Improved Performance of Enhanced Receiver Initiated Packet Train (E-RIPT) for Underwater Acoustic Networks

Nuttarit Leelapisut[1], Nitthita Chirdchoo[3], Teerawat Issariyakul[2], Lunchakorn Wuttisittikulkij[1]

Department of Electrical Engineering,Chulalongkorn University[1], TOT Public Company Limited[2]

Sensor Network and Embedded System Research Unit,Nakhon Pathom Rajabhat University[3]

Outline

➢Introduction

➢Protocol Design

➢Simulation & Results

➢Conclusion

Introduction

- **Why Underwater?**
  - The ocean covers 71% of the Earth's surface and contains 97% of the planet's water.
 - More than 95% of the underwater world remains unexplored.
- **Examples of Application in underwater**
  - Detect polluting chemical and biological substances
  - Monitor oceanic wind and current
 - Tsunami warning

Introduction

- **What is the difference between terrestrial and underwater wireless networks?**
  - Terrestrial networks use radio wave but underwater use acoustic waves.
    - Limit bandwidth
    - Long propagation delay.
    - Limited energy
- **Examples of MAC in UAN**
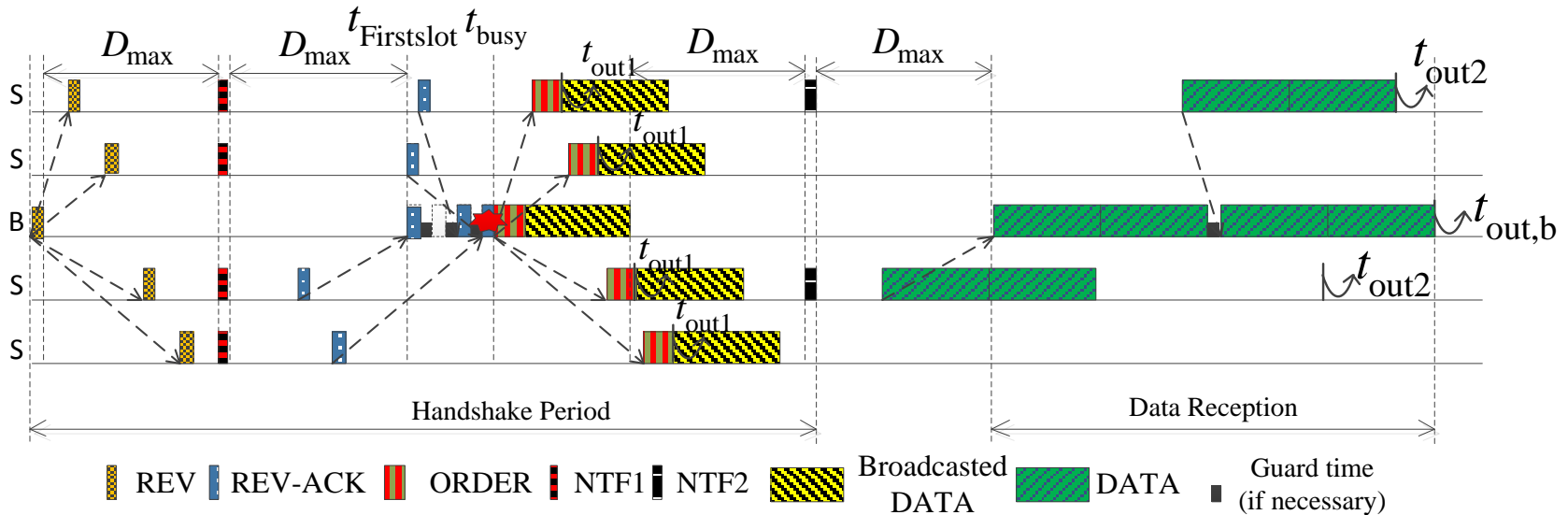 - MACA-U, RIPT, E-RIPT, MACA-APT

RIPT
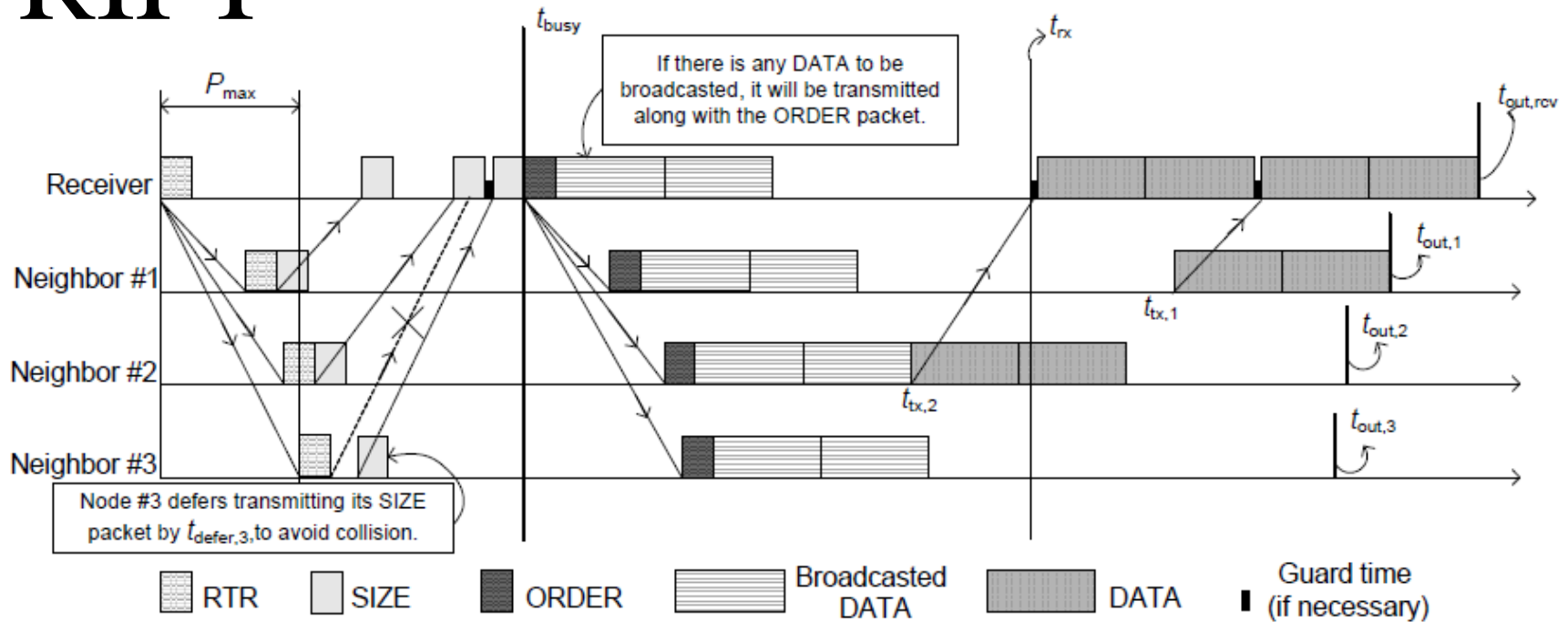
- RIPT was proposed by Chirdchoo et al.(2008)
  - is handshaking with Receiver-Initiated protocol.
  - use packet-train that can send more than one DATA packet in each handshake round.

E-RIPT
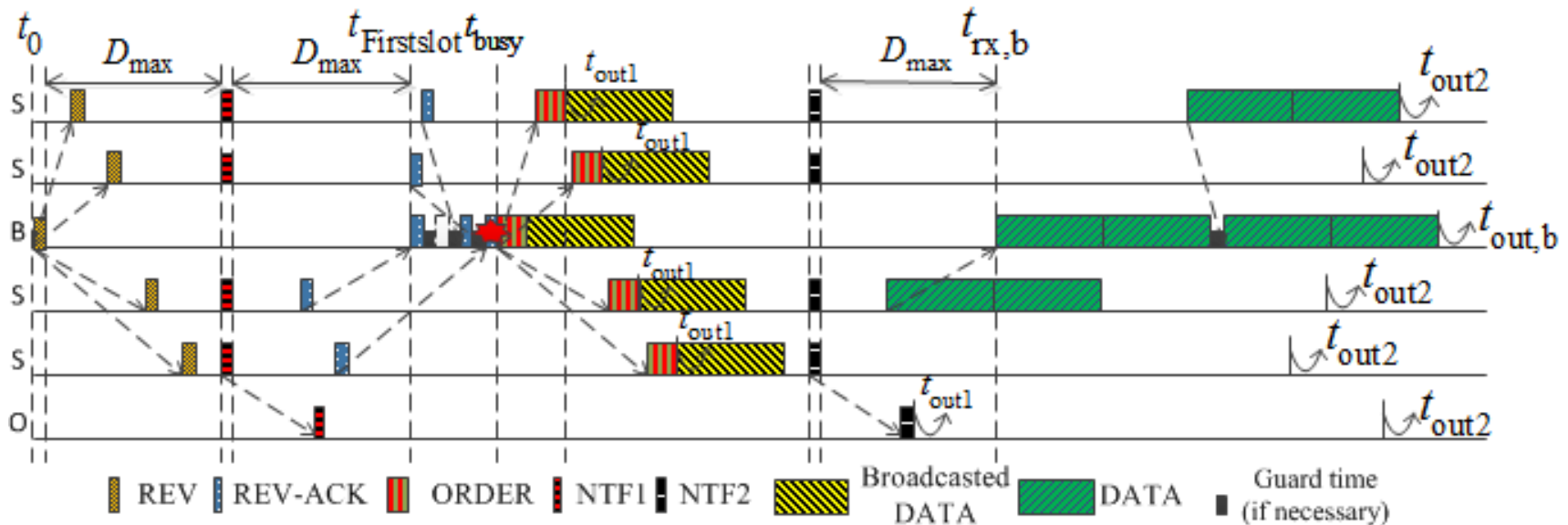
- E-RIPT (2014)
  - Use slot for reservation packet.
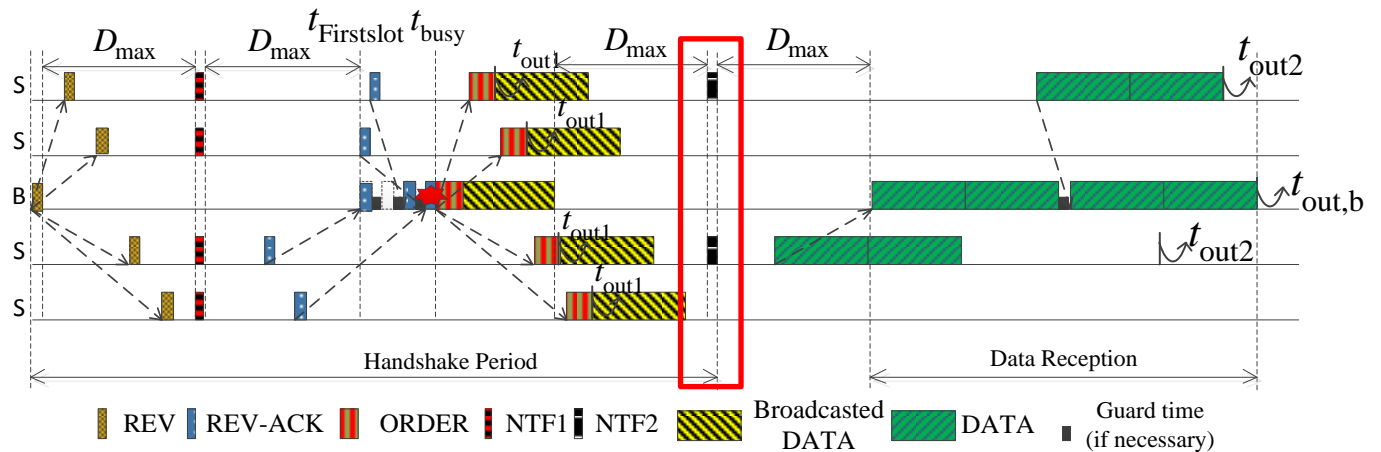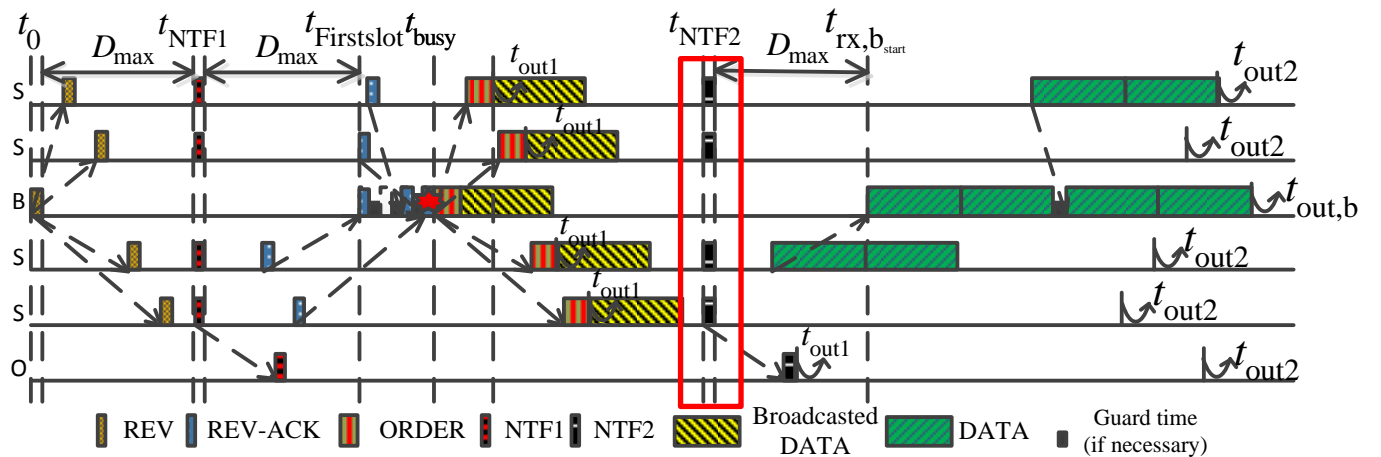 - Receive information before assign DATA slot.

ME-RIPT

- ME-RIPT stands for Modify Enhanced Receiver-Initiated Packet Train
- Remove unnecessary control packet to alleviates exposed node problems of E-RIPT
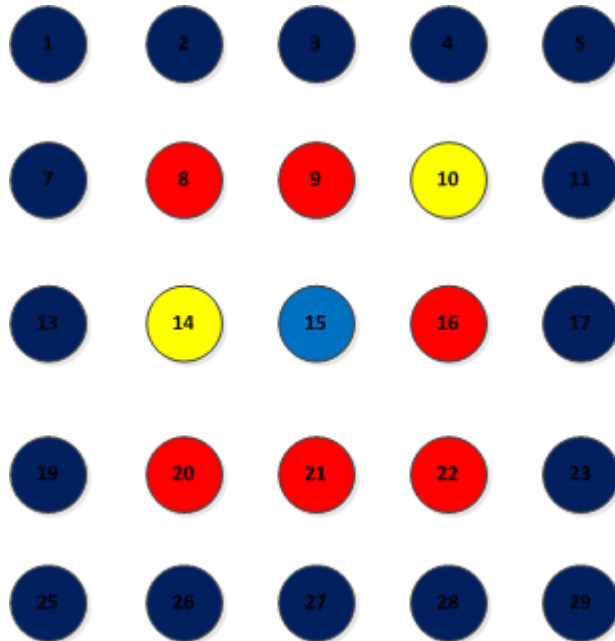
ME-RIPT and E-RIPT

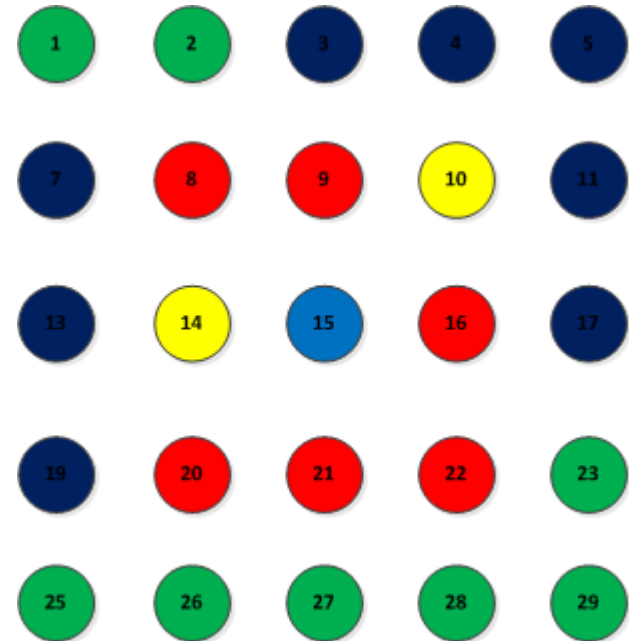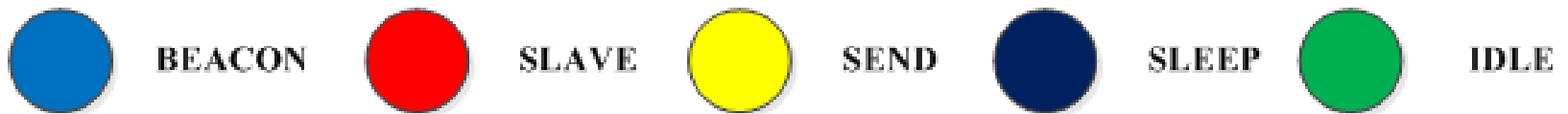# Node state

RIPT, E-RIPT

ME-RIPT

BEACON   SLAVE   SEND   SLEEP   IDLE
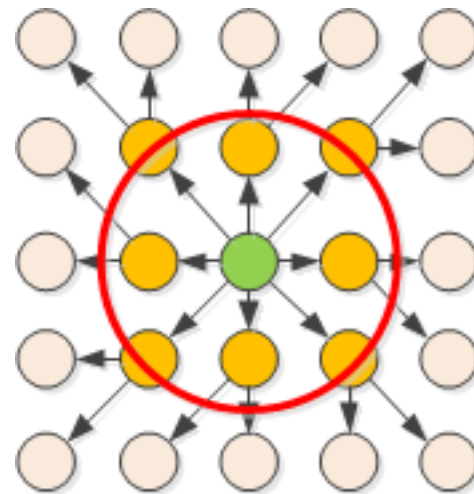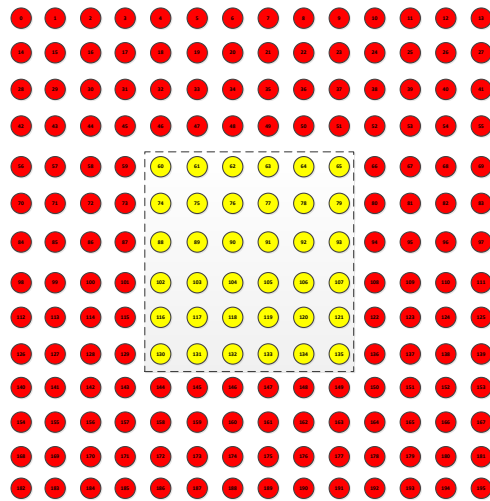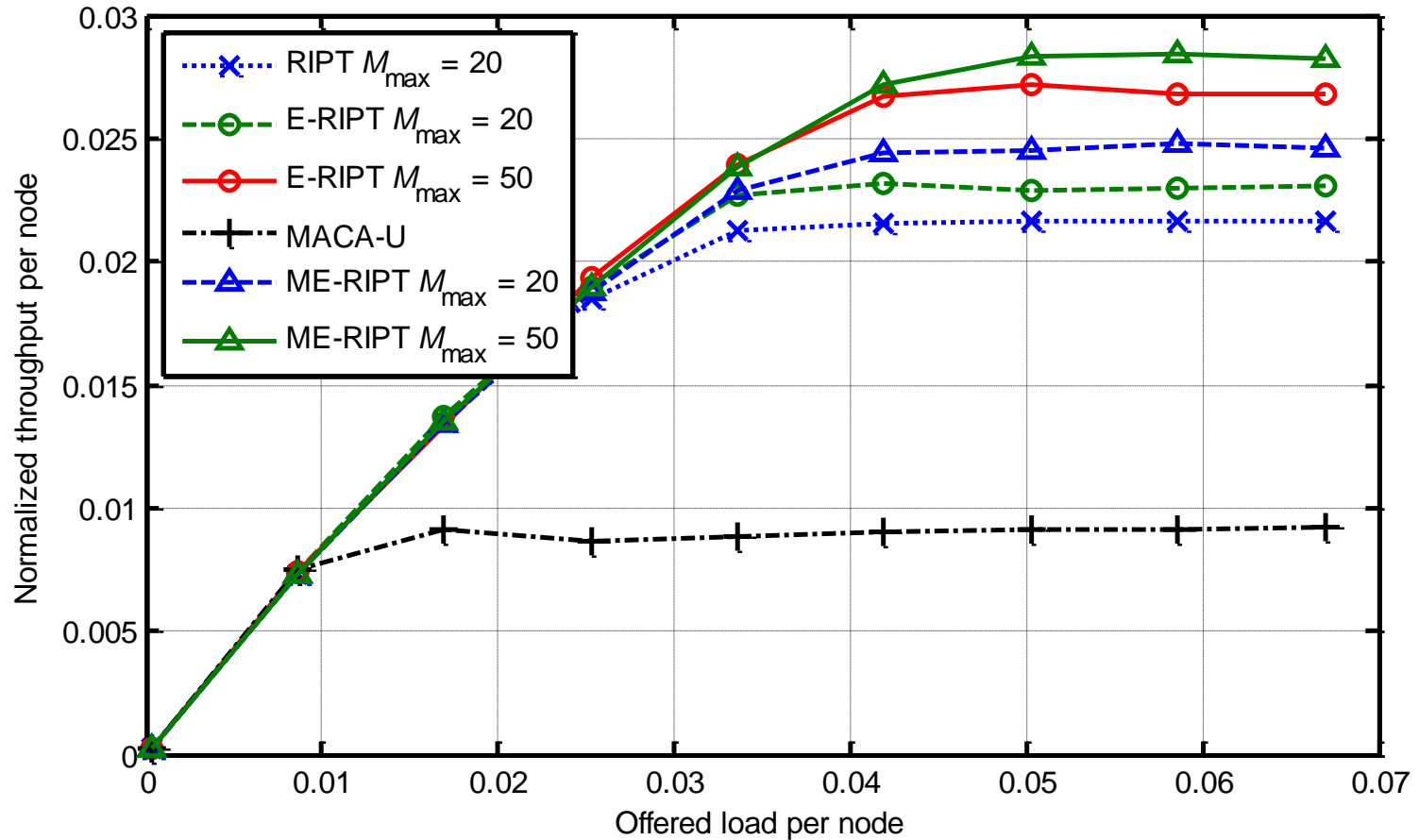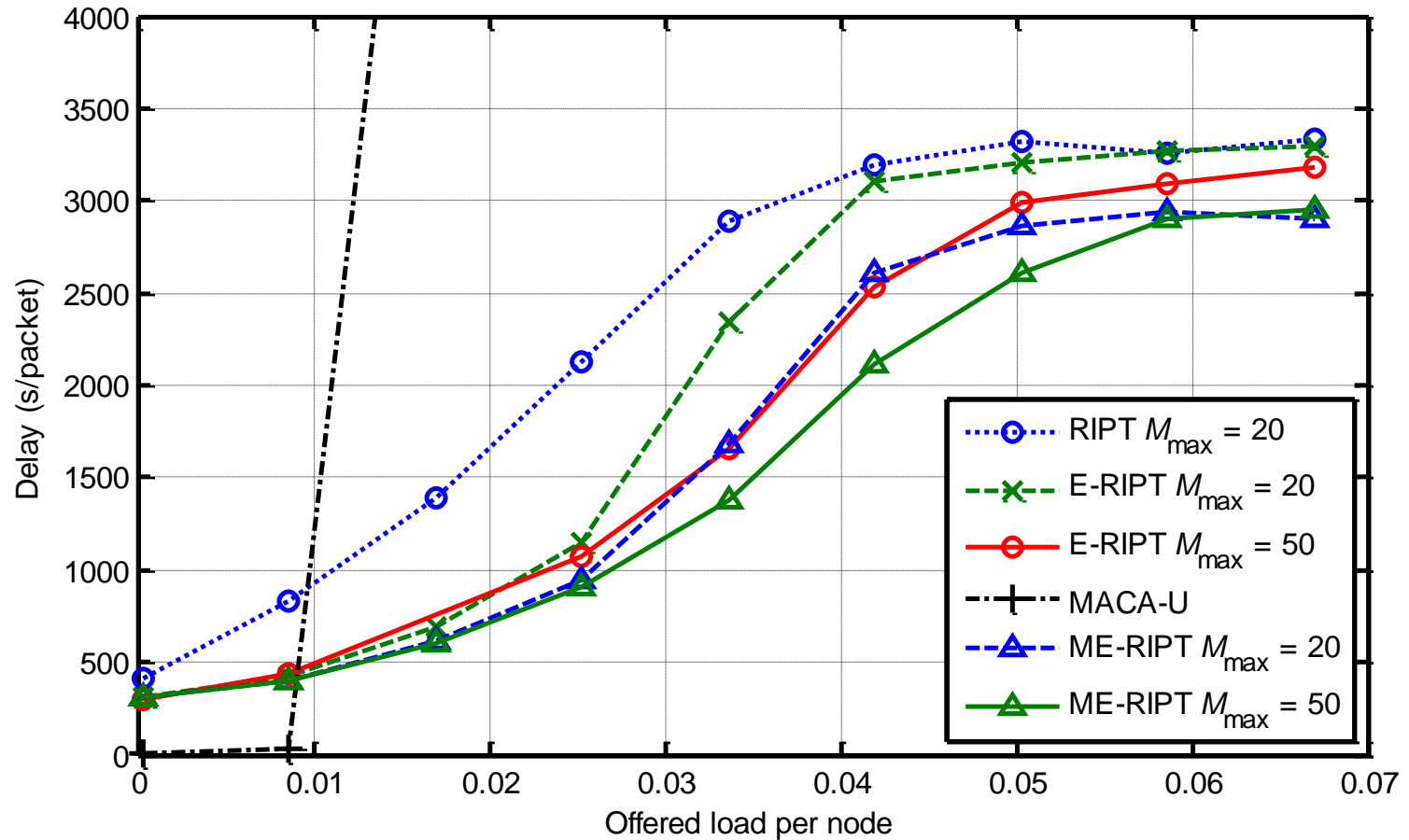
Simulation Model

- The open source simulator NS-3 version 3.14.1 is deployed with UAN module.
- Network topology has 196 nodes, only data of 36 nodes in the center of network topology are collected.
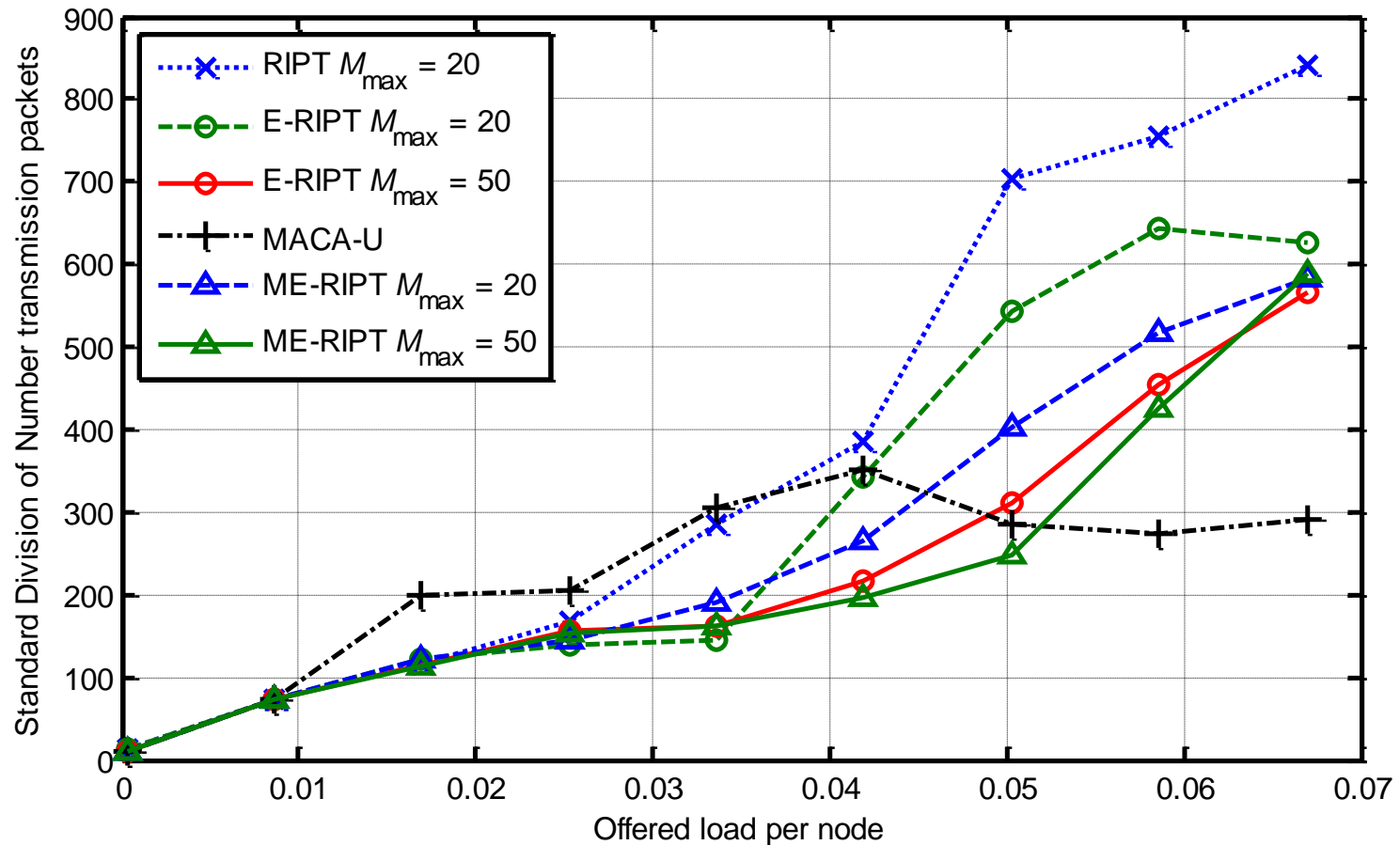
Throughput per node

Delay

Fairness (SD of No. of transmission)

Conclusion

- ME-RIPT alleviates exposed node problems that its predecessors RIPT and E-RIPT experience.
- The simulation results show the improvement in throughput, delay, and fairness.

Q & A

Thank you