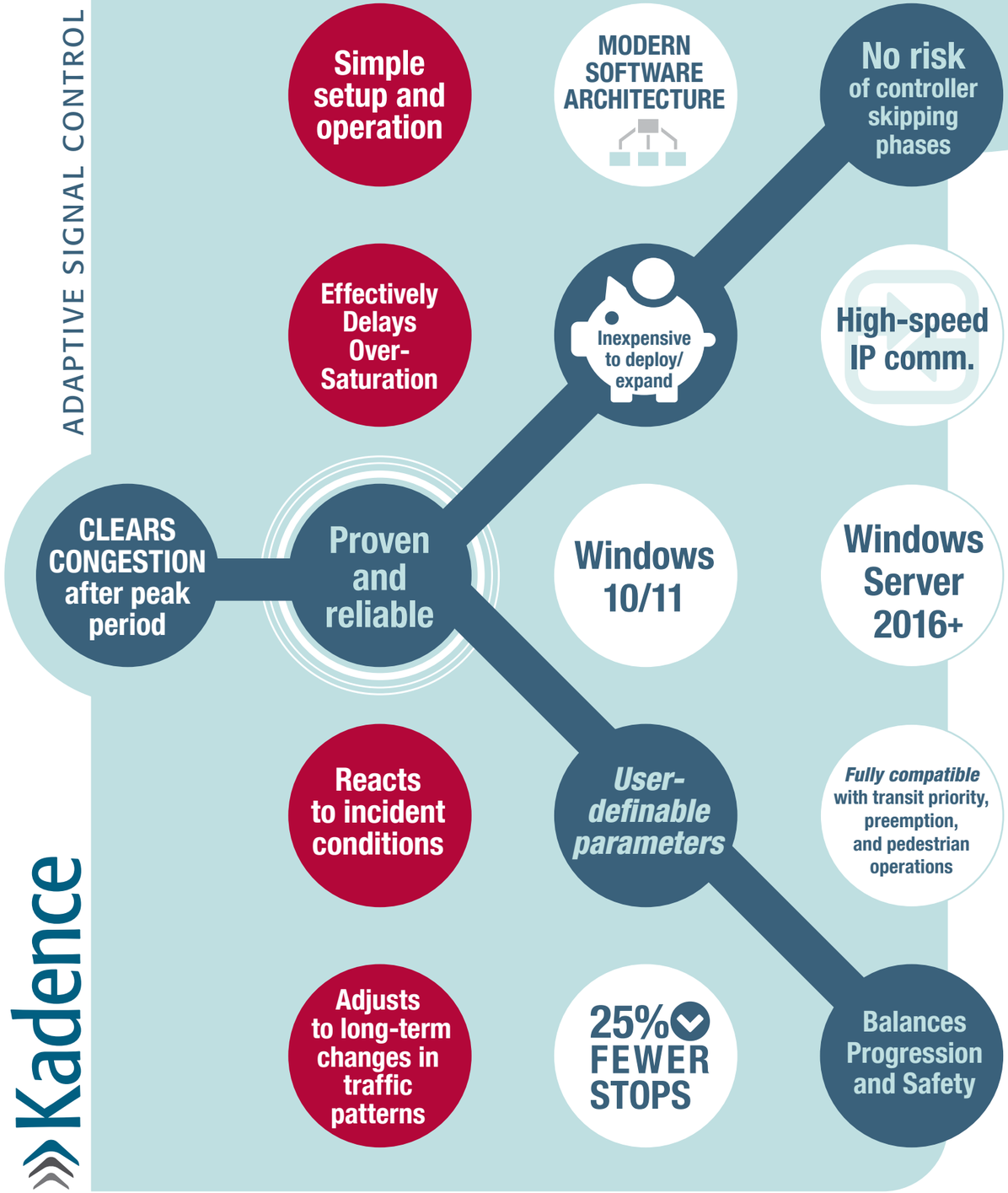
ADAPTIVE SIGNAL CONTROL



Kadence

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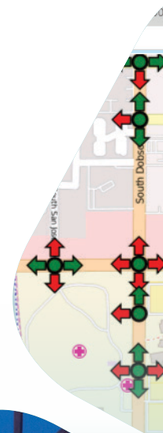
Kadence

A Kimley-Horn Software Solution



Adaptive Signal Control, Now With:

Deep Learning + Queue Management + Safety Adaptive

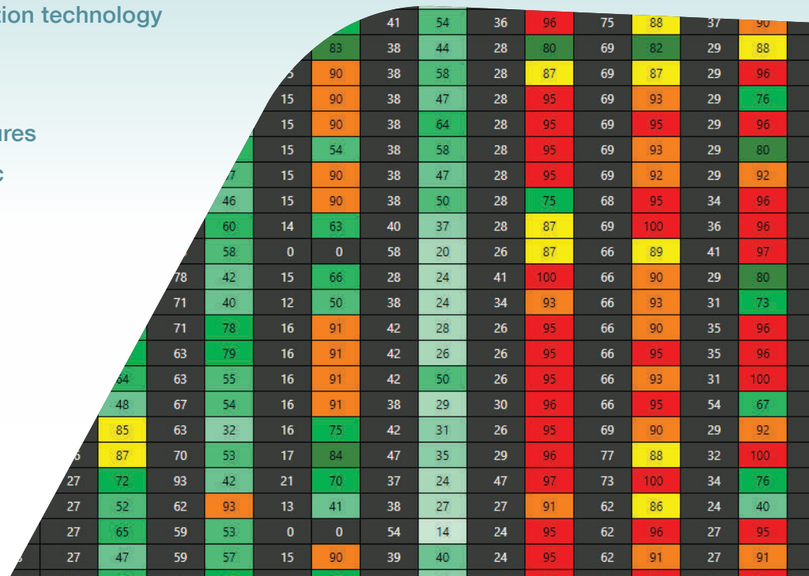
The Kadence system optimizes traffic signal timing to balance performance benefits for safety and efficiency. Kadence is a powerful tool in a traffic engineer's toolbox, handling fluctuations in demand and short- and long-term changes in land use and traffic patterns. Kadence dashboards and signal performance measures also allow traffic engineers to provide enhanced consulting services.

Key Features

- Use any field controller and detection technology
- System learns over time
- Highly scalable and cost effective
- Signal system performance measures
- Optimizations consider both traffic flow and safety

Real-Time Signal Parameter Tuning

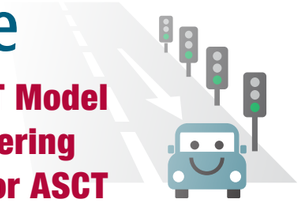
- Cycle
- Splits
- Offsets
- Sequence
- TOD Schedule

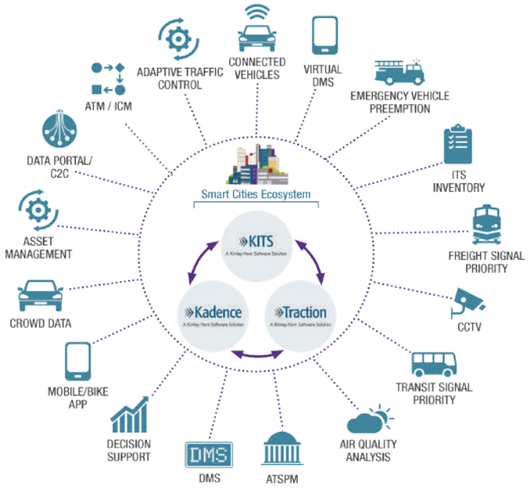


COMPATIBILITY AND SETUP

»Kadence

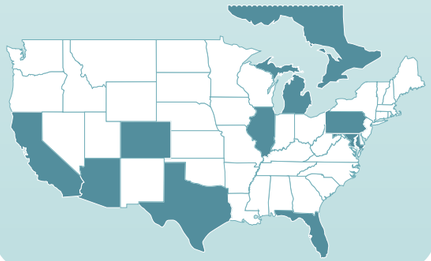
Meets All USDOT Model Systems Engineering Requirements for ASCT





Implementation

States/Provinces where Kimley-Horn has deployed Kadence signal system projects



Kadence is ***fully integrated*** into Kimley-Horn's Smart Cities Ecosystem and is ***fully compatible*** with KITS and all Traction Modules

- »TractionTravel
- »TractionLive
- »TractionPriority
- »TractionMetrics
- »TractionConnect
- »TractionWorkflow

Signal Controller Types

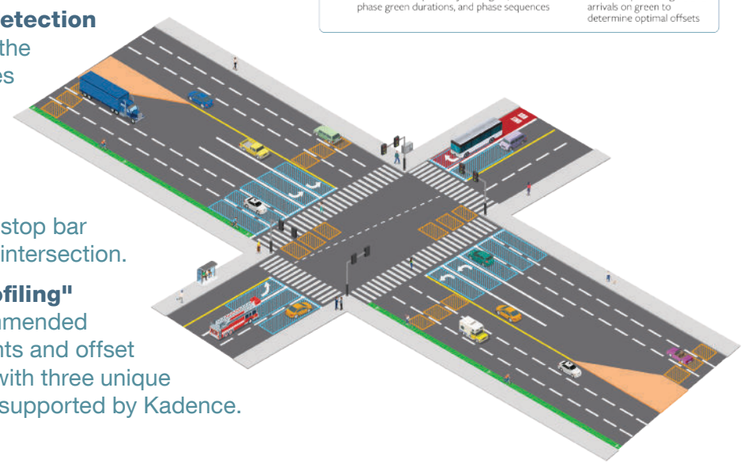
- Econolite ASC/3, Cobalt, and EOS
- Siemens SEPAC NTCIP
- McCain 233/Omni
- Fourth Dimension D4
- Q-Free
- LACO4E
- Caltrans TSCP
- Siemens NextPhase
- Any other NTCIP 1202 compliant controller

Kadence Detector Requirements

Kadence supports all detection technologies as long as the detection system interfaces directly with the traffic signal controller.

For optimal operation, **lane-by-lane detection** should be provided at the stop bar of each adaptive-enabled intersection.

Lane-by-lane "Flow Profiling" detectors are also recommended where queue measurements and offset adjustments are desired, with three unique placement configurations supported by Kadence.



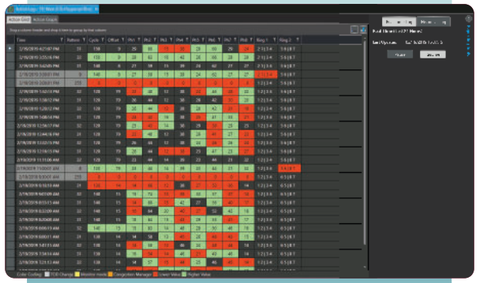
METHODOLOGY AND PERFORMANCE

Adaptive Control Methodology

- Data-driven parameter tuning
- No calibration
- No specific detector length
- No field hardware

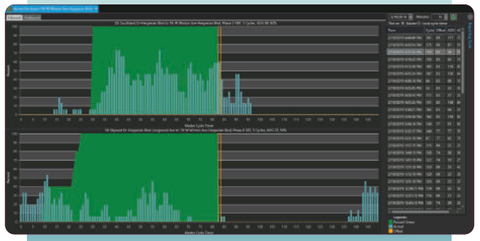
Adaptive Control Process

- Poll controllers for phase and detector data
- Calculate new splits, cycle, offset, sequence
- Download new pattern data to controllers
- Controller responsible for all traffic functions
- Kadence does not override operation with holds/force off
- Fully compatible with transit priority, emergency vehicle preemption, and all pedestrian modes
- Where speed sensor data is available, safety-based adjustments to mitigate excessive speeding can be enabled

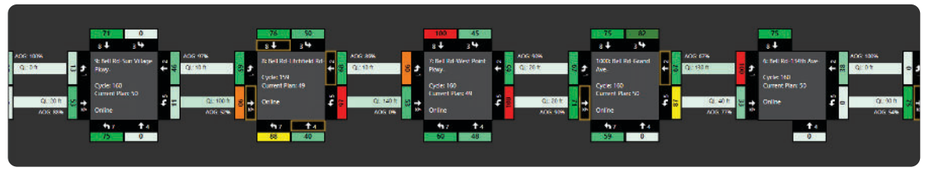


Action Log

Modern Graphical User Interface

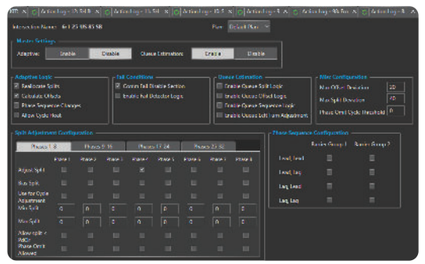


Arrivals On Green

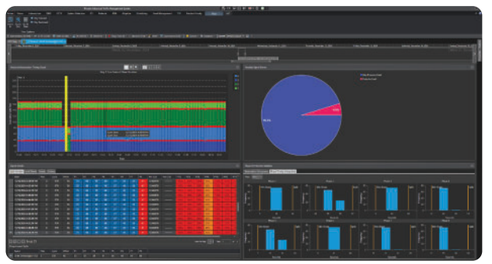


Status Map

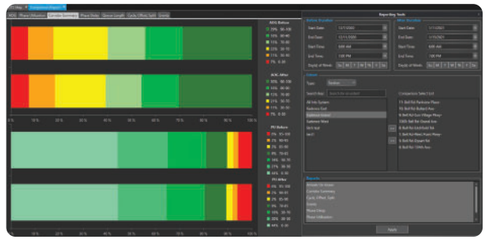
Phase Utilization



Detailed Intersection Configuration



Historical Intersection Timing Report



Before and After Corridor Summary