Sensor Networks Simulation - Stage 2

Benjamin Mannal and Madison Mejia

Project Requirements

- Variables:
  - Node Density Levels: Low (10 nodes), Medium (25 nodes), High (50 nodes)
  - Packet Density: Low (5s interval), Medium (3s interval), High (1s interval)
- Setup:
  - MAC Protocol: IEEE 802.11
  - Node Mobility: Static
  - Routing Protocols: Flooding (Not tested yet), AODV, GPSR
- Measure:
  - Average packet delay (ms)
  - Network throughput (packets/time)

Routing Methods

AODV

Ad-hoc On-Demand Distance Vector Routing:

- Adapts to dynamic network conditions.
- Distance vector approach to find paths
- Route request (RREQ) and route reply (RREP) messages

Flooding

Floods data to all neighbors:

- Broadcasts packets to all neighbors
- Simple implementation
- Could lead to duplicate messages
- Continues until destination is reached or TTL expires
- Nearly guaranteed delivery

GPSR

Greedy Perimeter Stateless Routing:

- Forwards to neighbor closest to destination
- Otherwise, packets routed around obstacle perimeter
- Requires minimal routing information

Simulation Parameters

High Node Density (50)

- Temporary control variable
- High starting point allows us to see the full effect of packet rate fluctuations and protocol type

Fluctuate Packet Rate (Low-High)

- From 5s intervals to 1s
- Completed sims for 50 node AODV
- Started running GPSR sim on high rate

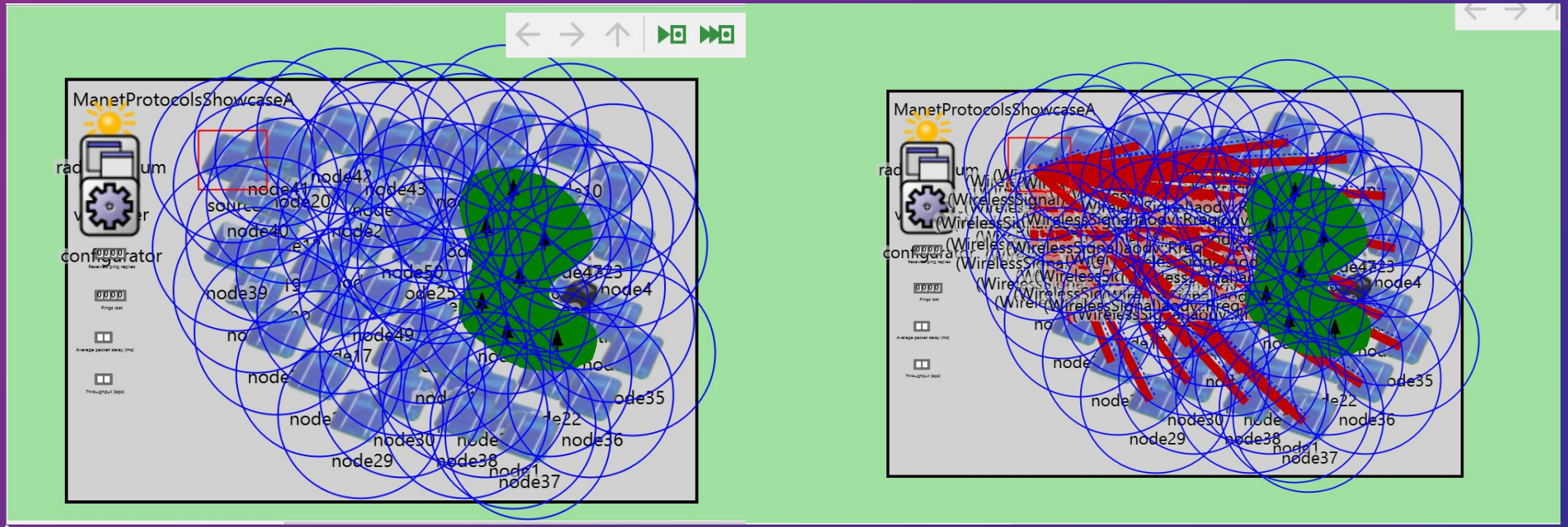
		N-Den			P-Rate		
Routing	OBJECTIVE	10	25	50	5s	3s	1s
AODV	Vary and change parameters to gather data for proper comparative analysis.						
GPSR	Vary and change parameters to gather data for proper comparative analysis.						

Project File Structure

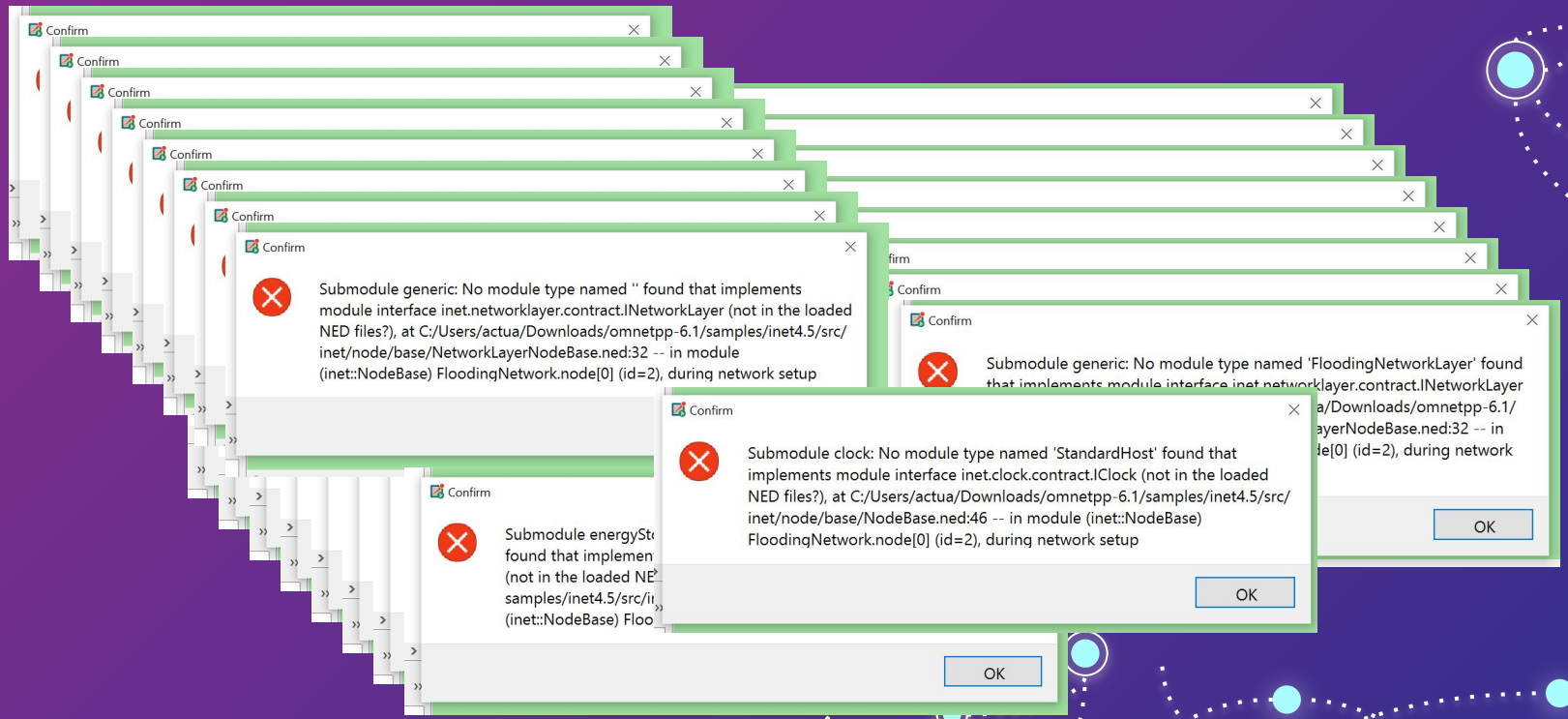
- SnSim
  - Binaries
  - Includes
  - simulations
    - results
    - Aodv_High_High.anf
    - Aodv_High_Low.anf
    - Aodv_High_Medium.anf
    - Gpsr_High_High.anf
    - omnetpp.ini
    - package.ned
    - run
  - src
    - SnSim_dbg.exe - [amd64/le]
    - SnSim.exe - [amd64/le]
    - Makefile
    - ManetProtocolsShowcase.ned
    - package.ned
  - out
  - Makefile

- results
  - Aodv_High_High-#0.sca
  - Aodv_High_High-#0.vci
  - Aodv_High_High-#0.vec
  - Aodv_High_Low-#0.sca
  - Aodv_High_Low-#0.vci
  - Aodv_High_Low-#0.vec
  - Aodv_High_Medium-#0.sca
  - Aodv_High_Medium-#0.vci
  - Aodv_High_Medium-#0.vec
  - Aodv_Medium_Low-#0.vci
  - Aodv_Medium_Low-#0.vec
  - Gpsr_High_High-#0.sca
  - Gpsr_High_High-#0.vci
  - Gpsr_High_High-#0.vec
  - Gpsr_High_Low-#0.vci
  - Gpsr_High_Low-#0.vec
  - Gpsr-#0.sca
  - Gpsr-#0.vci
  - Gpsr-#0.vec
- Aodv_High_High.anf
- Aodv_High_Low.anf
- Aodv_High_Medium.anf
- Gpsr_High_High.anf

Simulation Visual w/ Data



Issues Encountered



PROGRESS CHART

	DESCRIPTION	PROGRESS
Stage 1 Report	Initial Plan for project, timeline, project details, and extra credit.	Completed
Stage 2 Sim	Proper simulation with the various routing methods correctly simulated.	50%
Stage 2 Data	Analyzing the data collected in simulation.	No
Stage 3	TBD	TBD

THANKS

References:
https://en.wikipedia.org/wiki/Greedy_Perimeter_Stateless_Routing_in_Wireless_Networ ks

https://inet.omnetpp.org/docs/showcases/routing/manet/doc/#:~:text=Examples%20of%20reactive%20MANET%20routing,messages%20exchanged%20throughout%20the%2 0network

OMNet++ Installation Guide:
https://doc.omnetpp.org/omnetpp5/InstallGuide.pdf

https://inet.omnetpp.org/docs/users-guide/ch-other-network-protocols.html
https://inet.omnetpp.org/docs/users-guide/ch-adhoc-routing.html