The Chartered Institute of Logistics and Transport

Intelligent Transportation Solutions to Retain and Increase Ridership – The TriMet approach

Adrian Pearmine
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TRIMET DKS

Innovation and Disruption in Urban Mobility: Change Is Coming Fast

Susan Shaheen, PhD
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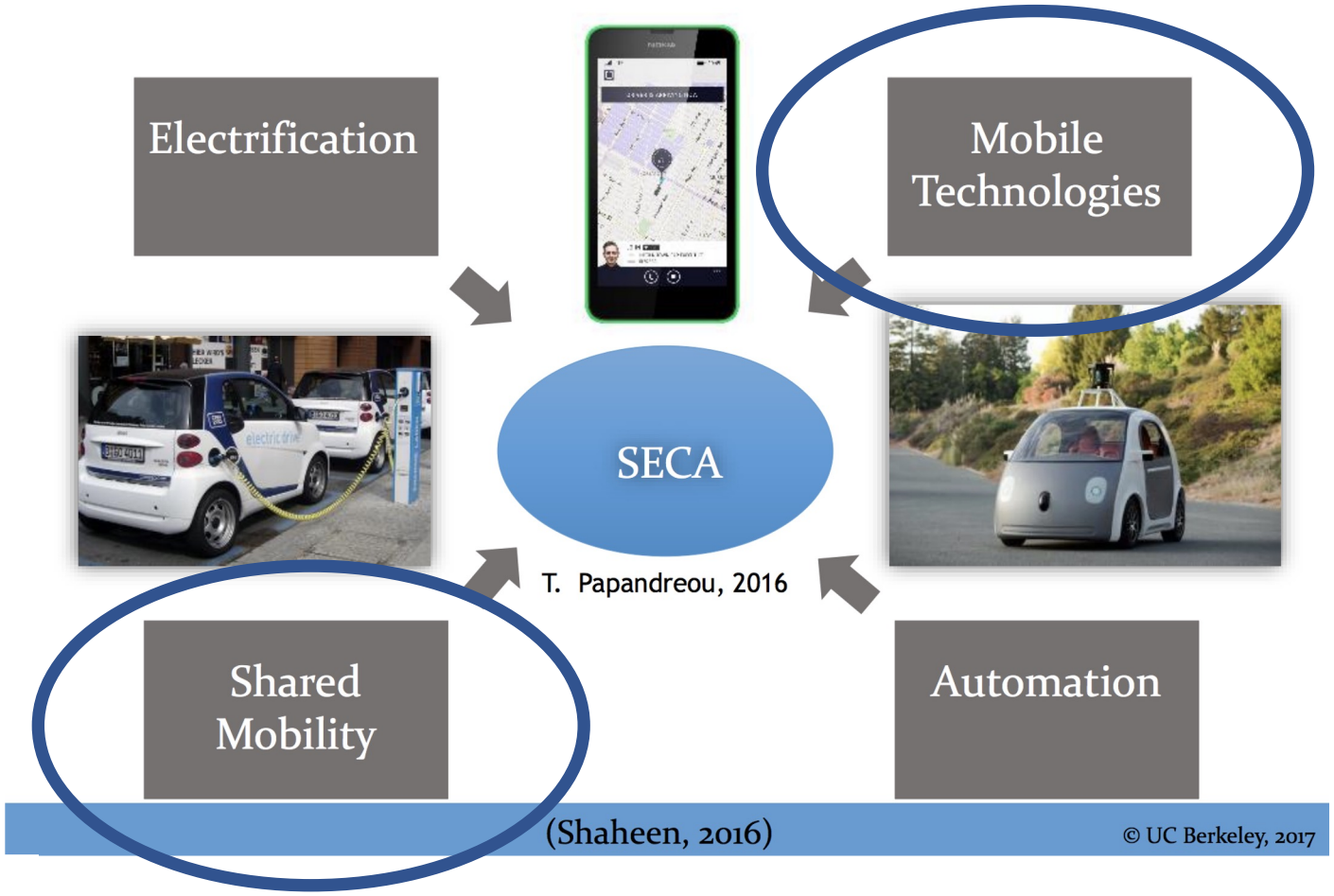
Convergence



tsrc
UNIVERSITY OF CALIFORNIA Berkeley
Transportation Sustainability
RESEARCH CENTER

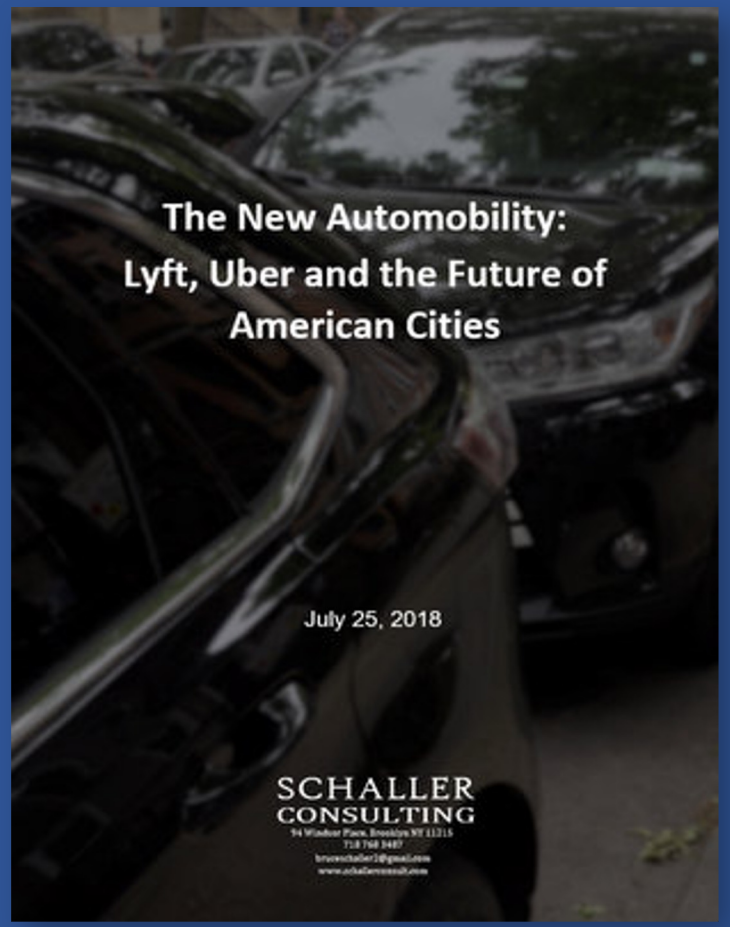

UBER
lyft


UBER
UBERATC.COM/CAR
ADVANCED
TECHNOLOGIES
CENTER
Credit: Uber


CONGESTION
AHEAD
NEXT 20
YEARS


ONLY
EXCEPT BUS
STOP

CITYLAB



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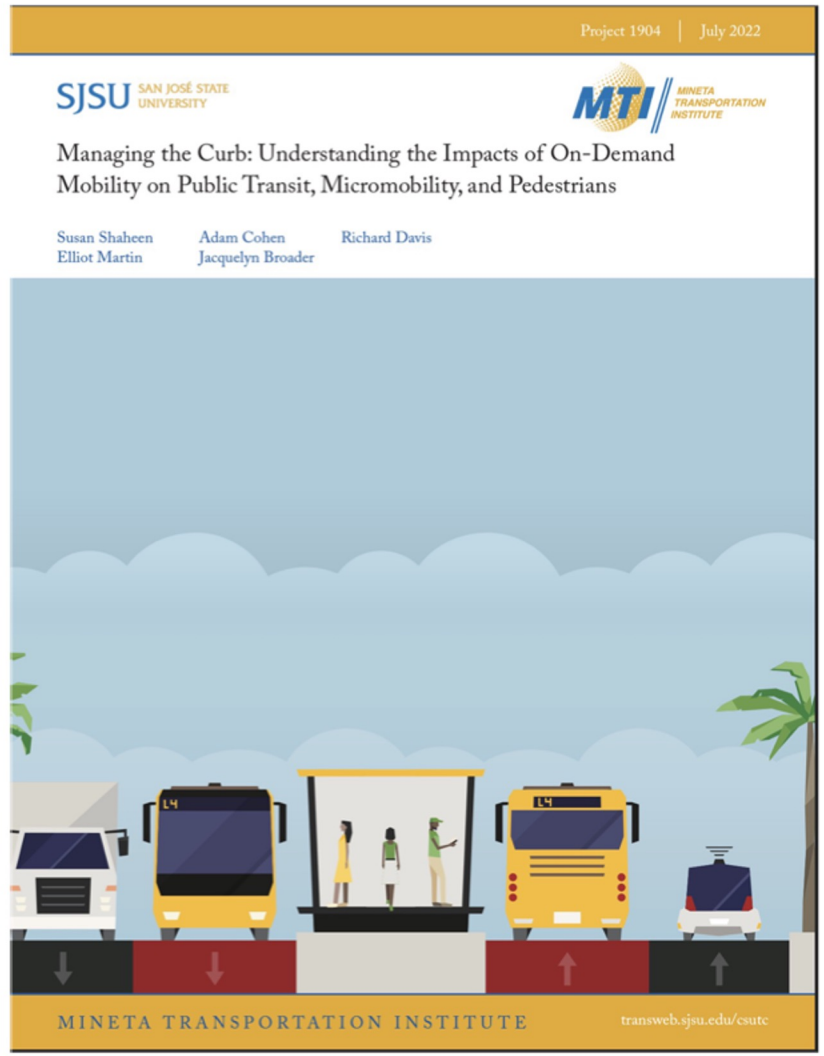
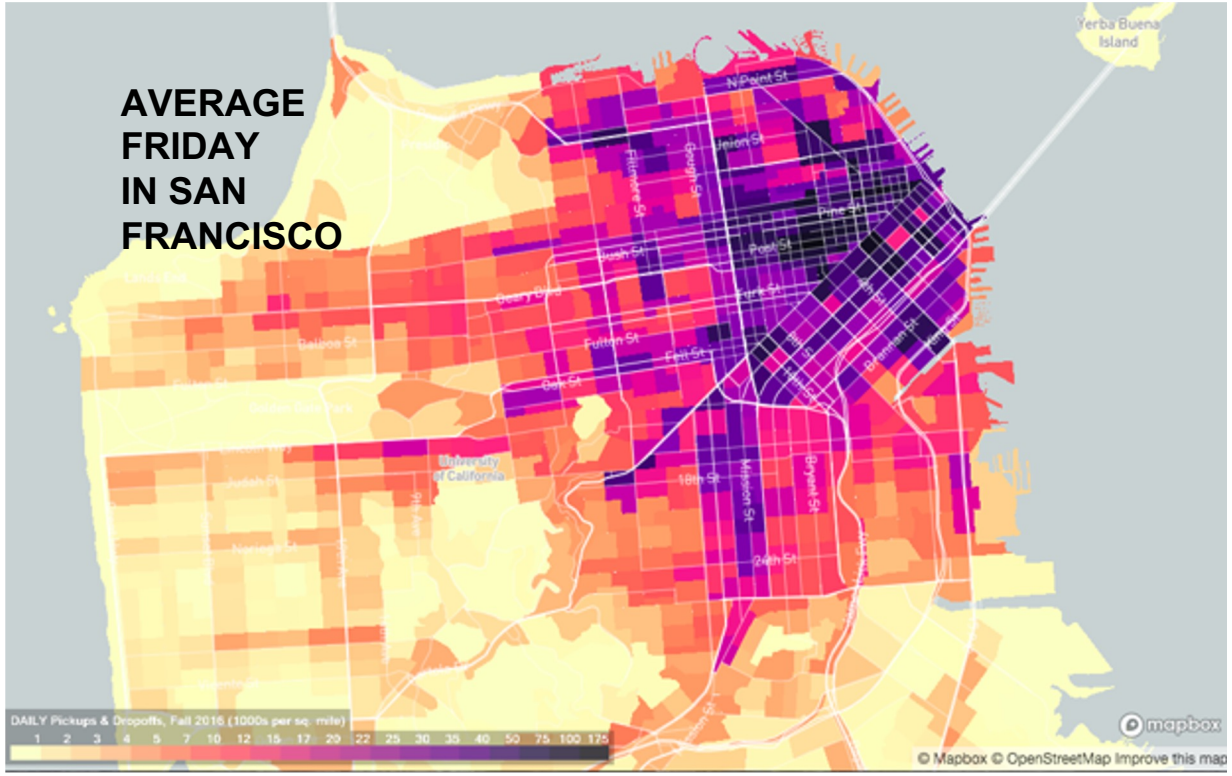
Lots of Additional Resources



Geographic Concentration of Uber/Lyft Drop-Offs



Source: SFCTA

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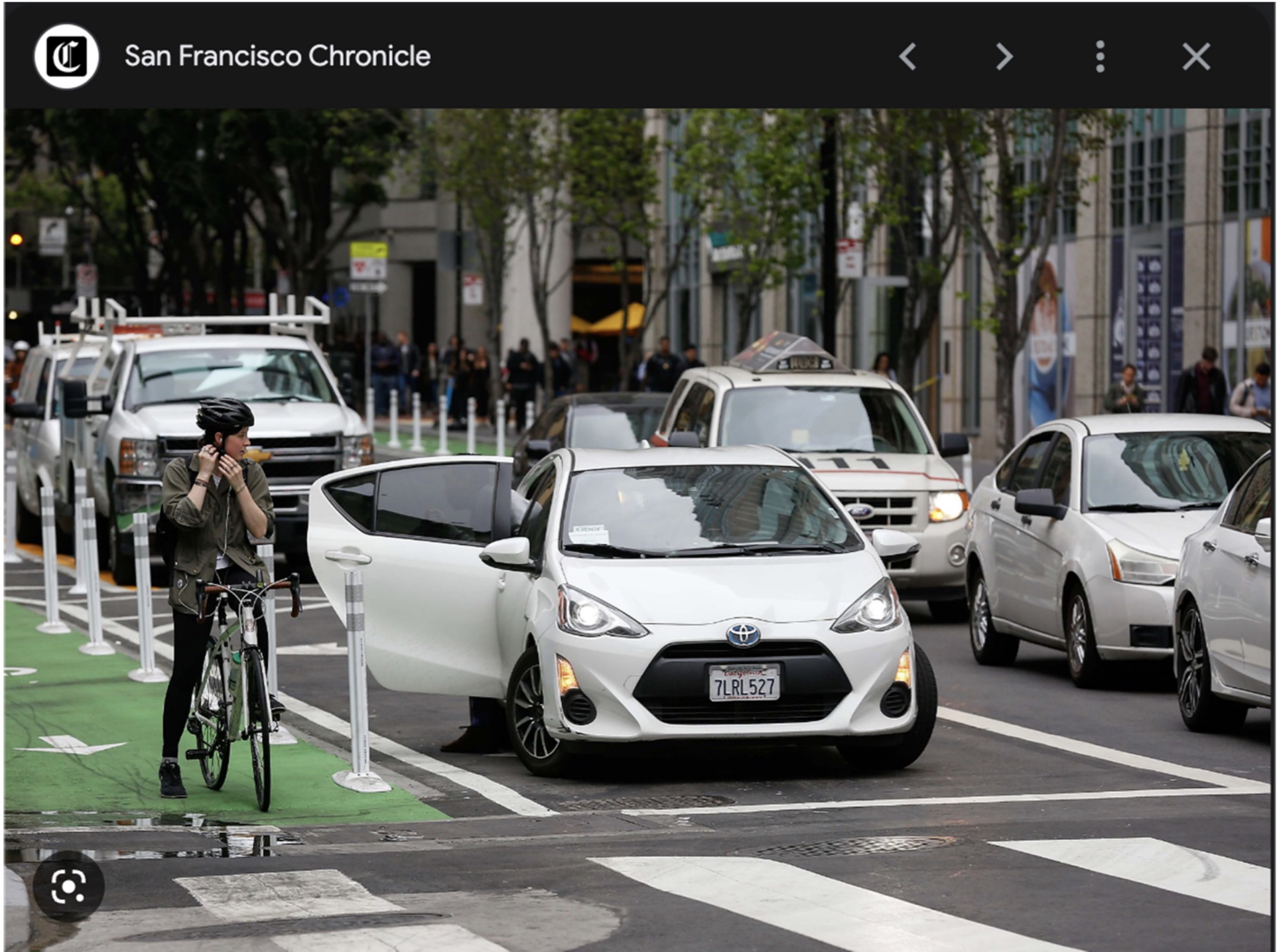
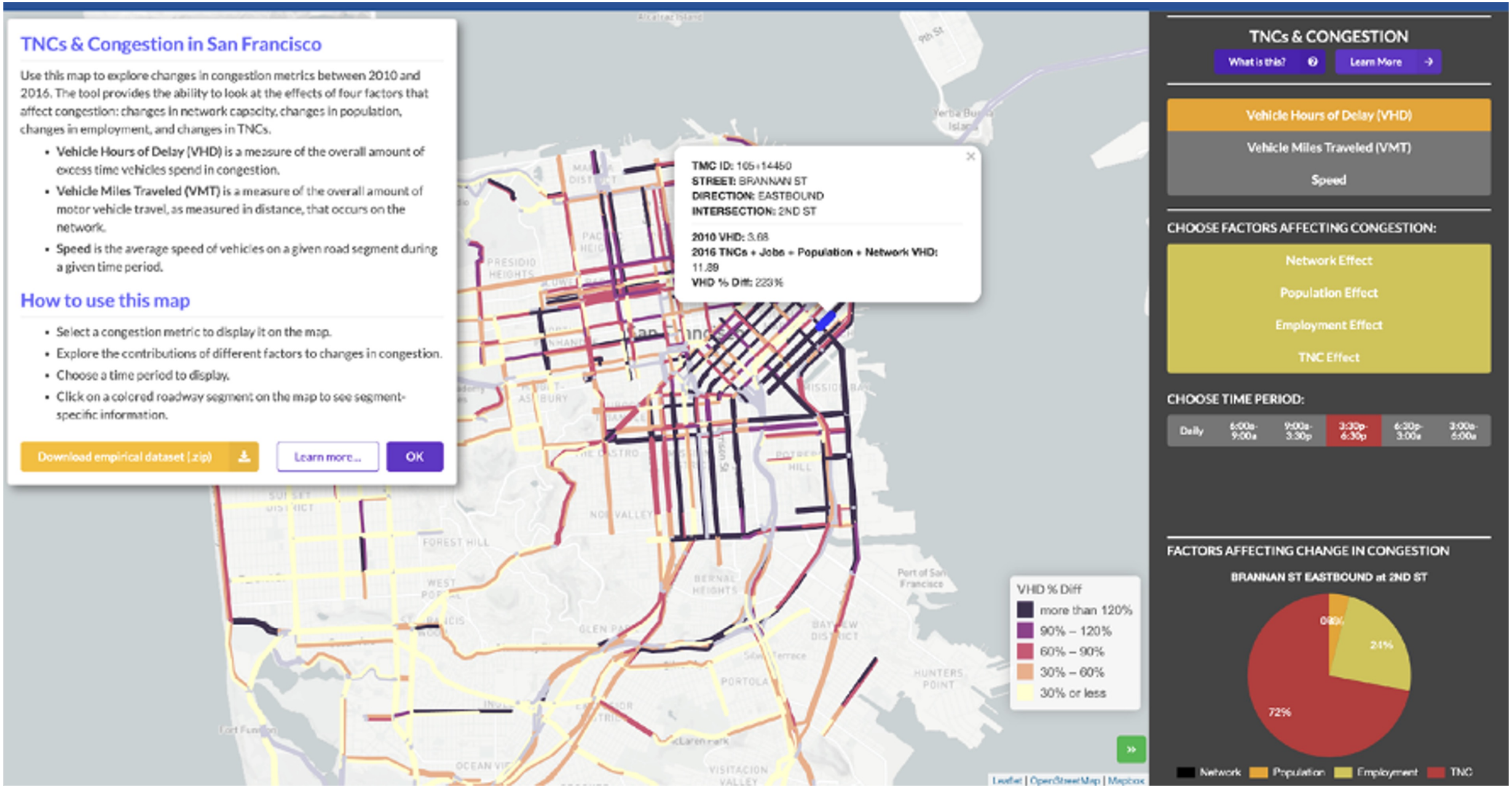
CHASE
CHASE
6PZM818


San Francisco Chronicle
7LRL527


TNCs & Congestion in San Francisco
Use this map to explore changes in congestion metrics between 2010 and 2016. The tool provides the ability to look at the effects of four factors that affect congestion: changes in network capacity, changes in population, changes in employment, and changes in TNCs.
• Vehicle Hours of Delay (VHD) is a measure of the overall amount of excess time vehicles spend in congestion.
• Vehicle Miles Traveled (VMT) is a measure of the overall amount of motor vehicle travel, as measured in distance, that occurs on the network.
• Speed is the average speed of vehicles on a given road segment during a given time period.
How to use this map
• Select a congestion metric to display it on the map.
• Explore the contributions of different factors to changes in congestion.
• Choose a time period to display.
• Click on a colored roadway segment on the map to see segment-specific information.
Download empirical dataset (.zip)
Learn more...
OK
TMC ID: 105+14450
STREET: BRANNAN ST
DIRECTION: EASTBOUND
INTERSECTION: 2ND ST
2010 VHD: 3.68
2016 TNCs + Jobs + Population + Network VHD: 11.89
VHD % Diff: 223%
VHD % Diff
more than 120%
90% – 120%
60% – 90%
30% – 60%
30% or less
Leaflet | OpenStreetMap | Mapbox
TNCs & CONGESTION
What is this?
Learn More
Vehicle Hours of Delay (VHD)
Vehicle Miles Traveled (VMT)
Speed
CHOOSE FACTORS AFFECTING CONGESTION:
Network Effect
Population Effect
Employment Effect
TNC Effect
CHOOSE TIME PERIOD:
Daily
6:00a-9:00a
9:00a-3:30p
3:30p-6:30p
6:30p-3:00a
3:00a-6:00a
FACTORS AFFECTING CHANGE IN CONGESTION
BRANNAN ST EASTBOUND at 2ND ST
21%
72%
Network
Population
Employment
TNC

If Your Car Is Stuck in Traffic, It's Not Uber and Lyft's Fault

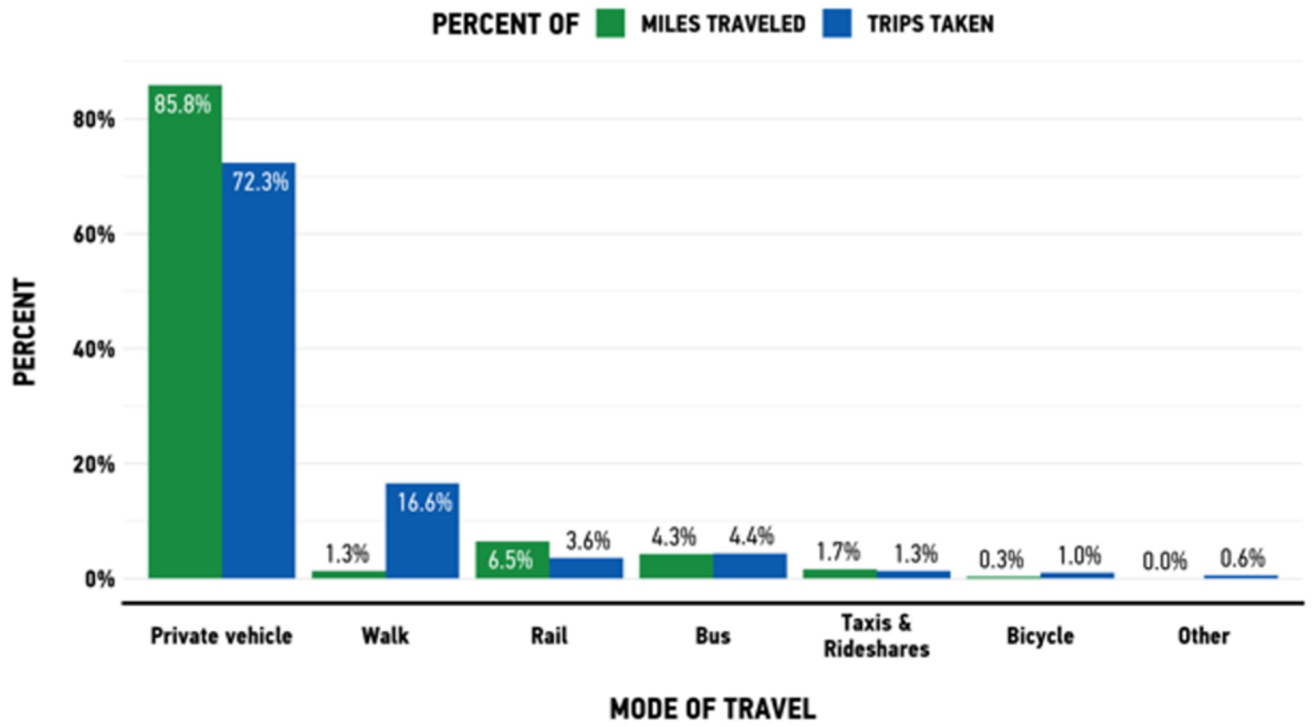
CITYLAB

Cities have been congested and transit has been poorly used for years before ride-hailing companies set up shop.

ROBIN CHASE JUL 27, 2018

zipcar

IN U.S. CITIES WHERE RAIL TRANSPORT IS AN OPTION



Source: Federal Highway Administration (David H. Montgomery/CityLab)

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UZA Name	Sum of 2015	Sum of 2016	Change
Seattle, WA	178,640,154	185,913,534	4.1%
Houston, TX	83,285,295	85,180,489	2.3%
Milwaukee, WI	40,610,851	41,476,982	2.1%
Detroit, MI	36,734,180	37,079,598	0.9%
New York-Newark, NY-NJ-CT	4,222,700,561	4,241,214,495	0.4%
San Francisco-Oakland, CA	454,952,418	454,996,256	0.0%
Boston, MA-NH-RI	403,464,723	402,554,159	-0.2%
Pittsburgh, PA	63,990,430	63,570,697	-0.7%
Denver-Aurora, CO	101,021,365	99,777,407	-1.2%
Portland, OR-WA	112,440,100	110,985,034	-1.3%
San Antonio, TX	37,983,886	37,290,201	-1.8%
Salt Lake City-West Valley City, UT	44,909,741	43,776,825	-2.5%
Minneapolis-St. Paul, MN-WI	96,636,368	93,716,857	-3.0%
Chicago, IL-IN	623,466,948	603,747,357	-3.2%
Urban Honolulu, HI	68,587,549	66,361,162	-3.2%
Las Vegas-Henderson, NV	72,044,767	69,420,973	-3.6%
Dallas-Fort Worth-Arlington, TX	75,998,371	72,137,725	-5.1%
Baltimore, MD	111,070,976	105,214,371	-5.3%
Atlanta, GA	141,154,134	132,925,293	-5.8%
Philadelphia, PA-NJ-DE-MD	369,644,085	346,276,496	-6.3%
Phoenix-Mesa, AZ	69,525,177	64,898,486	-6.7%
San Diego, CA	94,921,830	88,507,937	-6.8%
St. Louis, MO-IL	47,250,866	44,020,031	-6.8%
Cleveland, OH	46,844,074	43,507,057	-7.1%
Los Angeles-Long Beach-Anaheim, CA	619,459,557	572,589,716	-7.6%
San Jose, CA	44,718,244	40,763,554	-8.8%
Miami, FL	156,449,301	141,556,090	-9.5%
Washington, DC-VA-MD	441,222,366	396,260,838	-10.2%
Austin, TX	32,795,531	28,893,986	-11.9%
San Juan, PR	38,853,326	32,289,221	-16.9%

Increase

No Change

Decrease

- Top 30 Transit Agencies US
- 80% saw decrease in ridership
- Some quite significant
- TNCs are only one contributing factor

Source: NTD and Dr. Shaheen, Berekely TSRC

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What can Public Transportation do?

- Mobility Hubs
- Mobility as a Service
- National Trends of transit working with cities and other partners
- Combination of Infrastructure, Investment & Policy
- Focus on Corridors and High Capacity Service
  - Frequency
  - Speed
  - Reliability

Mobility Hubs & MaaS

Source: https://www.uitp.org/events/MaaS-workshop-2017

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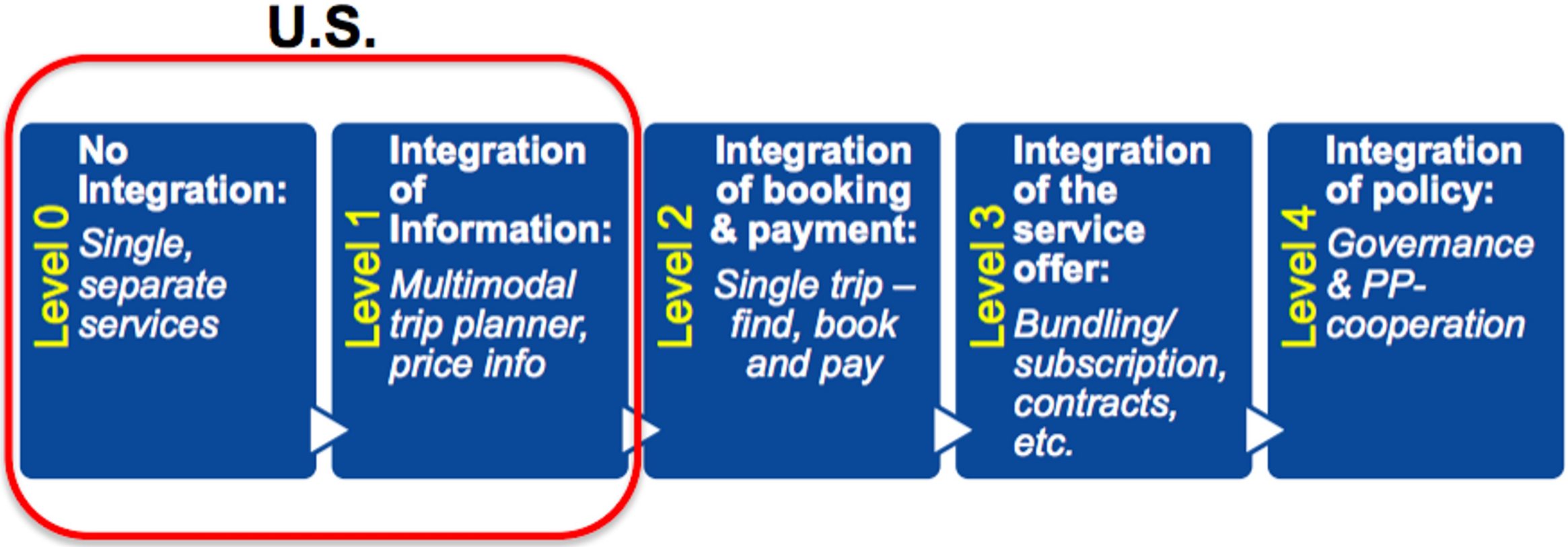
Mobility as a Service Topology



Source: Sochor, Hans Arby and MariAnne Karlsson, "The topology of Mobility as a Service: A tool for understanding effects on business and society, user behavior, and technical requirements," Paper No. EU-SP103, 2017 ITS World Congress, Montreal

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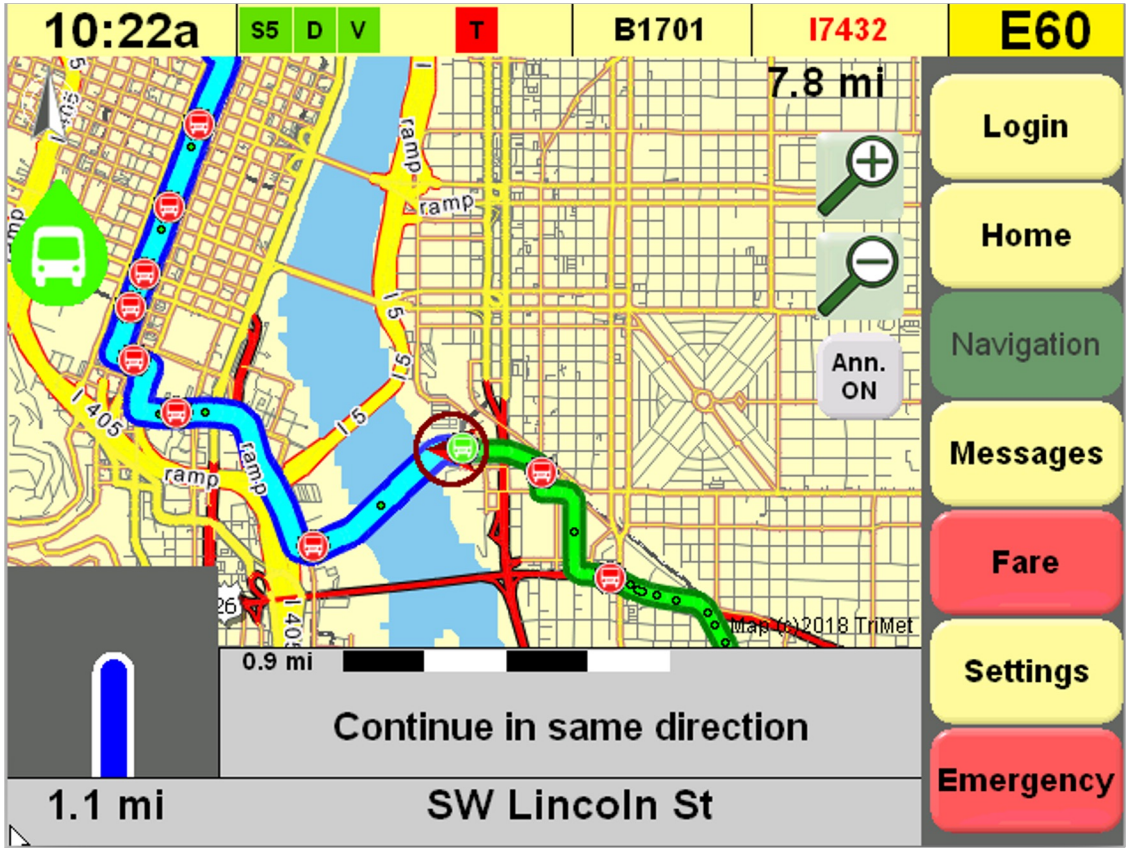
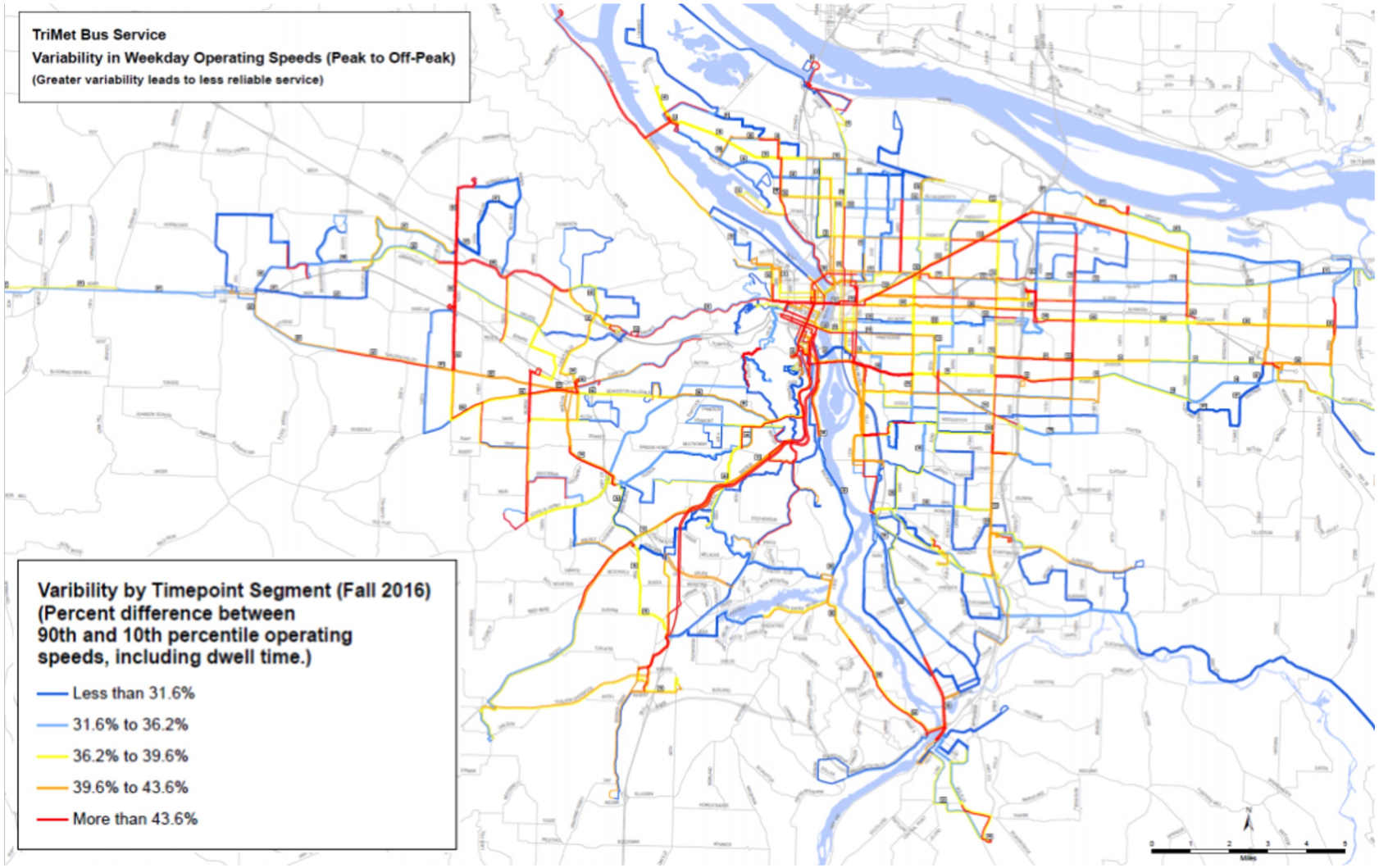
Existing Tools Already Impacting Reliability



Transit Delay During Peak Congestion

TRANSIT TRAVEL SPEED VARIABILITY OVER THE COURSE OF A DAY



Source: Enhance Transit Corridor Study / CAD/AVL Data

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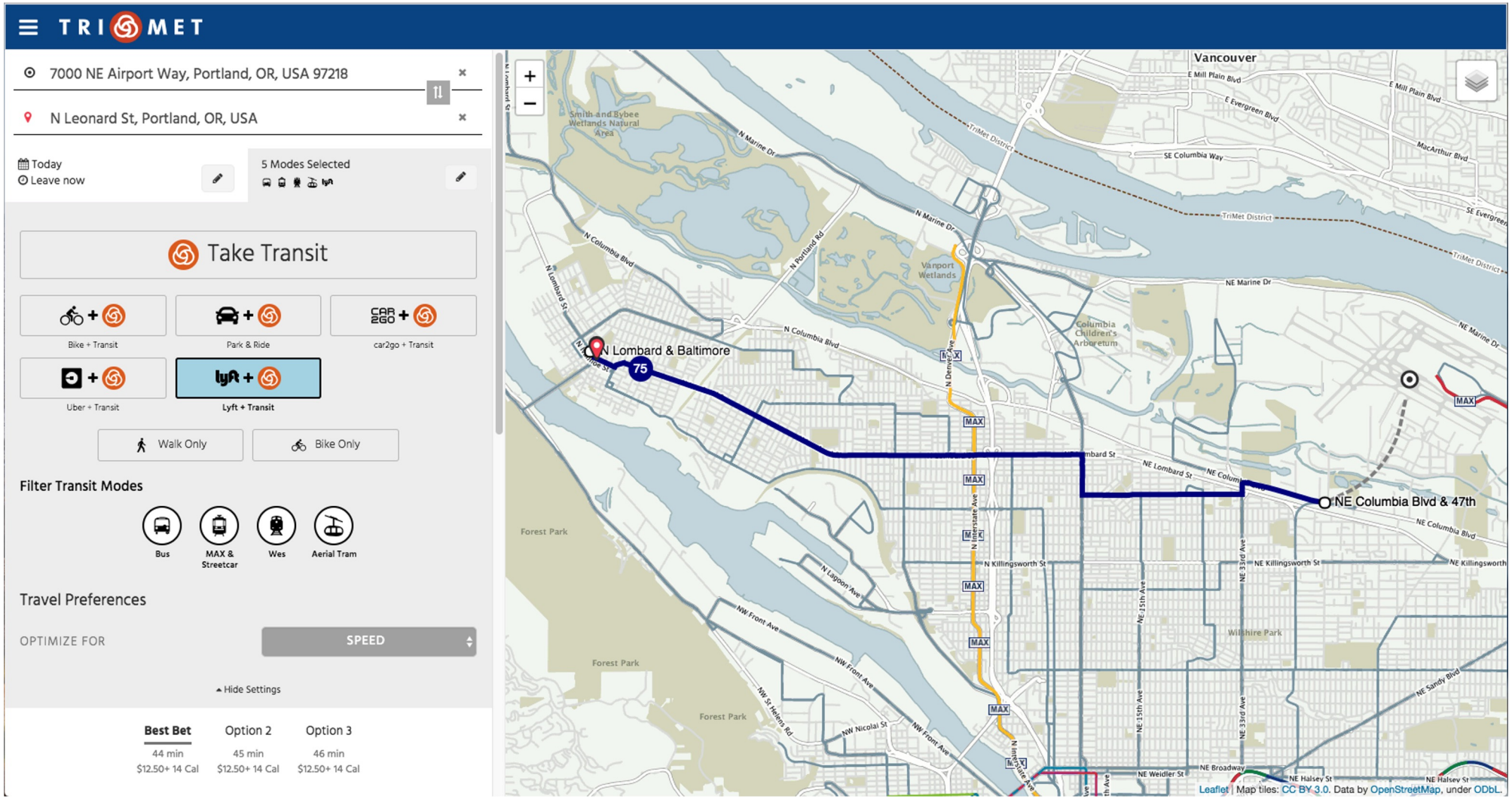
E-Fare and HOP Fastpass

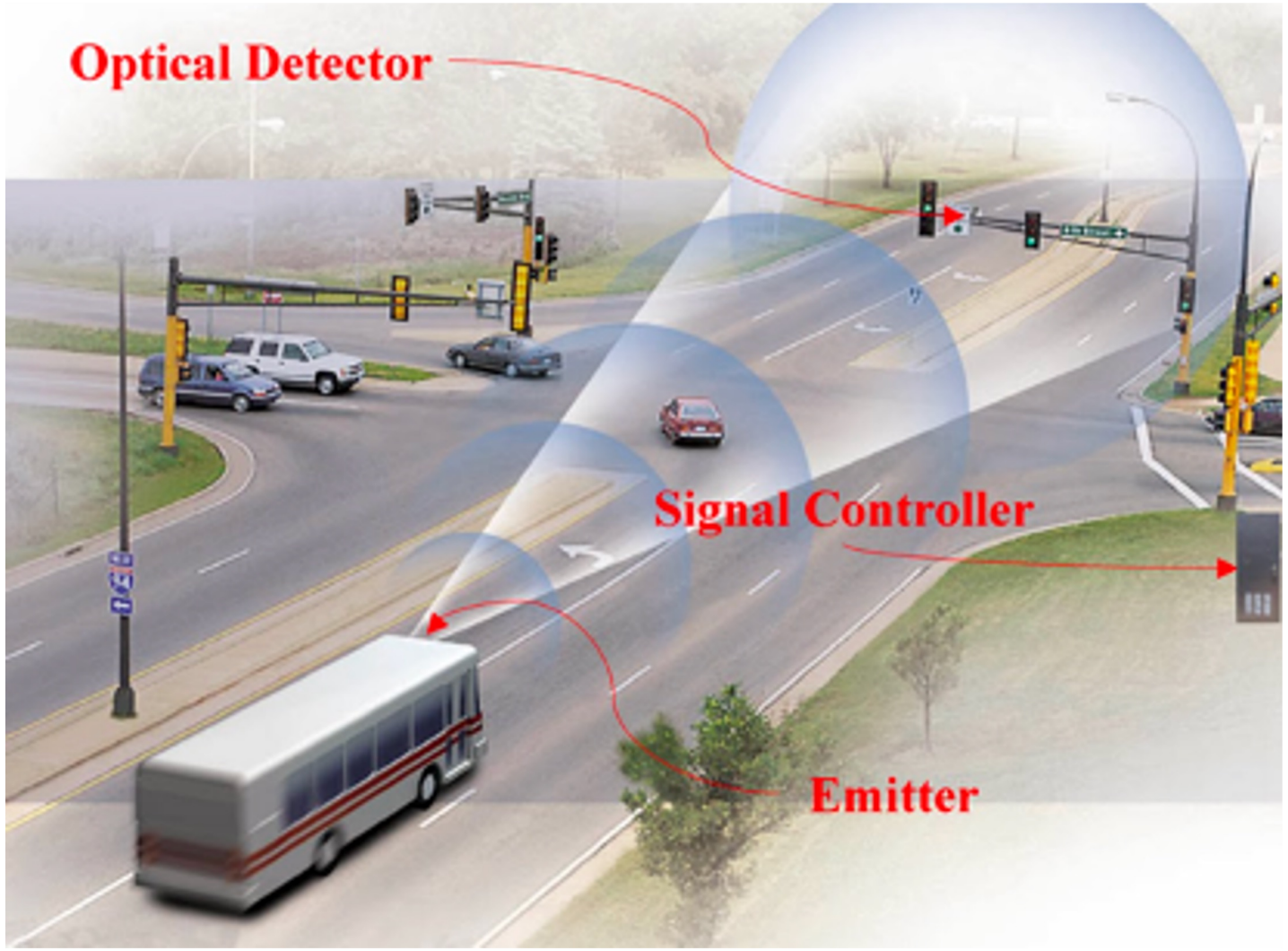
https://myhopcard.com/home/

Open Trip Planner

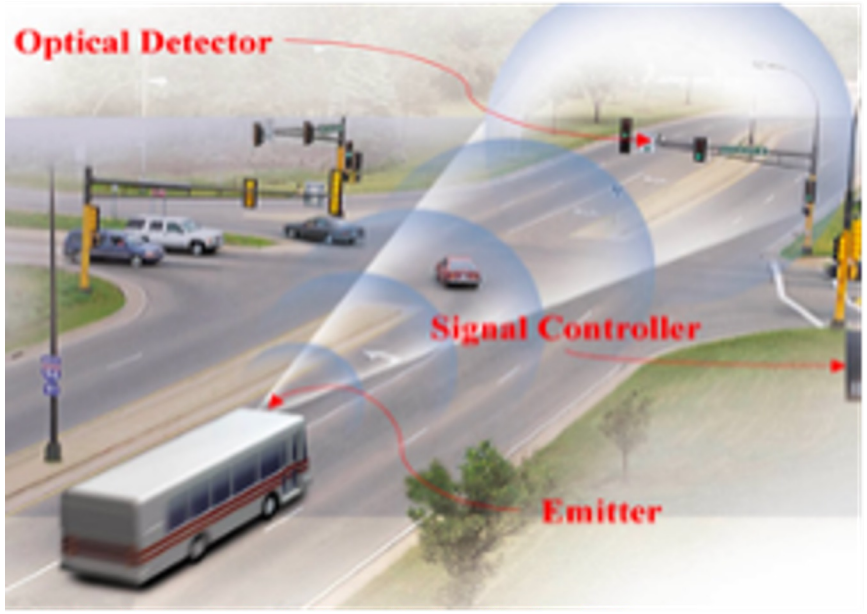
MOD Dashboard link: https://trimet.org/mod/



Legacy Transit Signal Priority System



Legacy TSP…



Hardware Heavy

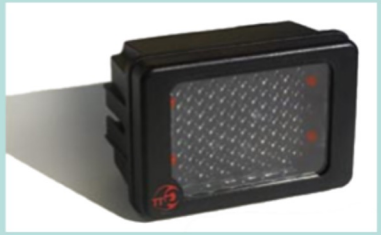
Labor Intensive

Operational Challenges

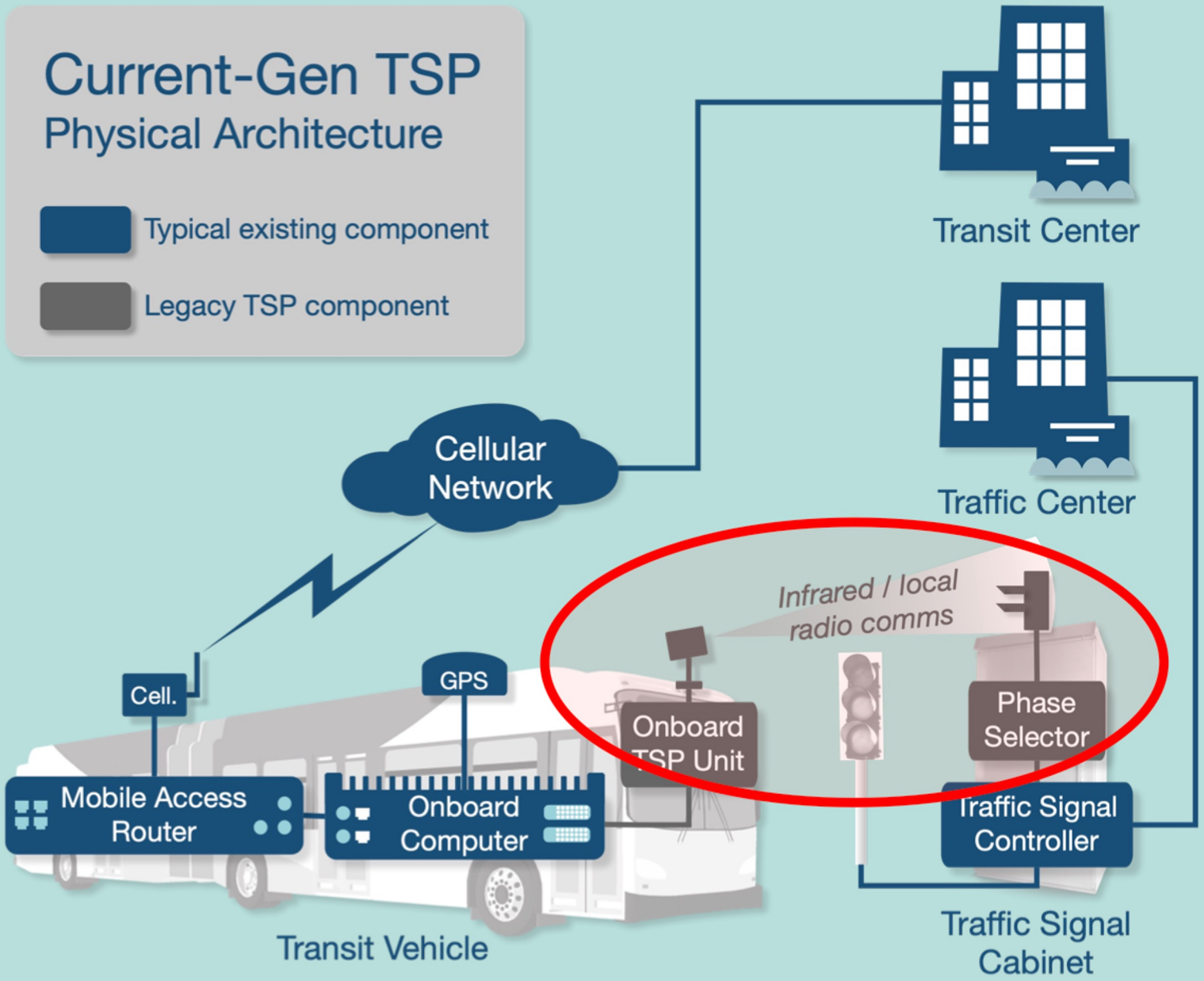
Current-Gen TSP
Physical Architecture

Typical existing component

Legacy TSP component



Emitter
(on bus)



Detector
(at signal)

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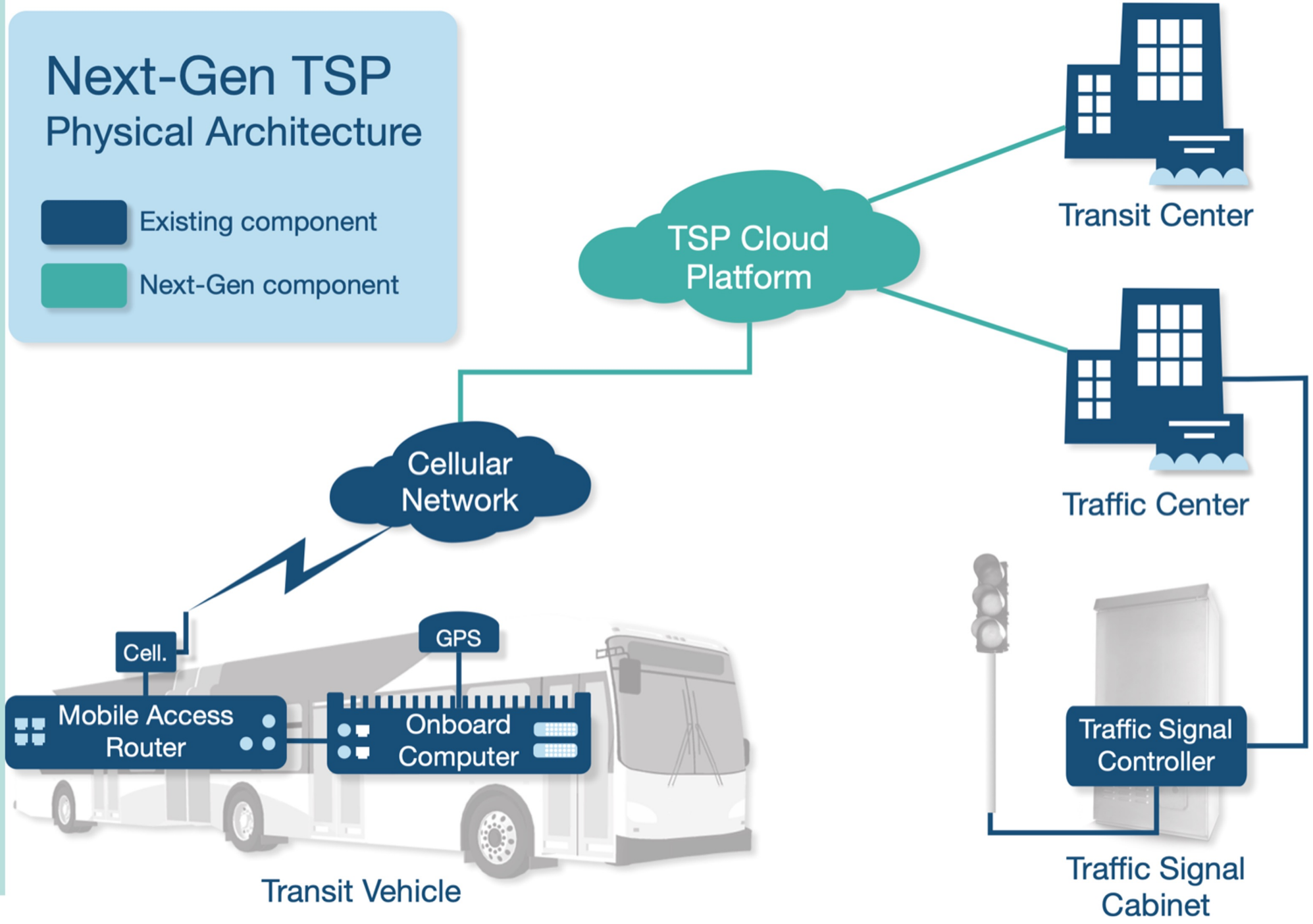
Next-Gen TSP
Physical Architecture

Existing component

Next-Gen component



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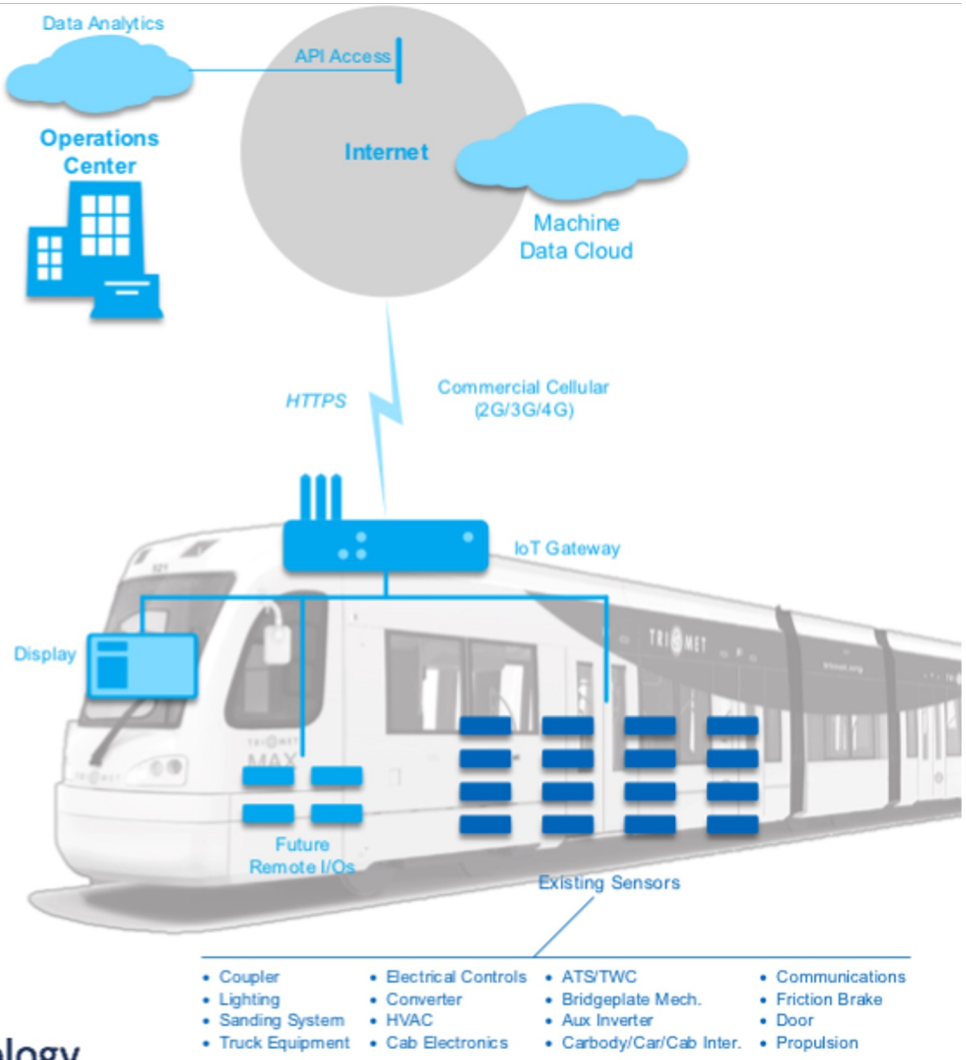
Rail Operations Optimization Technology (ROOT)

Seven main categories of functionality:

1. Customer Information
2. Incident Management & Data
3. Real-Time Maintenance
4. Historical Maintenance
5. Safety and Security
6. Transit Signal Priority
7. Infotainment



TRIMET Rail Operations Optimization Technology

Source: DKS Associates

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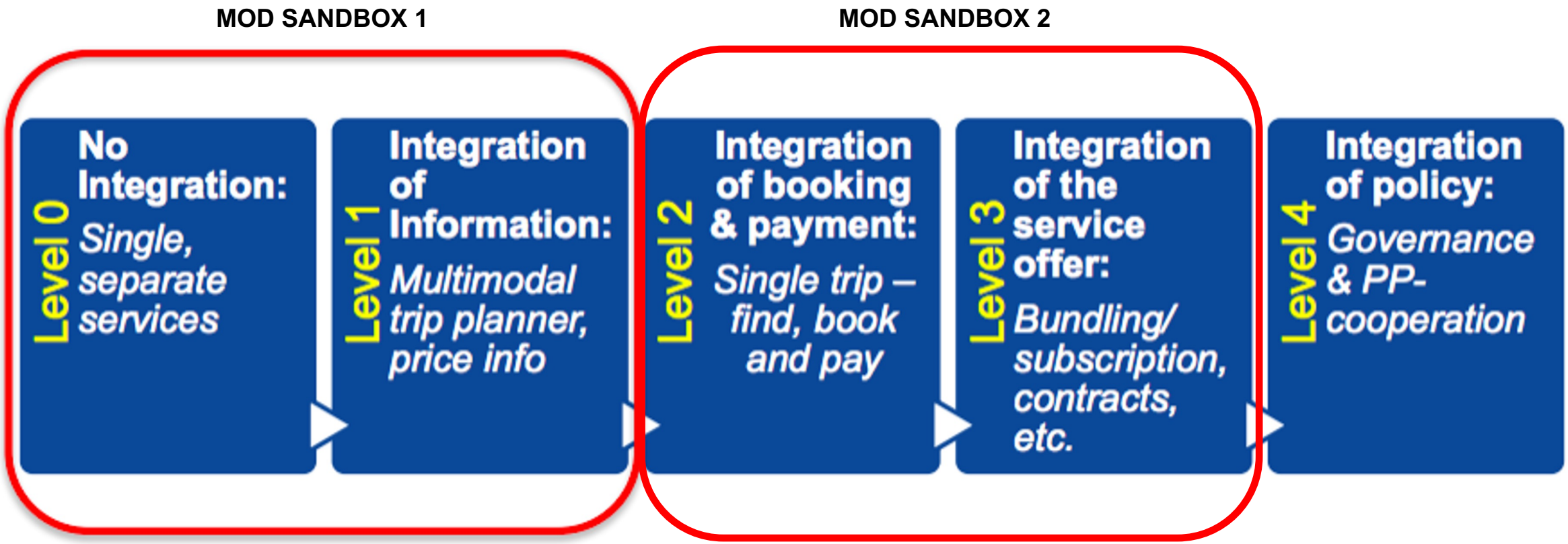
MaaS & Mobility On Demand Sandbox



Source: Sochor, Hans Arby and MariAnne Karlsson, "The topology of Mobility as a Service: A tool for understanding effects on business and society, user behavior, and technical requirements," Paper No. EU-SP103, 2017 ITS World Congress, Montreal

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Priority to High Occupancy Vehicles

Enhanced Transit Corridors Plan

Prepared in part by:

PBOT
PORTLAND BUREAU OF TRANSPORTATION

Granting agency: OREGON DEPARTMENT OF TRANSPORTATION

Prepared in part by:

ch2m SM

HDR

JARRETT WALKER + ASSOCIATES

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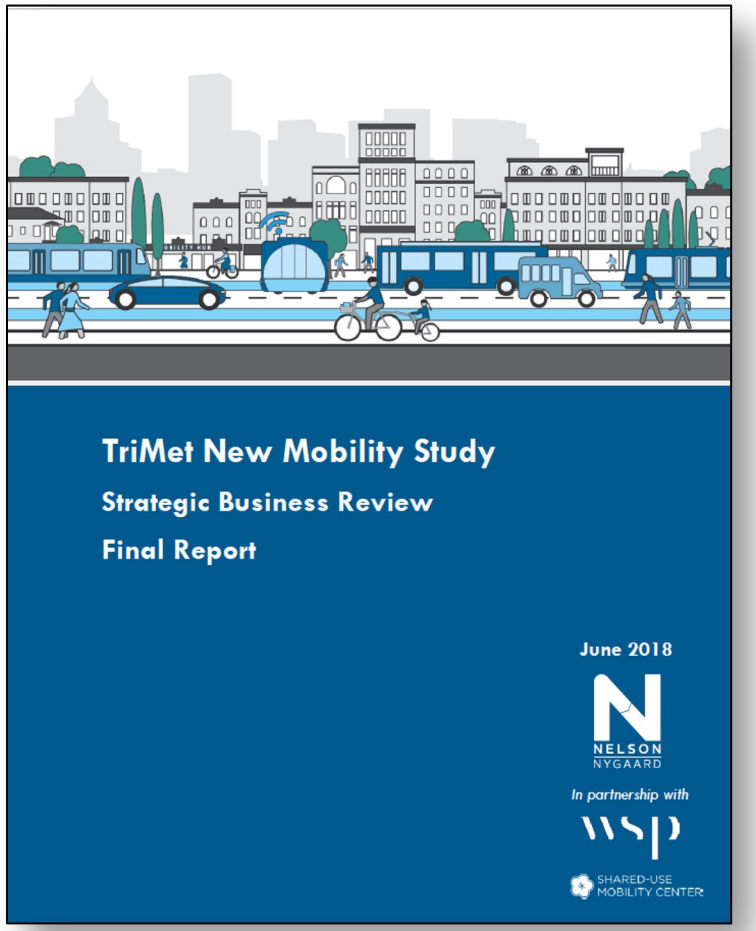
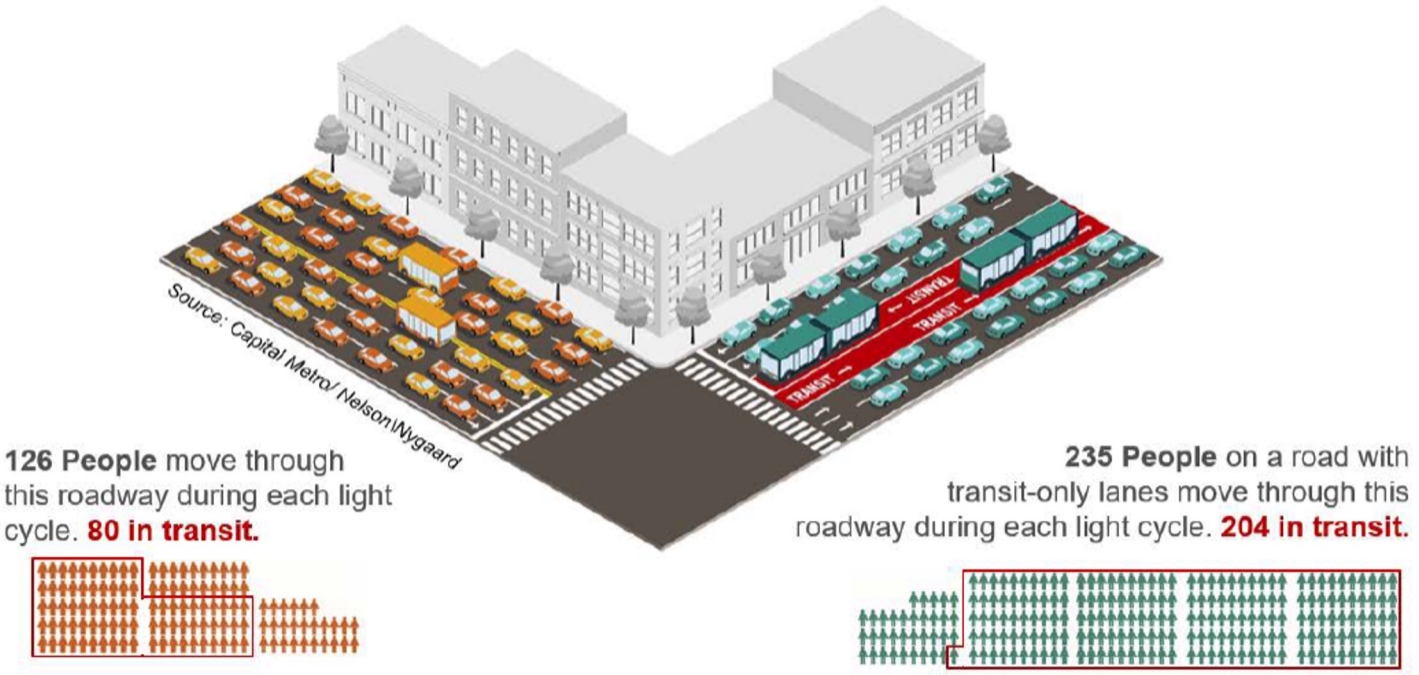
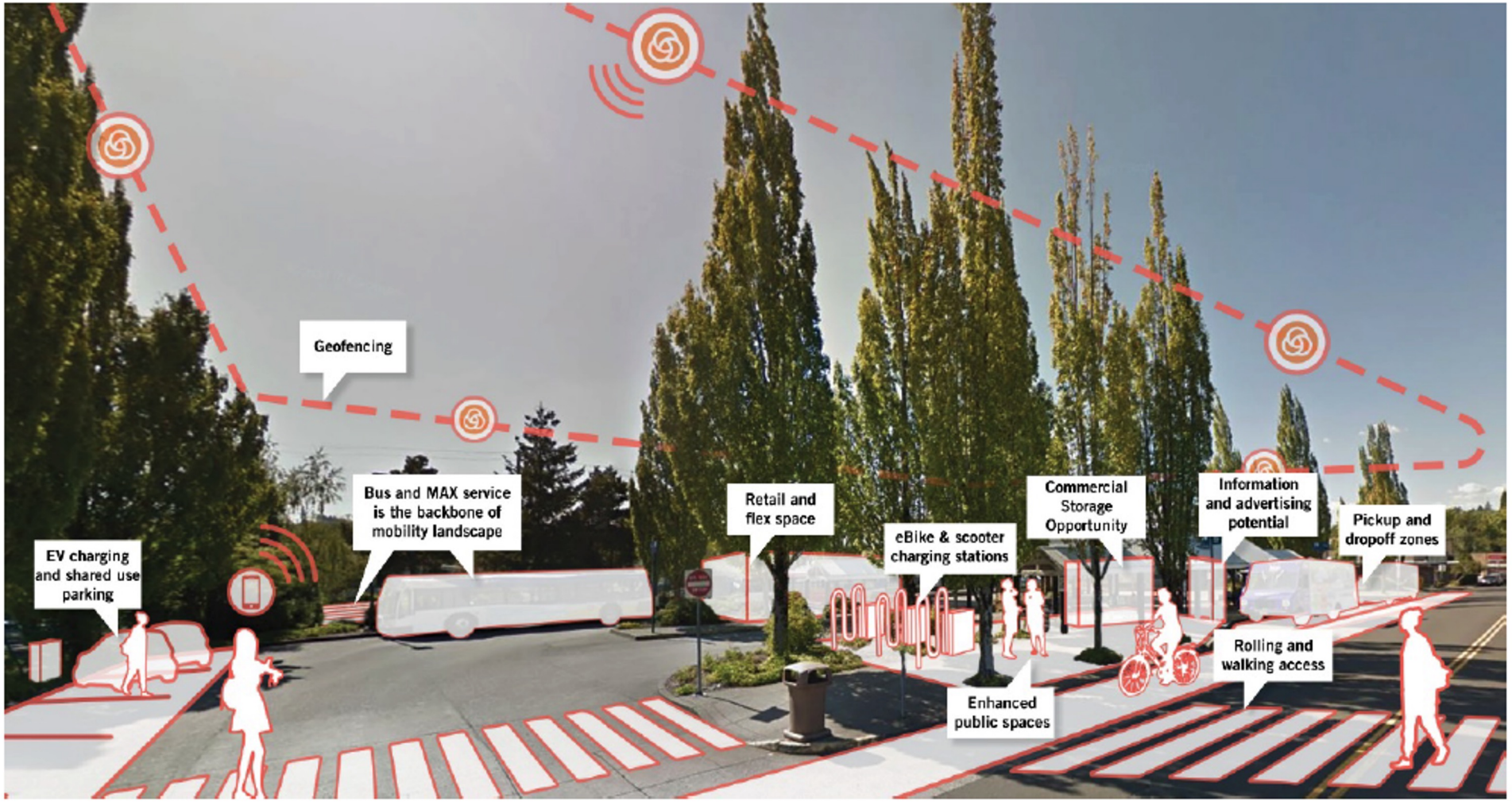
Efficient Use of R.O.W. with Transit





Source: Capital Metro / Nelson/Nygaard

Tigard Transit Center Mobility Hub



Source: Nelson/Nygaard

REDESIGNED STREETS CAN ACCOMMODATE A GROWING CENTRAL CITY

W Burnside: new bus and protected bike lanes will increase the people moving capacity of the street

Source: City of Portland Central City in Motion Plan

TRIMET DKS

U.S. Department of Transportation
Federal Transit Administration

CITY OF GRESHAM 1905

Metro

MULTNOMAH COUNTY

Oregon Department of Transportation

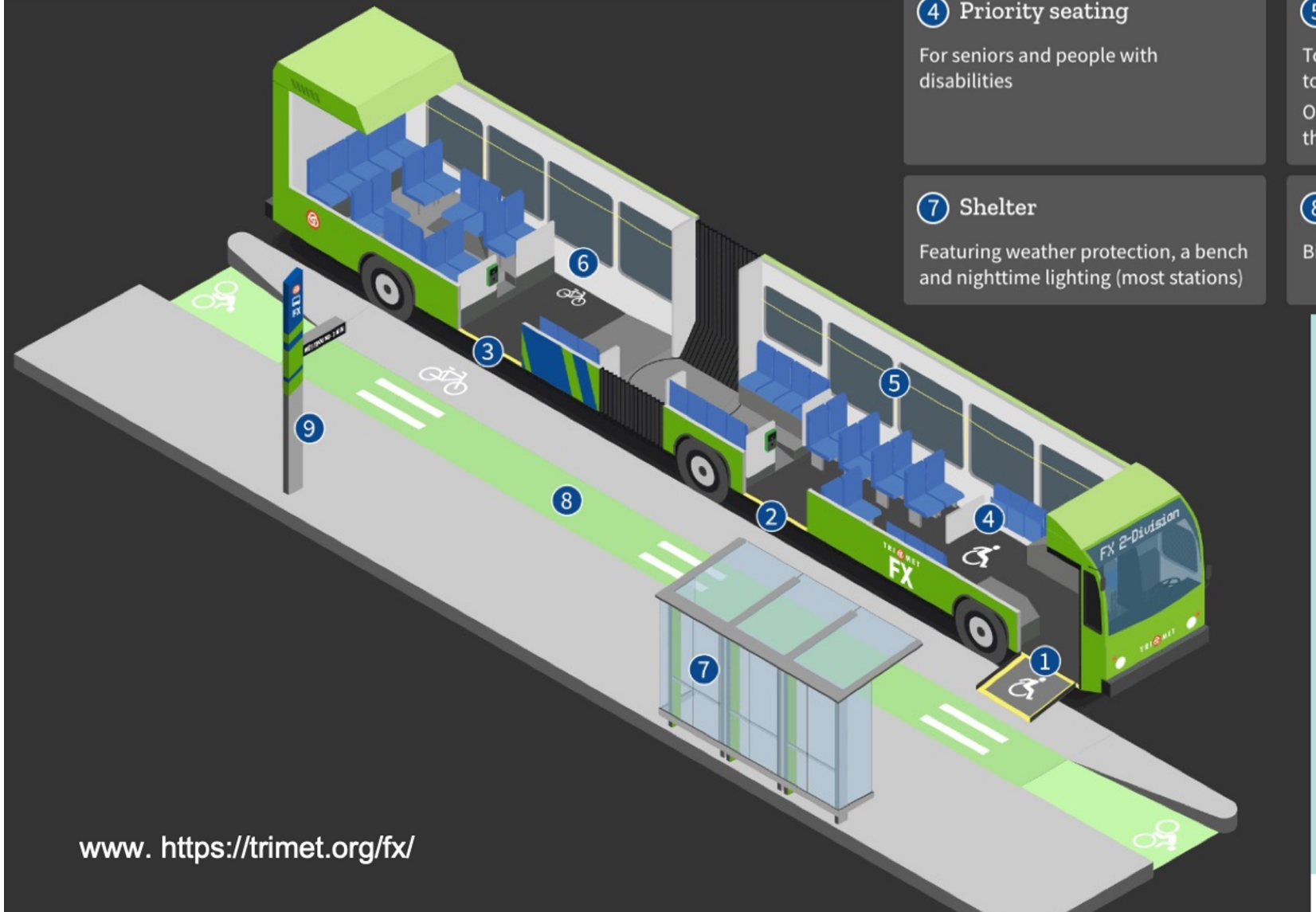
CITY OF PORTLAND OREGON 1851

TRIMET

Timeline

DIVISION TRANSIT PROJECT

FX 2-Division is our new high-capacity bus service along Division Street in Southeast Portland. It's fast, efficient and convenient, and will reduce travel times between Downtown Portland and Gresham by 20%.



1 Front door

Cash fare box and Hop reader;
Board and exit with mobility devices;
Ramp for mobility devices

2 Middle door

Pay with Hop

3 Rear door

Pay with Hop;
Board and exit with a bike

4 Priority seating

For seniors and people with disabilities

5 Getting off the bus

Touch strip/pull cord to tell operator to stop at the next station;
Overhead sign and speaker announce the next station

6 Bike racks

Board at the rear door to use either of the two bike racks

7 Shelter

Featuring weather protection, a bench and nighttime lighting (most stations)

8 Bike lane

Bicyclists must yield to pedestrians

9 TransitTracker sign

Shows next bus arrivals in real-time

www. https://trimet.org/fx/


FX2
TRIMET
STOP
STOP HERE FOR PEDS
FX

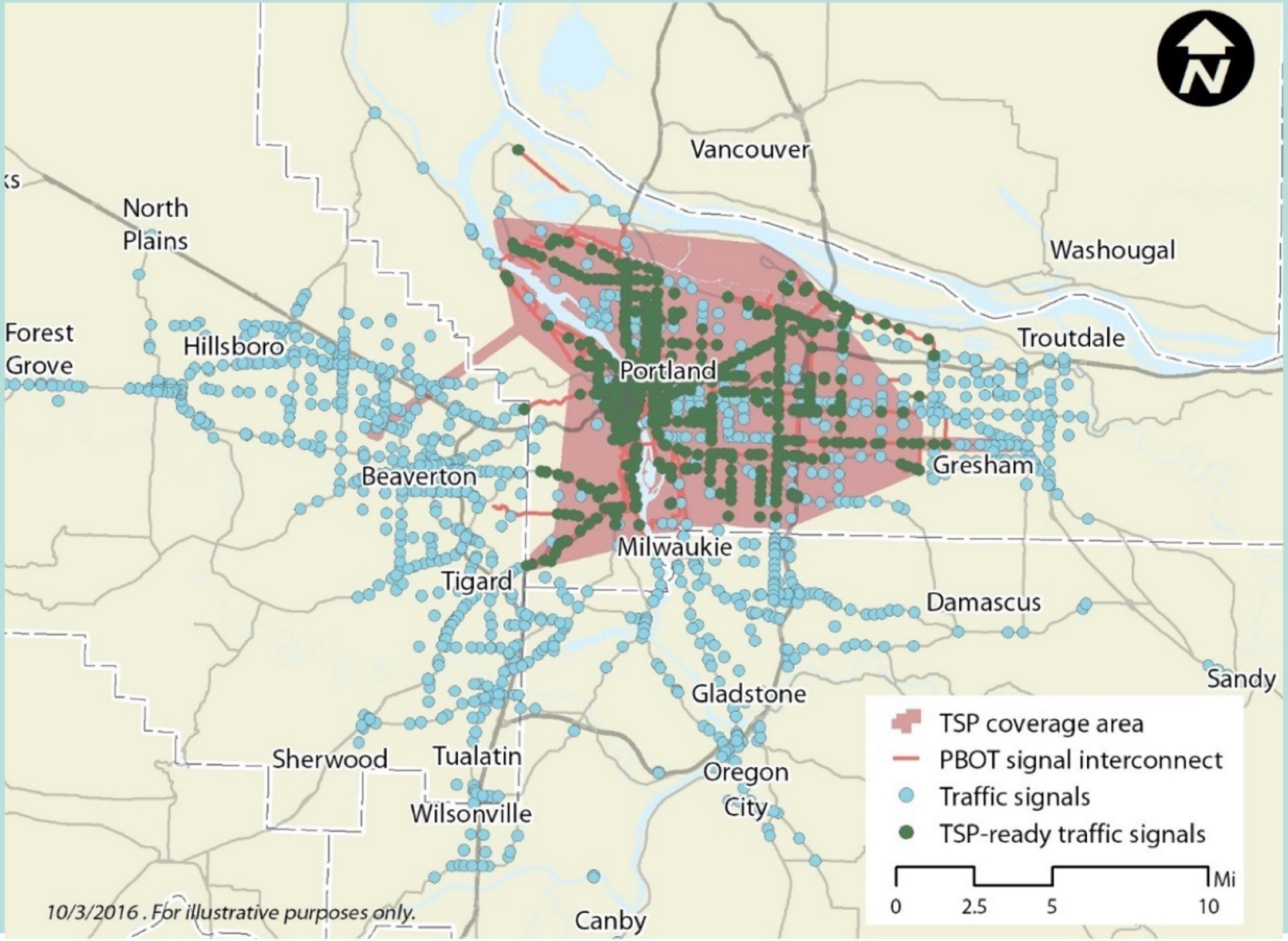

From backups to
back-to-business.
ONLY
BUS

TSP on Division FX2

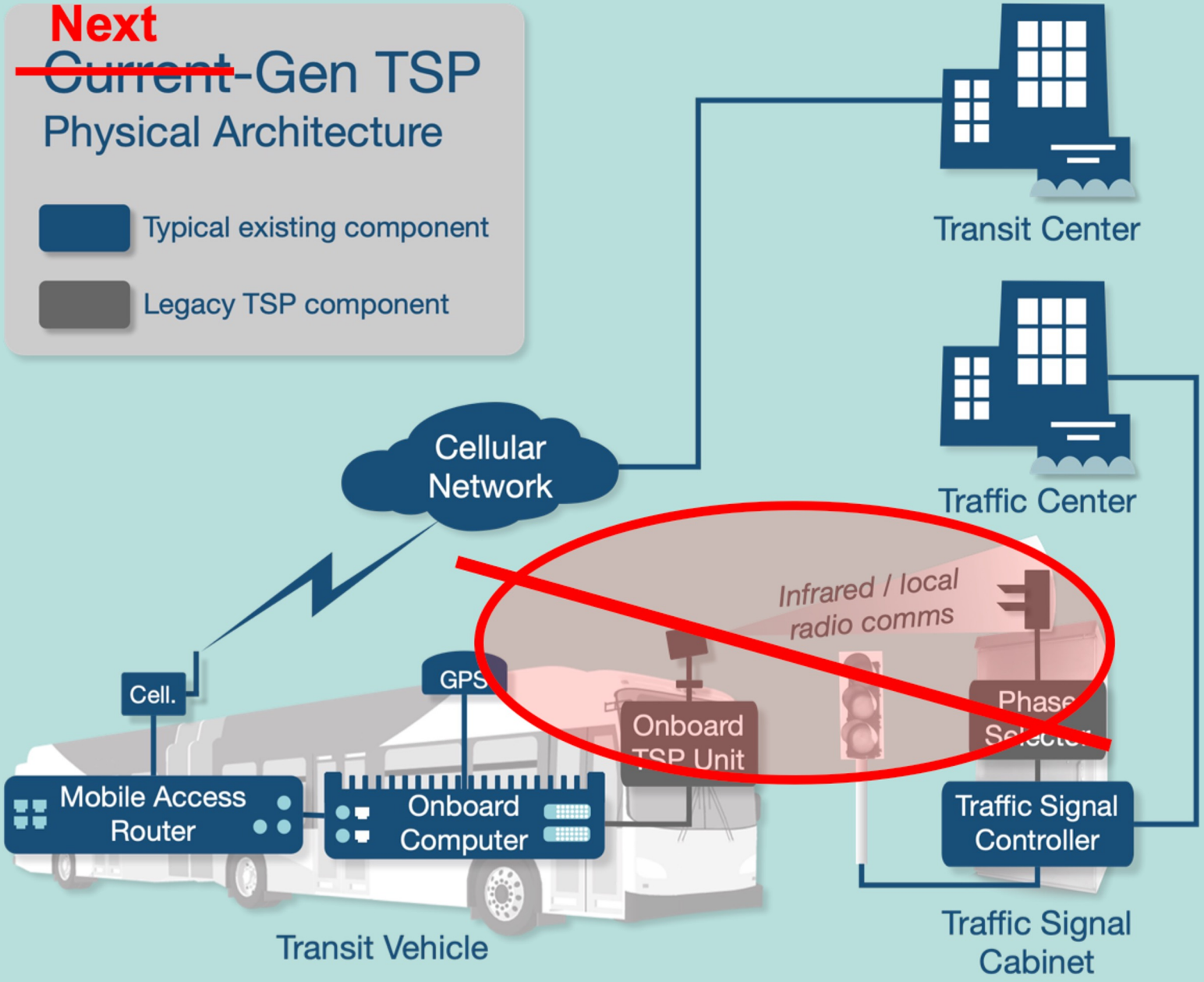
www. https://trimet.org/fx/

DKS

TSP IN TRIMET'S SERVICE AREA CURRENTLY



DKS

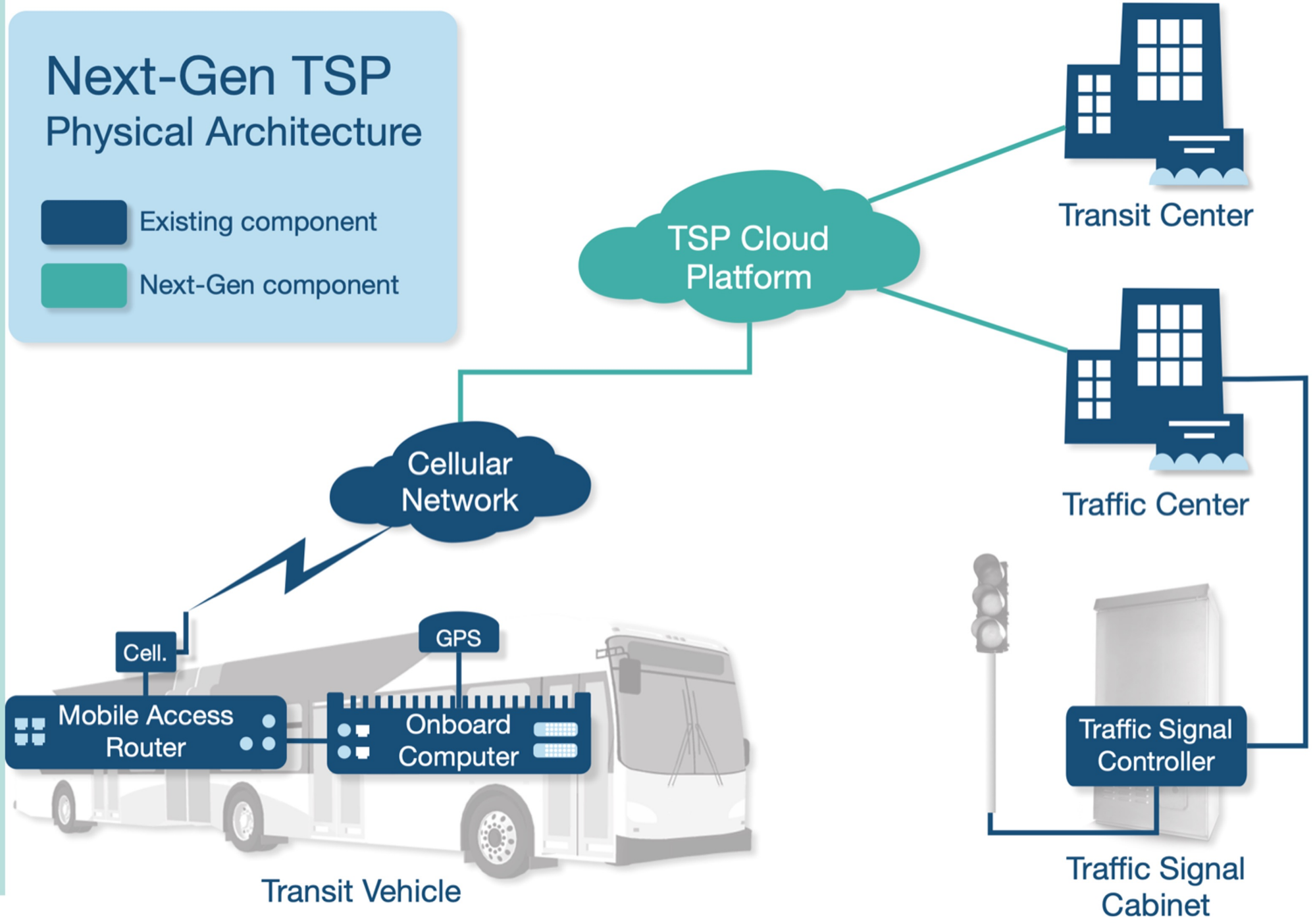

Next
~~Current~~-Gen TSP
Physical Architecture
Typical existing component
Legacy TSP component
Transit Center
Traffic Center
Cellular Network
Infrared / local radio comms
Cell.
GPS
Onboard TSP Unit
Phase Selector
Mobile Access Router
Onboard Computer
Traffic Signal Controller
Transit Vehicle
Traffic Signal Cabinet

DKS

Next-Gen TSP
Physical Architecture

Existing component

Next-Gen component



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Next-Gen TSP
Functional Architecture

- Generate requests
- Prioritize requests
- Implement requests

Transit Center

Monitor vehicles

Determine priority need

Generate requests

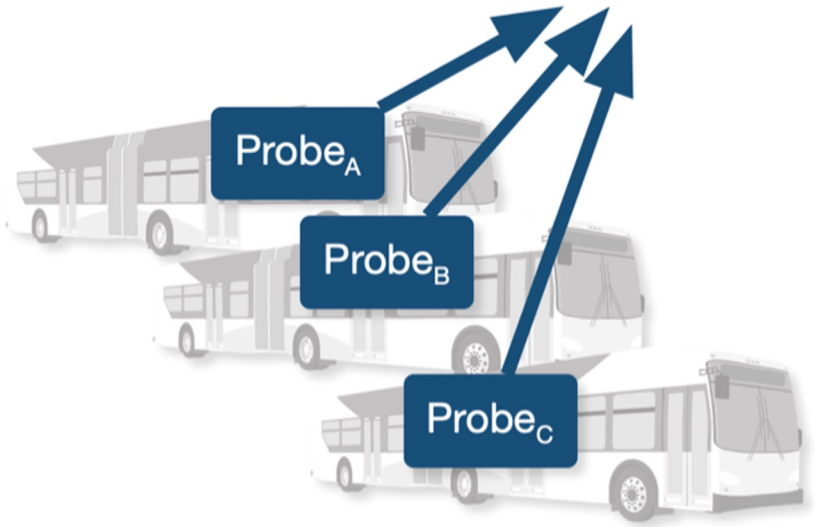
TSP Cloud Platform

Performance monitoring

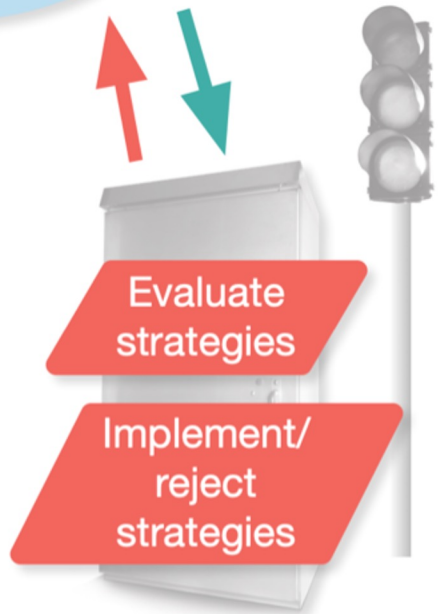
Traffic Center

Prioritize requests

Recommend signal strategies



Vehicles



Traffic Signals

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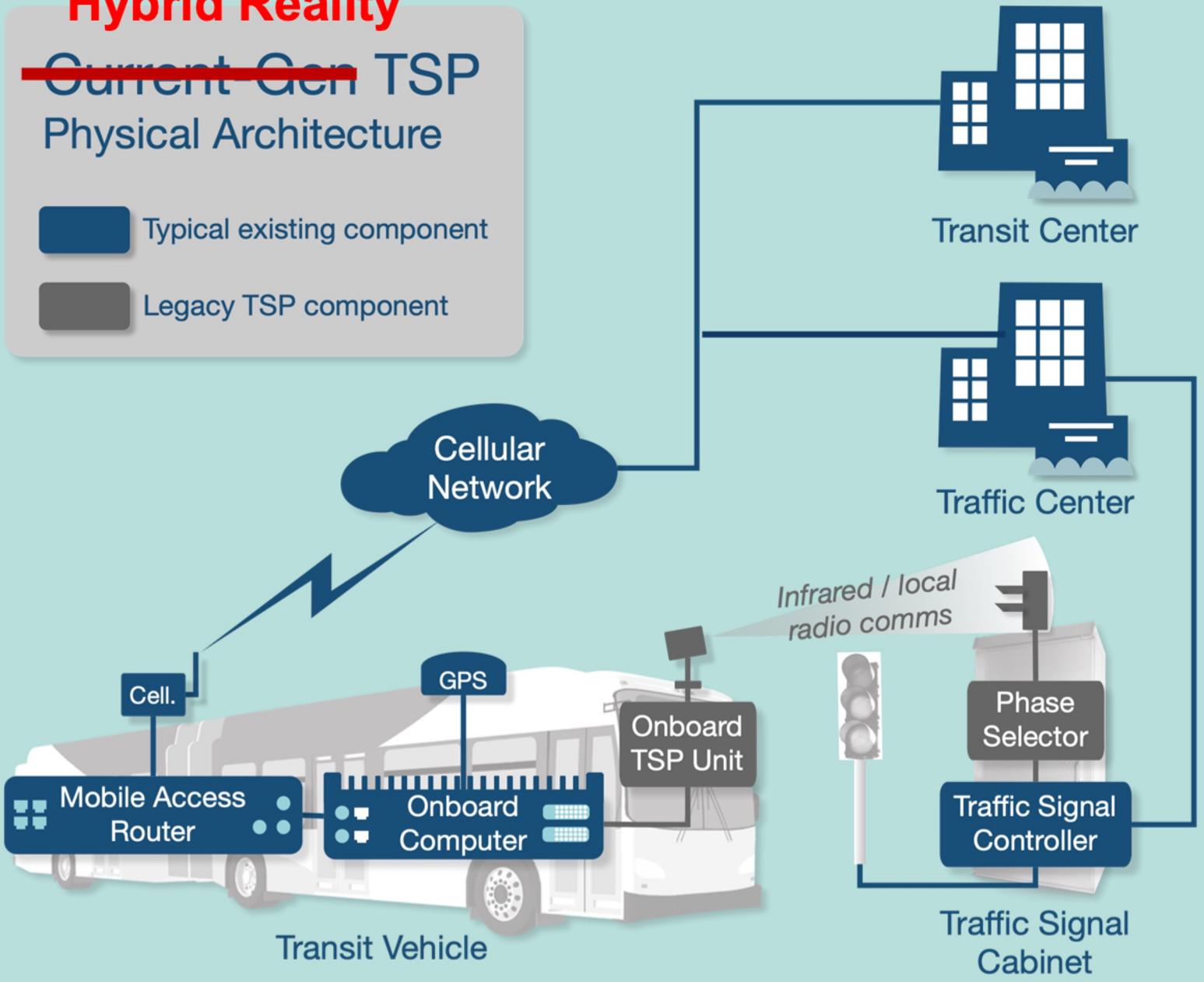
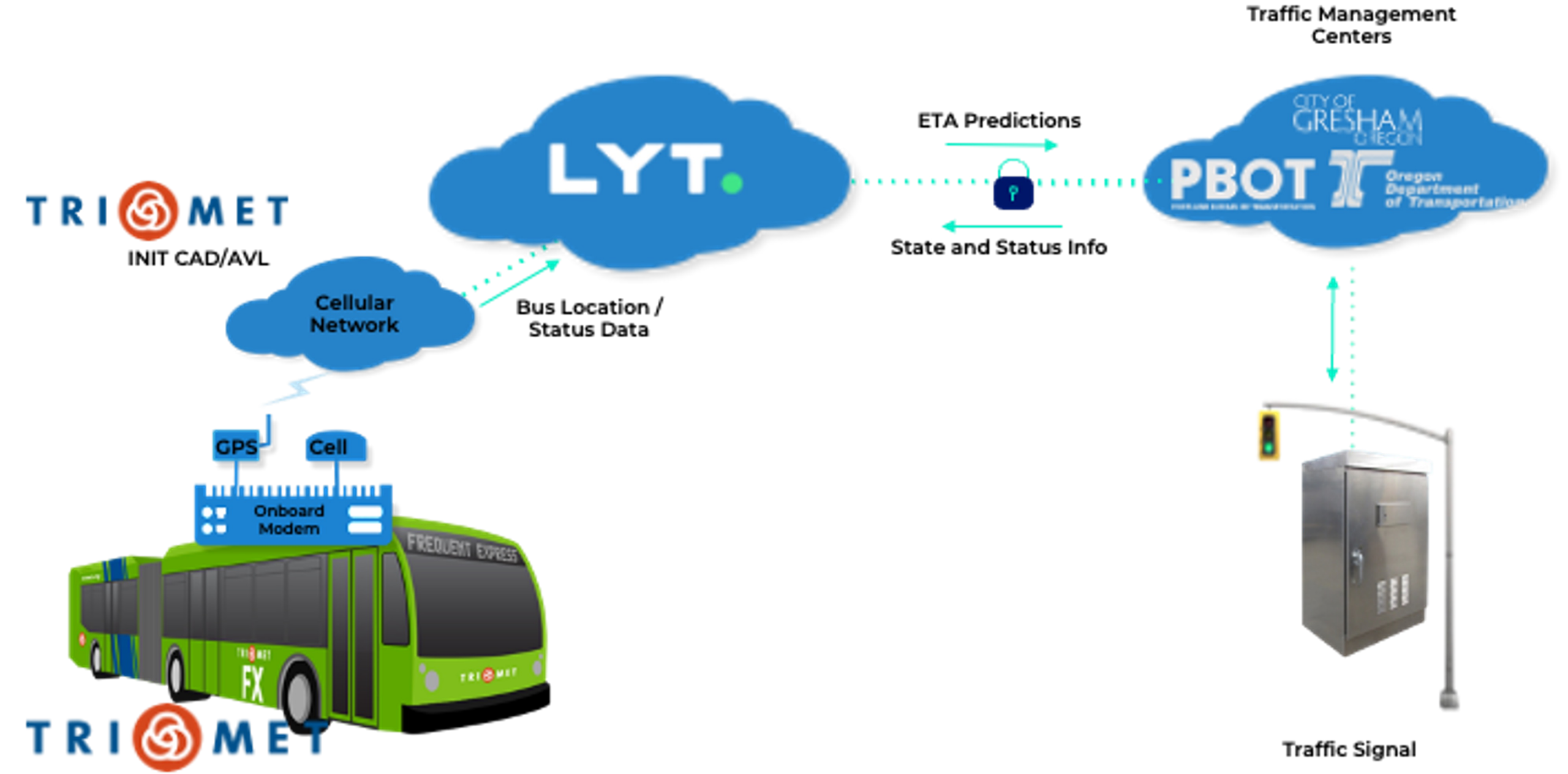
Hybrid Reality

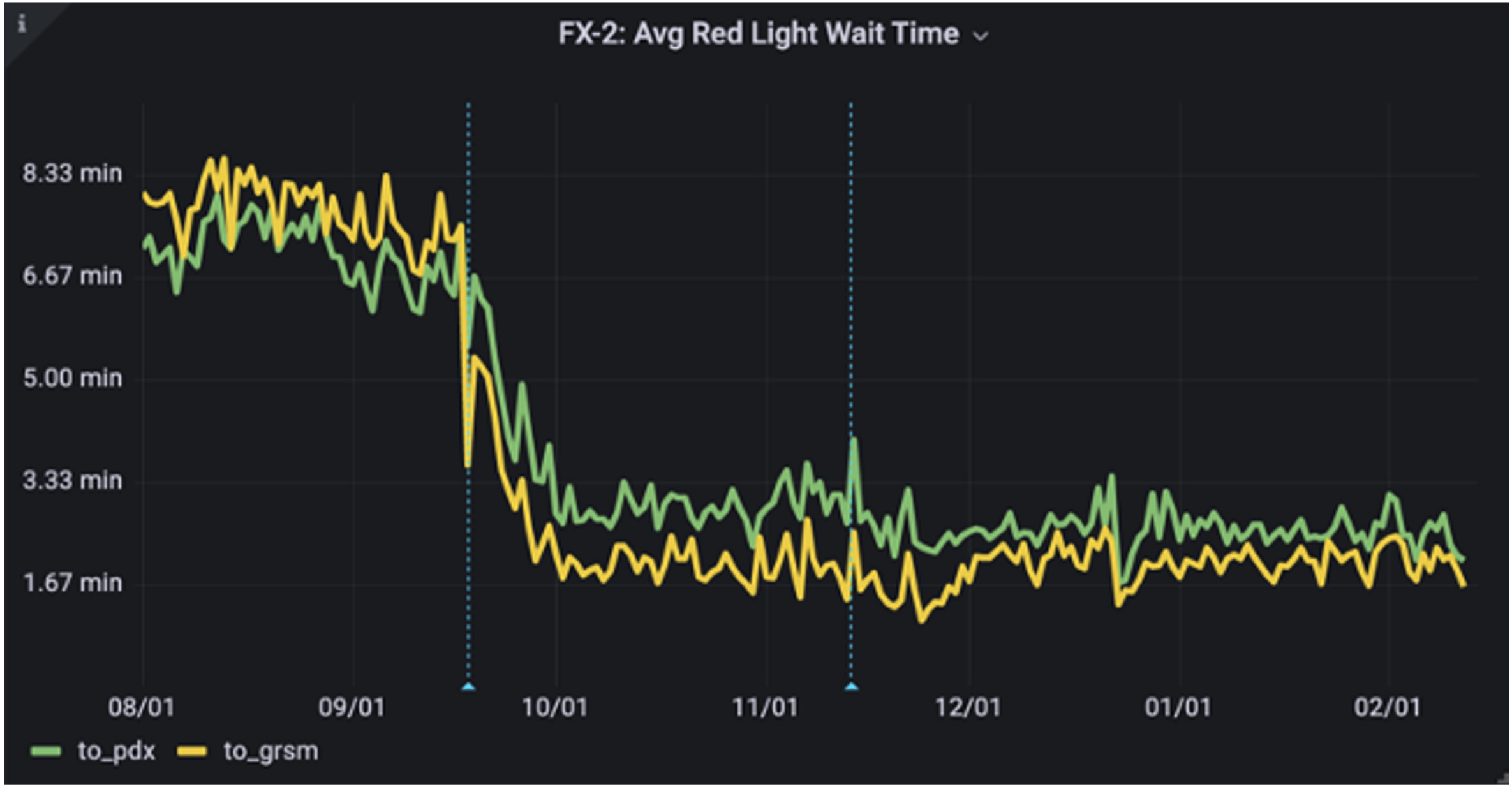
~~Current-Gen~~ TSP Physical Architecture

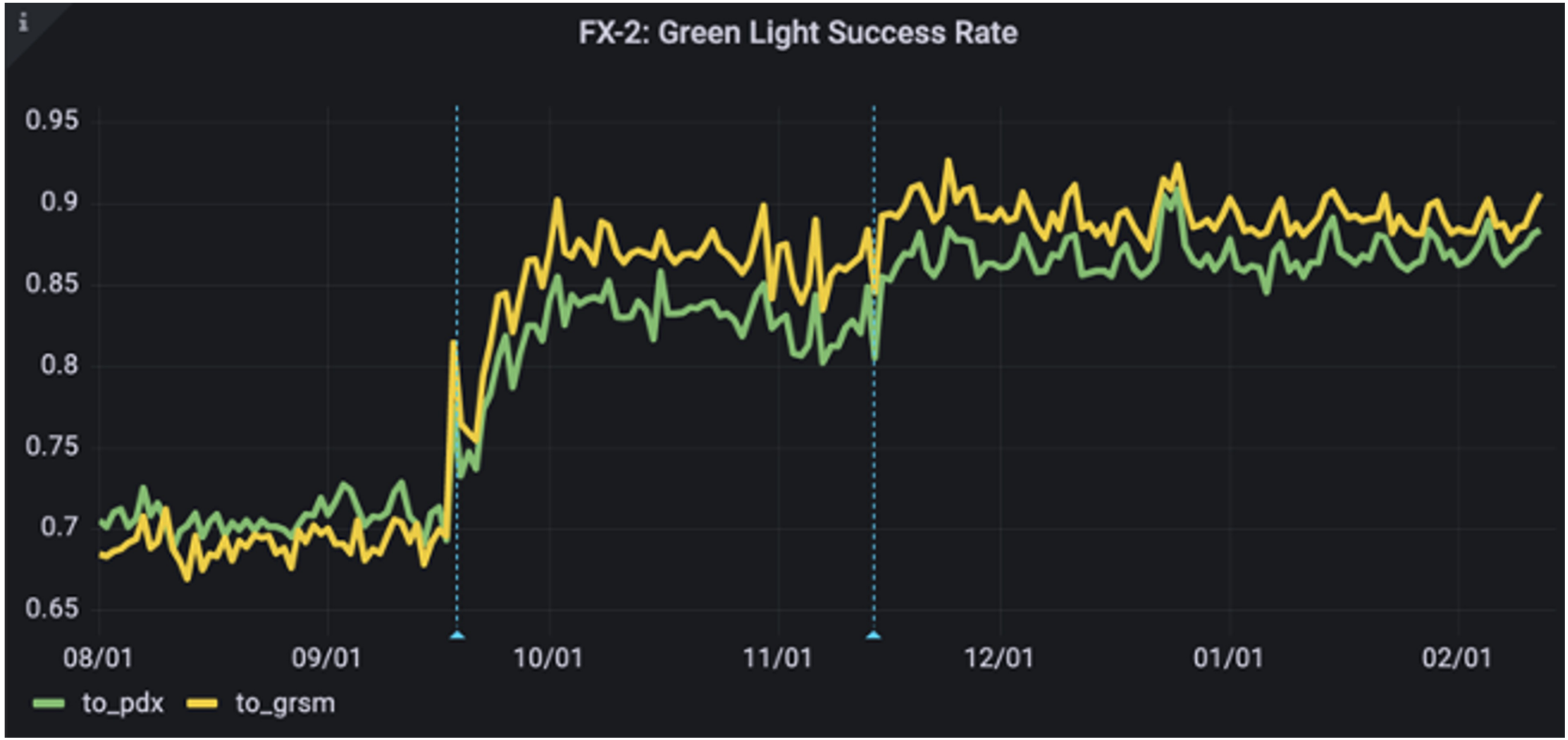


DKS

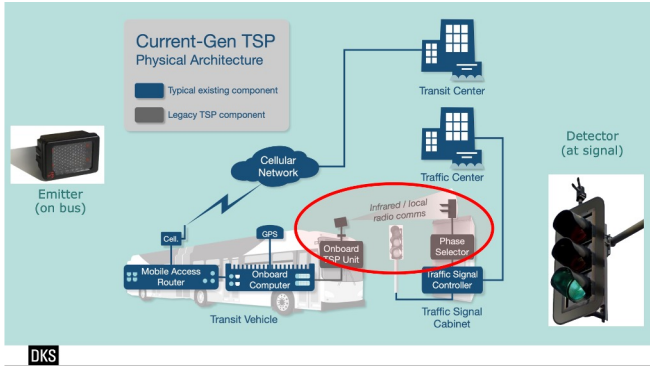
Architecture Overview of LYT.transit




FX-2: Avg Red Light Wait Time
8.33 min
6.67 min
5.00 min
3.33 min
1.67 min
08/01
09/01
10/01
11/01
12/01
01/01
02/01
to_pdx
to_grsm


FX-2: Green Light Success Rate
0.95
0.9
0.85
0.8
0.75
0.7
0.65
08/01
09/01
10/01
11/01
12/01
01/01
02/01
to_pdx
to_grsm

The Chartered Institute of Logistics and Transport



Thank You

Adrian Pearmine
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