Autonomous Public Transportation Project
Multi-Agent Systems

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March 5, 2017

Week Four Milestone

Based on the implementation delivered last week, we keep the same strategy for picking and delivering passengers. However, instead of using fixed routes, we use a simple communication protocol between the buses to decide the next move of each bus.

In this approach, a bus chooses its next station by considering the minimum number of buses headed towards that station at that moment. Note that this is restricted to the neighboring stations of the bus' current station. For instance, if a bus B is at station S, then it loops over all the states $S' \in \text{neighbors}(S)$ and chooses the next station according to:

$$\text{next} = \underset{S'}{\text{argmin}} \, | \, incoming(S') \, |$$

For this, our communication system maintains a *real-time* look-up table of all stations and their respective incoming buses. In order to reduce the messaging overhead, we assign the first bus as the broadcaster,who aggregates all updates from other buses and broadcasts to all other buses. An update is sent to the broadcaster every time a bus arrives at a station and selects its next destination. The broadcaster maintains the most up-to-date traffic look-up table, and upon any update immediately broadcasts it to the entire fleet. This process is visualized in Figure 1.

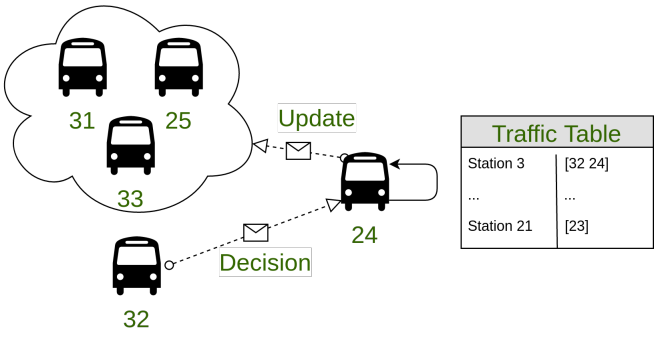

Figure 1: Example of the described messaging procedure.

For simplicity, we assume that neither the buses nor the communication system is prone to failure. However, the fault tolerance of the system will be improved for the final version.

Note that our submission and report is identical to the one submitted last week. After consulting the teaching assistants, we are resubmitting as our previous submission already satisfies this week's goal.