



ASCT VS ATSPM

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WHAT TRANSPORTATION CAN BE.

AGENDA

ASCT

ATSPM

ASCT vs ATSPM

Case Studies/Deployment Overviews



ADAPTIVE SIGNAL CONTROL TECHNOLOGY

WHAT IS ASCT?



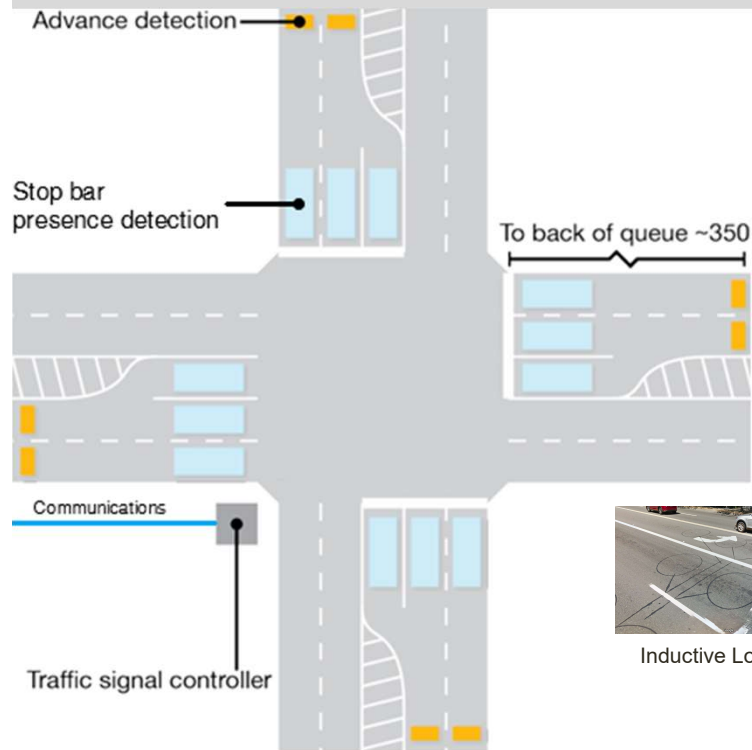
How It Works

- Adjust splits, cycle lengths, offsets, and phase sequences based on detected demand

Benefits

- Improve travel time reliability
- Improve vehicle progression
- Respond to highly variable traffic

GENERAL ASCT REQUIREMENTS

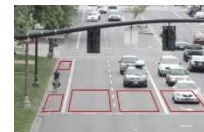


Detection

- Stop bar detection
 - Presence zone size
 - Per-lane separation
 - Major and minor streets
- Advance detection
 - Distance to stop bar
 - Per-lane separation
 - Major street only



Inductive Loops



Video

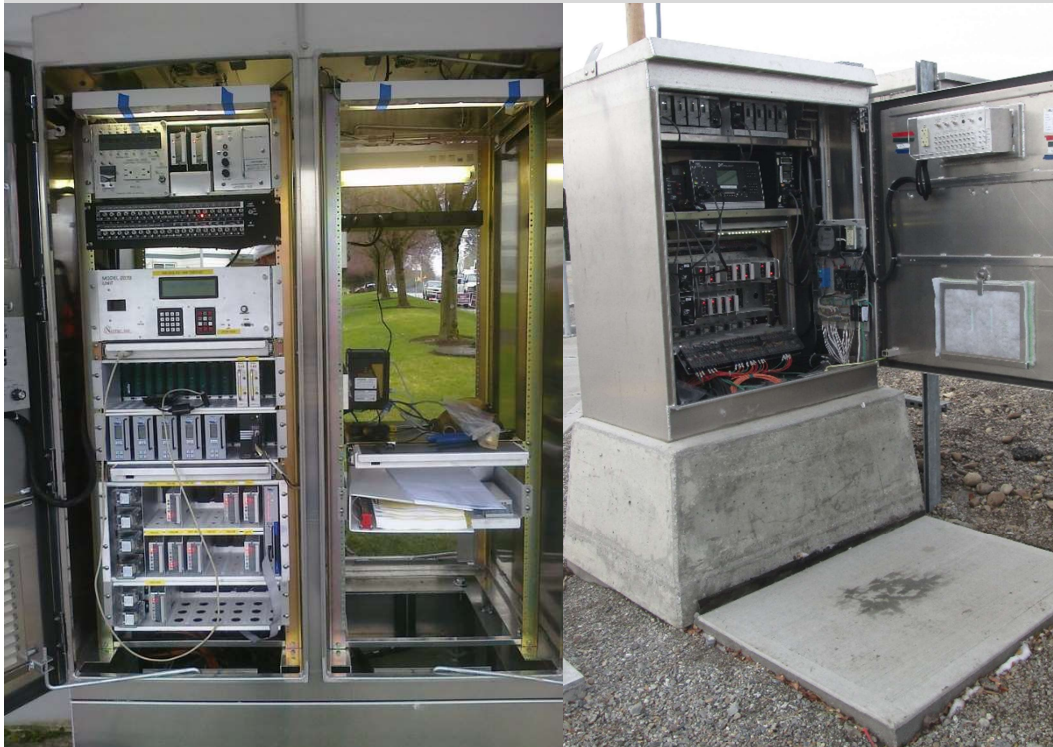


Magnetometers



Radar

GENERAL ASCT REQUIREMENTS



Signal Controllers

- Existing controllers and cabinets
 - NEMA vs 2070/33x

Central Systems

- Existing system(s)
- Interoperability with other inter- and intra-agency systems

GENERAL ASCT REQUIREMENTS



NEMA

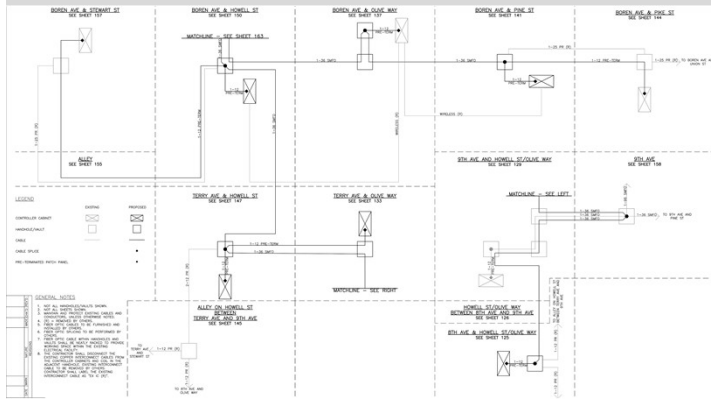
- Replace with new NEMA controller



2070

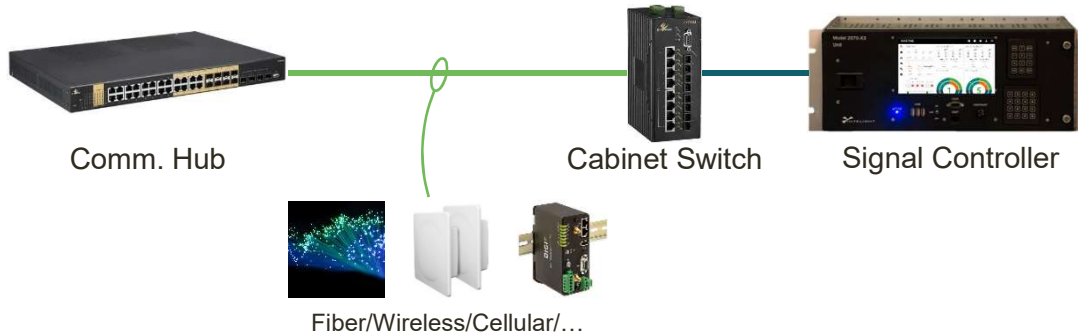
- Replace 2070-1C CPU card

GENERAL ASCT REQUIREMENTS



Communications

- Overall network architecture
- Communications medium
- Cabinet equipment



WHO MAKES ASCT SYSTEMS?

 **ECONOLITE**
Centrac Adaptive

 **RHYTHM**
ENGINEERING
InSync

Kimley»Horn
Kadence

INTELLIGHT
MaxAdapt

*TRANS***CORE.**
SCATS

SIEMENS
SCOOT

 **Trafficware**
SynchroGreen

 **McCain**[®]
Transparency Adaptive

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WHAT'S DIFFERENT BETWEEN THEM?

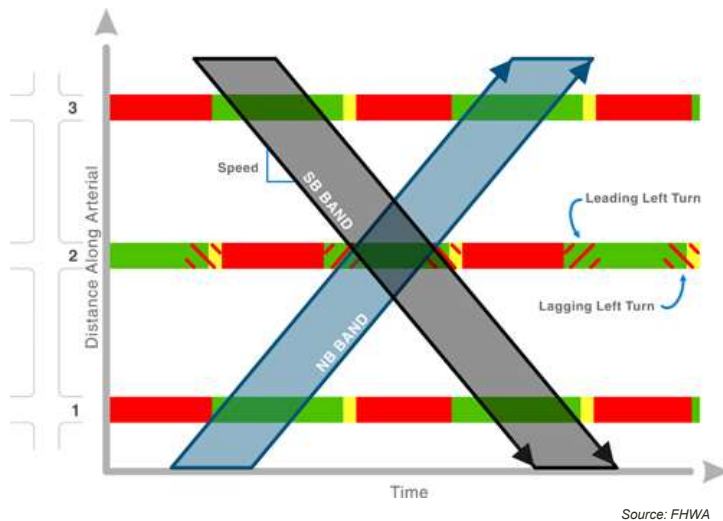


General ASCT Requirements

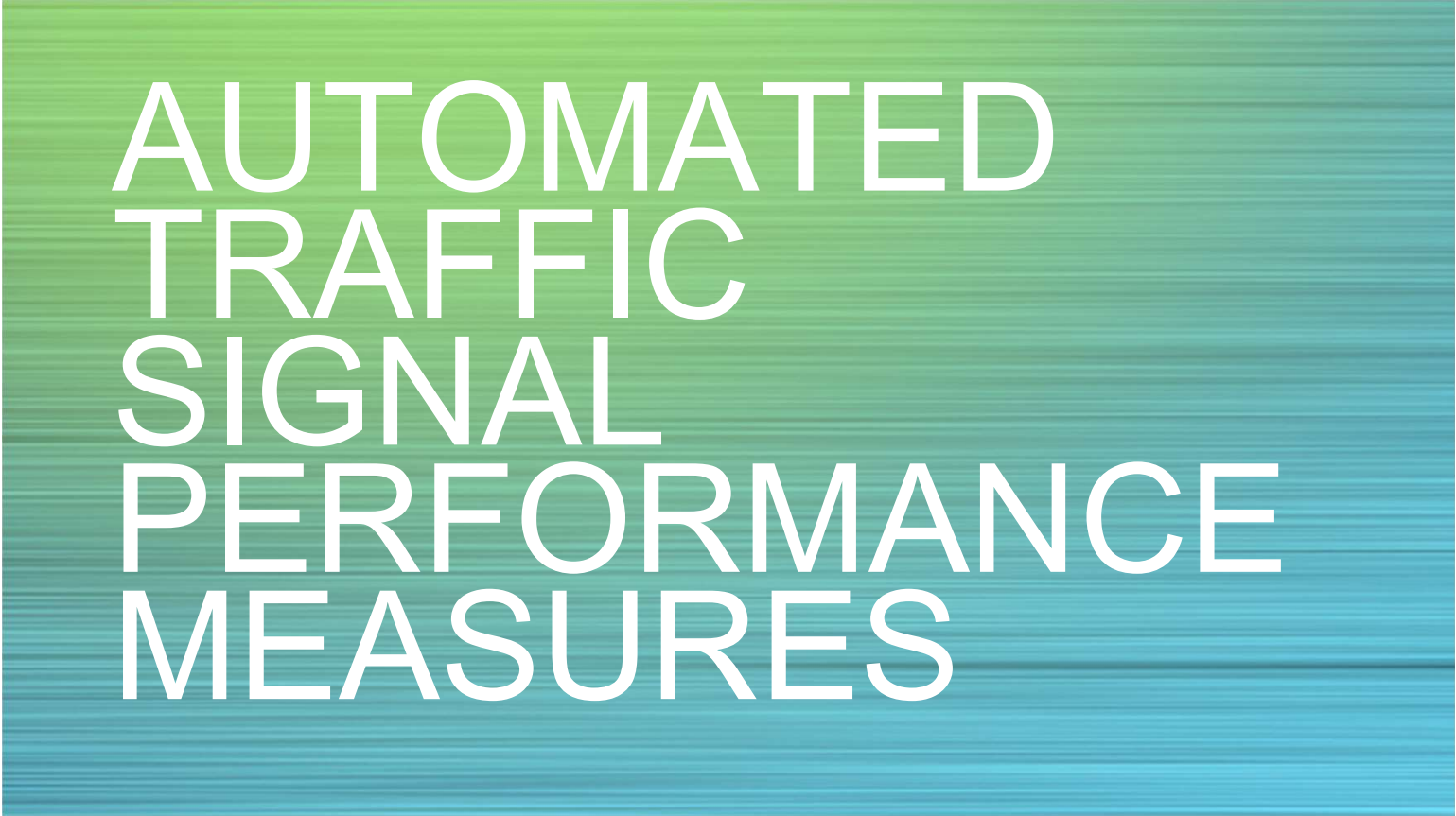
- Detection
 - Generally the same. Some systems have “lighter” detection requirements.
- Signal Controllers
 - Generally requires controller software from the ASCT vendor.
 - Other options:
 - InSync – physical in-cabinet interface to existing signal controller
 - Kadence – AB3418E protocol
- Central Systems
 - Centrally controlled vs peer-to-peer
- Communications
 - All require communications

WHAT'S DIFFERENT BETWEEN THEM?

Adaptive Algorithms



- Start with a base timing plan
- Split Optimization
 - Phase utilization (GOR, ROR5)
 - Proportional increase with cycle length
- Cycle Length Optimization
 - v/c
 - Sum of splits
 - TOD selection
 - “Critical” intersection
- Offset Optimization
 - Arrivals on green/red
- Phase Sequence Optimization
 - Allowable phases
 - Time-of-day
- Optimization Frequency
 - Every x number of cycles
- Optimization Magnitude
 - User definable



AUTOMATED
TRAFFIC
SIGNAL
PERFORMANCE
MEASURES

WHAT ARE ATSPM?

Benefits

- Real-world data 24/7
- Troubleshooting
- Proactive re-timing
- Dashboards/report cards

How It Works

- High resolution data (detector data + SPaT data collected every 0.1s)



— GENERAL ATSPM REQUIREMENTS

Basically the same as for ASCT systems, except...

GENERAL ATSPM REQUIREMENTS

Detection

- ATSPMs that can be generated depend on amount of detection available

Signal Controllers

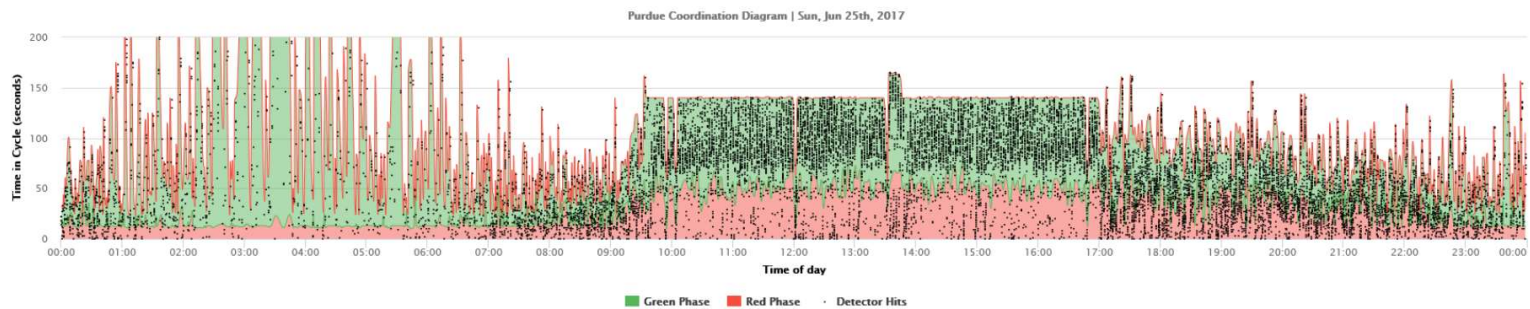
- Compatible controllers (e.g., ATC)
- Data aggregators

Central Systems

- Central signal management systems - module
- Web-based platforms

Communications

- Not required, but strongly preferred



Source: Miovision

WHO MAKES ATSPM SYSTEMS?

Central Signal Management Systems



Web-Based Platforms



Data Aggregators



UDOT ATSPM



WHAT'S DIFFERENT BETWEEN THEM?

Service Options

- Central signal management system module
- Data aggregators – “turnkey” solution
- UDOT ATSPM – agency O&M

Unique ATSPMs

- Miovision – variations on Split Failure, but all systems are generally based on Purdue
- Probe data – travel time, congestion, cost-benefit, origin-destination, etc.

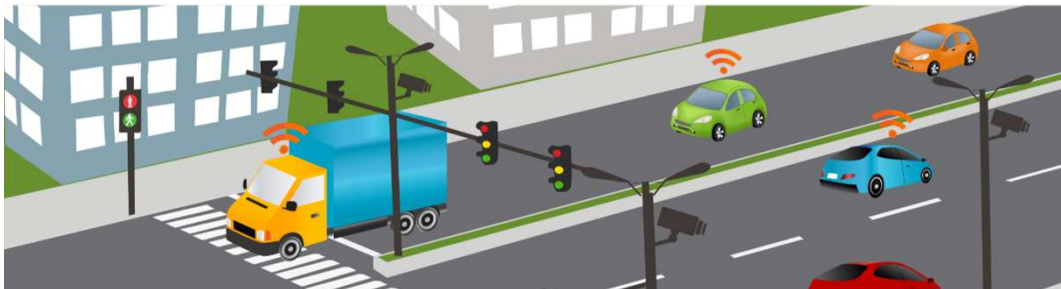
INRIX

verizon

TRAFFICAST



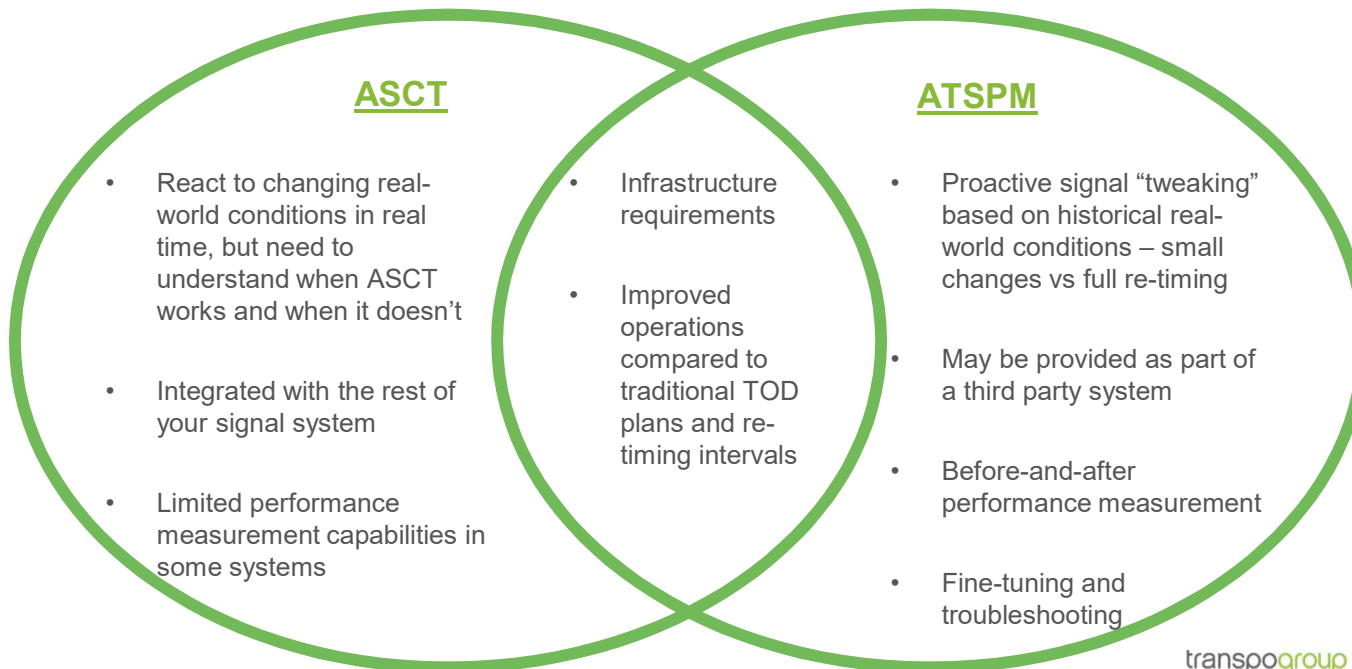
STREETLIGHTDATA



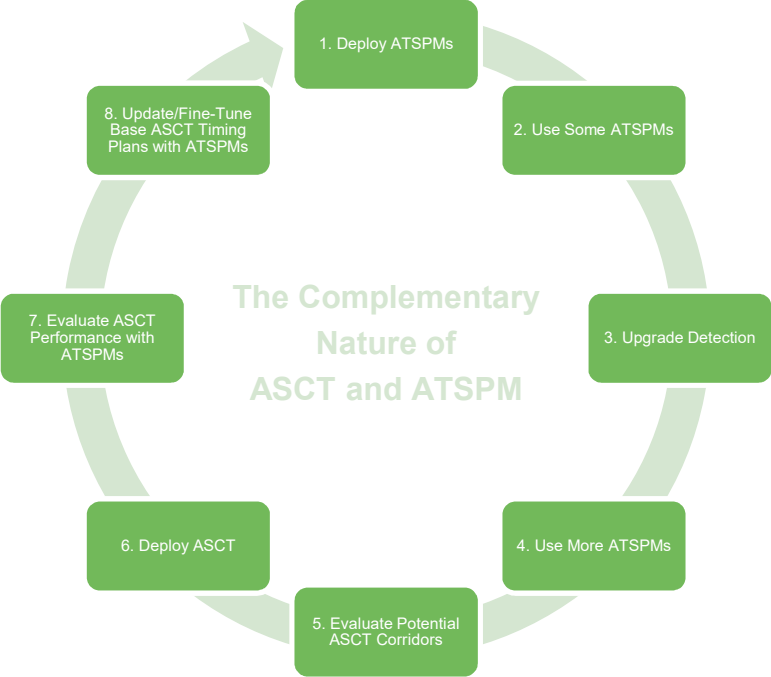
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ASCT
VS
ATSPM

ASCT VS ATSPM



ASCT AND ATSPM





CASE
STUDIES/
DEPLOYMENT
OVERVIEWS

CASE STUDIES/DEPLOYMENT OVERVIEWS



City of Irvine, CA Planning



Probe Data Evaluation

- Third-party data sources vs Bluetooth/Wi-Fi detectors

ASCT Corridor Selection

- Cost-benefit analysis based on:
 - Traffic volumes (mainline vs side street), probe data (travel time, variability), and existing infrastructure (detection)
 - ATSPMs were not yet available

ASCT System Evaluation

- Evaluated ASCT systems
 - Technical capability – adaptive algorithm
 - ROM cost – signal controller, detection, and central system upgrades

CASE STUDIES/DEPLOYMENT OVERVIEWS



City of Irvine, CA Planning



Performance Measures Strategy

- ATSPMs, probe data, and Bluetooth/Wi-Fi readers all play a role
 - ATSPMs for traffic engineers
 - Probe data and Bluetooth/Wi-Fi readers for planners
 - Distill the data for public consumption
- Day-to-day performance monitoring
 - Create dashboards/report cards to quickly see network performance

City of Federal Way, WA Systems Engineering and Deployment



Unique Constraints

- Flashing yellow arrow
 - Protected/permissive operation for pedestrian safety
- Variable lane use
 - Demand-based operation. TOD as backup
- Proximity to I-5; sensitivity to incidents
 - Highly variable traffic
 - Data sharing with WSDOT's central system
 - Coordination with WSDOT off-ramps
- Multiple jurisdictions
 - WSDOT – taking over 6 of their signals
 - King County – taking over 2 of their signals
 - Sound Transit – Link Light Rail
 - King County Metro – BRT + TSP
 - Pierce Transit – BRT + TSP

CASE STUDIES/DEPLOYMENT OVERVIEWS



City of Federal Way, WA Systems Engineering and Deployment

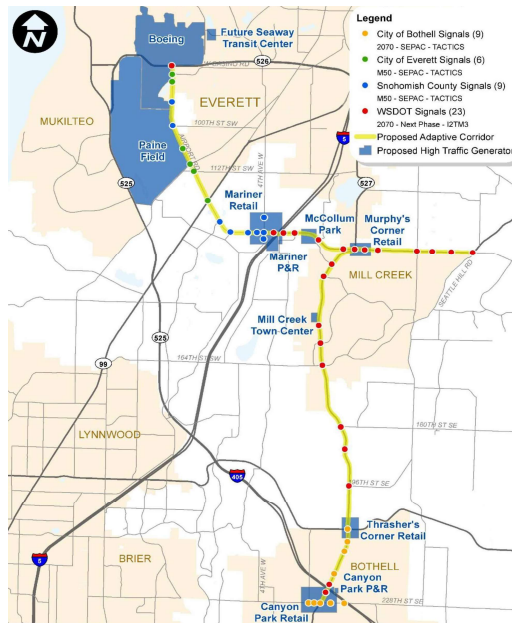


Next Steps

- Systems Engineering completed
 - Evaluation in progress
- Detection Upgrades
 - Upgrades will be designed in partnership with ASCT vendor, and bid out to a contractor
- Validation
 - Probe data
 - ATSPMs

CASE STUDIES/DEPLOYMENT OVERVIEWS

Snohomish County, WA Systems Engineering and Deployment



Unique Constraints

- Proximity to major freeways and state routes; sensitivity to incidents
 - Highly variable traffic
 - Data sharing with WSDOT's central system
 - Coordination with WSDOT off-ramps
- Multiple jurisdictions
 - WSDOT signals
 - City of Bothell signals
 - City of Everett signals
 - Community Transit – BRT + TSP + queue jumps

CASE STUDIES/DEPLOYMENT OVERVIEWS



Snohomish County, WA Systems Engineering and Deployment



Select ASCT System
INTELLIGHT

Upgrade Detection

Deploy ASCT Hardware

Turn On ATSPMs and Bluetooth/Wi-Fi Detectors

Collect Data: Existing Signal Timings

Turn On ASCT

Collect Data: ASCT Operations

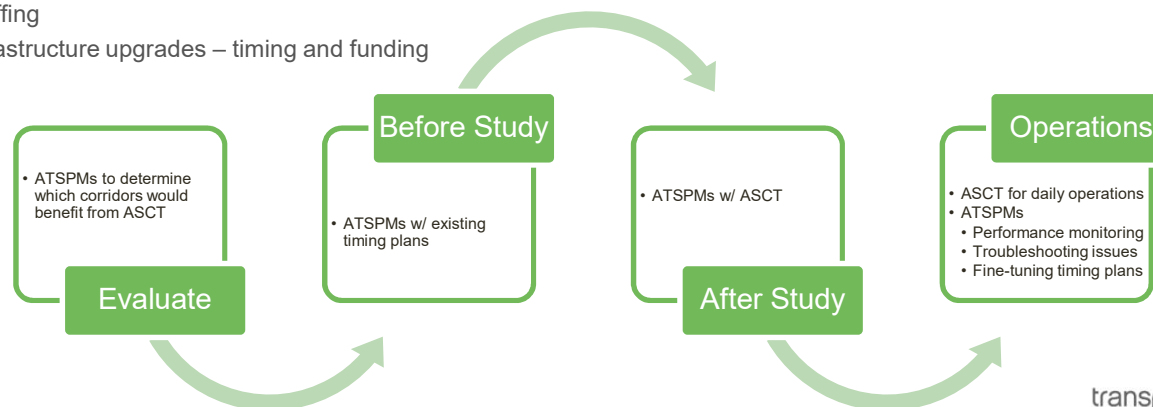
Next Steps

- Controller Upgrades
 - Convert databases and install 2070-1C CPU cards
- Detection Upgrades
 - Being completed by the County
- Validation
 - Bluetooth/Wi-Fi detectors
 - ATSPMs

CONCLUSION

Final Thoughts...

- Use of ATSPMs with ASCT is still relatively new
 - Benefits are not just limited to validation studies, but also:
 - Performance monitoring – dashboards and report cards
 - Troubleshooting issues
 - Fine-tuning base and backup timing plans
- Challenges
 - Performance measurement for TSP
 - Staffing
 - Infrastructure upgrades – timing and funding





THANK YOU

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