Appendix 1: NeXTA Data Structure

This document describes all input and output files associated with NeXTA. Each input/output file includes descriptions for all variable names, followed by a short description of their type, purpose, function, interaction with other variables, and the use cases in which the variable is required/not required. Since NeXTA uses DTALite for transportation network analysis, not all variables required as inputs to DTALite are required as inputs for visualization in NeXTA, and not all variables required as inputs to NeXTA are required as inputs to DTALite.

The following diagram describes the general work flow for the NeXTA data hub. The large data structure diagram on the next page shows the relationships between different input tables and their variables.

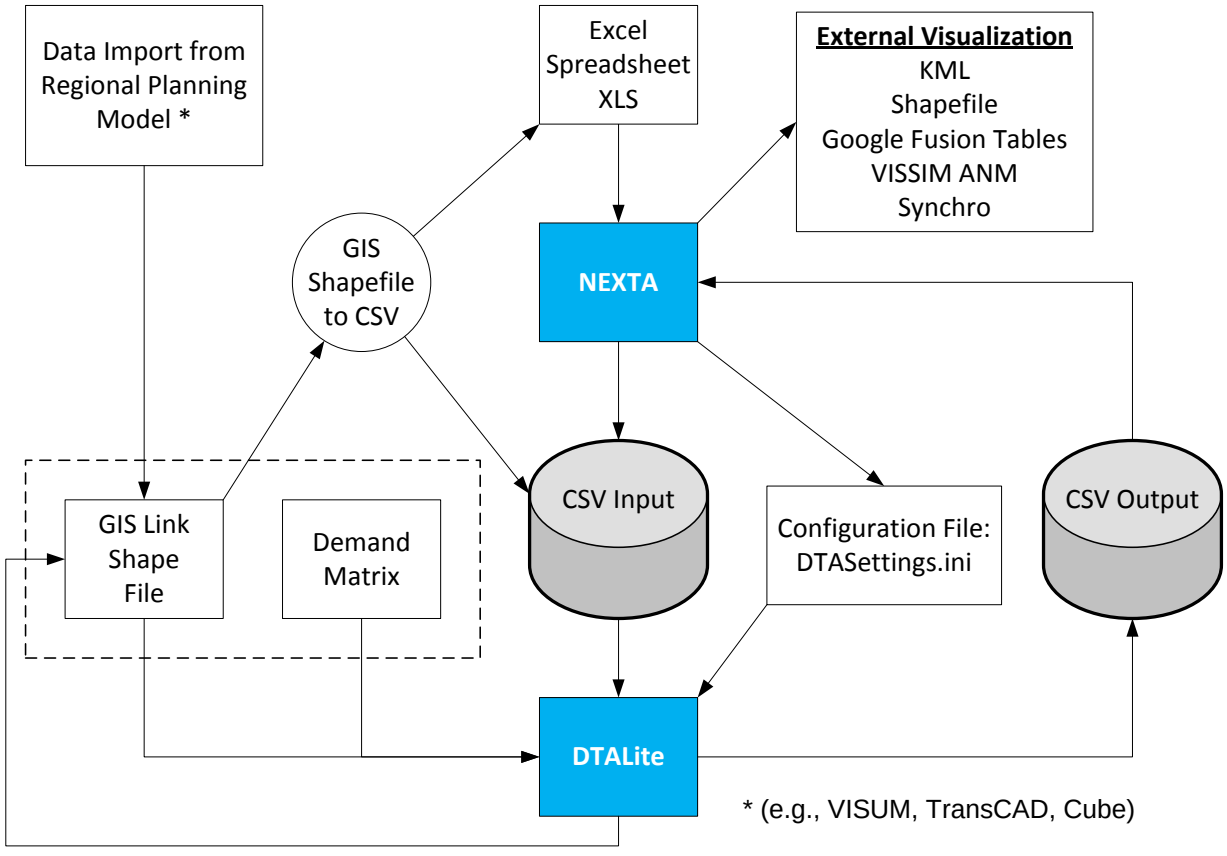


Figure 1: NeXTA/DTALite data input and output work flow diagram

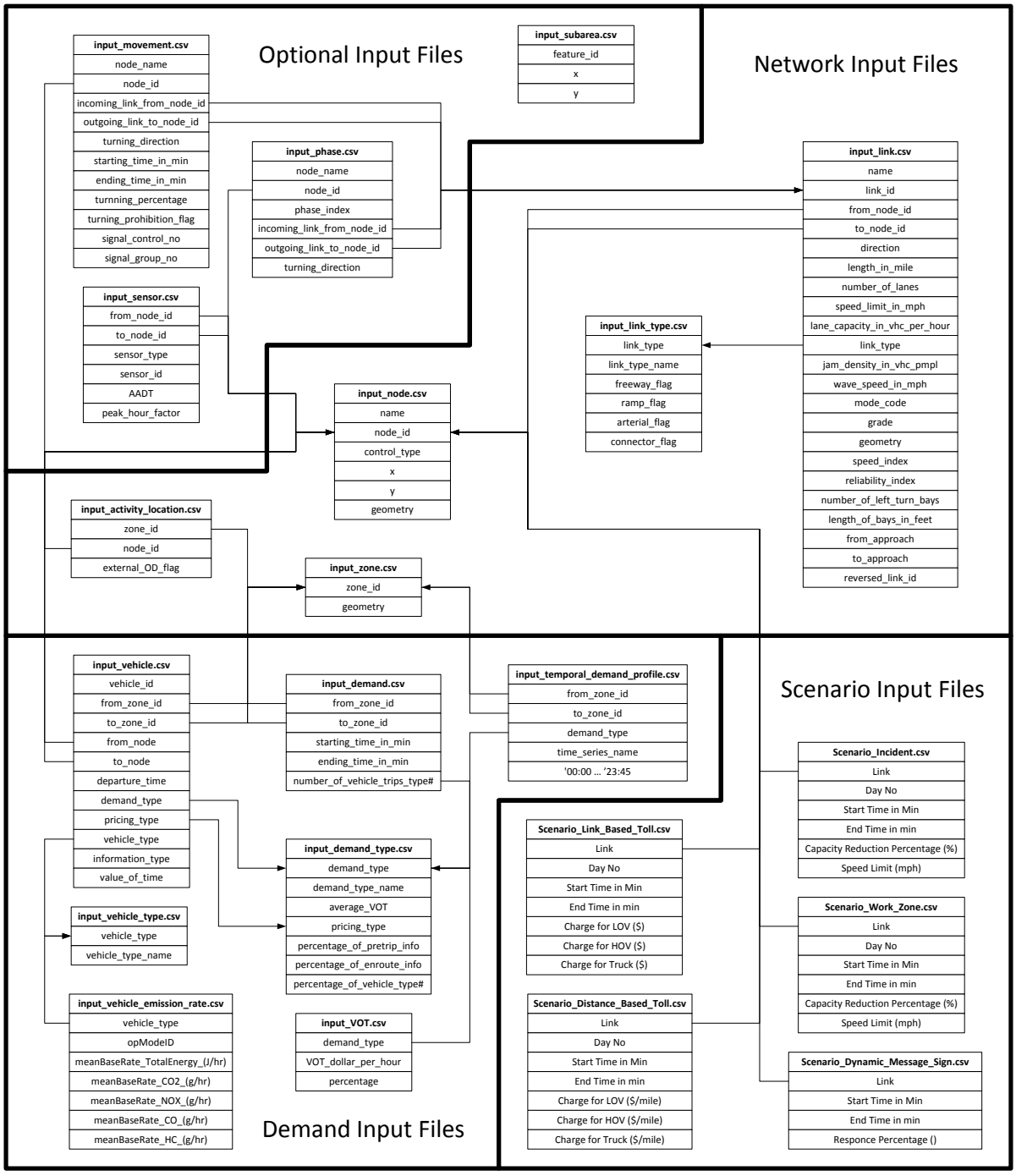


Figure 2: Input data structure diagram

File List

Input Files

File Name	Type	Optional	Description	Editor	Remarks
input_node.csv	Network		Defines all nodes in the network	NeXTA	
input_node_control_type.csv	Network		Definition for the control type of the nodes in the network	Excel	
input_link.csv	Network		Defines all links in the network	NeXTA	
input_link_type.csv	Network		Definition for the link types of the links in the network	Excel	
input_zone.csv	Network		Defines zones in the network; can also be used to visualize zones in KML and Google Fusion Tables.	Excel	
input_activity_location.csv	Demand		Defines how nodes are mapped/connected to zones	NeXTA	
input_movement.csv	Network	X	Defines all turning movements at a node in the network	Excel	
input_phase.csv	Network	X	Defines a phase for signal control at a node in the network	Excel	Not finalized yet
input_pricing_type.csv	Demand		Defines the pricing type in the simulation	Excel	
input_demand_type.csv	Demand		Defines the characteristics for different demand types for the trips in the demand files	Excel	
input_vehicle_type.csv	Demand		Defines different vehicle types for emissions analysis	Excel	
input_VOT.csv	Demand		Defines different VOT distributions for different demand types	Excel	
input_vehicle_emission_rate.csv	Demand		Defines a lookup-table used for emissions analysis	Excel	
input_demand_meta_data.csv	Demand		Defines the characteristics of demand data to be read by DTALite	Excel	
input_MOE_settings.csv	Scenario		Setting of input measures of effectiveness	Excel	
input_scenario_setting.csv	Scenario		Setting of input scenario	Excel	
Scenario_Link_Based_Toll.csv	Scenario	X	Defines the location and characteristics of tolls in the simulation	NeXTA	
Scenario_Work_Zone.csv	Scenario	X	Defines the location and characteristics of work zones in the simulation	NeXTA	
Scenario_Dynamic_Message_Sign.csv	Scenario	X	Defines the location and characteristics of variable message signs in the simulation	NeXTA	
Scenario_Incident.csv	Scenario	X	Defines the location and characteristics of incidents in the simulation	NeXTA	
input_configuration.ini	Importing	X	Defines how NeXTA reads GIS	Text	

			files	Editor	
DTA_settings.txt	DTALite simulation		Simulation settings for DTAlite	Text Editor	
ODME_settings.txt	ODME		Defines the ODME adjustment settings used by DTAlite	Text Editor	
input_sensor.csv	ODME		An optional input used for importing sensor data into NeXTA and DTALite.	Excel	
input_subarea.csv	Subarea cut		Defines a subarea polygon, based on its vertices, for subarea cut	NeXTA	

DTALite Output Files

File Name	Type	Optional	Description	Visualization	Remarks
Output_summary.csv	scenario		contains detailed information about traffic assignment iteration results	Excel	
output_multi_scenario_results	scenario		Contains the simulation results for multi-scenario results	NEXTA	
agent.bin	Vehicle/ agent		A binary version of output_agent.csv file	NEXTA	Binary file to save space, can be renamed as input_agent. bin file as vehicle/path input into DTALite
Output_agent.csv	Vehicle/ agent		shows the specific information of each agent in the simulation network	NEXTA	CSV file for better data processing
Output_ODMOE.csv	OD		Contains ODMOE simulation results	NEXTA	
Output_pathMOE.csv	Path		Contains the specific information of path MOE	NEXTA	Not output due to space limit
output_NetworkTDMOE.csv	network		contains time-dependent, network-level information about assignment iteration results over the modeling horizon	Excel	
Output_linkMOE.csv	network		contains detailed results from the simulation aggregated at each	NEXTA	

			link		
Output_linkTDMOE.csv	network		contains less detailed results from the simulation, aggregated at each link.	NEXTA	
output_MovementMOE.csv	network		describes the MOE information of movement	Excel	When there are movement input
output_vehicle_emission_MOE_summary.csv	network		describes all results from emissions post-processing	NEXTA	When there are movement input

NeXTA Export Files

File Name	Type	Optional	Description	Visualization	Remark
AMS_OD_table.csv	Subarea cut		outputs the OD time span volume.	Excel	
AMS_path_flow.csv	Subarea cut		Outputs the path flow	NEXTA	
AMS_movement.csv	Subarea cut		outputs the number of vehicles making movements in the intersections	Excel	
AMS_link shape files (dbf, shp)	network		For GIS visualization	GIS Editor	
AMS_link.kml	exporting		For Google Earth visualization	Google Earth & Google Fusion tables	
output_travel_time_matrix.csv	network		Outputs the zone-to-zone travel time matrix	Excel	
UTDF files	exporting		Files generated during Synchro exports	Synchro	
VISSIM ANM files	exporting		Files generated during VISSIM exports	VISSIM	

Input Files

The following tables describe the input files used in NeXTA and DTALite. Most tables can be defined as either essential input data (indicated by **Essential input data** label) or nonessential input data, while individual variables (columns) in each table may also be considered as optional variables.

1. Network Input Files

Network input files define the basic node-link structure used in DTALite and NeXTA, along with attributes for each link and node. Additionally, nodes are related to zones and activity locations, which can be used to disaggregate trips from zones to nodes and activity locations.

input_node.csv [Essential input data]

The input_node table defines the nodes in the network in terms of names, ID numbers, location/position, and characteristics.

Table 1: input_node.csv

Variable Name	Type	Optional	Acceptable Values/ Example Usage	Description	Defined in Table
name	String	X		Optional: Name label given to node for KML visualization, not currently used in NeXTA	
node_id	Integer		Value > 0	Node identification number	
control_type	Integer		Value > 0	Intersection control type, consistent with DYNASMART-P control type format. Not currently used in DTALite.	input_node_control_type.csv
control_type_name	String	X		Optional: The text name corresponding to the control type number in the control_type field.	
cycle_length_in_second	Integer	X	Value ≥ 0	Optional: The signal cycle length (time between the beginning of the green time) for a specific node	
signal_offset_in_second	Integer	X	Value ≥ 0		
x	Double		-111.979363	Longitude: Horizontal coordinate component used to identify node location in NeXTA. Not required to be longitude as defined by WGS84 geographic coordinate system.	
y	Double		40.781431	Latitude: Vertical coordinate component used to identify node location in NeXTA. Not required to be latitude as defined by WGS84 geographic coordinate system.	
geometry	String	X	<Point><coordinates>-111.979363,40.781431</coordinates></	Optional: Text string used to describe node location for KML visualization (in WGS84 geographic coordinate system). Can be prepared automatically in NeXTA from	

			Point>	input X and Y coordinates.	

Example from 6-node Network:

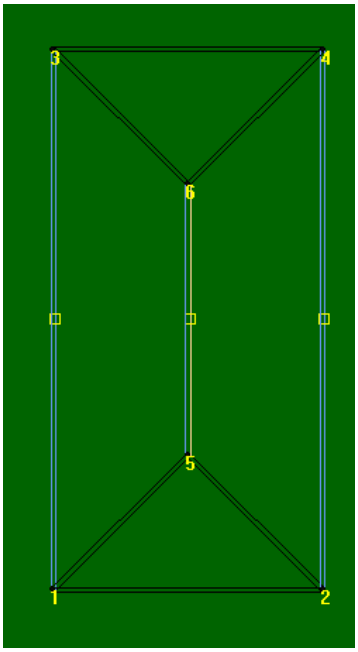
name	node_id	control_ty	control_ty	cycle_len	signal_off	x	y	geometry
	1	0	unknown_	0	0	0	0	
	2	0	unknown_	0	0	1.8314	0	
	3	0	unknown_	0	0	0	3.6628	
	4	0	unknown_	0	0	1.8314	3.6628	
	5	0	unknown_	0	0	0.9157	0.9157	
	6	0	unknown_	0	0	0.9157	2.7471	

input_node_control_type.csv [Essential input data]

The input_node_control_type table defines the control type of nodes in the network in terms of control type name, unknown control, no control, yield sign, 2way stop sign, 4way stop sign, pretimed signal, actuated signal and roundabout. This file is required when using the network import tool, and the control type field is read from the node shape file.

Variable Name	Type	Optional	Acceptable Values/ Example Usage	Description
control_type_name	String		control_type	
unknown_control	Integer		0	
no_control	Integer		1	
yield_sign	Integer		2	
2way_stop_sign	Integer		3	
4way_stop_sign	Integer		4	
pretimed_signal	Integer		5	
actuated_signal	Integer		6	
roundabout	Integer		100	

Example from 6-node Network:



control_ty	unknown_	no_contrc	yield_sign	2way_stop	4way_stop	pretimed_	actuated_	roundabout
control_ty	0	1	2	3	4	5	6	100

input_link.csv [Essential input data]

The input_link table defines all links in the network, along with their corresponding characteristics and traffic flow model input data. Several optional fields are included for generating/converting networks for use with microscopic simulation (e.g., VISSIM).

Variable Name	Type	Optional	Acceptable Values	Description	Defined in Table
name	String	X		Optional: Name label assigned to link in current row, used for visualization purposes in NeXTA and KML export	
link_id	Integer		Value > 0	Link identification number	
from_node_id	Integer		Value > 0	Identification number corresponding to the node located at the beginning of the link	(input_node.csv)
to_node_id	Integer		Value > 0	Identification number corresponding to the node located at the end of the link	(input_node.csv)
link_type_name	String	X			
direction	Integer		1 = default one-way link (From_Node -> To_Node) ; -1 = reverse direction (To_Node -> From_Node); 0 = Two-way link 2 = Two-way link	Identifies the direction of travel on the link. When -1, NeXTA reverses from_node_id and to_node_id for correct orientation. When 0 or 2, NeXTA automatically converts link into two one-way links.	

length_in_mile	Double		Value ≥ 0.00001	The length of the link (between end nodes), measured in units of miles.	
number_of_lanes	Integer		Value > 0	The number of lanes on the link	
speed_limit_in_mph	Integer		Value > 0 mph	Speed limit on defined link in units of miles per hour, used to define the free-flow speed. Zero values in table default to 5 mph in import function.	
saturation_flow_rate_in_vhc_per_hour_per_lane	Double		Value ≥ 0		
lane_capacity_in_vhc_per_hour	Double		Value ≥ 0	Maximum service flow rate for each lane on the link, in vehicles per hour. Used in BPR Function.	
link_type	Integer		Value > 0	Link type identification number, corresponding to link class (freeway, ramps, etc.)	(input_link_type.csv)
jam_density_in_vhc_pmpl	Double		Default = 180 vphpl	Jam density (in vehicles per mile per lane), input for traffic flow model in DTALite	
wave_speed_in_mph	Double		Default = 12 mph	Backward wave speed in miles per hour, input in traffic flow model to define the vehicle storage space on a link	
effective_green_time_length_in_second		X	Value ≥ 0		
green_start_time_in_second		X	Value ≥ 0		
AADT_conversion_factor		X	Default = 0.1		
mode_code	String	X		Optional: Indicates which types of traffic (transit, pedestrian, car, etc.) can use a link	
grade	Float	X		Optional: Roadway grade	
geometry	String	X	<LineString><coordinates>4165.673828,23656.343750,0.0 5207.092773,23656.343750,0.0</coordinates></LineString>	Optional: Text string used to describe link shape and location for KML visualization (in WGS84 geographic coordinate system). Can be prepared automatically in NeXTA.	
KML_green_height		X	Value ≥ 0		
KML_red_height		X	Value ≥ 0		
KML_blue_height		X	Value ≥ 0		
KML_yellow_leigh		X	Value ≥ 0		
number_of_left	Integer	X	Value ≥ 0	Optional: The number of left turn bays	

_turn_bays				on the link	
length_of_bays_in_feet	Double	X	Value ≥ 0	Optional: Length of the left turn bays on the link, in units of feet	
left_turn_capacity_in_veh_per_hour		X	Value ≥ 0		
from_approach	String	X	N = North, S = South, E = East, W = West	Optional: Indicates the direction from which vehicles enter the link. Generated by NeXTA for microscopic simulation (e.g., VISSIM)	
to_approach	String	X	N = North, S = South, E = East, W = West	Optional: Indicates the direction in which vehicles leave the link, which is the opposite direction of from_approach. Generated by NeXTA for microscopic simulation (e.g., VISSIM)	
reversed_link_id	Integer	X	Value > 0	Optional: Identifies the link ID for the link between the same two nodes, but with opposite travel direction. Generated by NeXTA for microscopic simulation (e.g., VISSIM)	

Example from 6-node Network:

name	link_id	from_nod	to_node_i	direction	length_in	number_c	speed_lin	saturation_flow_ra
(null)	0	1	2	1	2	2	35	2000
(null)	0	1	3	1	4	2	45	2000
(null)	0	1	5	1	1	4	35	2000
(null)	0	2	1	1	2	2	35	2000
(null)	0	2	4	1	4	2	45	2000
(null)	0	2	5	1	1	2	35	2000
(null)	0	3	1	1	4	2	45	2000
(null)	0	3	4	1	2	2	35	2000
(null)	0	3	6	1	1	2	35	2000
(null)	0	4	2	1	4	2	45	2000
(null)	0	4	3	1	2	2	35	2000

link_type	jam_dens	wave_spe	mode_code	grade	geometry
4	120	12			<LineString><coordinates>0.000000,-0.015151,0.0 1.831400,
2	120	12			<LineString><coordinates>0.015151,0.000000,0.0 0.015151,3
4	120	12			<LineString><coordinates>0.010714,-0.010714,0.0 0.926414,
4	120	12			<LineString><coordinates>1.831400,0.015151,0.0 -0.000000,
2	120	12			<LineString><coordinates>1.846551,0.000000,0.0 1.846551,3
4	120	12			<LineString><coordinates>1.842114,0.010714,0.0 0.926414,0
2	120	12			<LineString><coordinates>-0.015151,3.662800,0.0 -0.015151
4	120	12			<LineString><coordinates>0.000000,3.647649,0.0 1.831400,3
4	120	12			<LineString><coordinates>-0.010714,3.652086,0.0 0.904986,
2	120	12			<LineString><coordinates>1.816249,3.662800,0.0 1.816249,-
4	120	12			<LineString><coordinates>1.831400,3.677951,0.0 -0.000000,

input_link_type.csv [Essential input data]

The input_link_type table allows users to define their own specific link types, as long as the flag variables are correctly used to identify how the different link types are connected/related (e.g., freeways connect to arterials using ramps). Only one flag may be used for each link type. Link types can

also be used to determine how links are visualized in NeXTA. This file is required when using the network import tool to interpret the link type field in the link shape file.

Variable Name	Type	Optional	Acceptable Values	Description
link_type	Integer		Value > 0	Link type identification number
link_type_name	String	X		Optional: Name label assigned to link type in the same row, used for visualization purposes in NeXTA
type_code	Char		f, h, a, c, r, t, w	A text character which identifies which type of link is mapped to the link type identification number. f = freeway, h = highway/expressway, a = arterial, c = connector, r = ramp, t = transit, w = walk
default_lane_capacity	Integer		Value ≥ 0	The lane capacity assigned by default to new links created in NeXTA.

Twelve (12) link types are defined by default, as shown below, but they can be modified to suit individual uses.

link_type	link_type_name	type_code	default_lane_capacity
1	Freeway	f	1000
2	Highway/Expressway	h	1000
3	Principal arterial	a	1000
4	Major arterial	a	1000
5	Minor arterial	a	1000
6	Collector	a	1000
7	Local	a	1000
8	Frontage road	a	1000
9	Ramp	r	1000
10	Zonal Connector	c	1000
100	Transit Link	t	1000
200	Walking Link	w	1000

input_zone.csv [Essential input data]

The input_zone table, in the current version, defines zones in the network, but it is also used to visualize zones in KML and Google Fusion Tables. Previous versions used a node_id field to map nodes to zones, an essential component which is now performed in the input_activity_location table.

Variable Name	Type	Optional	Acceptable Values/ Example Usage	Description
zone_id	Integer		Value > 0	Zone identification number
production				
attraction				
color_code				
height				

notes				
geometry	String	X	<Polygon><outerBoundaryIs><LinearRing><coordinates>-111.907241,40.802401,0.0 -111.870550,40.789266,0.0 -111.822437,40.768850,0.0 -111.907241,40.802401,0.0<coordinates></LinearRing></outerBoundaryIs></Polygon>"	Optional: Text string used to describe zone location for KML visualization (in WGS84 geographic coordinate system).

Example from 6-node Network:

zone_id	productio	attraction	color_cod	height	notes	geometry
1						<Polygon><outerBoundaryIs><LinearRing><coordinates>-0.59300,0.66112,0.0 0.3240
2						<Polygon><outerBoundaryIs><LinearRing><coordinates>1.30652,0.39257,0.0 2.29558
3						<Polygon><outerBoundaryIs><LinearRing><coordinates>-0.59300,4.06716,0.0 0.4746
4						<Polygon><outerBoundaryIs><LinearRing><coordinates>1.03797,4.19161,0.0 2.36108

input_activity_location.csv [Essential input data]

The input_activity_location table is used to map nodes to zones, where multiple nodes may be associated with a zone (many nodes, one zone).

Variable Name	Type	Optional	Acceptable Values	Description	Defined in Table
zone_id	Integer		Value > 0	Zone identification number	(input_zone.csv)
node_id	Integer		Value > 0	Node identification number associated with the zone identification number in the same row	(input_node.csv)
external_OD_flag	Integer		0 = land use activity 1 = external origin -1 = external destination	Used to identify the type of activity location as non-external (default = 0) or external (-1 or 1). When 0, acts as both origin and destination.	

Example from Salt Lake City Network:

zone_id	node_id	external_OD_flag
1	795	0
1	9782	0

2. Demand Input Files

Demand files are DTALite traffic assignment input files which describe the number of trips between zones or nodes. They are necessary when using NeXTA for analysis, but not necessary when NeXTA is used only for visualization. There are three different ways to describe the demand inputs: 1) Demand table with starting time and ending time, 2) Demand table with time-dependent profile, and 3) Input vehicle file. Methods 1 and 2 will generate vehicles in the network based on the time period information provided. When a higher-resolution temporal demand profile table exists, DTALite ignores the time information provided in the demand table. The vehicle table describes all vehicle trips in the network, allowing the user to provide very detailed trip information, but it also allows DTALite to skip generating vehicles in the network.

input_demand.csv

The input_demand table represents the time-dependent origin-destination matrix used by DTALite for traffic assignment (as an alternative to using temporal demand information). It can be visualized in NeXTA, but is not necessary for using NeXTA.

Variable Name	Type	Optional	Acceptable Values	Description	Defined in Table
from_zone_id	Integer		Value > 0	Departure zone identification number	(input_zone.csv)
to_zone_id	Integer		Value > 0	Arrival zone identification number	(input_zone.csv)
number_of_vehicle_trips_type1	Float		Value ≥ 0	Number of vehicle trips for demand type 1	(input_demand_type.csv)
number_of_vehicle_trips_type2	Float		Value ≥ 0	Number of vehicle trips for demand type 2	(input_demand_type.csv)
number_of_vehicle_trips_type3	Float		Value ≥ 0	Number of vehicle trips for demand type 3	(input_demand_type.csv)
number_of_vehicle_trips_type#	Float	X	Value ≥ 0	Number of vehicle trips for demand type # defined by user	(input_demand_type.csv)

Example from 6-node Network:

from_zon	to_zone_i	number_c	number_c	number_of_vehicle_trips_type3		
1	4	8000	0	0		

input_demand_meta_data.csv

The input_demand_meta data table is used to define the characteristics of demand data.

The input_temporal_demand_profile table is used to define the proportion of demand in the network as a function of time, which is used to initiate trips in the simulation over the modeling horizon. This table can be used to supplement information in the input_demand table, where DTALite will use the temporal demand profile information in place of other time information.

Variable Name	Type	Optional	Acceptable Values	Description	Defined in Table
scenario_no	Integer		Value ≥ 0	Scenario identification number	input_sce

					nario_settings.csv
file_sequence_no	Integer		Value > 0	File identification number	
file_name	string		demand.dat	Name of demand file	
format_type	string		dynasmart, column, matrix, agent_csv, agent_bin	Input file format type	
number_of_lines_to_be_skipped	Integer		Value ≥ 0	The number of lines to be skipped at the beginning of demand file	
loading_multiplier	float		Value > 0	Local multiplication factor applied to the number of trips in the demand file	
start_time_in_min	Integer		0 to 1440	Demand loading start time, which is the time gap in min from 0:00	
end_time_in_min	Integer		0 to 1440	Demand loading end time, which is the time gap in min from 0:00	
apply_additional_time_dependent_profile	bool		0 or 1	0: not use the time dependent profile in this table 1: use the time dependent profile in this table	
subtotal_in_last_column	bool		0 or 1	flag used for subtotal in last column of matrix demand file	
number_of_demand_types	Integer		Value ≥ 1	Number of demand types stored in demand file	
demand_type_1	Integer		Value ≥ 1		
demand_type_2	Integer		Value ≥ 1		
demand_type_3	Integer		Value ≥ 1		
demand_type_4	Integer		Value ≥ 1		
'00:00	Double		0 to 1	Proportion of demand in specified time interval compared to 24-hour time period	
'00:15	Double		0 to 1	Proportion of demand in specified time interval compared to 24-hour time period	
…					
'23:45	Double		0 to 1	Proportion of demand in specified time interval compared to 24-hour time period	

input_demand_type.csv

The input_demand_type table is used to define the characteristics for different demand types for the trips in the input_demand table. There are three different demand types by default (1 = SOV, 2 = HOV, 3 = Trucks), but additional types can be defined in the table (e.g., trip purpose – HBW, HBO, etc.).

Variable Name	Type	Optional	Acceptable	Description	Defined in

			Values		Table
demand_type	Integer		Value > 0	Demand type identification number	
demand_type_name	String	X		Optional: Name label assigned to demand type in the same row, used for visualization purposes in NeXTA	
average_VOT	Float		Default = $10/hour	Average Value of Time (in units of dollars/hour) assigned to the demand type in the same row.	
pricing_type	Integer	X	Value > 0; Default: 1 = SOV, 2 = HOV, 3 = Trucks	Optional: Pricing type identification number, only used for tolling applications.	input_pricing_type.csv
percentage_of_pretrip_info	Float		0 to 100	Percentage of vehicles with pre-trip travel time information. Affects routing behavior in DTALite.	
percentage_of_enroute_info	Float		0 to 100	Percentage of vehicles with en-route travel time information. Affects routing behavior in DTALite. Drivers with historical information = 100 – percentage_of_pretrip_info – percentage_of_enroute_info.	
percentage_of_vehicle_type1	Float		0 to 100	Percentage of vehicles of vehicle type 1 for the demand type in the same row. Percentages in row should sum to 100.	(input_vehicle_type.csv)
percentage_of_vehicle_type2	Float		0 to 100	Percentage of vehicles of vehicle type 2 for the demand type in the same row. Percentages in row should sum to 100.	(input_vehicle_type.csv)
percentage_of_vehicle_type#	Float	X	0 to 100	Additional columns (with incremental #) can be used when more vehicle types are defined.	(input_vehicle_type.csv)

Example from 6-node Network:

demand_t	demand_t	average_V	pricing_ty	percentag	percentag	percentag	percentag	percentag	percentag	percentage_of_vehicle_type5	
1	SOV	10	1	0	0	80	20	0	0	0	
2	HOV	10	2	0	0	80	20	0	0	0	
3	truck	20	3	0	0	0	0	30	30	40	

input_VOT.csv

The input_VOT table is used to define different VOT distributions for different demand types. Refer to the sample Excel import tables in the Sample_Excel_Import_Files folder for some practical formulations for calculating VOT based on trip purposes.

Variable Name	Type	Optional	Acceptable Values	Description	Defined in Table
demand_type	Integer		Value > 0	Demand type identification number	(input_demand_type.csv)
VOT_dollar_per_hour	Integer		Value ≥ 0	Value of Time in dollars/hour	
percentage	Float		0 to 100	Defines the percentage of travelers in	

				of a specified demand type with a specified VOT. Used to describe the VOT distribution for the demand type in the same row.	

Example from Sample Import Excel Files Folder (used in 6-node Network):

demand_t	VOT_dolla	percentage
1	0	2.749
1	5	12.206
1	10	10.007
1	15	12.619

input_vehicle_type.csv

The input_vehicle_type table is used to define different vehicle types for emissions analysis.

Variable Name	Type	Optional	Acceptable Values	Description
vehicle_type	Integer		Value > 0	Vehicle type identification number
vehicle_type_name	String	X		Optional: Name label assigned to vehicle type in the same row

There are five vehicle types defined by default, as shown below.

vehicle_type	vehicle_type_name
1	Passenger car
2	Passenger truck
3	Light commercial truck
4	Single unit long-haul truck
5	Combination long-haul truck

input_vehicle_emission_rate.csv (provided by NCSU team, detailed information)

The input_vehicle_emission_rate table defines a lookup-table used for emissions analysis (post-processing), mapping emissions rates and energy use to vehicle types and operating modes. While this table has default values based on empirical data and studies, the user can modify values in the table to suit individual uses.

Variable Name	Type	Optional	Acceptable Values	Description	Defined in Table
vehicle_type	Integer		Value > 0	Vehicle type identification number	(input_vehicle_type.csv)
opModeID	Integer		Value ≥ 0	Operating Mode ID, associated with speed and vehicle weight	
meanBaseRate_TotalEnergy_(KJ/hr)	Float			Base rate total energy from combustion associated with vehicle type and operating mode in same row (in kilo-joules/hour)	
meanBaseRate_CO2_	Float			Average base carbon dioxide (CO2)	

(g/hr)				emission rate associated with vehicle type and operating mode in same row (in grams/hour)	
meanBaseRate_NOX_(g/hr)	Float			Average base emission rate for nitrogen oxides (NO and NO2) associated with vehicle type and operating mode in same row (in grams/hour)	
meanBaseRate_CO_(g/hr)	Float			Average base carbon monoxide (CO) emission rate associated with vehicle type and operating mode in same row (in grams/hour)	
meanBaseRate_HC_(g/hr)	Float			Average base hydrocarbon (HC) emission rate associated with vehicle type and operating mode in same row (in grams/hour)	

Example from 6-node Network:

vehicle_ty	opModeID	meanBase	meanBase	meanBase	meanBase	meanBaseRate_HC_(g/hr)
1	0	68371.1	4913.603	0.05385	2.36609	0.039171
1	1	52728.1	3789.393	0.008979	4.05557	0.000418
1	11	85288.1	6129.372	0.146868	6.52187	0.022892
1	12	106704	7668.461	0.155233	2.82379	0.02085
1	13	153460	11028.66	0.363034	9.76815	0.052262
1	14	194390	13970.16	0.657844	14.2137	0.072532
1	15	234348	16841.81	1.18797	20.8813	0.103686

input_agent.bin

Description.

agent.bin

The agent.bin file is a binary version of the output_agent.csv file, which shows the specific information of each agent in the simulation network. NeXTA will use this file to load DTAlite simulation results for visualization.

input_pricing_type.csv

The input_pricing_type.csv file defines the pricing type in the simulation.

Variable Name	Type	Description
pricing_type	Integer	Pricing type id

pricing_type_name	string	Pricing type name
default_VOT	int	Default value of time

3. Optional Files

The following files are optional inputs for NeXTA or DTALite. Most files in this list are related to traffic signal control (movement and phasing tables), which are only used for exporting projects to VISSIM. Sensor input data is used by DTALite for Origin-Destination Matrix Estimation (ODME), and the subarea input table is used by NeXTA to manage subarea analyses.

input_movement.csv

The optional input_movmement table defines all turning movements at a node in the network. This file is required for generating microscopic simulation networks – it is not currently used by NeXTA or DTALite.

Variable Name	Type	Optional	Acceptable Values	Description	Defined in Table
node_name	String	X		Optional: Name label given to node for KML visualization, not currently used in NeXTA	(input_node.csv)
node_id	Integer		Value > 0	Node identification number	(input_node.csv)
incoming_link_from_node_id	Integer		Value > 0	Link ID from which the vehicle turning movement begins	(input_link.csv)
outgoing_link_to_node_id	Integer		Value > 0	Link ID at which the vehicle turning movement ends	(input_link.csv)
turning_direction	String		Left, Right, Through	Name label used to identify the direction of the turning movement	
starting_time_in_min	Integer		Value ≥ 0	Starting time (in minutes) for signal timing plan	
ending_time_in_min	Integer		Value ≥ 0	Ending time (in minutes) for signal timing plan	
turnning_percentage	Float			For VISSIM Export	
turning_prohibition_flag	Integer			For VISSIM Export	
signal_control_no	Integer			For VISSIM Export	
signal_group_no	Integer			For VISSIM Export	

input_phase.csv

The optional input_phase table defines a phase for signal control at a node in the network. This file is required for generating microscopic simulation networks.

Variable Name	Type	Optional	Acceptable Values	Description	Defined in Table
node_name	String	X		Optional: Name label given to node for KML visualization, not currently used in NeXTA	(input_node.csv)
node_id	Integer		Value > 0	Node identification number	(input_node.csv)
phase_index			0 = North/South 1 = East/West	Identifies the movement direction.	

incoming_link_from_node_id	Integer		Value > 0	Link ID from which the vehicle turning movement begins	
outgoing_link_to_node_id	Integer		Value > 0	Link ID at which the vehicle turning movement ends	
turning_direction	String		Left, Right, Through	Name label used to identify turning movement direction	

input_sensor.csv

The input_sensor table is an optional input used for importing sensor data into NeXTA and DTALite. DTALite uses this data for Origin-Destination (OD) demand calibration, and NeXTA can visualize the calibration results.

Variable Name	Type	Optional	Acceptable Values	Description	Defined in Table
sensor_id	Integer		Value > 0	Sensor identification number	
x_coord					
y_coord					
from_node_id	Integer		Value > 0	Identifies the beginning node for the link on which the sensor is located	(input_node.csv)
to_node_id	Integer		Value > 0	Identifies the end node for the link on which the sensor is located	(input_node.csv)
day_no	Integer				
unix_timestamp					
start_time_in_min	Integer				
end_time_in_min	Integer				
sensor_type	String	X		Optional: Text label used to identify the type of sensor which recorded the data	
drection	Integer				
link_count		X			
occupancy		X			
travel_time		X			
avg_speed		X			

input_subarea.csv

The optional input_subarea table defines a subarea polygon based on its vertices, which is used in NeXTA for subarea analysis.

Variable Name	Type	Optional	Acceptable Values	Description
feature_id	Integer		Value ≥ 0	Feature point identification number
x	Double		Value ≥ 0	Defines longitudinal vertex position in subarea polygon
y	Double		Value ≥ 0	Defines latitudinal vertex position in subarea polygon

4. Scenario Input Files

The user may prepare scenarios by preparing the following input files, which describe different network conditions so that their effects on operations may be evaluated. Different scenarios available include tolling (distance-based and link-based tolls), dynamic message signs, incidents, and work zones.

Scenario_Link_Based_Toll.csv

The link-based toll scenario input table is used to define tolling conditions on a road segment in the simulation. Currently, there are three classes defined for different toll pricing – SOV, HOV, and trucks.

Variable Name	Type	Optional	Acceptable Values	Description
Link	Integer		[1,2]	Node pair [upstream, downstream] used to identify the link on which the toll is implemented
Day No	Integer		Value > 0	Day identification number in the simulation on which the tolling strategy is implemented
Start Time in Min	Integer		0 to 1440	Daily starting time for the link-based toll
End Time in min	Integer		0 to 1440	Daily ending time for the link-based toll
Charge for LOV ($)	Float		0 to 999	Charge for Single Occupancy Vehicles (SOV) to travel across the link
Charge for HOV ($)	Float		0 to 999	Charge for High Occupancy Vehicles (HOV) to travel across the link
Charge for Truck ($)	Float		0 to 999	Charge for Trucks to travel across the link

Scenario_Dynamic_Message_Sign.csv

The dynamic message sign scenario input file is used to define the location and characteristics of variable message signs in the simulation, which influences driver route choice by the response percentage defined in the table.

Variable Name	Type	Optional	Acceptable Values	Description
Link	Integer		[1,2]	Node pair [upstream, downstream] used to identify the link on which the sign is installed
Start Time in Min	Integer		0 to 1440	Starting time for the dynamic message sign display
End Time in min	Integer		0 to 1440	Ending time for the dynamic message sign display
Responce Percentage ()	Float		Value ≥ 0	Percentage of drivers on the link which respond to the real time information displayed on the sign.

Scenario_Incident.csv

The incident scenario input file is used to define the location and characteristics of incidents in the simulation, which may include any general capacity reduction and can be applied for general incidents (e.g., debris) weather, and crashes.

Variable Name	Type	Optional	Acceptable Values	Description
Link	Integer		[1,2]	Node pair [upstream, downstream] used to identify the

				link on which incident occurs
Day No	Integer		Value > 0	Day identification number in the simulation on which the incident occurs
Start Time in Min	Integer		0 to 1440	Starting time for the capacity reduction due to incident
End Time in min	Integer		0 to 1440	Ending time for the capacity reduction due to incident
Capacity Reduction Percentage (%)	Float		Value ≥ 0	Capacity reduction percentage (1 – percent remaining capacity) due to incident
Speed Limit (mph)	Integer		Value ≥ 0	Speed limit on link due to incident

Scenario_Work_Zone.csv

The work zone scenario input file is used to define the location and characteristics of work zones in the simulation, which is described in terms of capacity reduction, project duration, and speed reduction.

Variable Name	Type	Optional	Acceptable Values	Description
Link	Integer		[1,2]	Node pair [upstream, downstream] used to identify the link on which work zone is located
Day No	Integer		Value > 0	Day identification number in the simulation on which the work zone causes capacity reductions
Start Time in Min	Integer		0 to 1440	Starting time for capacity reduction due to work zone
End Time in min	Integer		0 to 1440	Ending time for capacity reduction due to work zone
Capacity Reduction Percentage (%)	Float		Value ≥ 0	Capacity reduction percentage (1 – percent remaining capacity) due to work zone
Speed Limit (mph)	Integer		Value ≥ 0	Speed limit on link posted during work zone

Output Files

Output files from NeXTA or DTALite include information about measures of effectiveness (MOEs), such as travel time, speed, traffic volume, and queuing, which are offered at several spatial resolutions (link, path, OD, and network) in time-dependent and static forms. Additional non-MOE information, such as traffic assignment log data, and the results of post-processing functions for evaluating emissions, safety, and travel time reliability, is also available through the output files described below.

output_summary.csv

The output_summary table contains detailed information about traffic assignment iteration results, primarily related to travel time and origin-destination estimation.

Variable Name	Type	Description
CPU_time	String	Indicates the time at which the iteration ends Example: CPU Clock: 00:02:09 --
iteration_no	Integer	Assignment iteration number
avg_travel_time_in_min	Float	Average travel time (in minutes) for each vehicle in the simulation in the iteration
avg travel_time_index	Float	Average travel time (in minutes) for each vehicle in the simulation in the iteration / Average travel time (in minutes) under free-flow speed
avg_travel_distance_in_mile	Float	Average travel distance (in miles) for each vehicle in the simulation in the iteration
vehicle_route_switching_rate	Float	Percentage of vehicles switching paths/routes in the iteration
number_of_vehicles_completing_trips	Integer	The number of vehicles which complete their trips within the modeling horizon
perc_of_vehicles_completing_trips	Float	Percentage of vehicles completing their trips in the simulation modeling horizon
avg_travel_time_gap_per_vehicle_in_min	Float	Average travel time gap (in minutes) for each vehicle in the simulation in the iteration
target_demand_deviation	Float	The difference between observed and simulated link volume for origin-destination estimation
abs_estimation_error_of_link_volume	Float	Cumulative absolute estimation error for link volume (for OD estimation)
RMSE_of_est_link_volume	Float	Root-mean squared error of the estimated link volume (for OD estimation)
avg_abs_perc_error_of_est_link_volume	Float	Average absolute percent error (MAPE) of estimated link volume (for OD estimation)

output_multi-scenario_results.csv

This output_multi-scenario_results.csv file describes the simulation results for multiple scenario conditions.

Variable Name	Type	Description
scenario_no	Integer	Scenario id number
demand_multiplier	float	Global multiplier to adjust number of vehicles in the simulation for the

		current scenario
scenario_name	string	Name of scenario
number_of_assignment_days	integer	Number of iterations
traffic_flow_model	integer	Selection of traffic flow model
default_arterial_k_jam	integer	Number of vehicles which can be stored in each lane on the link
default_cycle_length	integer	Default time length of signal cycle
#_of_vehicles_network	integer	Number of vehicles generated in the network
percentage_network		
avg_distance_network	float	Average travel distance for each vehicle in the network
avg_travel_time(min)_network	float	Average travel time for each vehicle in the network
avg_speed_network	float	Average travel speed for each vehicle in the network
avg_toll_cost_network	float	Average toll cost for each vehicle in the network
avg_energy_network	float	Average energy for each vehicle in the network
avg_CO2_network	float	Average CO2 for each vehicle in the network
avg_NOX_network	float	Average NOX for each vehicle in the network
avg_CO_network	float	Average CO for each vehicle in the network
avg_HC_network	float	Average HC for each vehicle in the network

output_LinkMOE.csv

The output_LinkMOE table contains detailed results from the simulation aggregated at each link, including safety and emissions data.

Variable Name	Type	Description
from_node_id	Integer	Departure node identification number.
to_node_id	Integer	Arrival node identification number.
start_time_in_min	Integer	Starting time (in minutes) for the modeling time period.
end_time_in_min	Integer	Ending time (in minutes) for the modeling time period.
total_link_volume	Integer	The total number of vehicles which traveled on the link during the modeling time period.
lane_capacity_in_vhc_per_hour	Double	Maximum service flow rate for each lane on the link,
volume_over_capacity_ratio	Float	Volume-capacity ratio
speed_limit_in_mph	Integer	Speed limit on the link, taken from input_link.csv
speed_in_mph	Float	Estimated speed in the simulation
percentage_of_speed_limit	Integer	Speed, reported as a percentage of the speed limit (speed_in_mph/speed_limit_in_mph)
level_of_service	String	Level of service, calculated based on Volume-to-Capacity ratio
sensor_data_flag	Integer	Indicates the presence of sensor data for a specific link (0 = no data, 1 = data present)
sensor_link_volume	Integer	Observed link volume on the link from sensor data file
measurement_error_percentage	Float	Percent error between simulated and observed link volume on the link
abs_measurement_error_percentage	Float	Absolute percent error between simulated and observed link volume on the link
simulated_AADT	Float	Simulated link volume, estimated as Average Annual Daily Traffic after applying a peak hour factor relevant to the modeling time period.
num_of_crashes_per_year	Float	Total predicted annual crash frequency for all crashes on the link

num_of_fatal_crashes_per_year	Float	Total predicted annual crash frequency for Fatal/Injury crashes on the link
num_of_PTO_crashes_per_year	Float	Total predicted annual crash frequency for Property Damage Only (PDO) crashes on the link
TotalEnergy_(J/hr)	Float	Total cumulative energy consumption rate from combustion on the link (in Joules/hour)
CO2_(g/hr)	Float	Total cumulative carbon dioxide (CO2) emission rate on the link (in grams/hour)
NOX_(g/hr)	Float	Total cumulative emission rate for nitrogen oxides (NO and NO2) on the link (in grams/hour)
CO_(g/hr)	Float	Total cumulative carbon monoxide (CO) emission rate on the link (in grams/hour)
HC_(g/hr)	Float	Total cumulative hydrocarbon (HC) emission rate on the link (in grams/hour)

output_ODMOE.csv

This output_ODMOE.csv file contains the MOE information of multiple paths between origin and destination.

Variable Name	Type	Description
origin_zone_no	Integer	Departure zone identification number.
destination_zone_no	Integer	Arrival zone identification number.
number_of_vehicles	Integer	The number of vehicles traveling between the origin and destination zones
trip_time_in_min	Integer	Average travel time for each vehicle traveling between the origin and destination zones
distance_in_mile	Integer	Average distance traveled by each vehicle traveling between the origin and destination zones

output_agent.csv

This output_agent.csv file shows the specific information of each agent in the simulation network. NeXTA will use this file to load DTAlite simulation results for visualization.

Variable Name	Type	Optional	Acceptable Values	Description
agent_id	Integer		Value ≥ 0	Agent id
from_zone_id	Integer		Value > 0	From zone id
to_zone_id	Integer		Value > 0	to zone id
departure_time	float		Value ≥ 0	departure time of one agent which is the time gap in min to 0:00
arrival_time	float		Value ≥ 0	arrival time of one agent which is the time gap in min to 0:00
complete_flag	bool		0 or 1	A flag to show whether the agent has completed its trip
trip_time	float		0<Value	Trip time
demand_type	Integer		Value ≥ 0	Demand type
pricing_type	Integer		Value ≥ 0	Pricing type
vehicle_type	Integer		Value ≥ 0	Vehicle type
information_type	Integer		Value ≥ 0	Information type to choose the route

value_of_time	Integer		Value > 0	Value of time for the trip of the agent
toll_cost_in_dollar	float		Value ≥ 0	Toll cost in dollar for the trip of the agent
emissions	float		Value ≥ 0	Emissions for the trip of the agent
distance_in_mile	float		Value ≥ 0	Travel distance in mile for the trip of the agent
TotalEnergy_(KJ)	float		Value ≥ 0	Total energy for the trip of the agent
CO2_(g)	float		Value ≥ 0	CO2(gram) for the trip of the agent
NOX_(g)	float		Value ≥ 0	NOX(gram) for the trip of the agent
CO_(g)	float		Value ≥ 0	CO(gram) for the trip of the agent
HC_(g)	float		Value ≥ 0	HC (gram) for the trip of the agent
number_of_nodes	float		Value ≥ 0	Number of nodes for the trip of the agent
path_sequence	string			Node sequence and some information during the trip of the agent

output_2WayLinkMOE.csv

Description.

Variable Name	Type	Description

output_LinkCapacity.csv

Description.

Variable Name	Type	Description

output_LinkMOE_summary.csv

The output_LinkMOE summary table contains less detailed results from the simulation, aggregated at each link. In this case, most variables capture general speed and volume MOEs.

Variable Name	Type	Description
from_node_id	Integer	Departure node identification number.
to_node_id	Integer	Arrival node identification number.
start_time_in_min	Integer	Simulation start time, in units of minutes
end_time_in_min	Integer	Simulation end time, in units of minutes
total_link_volume	Integer	The total number of vehicles which traveled on the link during the simulation.
lane_capacity_in_vhc_per_hour	Double	Maximum service flow rate for each lane on the link,
volume_over_capacity_ratio	Float	Volume-capacity ratio
speed_limit_in_mph	Integer	Speed limit on the link, taken from input_link.csv
speed_in_mph	Float	Estimated speed in the simulation

percentage_of_speed_limit	Integer	Speed, reported as a percentage of the speed limit (speed_in_mph/speed_limit_in_mph)
level_of_service	String	Level of service, calculated based on Volume-to-Capacity ratio
sensor_data_flag	Integer	Indicates the presence of sensor data for a specific link (0 = no data, 1 = data present)
sensor_link_volume	Integer	Observed link volume on the link from sensor data file
measurement_error_percentage	Float	Percent error between simulated and observed link volume on the link
abs_measurement_error_percentage	Float	Absolute percent error between simulated and observed link volume on the link
simulated_AADT	Float	Simulated link volume, estimated as Average Annual Daily Traffic after applying a peak hour factor relevant to the modeling time period.
num_of_crashes_per_year	Float	Total predicted annual crash frequency for all crashes on the link

output_LinkTDMOE.csv

The output_LinkMOE summary table contains less detailed results from the simulation, aggregated at each link. In this case, most variables capture general speed and volume MOEs.

Variable Name	Type	Description
from_node_id	Integer	Departure node identification number for link.
to_node_id	Integer	Arrival node identification number for link.
timestamp_in_min	Integer	Simulation time stamp
travel_time_in_min	Float	Total travel time for vehicles leaving at the current time stamp, traveling between the origin and destination nodes.
delay_in_min	Float	Additional delay time (in minutes) on the link at the current time stamp, based on queuing analysis.
link_volume_in_veh_per_hour_per_lane	Float	Traffic flow rate for a single lane (in vehicles per hour per lane) on the link at the current time stamp
link_volume_in_veh_per_hour_for_all_lanes	Float	Link flow rate (in vehicles per hour) on the link at the current time stamp
density_in_veh_per_mile_per_lane	Float	Density (in vehicles per mile per lane) on the link at the current time stamp
speed_in_mph	Float	Speed (in miles per hour) on the link at the current time stamp
exit_queue_length	Float	The length of the queue (in terms of the number of vehicles waiting to exit the queue) at the end of the link
cumulative_arrival_count	Integer	Cumulative arrival count for the link at the current time stamp, used for queuing analysis
cumulative_departure_count	Integer	Cumulative departure count for the link at the current time stamp, used for queuing analysis
cumulative_SOV_count	Integer	Cumulative number of SOV vehicles crossing the link at the current time stamp, used for tolling analysis
cumulative_HOV_count	Integer	Cumulative number of HOV vehicles crossing the link at the current time stamp, used for tolling analysis
cumulative_truck_count	Integer	Cumulative number of trucks crossing the link at the current time stamp, used for tolling analysis
cumulative_SOV_revenue	Integer	Cumulative toll revenue from SOV vehicles crossing the link at the current time stamp, based on cumulative SOV count and pricing input variables

cumulative_HOV_revenue	Integer	Cumulative toll revenue from HOV vehicles crossing the link at the current time stamp, based on cumulative HOV count and pricing input variables
cumulative_truck_revenue	Integer	Cumulative toll revenue from trucks crossing the link at the current time stamp, based on cumulative truck count and pricing input variables

output_LinkTDMOE.bin

This linkTDMOE.bin file is a binary version of the output_linkTDMOE.csv file, which shows the time dependent MOE information of the links in the network. NeXTA will use this file to load DTAlite simulation results for visualization.

output_MovementMOE.csv

This output_movementMOE.csv file describes the MOE information of vehicle movements for all nodes in the network.

Variable Name	Type	Description
node_id	Integer	Node identification number
incoming_link_from_node_id	Integer	node id of incoming link
outgoing_link_to_node_id	Integer	node id of outgoing link
turning_direction		
movement_hourly_capacity	Integer	Hourly capacity of movement
total_vehicle_count	Integer	Total vehicle count passing through the three nodes
avg_vehicle_delay_in_sec	Integer	Average delay in seconds for vehicles passing the three nodes

output_NetworkTDMOE.csv

The output Network TDMOE table contains time-dependent, network-level information about assignment iteration results over the modeling horizon, primarily related to cumulative flow into and out of the simulation.

Variable Name	Type	Description
iteration	Integer	Assignment iteration number
time_stamp_in_min	Integer	Simulation time stamp during iteration, in 1 minute intervals
cumulative_in_flow_count	Integer	Cumulative number of vehicles that have entered the simulation at the current time stamp
cumulative_out_flow_count	Integer	Cumulative number of vehicles that have exited the simulation at the current time stamp
number_vehicles_in_network	Integer	Total number of vehicles in the network at the current time stamp
flow_in_a_min	Integer	The cumulative network flow rate for vehicles entering the simulation since the last time stamp.
avg_trip_time_in_min	Float	Average end-to-end trip travel time in minutes, calculated over all origins and destinations

output_od_flow.csv

The output_od_flow table describes the flow information for the OD pairs in the network.

Variable Name	Type	Description
od_index	integer	Origin and destination id number
vehicle_type	integer	Vehicle type
from_zone_id	integer	From zone id
to_zone_id	integer	To zone id
time_span_volume	integer	Time span volume
day_volume	integer	Day volume

output_ODME_MOE.csv

The output ODME_MOE table contains information about the ODME results. The observed count by sensor can be compared with the simulated count by DTAlite.

Variable Name	Type	Description
Iteration	integer	Iteration id
Link from node	String	origin node of link
to node	integer	destination node of link
time start time in min->end time in min	string	Start time of sensor to end time of sensor
observed link count	integer	observed link count by sensor
simulated link count	integer	simulated link count by DTAlite
Simulated flow count - Obs flow count	integer	Absolute errors
Abosolute Percentage Error	float	Percentage errors
obs voc	float	Observed volume over capacity
simu VOC	float	Simulated volume over capacity

output_ODMOE.csv

The output ODMOE table contains information about the demand and assignment results aggregated over the modeling horizon for each origin-destination pair, disaggregated by departure time.

Variable Name	Type	Description
from_zone_id	Integer	Departure zone identification number.
to_zone_id	Integer	Arrival zone identification number.
departure_time	Integer	Time in the simulation at which the vehicle trip begins
demand_type	Integer	Demand type identification number
information_type	Integer	Identifies the type of information the driver has about their trip. Default value (value = 0) indicates driver only has historical travel time information, while other values indicate additional information which DTALite uses during assignment.
#_of_vehicles_completing_trips	Integer	The number of vehicles, leaving at the indicated departure time and traveling between the origin and destination zones, which complete their trips within the modeling horizon
trip_time_in_min	Float	Average end-to-end trip travel time in minutes, calculated for vehicles traveling between the origin and destination zones
cost_in_dollar	Float	Average generalized cost for traveling between the origin and destination zones (not currently included)

emissions	Float	Average CO2 emission rate associated with traveling between the origin and destination zones (not currently included)

output_ODTDMOE.csv

Description.

Variable Name	Type	Description

output_path.csv

The output_path.csv file describes the path information for each vehicle in the simulation.

Variable Name	Type	Description
vehicle_id	string	Vehicle id
from_zone_id	string	From zone id
to_zone_id	string	To zone id
pricing_type	string	Pricing type
number_of_nodes	string	Number of nodes during the path
path_sequence	string	Node sequence for the path of vehicle

output_path_flow.csv

The output_path_flow.csv file describes the path flow information in the simulation.

Variable Name	Type	Description
route_index	integer	Route id number
vehicle_type	integer	Vehicle type
from_zone_id	integer	From zone id
from_node_id	integer	From node id
to_zone_id	integer	To zone id
to_node_id	integer	To node id
time_span_volume	integer	Time span volume of path
day_volume	integer	Day volume of path
node_chain_number_of_nodes	integer	Number of nodes in the path sequence
node_chain_node_sequence	string	Node sequences in the path

output_vehicle_emission_MOE_summary.csv

The output vehicle emission MOE summary table describes all results from emissions post-processing, disaggregated to emissions estimates for each individual vehicle in the simulation.

Variable Name	Type	Description
vehicle_id	Integer	Vehicle identification number
from_zone_id	Integer	Departure zone identification number.
to_zone_id	Integer	Arrival zone identification number.

departure_time	Integer	Time in the simulation at which the vehicle trip begins
vehicle_type	Integer	Vehicle type identification number for the specified vehicle
information_type	Integer	Identifies the type of information the driver has about their trip. Default value (value = 0) indicates driver only has historical travel time information, while other values indicate additional information which DTALite uses during assignment.
TotalEnergy_(J)	Float	Total cumulative energy consumption from combustion on the link (in Joules)
CO2_(g)	Float	Total cumulative carbon dioxide (CO2) emissions on the link (in grams)
NOX_(g)	Float	Total cumulative emissions for nitrogen oxides (NO and NO2) on the link (in grams)
CO_(g)	Float	Total cumulative carbon monoxide (CO) emissions on the link (in grams)
HC_(g)	Float	Total cumulative hydrocarbon (HC) emissions on the link (in grams)

Vehicle.csv

The vehicle file is a highly disaggregated summary file for all vehicles in the simulation. The output data describes each individual vehicle and its characteristics, its path in the network, and some of its path characteristics, such as its traveling distance and emissions estimates.

Variable Name	Type	Description
vehicle_id	Integer	Vehicle identification number
from_zone_id	Integer	Departure zone identification number
to_zone_id	Integer	Arrival zone identification number
departure_time	Integer	Time in the simulation at which the vehicle trip begins
arrival_time	Integer	Time in the simulation at which the vehicle trip ends
complete_flag	Integer	0 = incomplete trip, 1 = completed trip within modeling time period
trip_time	Float	The total time required to travel from origin to destination
demand_type	Integer	Demand type identification number for specified vehicle
pricing_type	Integer	Pricing type identification number, only used for tolling applications. Default: 1 = SOV, 2 = HOV, 3 = Trucks
vehicle_type	Integer	Vehicle type identification number for the specified vehicle
information_type	Integer	Identifies the type of information the driver has about their trip. Default value (value = 0) indicates driver only has historical travel time information, while other values indicate additional information which DTALite uses during assignment.
value_of_time	Integer	The individual driver's value of time.
toll_cost_in_dollar	Float	The vehicle's total toll cost associated with its path in the network.
emissions	Float	The total estimated CO2 emission rate for the specific vehicle traveling along its specified path.
distance_in_mile	Float	The total path distance traveled by the vehicle between zones.
number_of_nodes	Integer	The number of nodes in the path sequence for the vehicle trip.
path_sequence	String	The nodes in the path, identified by node ID, in chronological order from origin to destination.

AMS_movement.csv

The AMS_movement.csv file describes the movement information of vehicles between different nodes in the simulation.

Variable Name	Type	Description
movement_index	integer	Movement id
three-node key	string	Movement starts from the first node, passes through the middle node,

		and arrive at the third node.
count	integer	The volume of the movement in the simulation.

AMS_OD_table.csv

The AMS_OD_table.csv file describes the OD time span volume.

Variable Name	Type	Description
from_zone_id	integer	From zone id
to_zone_id	integer	To zone id
time_span_volume	integer	Time span volume of the OD pair

AMS_path_flow.csv

The AMS_path_flow.csv file describes the path flow.

Variable Name	Type	Description
route_index	integer	Route id
volume	integer	Volume of path
node_chain_number_of_nodes	string	Number of nodes in the path
node_chain_node_sequence	string	Node sequence of path

error.txt

The error.log stores the error information in the simulation.

summary.txt

The summary.log file contains detailed information about traffic assignment iteration results, primarily related to nodes, links, network, vehicle numbers, average travel time, average distance, travel time index and number of vehicles having completed their trips.

warning.txt

The warning.log stores the warning information in the simulation.

Configuration/Settings Files

Description.

input_scenario_settings.csv [Essential input data]

The scenario settings file allows the user to alter the characteristics of the scenarios being run, as well as create various traffic scenarios that can be run simultaneously. Scenario attributes such as demand multiplier, traffic flow model, and number of days a scenario will be run can all be changed in this file. Further, each row can contain data for a separate scenario, allowing the user to simultaneously run

models with differing model attributes. The scenario settings file allows the user to alter 12 different attributes for each scenario. Starting from the far-right column, these attributes are:

Variable	Description	Example Usage
scenario_no	This is a discrete integer value assigned to a given scenario, and will be used as the scenario's unique identifier when the simulation is running in DTALite.	scenario_no =1
scenario_name	This is the identifier by which the scenario will be displayed to the end user. This identifier, unlike the scenario_no, need not be an integer.	scenario_name = test1
number_of_assignment_days	This value, an integer, is the number of days the scenario will be run. If the user is employing Origin-Destination Matrix Estimation, the scenario should run for at least 15 assignment days.	number_of_assignment_days = 95
demand_multiplier	This value is the number by which the demand given in the imput_demand.csv file will be multiplied for a given scenario, e.g. if the demand for a given OD pair is 1000, and a demand multiplier of 1.8 is used for a given scenario, then for that scenario DTALite will use a value of 1800 for the demand on that OD pair.	demand_multiplier =0.7
random_seed	This value is the seed number used for the pseudorandom number generator, used to create a level of randomness in certain aspects of the simulation.	random_seed =100
traffic_flow_model	This value must be one of four possible values: **0**: Bureau of Public Roads (BPR) Model. This is a simple model which relates flow rate on a link to its volume-to-capacity ratio. **1**: Point Queue Model. This model assumes vehicles "stack up" at nodes, rather than filling up the link. **2**: Spatial Queue Model. This model represents queues as they actually exist, filling up links as they form. **3**: Newell's N-Curve Model. The most thorough of the four models, which takes into account features such as wave propagation through traffic.	traffic_flow_model = 3
default_arterial_k_jam	This value will be the default value	default_arterial_k_jam =250

	used in the simulation for the maximum possible number of vehicles per mile per lane (jam density).	
default_cycle_length	This value will be used as the default time (in seconds) on control signals for an entire cycle (that is, all three colors).	default_cycle_length =60
emission_data_output	This, too, is a binary field. As with ODME_mode, a value of 0 will disable emission data output, and a value of 1 will enable it.	emission_data_output =0
ODME_mode	This is a binary field (the user must enter either a value of 0 or 1) for Origin-Destination Matrix Estimation (ODME). A value of 0 will turn off ODME, and a value of 1 will enable it.	ODME_mode=1
freeway_bias_factor	This value dictates the degree to which agents modeled in the simulation will choose routes. The default value is sufficient for most simulations.	freeway_bias_factor=1
traffic_assignment_method	Like traffic_flow_model, this field allows integer values from zero to four. For assignment method, these values are pre-defined: **0**: Method of Successful Averages (MSA) **1**: Day-to-day learning **2**: Gap-based switching rule for user equilibrium **3**: Gap-based switching rule and MSA step-size for user equilibrium	traffic_assignment_method=1

input_MOE_settings.csv [Essential input data]

The measure of effectiveness, or MOE, settings allow the user to test the effectiveness of the network as a whole, or smaller sections of a network, such as a single link, 3-point path, or origin-destination pair. The MOE settings file also allows the user to identify links, paths, and origin-destination pairs that are above user-defined threshold values. The following are the possible values for the moe_type field (the first column in the input_MOE_settigns.csv file), as well as which fields must be filled in for each:

MOE_type	**Description**
network	Network MOE measures the effectiveness of the network at large. This network-wide measure can also be broken down based on attributes such as demand type and vehicle type.
od	This MOE type gauges the effectiveness of the network from one zone to another. The only field that must be populated are “origin_zone_id” and destination_zone_id It should be noted that it will only measure the

	effectiveness in the from-to direction. That is to say, if zone 1 is set as the origin zone, and zone 2 as the destination, effectiveness will only be measure from zone 1 to 2, not 2 to 1. In order to measure effectiveness in both directions, create two separate OD MOEs.
link	To measure the effectiveness of a link, only the "from_node_id" and "to_node_id" fields must be populated. As with OD MOE, the measure of effectiveness only goes in the from-to direction.
path_3point	Much the same as link MOE, 3-point path MOE measures the effectiveness of a path between three connected nodes. This MOE needs an entry in "from_node_id," "mid_node_id," and "to_node_id."
network_time_dependent	This measures the effectiveness of the network on a minute-by-minute basis. The results from this MOE are displayed in the output_NetworkTDMOE.csv file.
od_critical, link_critical, and path_critical	Each of these only requires the user to enter a value in the "threshold_volume" field. For example, if link critical MOE is performed with a threshold volume of 1250, then, in the output summary file, NeXTA will print MOE results for all of the links with volume over 1250.

The "moe_group" column is used to break the MOE settings into discreet groups in the output summary. For example, to have all MOE critical values displayed together, assign them all the same group number, and they will be clustered together in the output summary. The "moe_cetegory_label" is a user-defined field used to give simpler names to each individual measure of effectiveness. Each MOE may also have an associated start and end time based on when vehicles enter or exit the network, OD pair, link, or path.

DTASettings.txt

The DTASettings.txt file is used to modify the configuration settings for running DTAlite. There are several sections in the DTASettings.txt file, denoted by a header in the form of [Title]. Each section includes descriptions for all variable names, followed by a short description of their type, purpose, function, and/or interaction with other variables, and a quick example usage.

[GUI]

This section defines GUI configuration.

Variable	Description	Example Usage
node_display_size	Indicates the display size of node	node_display_size=50.00
node_text_display_ratio	Indicates the display ratio of node text	node_text_display_ratio=4.000000
long_lat_coordinate_flag	Longtitude and latitude coordinate flag	long_lat_coordinate_flag= 1.00

[BackgroundImage]

This section defines Background Image configuration.

Variable	Description	Example Usage
x1	X postion of background image	x1=0.000000
y1	Y postion of background image	y1=0.000000
ImageWidth	Width of background image	ImageWidth=0.000000
ImageHeight	Height of background image	ImageHeight=0.000000
ImageXResolution	X resolution of background image	ImageXResolution=0.000000
ImageYResolution	Y resolution of background image	ImageYResolution=0.000000

[simulation]

This section defines simulation configuration.

Variable	Description	Example Usage
use_default_lane_capacity	Default lane capacity	use_default_lane_capacity=0
stochatic_capacity_mode	Stochastic capacity mode	stochatic_capacity_mode=1
merge_node_model	Merge node model	merge_node_model=1
first_in_first_out_condition_across_different_movements	First-in-First-out condition across different movements	first_in_first_out_condition_across_different_movements=0
minimum_link_in_flow_ratio	A factor applied to the maximum link flow rate to find the minimum flow rate	minimum_link_in_flow_ratio = 0.02
max_density_ratio_for_loading_vehicles	Max density ratio for loading vehicles	max_density_ratio_for_loading_vehicles= 0.80
cycle_length_in_seconds	Signal cycle length in seconds	cycle_length_in_seconds=120.00
default_saturation_flow_rate_in_vehphpl	Default saturation flow rate in vehicle/hour/lane	default_saturation_flow_rate_in_vehphpl=1800.00
random_number_seed	A seed to generate random numbers	random_number_seed=100

[emission]

This section defines emission configuration.

Variable	Description	Example Usage
output_opreating_mode_data	Output operating mode data	output_opreating_mode_data=0
target_vehicle_id_for_output_second_by_second_emission_data	Target vehicle id for outputting second by second emission data	target_vehicle_id_for_output_second_by_second_emission_data=0

[assignment]

This section defines assignment configuration.

Variable	Description	Example Usage
agent_based_assignment	Agent based assignment	agent_based_assignment=1
aggregation_time_interval_in_min	Aggregation time interval in mins.	aggregation_time_interval_in_min=15

number_of_inner_iterations	Number of inner interations	number_of_inner_iterations=0
convergency_relative_gap_threshold_percentage	Convergency relative gap threshold percentage	convergency_relative_gap_threshold_percentage= 5.00
UE_assignment_method	UE assignment method	UE_assignment_method=1
day_to_day_agent_learning_method	Day to day agent learning method	day_to_day_agent_learning_method=0
departure_time_choice_early_delay_penalty	Departure time choice early delay penalty	departure_time_choice_early_delay_penalty= 0.97
departure_time_choice_late_delay_penalty	Departure time choice late delay penalty	departure_time_choice_late_delay_penalty= 1.31
learning_percentage	Learning percentage	learning_percentage=15
travel_time_difference_for_switching_in_min	Travel time difference for switching in mins.	travel_time_difference_for_switching_in_min=5

[output]

This section defines output configuration.

Variable	Description	Example Usage
start_iteration_for_MOE	Start interation for MOE	start_iteration_for_MOE=-1
simulation_data_horizon_in_min	Simulation data horizon in mins.	simulation_data_horizon_in_min=1410

[traveler_information]

This section defines traveler_information configuration.

Variable	Description	Example Usage
coefficient_of_variation_of_historical_info_travelers_perception_error	coefficient_of_variation_of_historical_information_travelers_perception_error	coefficient_of_variation_of_historical_info_travelers_perception_error= 0.30
coefficient_of_variation_of_pretrip_info_travelers_perception_error	coefficient_of_variation_of_pretrip_information_travelers_perception_error	coefficient_of_variation_of_pretrip_info_travelers_perception_error=0.05
coefficient_of_variation_of_enroute_info_travelers_perception_error	coefficient_of_variation_of_enroute_information_travelers_perception_error	coefficient_of_variation_of_enroute_info_travelers_perception_error = 0.05
coefficient_of_variation_of_VMS_perception_error	coefficient_of_variation_of_VMS_perception_error	coefficient_of_variation_of_VMS_perception_error= 0.05
information_updating_interval_of_en_route_info_travelers_in_min	information_updating_interval_of_en_route_information_travelers_in_min	information_updating_interval_of_en_route_info_travelers_in_min=5
information_updating_int	information_updating_interval_of_VMS_in_min	information_updating_i

erval_of_VMS_in_min		nterval_of_VMS_in_min=60

[input_checking]

This section defines input checking configuration.

Variable	Description	Example Usage
allow_extremely_low_capacity	Allow extremely low capacity	allow_extremely_low_capacity=1

[safety_planning]

This section defines input checking configuration.

Variable	Description	Example Usage
default_AADT_conversion_factor	default_AADT_conversion_factor	default_AADT_conversion_factor= 0.10

ODME_Settings.txt

This ODME_Settings.txt file defines the setting for ODME used by DTAlite.

Origin-Destination Matrix Estimation (ODME) allows traffic patterns to change in response to change from iteration to iteration of a scenario, progressing towards equilibrium. The ODME settings can be accessed by clicking Tools | OD Demand |1. Configure OD Matrix Estimation Settings. This file allows the user to alter some of the ODME settings. The default options should be sufficient for the majority of users. For further information on how to adjust the ODME settings, consult the NeXTA User's Guide that comes with the software.

Variable	Description	Example Usage
measurement_type	Measurement type	measurement_type=1
adjustment_step_size	Adjustment step size	adjustment_step_size= 0.05
weight_on_hist_oddemand	Weight on historical od demand	weight_on_hist_oddemand= 1.00
estimation_end_time_in_min	Estimation end time in minutes	estimation_start_time_in_min=990
weight_on_ue_gap	Weight on UE gap	estimation_end_time_in_min=1110
weight_on_ue_gap	Weight on UE gap	weight_on_ue_gap= 1.00
starting_iteration	Starting iteration	starting_iteration=15
number_of_iterations_per_sequential_adjustment	Number of iterations per sequential adjustment	number_of_iterations_per_sequential_adjustment=10
time_period_in_min_per_sequential_adjustment	Time period in minutes per sequential adjustment	time_period_in_min_per_sequential_adjustment=60

NEXTA_Settings.ini

Description.

Variable Name	Type	Description

LaneSettings.ini

Description.

Variable Name	Type	Description

PhaseSettings.ini

Description.

Variable Name	Type	Description

DTASettings.ini

Description

Variable Name	Type	Description

Synchro Export Files

Description.

Lanes.csv

Description.

Layout.csv

Description.

Phasing.csv

Description.

Timing.csv

Description.

Volume.csv

Description.

Synchro_layout.csv

Description.

VISSIM Export Files

Description

simulation.anm

Description.

simulation.anmRoutes

Description.

ms_linktypes.csv

Description.

Variable Name	Type	Description

ms_signal.csv

Description.

Variable Name	Type	Description

ms_vehclasses.csv

Description.

Variable Name	Type	Description

ms_vehtypes.csv

Description.

Variable Name	Type	Description

msLog.txt

Description.

Output Visualization Files

AMS_link.shp

AMS_link_3D.kml

AMS_link_blue_3D.kml

AMS_link_blue_3D_SL.kml

AMS_link_green_3D.kml

AMS_link_green_3D_SL.kml

AMS_link_red_3D.kml

AMS_link_red_3D_SL.kml

AMS_link_yellow_3D.kml

AMS_link_yellow_3D_SL.kml