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Aimsun – SIDRA Interface

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Presentation at the SIDRA API Workshop
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1. Overview
2. Introduction to Aimsun
3. Signals in Aimsun Next
4. Interface with SIDRA
5. Further improvements

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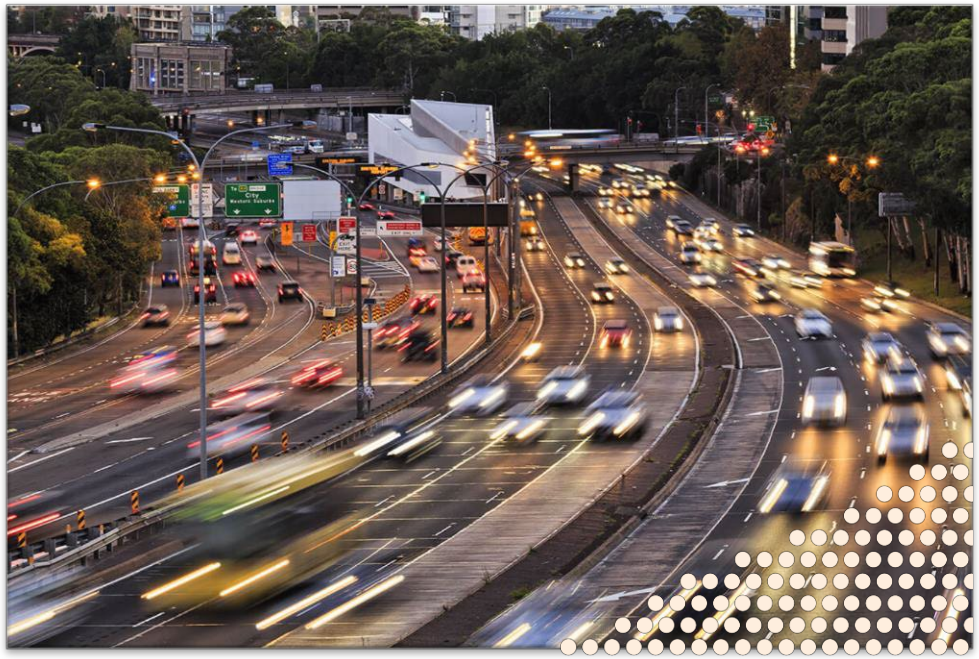
The Company

We are a company with a sole focus on algorithms, software and operational know-how for mobility applications in

- Strategic transport planning
- Traffic engineering
- Mobility management

We are a stand-alone entity fully owned by Siemens.

aimsun.next aimsun.live



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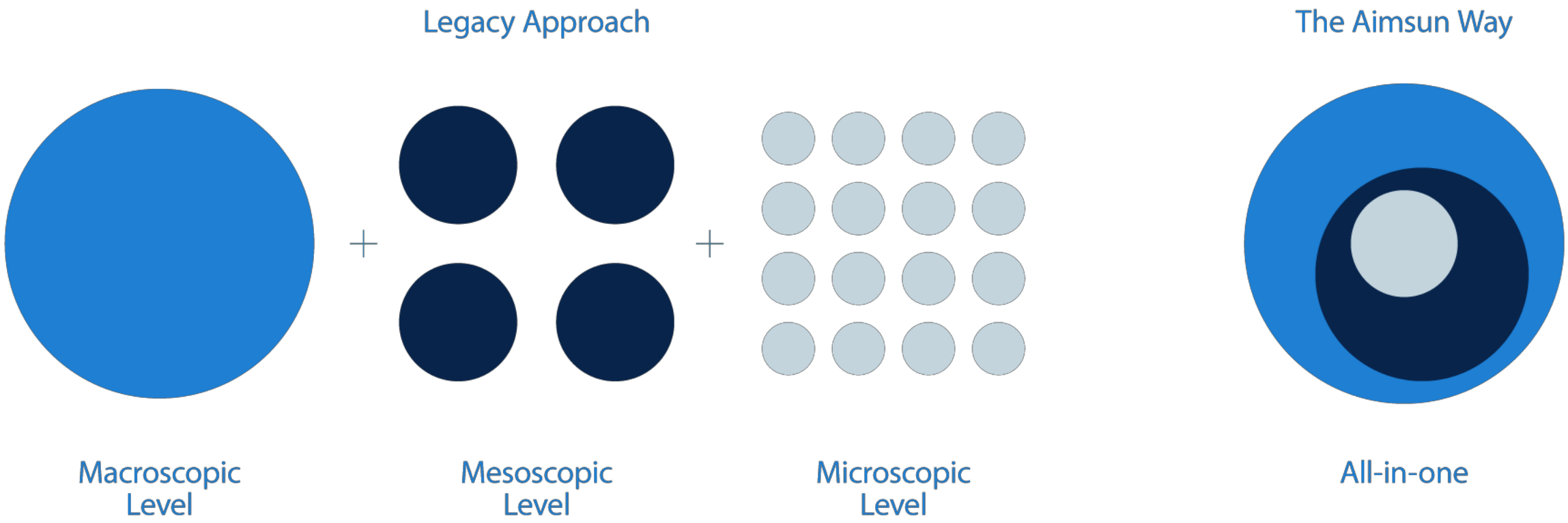
Aimsun Next integrates three modeling tiers

Ideal platform for large-scale dynamic models



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Operational richness

Today's networks are complex and dynamic

- Parking and cleaning schedules
- Prohibited turns
- Reserved bus/HOV/HOT lanes
- Tunnel and bridge operations
- Lane reversals
- Toll booth closures
- Adaptive signal control
- Incidents
- Response plan evaluation

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Programming capabilities

Scripting

- Python
- Edit the model, access the outputs

API

- Python or C/C++
- Perform actions during a microscopic or mesoscopic simulation
- Exchange information with other software

microSDK

- C++
- Implement customized microscopic behavioral model

platformSDK

- C++
- Extend the kernel and the user interface

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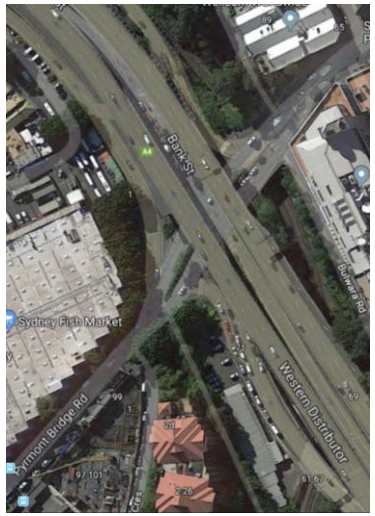
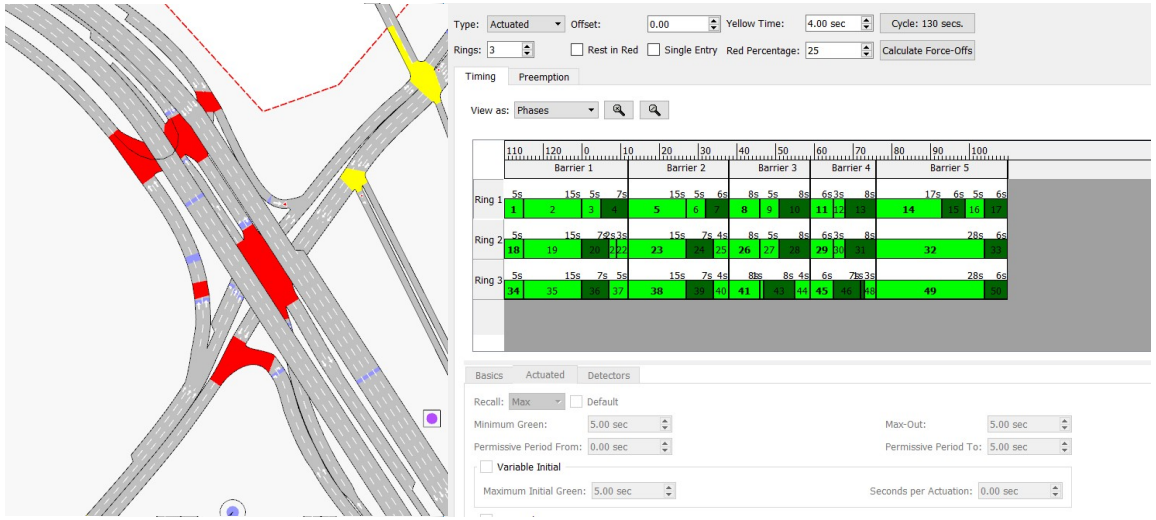
Able to replicate signals

Provides a simple but powerful way of representing signal control plans.

- Fixed signal control plan
- Actuated signals following NEMA standards
- Actuated pedestrian phase
- Coordinated signals
- Public transport priority
- Example showing multiple nodes with actuated control plan





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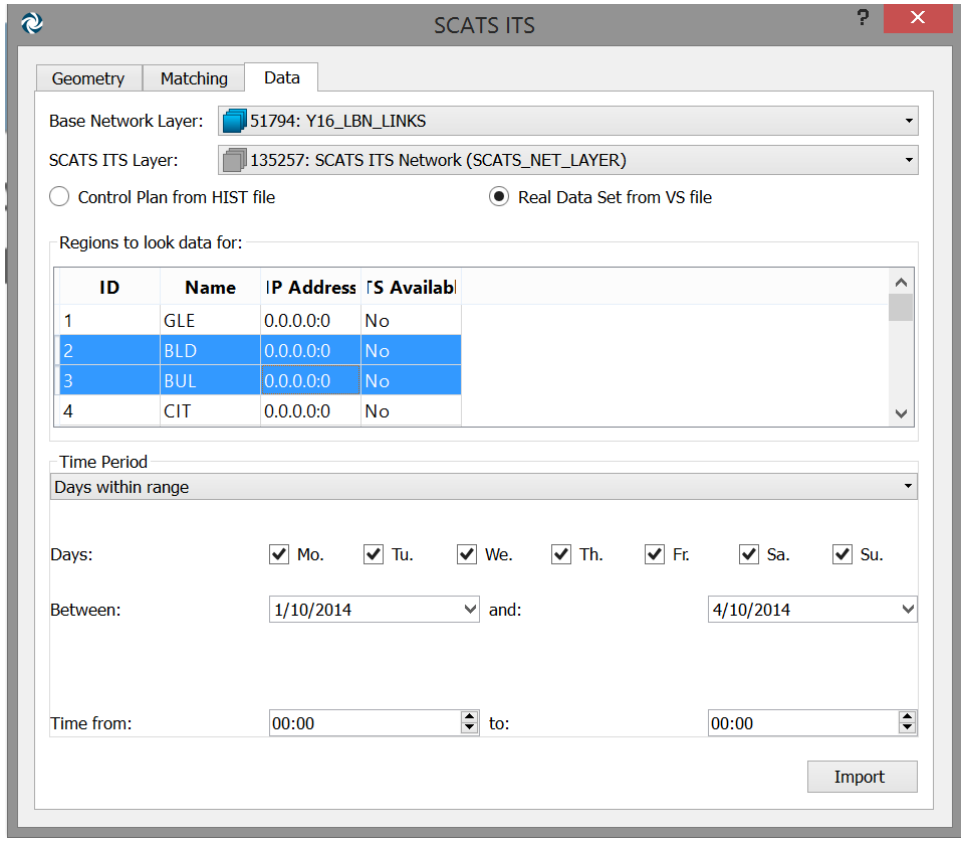
Interface with SCATS ITS Data port

Able to import historical information on:

- Signal Geometry
- Signal Groups
- Signal Phases
- Detectors
- Detector counts
- Historical signal timings

Working with RMS on the future SSDI format



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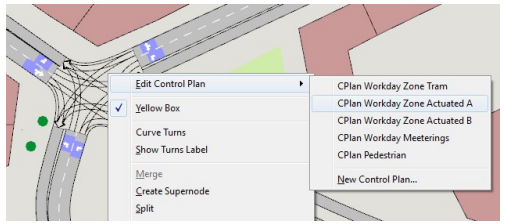
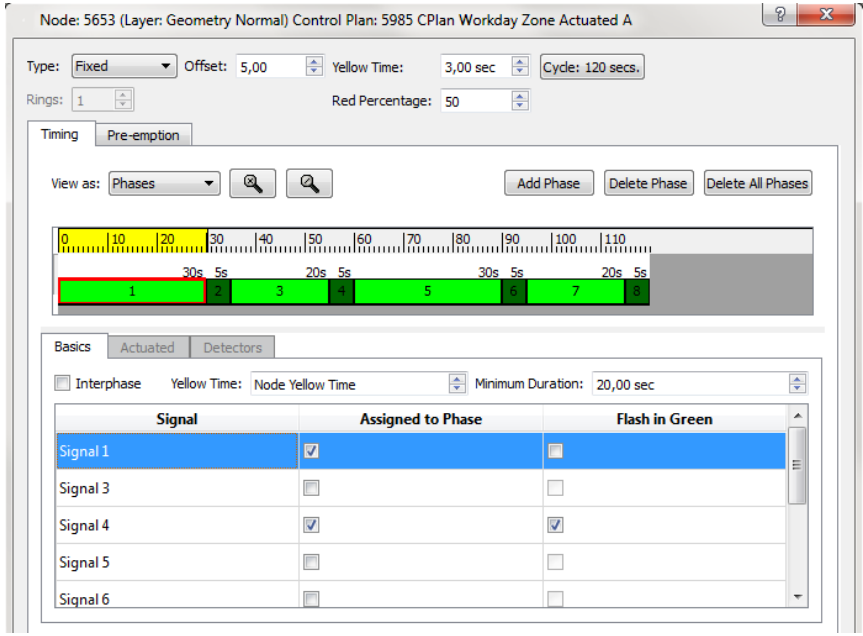
Interface with SCATSIM

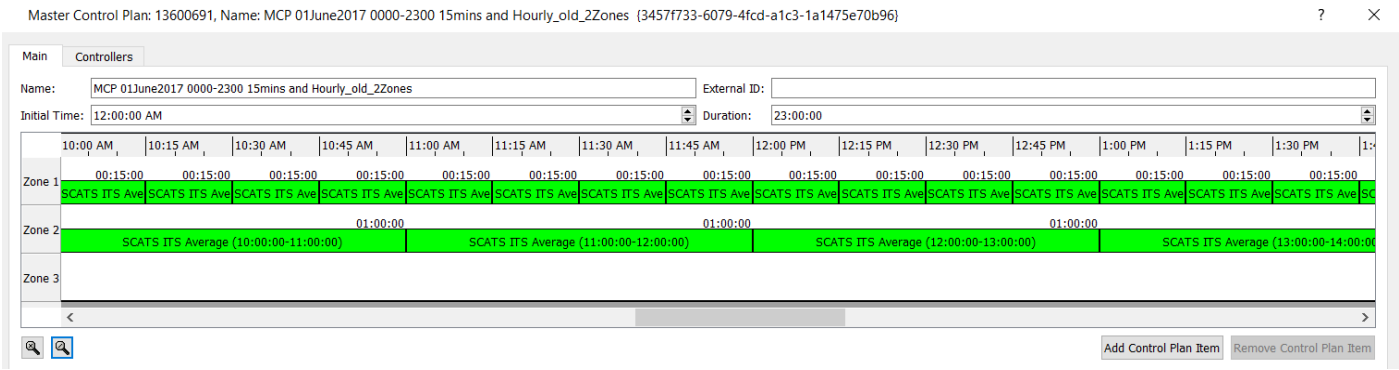
- Interface developed with and certified by RMS
- Available both at meso and micro level
- May require micro pocket in complex intersections
- Internal actuated (NEMA) solution as a proxy

Overview of traffic signals in Aimsun

- Five different node types are available:
  - Uncontrolled – priority intersections
  - Fixed – Predefined fixed CP
  - Actuated - Follows NEMA standards
  - External – Controlled by API
  - Unspecified - no CP defined
- Control plan and master control plan







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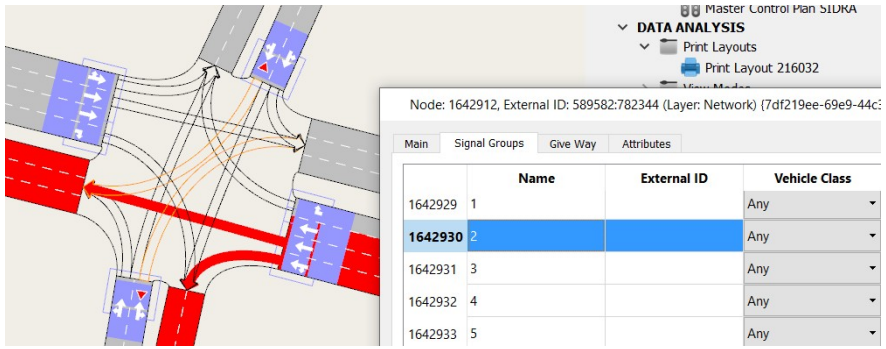
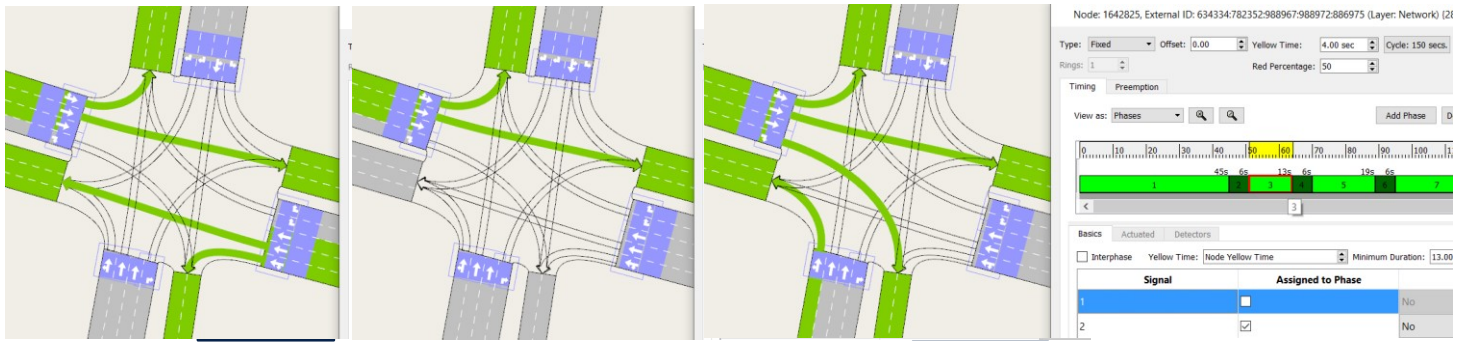
Overview of traffic signals in Aimsun

Few differences with SIDRA

- Signal group
- Red percentage
- Interphase
- Multiple nodes in single CP





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Overview of traffic signals in Aimsun

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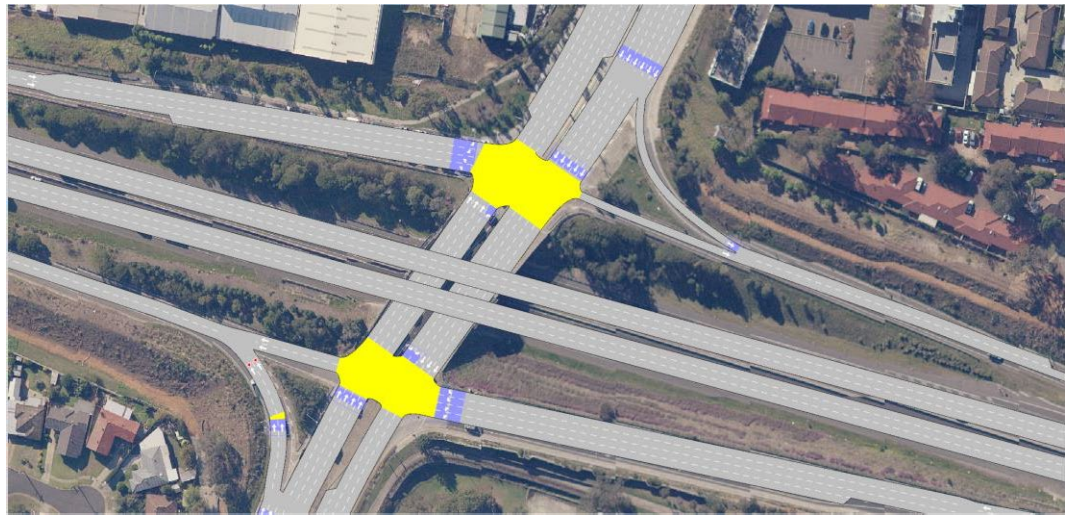

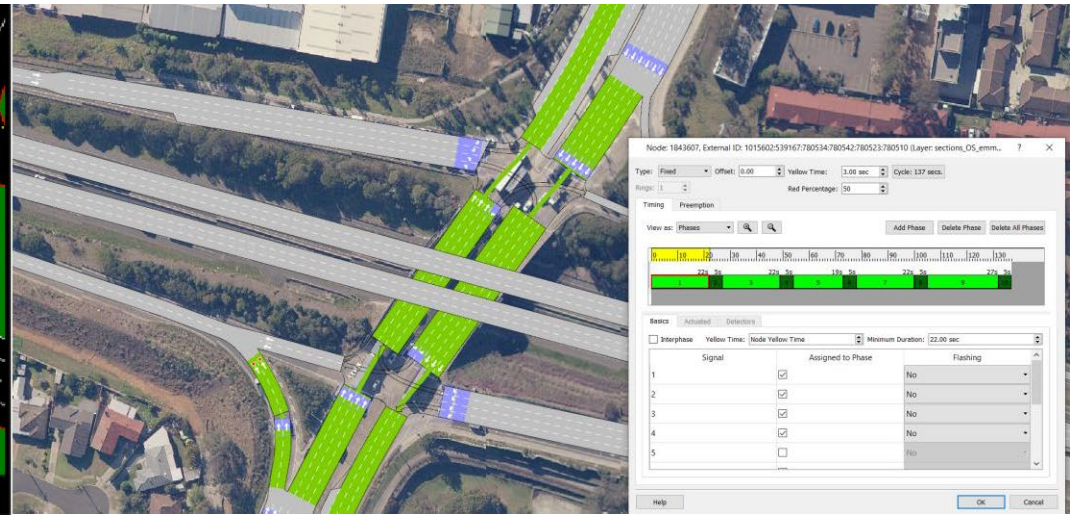

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https://www.youtube.com/watch?v=4ldHpxE1p_A&feature=youtu.be

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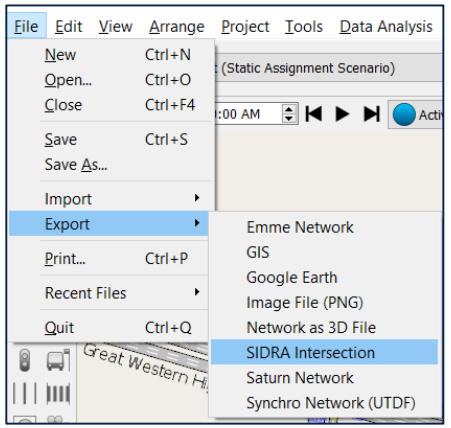
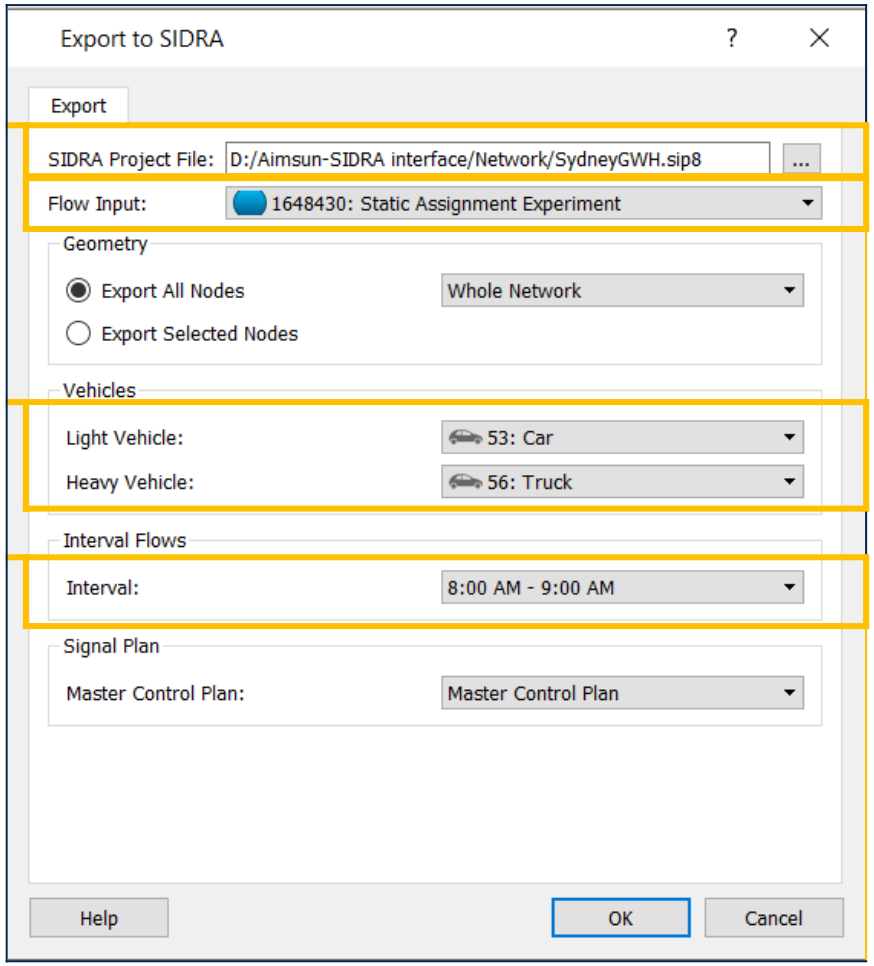
Interface design

Export to SIDRA

Requirements

- Blank SIDRA file
- Simulation result
  - Static experiment
  - Dynamic experiment
    - Mesoscopic
    - Microscopic
- Maximum 20 nodes





Blank SIDRA file

Aimsun Simulation experiment
(generates the demand)

Export all or selected nodes
(Maximum 20 nodes)

Vehicle types available in the demand

Duration of the demand

Signal control plan used

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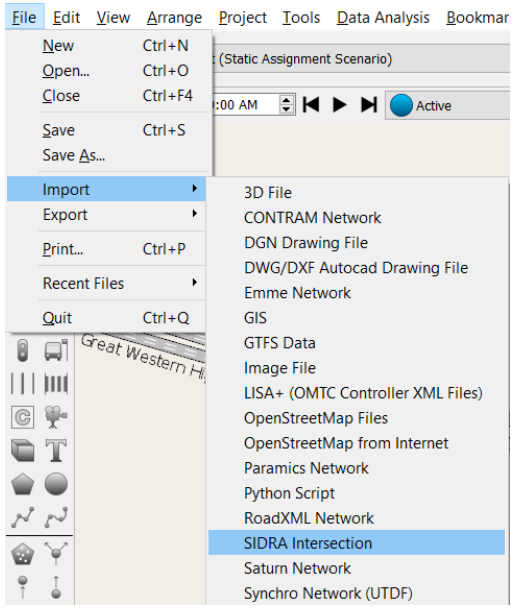
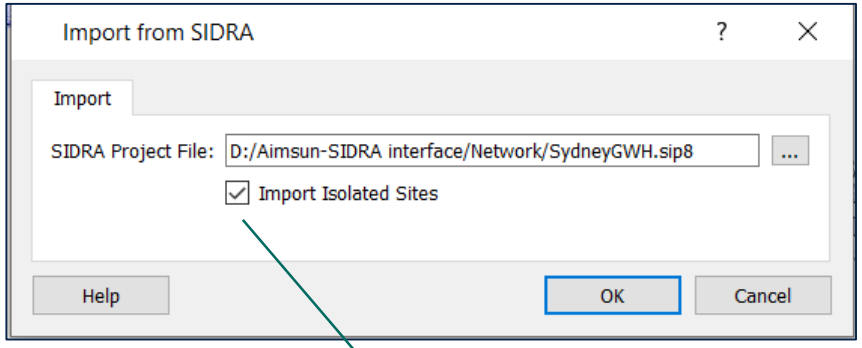
Interface design

Import from SIDRA

Requirements

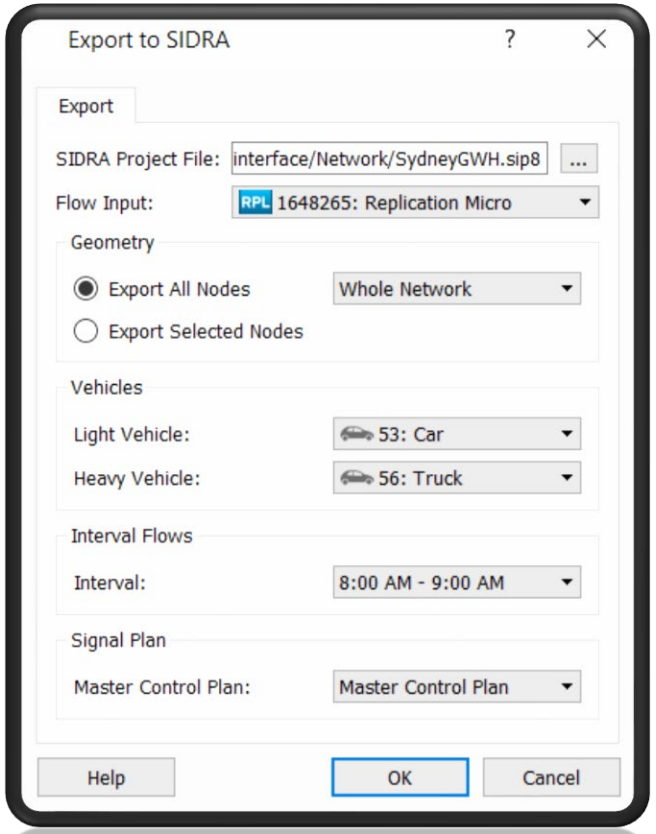
- Same Aimsun network that has been used for export

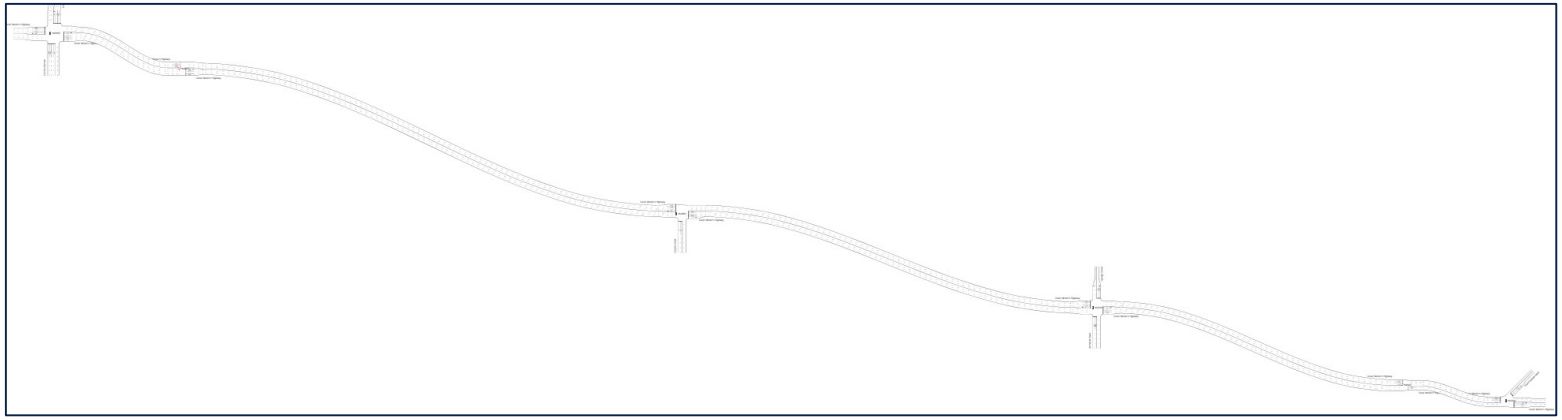




Uncheck if the SIDRA process has been done at Network level

Example from real case





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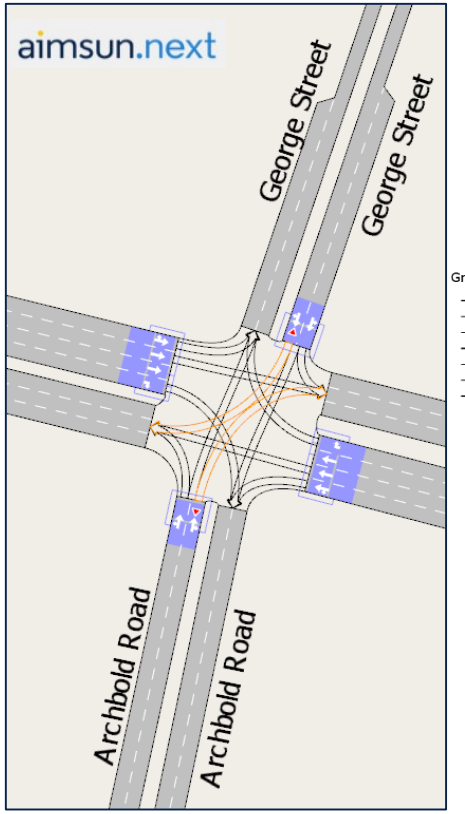
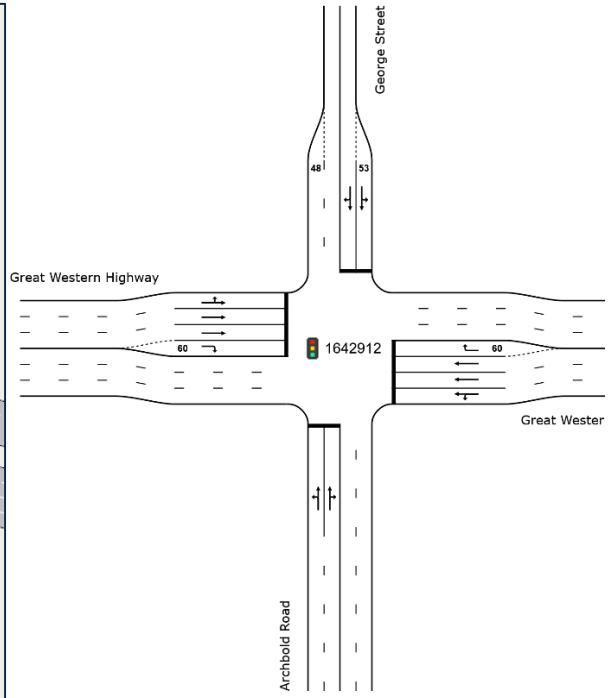
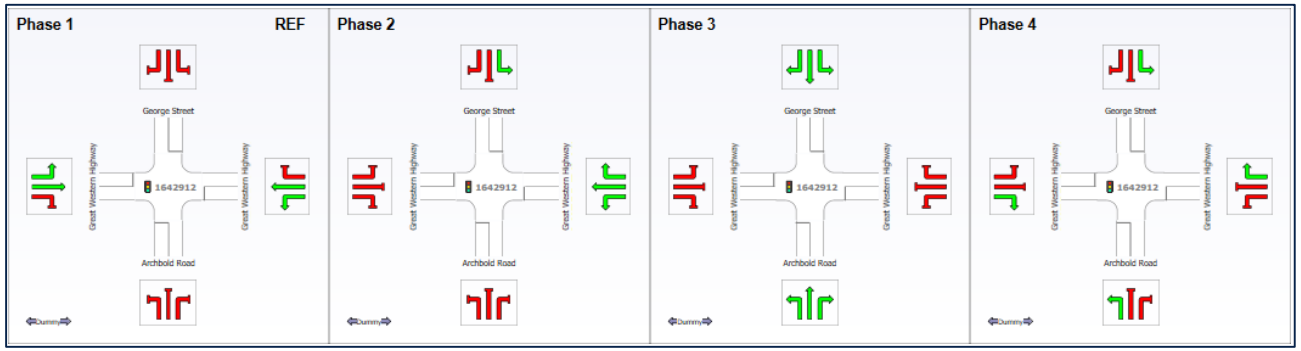
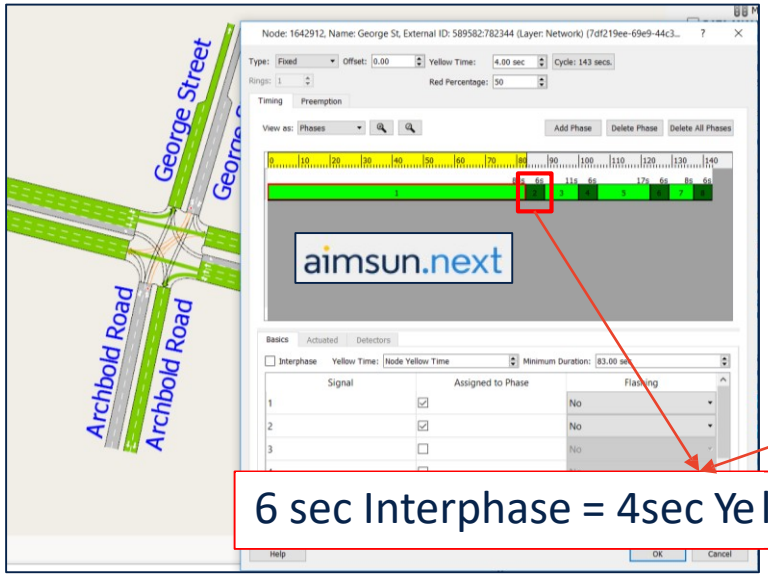
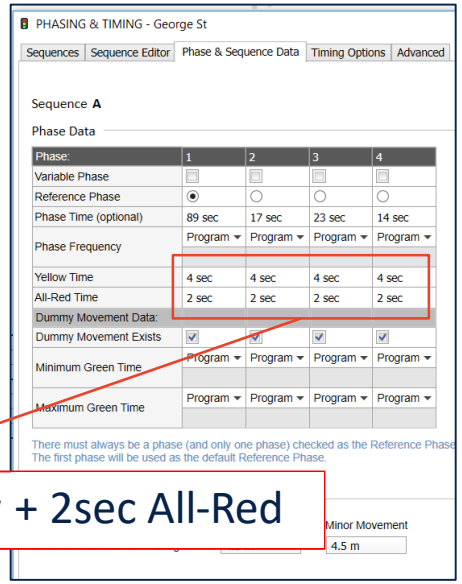
George St. intersection











6 sec Interphase = 4sec Yellow + 2sec All-Red

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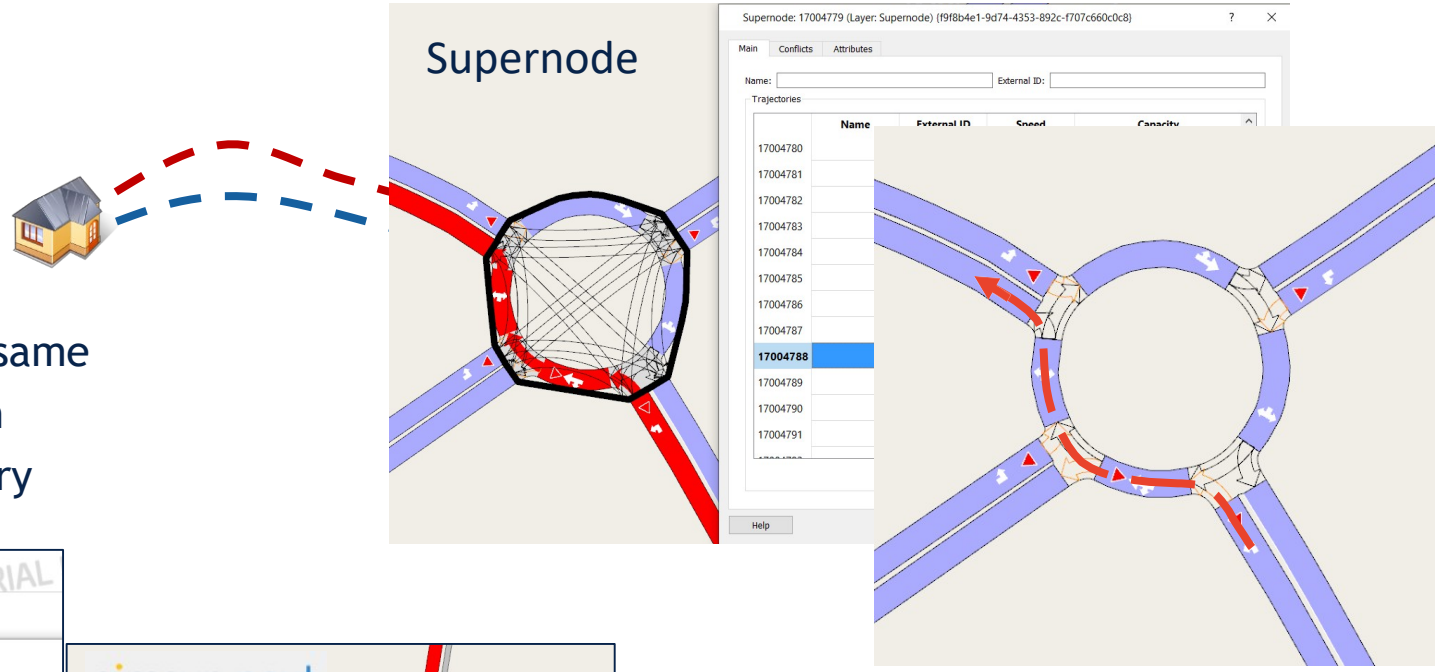
Transfer of traffic volume

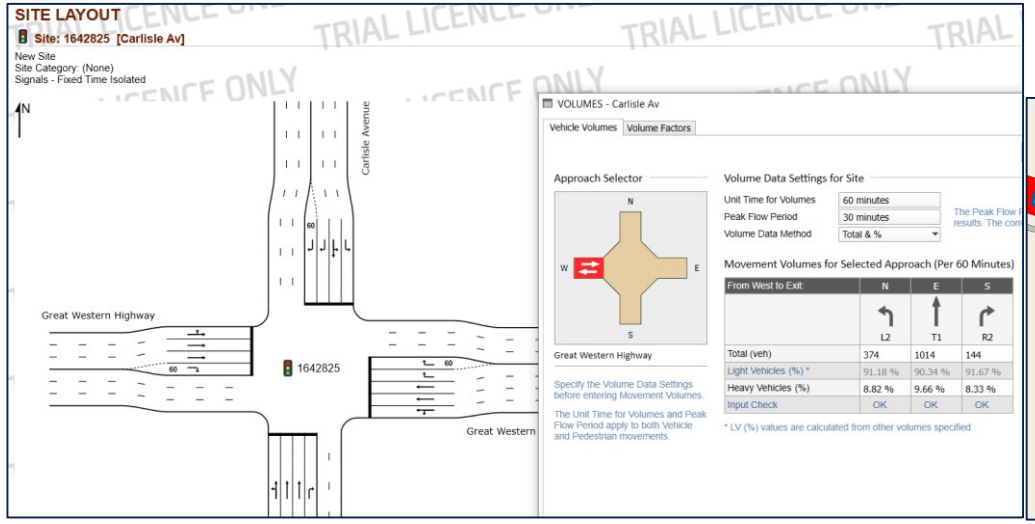
Able to transfer volume from

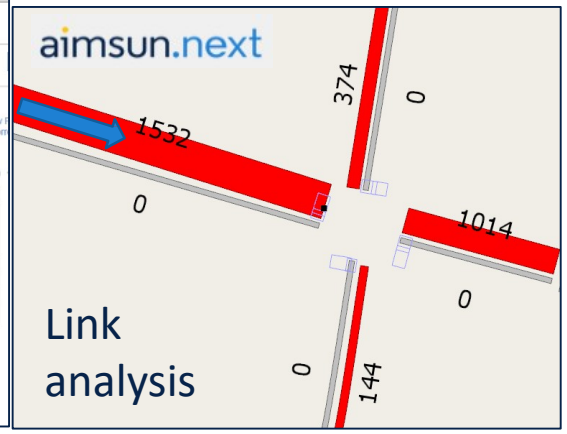
- Equilibrium path file
- Turn counts

Path volume and turn volume may not be exactly same

- How far is the intersection from the origin
- How complicated the intersection geometry







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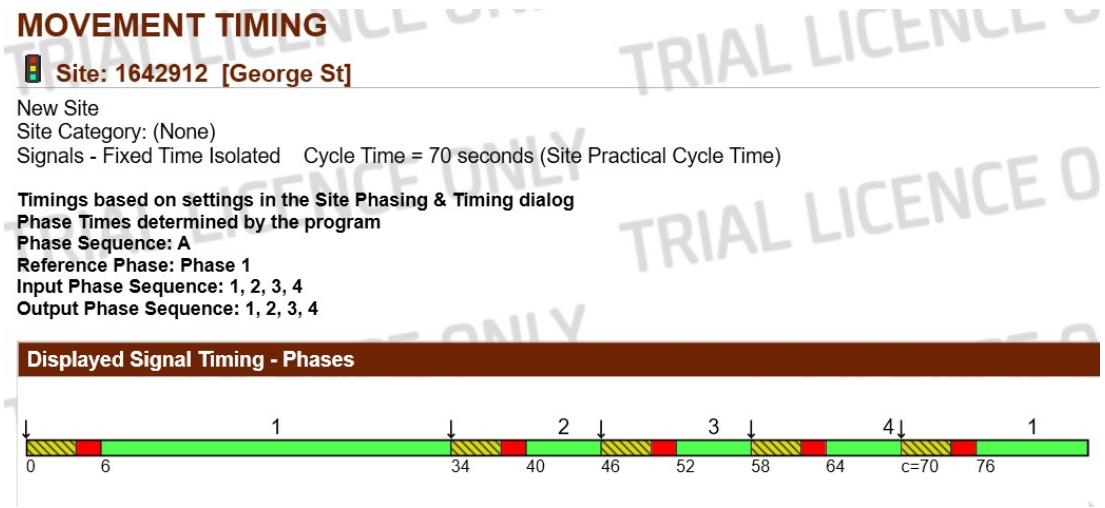
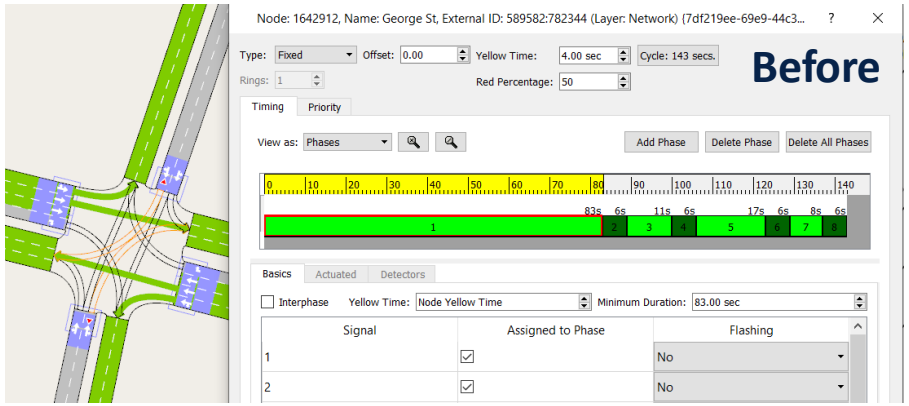
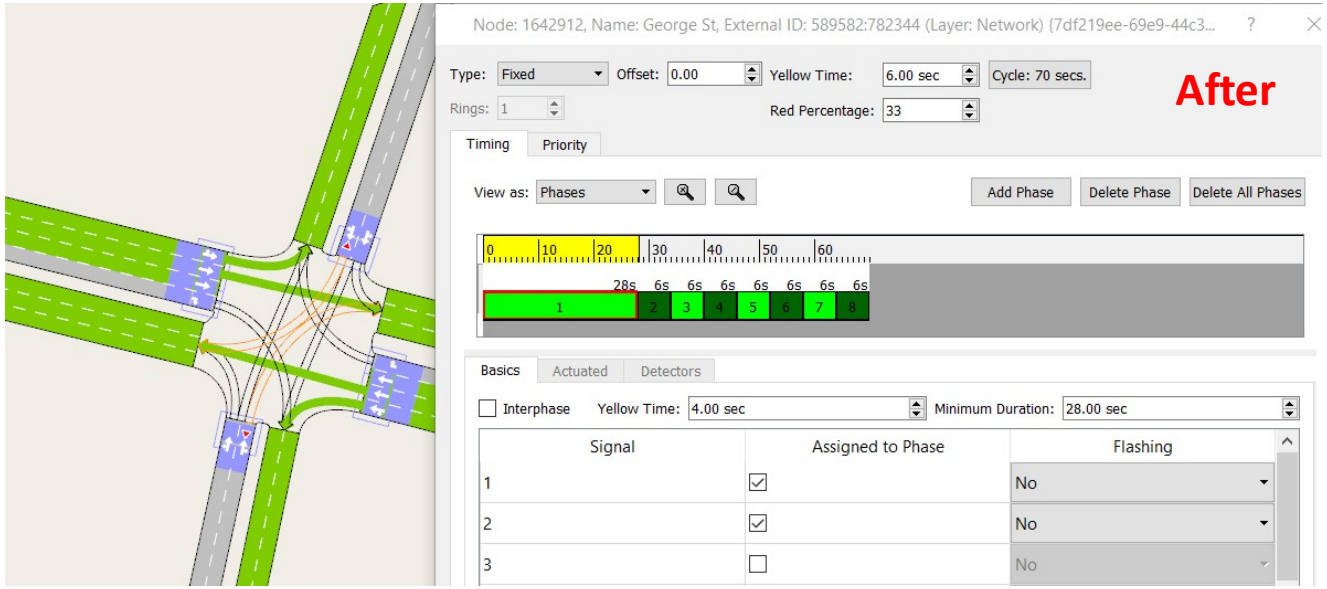
Import Quality (George St. intersection)

- Cycle time has been updated
- Yellow time updated per signal groups
- Interphase time unchanged
- Minimum phase duration updated
- Red percentage needs to be checked
- An interphase has been added in between two phases







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Import Quality (George St. intersection)

MOVEMENT TIMING

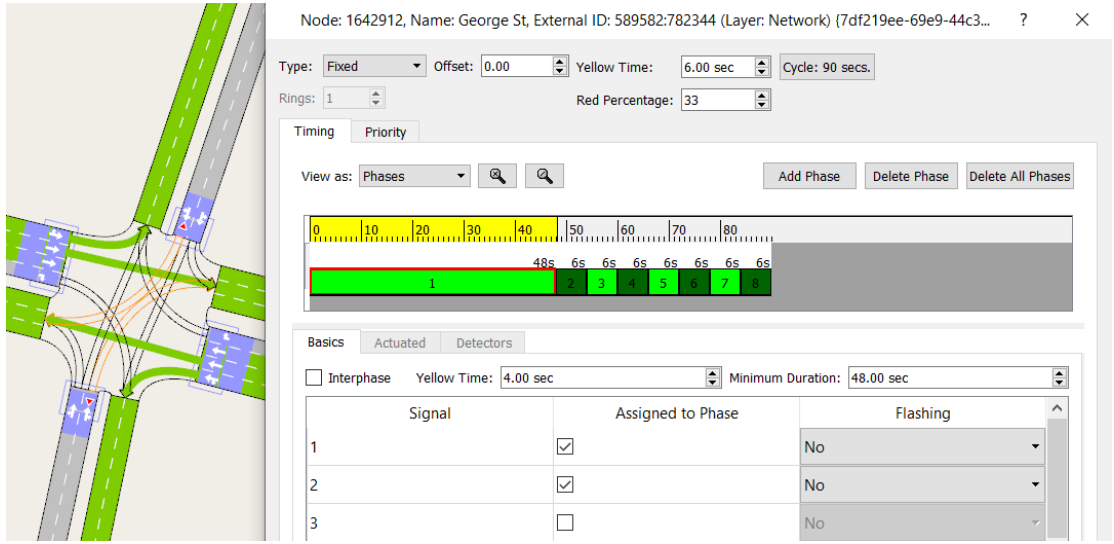
Processed as Network

Site: 1642912 [George St]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 90 seconds (Network Practical Cycle Time)

Timings based on settings in the Network Timing dialog
Phase Times determined by the program
Phase Sequence: A
Reference Phase: Phase 1
Input Phase Sequence: 1, 2, 3, 4
Output Phase Sequence: 1, 2, 3, 4

Displayed Signal Timing - Phases



MOVEMENT TIMING

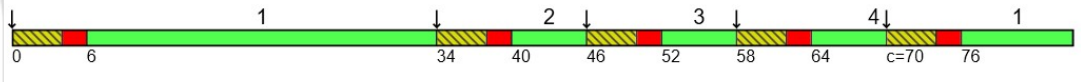
Processed as isolated sites

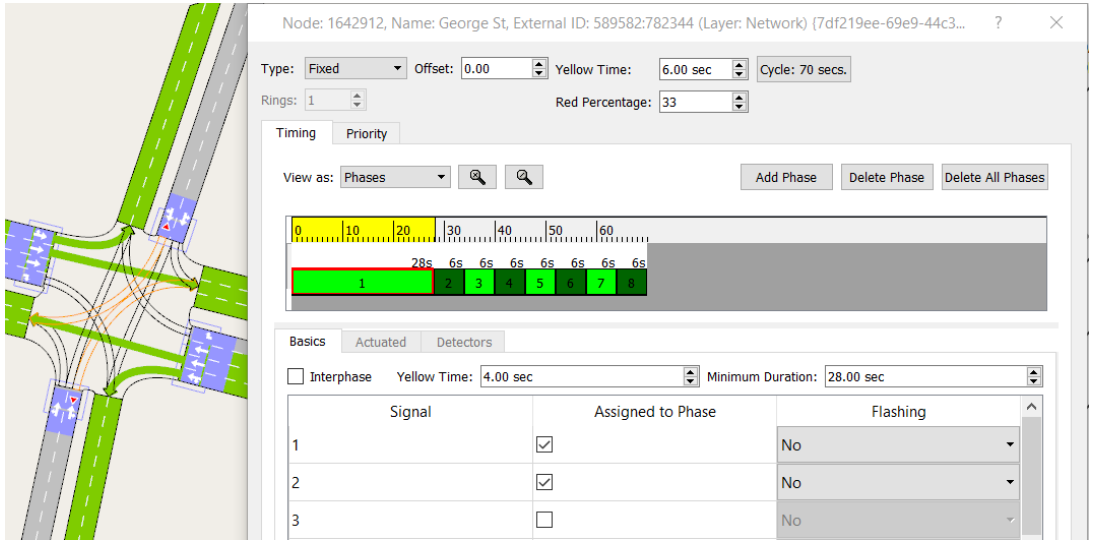
Site: 1642912 [George St]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: A
Reference Phase: Phase 1
Input Phase Sequence: 1, 2, 3, 4
Output Phase Sequence: 1, 2, 3, 4

Displayed Signal Timing - Phases





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Simulation outcome with the new signals

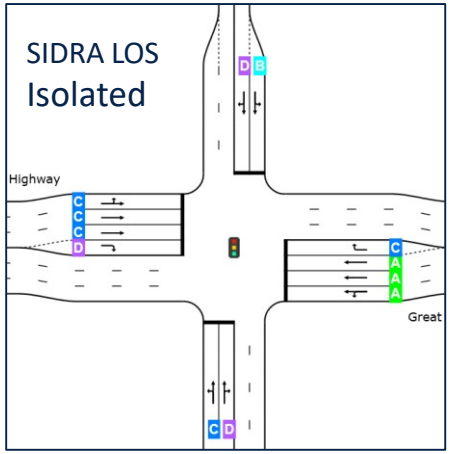
Original – Isolated – Coordinated

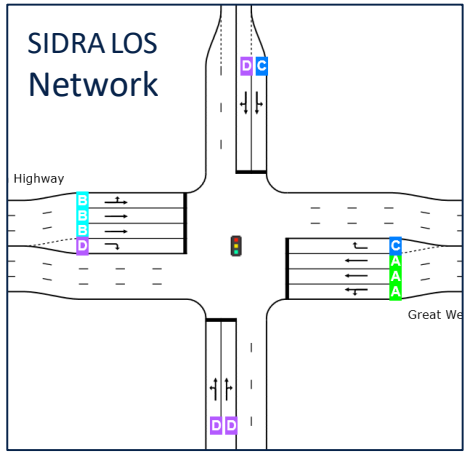
- A quick isolated signal process did not improve the network performance.
- When processed as network in SIDRA (Fixed time coordinated), the new control plan has improved the overall network performance
- 3 out of 4 intersections has improved their LOS and the other remains unchanged

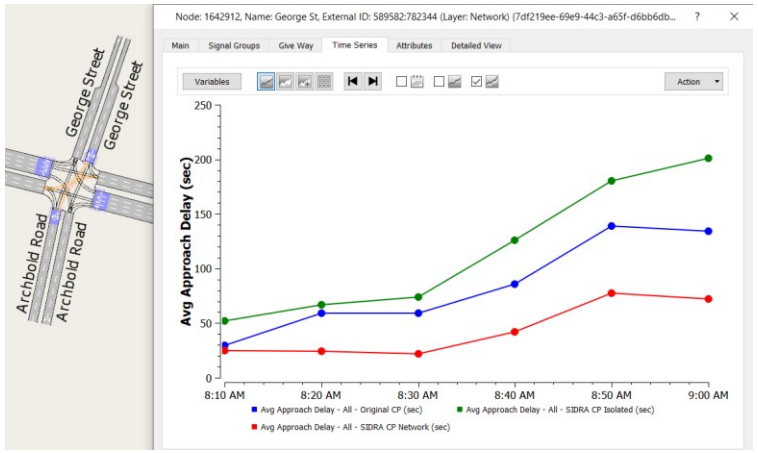
Network performance

	Original CP	SIDRA CP Isolated	SIDRA CP Network	Units
Delay Time	265.2	297.0	224.6	sec/km
Travel Time	314.9	347.2	274.5	sec/km
Mean Queue	241.8	369.0	229.1	veh
Stop Time	234.0	266.5	200.6	sec/km
Density	21.1	29.0	19.8	veh/km
Flow	4188.0	3919.0	4156.0	veh/h
Speed	22.4	21.0	25.9	km/h

George St. intersection







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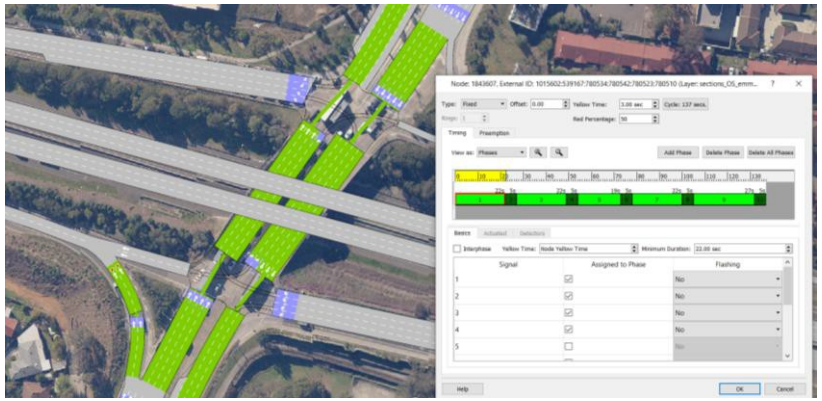
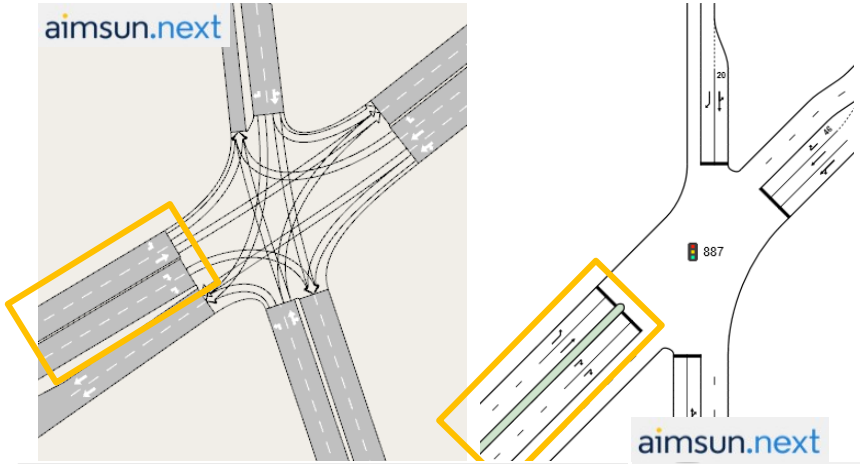
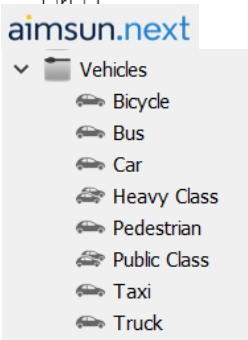
Few complicated issues

- For multiple nodes in a CP
  - Aimsun Next considers them under same control plan
  - SIDRA considers it as two different intersections and process under common control group (CCG) option
- If the approach has multiple section
- Vehicle types
- Start lag
- End gain





From South to Exit:	SW	N	NE
	L3	T1	R1
Total (veh)	142	107	253
Light Vehicles (%) *	98.59 %	92.52 %	77.08 %
Heavy Vehicles (%)	1.41 %	7.48 %	22.92 %
Input Check	OK	OK	OK



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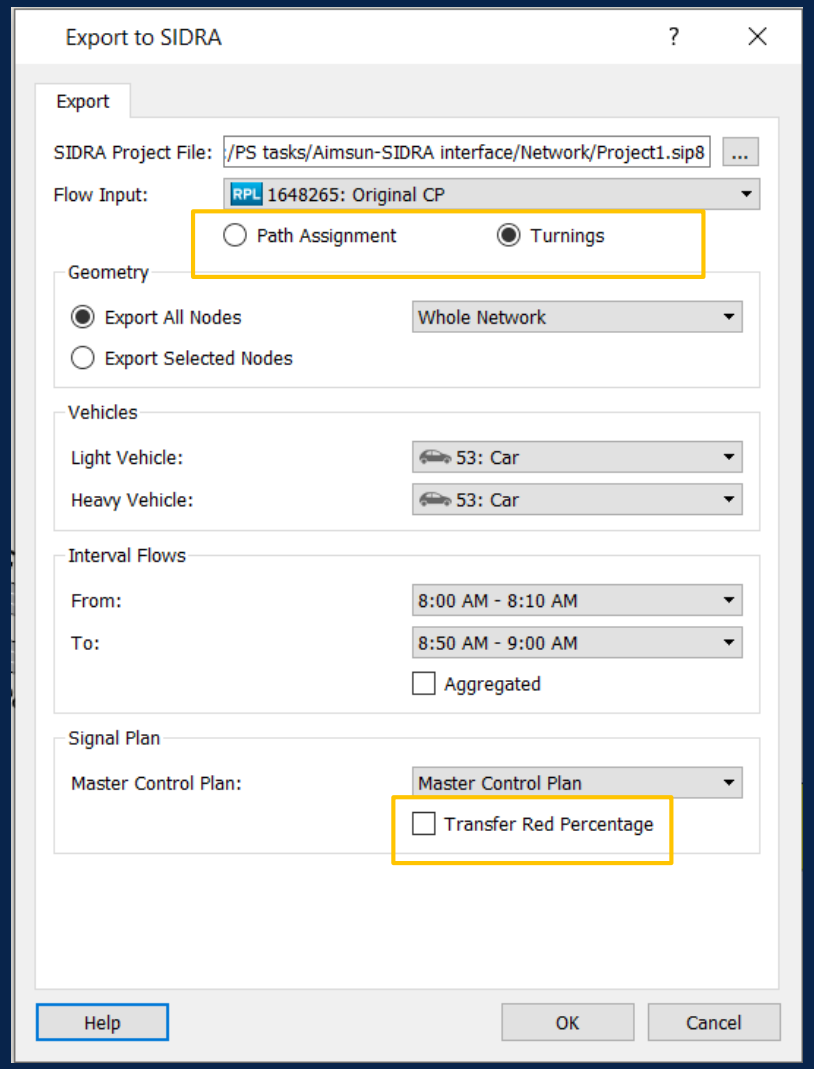
Future works

- Aimsun is open with any suggestions to improve the interface
- Review export/import of complicated intersection geometries
- Option to export red percentage to replace end gain
- Option to get volume from turn counts



Thank you …

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