



# TASK ASSIGNMENT STRATEGY OPTIMIZATION FOR POST-DISASTER SCHEDULING OF ELECTRICAL DISTRIBUTION NETWORKS

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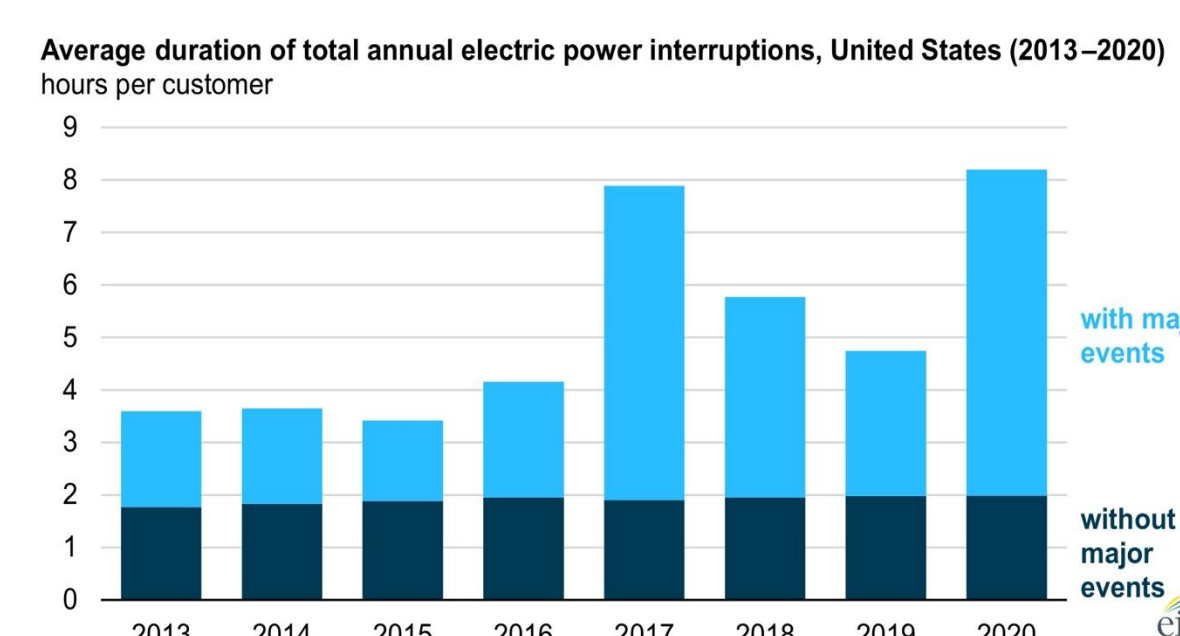
## Disaster Impact

- Extreme weather and seismic events cause large scale disruptions in power supply with significant social and economic costs.



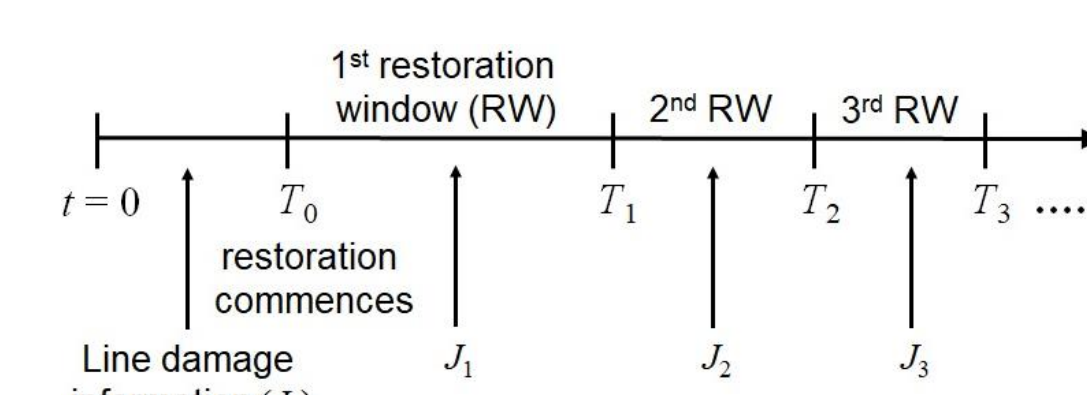
- Widespread damage in the distribution network.

- How do we optimally schedule multiple crews to minimize customer inconvenience?



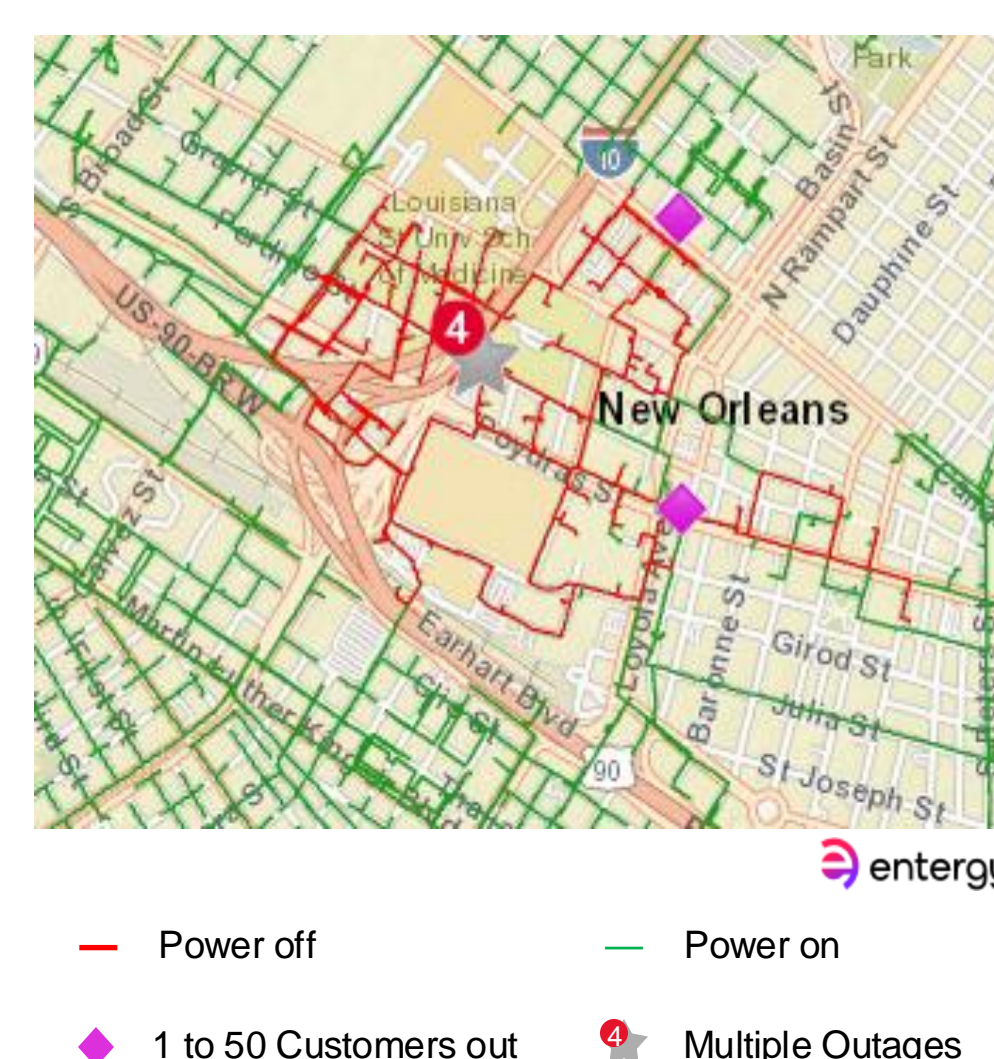
## Solution Approach

- Information about damaged components is a streaming process.
- Divide restoration timeline into "restoration windows".

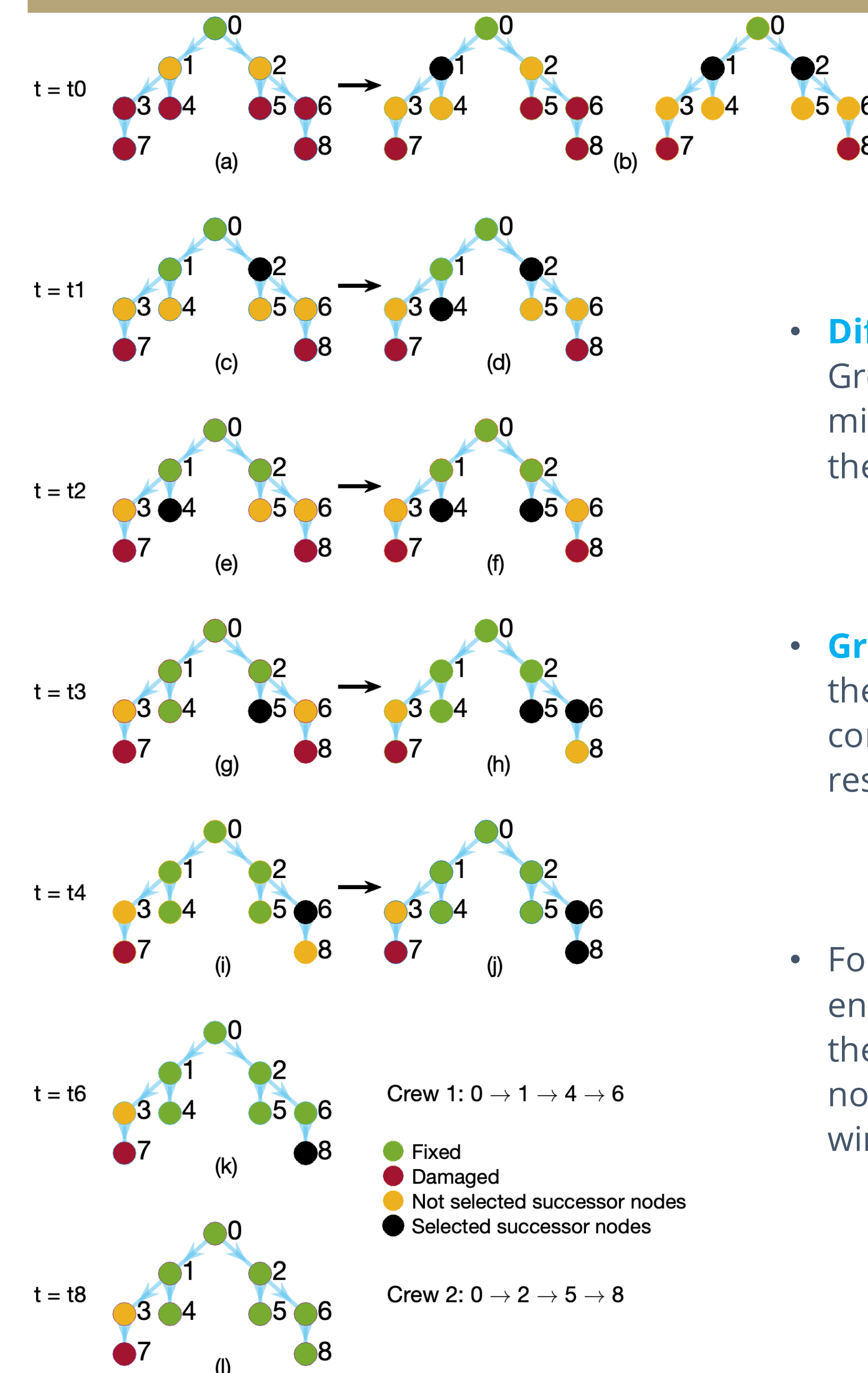


- Planning horizon depends on crew availability, workhour restrictions, extent of available damage information.

- Line damage information map within one restoration window



## Asynchronous Greedy Policy

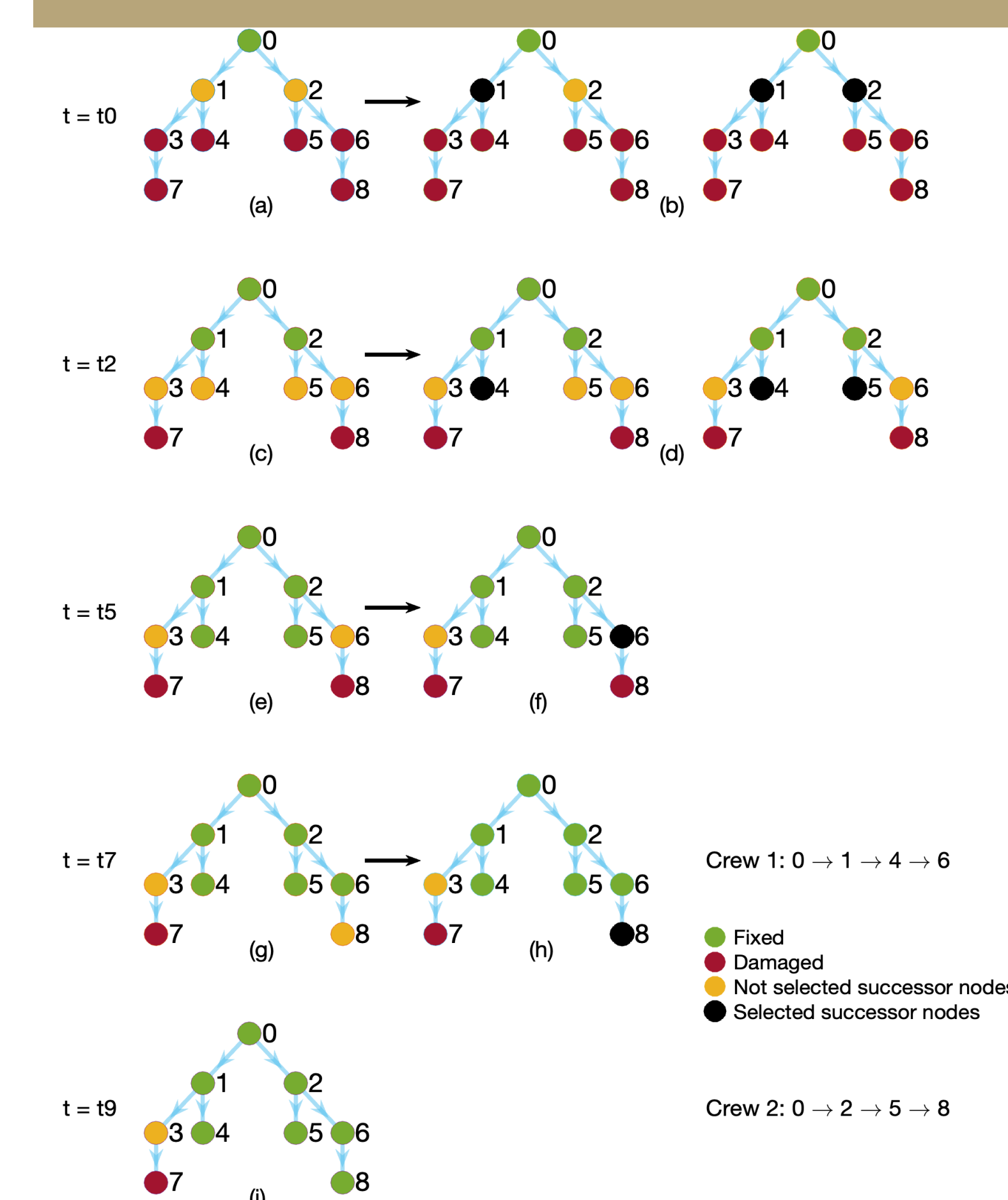


- Differences:** Step by step **asynchronous** Greedy strategy. Check the crew status every minute. Assign the next repair job as soon as the crew finished its current job.

- Greedy objective:** Maximize total reward at the current time step, subject to time constraints (per crew, per restoration/service window).

- Follow the **precedence constraints** to ensure electrical continuity when looking for the successor node list (i.e., all repaired nodes can be restored at the end of the window).

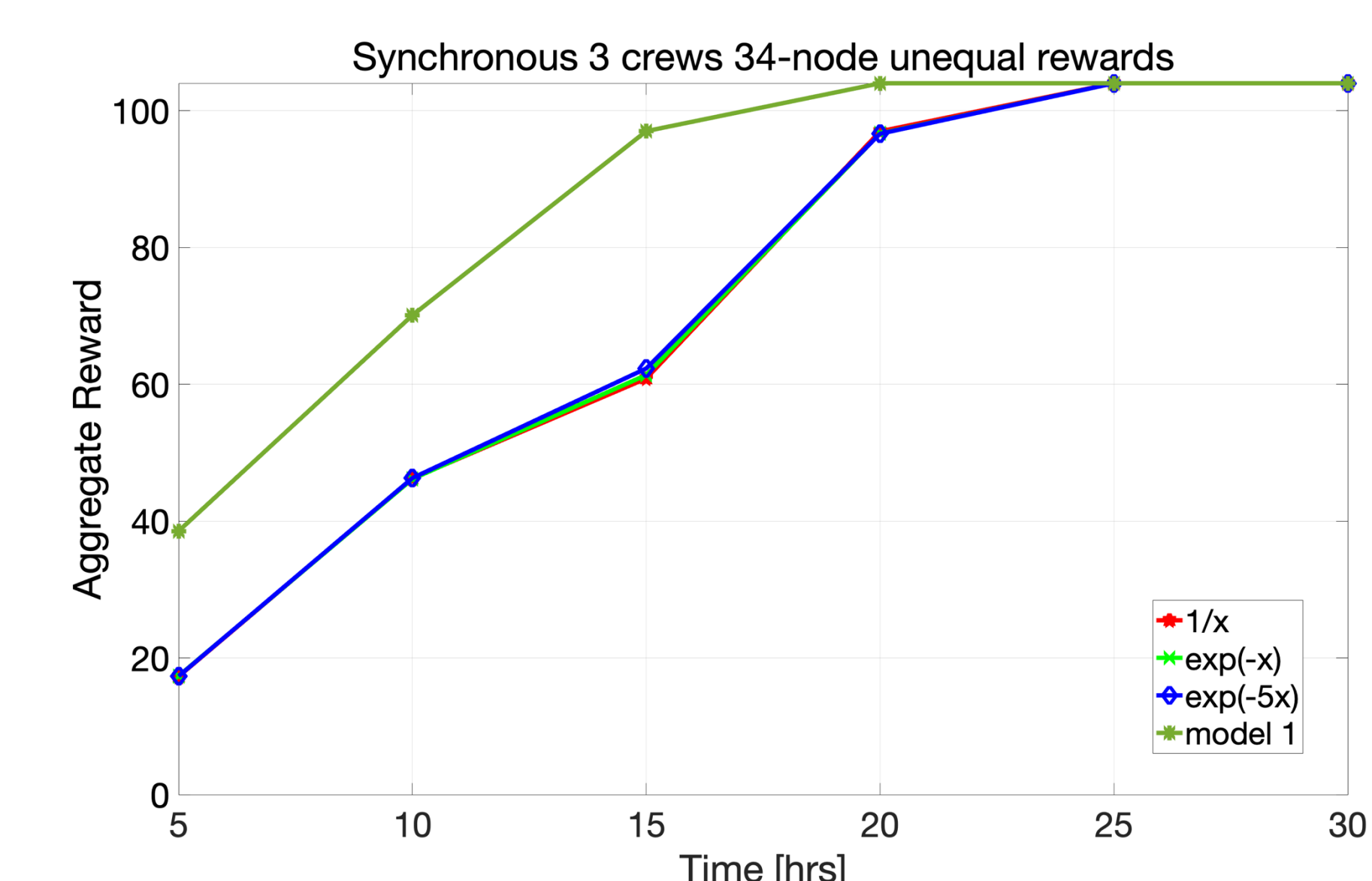
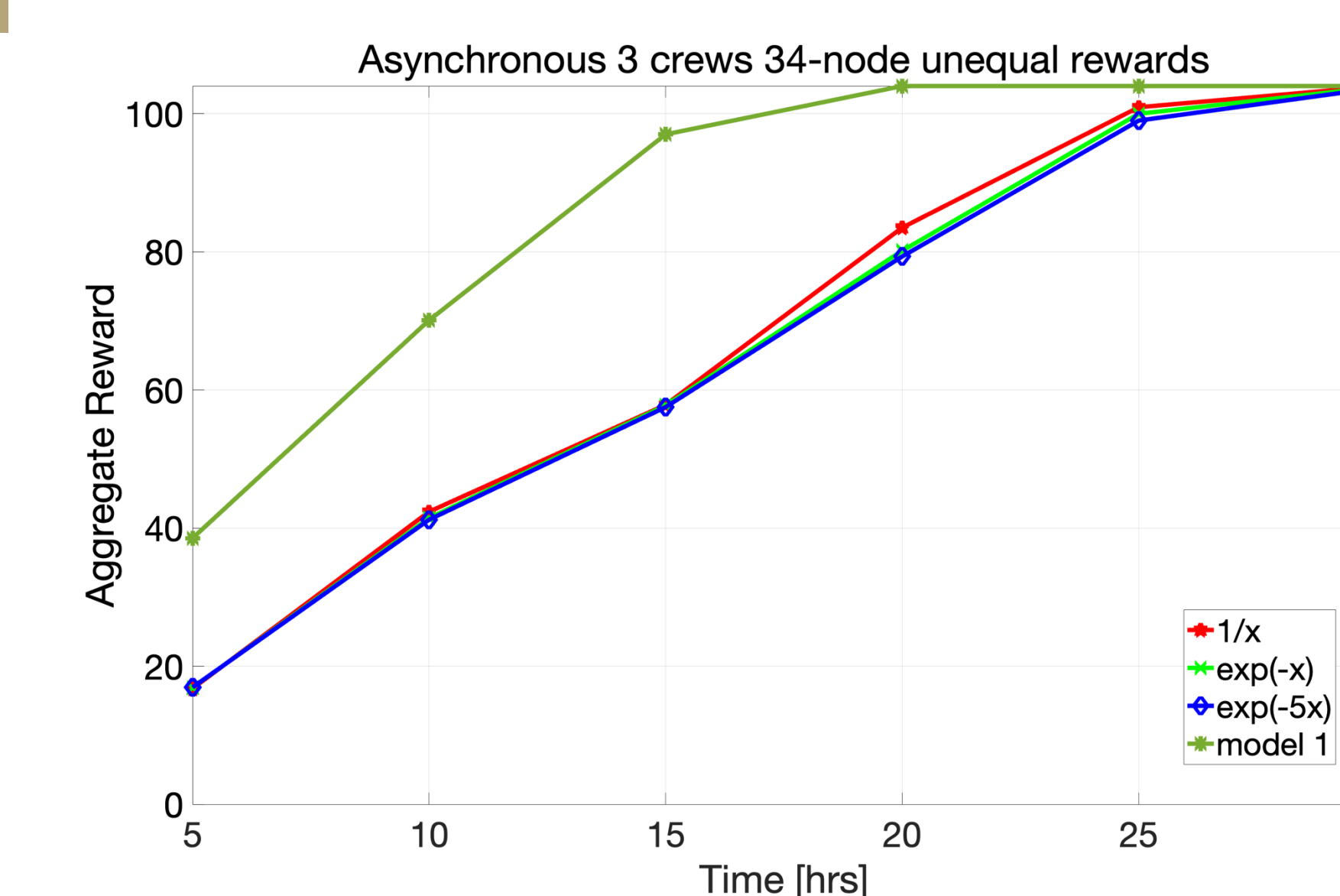
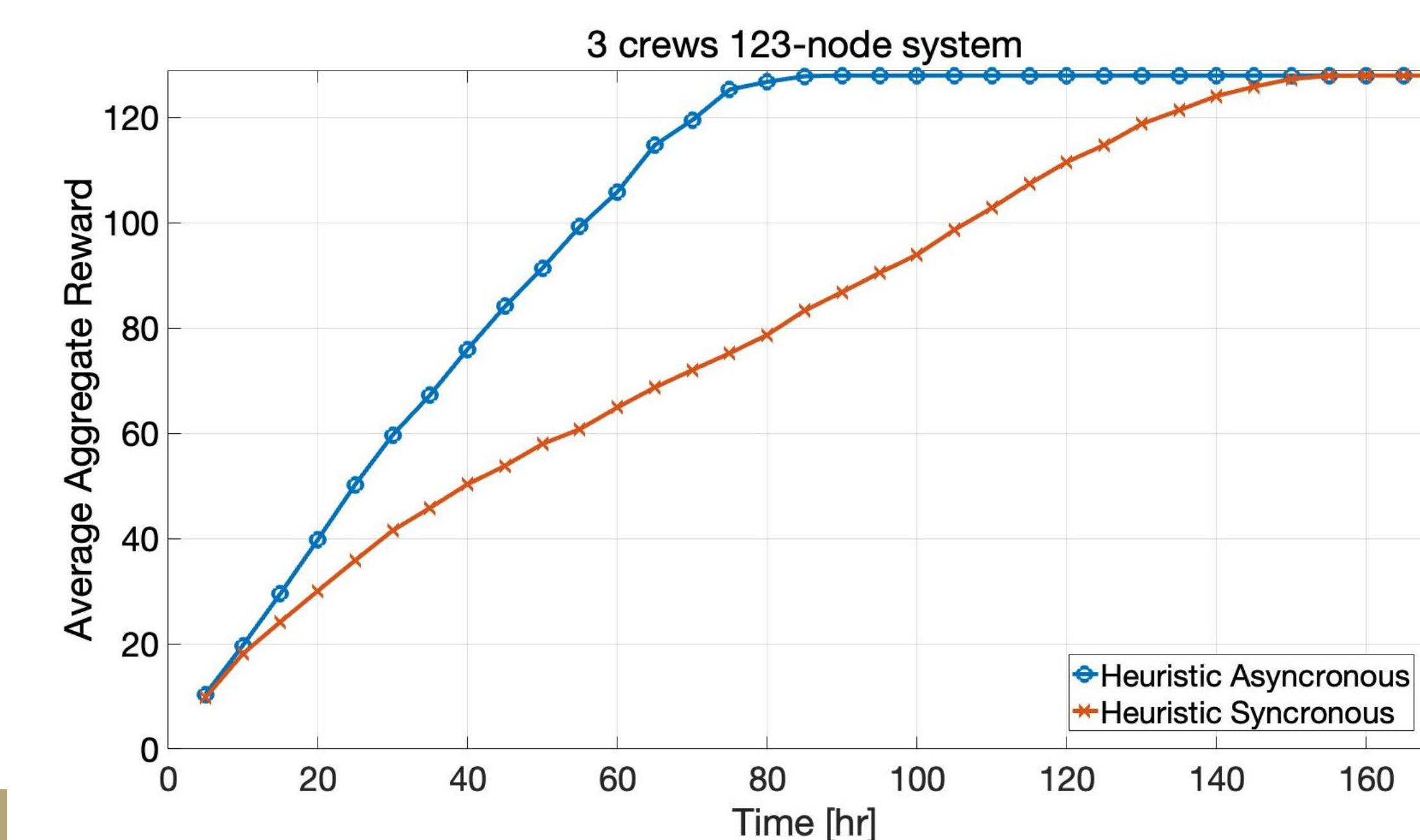
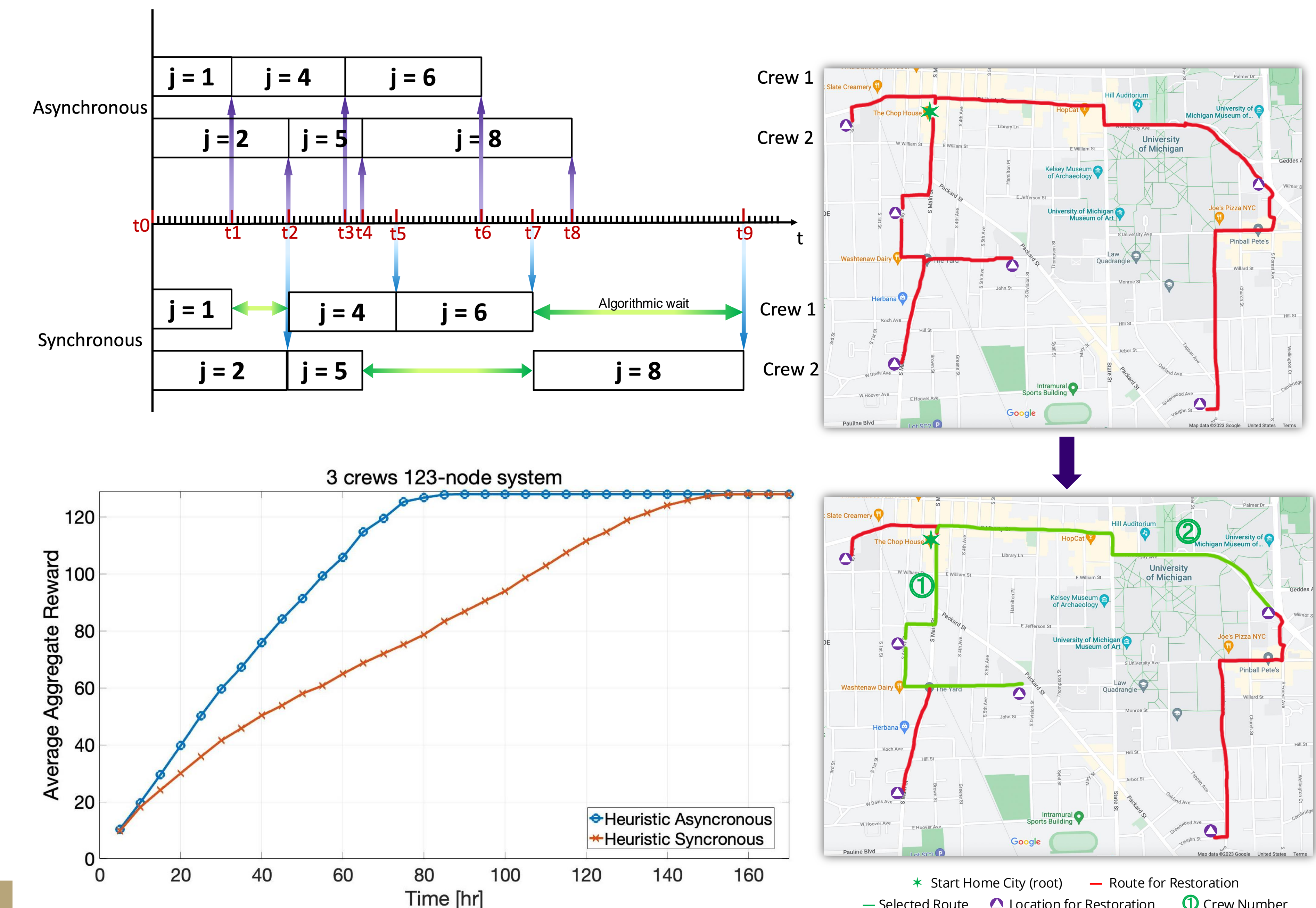
## Synchronous Greedy Policy



- Differences 1:** Step by step **synchronous** Greedy strategy. Check the crew status only when all the crews are idle. Assign the next repair jobs to all crews at once.

- Differences 2:** Only subtract the waiting time on the computation process.

## Computational Results



## Future Work

- Investigate alternate solution methods, e.g., facility locations, graph neural networks, and/or reinforcement learning.

