Autonomous Public Transportation Project
Multi-Agent Systems

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Week Three 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 the station with minimum number of buses headed towards it at that moment. Note that this only applies for neighboring stations. 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:

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

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, whom aggregates all updates and broadcasts to all other buses. An update is sent to the broadcaster every time a bus arrives at its current destination and selects its next. 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.

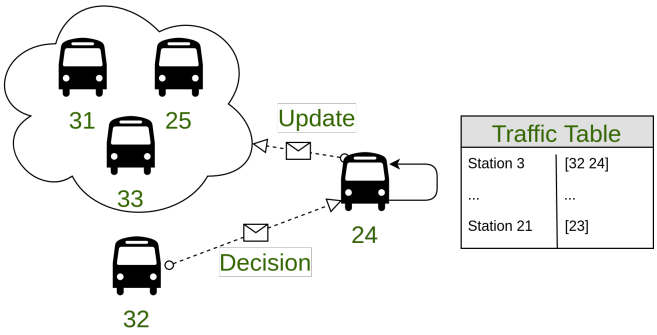

Figure 1: Exemplification of the described messaging procedure.

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.