



# Making Intersections Smarter in the City of Chicago

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# Agenda

- Challenges
- Goals
- Key Features
- Considerations
- Building a Smart Intersection
- Next steps
- Questions



# Chicago's challenges

- Legacy infrastructure, limited connectivity, lack of visibility into signal network
- About 3000 mixed controllers
- Limited resources to update signal timing
- Frequent failure of signal coordination due to clock drifts
- Increasing congestion and traffic crashes
- Limited resources to maintain the fiber network
- Expensive to install new fiber
- Need to build an infrastructure to support active traffic management/TMC

# Chicago's goals

- Connect new and legacy infrastructure providing remote access to traffic signals
- Maintain optimal offset between signals so as to maximize throughput at intersections
- Ability to identify, diagnose and better allocate resources to address traffic operations and citizen safety issues
- Drive forward Vision Zero goal of reducing number of traffic related deaths by 2026
- Prepare for the future with hardware that can accommodate connected city functionality

# Key features of a smart signal network

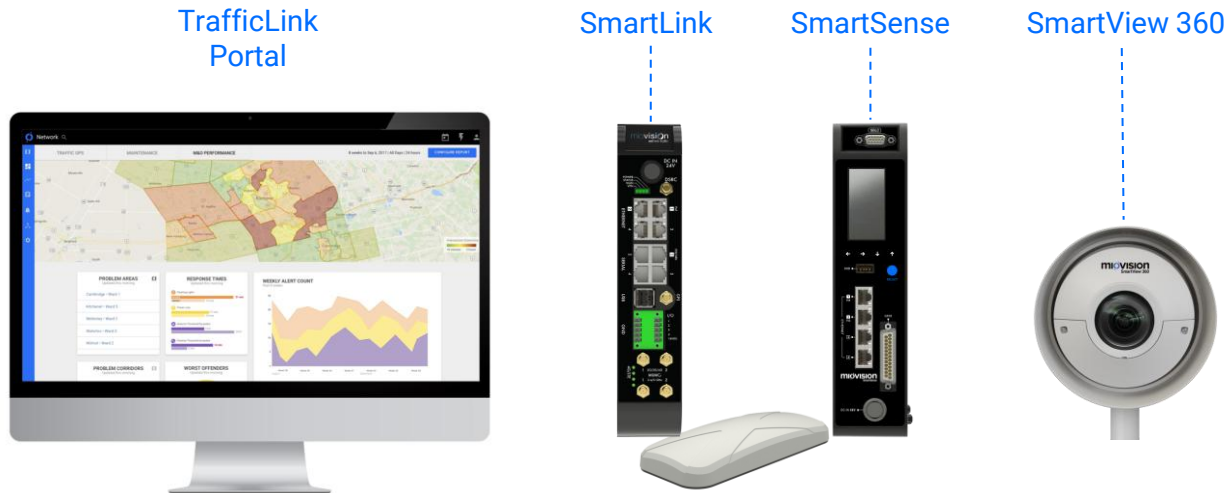
- Ongoing approach volume counts
- Update signal timings as conditions change
- Stop bar and advanced detection
- Accurate left turn actuation
- Travel time estimation between points
- Signal performance measures

# Considerations

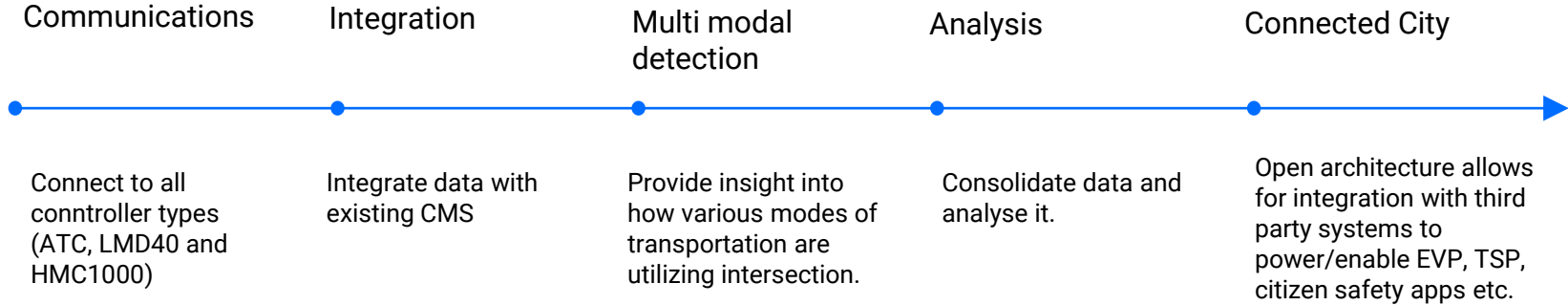
- No video streaming needed over the network
- A solution that can scale citywide
- Want to use a network that requires least maintenance
- Reasonable overall cost
- Retrofit existing signals without changing the infrastructure
- Short implementation timeline

# Potential solution - TrafficLink

The City was looking for a turnkey solution that addresses the ITS challenges. Miovision approached the City with an ITS solution stack that can address our needs. A pilot project was initiated in 2017 and we are in the final stages of testing the capabilities.



# Building a smart intersection

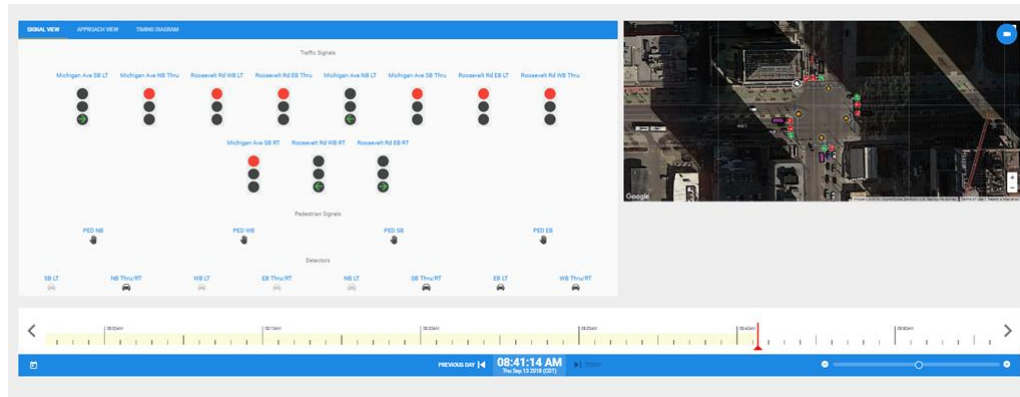




# Building a Smart Intersection

## Communications

- Successfully integrated with DOIT Verizon network
- Developed custom interface to connect to HMC 1000
- Installed at 4 different intersections representing a wide range of cabinet configurations and controller types
- Demonstrated ability to time sync all controllers and to choose between timing plans



# Building a Smart Intersection Integration

- Set up ports and communication tunnel to connect to MIST
- Joint effort between HNTB, Kapsch, Parsons, CDOT and Miovision

The screenshot displays the MIST Operator Interface. The main window is titled "Site 308 - Western Av & W. Roosevelt Rd status report". Below this, there is a table with columns: Device Name, Device ID, Site ID, Section ID, Status Mode, Control Mode, Coord. State, Media Source, Cycle, Split, and Offset. The data row shows: Western Av & W. Roosevelt Rd, 6308, 308, 25, COMM ON, TEC, COORDINATED, Section Command, 1, 1, 1.

Below the status report is a "Site 308 - Western Av & W. Roosevelt Rd communications report" table. It has columns: Time Requested, Channel, Device, Time To Process (ms), Type, Response Status, and Message. The table contains multiple rows of communication logs, all showing "Valid" response status.

On the right side, there is a "Signal Control Navigator" table with columns: Sites, Sections, Regions, Links, ID, Description, Section ID, and Channel ID. The table lists various signal control elements, including "Western Av & W. Roosevelt Rd" (Section ID 308, Channel ID 322) and "Western Blvd & Garfield Blvd" (Section ID 28, Channel ID 330).

At the bottom left, there is a status bar with the text: "09/13/18 12:53:30 Failed to read default options file del\_comm.v... Error in getting report data".

# Building a Smart Intersection

## Multimodal detection

- Intersection is fully actuated
- Detecting following classifications:



Light Vehicles



Pedestrians



Bicycles



Articulated Trucks



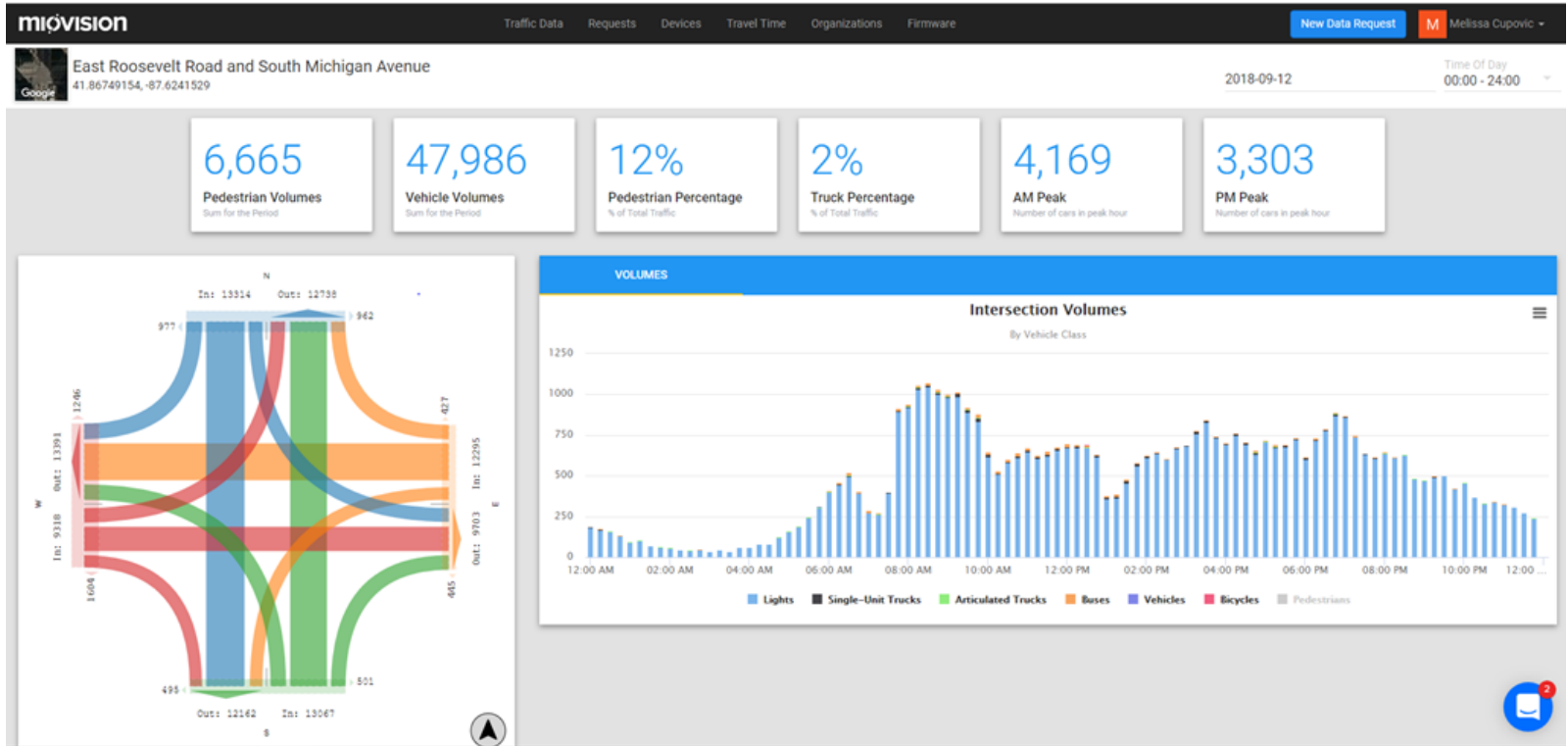
Single-unit Trucks



Buses

# Building a Smart Intersection

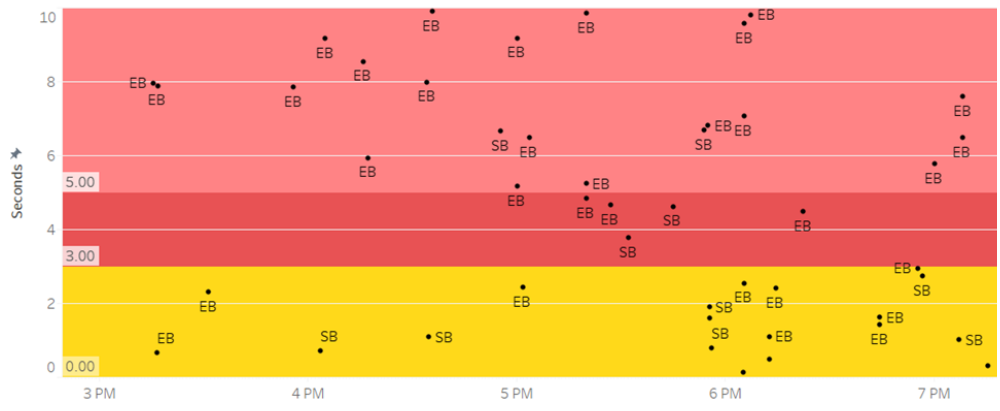
## Analytics - TMCs



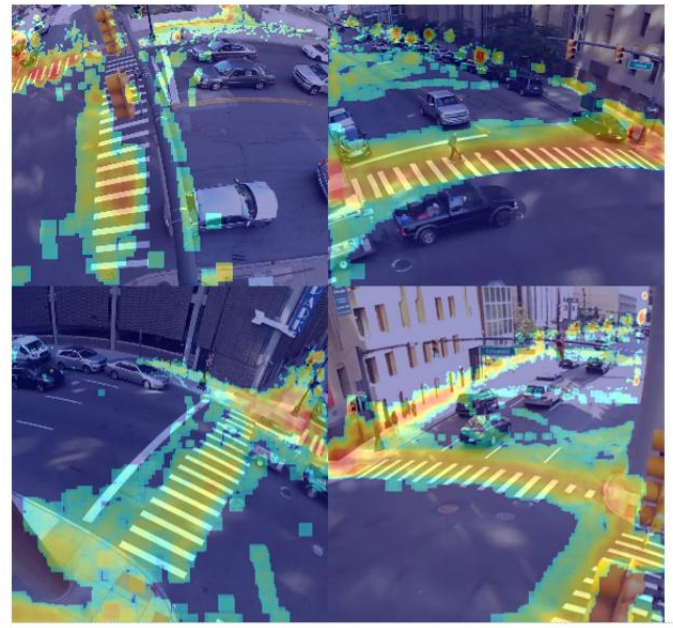
# Building a Smart Intersection

## Analytics - Safety Analytics

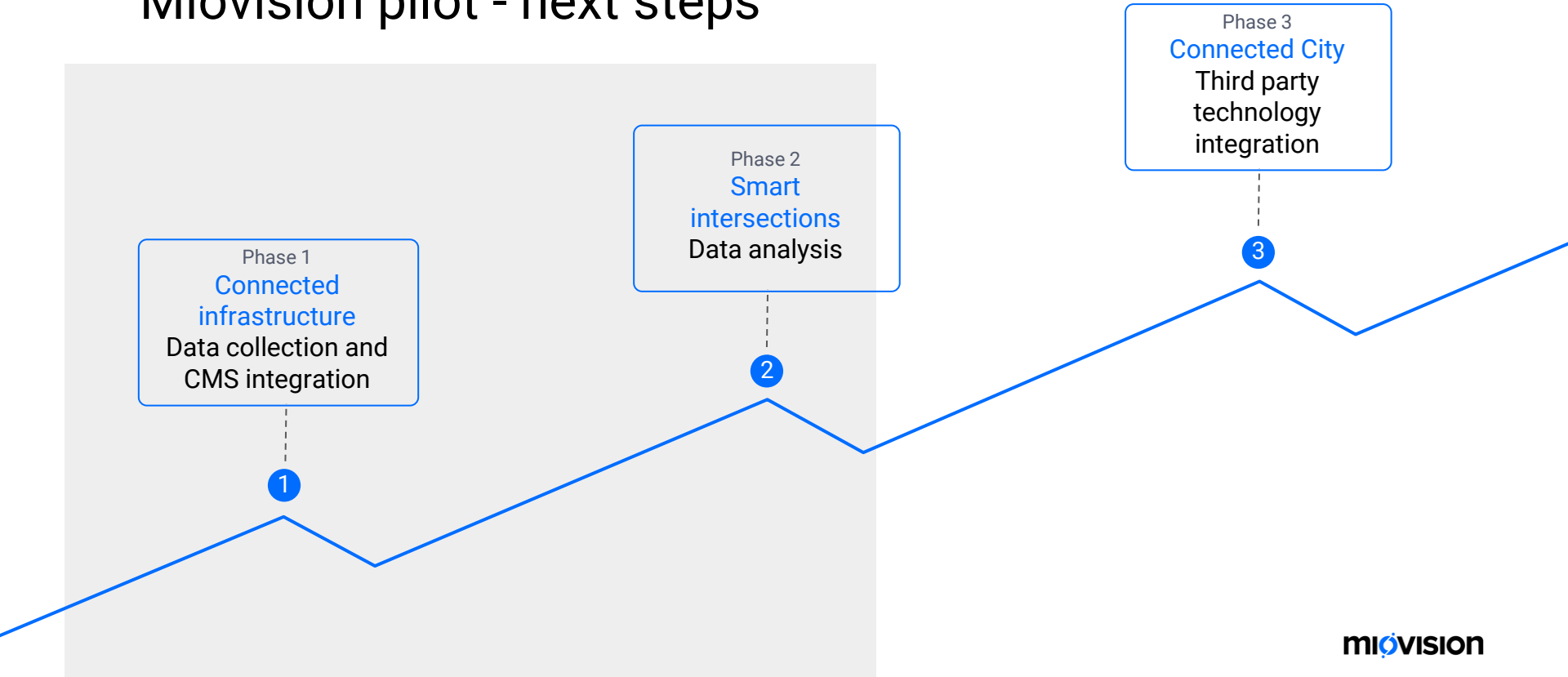
Yellow and Red Light Behavior



Pedestrian Spatial Activity Heatmap

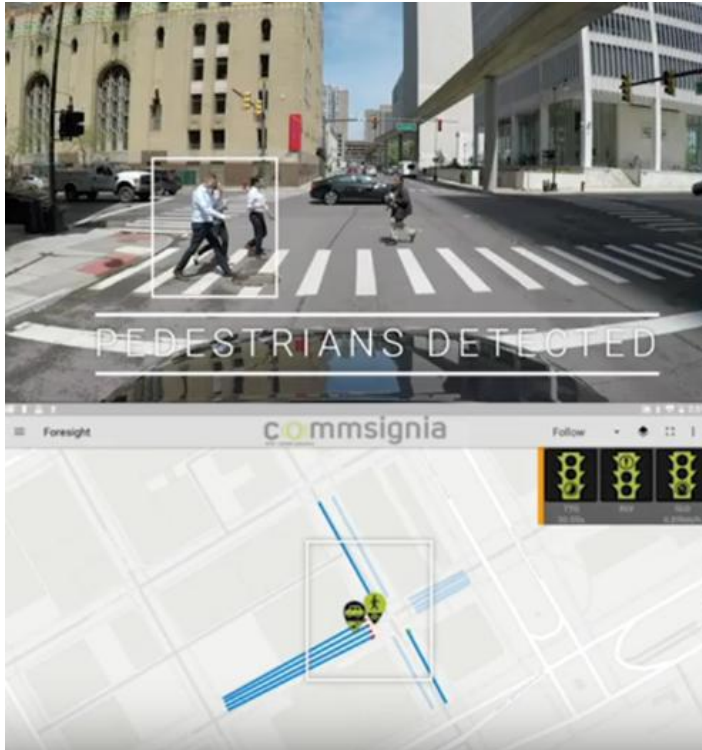


# Miovision pilot - next steps



# Connected City

## Integration w/Commsignia





Questions?

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