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Behavior Simulation and Functional Verification of WSN Application

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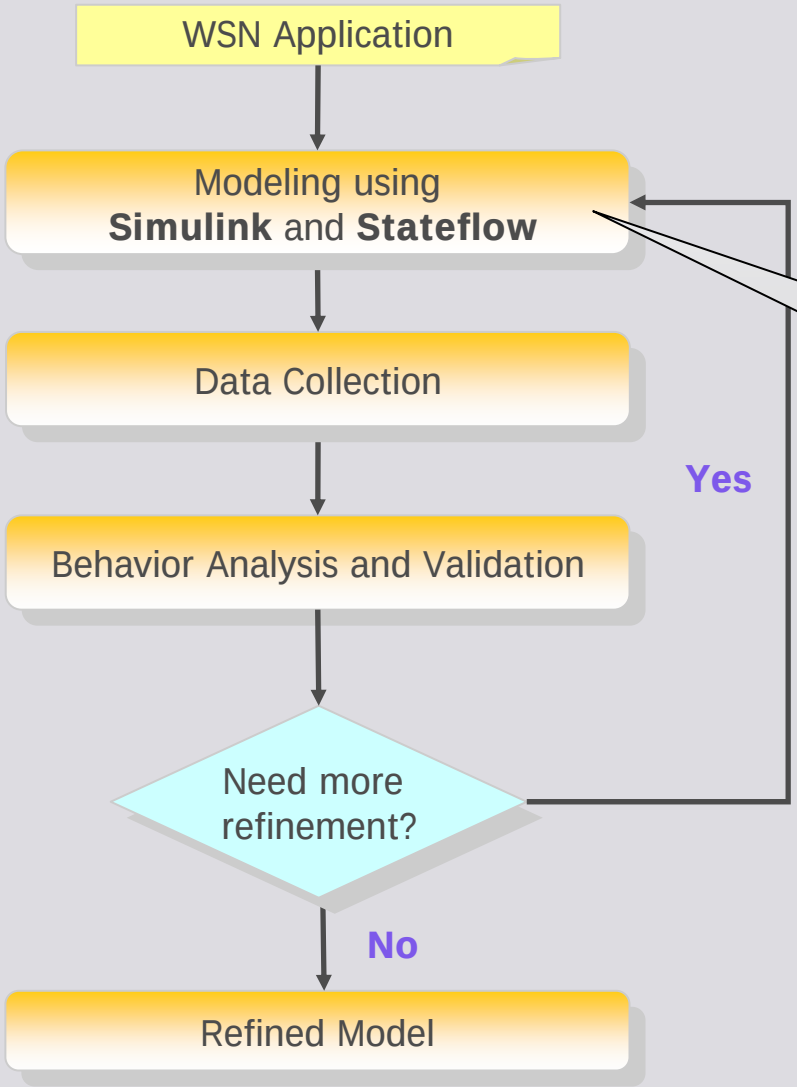
Problem Space and Motivation

- **Problem Space**
  - Before implementation, **behavior simulation** and **functional verification** are essential for a sound design methodology
  - Lack of tool for behavior simulation, functional verification and performance analysis (time and energy) in WSN application domain
  - With TOSSim or OmNet needs lots of efforts!!!
- **Motivation**
  - To build a framework (library) for behavior simulation, functional verification and performance analysis of WSN application
  - Using Mathworks Tools (Simulink and Stateflow)
  - Reason for choosing Mathworks tool is that it has rich library for Simulation

Methodology: Behavior Simulation and Functional Verification of WSN Application

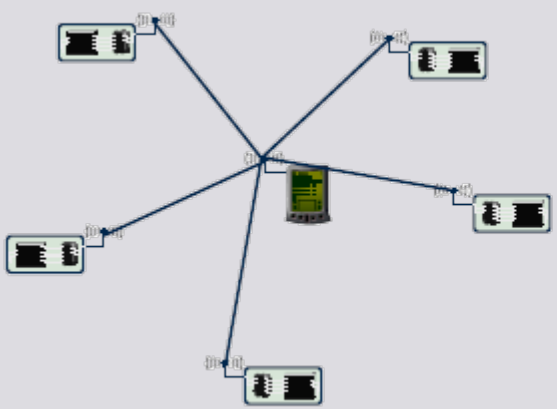


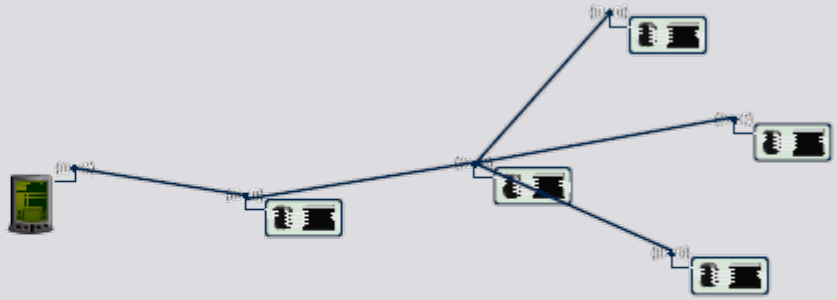
Extension of library by **parameterized blocks** of

- **Radio**
- **Sensors**
- **Broad-casting Medium**
- **Device Drivers and ..**

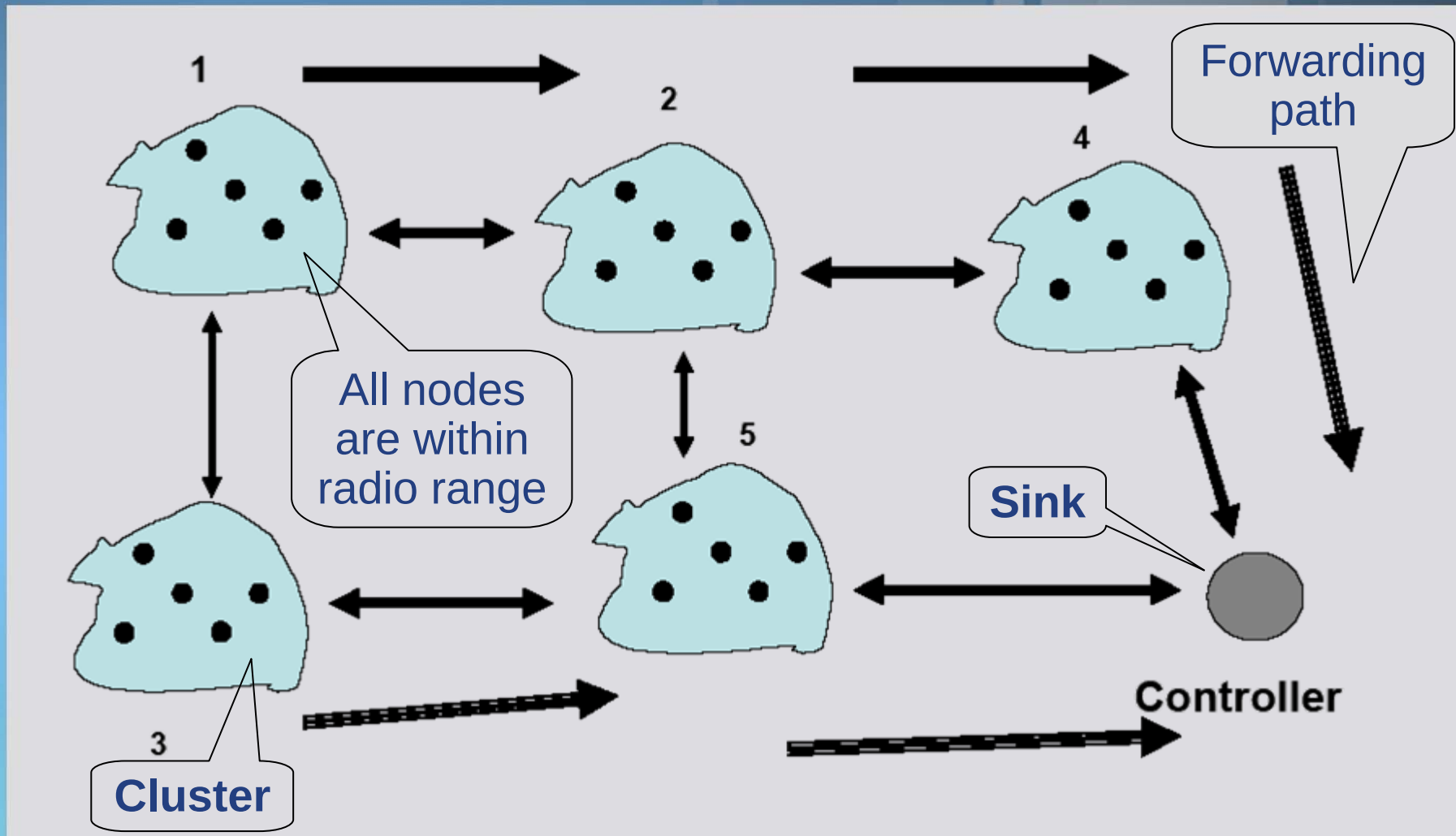
Data Aggregation

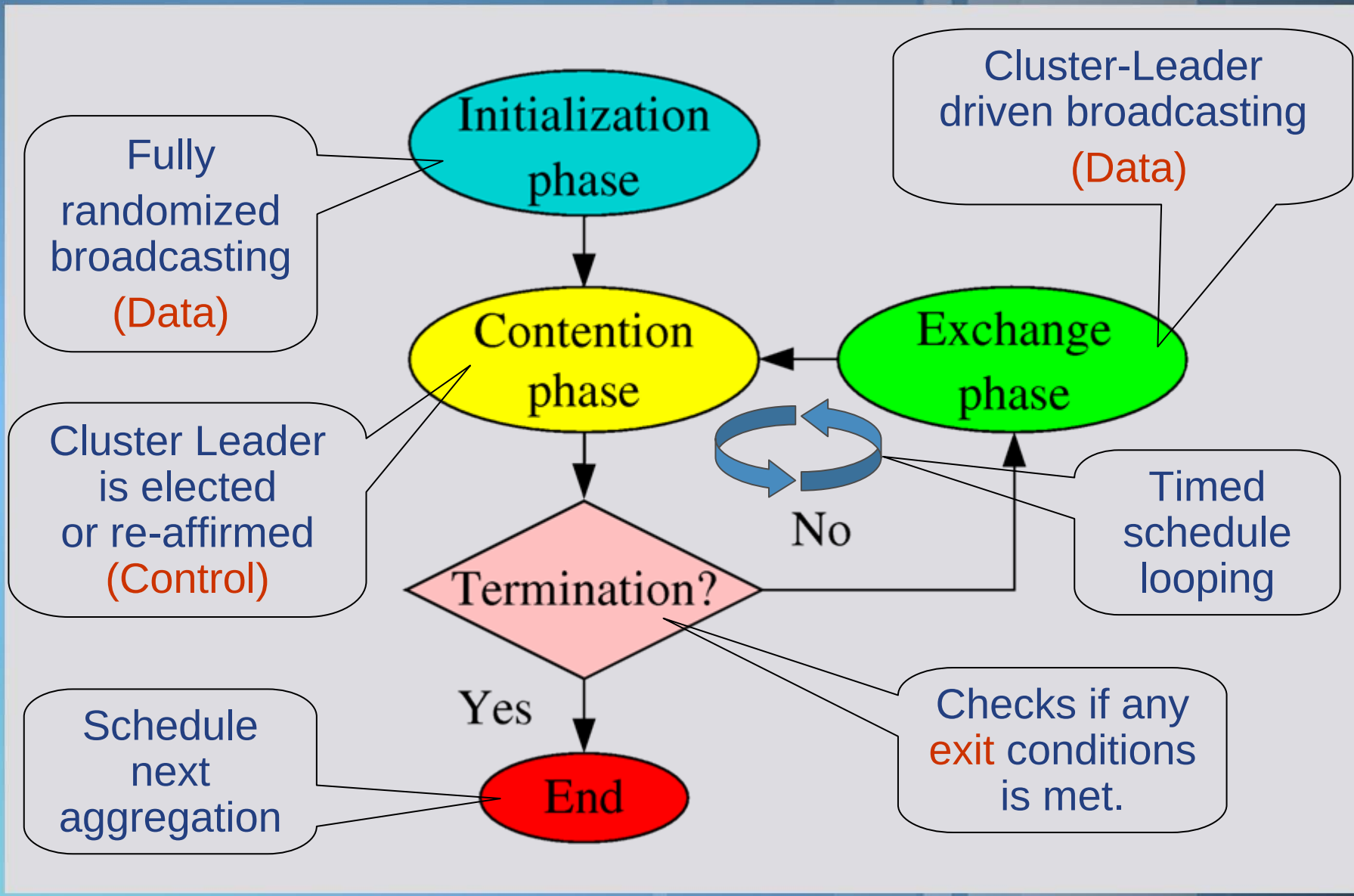
- Performing distributed, in network activity to reduce the overall amount of data flowing over multi-hop paths
  - Less traffic
  - Less energy consumption
  - Better network scalability
- Depending on network topology, aggregation can be useful or pointless



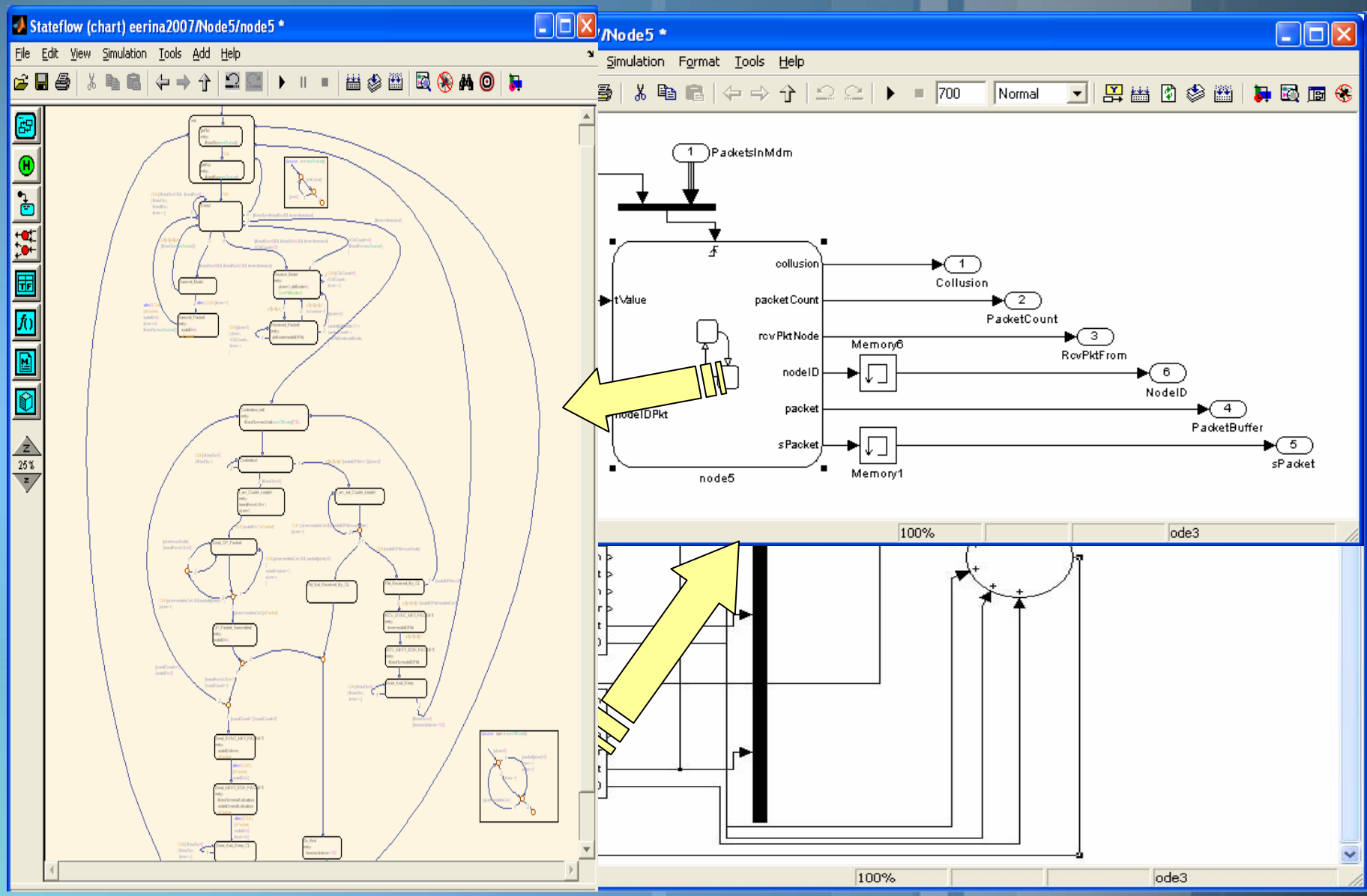


Clustered topology

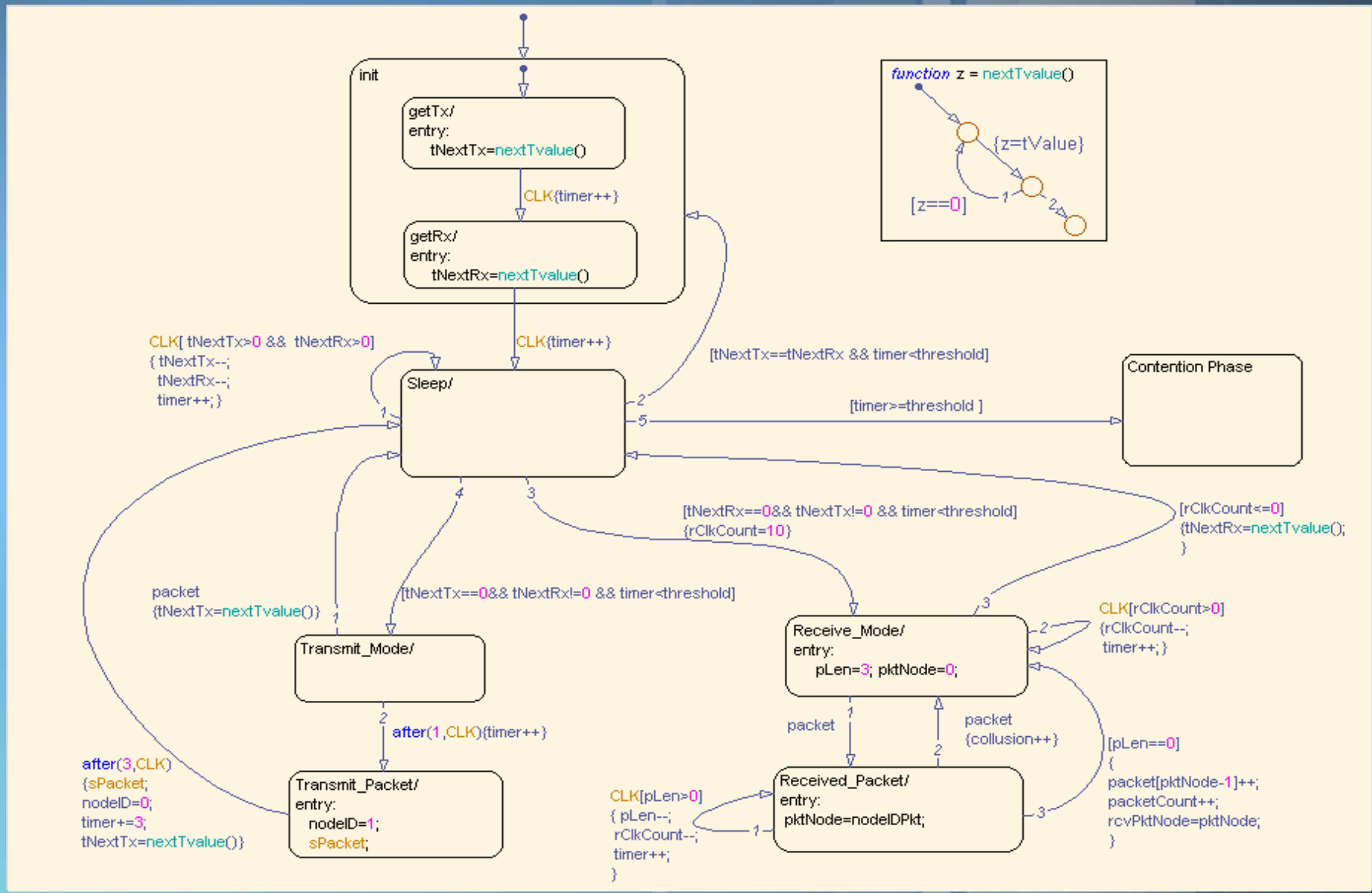



Initialization phase
Fully randomized broadcasting (Data)
Cluster-Leader driven broadcasting (Data)
Contention phase
Exchange phase
Cluster Leader is elected or re-affirmed (Control)
No
Timed schedule looping
Termination?
Yes
Schedule next aggregation
End
Checks if any exit conditions is met.

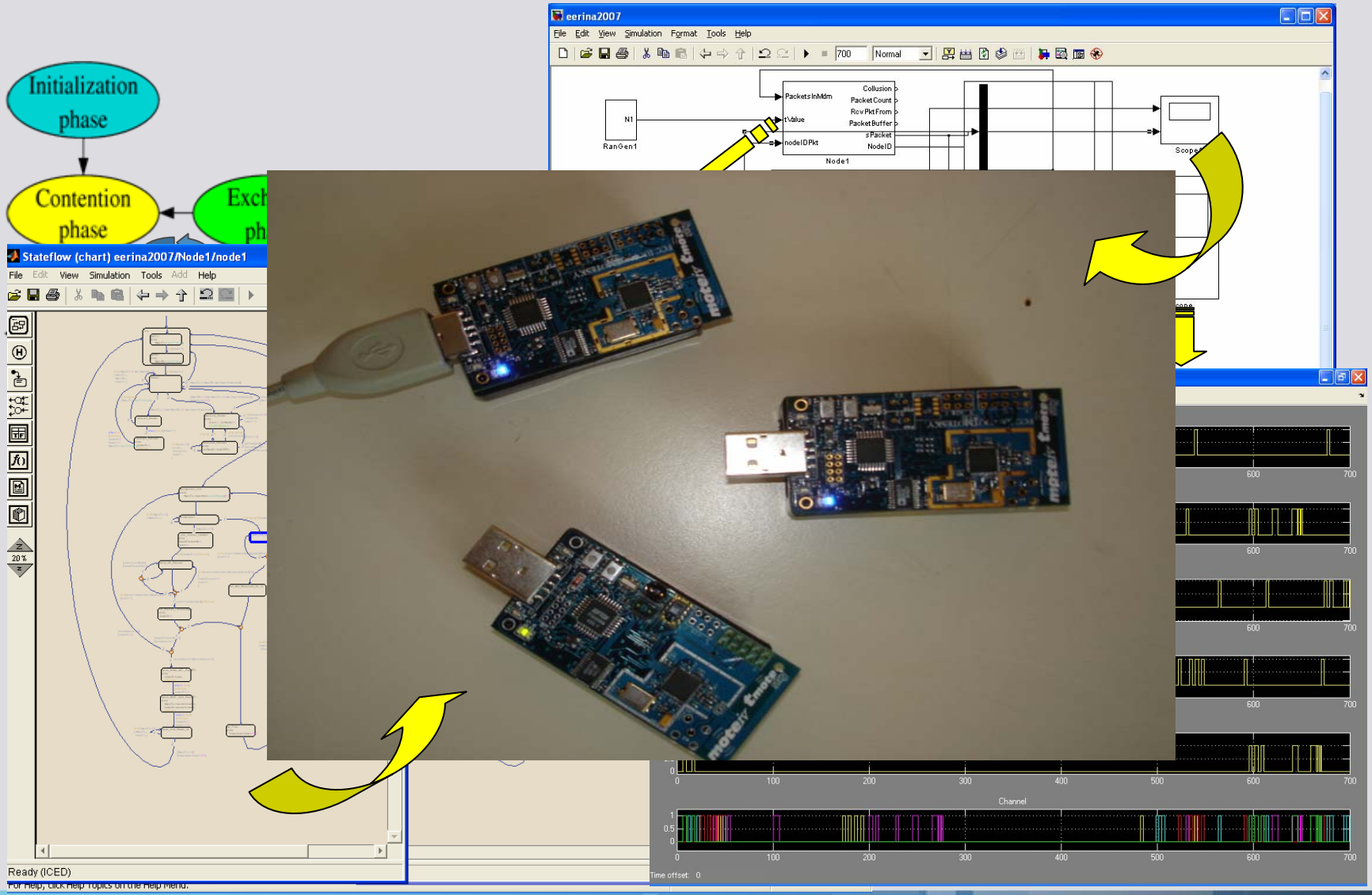
Modeling using Simulink+ Stateflow



Initialization Phase Modeling using Simulink+ Stateflow



Behavioral Simulation and Functional Verification



Thanks for your questions!!!