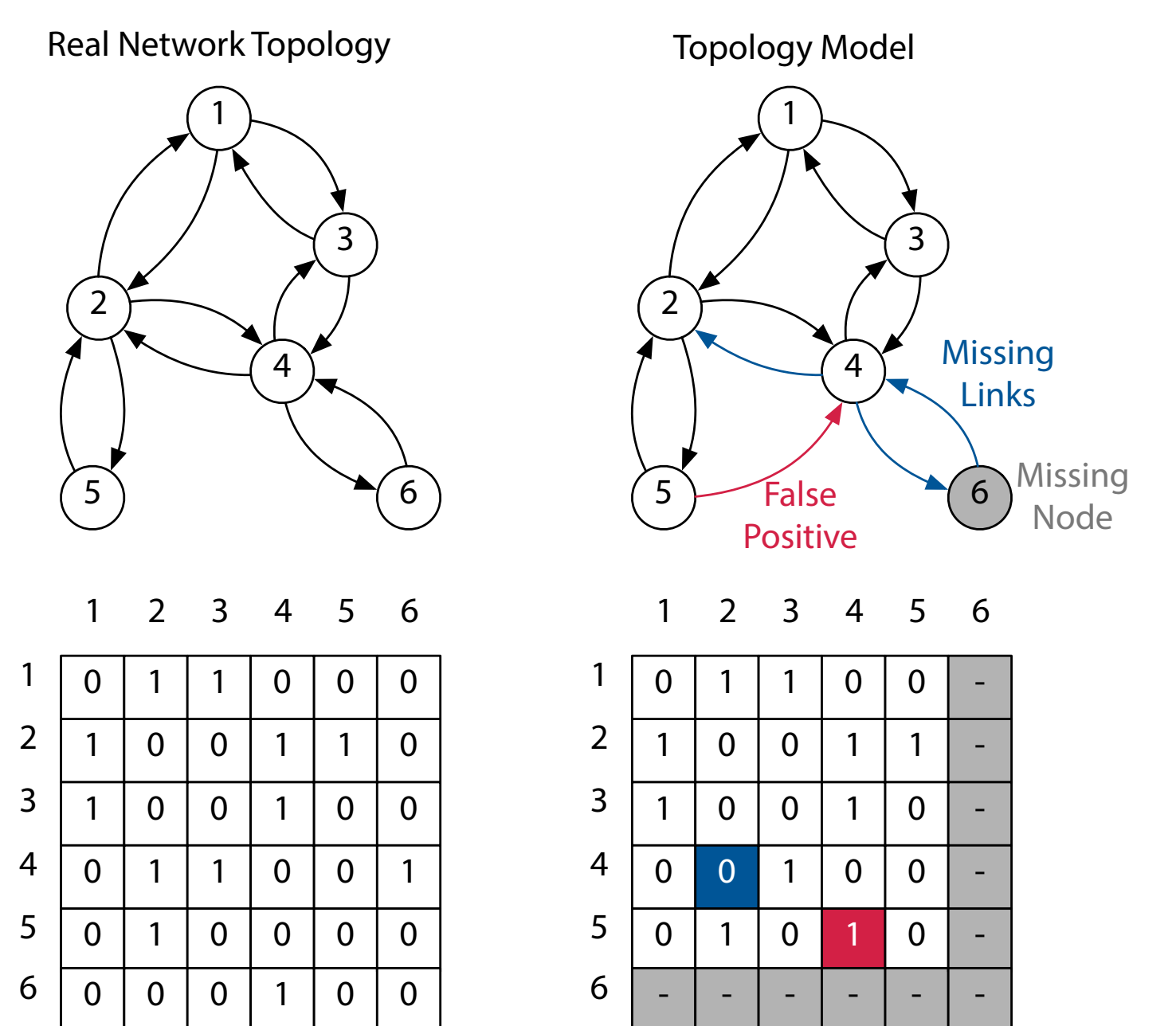
How It Works



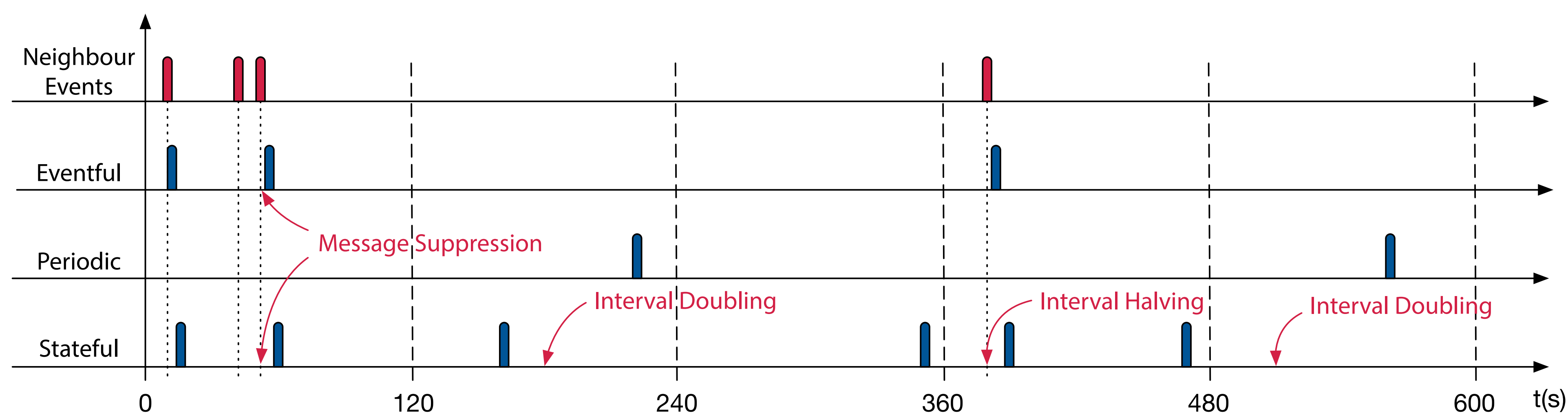
Features

- Complete network model as a directed graph
- Depends on: RPL & IPv6 NDP
- Probabilistic: Bloom Filters (BFs) are used to compress neighbourhood information
- Modes of Operation: Eventful, Periodic, & Stateful
- False Positive Discovery Mechanisms
- Model Accuracy (Ma) = $f(\text{Inconsistencies})$

Inconsistencies

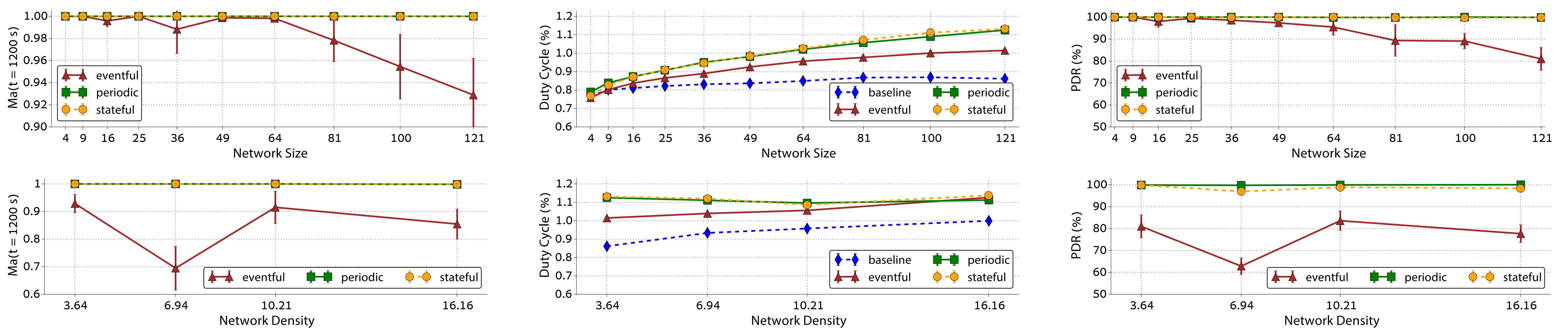


Modes of Operation (MOPs)

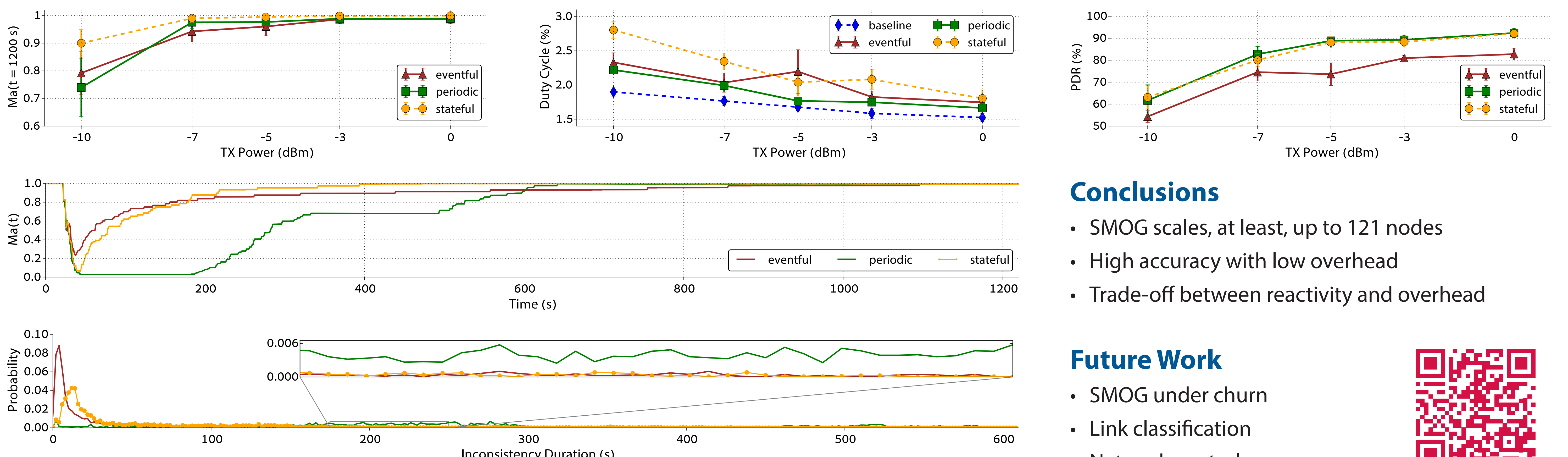


Evaluation

Simulation-based Evaluation: Cooja simulations with different square grid networks with a corner sink and UDGm radio model.



Testbed-based Evaluation: Experiments in Indriya Testbed (100 nodes) with five different transmission powers resulting in networks with different densities.



Conclusions

- SMOG scales, at least, up to 121 nodes
- High accuracy with low overhead
- Trade-off between reactivity and overhead

Future Work

- SMOG under churn
- Link classification
- Network control

