Key Arterial Performance Measurement Project

Verizon Data Quality Measurement

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ITS Washington

December 11, 2018

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Agenda

1. Verizon Traffic Solutions
2. Traffic Data Services
3. Use Cases
4. UW Data Validation Study

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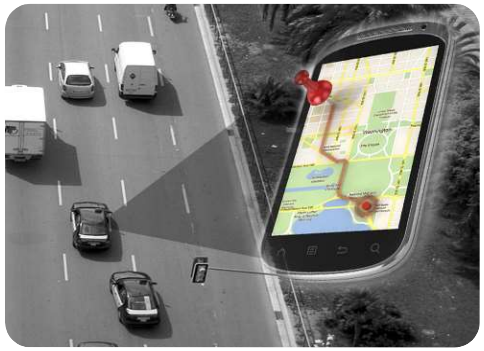
SDOT
Seattle Department of Transportation

Verizon Traffic Solutions

Reduce congestion, enhance traffic data and improve safety

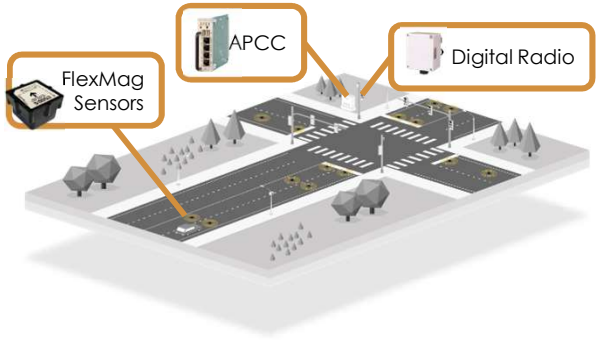
Traffic Data Services

Near real time data, dashboard & data feeds to support transportation operations, planning, and origin & destination analysis



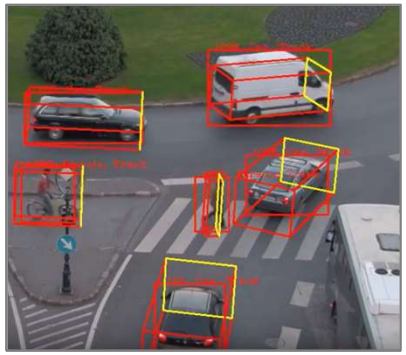
Intelligent Traffic Management

Sensing hardware, real time data, dashboard, and data feeds to optimize arterial signal timing and traffic flow



Intersection Safety Analytics

Video data analytics on vehicles, bicycles, pedestrians and their interactions to reduce accidents and and enhance safety



Regional ⟵ Corridor ⟶ Local

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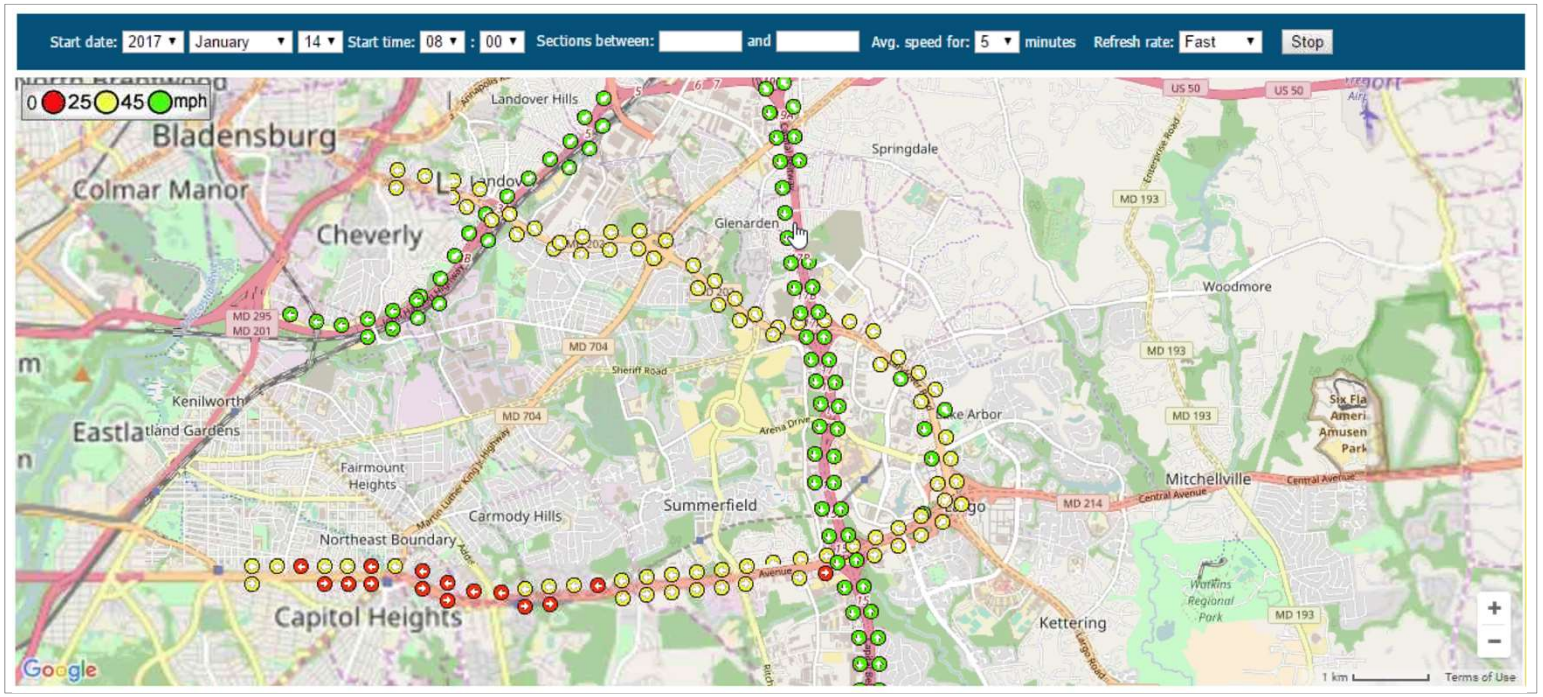
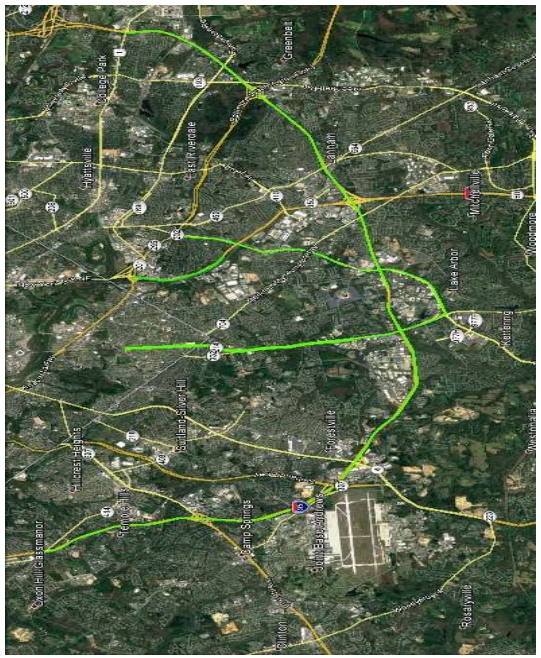
Traffic Data Services – Real-time Traffic



Traffic Data Services – Origin-Destination

- Identify where people come from & where they go
- Analyze mobility patterns of people caught in traffic congestion
- Determine main contributors for congestion through specific areas
- Leverage data to evaluate effectiveness of changes



road	direction	20:30	21:00	21:30	22:00	22:30	23:00	23:30	0:00	0:30	1:00	1:30	2:00	2:30	3:00	Total
Route_50_West	Out	10.1%	11.3%	7.6%	8.0%	5.9%	10.5%	10.1%	18.5%	8.4%	6.3%	1.7%	1.3%	0.0%	0.4%	100%
Route_202_East	Out	15.2%	10.9%	2.2%	6.5%	10.9%	6.5%	17.4%	15.2%	4.3%	8.7%	2.2%	0.0%	0.0%	0.0%	100%
Route_202_West	Out	12.5%	10.4%	12.5%	4.2%	6.3%	4.2%	12.5%	25.0%	2.1%	4.2%	2.1%	0.0%	2.1%	2.1%	100%
Route_214_East	Out	11.9%	9.2%	11.0%	6.4%	8.3%	2.8%	10.1%	22.0%	10.1%	2.8%	2.8%	0.0%	2.8%	0.0%	100%
Route_214_West	Out	5.1%	6.7%	4.5%	6.2%	5.1%	6.7%	21.3%	19.7%	16.3%	2.8%	2.2%	1.7%	0.6%	1.1%	100%
Route_495_North	Out	10.9%	7.7%	6.3%	6.7%	6.4%	8.6%	14.8%	16.2%	13.7%	3.2%	1.7%	1.7%	1.2%	1.0%	100%
Route_495_South	Out	7.6%	5.9%	4.4%	5.8%	6.4%	8.5%	15.7%	21.6%	16.2%	4.3%	1.6%	0.8%	0.7%	0.7%	100%
All outgoing roads	Out	9.3%	7.2%	5.6%	6.3%	6.4%	8.3%	15.1%	19.1%	14.1%	3.9%	1.7%	1.2%	0.9%	0.8%	100%

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Micro Origin/Destination and Turning Movements

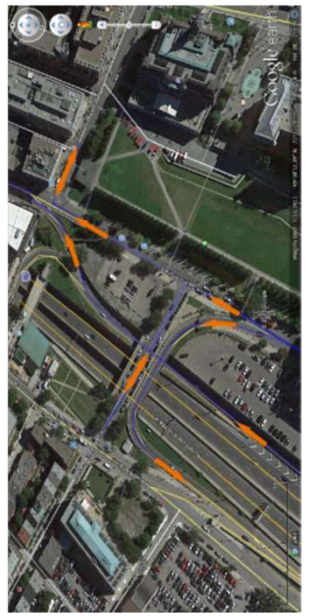
Collect and analyze turning movement data at complex intersections.

	All (including weekends and holidays)	Work days	6:00-10:00	10:00-15:00	15:00-19:00	6:00-19:00
Which percentage exited City A in the junction	34.4%	52.0%	58.6%	34.3%	40.9%	44.2%
Which percentage stayed on City A through the junction	65.6%	48.0%	41.4%	65.7%	59.1%	55.8%

Analysis of those arrived at the junction from City A

	All (including weekends and holidays)	Work days	6:00-10:00	10:00-15:00	15:00-19:00	6:00-19:00
Which percentage entered to City A in the junction	38.9%	55.1%	47.8%	51.1%	51.9%	50.5%
Which percentage arrived on City A before the junction	61.1%	44.9%	52.2%	48.9%	48.1%	49.5%

Analysis of those who traveled on City A after the junction



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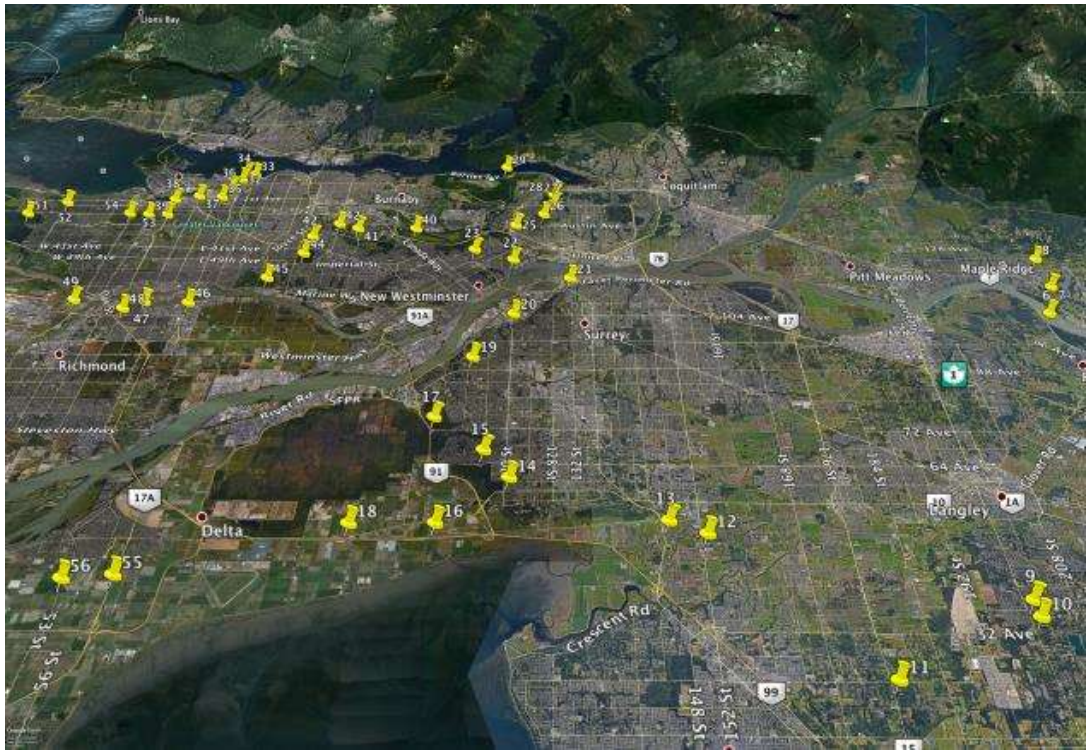
Cellular Counting Station Map

Track the volume patterns of vehicles traveling through targeted points.



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Data Quality Validation Study

Seattle Department of Transportation

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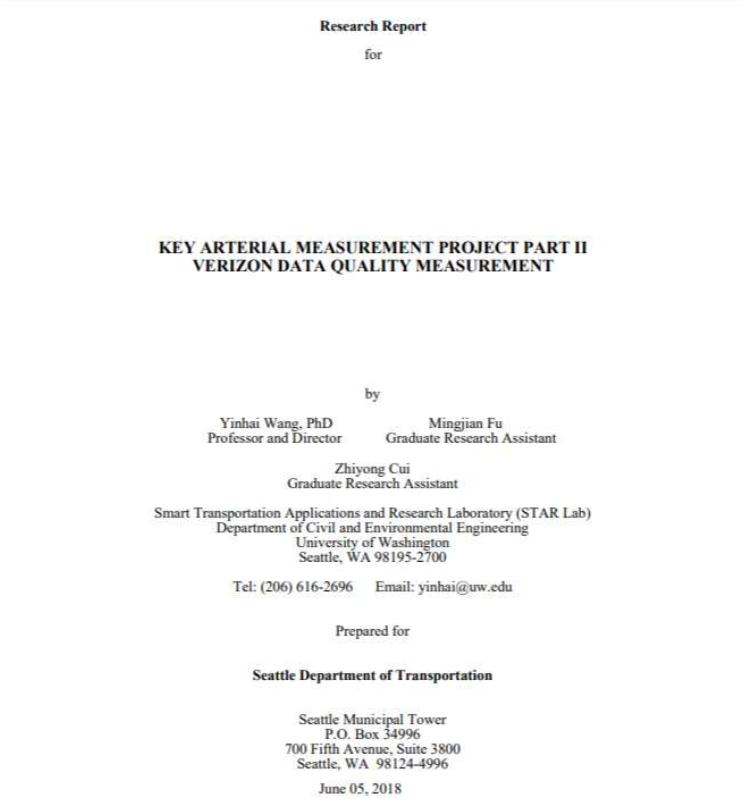

Research Report

for

KEY ARTERIAL MEASUREMENT PROJECT PART II
VERIZON DATA QUALITY MEASUREMENT

by

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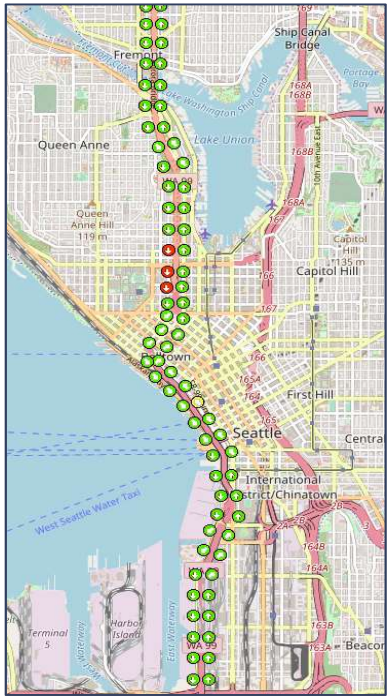
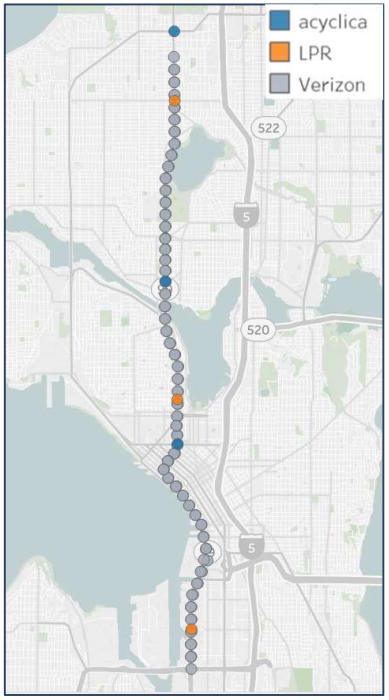
Key Arterial Performance Measurement Project

- **Objectives**
  - Evaluate the quality of this Verizon data.
  - Compare Verizon data with License Plate Reader (LPR) data and Acyclica data.
  - Assess the data quality based on travel time reliability-based performance measure metrics.
  - Summarize pros and cons of the Verizon data and provide comprehensive recommendations to SDOT



Virtual stations of Verizon data



Compared Data Sources

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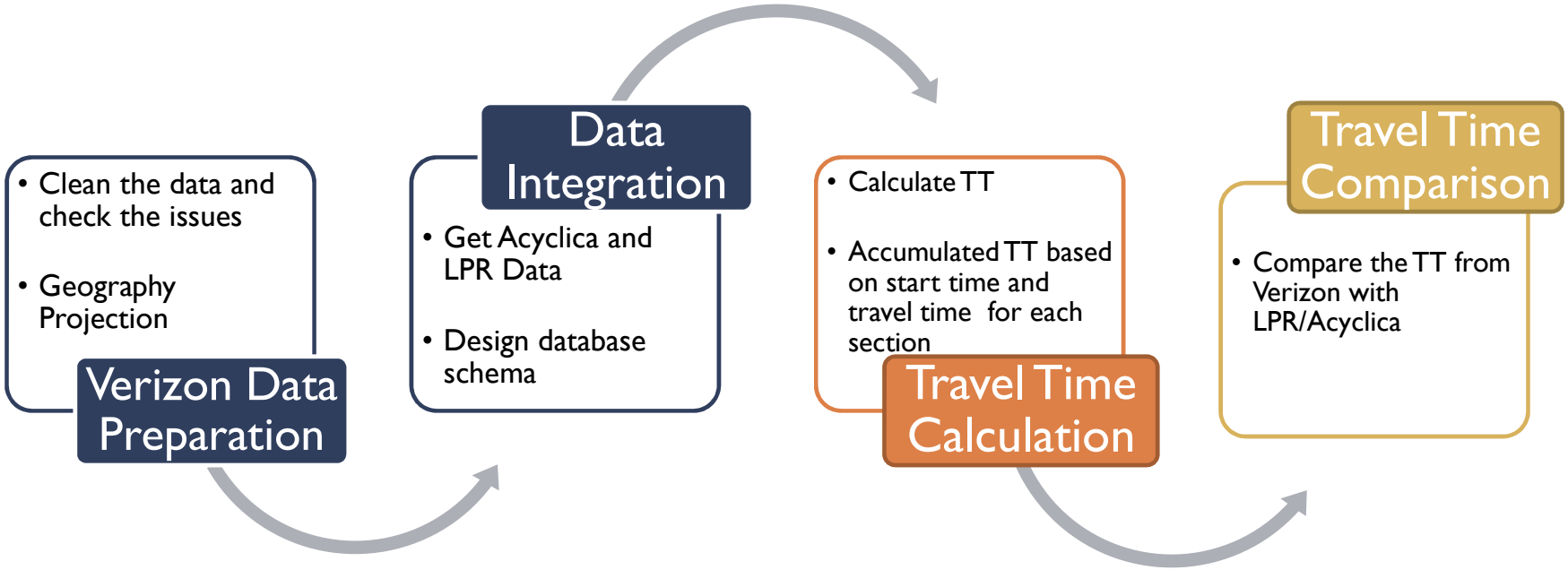
Methodology



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Travel time comparison segments & Metrics

		LPR/Acyclica Section						Verizon Section	
SegName	Dir	Data source	Sec ID	Start Lon	Start Lat	End Lon	End Lat	Start ID	End ID
LPR_713	NB	LPR	7	-122.343611	47.628023	-122.344442	47.690557	29	54
LPR_713	SB	LPR	13	-122.344442	47.690557	-122.343611	47.628023	123	148
LPR_814	NB	LPR	8	-122.339264	47.579898	-122.343611	47.628023	7	29
LPR_814	SB	LPR	14	-122.343611	47.628023	-122.339264	47.579898	148	170
Acyclica_1	NB	Acyclica	1	-122.343553	47.6186971	-122.347251	47.652703	25	38
Acyclica_1	SB	Acyclica	102	-122.347251	47.652703	-122.343553	47.6186971	139	152

Comparison Standard (Metrics)

- Free Flow Travel Time: 15th percentile travel time during the analysis period.
- Mean Travel Time
- Planning Time: 95th percentile travel time during the analysis period.
- Planning Time Index (PTI) : $\frac{\text{Planning Time}}{\text{Free Flow Travel Time}}$

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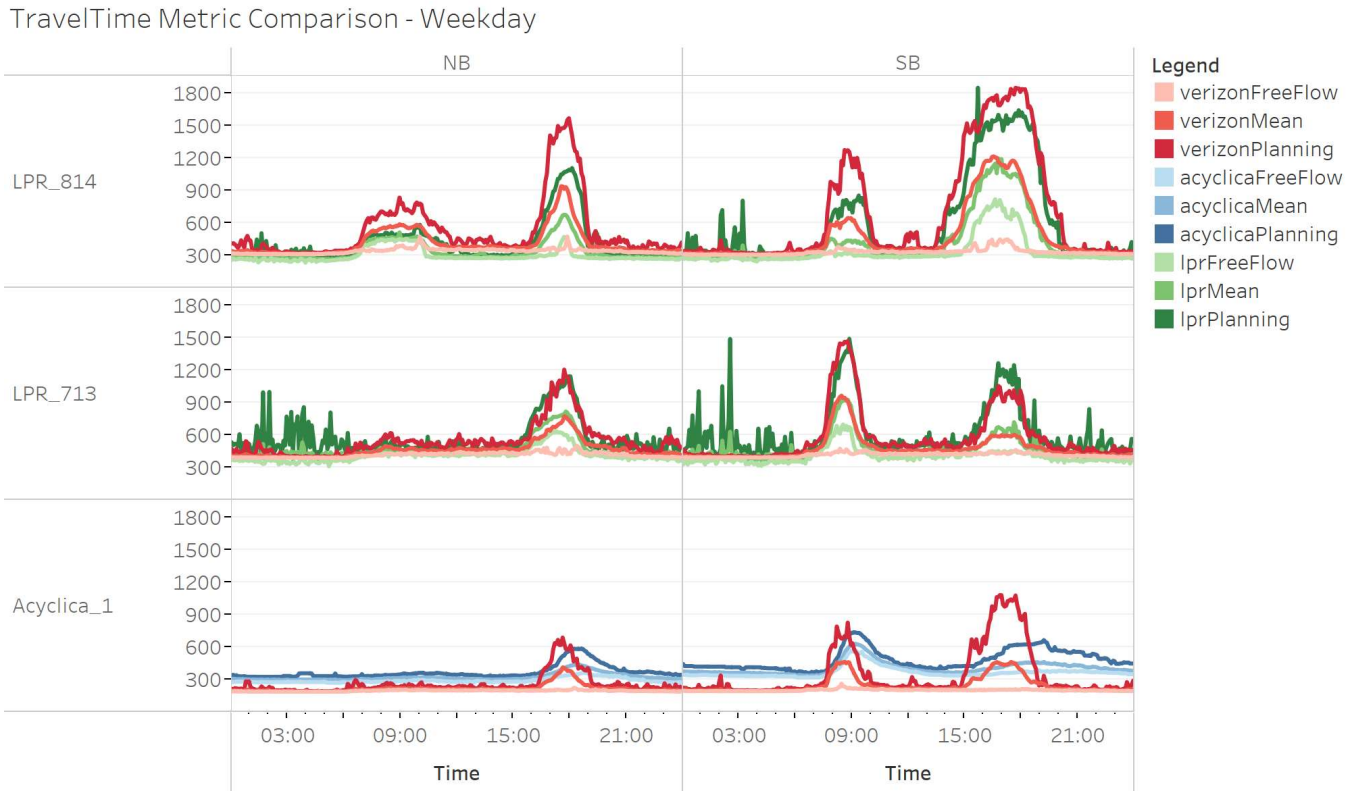
Travel Time Metric Comparison - Weekday



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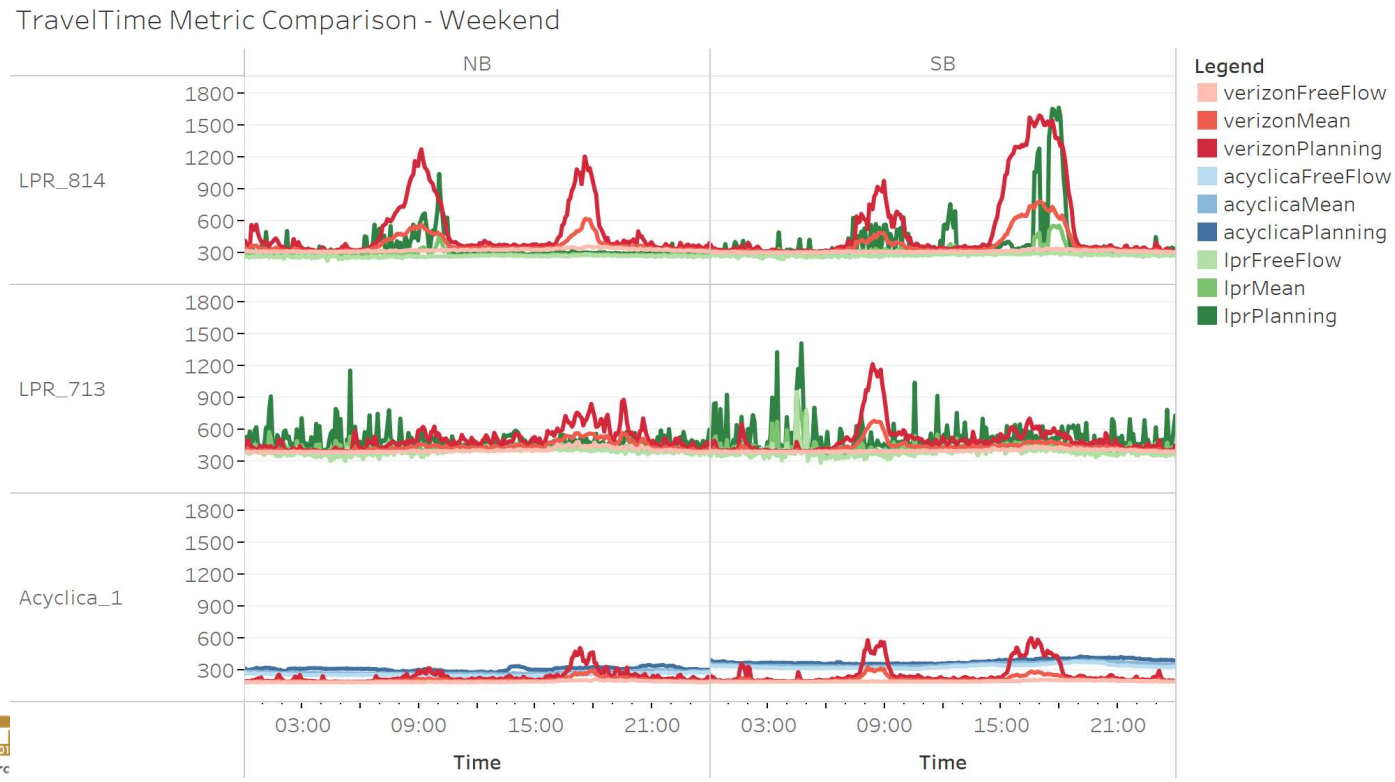
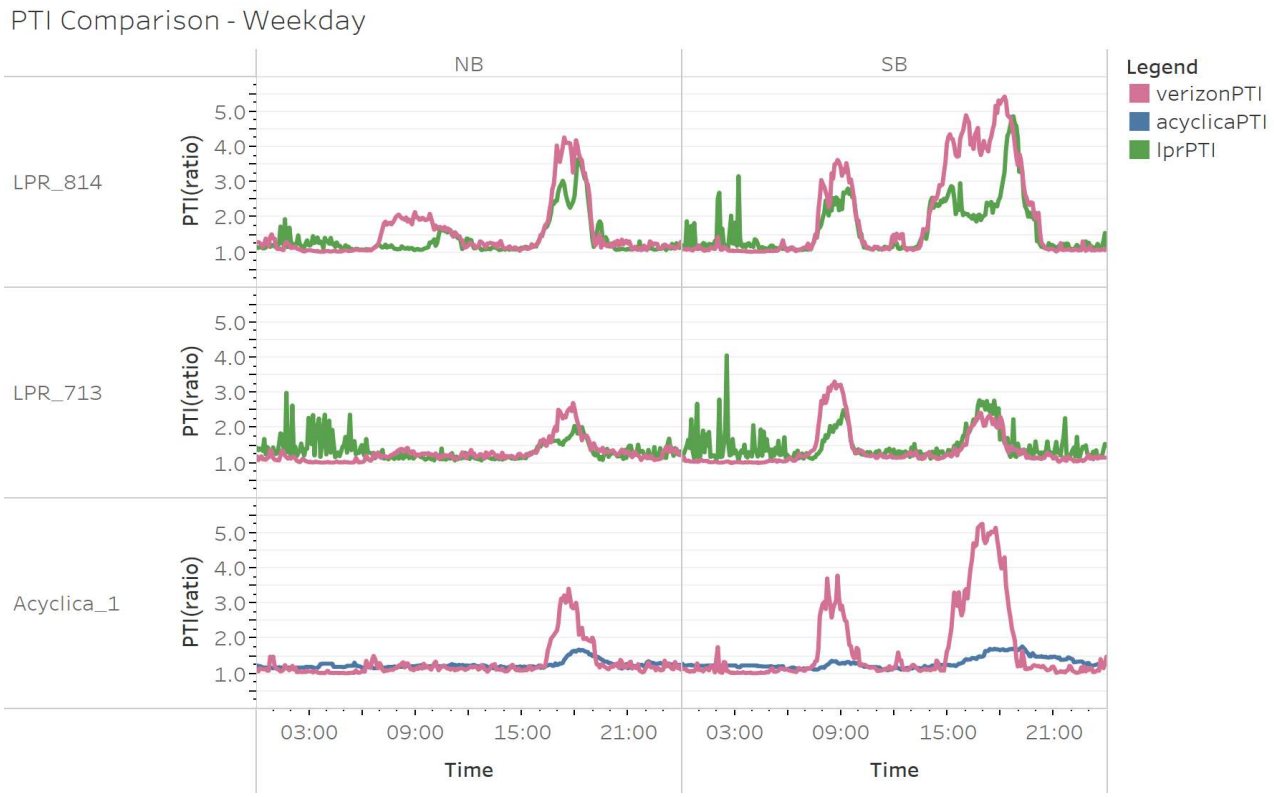
Travel Time Metric Comparison - Weekend



PTI Comparison - Weekday



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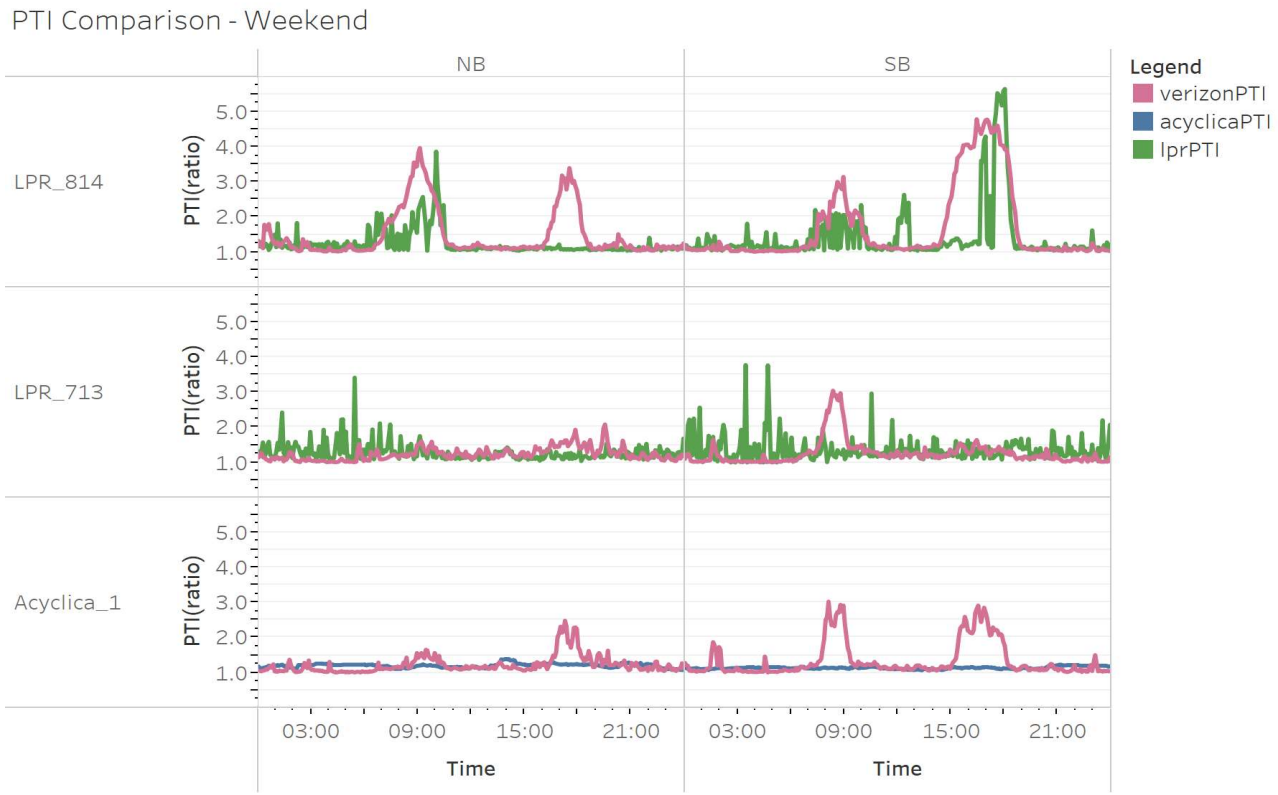
PTI Comparison - Weekend



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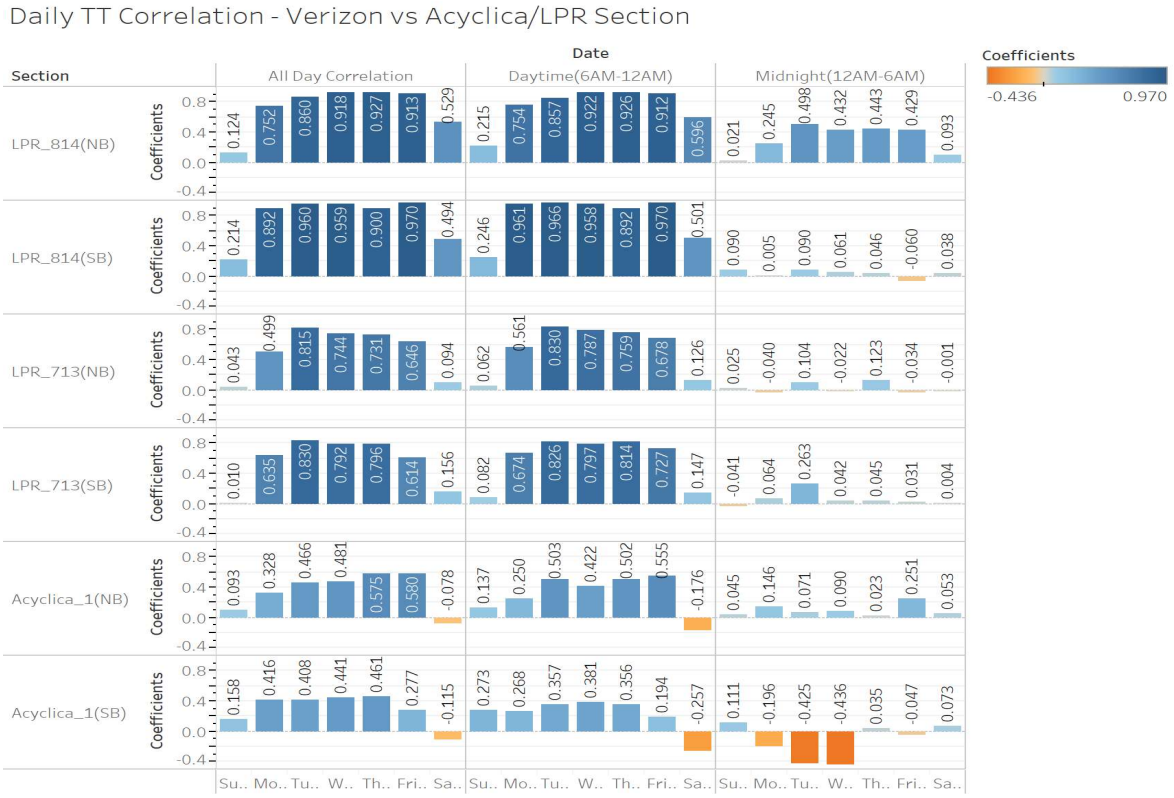
Daily TT Correlation – Verizon vs Acyclica/LPR Section



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Results Summary

- During weekdays, both travel time metrics and travel time reliability metrics of the Verizon data and the LPR data have the same trends.
- During weekends, the Verizon data can capture more obvious morning peak and evening peak patterns.
- The travel time correlation between LPR and Verizon is much higher than that between Acyclica and Verizon. During night time or on weekends, the correlations are all pretty low.
- The standard deviation of the Verizon travel time is similar to that of the LPR and Acyclica travel times.

Thank You

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