Understanding Population Dynamics at City Scale through Edge Computing

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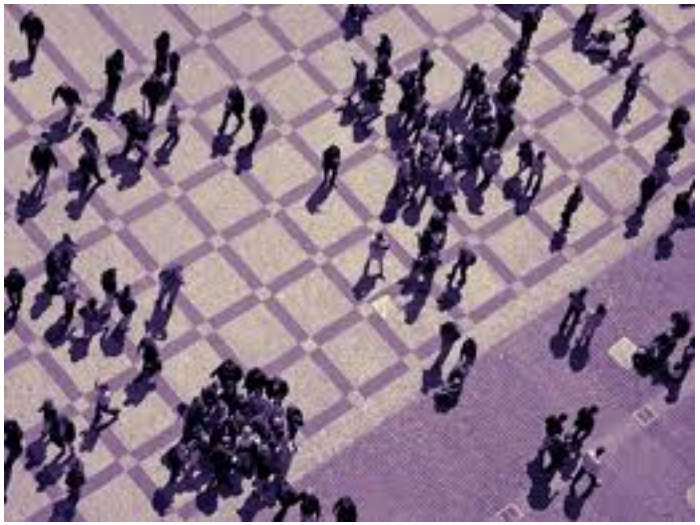


How are citizens using spaces?

Street corners

Parks

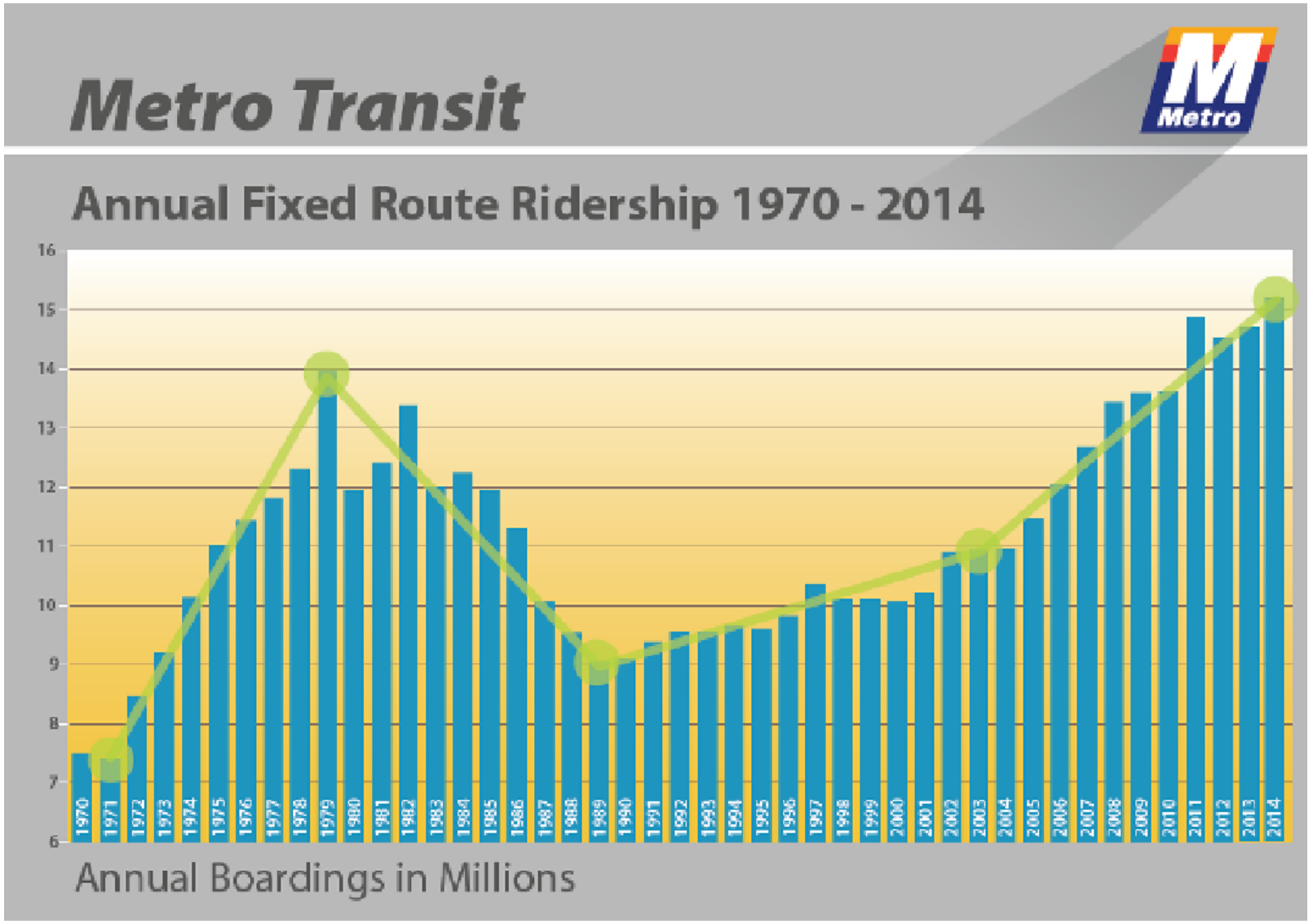
In public transit

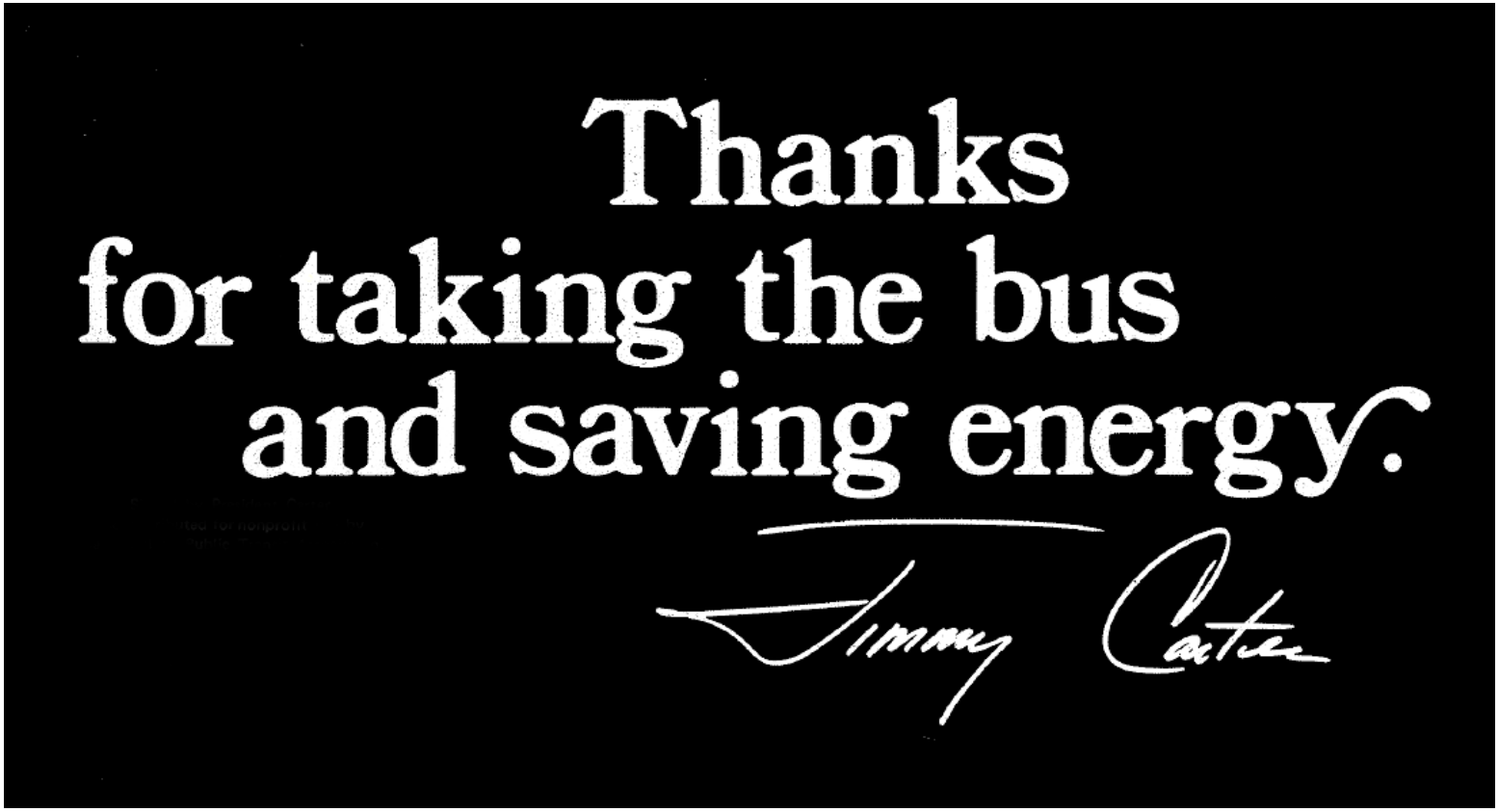
Applications: City planning

New parks?

Add more public spaces?

Madison Metro Transit Ridership has been trending significantly upwards over the past several years




Thanks
for taking the bus
and saving energy.
Jimmy Carter

The Evolving State of Transit Information Technology

1,822,500 MILES
ON CAR TRACKS;
STILL ROLLS ON

OLDEST STREET CAR
MOTORMAN RETIRES;
IN SERVICE 53 YEARS

Edgar Monroe Dickens
Started driving a horse car in Chicago in 1874; subsequently he worked as a cable car grip operator; and retired as a motorman in 1927.

In the fifty years that passed between the retirement of my Great Grandfather and the time I started driving a bus in Kalamazoo, Michigan, not very much changed, in terms of the information that transit operators knew about the riding patterns of their customers. Passengers showed up at a stop and they were driven to the stop as close as possible to their destination.

Now a plethora of technologies are in a continual state of research and development that will undoubtedly assist passengers and operators in their endeavors. Already passengers can find out the real time location of the transit vehicle that they are waiting for. Transit Operators can manage the flow of vehicles along routes. From one perspective, this is just the beginning…

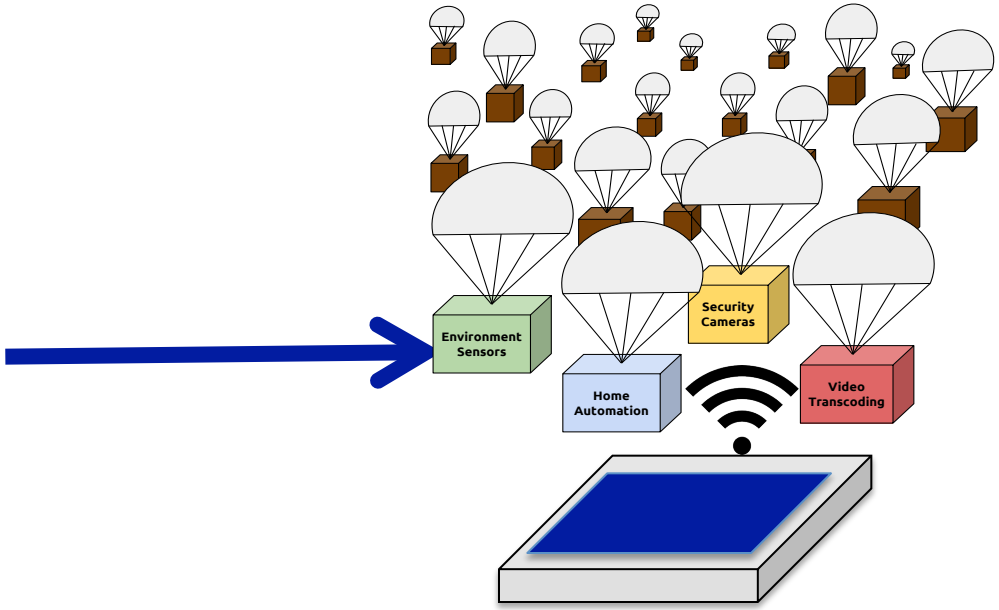
Applications: Transit planning

New routes?

New bus stops?

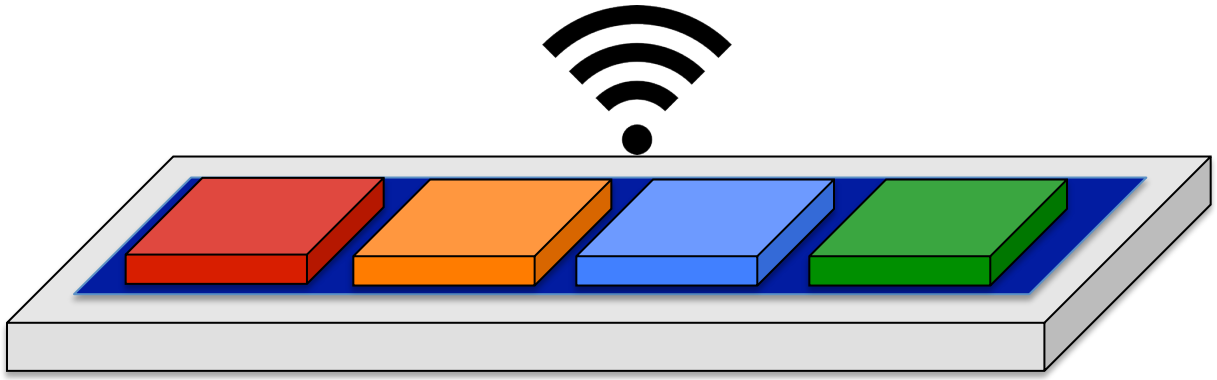
What is Paradrop?

A platform that allows us to deploy new intelligence and analytics in WiFi routers through virtualization



Paradrop: Analytics on WiFi router

Dynamically install 3rd party analytics into the router



Demo and plans

- ParaDrop routers across downtown Madison, WI
  - Bookstores
  - Coffee shops
  - Near bus stops
  - On buses
  - Other outdoor sites

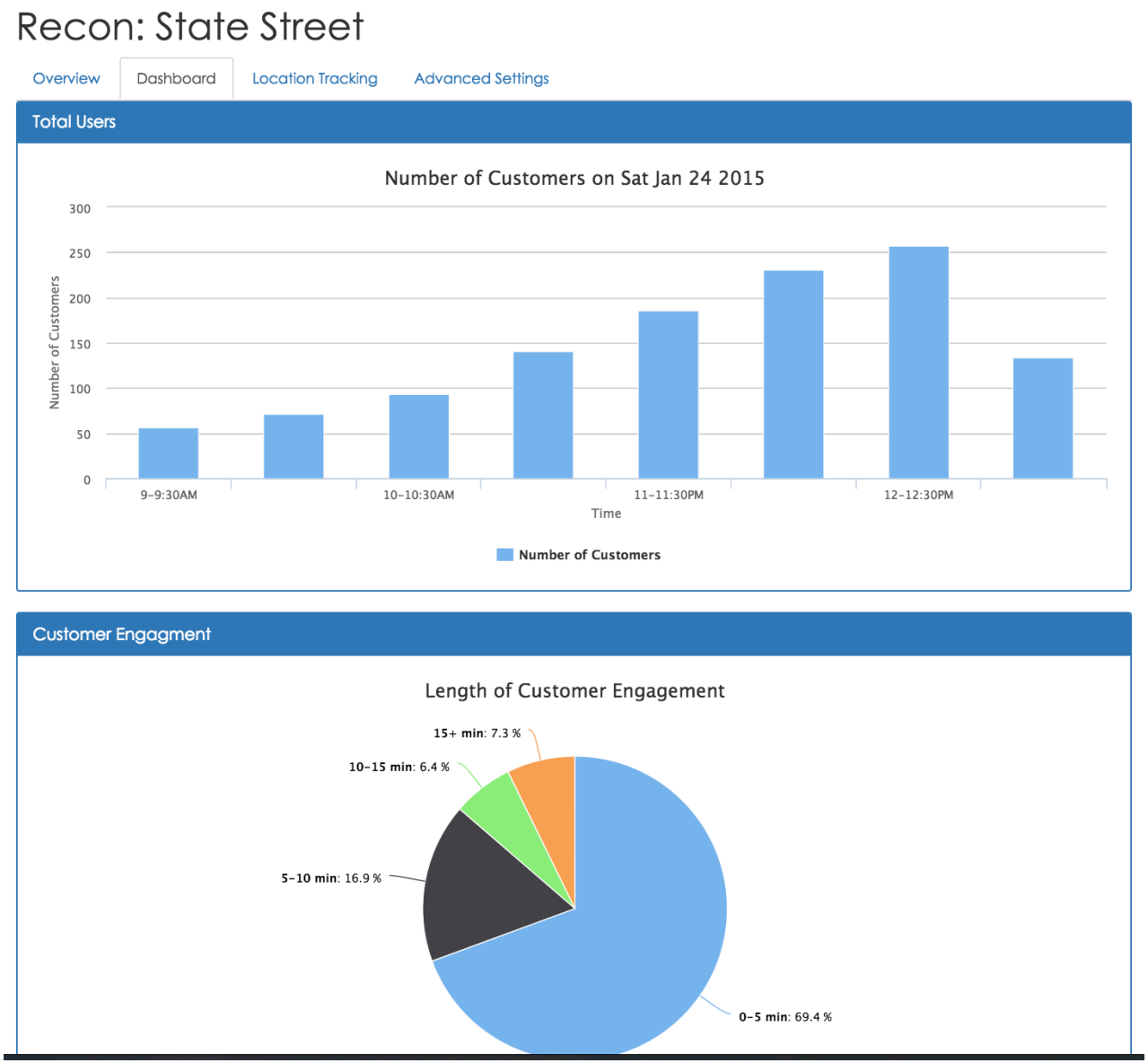
- Other sensors

- Use data observed by Paradrop routers to understand population dynamics

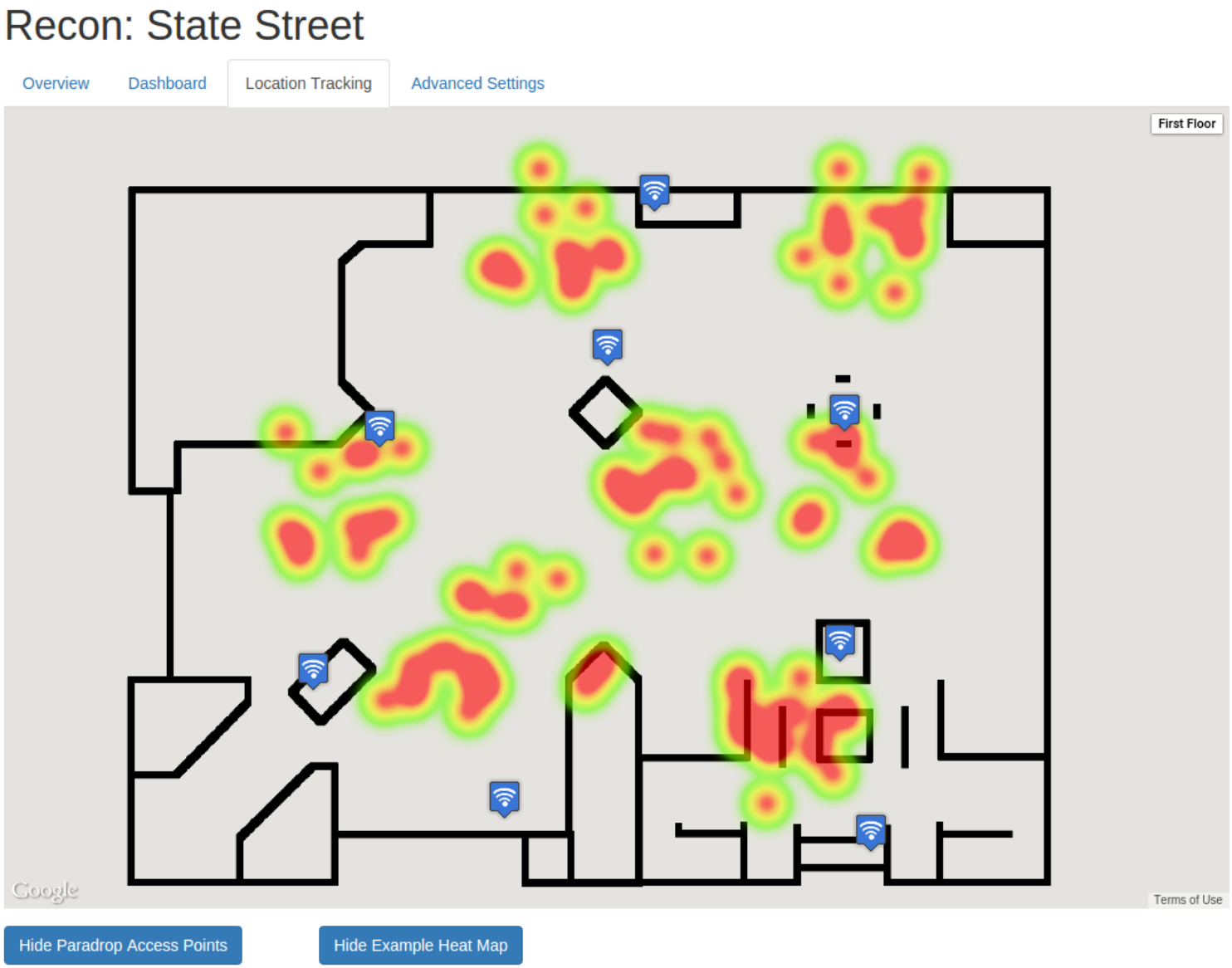
"Space-alytics"

- How people use different public spaces:
  - Retail stores, Coffee shops, malls
- Track how long customers wait, how they use the spaces
- Locate how busy stores are at different times of day, etc.
- What is the "busiest" corner of the city?

Space-alytics in action



Space-alytics in action

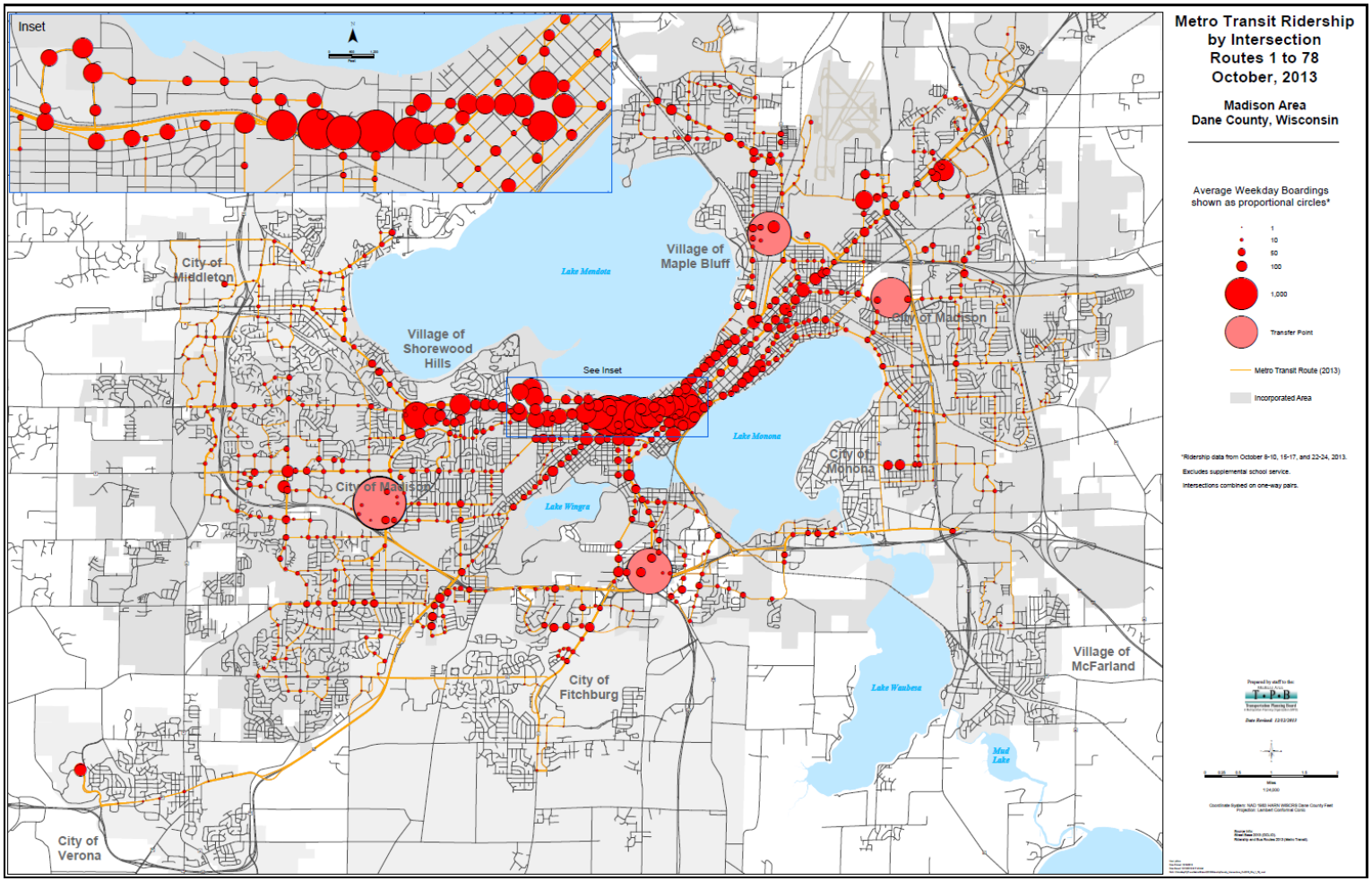


"Transit-alytics"

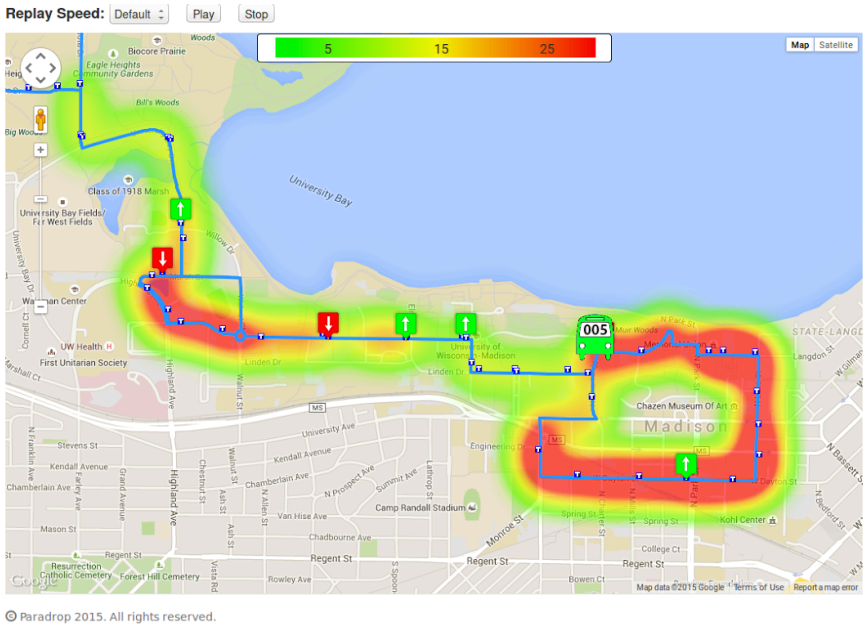
- Where are people getting on and off buses?
- What are most popular routes?
- How long are people waiting at bus stops?

- How many people are waiting?
  - Propose when to provide additional buses

Metro Transit can collect some data about its passengers, but new kinds of data available from ParaDrop is likely to provide significantly new insights, e.g., origin-destination of passengers, waiting times for buses, etc.

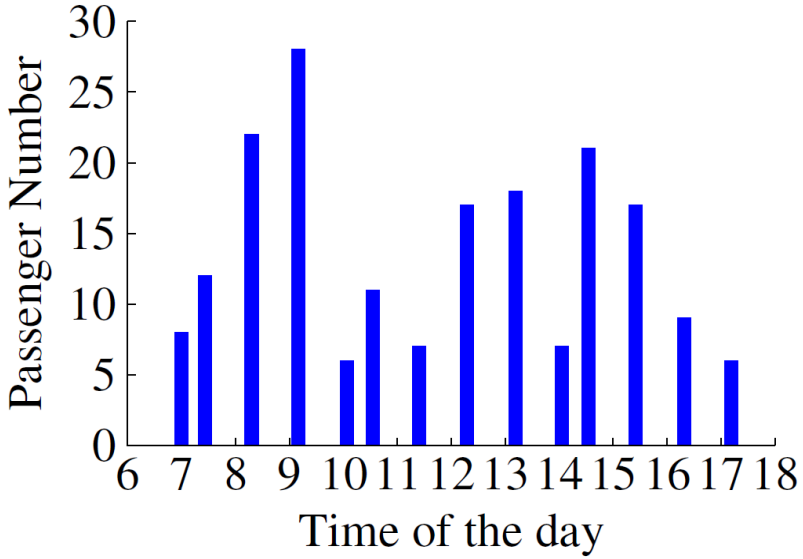


Transit-alytics in action



Where are the people in the city

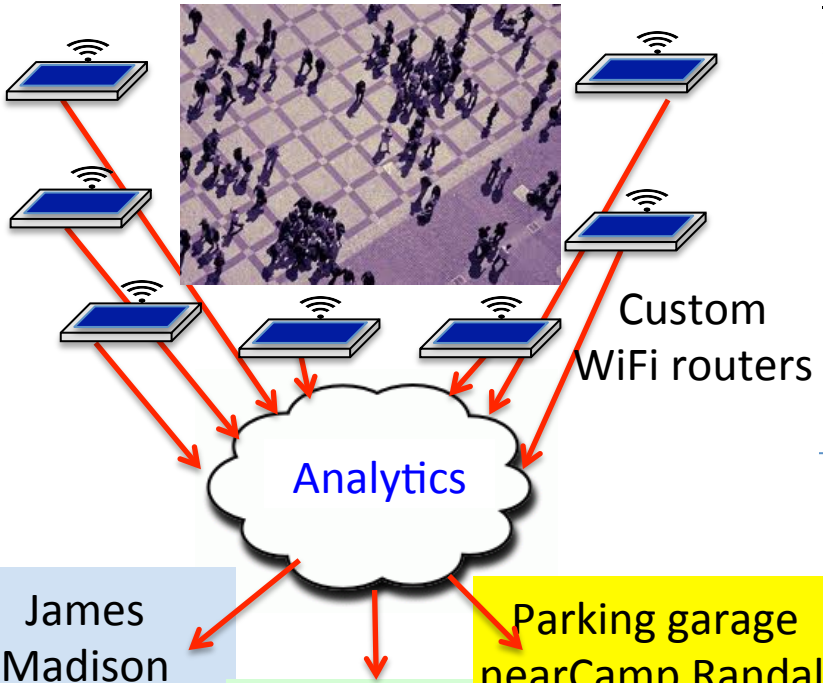
What are the popular times to ride



Population Dynamics at City Scale through Edge Computing

Challenge:

- How are city spaces being used?
  - Parks, Bus routes, etc.
- Assist urban planning



Scientific Impact:

- Provides a non-intrusive way to track people and populations across large wide-area spaces

Solution:

- Use wireless signals to understand dynamics

Broader Impact:

- Assist urban planners, transit planners, etc.
- Working with City of Madison and Madison Metro Transit
- Helping organizations on how to better utilize local resources
- Answering when and where to introduce new public spaces

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