ENSC 427 Project

ZigBee Transmission Analysis in Tree Topology

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Agenda

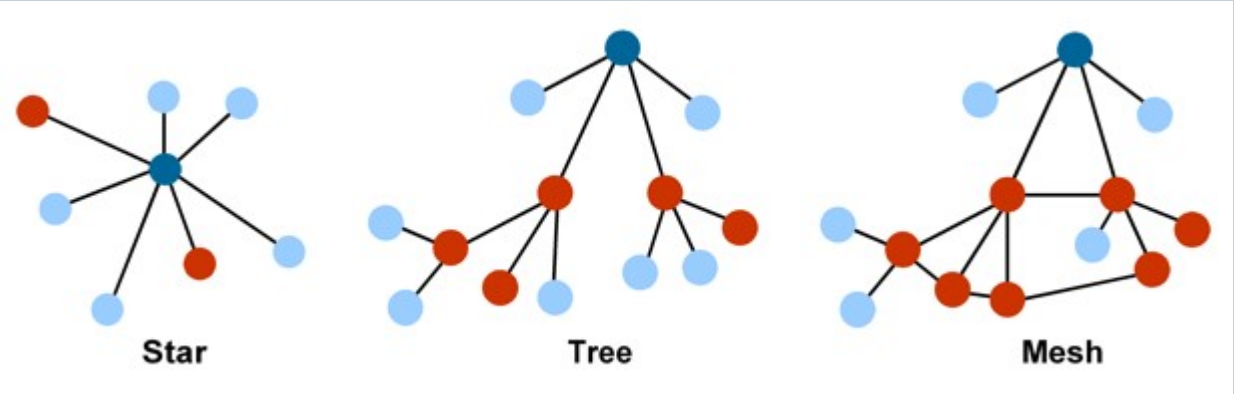
- Introduction to ZigBee
- How does ZigBee work?
- Project Overview
- Simulation Scenarios and Results
- Observation
- References

Introduction to ZigBee

- A low-cost, low-power, wireless network (IEEE 802.15.4)
- Similar to Bluetooth, but with lower power consumption and slower speed
- Applications – Home Entertainment and Control, Mobile Services, Home Awareness
- Topologies: Star Topology, Mesh Topology, Tree Topology

How Does ZigBee Work?

- **Co-ordinator** (Dark Blue) – All ZigBee network must have one and only one Co-ordinator. It defines the frequency channel of the network and allows other devices to join the network
- **Router** (Red) – Tree or Mesh topology need at least one router. It allows data to be routed from node to node.
- **End Device** (Light Blue)– An user-end communication device (e.g. remote control)



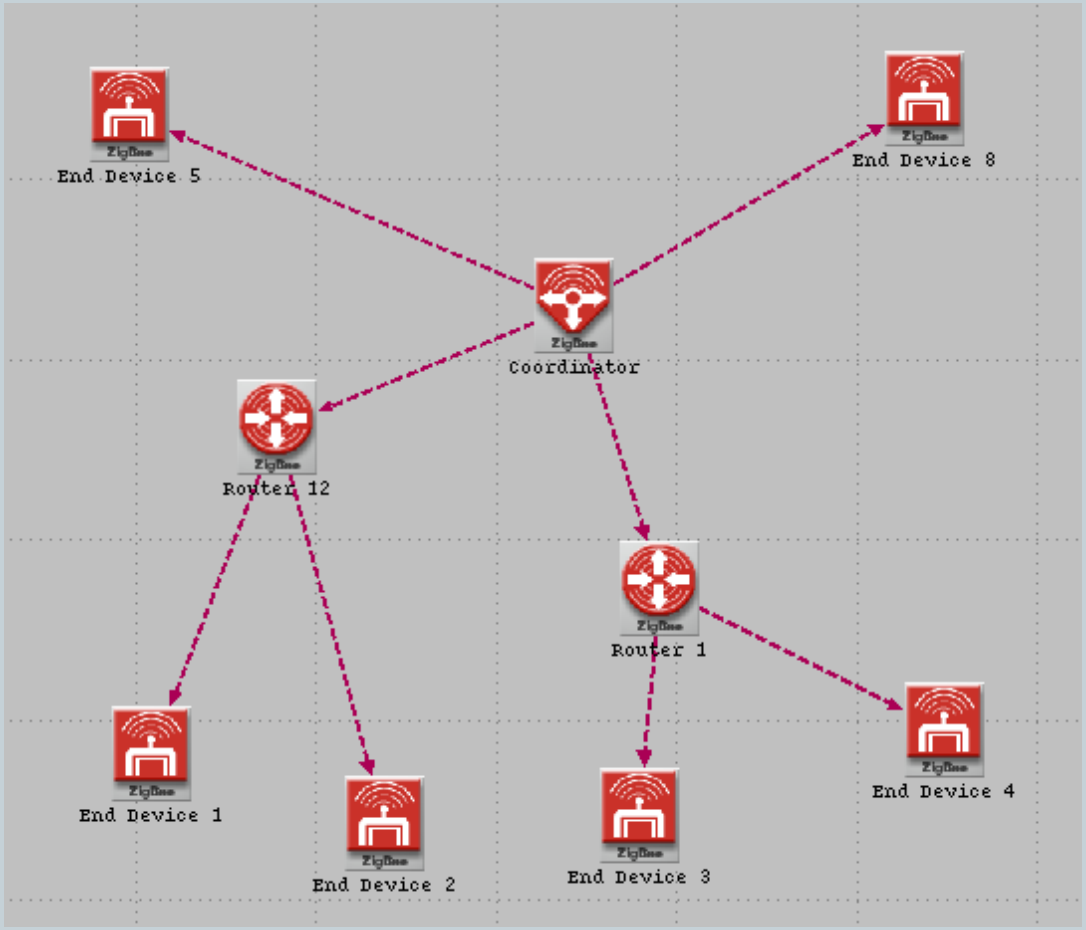
Project Overview

- Analyze the performance of ZigBee network in Tree Topology
- Analyze the performance of ZigBee network with a floating end-device in Tree Topology
- Analyze the performance of ZigBee network for a mobile end-device travelling across different networks

Simulation Scenarios and Results

- Consists of 1 co-ordinator, 2 routers and several end-devices
- All nodes are static with random destination for each node

Simulation Scenarios and Results



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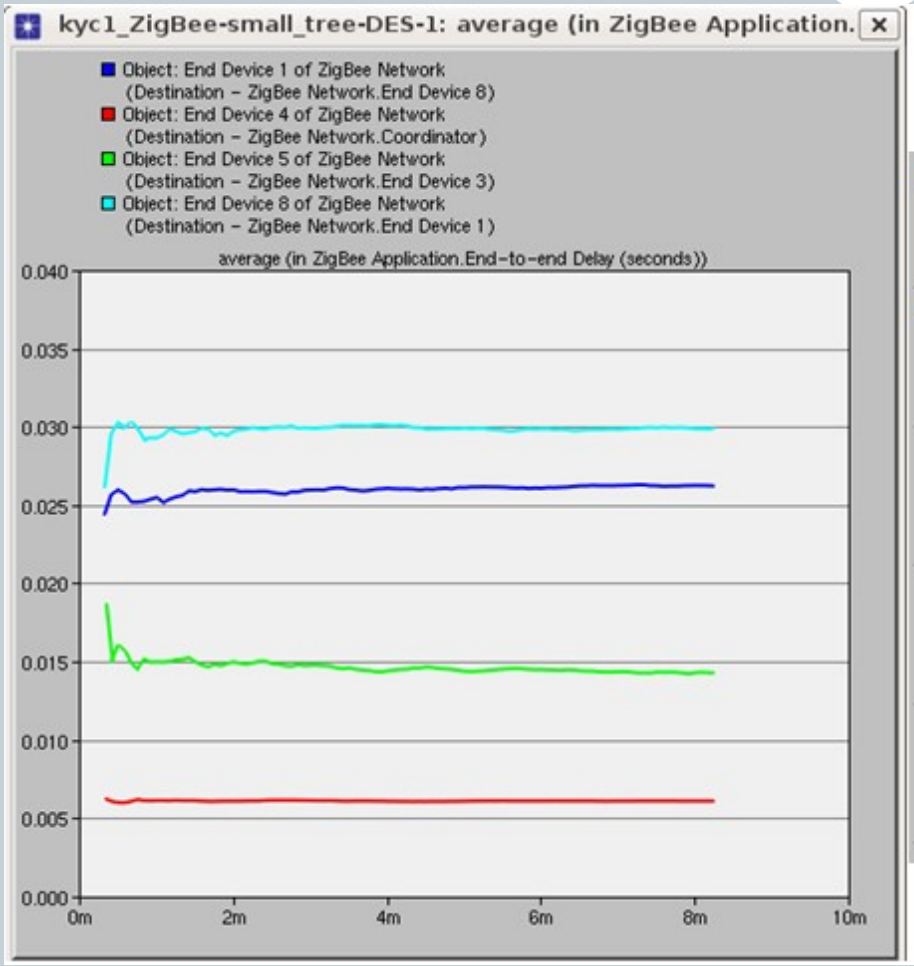
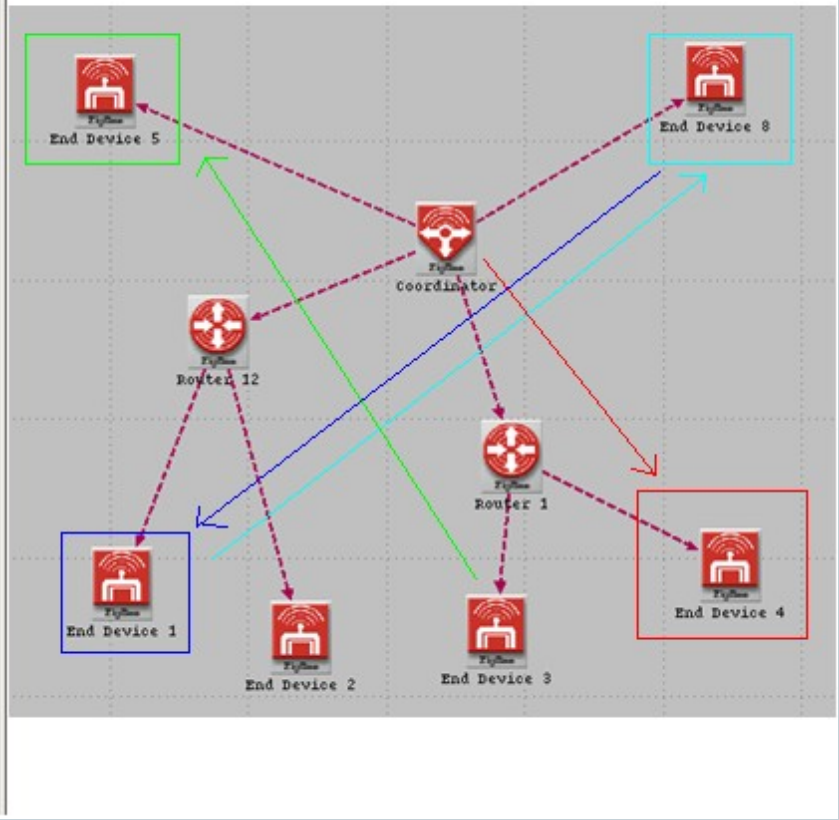
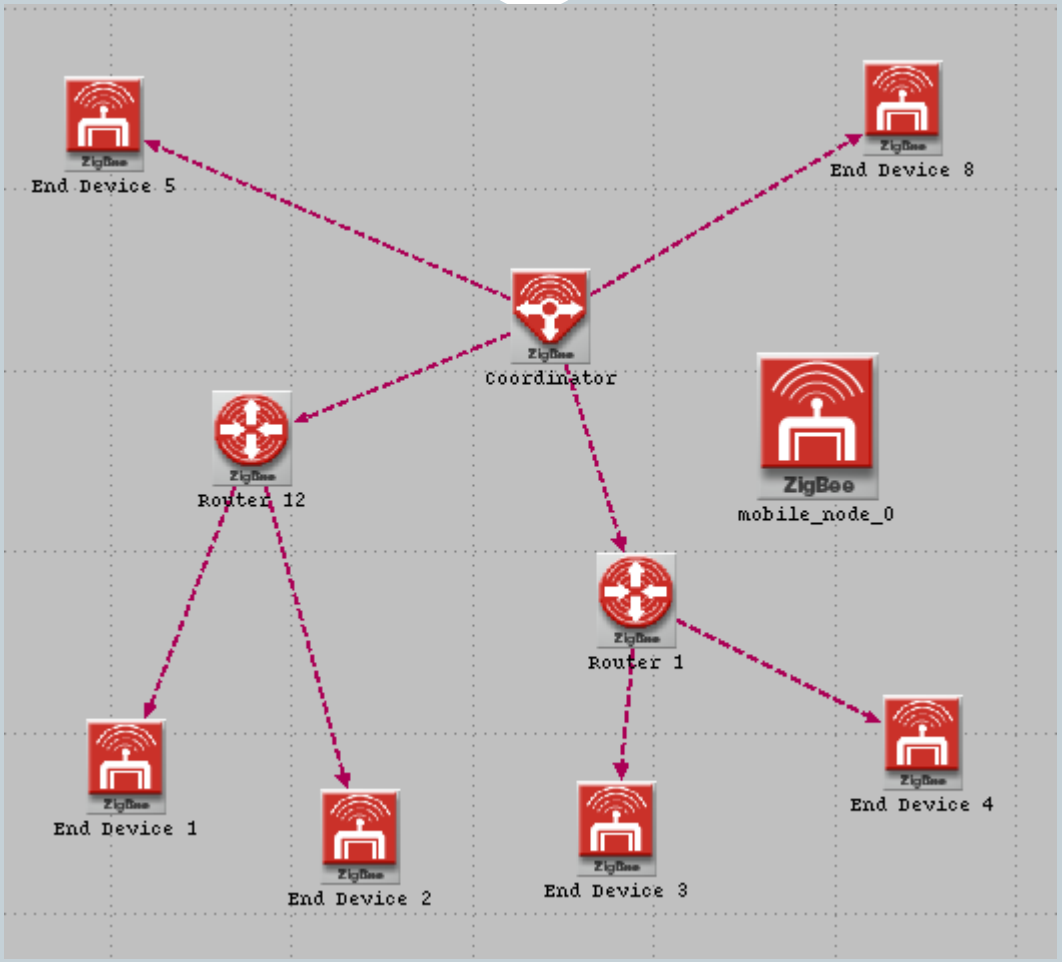




Simulation Scenarios and Results

- Base on the previous scenario
- 1 extra end-device locating inside the network coverage area

Simulation Scenarios and Results



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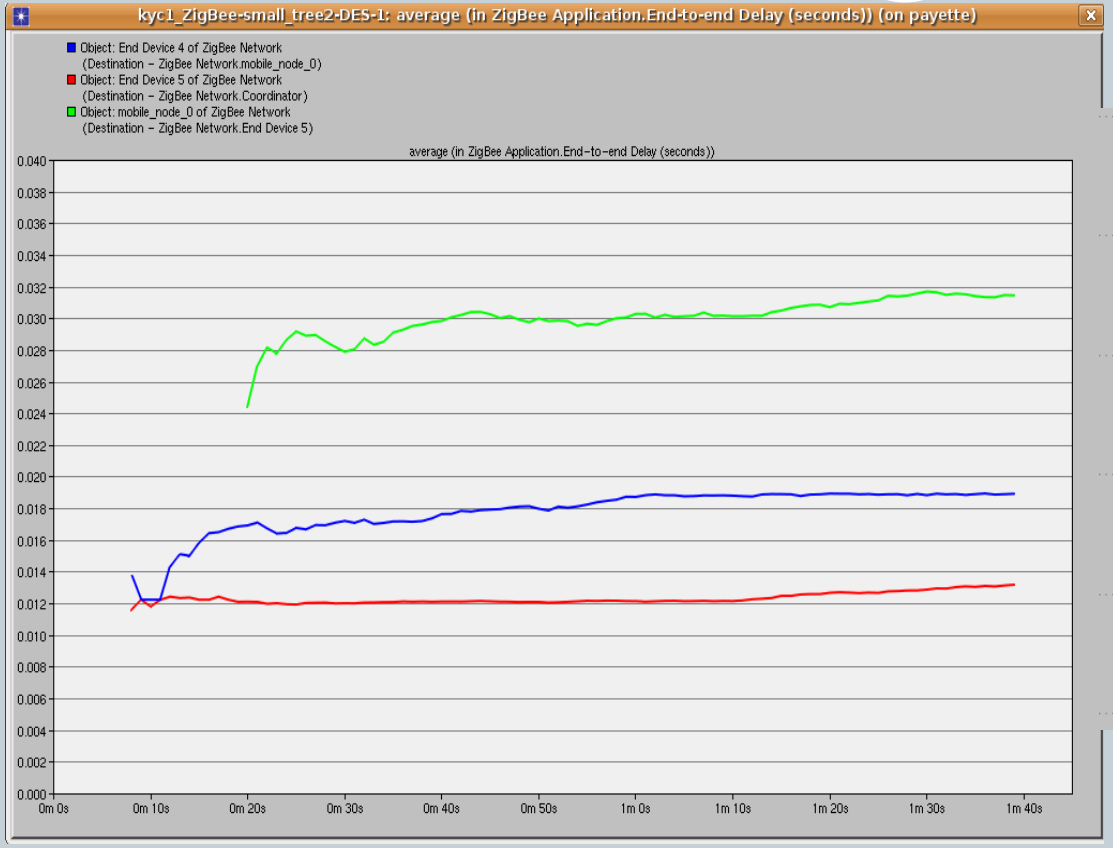
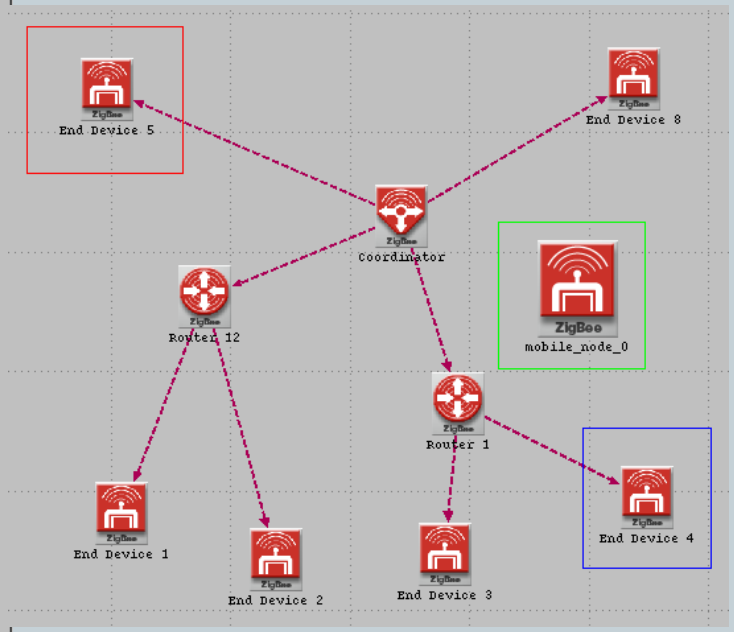
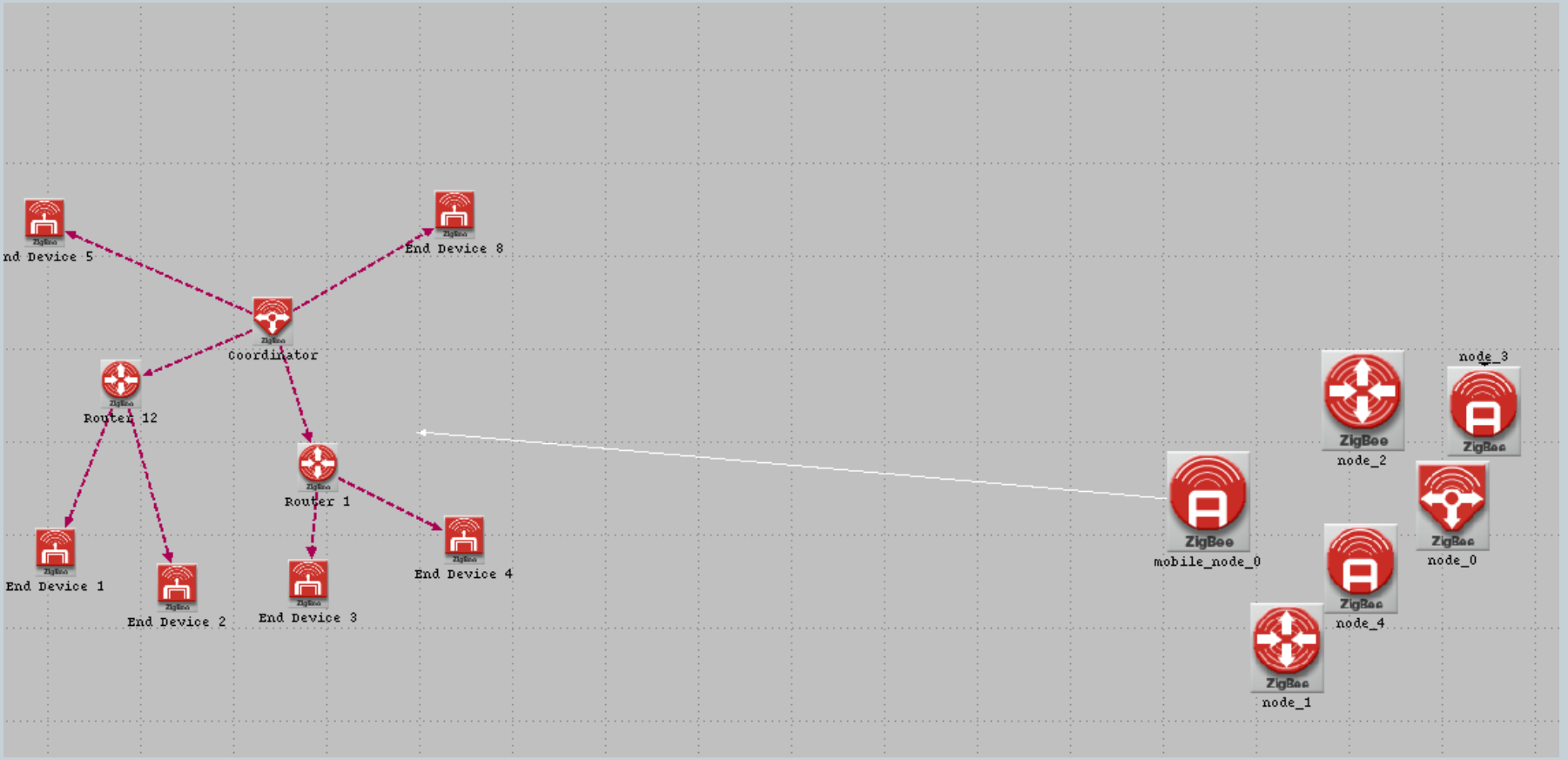




Simulation Scenarios and Results

- Consist of two networks with different topologies (Tree and Mesh)
- No overlapping coverage area
- Mobile node moving from Mesh topology network coverage area towards Tree topology network coverage area

Simulation Scenarios and Results



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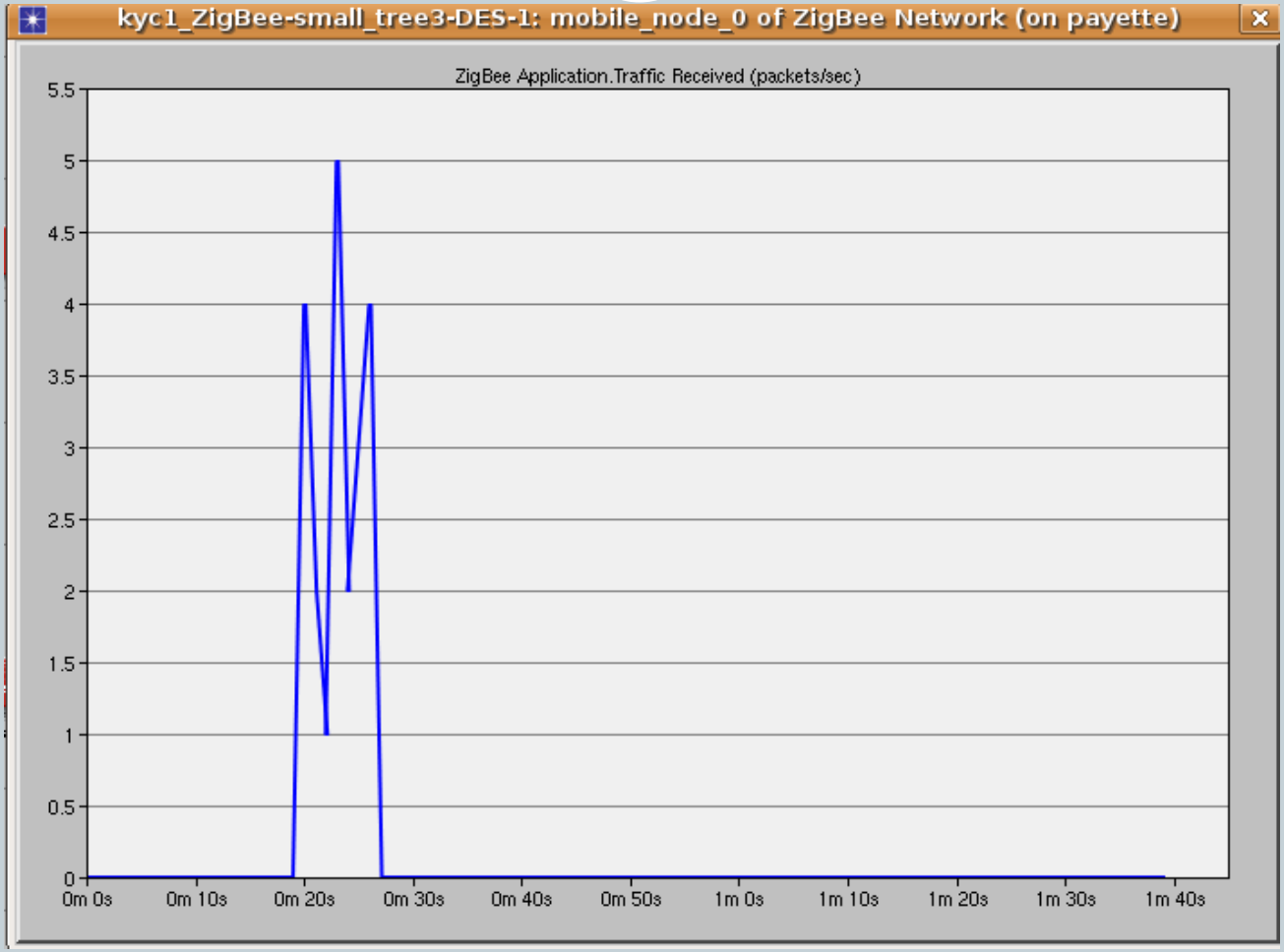

Observation

- Different routes result in different end-to-end delay. Delays usually depend on the status of the mediums
- An end device which is not in the topology has higher end-to-end delay than those are in the topology
- An end-device cannot belong to two different networks at the same time.

References

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Questions?