



**POLITECNICO**  
**MILANO 1863**

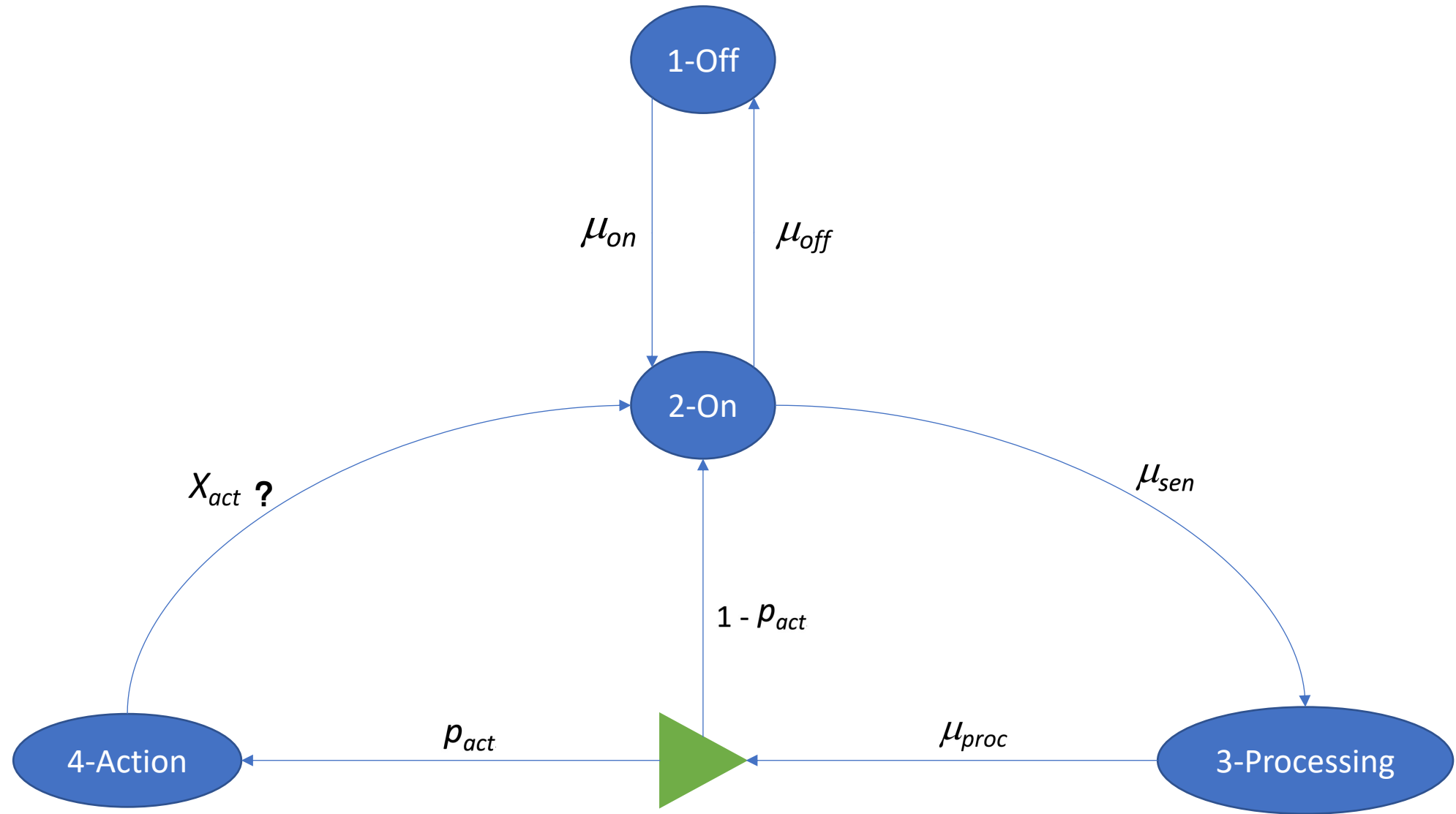
## PERFORMANCE EVALUATION AND APPLICATIONS

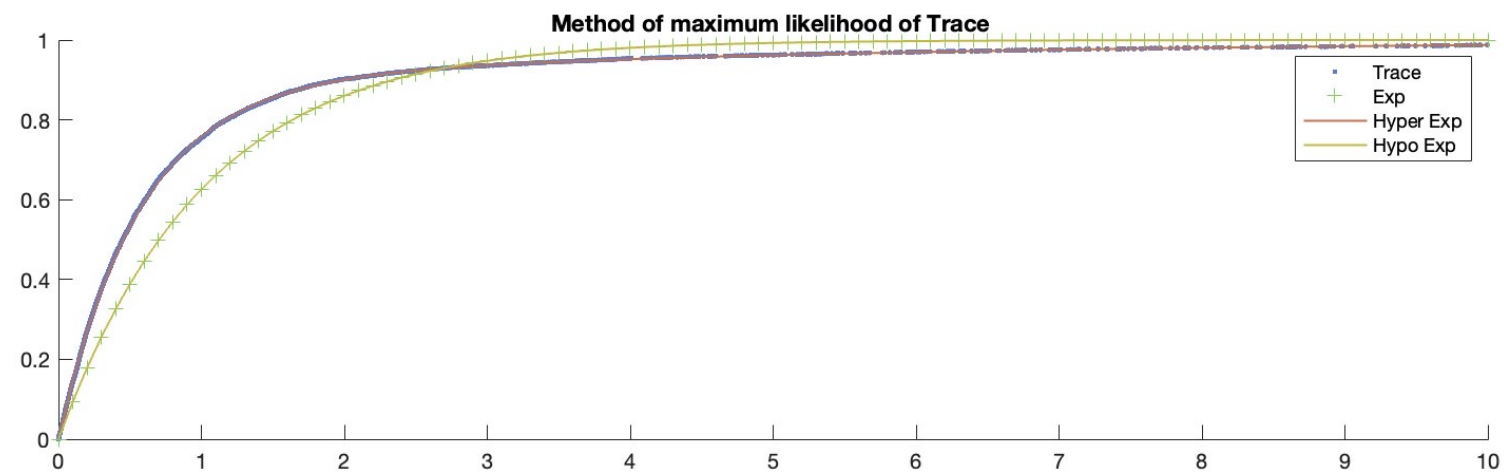
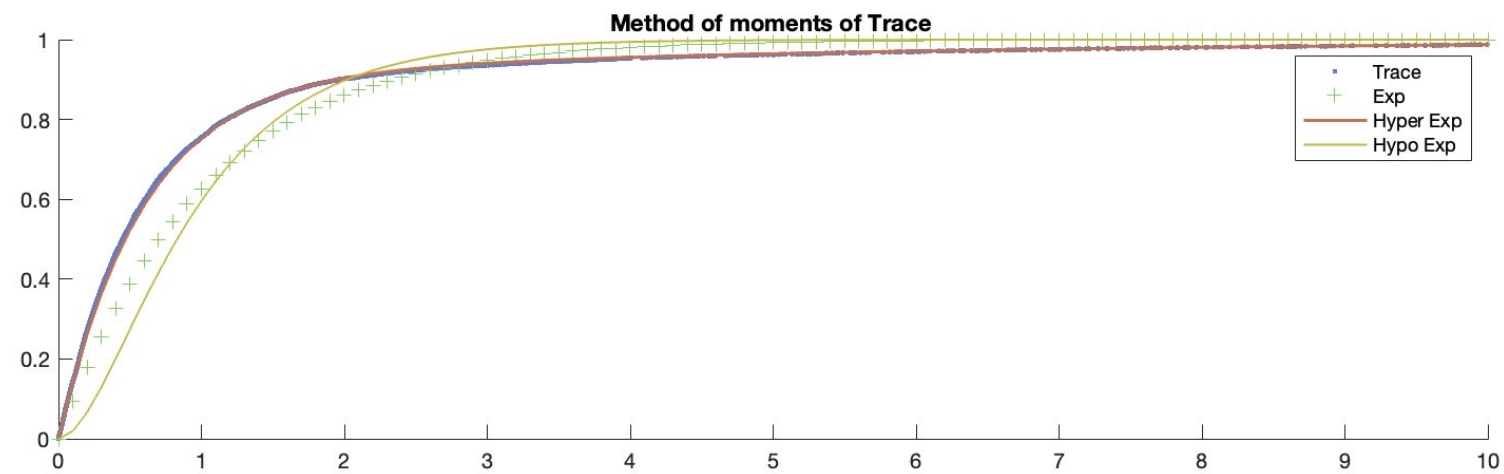
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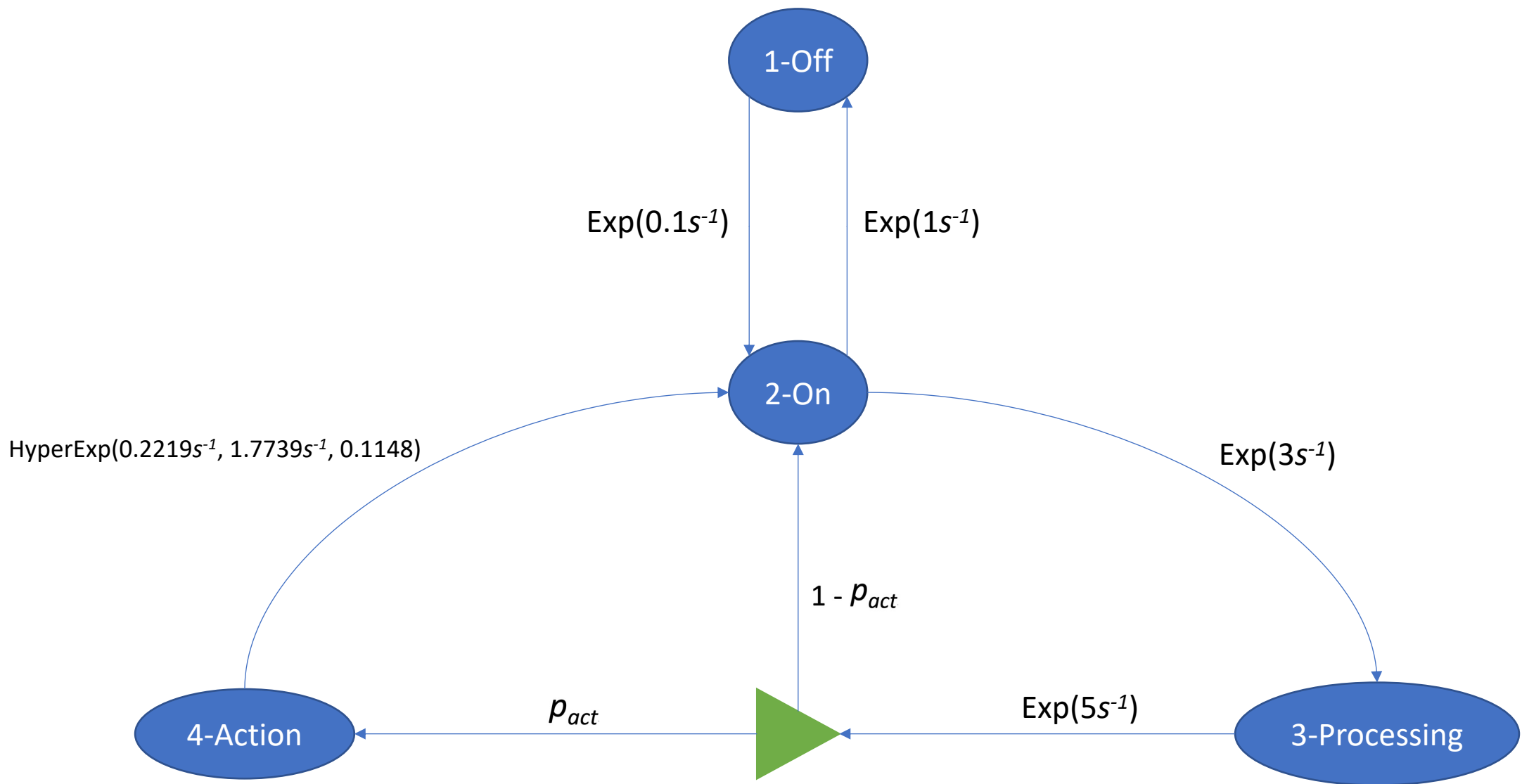
# Outline

- Simulation with MATLAB
  - Fit the unknown distribution
  - Rebuild the model with Phase-Type distributions
  - Solve the ode45 function, plot the probability of the various states for the time  $T = [0, 20]$  and  $T = [0, 10000]$
  - Compute the steady-state
  - Compute the average energy consumption through state rewards
  - Compute the on frequency through transition reward
- Simulation with Java Modelling Tools (Double-check the result of MATLAB)
  - Build the model
  - Compute the average energy consumption through the steady-state
  - Compute the on frequency through the throughput

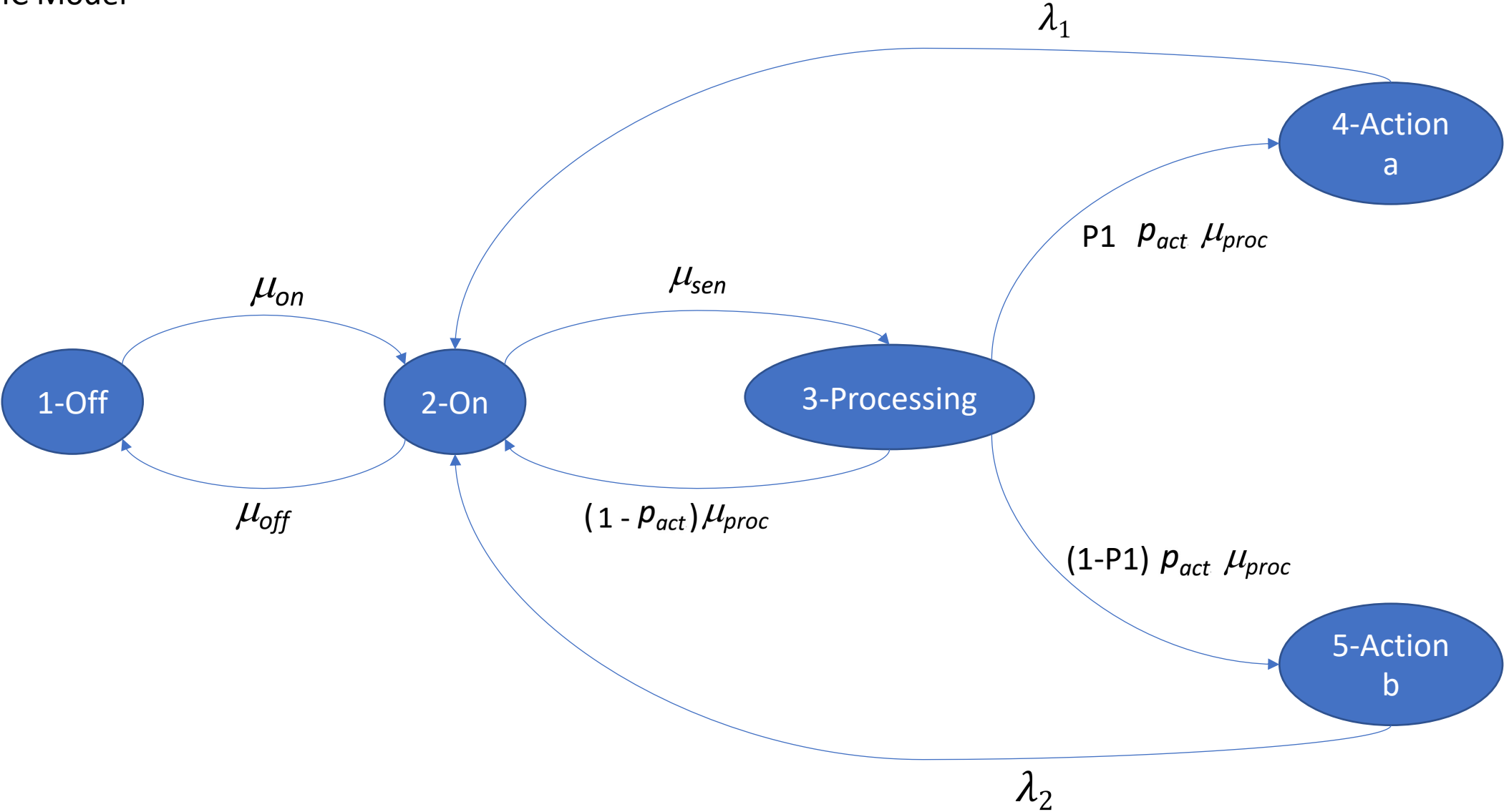




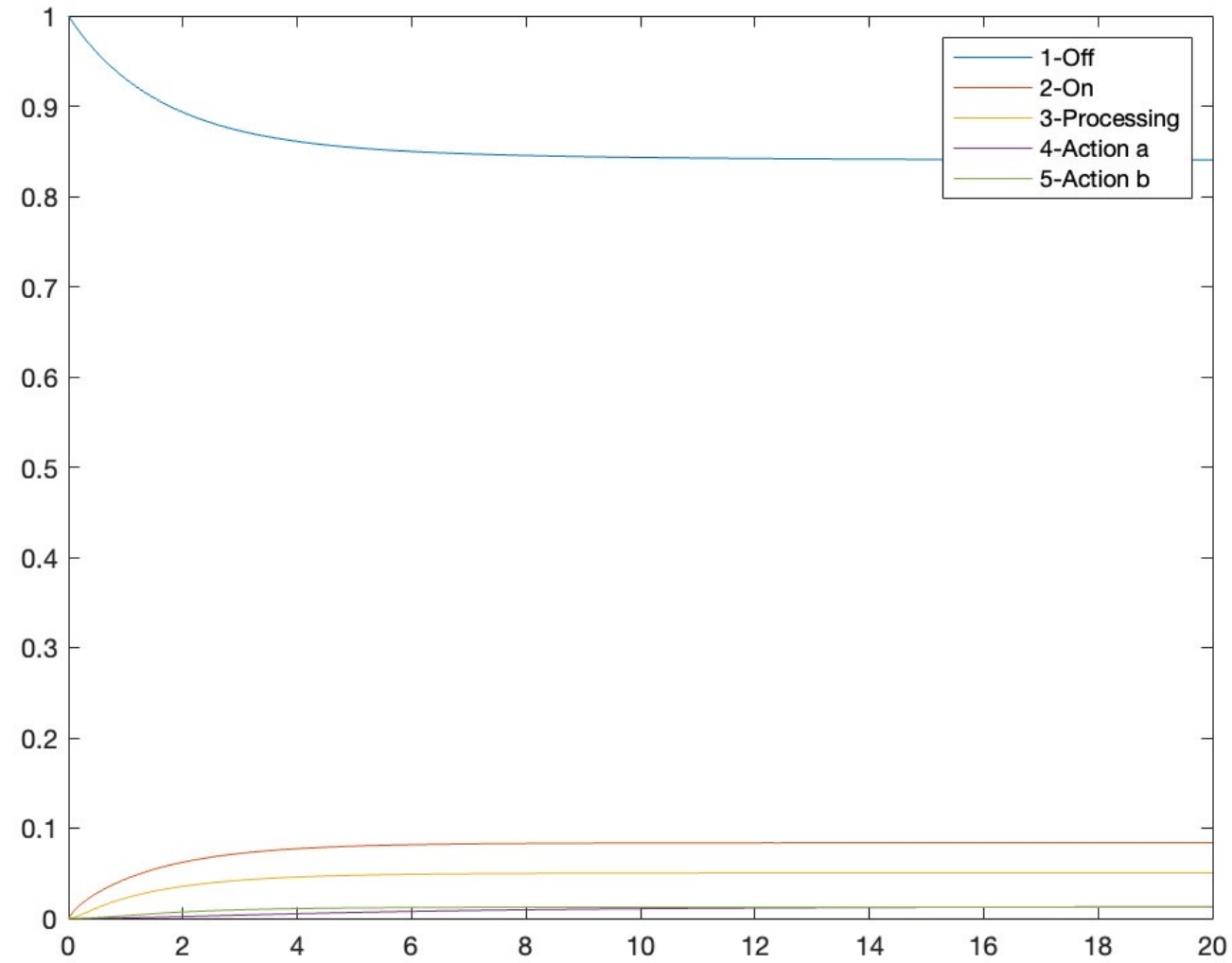




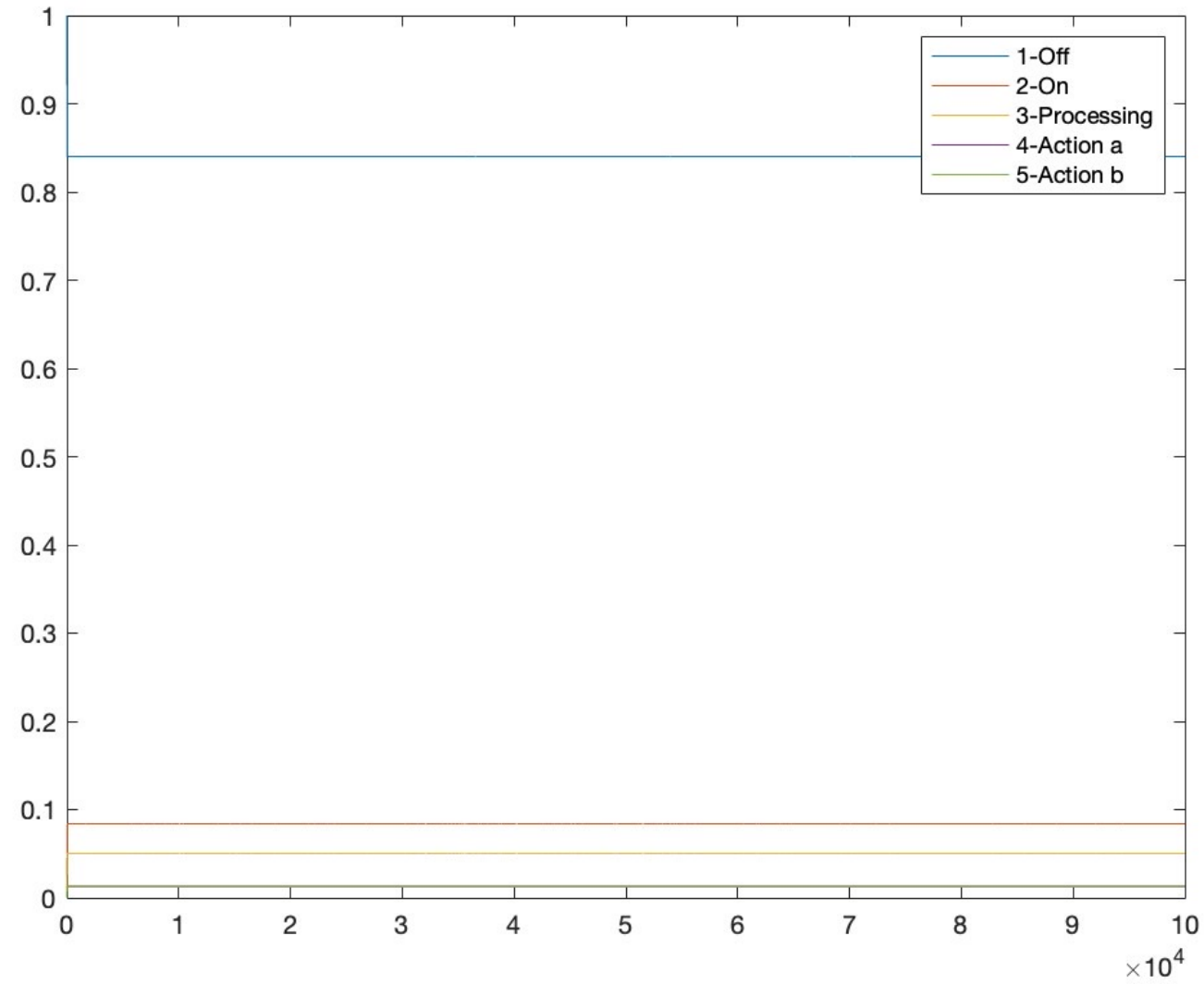
CTMC Model



Probability of the various states for the time  $T = [0, 20]$



Probability of the various states for the time  $T = [0, 10000]$



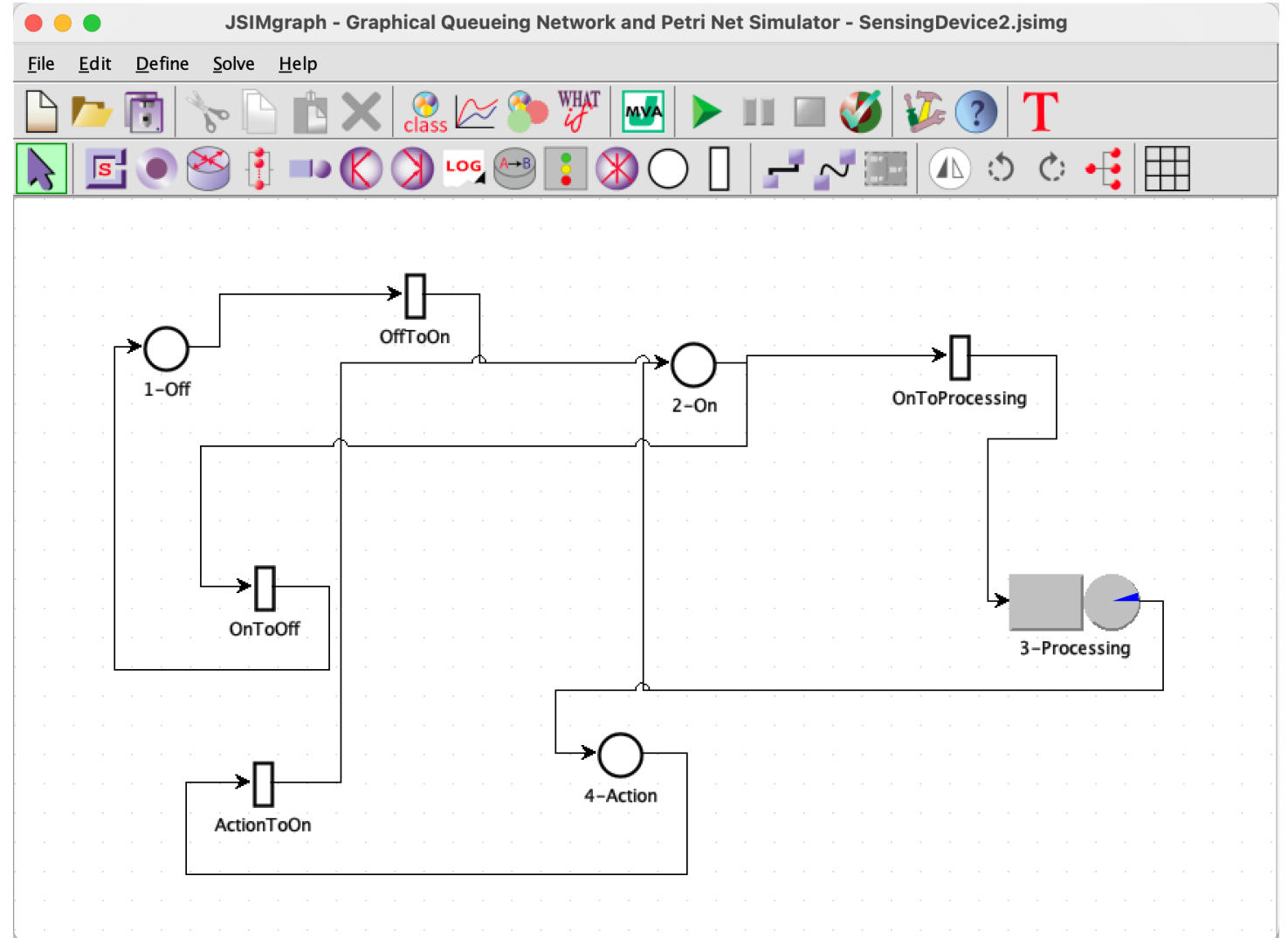


# Result

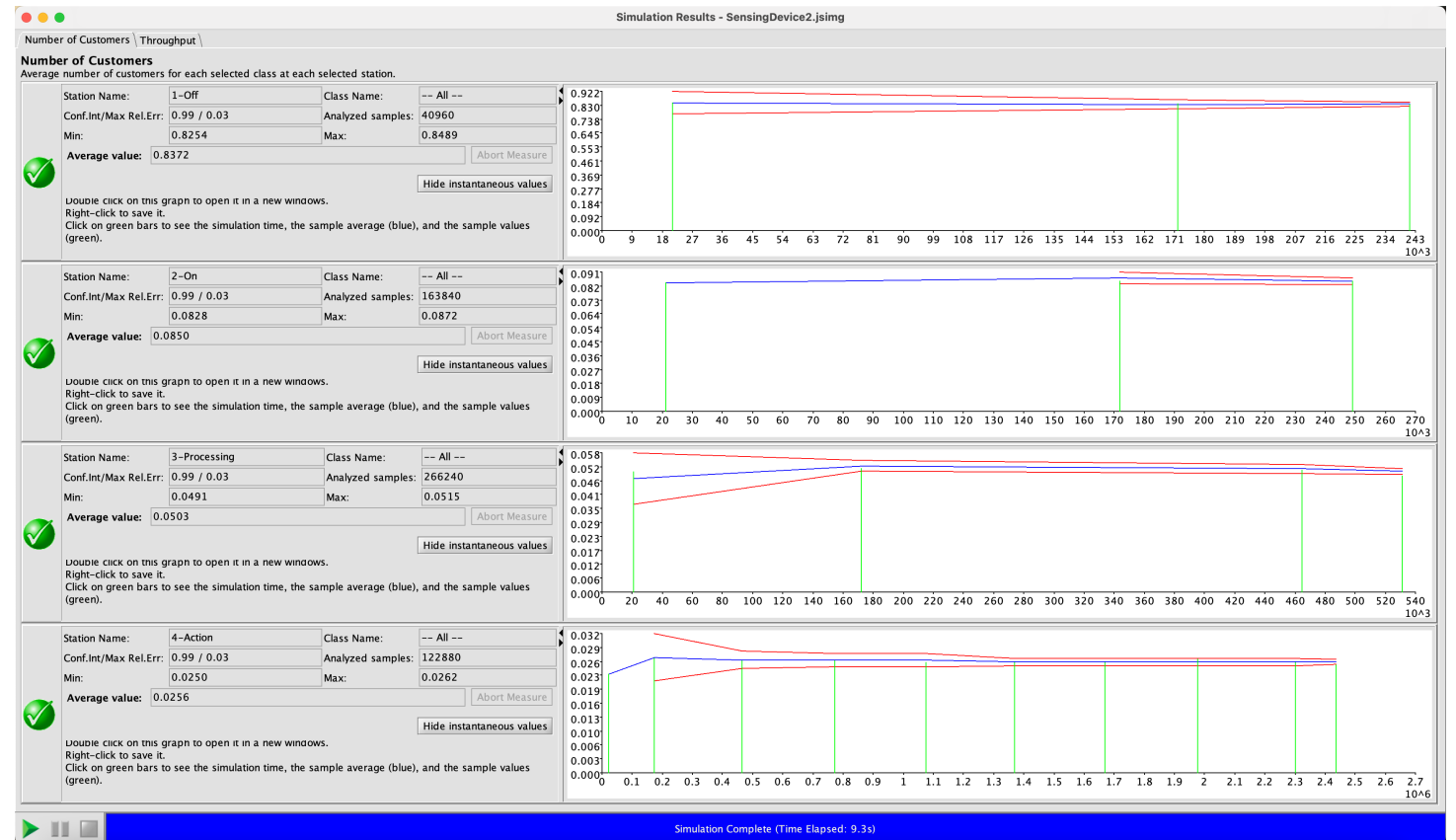
- Steady-state:  $\pi = [0.8400, 0.0840, 0.0504, 0.0130, 0.0126]$
- Average energy consumption: 1.7003 mW
- On frequency: 0.3360

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- JSIMgraph



- Double-Check the result of MATLAB simulation



Steady-state: 0.8372 0.0850 0.0503 0.0256

# Average energy consumption

$$[0.8372, 0.0850, 0.0503, 0.0256] \cdot [\varepsilon_{off}, \varepsilon_{on}, \varepsilon_{proc}, \varepsilon_{act}]^T = 1.7002 \text{ mW}$$

- On frequency

