As the goal of this simulation is to find which combination of bus sizes and quantity is the most cost efficient while still providing a convenient service to the riders of the buses, as a starting point, let us compare 18 buses, all being 60 seated busses or all being 40 seat busses. The data is shown below.

**18 buses: 60 seats**

--------------------BUS AVERAGES--------------------

Bus #1 AVERAGE OCCUPANCY: 14.0 | PMPG: 56.0

Bus #2 AVERAGE OCCUPANCY: 14.0 | PMPG: 56.0

Bus #3 AVERAGE OCCUPANCY: 13.0 | PMPG: 52.0

Bus #4 AVERAGE OCCUPANCY: 18.0 | PMPG: 72.0

Bus #5 AVERAGE OCCUPANCY: 13.0 | PMPG: 52.0

Bus #6 AVERAGE OCCUPANCY: 20.0 | PMPG: 80.0

Bus #7 AVERAGE OCCUPANCY: 13.0 | PMPG: 52.0

Bus #8 AVERAGE OCCUPANCY: 17.0 | PMPG: 68.0

Bus #9 AVERAGE OCCUPANCY: 12.0 | PMPG: 48.0

Bus #10 AVERAGE OCCUPANCY: 22.0 | PMPG: 88.0

Bus #11 AVERAGE OCCUPANCY: 10.0 | PMPG: 40.0

Bus #12 AVERAGE OCCUPANCY: 21.0 | PMPG: 84.0

Bus #13 AVERAGE OCCUPANCY: 15.0 | PMPG: 60.0

Bus #14 AVERAGE OCCUPANCY: 18.0 | PMPG: 72.0

Bus #15 AVERAGE OCCUPANCY: 17.0 | PMPG: 68.0

Bus #16 AVERAGE OCCUPANCY: 16.0 | PMPG: 64.0

Bus #17 AVERAGE OCCUPANCY: 17.0 | PMPG: 68.0

Bus #18 AVERAGE OCCUPANCY: 12.0 | PMPG: 48.0

Max waiting time for a passenger so far: 5442.0 seconds

Average waiting time for passengers 348.0 seconds

--------------------STOP AVERAGES--------------------

STOP #1

AVERAGE WESTBOUND QUEUE LENGTH: 1

AVERAGE EASTBOUND QUEUE LENGTH: 131

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STOP #2

AVERAGE WESTBOUND QUEUE LENGTH: 6

AVERAGE EASTBOUND QUEUE LENGTH: 37

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STOP #3

AVERAGE WESTBOUND QUEUE LENGTH: 8

AVERAGE EASTBOUND QUEUE LENGTH: 42

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STOP #4

AVERAGE WESTBOUND QUEUE LENGTH: 11

AVERAGE EASTBOUND QUEUE LENGTH: 119

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STOP #5

AVERAGE WESTBOUND QUEUE LENGTH: 43

AVERAGE EASTBOUND QUEUE LENGTH: 98

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STOP #6

AVERAGE WESTBOUND QUEUE LENGTH: 68

AVERAGE EASTBOUND QUEUE LENGTH: 82

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STOP #7

AVERAGE WESTBOUND QUEUE LENGTH: 115

AVERAGE EASTBOUND QUEUE LENGTH: 37

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STOP #8

AVERAGE WESTBOUND QUEUE LENGTH: 308

AVERAGE EASTBOUND QUEUE LENGTH: 30

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STOP #9

AVERAGE WESTBOUND QUEUE LENGTH: 212

AVERAGE EASTBOUND QUEUE LENGTH: 7

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STOP #10

AVERAGE WESTBOUND QUEUE LENGTH: 375

AVERAGE EASTBOUND QUEUE LENGTH: 1

**Buses: 18 : 40 seats**

**--------------------BUS AVERAGES--------------------**

**Bus #1 AVERAGE OCCUPANCY: 8.0 | PMPG: 48.0**

**Bus #2 AVERAGE OCCUPANCY: 9.0 | PMPG: 54.0**

**Bus #3 AVERAGE OCCUPANCY: 9.0 | PMPG: 54.0**

**Bus #4 AVERAGE OCCUPANCY: 11.0 | PMPG: 66.0**

**Bus #5 AVERAGE OCCUPANCY: 10.0 | PMPG: 60.0**

**Bus #6 AVERAGE OCCUPANCY: 15.0 | PMPG: 90.0**

**Bus #7 AVERAGE OCCUPANCY: 9.0 | PMPG: 54.0**

**Bus #8 AVERAGE OCCUPANCY: 13.0 | PMPG: 78.0**

**Bus #9 AVERAGE OCCUPANCY: 12.0 | PMPG: 72.0**

**Bus #10 AVERAGE OCCUPANCY: 18.0 | PMPG: 108.0**

**Bus #11 AVERAGE OCCUPANCY: 9.0 | PMPG: 54.0**

**Bus #12 AVERAGE OCCUPANCY: 17.0 | PMPG: 102.0**

**Bus #13 AVERAGE OCCUPANCY: 11.0 | PMPG: 66.0**

**Bus #14 AVERAGE OCCUPANCY: 15.0 | PMPG: 90.0**

**Bus #15 AVERAGE OCCUPANCY: 12.0 | PMPG: 72.0**

**Bus #16 AVERAGE OCCUPANCY: 12.0 | PMPG: 72.0**

**Bus #17 AVERAGE OCCUPANCY: 13.0 | PMPG: 78.0**

**Bus #18 AVERAGE OCCUPANCY: 8.0 | PMPG: 48.0**

**Max waiting time for a passenger so far: 5457.0 seconds**

**Average waiting time for passengers 296.0 seconds**

**--------------------STOP AVERAGES--------------------**

**STOP #1**

**AVERAGE WESTBOUND QUEUE LENGTH: 3**

**AVERAGE EASTBOUND QUEUE LENGTH: 156**

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**STOP #2**

**AVERAGE WESTBOUND QUEUE LENGTH: 4**

**AVERAGE EASTBOUND QUEUE LENGTH: 50**

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**STOP #3**

**AVERAGE WESTBOUND QUEUE LENGTH: 7**

**AVERAGE EASTBOUND QUEUE LENGTH: 189**

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**STOP #4**

**AVERAGE WESTBOUND QUEUE LENGTH: 9**

**AVERAGE EASTBOUND QUEUE LENGTH: 133**

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**STOP #5**

**AVERAGE WESTBOUND QUEUE LENGTH: 51**

**AVERAGE EASTBOUND QUEUE LENGTH: 150**

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**STOP #6**

**AVERAGE WESTBOUND QUEUE LENGTH: 82**

**AVERAGE EASTBOUND QUEUE LENGTH: 102**

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**STOP #7**

**AVERAGE WESTBOUND QUEUE LENGTH: 102**

**AVERAGE EASTBOUND QUEUE LENGTH: 75**

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**STOP #8**

**AVERAGE WESTBOUND QUEUE LENGTH: 329**

**AVERAGE EASTBOUND QUEUE LENGTH: 79**

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**STOP #9**

**AVERAGE WESTBOUND QUEUE LENGTH: 274**

**AVERAGE EASTBOUND QUEUE LENGTH: 12**

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**STOP #10**

**AVERAGE WESTBOUND QUEUE LENGTH: 369**

**AVERAGE EASTBOUND QUEUE LENGTH: 0**

As we can see by comparing the results of these two formats for the system, the average occupancy in the busses never nears the capacity of the smaller bus(which is ideal, as it has higher gas mileage), however the biggest issue involved in this simulation is when many people are at a stop, or when bus traffic is at its peak. The maximum wait time for both size of bus in this simulation was around 5400 seconds, which is just about 90 minutes. Even if only one person has to wait that long, that is far from acceptable. Note that at this point the average waiting time is ~6 minutes for 60 seat busses and ~5 minutes for 40 seat busses, which are both acceptable times. Since the max time was similar for both simulations, we can assume that the size of the bus isn’t causal of the maximum wait time. Furthermore, the next logical step would be to add more buses, of a size 40. We will compare the following data to the data from above.