



# Dynamic Mileage-based User Fee for Integrated Mobility

Linghong Zou  
Northeastern University  
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# Boston: A City with Incredible Transportation History



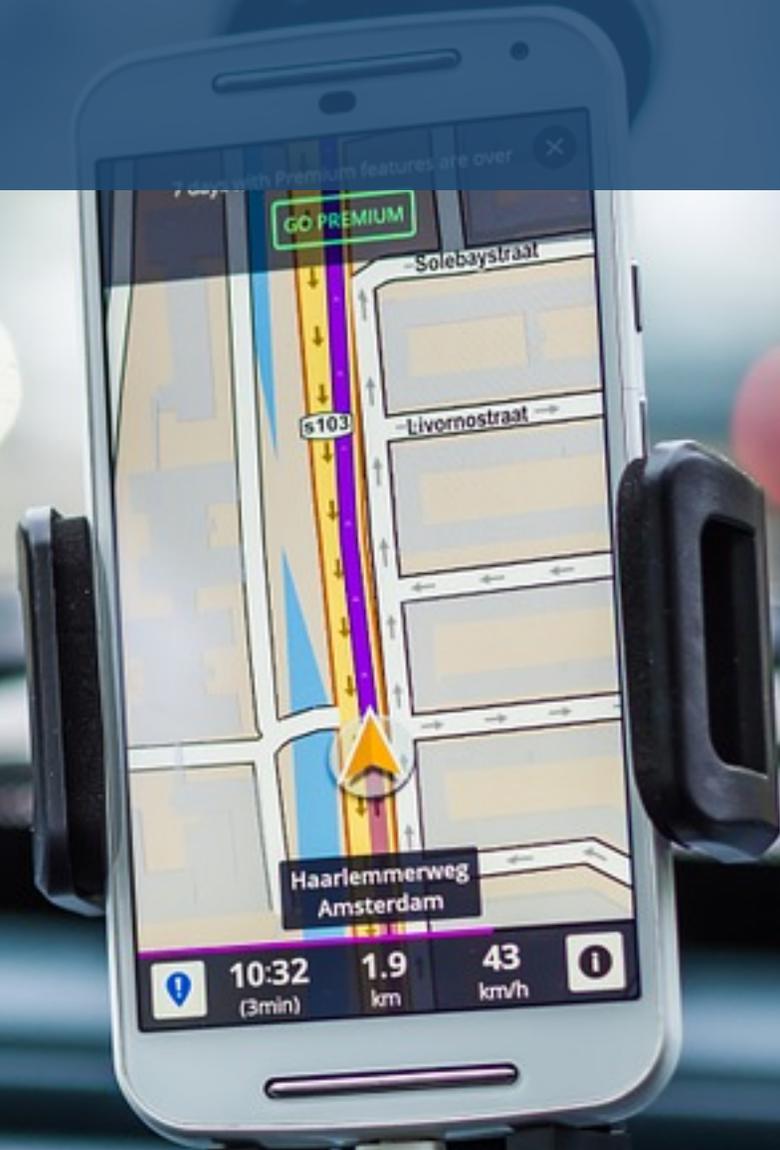
# Challenges: Congestion



# Challenges: Funding Shortage



# Opportunities: Technological Advancement



# Dynamic Mileage-based User Fee



# Dynamic Mileage-based User Fee

- Charge by Miles Driven
- Variable per-mile User Fee

# Key Elements of User Fee

#1 Location and Time of Day

#2 Vehicle Characteristics

#3 Transit Use

#4 Income Level

# Key Elements of User Fee

#1 Location and Time of Day

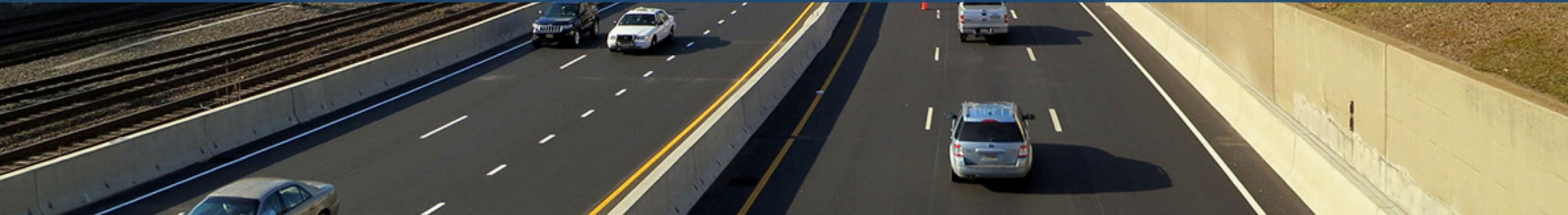
#2 Vehicle Characteristics

#3 Transit Use

#4 Income Level

# #1. Location and Time of Day

“*Congestion Multiplier*” is calculated based on the congestion level of the route and time of day travelled.



# #1. Location and Time of Day

A close-up photograph showing a person's hand holding a small, white, rectangular electronic device. The device has a prominent square white area on its top surface, which appears to be a sensor or a display. The hand is positioned near a light-colored, textured interior panel of a vehicle, possibly a door or a console. The background is dark and out of focus, suggesting the interior of a car.

On-board device with GPS  
and wireless communications

# Congestion Multiplier Example

A Metro Area is divided into zones with three levels of congestion

Each congestion level corresponds to a numerical number



1.0

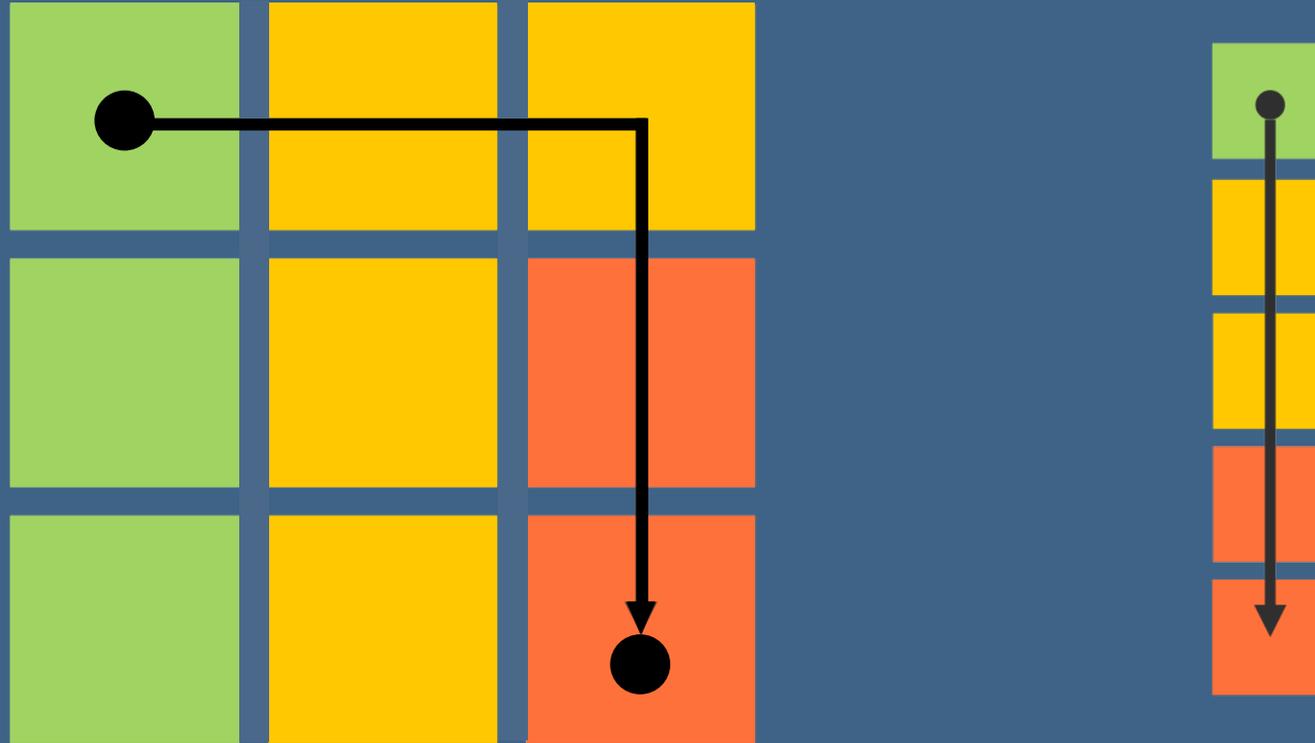


1.5



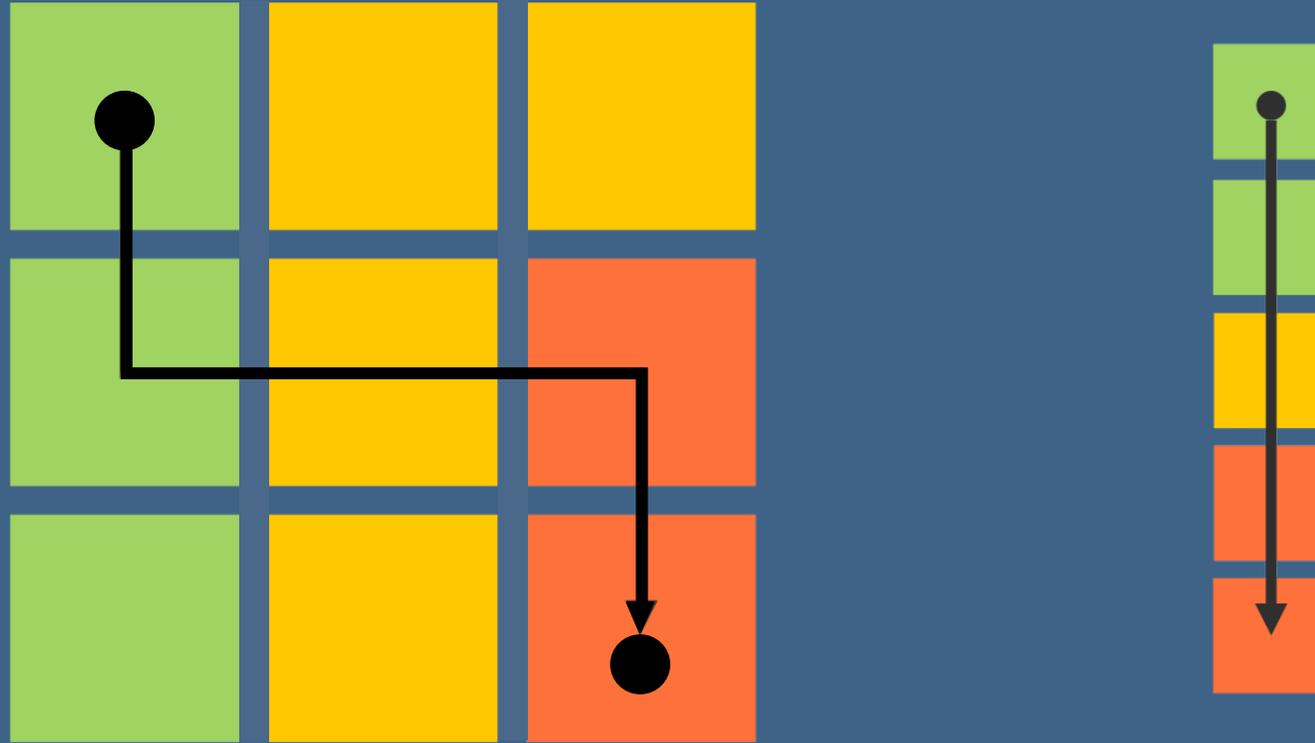
2.0

# Route Choice #1



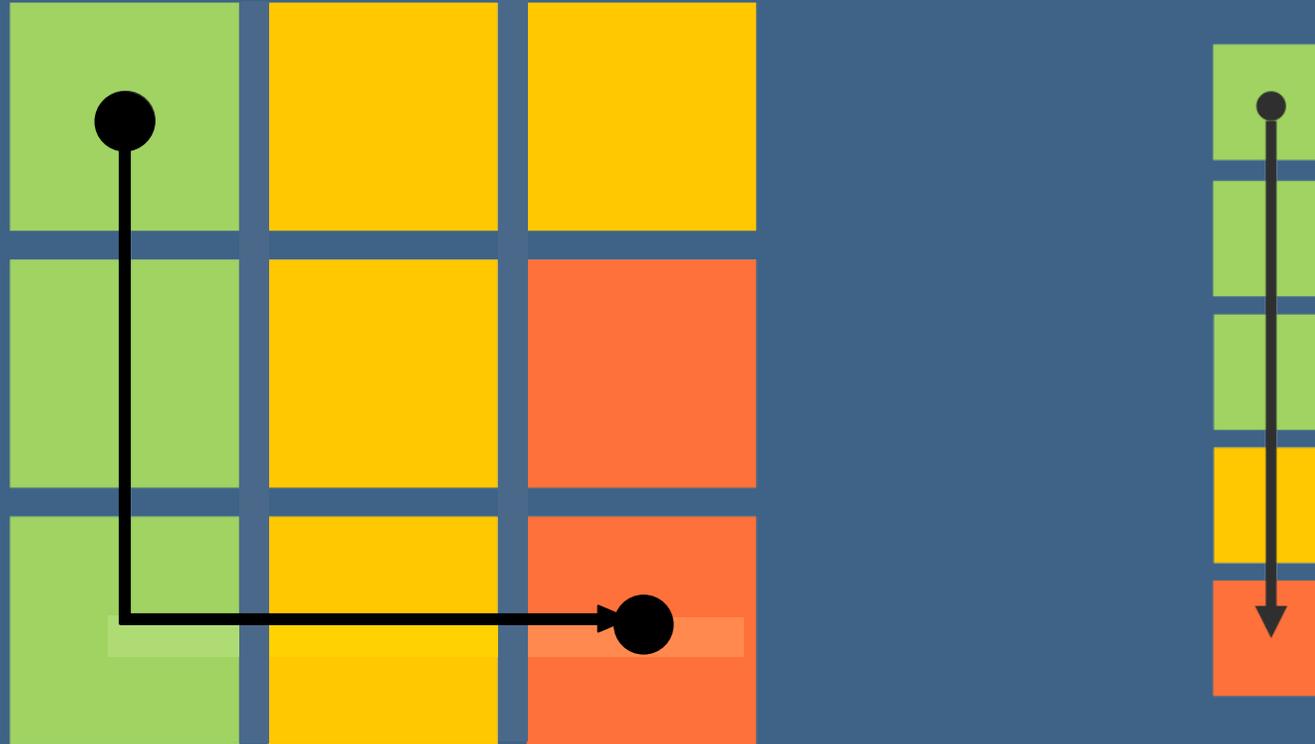
$$\text{Congestion Multiplier} = \frac{1.0*1 + 1.5*2 + 2.0*2}{5} = 1.6$$

## Route Choice #2



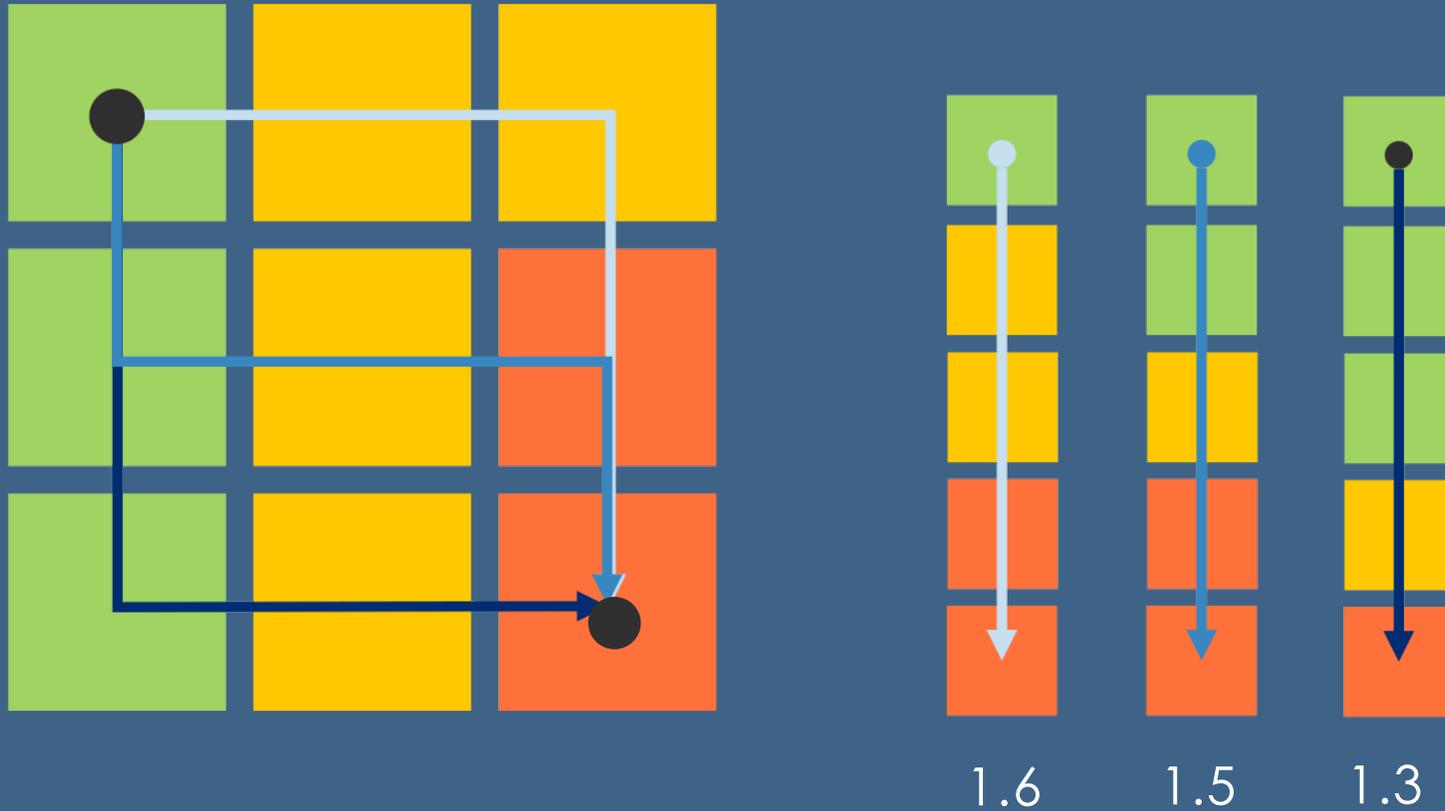
$$\text{Congestion Multiplier} = \frac{1.0*2 + 1.5*1 + 2.0*2}{5} = 1.5$$

# Route Choice #3

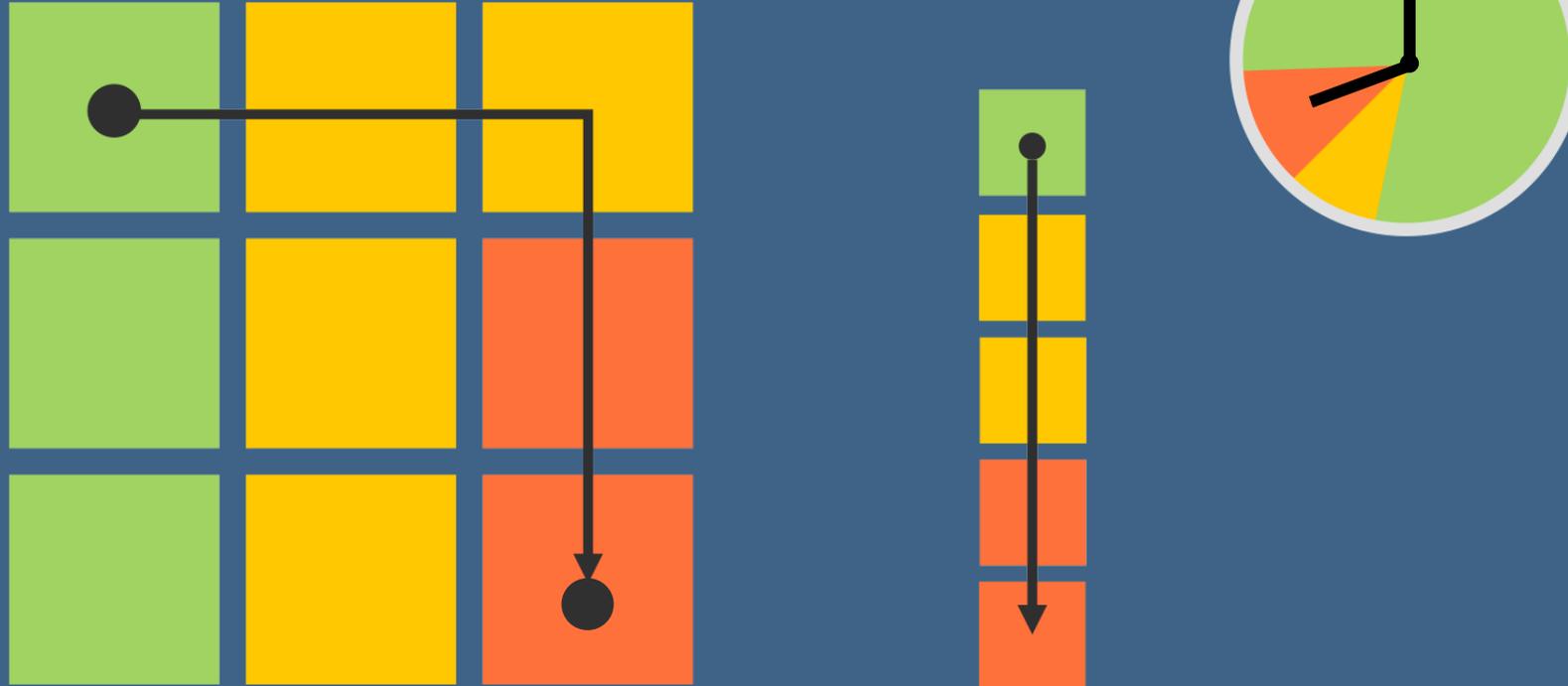


$$\text{Congestion Multiplier} = \frac{1.0*3 + 1.5*1 + 2.0*1}{5} = 1.3$$

# Traveling on less crowded routes results in lower Congested Multiplier

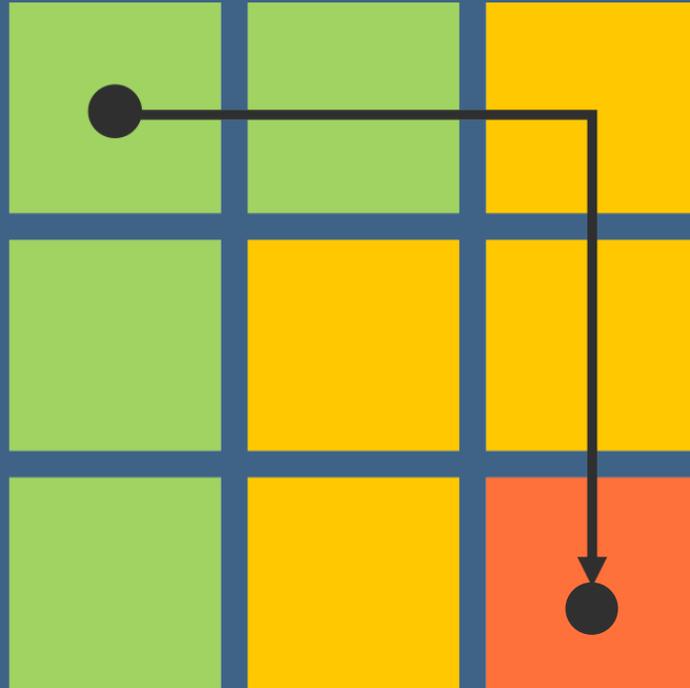


# Departure Time Choice #1



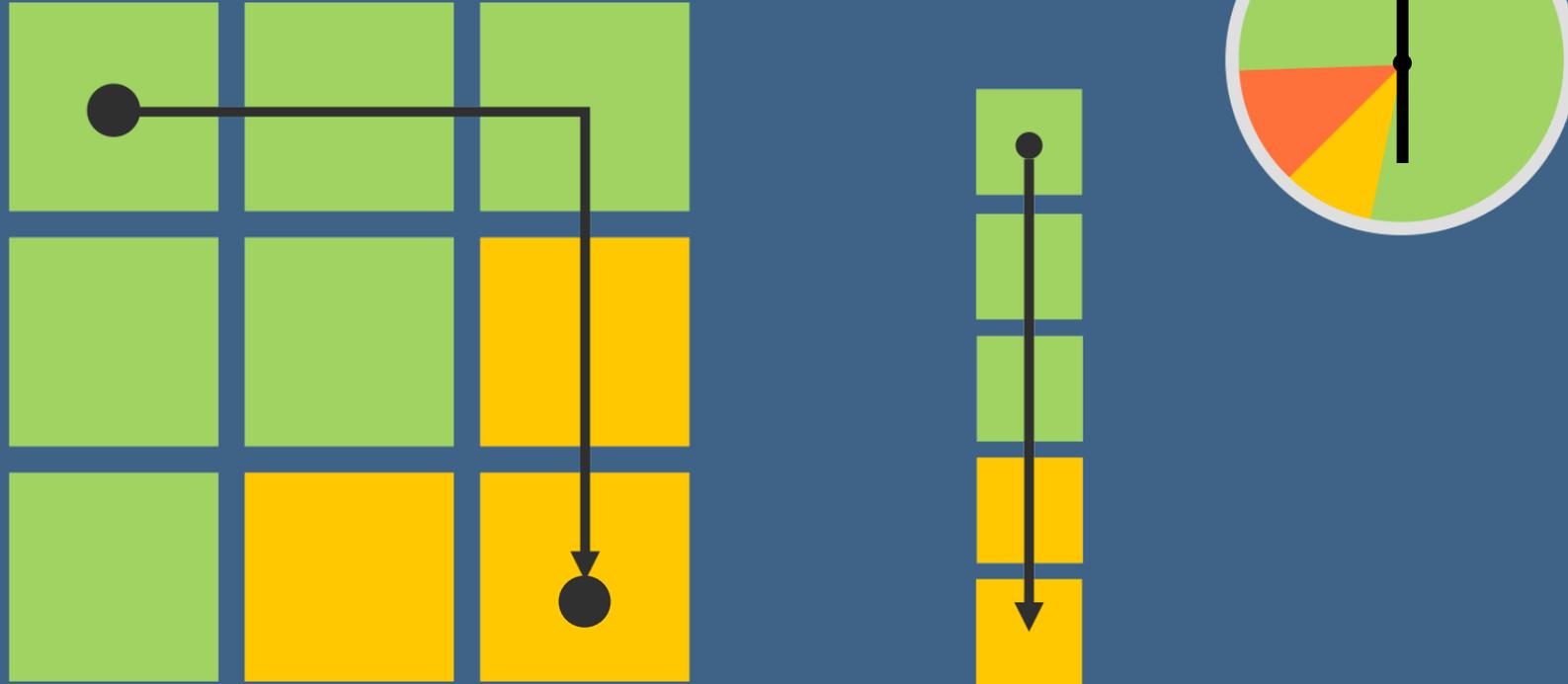
$$\text{Congestion Multiplier} = \frac{1.0*1+1.5*2+2.0*2}{5} = 1.6$$

## Departure Time Choice #2



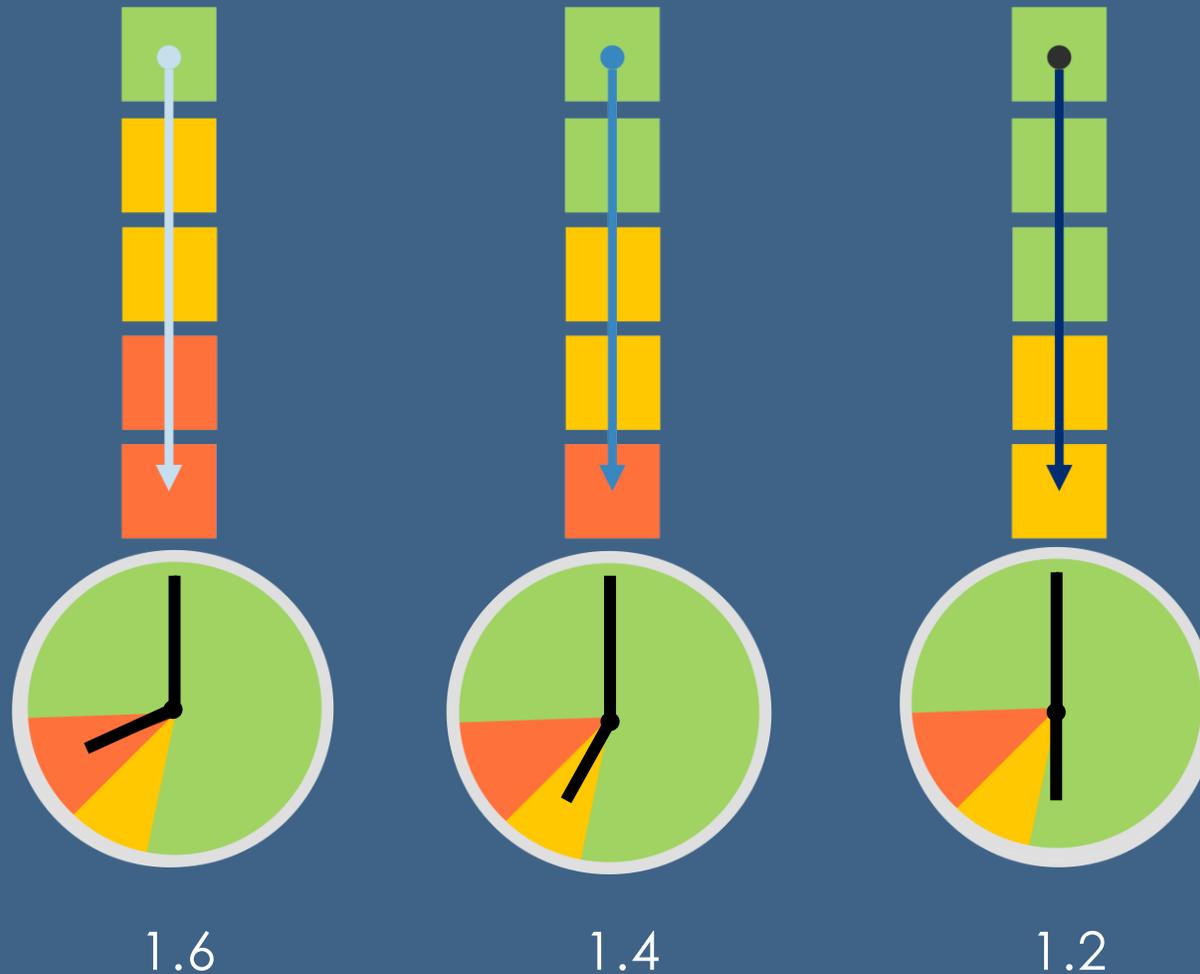
$$\text{Congestion Multiplier} = \frac{1.0*2 + 1.5*2 + 2.0*1}{5} = 1.4$$

# Departure Time Choice #3



$$\text{Congestion Multiplier} = \frac{1.0*3+1.5*2}{5} = 1.2$$

# Traveling at less crowded hours results in smaller Congested Multiplier





# Privacy Concerns





# Potential Remedy: Aggregation

- 
- User fee is calculated **locally** at on-board Device.
  - No trip details will be disclosed.
- 

# Key Elements of User Fee

#1 Location and Time of Day

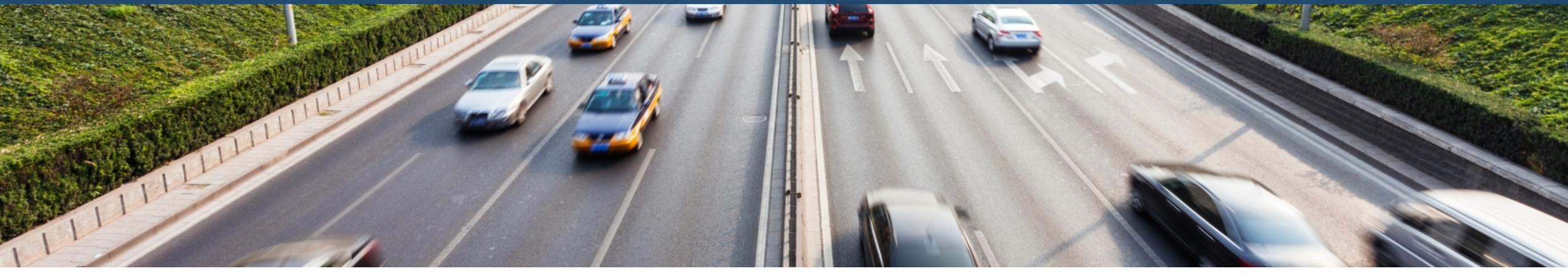
#2 Vehicle Characteristics

#3 Transit Use

#4 Income Level

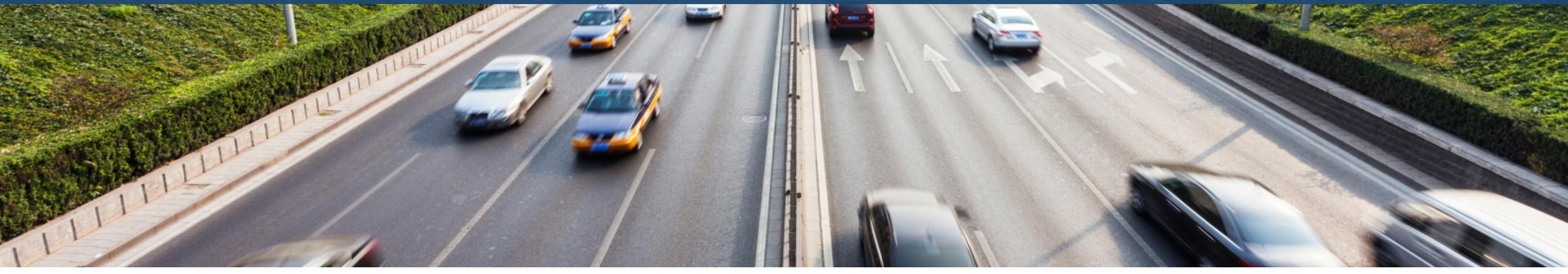
## #2. Vehicle Characteristics

- Vehicle Weight



## #2. Vehicle Characteristics

- Vehicle Weight
- Emission Level



# Key Elements of User Fee

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## #3. Rebates based on Transit Use



# Key Elements of User Fee

#1 Location and Time of Day

#2 Vehicle Characteristics

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# Equity Concerns: The Needs for an Income-based Rebate Program



# #4. Rebates based on Income



# Boston Today





# Boston Tomorrow

- Appropriate and Intelligent Pricing for Driving



# Boston Tomorrow

- Appropriate and Intelligent Pricing for Driving
- Encourage Mode Shifts to Sustainable Modes



# Boston Tomorrow

- Appropriate and Intelligent Pricing for Driving
- Encourage Mode Shifts to Sustainable Modes
- Provide Equitable Mobility to All Groups

A collage of city scenes including skyscrapers, traffic lights, and a subway train. The background is a grid of images: top-left shows a modern building facade; top-center shows a blurred city street; top-right shows a close-up of a building's facade; middle-left shows a street with a 'JEWELERS 333' sign; middle-center shows traffic lights at night; middle-right shows a city skyline with a prominent skyscraper; bottom-left shows a person walking; bottom-center shows a person on a bicycle; bottom-right shows a subway train.

# Acknowledgement

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Session Moderator: Samantha Soules

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