Performance analysis of QoS-Oriented Distributed Routing protocols for wireless networks using NS-2.35

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ENSC 833 : NETWORK PROTOCOLS AND PERFORMANCE

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Roadmap

- **Motivation**
- Introduction
- Related work
- Simulation design
- NS-2.35 model
- Simulation results
- Conclusions
- Challenges and future work
- References

Acronyms

- **EAODV:** Enhanced Ad-hoc on demand distance vector routing
- **QOD:**QOS oriented dynamic routing protocol
- **DSR:** Dynamic source routing
- **AS:** Access Point
- **UDP:** User datagram protocol
- **CBR:** Constant Bit rate
- **TX**: Transmission

Motivation

- Related to my Co-op work
- Emergence of real time and multimedia applications have stimulated the need of high Quality of Service (QoS) support for wireless networking environment.
- **Challenges in QOS**
  - Mobility
  - Bandwidth constraints
  - Energy constraints
  - Dynamic changing topology

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Introduction

- **Data transmission in hybrid networks has two features**.
  - AP can be a source or a destination to any mobile node.
  - Number of transmission hops between a mobile node and an AP is small.
- **EAODV:** Node always forwards a packet to a next hop node that has small buffer usage than itself and high remaining energy

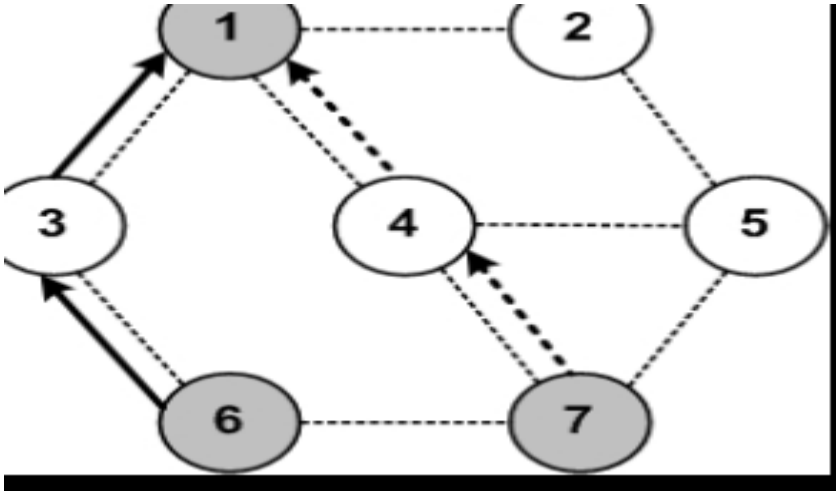

Fig. 1

Reference:**[1]**

QoS-Oriented distributed routing protocol

- **QOD:** If source node is not within the TX range of the AP, it selects nearby neighbors that can provide QOS services to forward its packets to AP in a distributed manner

- Neighbor node selection criterion of **QOD**:
  - Queuing condition
  - Channel condition
  - Bandwidth availability

- Neighbor node selection criterion of **EAODV**:
  - Power availability
  - Buffer usage

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Related work

[1]. Agarwal, K., & Awasthi, L. K. (2008, December), Enhanced AODV routing protocol for ad hoc networks, In *Networks, 2008. ICON 2008. 16th IEEE International Conference* IEEE,2008.

- **Only AODV and EAODV is compared**

[2]. Li, Ze, and Haiying Shen. "A QoS-oriented distributed routing protocol for hybrid networks." *Mobile Adhoc and Sensor Systems (MASS), 2010 IEEE 7th International Conference* IEEE, 2010.

- **QOD routing protocol is discussed and simulated**

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Simulation design

SIMULATOR	Network Simulator 2
NUMBER OF NODES	Random
TOPOLOGY	mobile users
INTERFACE TYPE	Phy/WirelessPhy
MAC TYPE	802.11
QUEUE TYPE	Droptail/Priority Queue
QUEUE LENGTH	50 Packets
ANTENNA TYPE	Omni Antenna
PROPAGATION TYPE	Tworay Ground
ROUTING PROTOCOL	DSR
TRANSPORT AGENT	UDP
APPLICATION AGENT	CBR
SIMULATION TIME	50seconds

Network model

Basic Hybrid N/w model

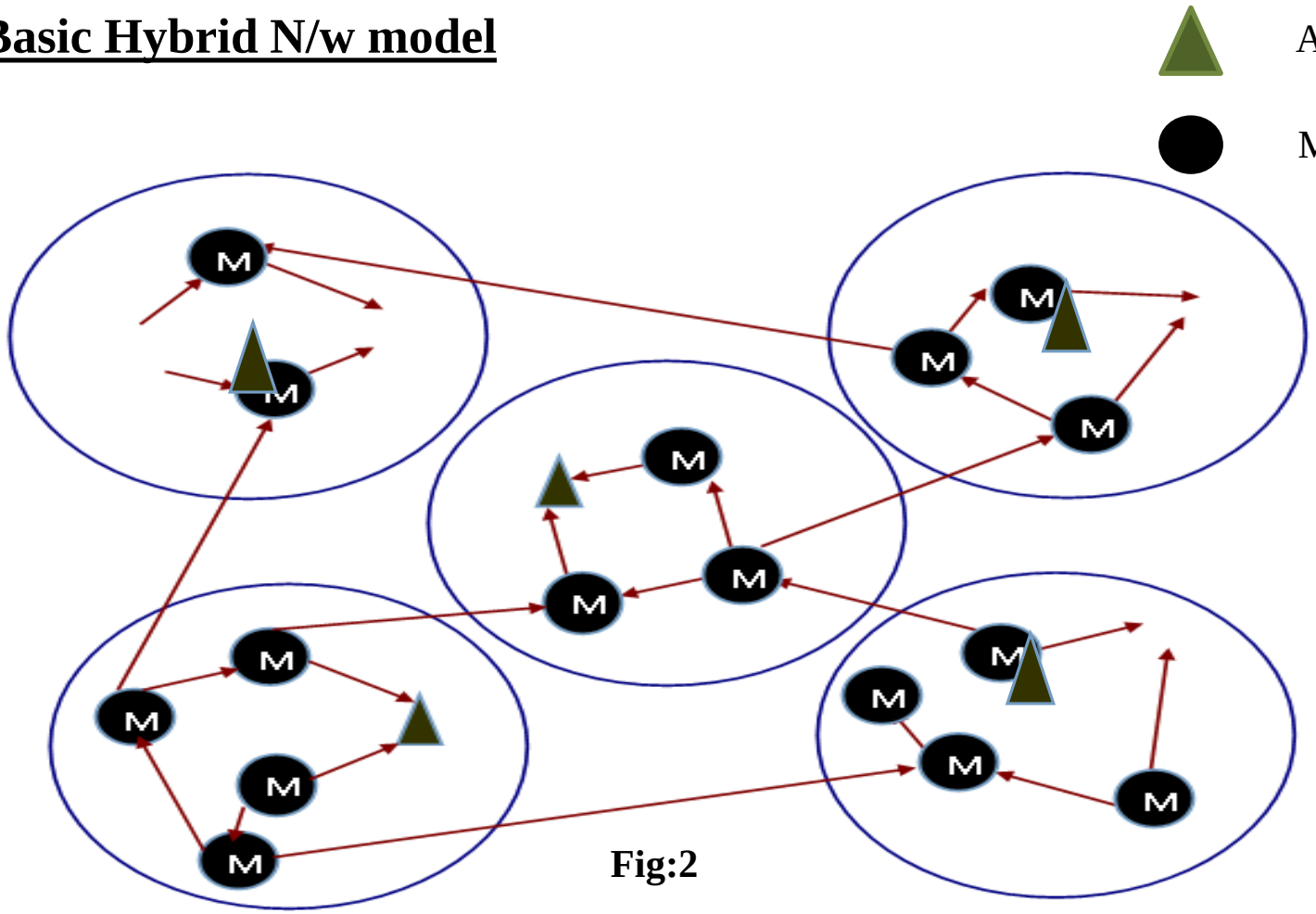

Fig:2

Reference:[1]

Flow chart

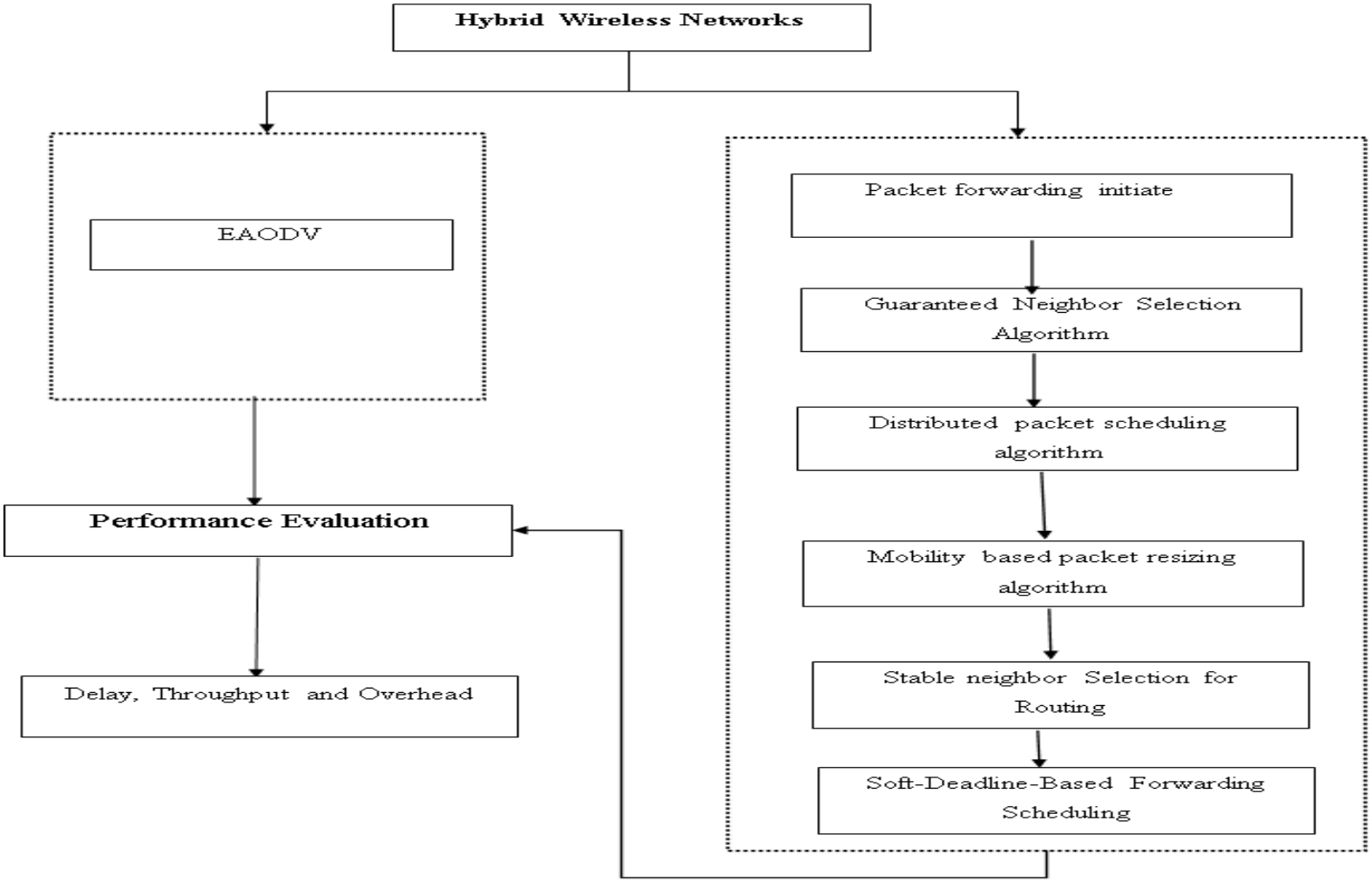

Fig :3

Reference:[2]

Network topology

- 30 mobile nodes in the network
- APs are fixed nodes
- Source nodes connects to nearest AP using neighbor node while ensuring QOS.

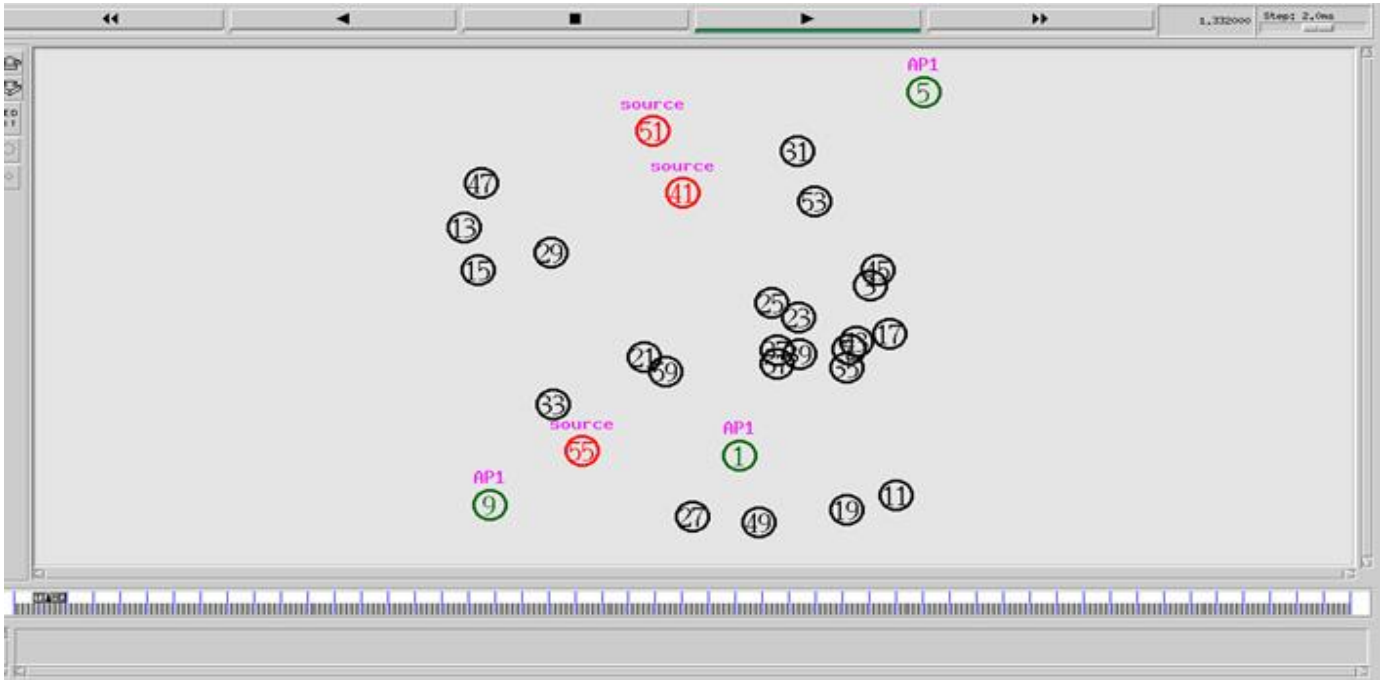

Fig :4

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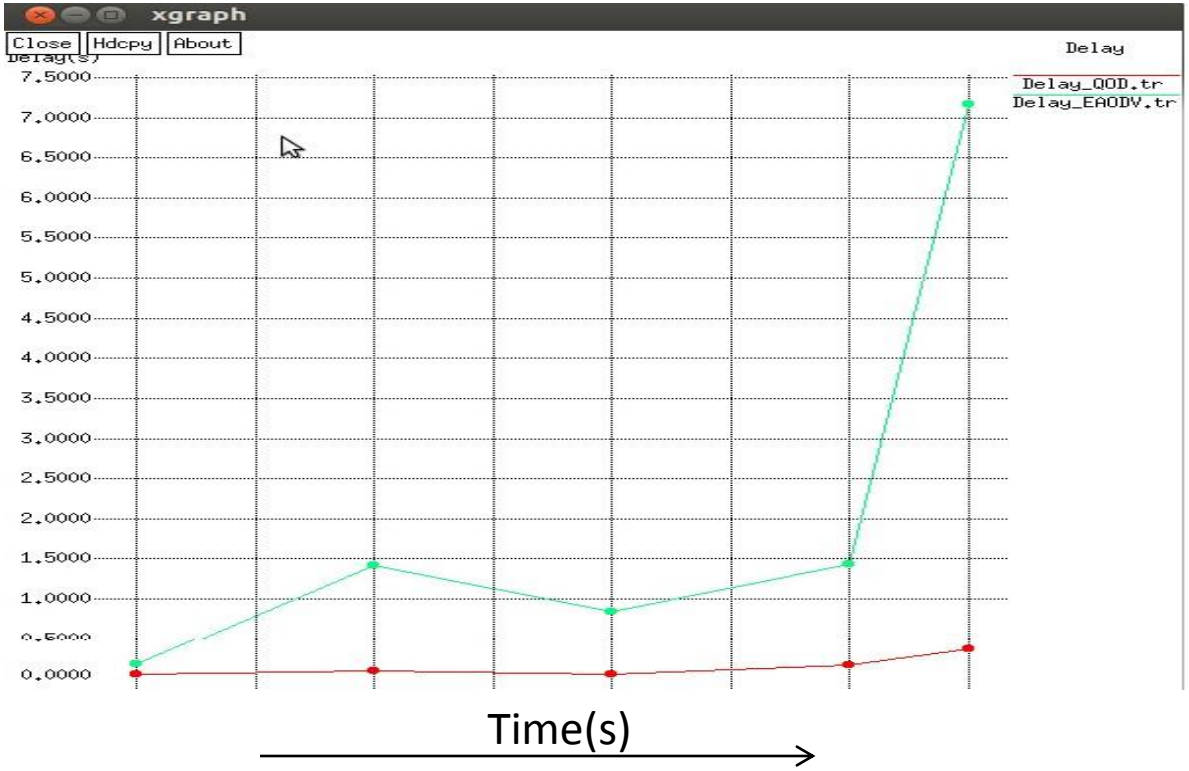
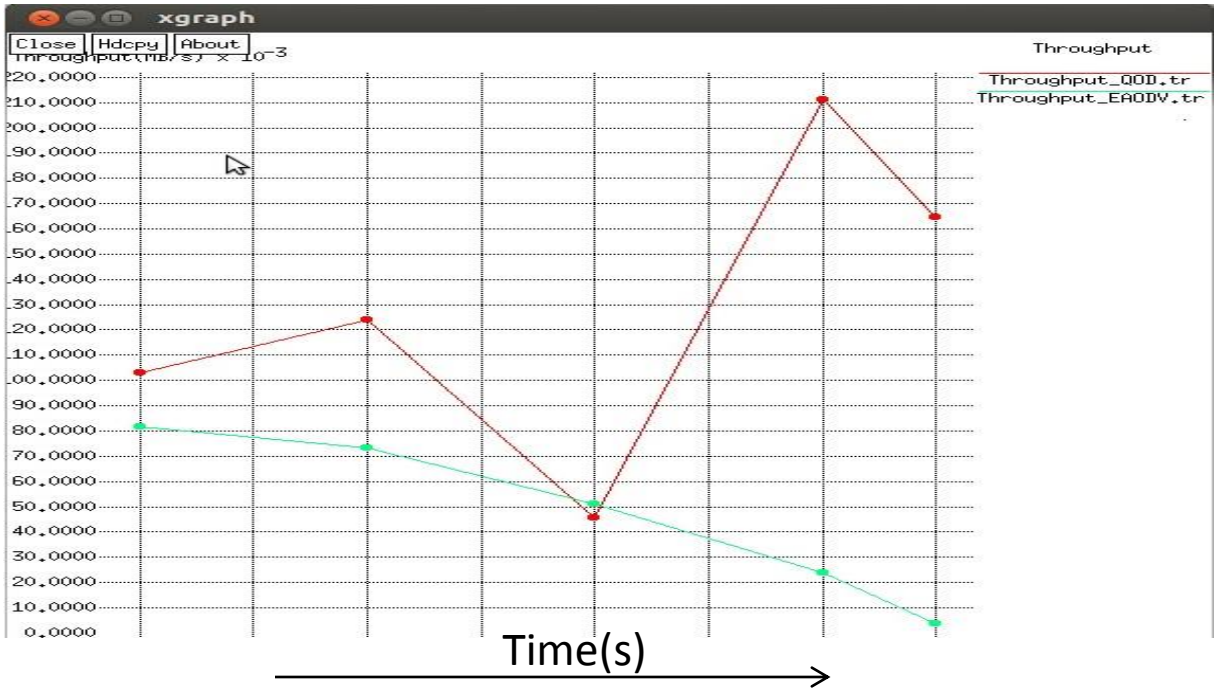
Transmission delay

- **Analysis:** QOD has performed better as comparison to energy based EAODV
  - EAODV has higher TX delay in this scenario.
- **Reason:** QOD uses the distributed packet switching algorithm which reduce the TX delay.



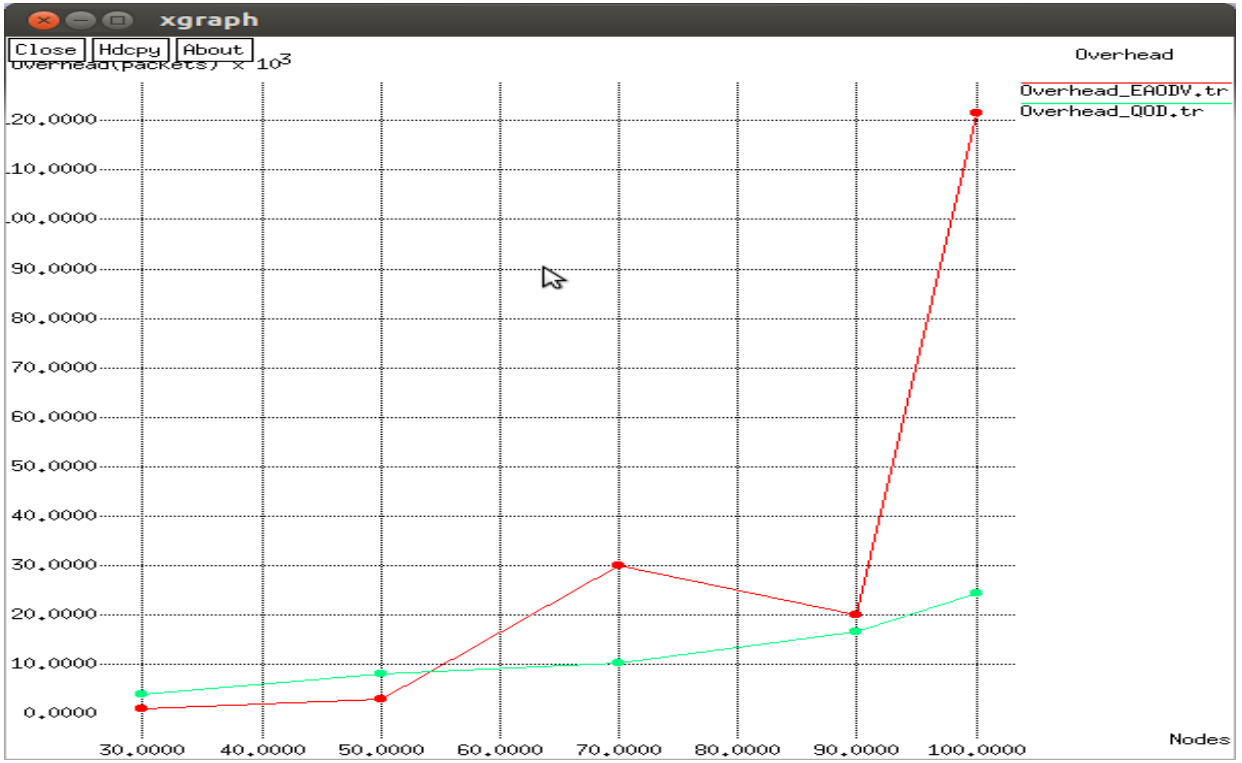
Throughput

- **Analysis**: QOD has performed better as comparison to energy based EAODV
  - Result may vary according to scenario and topology chosen.
- **Reason:** In EAODV the delay resulted from the path searching degrades the ability to meet the QOS requirements as comparison to QOD.



Overhead

- **Analysis:** In low mobility environment, QOD generates higher overhead than E-AODV. But with high mobility EAODV has higher overhead.



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Conclusion

Extensive simulations of hybrid wireless networks is conducted and the findings are

- Direct adoption of the QOS routing techniques in hybrid networks inherits their drawbacks such as race condititon.
- QOD provides better quality of service than energy based EAODV but this might differ depending upon scenario and topology.
- With low mobility in network QOD has higher overhead

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Challenges and Future Work

- **Challenges:**
  - Understanding TCL and ns-2.35
  - Implementation of mobile nodes with fixed node

- **Future work:**
  - Enhanced propose a QoS-based distributed routing protocol (QOD) for hybrid networks to provide QoS services in a highly dynamic scenario

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References

[1]. Hong-Peng Wang, and Lin Cui,An enhanced AODV for mobile ad hoc network. Machine Learning and Cybernetics, 2008 International Conference on Volume 2, 12--15 July 2008, 1135—1140

[2]. Z. Li and H. Shen, &ldquo,A QoS-Oriented Distributed Routing Protocol for Hybrid Networks,&rdquo, Proc. IEEE Seventh Int',l Conf. Mobile Adhoc and Sensor Systems, 2010

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