

Presentation at DTALite Training Workshop

6/28/2017, University of Maryland, College Park



DTALite/NEXTA Quick Start and Preparing Inputs

Useful Resources

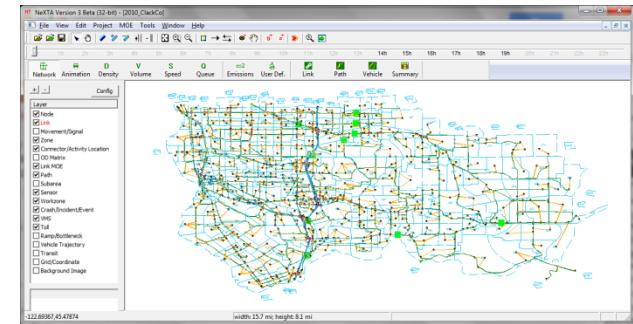
- Guidelines
 - **Module 2.1:** 1_Data Structure and Workflow of DTALite and NeXTA
 - **Module 2.1:** learning_document_GIS_importing
 - **Module 2.2:** 4_Users_Guide_for OD Estimation
- DTALite Developers
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Outline

- Quick Start
 - Software Installation
 - Simulation Run - NeXTA GUI - Visualization
- Input at a Glance
 - Demand data
 - Network data
 - Configuration files
- Advanced Topics
 - Develop/Extend network from scratch
 - Import network data from a transportation planning model

Open-source Free Software Package

- NeXTA: front-end GUI (C++)
 - Version 3: GUI Open-source data hub
 - Import
 - Other regional planning models (TransCAD, VISSUM, Cube)
 - GIS shape files (household data without node layer)
 - Traffic volume, speed, GPS data, Google Public Transit Feed
 - Export
 - Google Earth, Google fusion tables
 - Prepare network and signal data for Synchro and VISSIM (through QEM)
- DTALite: Open-source computational engine (C++)
 - Light-weight and agent-based DTA
 - Built-in OD demand matrix estimation (ODME) program
- Required Software Packages:
 - Microsoft Visual C++ 2015 Redistributable Package (x64): for DTALite parallel computing
 - Gnuplot: for build-in visualization in NeXTA.



```
.\ex C:\NeXTA_OpenSourceInternal_releaseDTALite.exe
Converting demand flow to vehicles...
Free global path set for Iteration: 16
start simulation process...
simulation clock:0 min, # of vehicles -- Generated: 0 In network: 0
simulation clock:5 min, # of vehicles -- Generated: 721 In network: 721
simulation clock:10 min, # of vehicles -- Generated: 1442, In network: 1280
simulation clock:15 min, # of vehicles -- Generated: 2163, In network: 1279
simulation clock:20 min, # of vehicles -- Generated: 2884, In network: 1279
simulation clock:25 min, # of vehicles -- Generated: 3605, In network: 1279
simulation clock:30 min, # of vehicles -- Generated: 4326, In network: 1288
simulation clock:35 min, # of vehicles -- Generated: 5047, In network: 1288
simulation clock:40 min, # of vehicles -- Generated: 5767, In network: 1288
simulation clock:45 min, # of vehicles -- Generated: 6492, In network: 1288
simulation clock:50 min, # of vehicles -- Generated: 7214, In network: 1288
simulation clock:55 min, # of vehicles -- Generated: 7934, In network: 1288
simulation clock:60 min, # of vehicles -- Generated: 8657, In network: 1288
simulation clock:65 min, # of vehicles -- Generated: 8657, In network: 559
simulation clock:70 min, # of vehicles -- Generated: 8657, In network: 559
CPU Clock: 00:00:02 Iteration: 16, Average Travel Time: 9.86283, Average Distance: 4.66305, Switch x:0, Number of Vehicles Complete Their Trips: 8657, 100% Avg Gap Error: 0.00000 and 0.00000, Avg volume error: 381, Avg x error: 17.4991
avg gap error = 0.00000 and iteration = 17
Processor 0 is working on shortest path calculation..
```

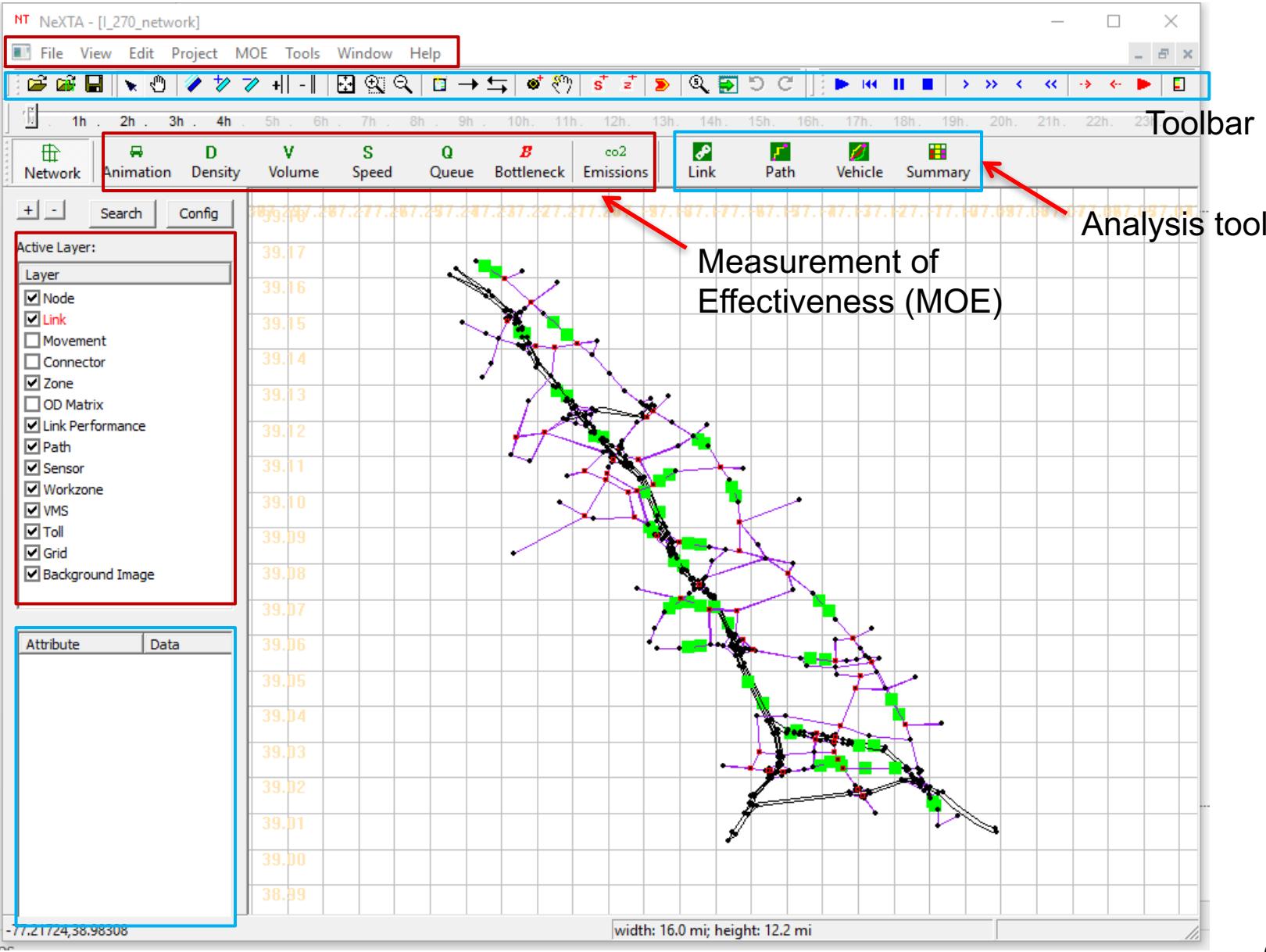
Simulation Run

DTALite-NEXTA-Software-Package > Dataset_1_West_Jordan > West_Jordan_base_case				
	Name	Date modified	Type	Size
	agent.bin	1/23/2017 12:09 AM	BIN File	5,279 KB
	background_image	1/11/2013 9:43 AM	BMP File	2,142 KB
	Base_Condition.tnp	1/22/2017 4:23 PM	TNP File	2 KB
	debug	1/23/2017 12:09 AM	Text Document	0 KB
	DTALite	6/30/2016 3:33 PM	Application	1,102 KB
	DTASettings	1/23/2017 12:09 AM	Text Document	4 KB
	input_activity_location	1/22/2017 4:14 PM	Microsoft Excel C...	1 KB

```
C:\DTALite_release\DTALite-NEXTA-Software-Package\Dataset_1_West_Jordan\West_Jordan_base_case\DTALite.exe
simu clock: 17:15,# of veh --Generated: 22445, In network: 4422
simu clock: 17:20,# of veh --Generated: 23511, In network: 4576
simu clock: 17:25,# of veh --Generated: 24612, In network: 4765
simu clock: 17:30,# of veh --Generated: 25282, In network: 4490
-- CPU Clock: 00:00:01 --
simu clock: 17:35,# of veh --Generated: 25282, In network: 3883
simu clock: 17:40,# of veh --Generated: 25282, In network: 3457
simu clock: 17:45,# of veh --Generated: 25282, In network: 3083
simu clock: 17:50,# of veh --Generated: 25282, In network: 2746
simu clock: 17:55,# of veh --Generated: 25282, In network: 2419
simu clock: 18:00,# of veh --Generated: 25282, In network: 2166
simu clock: 18:05,# of veh --Generated: 25282, In network: 1942
simu clock: 18:10,# of veh --Generated: 25282, In network: 1721
simu clock: 18:15,# of veh --Generated: 25282, In network: 1534
simu clock: 18:20,# of veh --Generated: 25282, In network: 1348
simu clock: 18:25,# of veh --Generated: 25282, In network: 1171
simu clock: 18:30,# of veh --Generated: 25282, In network: 1062
-- CPU Clock: 00:00:02 --
simu clock: 18:35,# of veh --Generated: 25282, In network: 851
simu clock: 18:40,# of veh --Generated: 25282, In network: 549
simu clock: 18:45,# of veh --Generated: 25282, In network: 379
simu clock: 18:50,# of veh --Generated: 25282, In network: 224
simu clock: 18:55,# of veh --Generated: 25282, In network: 74
simu clock: 19:00,# of veh --Generated: 25282, In network: 0
simu clock: 19:05,# of veh --Generated: 25282, In network: 0
simu clock: 19:10,# of veh --Generated: 25282, In network: 0
simu clock: 19:15,# of veh --Generated: 25282, In network: 0
simu clock: 19:20,# of veh --Generated: 25282, In network: 0
simu clock: 19:25,# of veh --Generated: 25282, In network: 0
```

NeXTA GUI

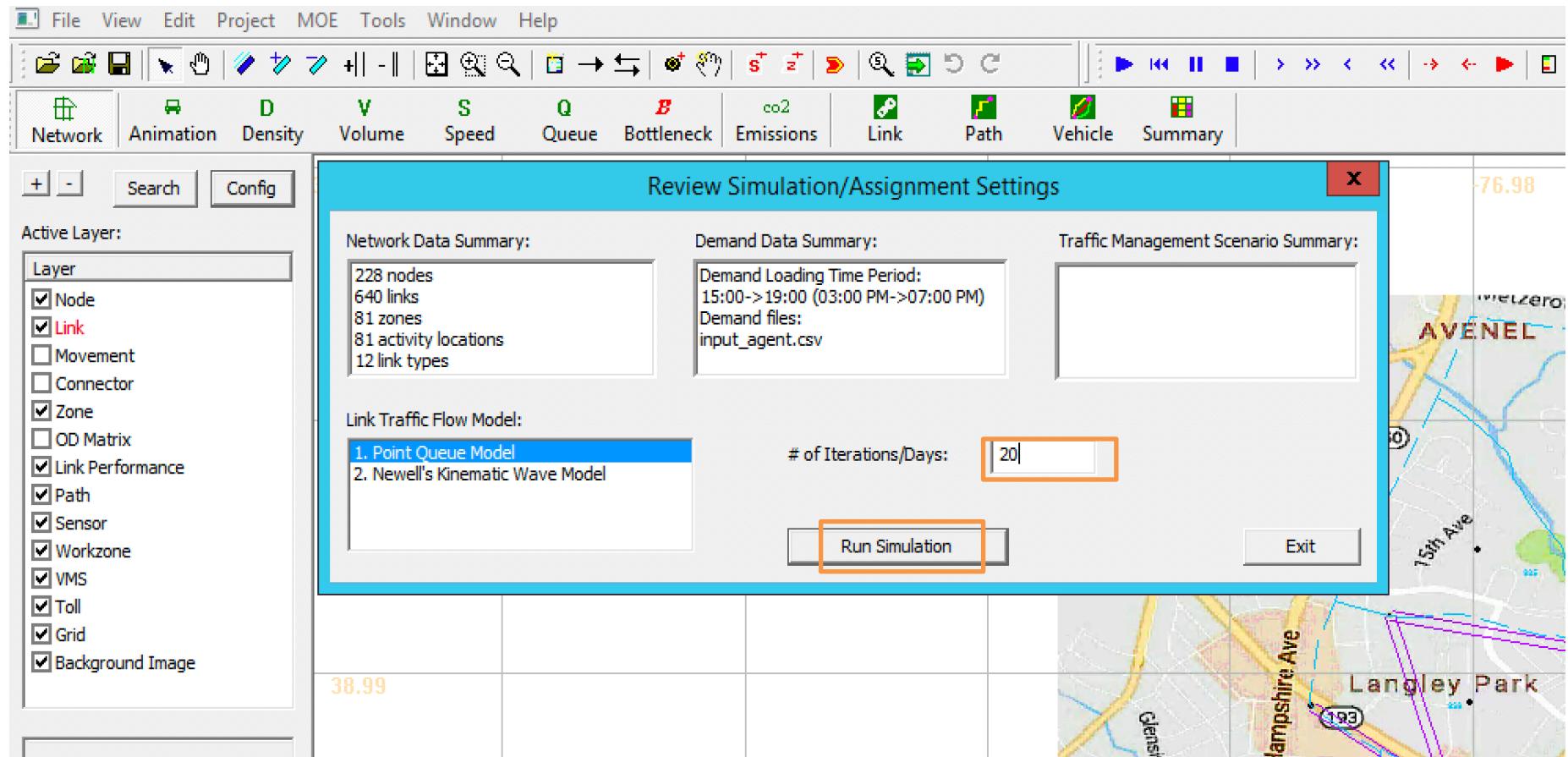
Menu



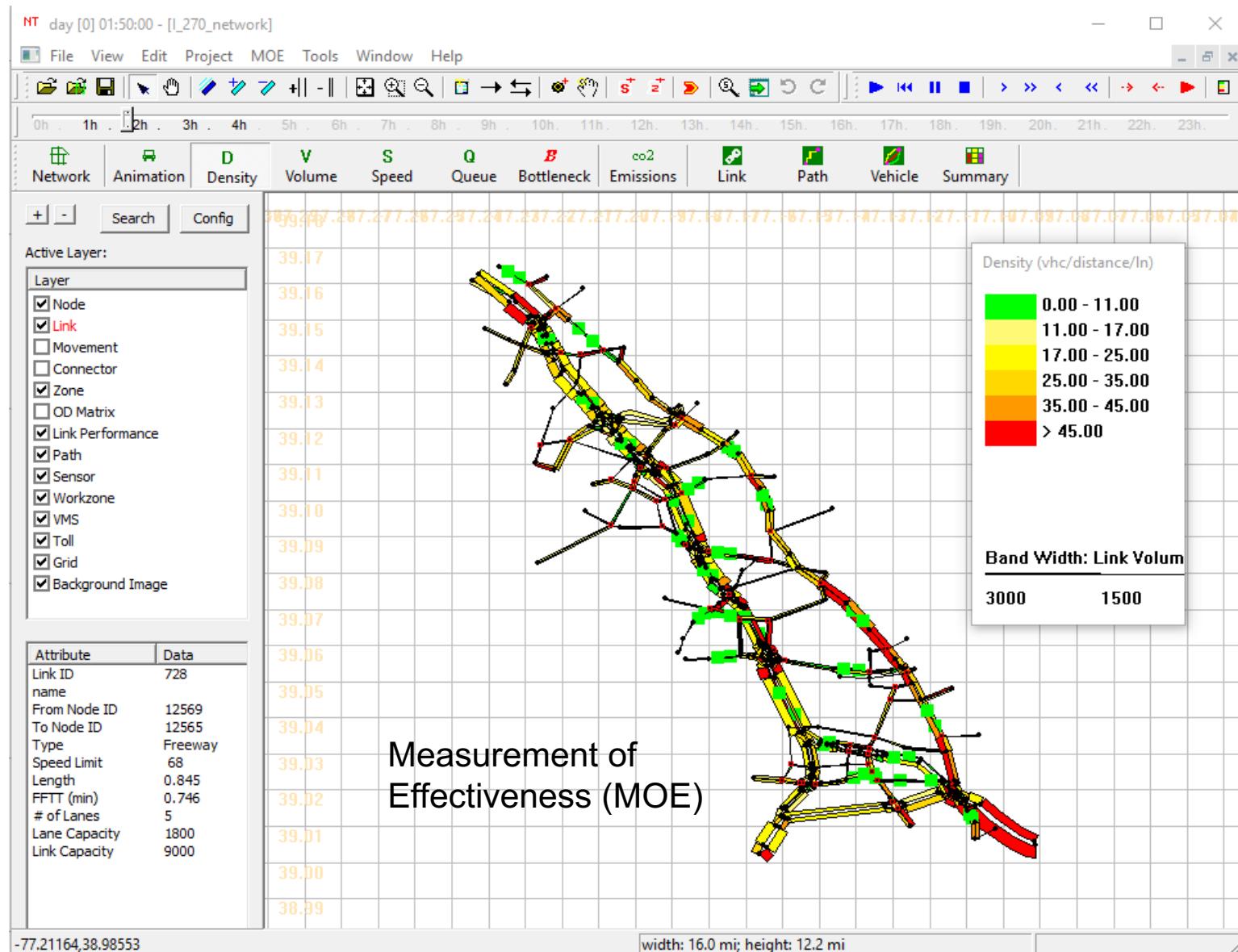
Layer control panel

Running the Model from the GUI

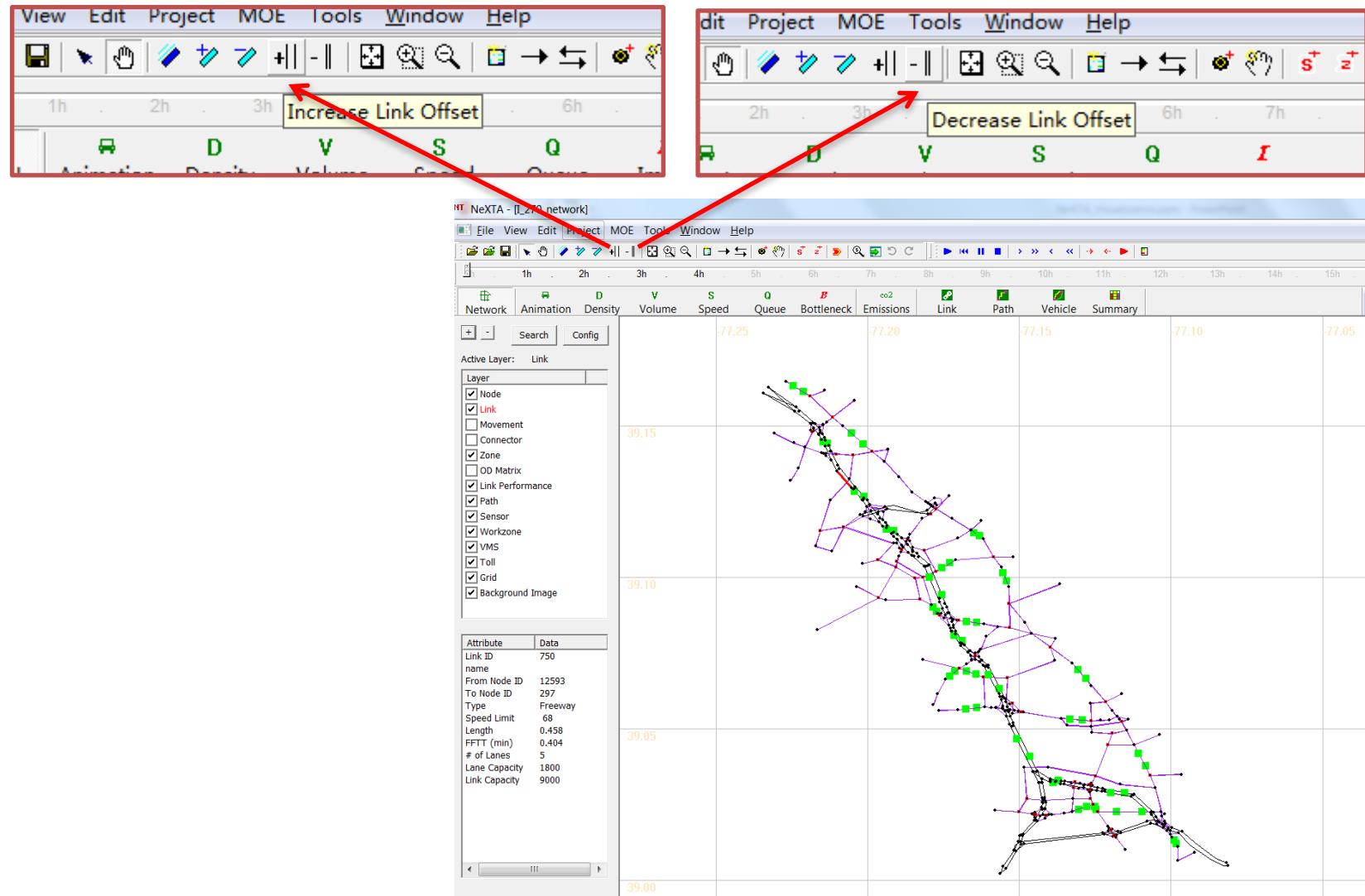
- Click the  Button on the toolbar.



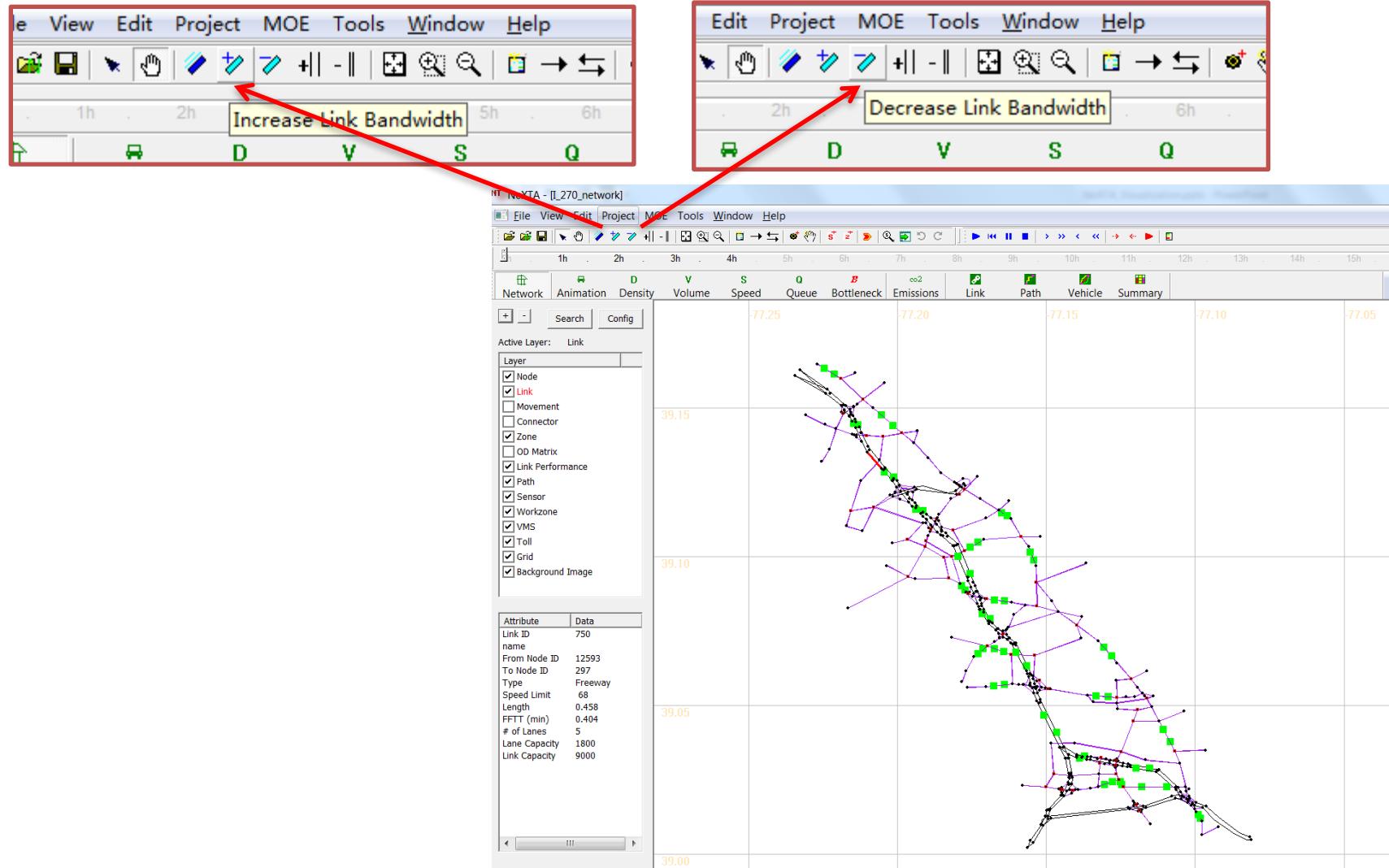
Visualization of the Simulation



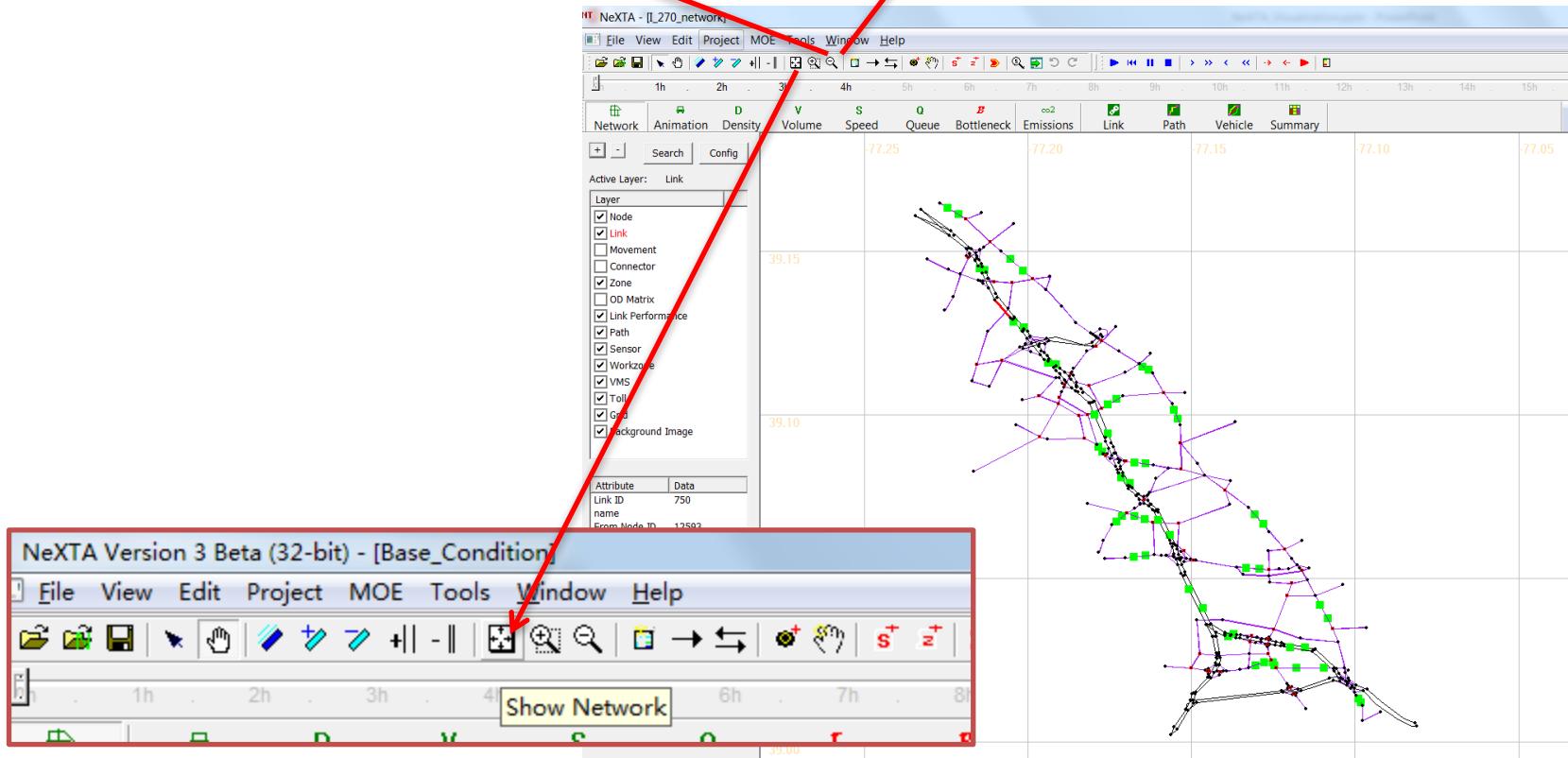
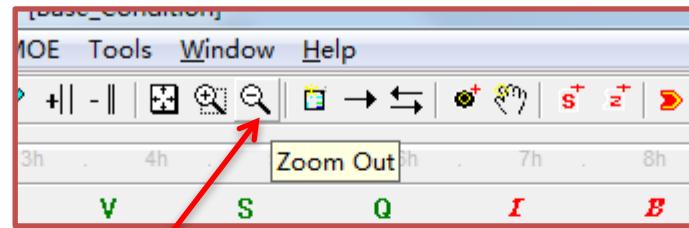
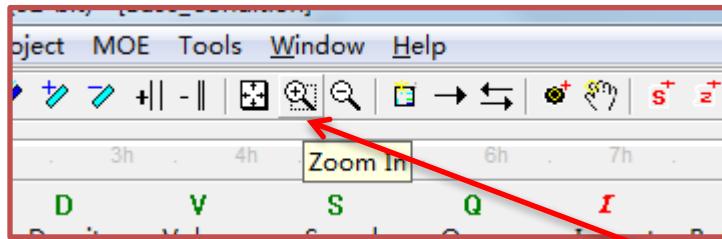
How to increase/decrease offset between links?



How to increase the bandwidth of a link?



How to zoom in, zoom out, and reset?



DTALite Input at a Glance

- Travel Demand Data
 - OD tables
 - input_agent.csv
 - Demand data from other models, CUBE, VISSUM, DynusT, etc.
 - Demand data can be time-dependent, eg. OD_table_hour1.csv, OD_table_hour2.csv, and so forth.
- Transportation Network Data
 - input_link.csv
 - input_node.csv
 - input_zone.csv
 - Related meta data files: link_type.csv, node_type.csv

DTALite Input at a Glance

- Simulation Configurations:
 - `input_scenario_settings.csv`:
 - Define DTA basic settings: number of iterations, traffic/signal models, etc.
 - Define (multiple) scenario(s)
 - `Input_demand_file_list.csv`
 - Identify the demand data file(s) for DTALite
 - Define the time period of the demand data
 - Define the type of the demand: e.g. SOV, HOV, etc.

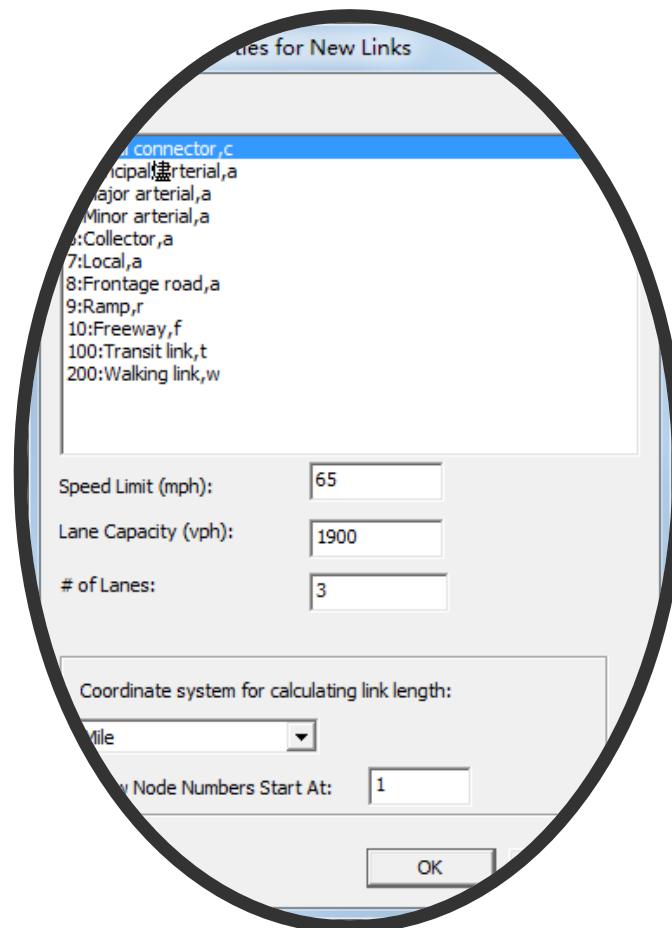
Editing the Network

- Add a link



1

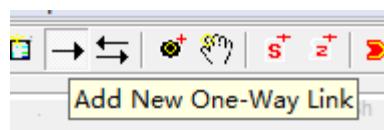
2



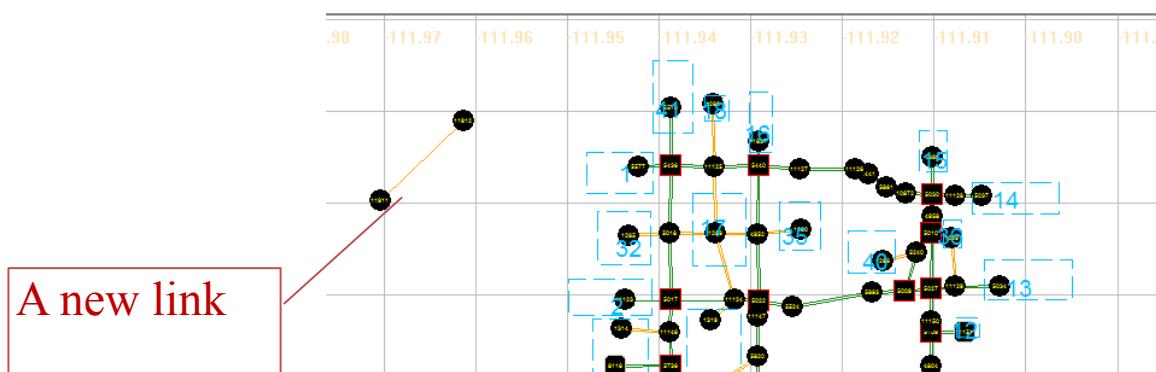
Editing the Network

- Add a link

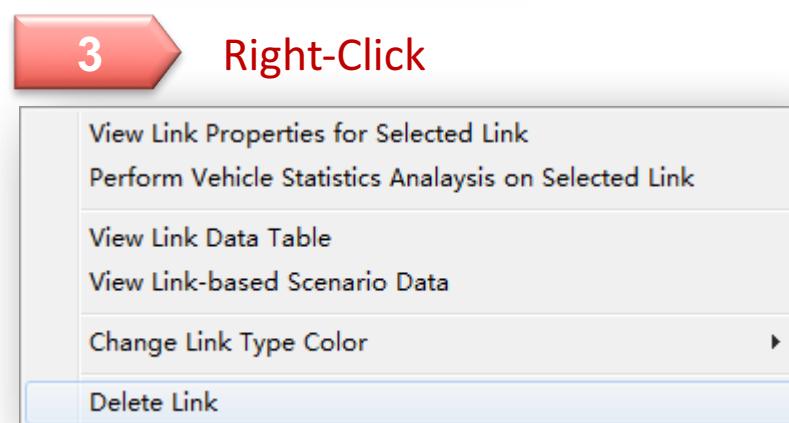
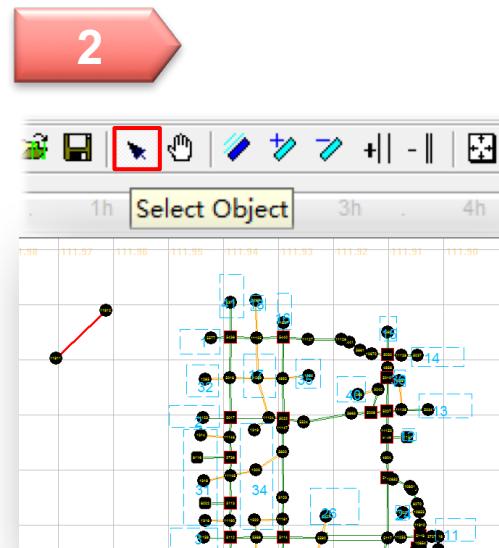
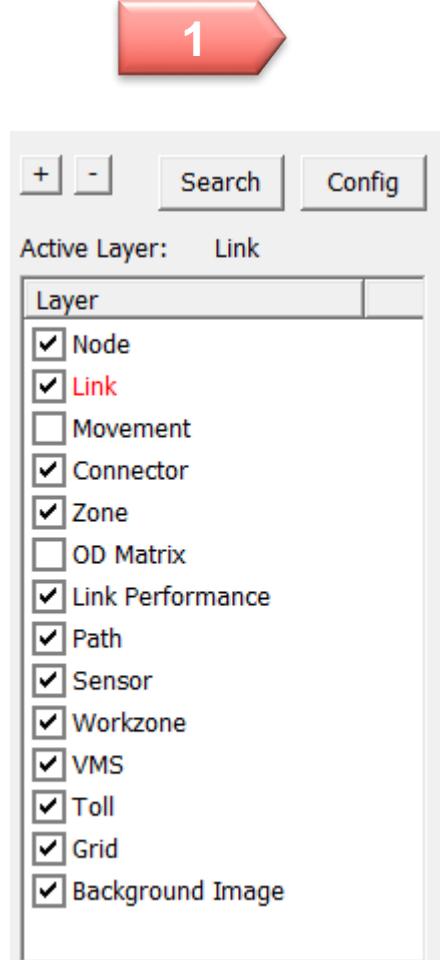
3



4



How to delete a link?



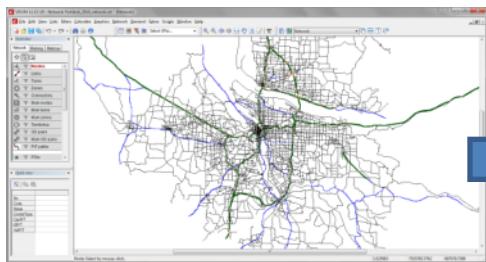
Advanced Topics: Import Data

- **Step 1:** Export network and demand data from CUBE, VISSUM, TransCAD, etc.
- **Step 2:** Prepare default network files
- **Step 3:** Import network into NeXTA
- **Step 4:** Prepare demand and configurations

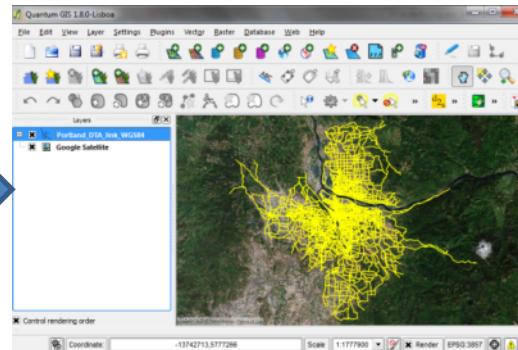
Details of importing data can be found in the learning document,
User Guides/ learning_document_GIS_importing.docx

Advanced Topics: Import Data

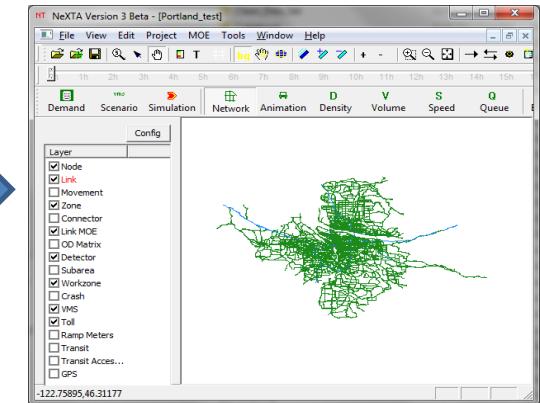
- Import GIS node/link/zone shape files
- Utilize Open-source Geospatial Data Abstraction Library (GDAL) library
- Script for mapping planning data set to NEXTA data hub



CUBE



Open-Source Q-GIS



Open-Source NEXTA GUI

- **Step 1: Export network and demand data from Cube**
- Node layer: SLC_Network_Node.shp
- Link layer: SLC_Network_Link.shp
- Zone layer: SLC_90thSouth_Zone.shp
- Demand Files: input_demand.csv

- **Step 2: Prepare default network files**
- Input_link_type.csv
- Input_node_control_type.csv
- Import_GIS_settings.csv

• Step 2: Prepare default network files

- In addition to the data from shape files through setting the import_GIS_settings.csv (2), it still needs meta data files to supplement extra necessary information for the network.

link_type	link_type_type_code	default_la	default_sp	default_nu	capacity_a	travel_time	approximate
0	centroid cc	10000	7	2	1	1	0
1	interstate/f	1900	64	2	1	1	0
2	expressway h	1200	43	2	1	1	0
3	parkway r	1150	41	2	1	1	0
4	freeway H f	1900	66	2	1	1	0
5	freeway H f	1900	66	2	1	1	0
6	freeway tr f	1900	64	2	1	1	0
7	system to r	1300	50	2	1	1	0
8	exit ramp r	800	25	2	1	1	0
9	entrance r r	900	25	2	1	1	0
10	principal a a	1000	29	2	1	1	0
11	minor arte a	900	26	2	1	1	0
12	arterial HC a	1000	25	2	1	1	0

Input_link_type.csv

- They are input_link_type.csv and input_node_control_type.csv.

control_type_name	unknown	no_control	yield_sign	2way_stop	4way_stop	pretimed	actuated	roundabout
control_type	0	1	2	3	4	5	6	100

Input_node_control_type.csv

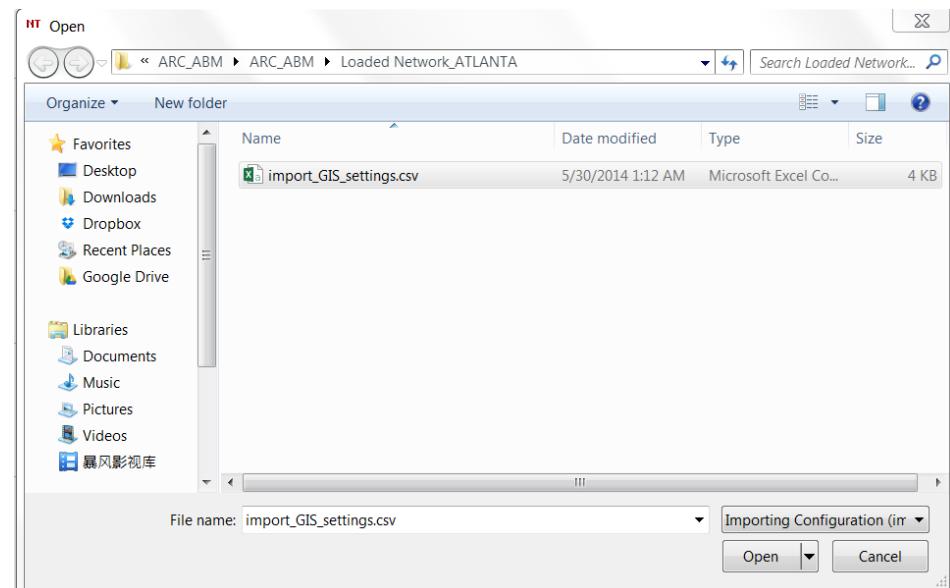
Prepare the configuration file for conversion (import_GIS_settings.csv)

section	key	value	allowed_values	required
file_name	node	SLC_Network_Node.shp		x
file_name	link	SLC_Network_Link.shp		x
file_name	zone	SLC_90thSouth_Zone.shp		
file_name	centroid			
file_name	connector			
configuration	with_decimal_long_l at	yes	yes;no	
configuration	length_unit	mile	km;mile	
configuration	number_of_lanes_on eway_vs_twoway	oneway	oneway;twoway	
configuration	lane_capacity_vs_link _capacity	lane	lane;link	

Please refer to the learning document:
User Guides/learning_document_GIS_importing.docx

- **Step 3: Import network into NeXTA**

- Open NEXTA_for_GIS.exe
- Click “File” → “Import GIS Data Set” → Click “NEXT”
- Choose the right “import_GIS_setting.csv”
- Click “Import GIS Data”



- **Step 4: Prepare demand and configurations**
 - Input_demand.csv
 - Input_demand_file_list.csv

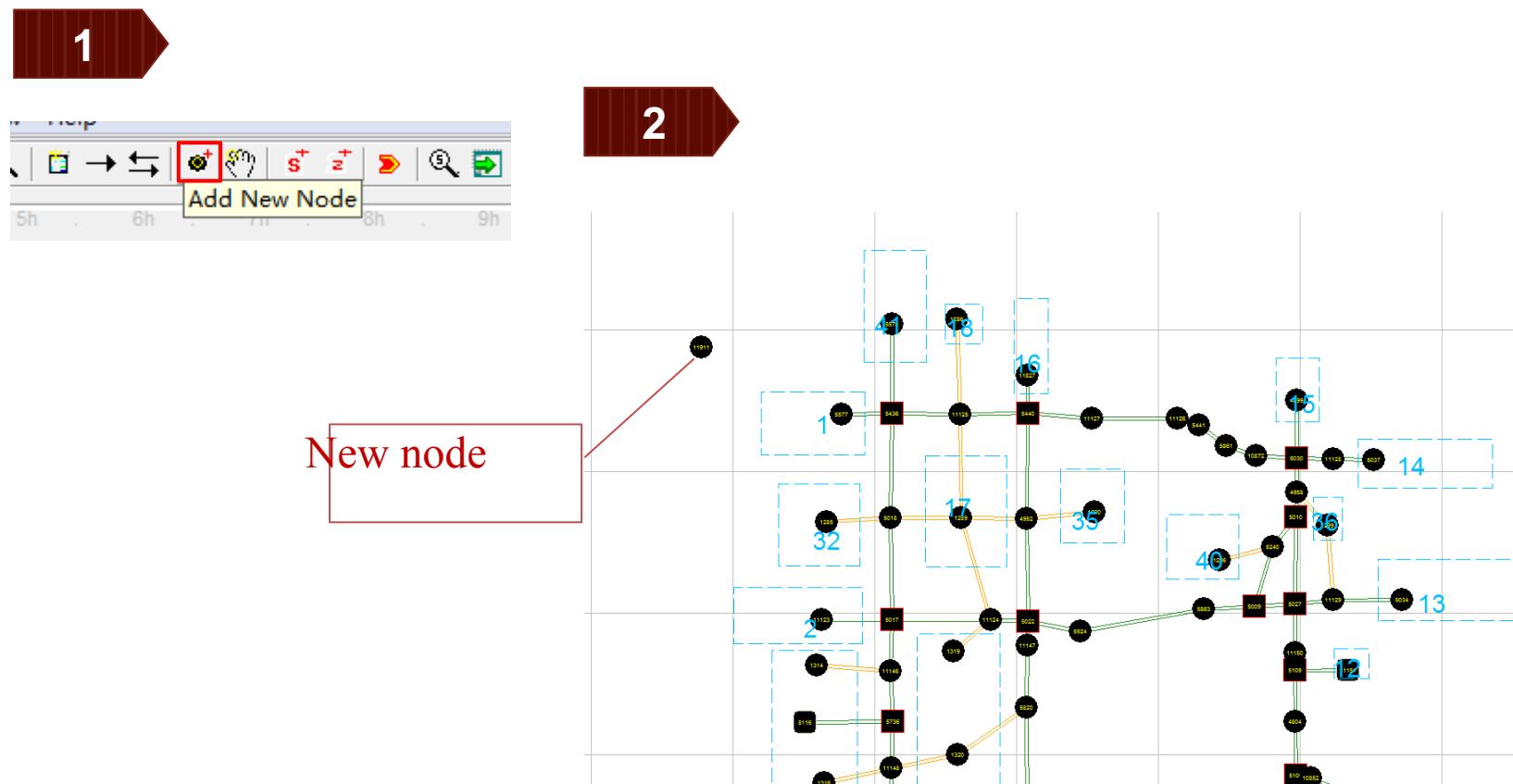
Please refer to: *User Guides/1_Data Structure and Workflow of DTALite and NeXTA, Chapter 2, Page 19*, for the details about how to prepare input_demand_file_list.csv



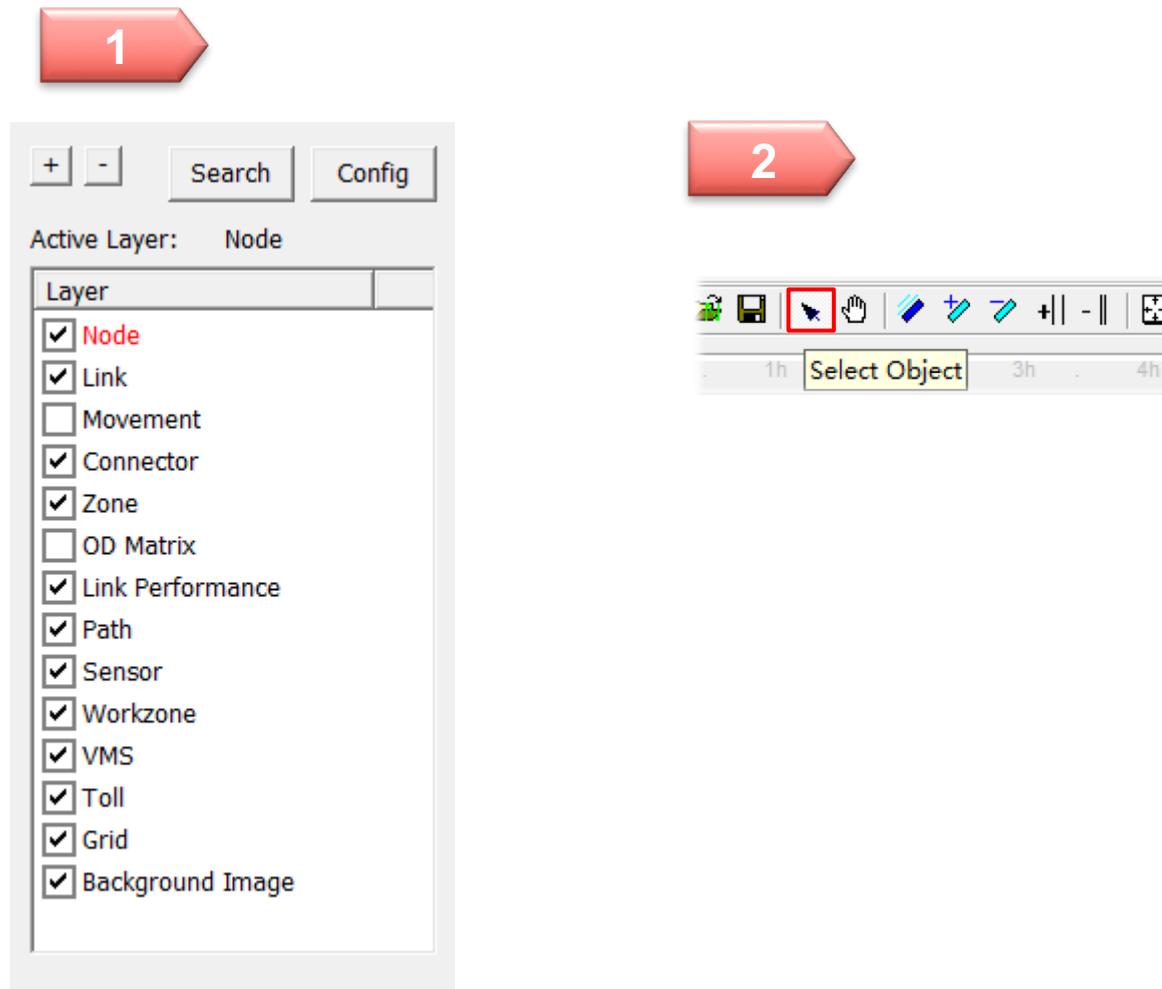
**Additional Slides on the Basic Features
of the NeXTA GUI**

Editing the Network

- Add a node

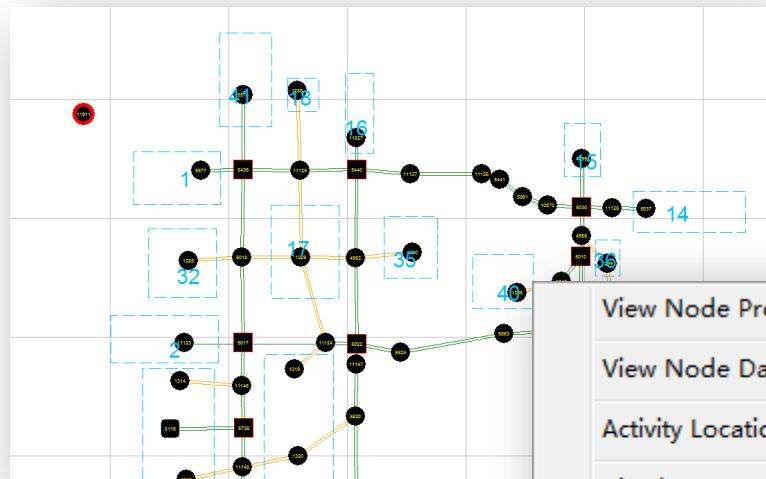


How to delete a node?

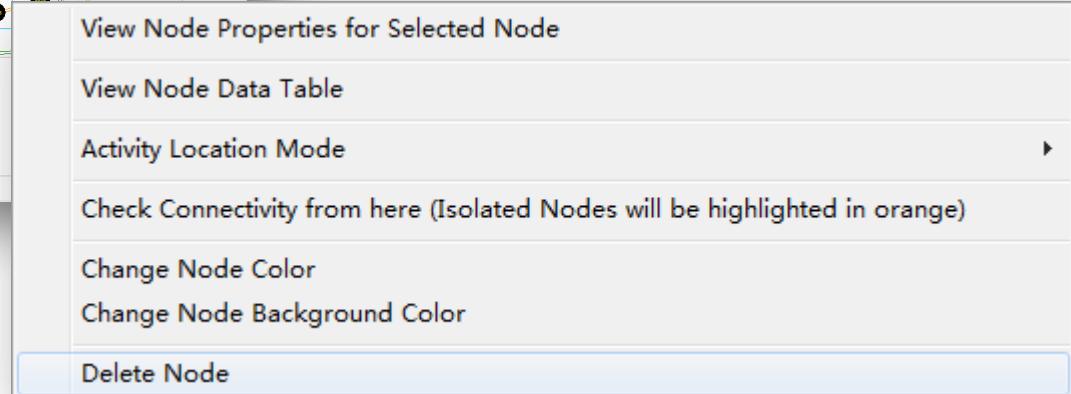


How to delete a node?

3



4

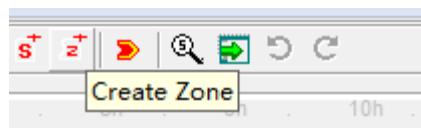


Editing the Network

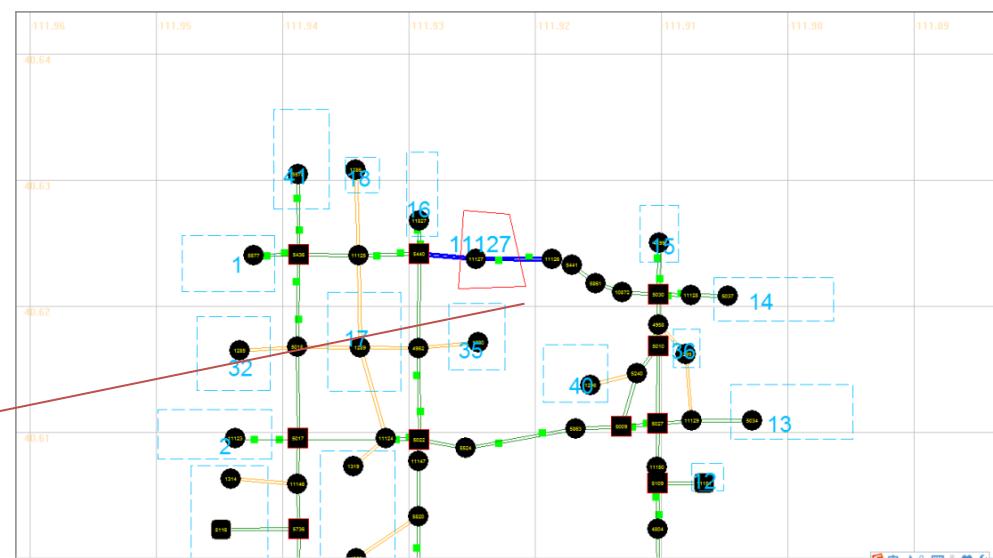
- Add a zone

1

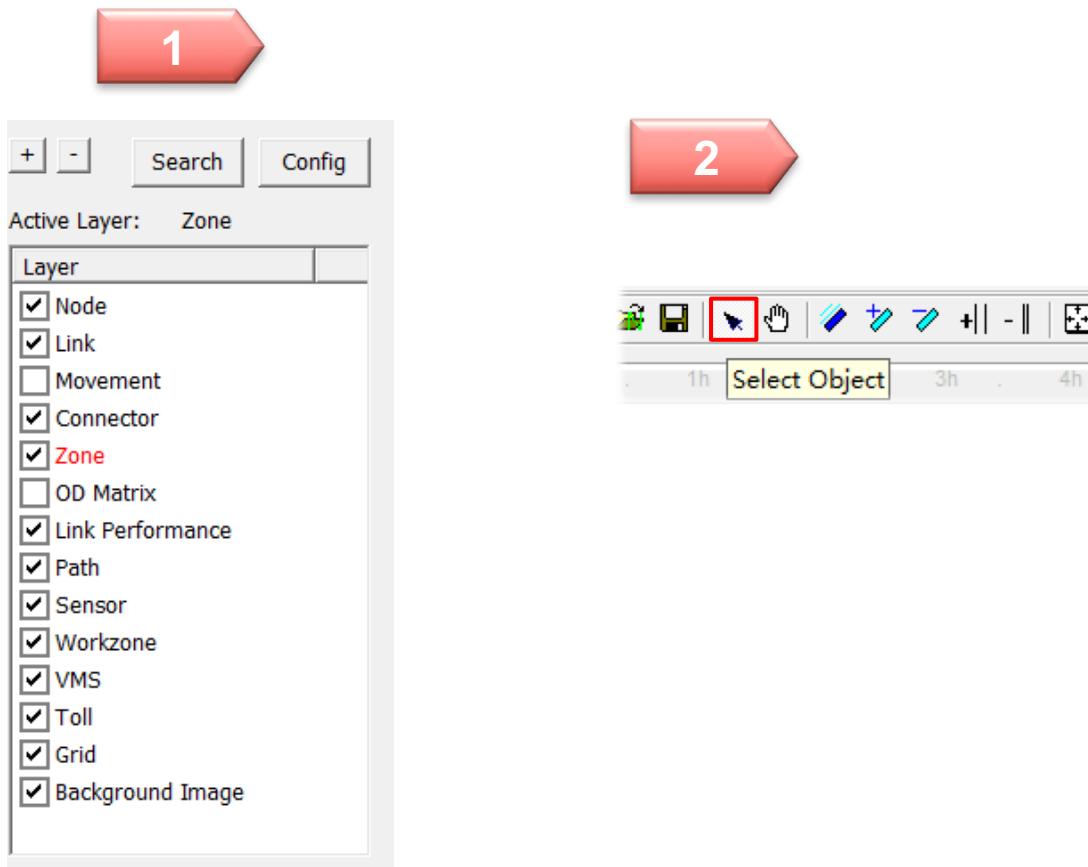
2



A new zone

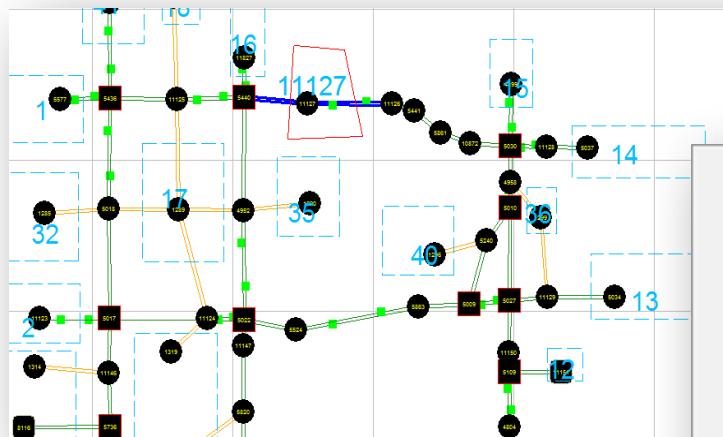


How to delete a zone?

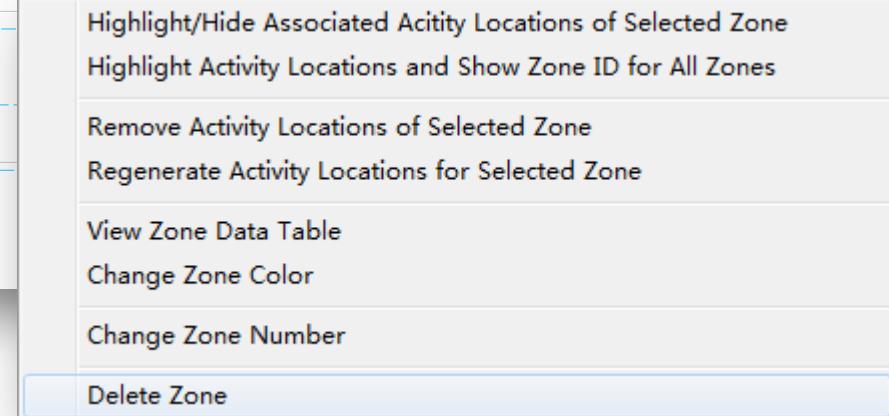


How to delete a zone?

3

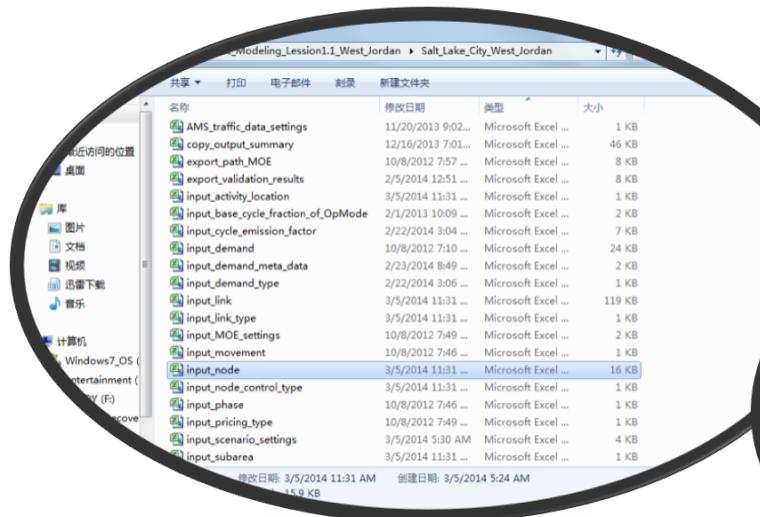


4



How to add node in CSV file?

1



2

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
11257	0	1	no_contr	-111.908	40.56975	<Point><coordinates>-111.908371,40.569754</coordinates>	/>	<Point>							
11259	0	1	no_contr	-111.927	40.56201	<Point><coordinates>-111.92737,40.562009</coordinates>	/>	<Point>							
11261	0	1	no_contr	-111.935	40.56223	<Point><coordinates>-111.934612,40.562298</coordinates>	/>	<Point>							
11261	0	1	no_contr	-111.929	40.56575	<Point><coordinates>-111.929153,40.555761</coordinates>	/>	<Point>							
11262	0	1	no_contr	-111.944	40.56225	<Point><coordinates>-111.94462,40.562254</coordinates>	/>	<Point>							
11489	0	1	no_contr	-111.903	40.56965	<Point><coordinates>-111.90325,40.569647</coordinates>	/>	<Point>							
11507	0	1	no_contr	-111.903	40.56225	<Point><coordinates>-111.902507,40.562239</coordinates>	/>	<Point>							
11763	0	1	no_contr	-111.904	40.58491	<Point><coordinates>-111.905480,40.584909</coordinates>	/>	<Point>							
11827	0	1	no_contr	-111.928	40.56278	<Point><coordinates>-111.920192,40.562782</coordinates>	/>	<Point>							
11910	0	1	no_contr	-111.904	40.58998	<Point><coordinates>-111.904215,40.589983</coordinates>	/>	<Point>							
3000	0	1	no_contr	-111.912	40.58102	<Point><coordinates>-111.912007,40.581000</coordinates>	/>	<Point>							
3001	0	1	no_contr	-111.91	40.58079	<Point><coordinates>-111.909873,40.580790</coordinates>	/>	<Point>							
3002	0	1	no_contr	-111.911	40.58197	<Point><coordinates>-111.91260,40.581966</coordinates>	/>	<Point>							

How to add a link in CSV file?

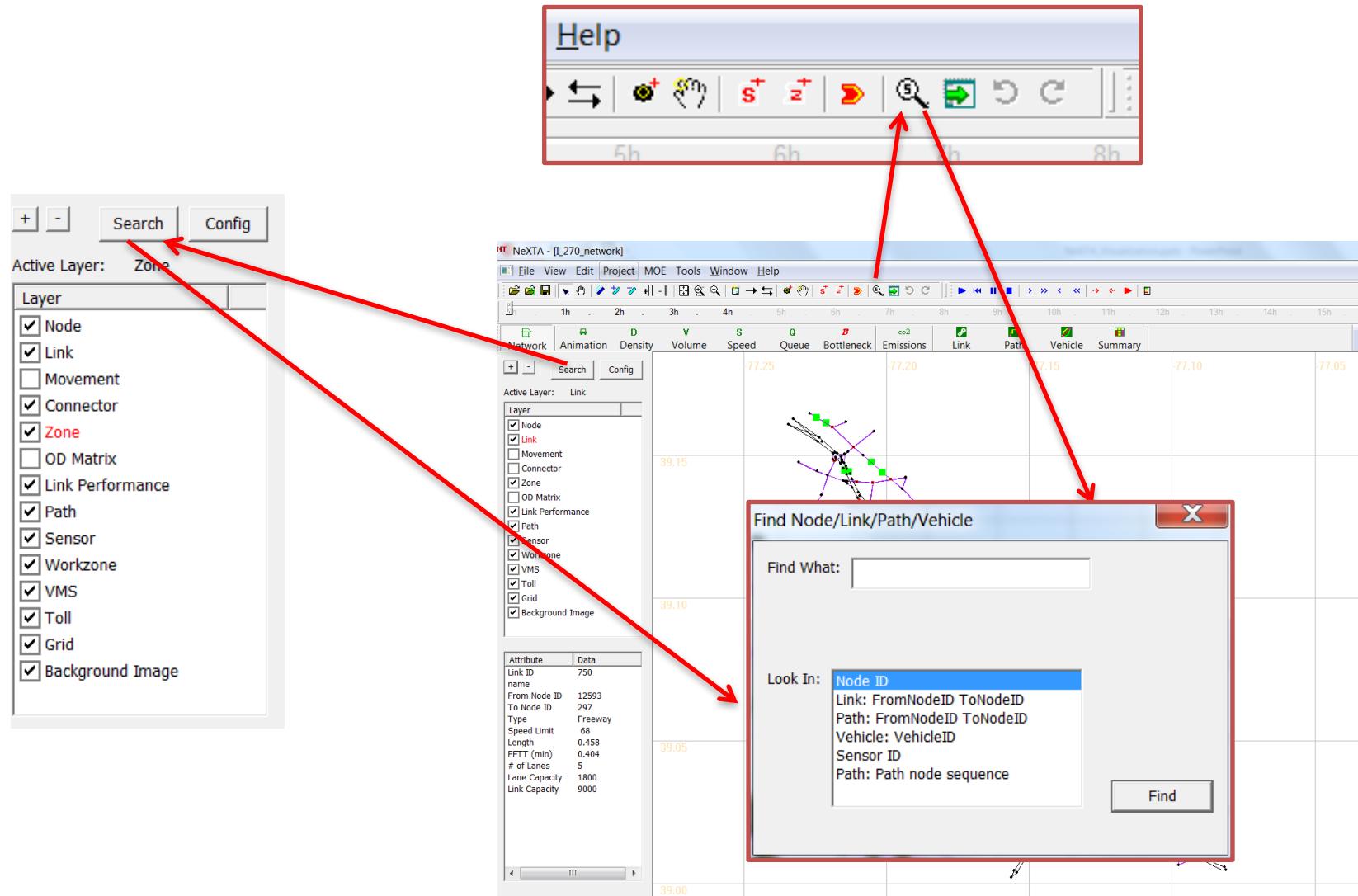
1

名称	修改日期	类型	大小
AMS_traffic_data_settings	11/20/2013 9:02...	Microsoft Excel ...	1 KB
copy_output_summary	12/16/2013 7:01...	Microsoft Excel ...	46 KB
export_path_MOE	10/8/2012 7:57 ...	Microsoft Excel ...	8 KB
export_validation_results	2/5/2014 12:51 ...	Microsoft Excel ...	8 KB
input_activity_location	3/5/2014 11:31 ...	Microsoft Excel ...	1 KB
input_base_cycle_fraction_of_OpMode	2/1/2013 10:09 ...	Microsoft Excel ...	2 KB
input_cycle_emission_factor	2/22/2014 3:04 ...	Microsoft Excel ...	7 KB
input_demand	10/8/2012 7:10 ...	Microsoft Excel ...	24 KB
input_demand_meta_data	2/23/2014 8:49 ...	Microsoft Excel ...	2 KB
input_demand_type	2/22/2014 3:06 ...	Microsoft Excel ...	1 KB
input_link	3/5/2014 11:31 ...	Microsoft Excel ...	119 KB
input_link_type	3/5/2014 11:31 ...	Microsoft Excel ...	1 KB
input_MOE_settings	10/8/2012 7:49 ...	Microsoft Excel ...	2 KB
input_movement	10/8/2012 7:46 ...	Microsoft Excel ...	1 KB
input_node	3/5/2014 11:31 ...	Microsoft Excel ...	16 KB
input_node_control_type	3/5/2014 11:31 ...	Microsoft Excel ...	1 KB
input_phase	10/8/2012 7:46 ...	Microsoft Excel ...	1 KB
input_pricing_type	10/8/2012 7:49 ...	Microsoft Excel ...	1 KB
input_scenario_settings	3/5/2014 5:30 AM	Microsoft Excel ...	4 KB
input_subarea	3/5/2014 11:31 ...	Microsoft Excel ...	1 KB

2

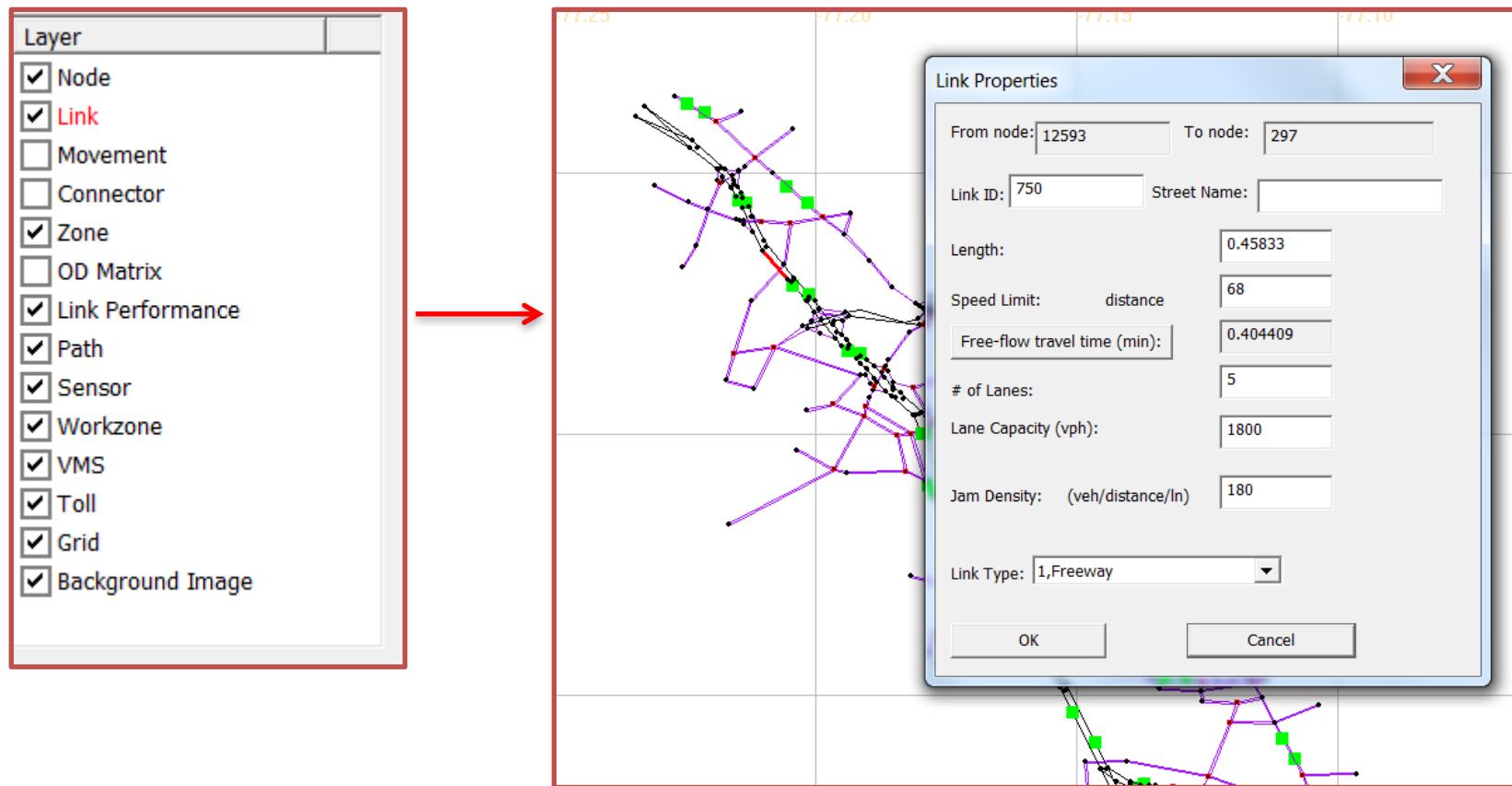
A	B	C	D	E	F	G	H	I	J	K	L	M	N
1000	Sout	0_0_BA		11127	11126	Major art	1	0.3179	2	40	1000	3	180
9800	Sout	0_0_AB		11181	11182	Minor art	1	0.06164	1	40	800	4	180
9800	Sout	0_0_BA		11182	11181	Minor art	1	0.06667	1	40	800	4	190
9800	Sout	0_0_AB		11184	11185	Minor art	1	0.33499	1	40	800	4	190
9800	Sout	0_0_BA		11257	11184	Minor art	1	0.33499	1	40	800	4	190
342	0			5592	5117	Major art	1	0.01195	2	40	1000	3	180
343	0			5117	5592	Major art	1	0.01195	2	40	1000	3	180
344	0			5117	1358	Major art	1	0.00439	2	40	1000	3	180
345	0			1358	5117	Major art	1	0.00439	2	40	1000	3	180
346	0			1358	3000	Major art	1	0.00525	2	40	1000	3	180
347	0			3000	1358	Major art	1	0.00525	2	40	1000	3	180
3	0			3000	1359	Major art	1	0.0056	2	40	1000	3	180
0	0			1359	3000	Major art	1	0.0056	2	40	1000	3	180
0	0			3002	1358	Zonal cor	1	0.00157	2	50	2000	1	
0	0			1358	3002	Zonal cor	1	0.00157	2	50	2000	1	
0	0			3001	3002	Zonal cor	1	0.00206	2	50	2000	1	
0	0			3002	3001	Zonal cor	1	0.00206	2	50	2000	1	
0	0			3001	8172	Major art	1	0.00407	2	40	1000		
0	0			8172	3001	Major art	1	0.00407	2	40	1000		

How to search node/link/path/vehicle?

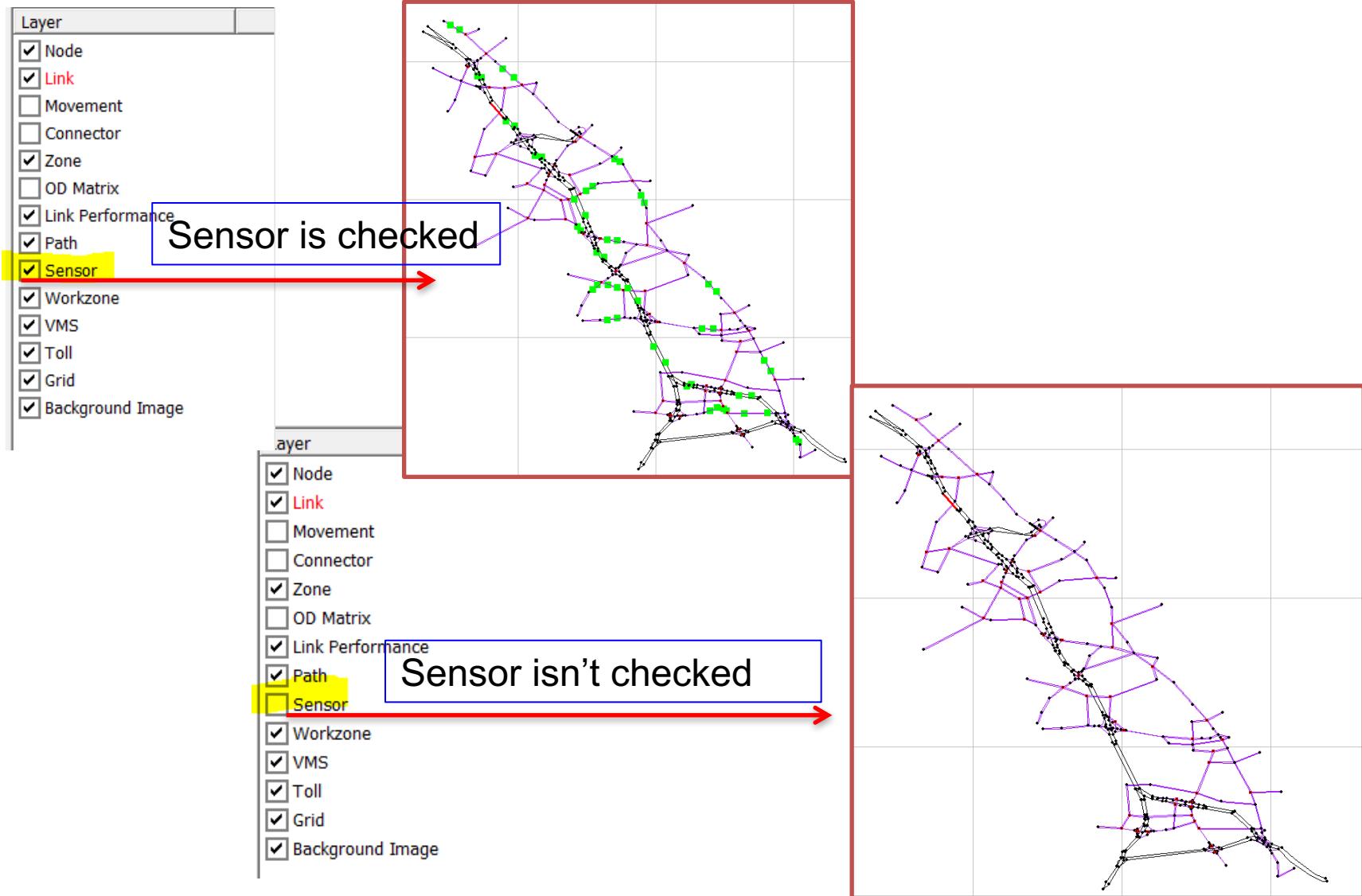


How to use GIS layer panel?

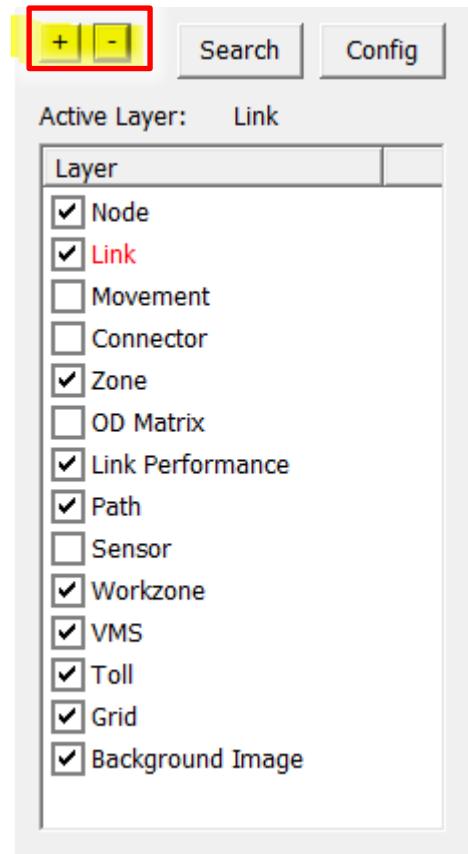
- Link layer is selected.



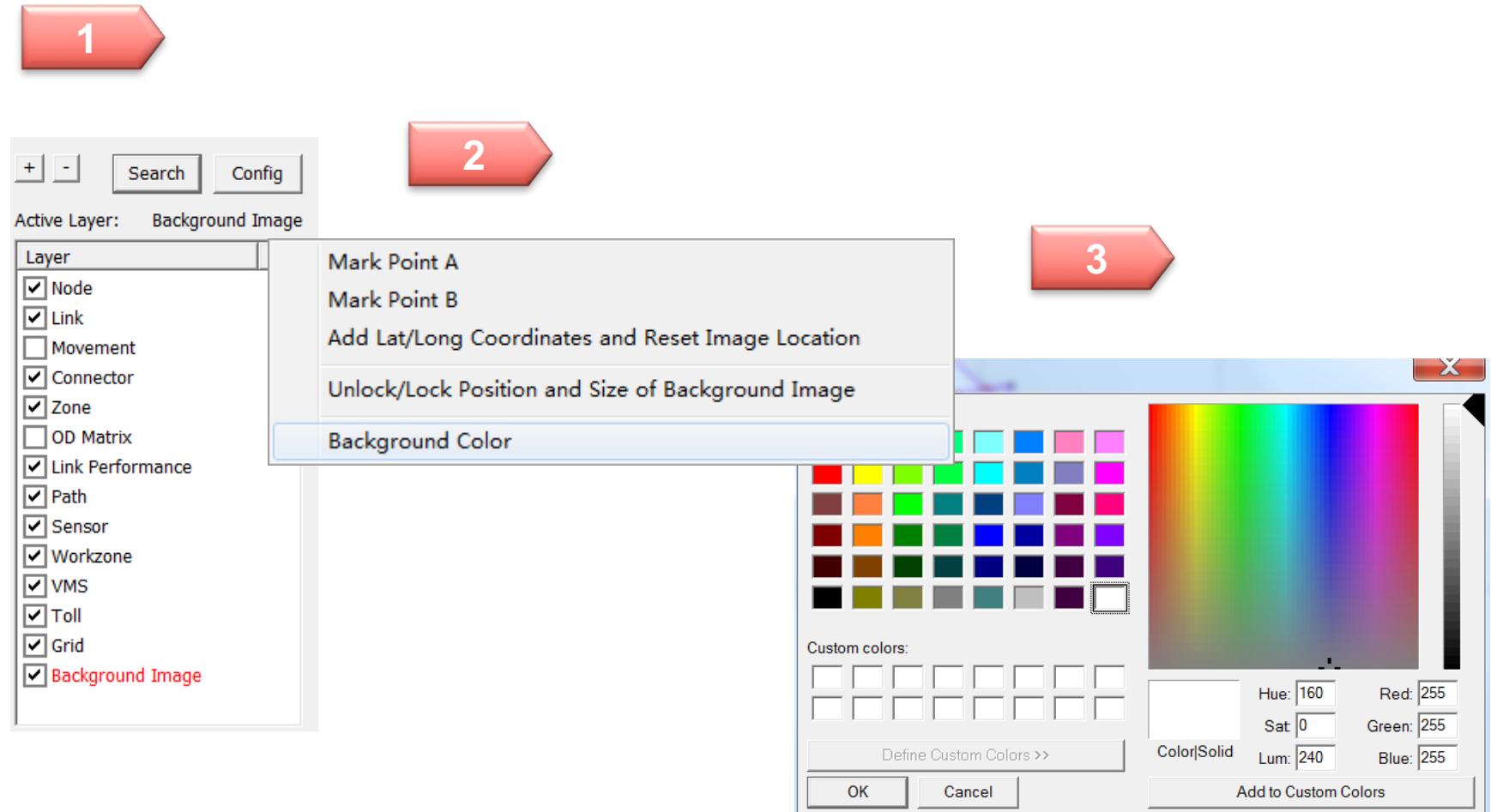
How to use GIS layer panel?



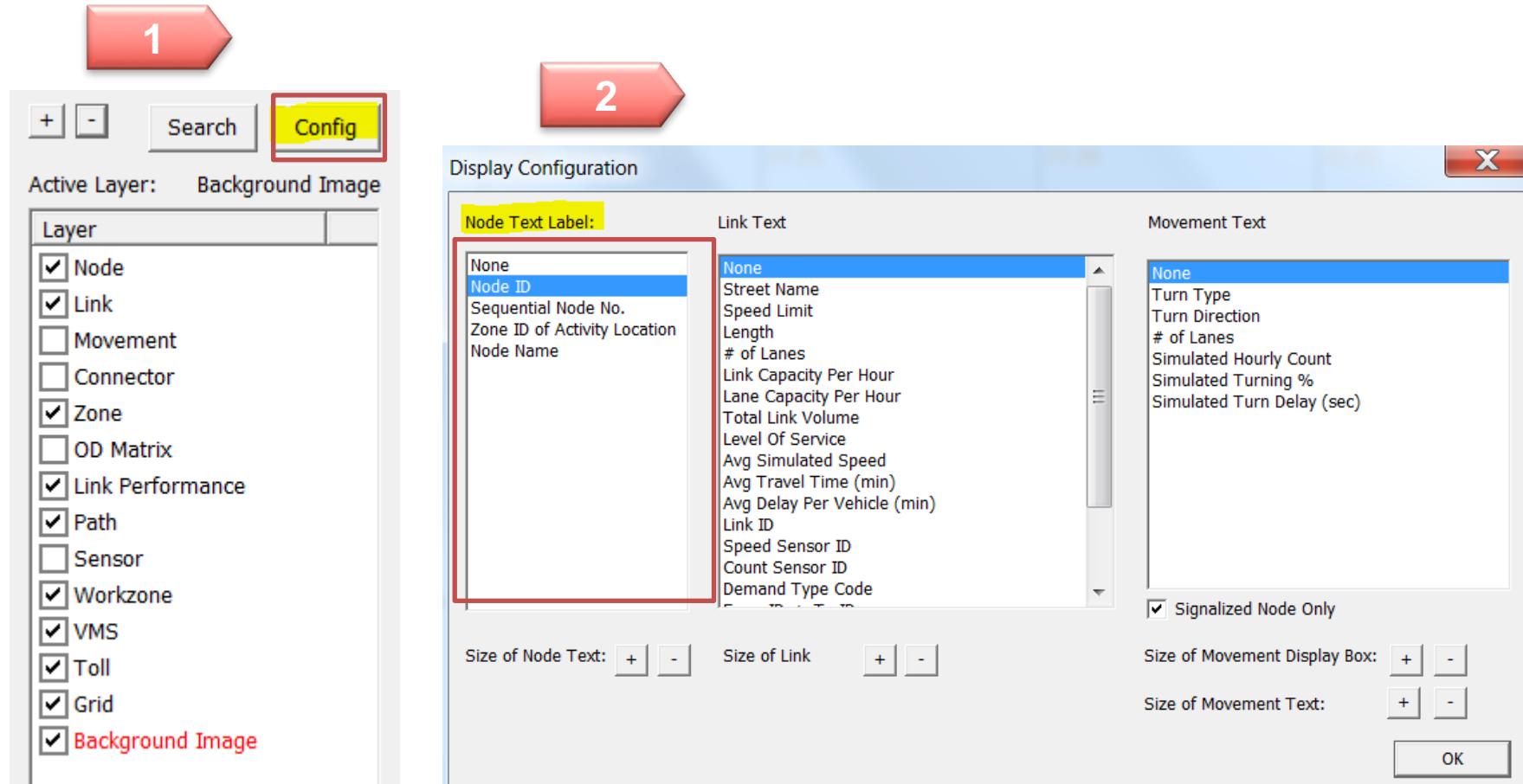
How to increase/decrease the size of node?



How to change background color?



How to show node label?



How to show link label?

1

2

The screenshot shows a software interface with two main sections. On the left, a toolbar has a red arrow labeled '1' pointing to the 'Config' button, which is highlighted with a yellow box. Below the toolbar is a section titled 'Active Layer: Background Image' with a 'Layer' dropdown menu. The 'Node' and 'Link' checkboxes are checked. A red box highlights the 'Link' checkbox. Other unchecked options include Movement, Connector, Zone, OD Matrix, Link Performance, Path, Sensor, Workzone, VMS, Toll, Grid, and Background Image. To the right, a red arrow labeled '2' points to a 'Display Configuration' dialog box. This dialog has tabs for 'Node Text Label' and 'Link Text'. The 'Link Text' tab is active, showing a list of options with 'Avg Simulated Speed' selected and highlighted by a red box. Other options include None, Node ID, Sequential Node No., Zone ID of Activity Location, Node Name, Street Name, Speed Limit, Length, # of Lanes, Link Capacity Per Hour, Lane Capacity Per Hour, Total Link Volume, Level Of Service, Avg Travel Time (min), Avg Delay Per Vehicle (min), Link ID, Speed Sensor ID, Count Sensor ID, and Demand Type Code. At the bottom of the dialog are size adjustment sliders for 'Size of Node Text', 'Size of Link', 'Size of Movement Display Box', and 'Size of Movement Text', along with an 'OK' button. To the right of the dialog is a map view showing a network of nodes and links, with various speed values labeled on the links.

How to show movement label?

1

2

Display Configuration

Node Text Label:

- None
- Node ID**
- Sequential Node No.
- Zone ID of Activity Location
- Node Name

Link Text

- None
- Street Name
- Speed Limit
- Length
- # of Lanes
- Link Capacity Per Hour
- Lane Capacity Per Hour
- Total Link Volume
- Level Of Service
- Avg Simulated Speed
- Avg Travel Time (min)
- Avg Delay Per Vehicle (min)
- Link ID
- Speed Sensor ID
- Count Sensor ID
- Demand Type Code

Movement Text

- None
- Turn Type
- Turn Direction
- # of Lanes
- Simulated Hourly Count
- Simulated Turning %
- Simulated Turn Delay (sec)

Signalized Node Only

Size of Node Text: + -

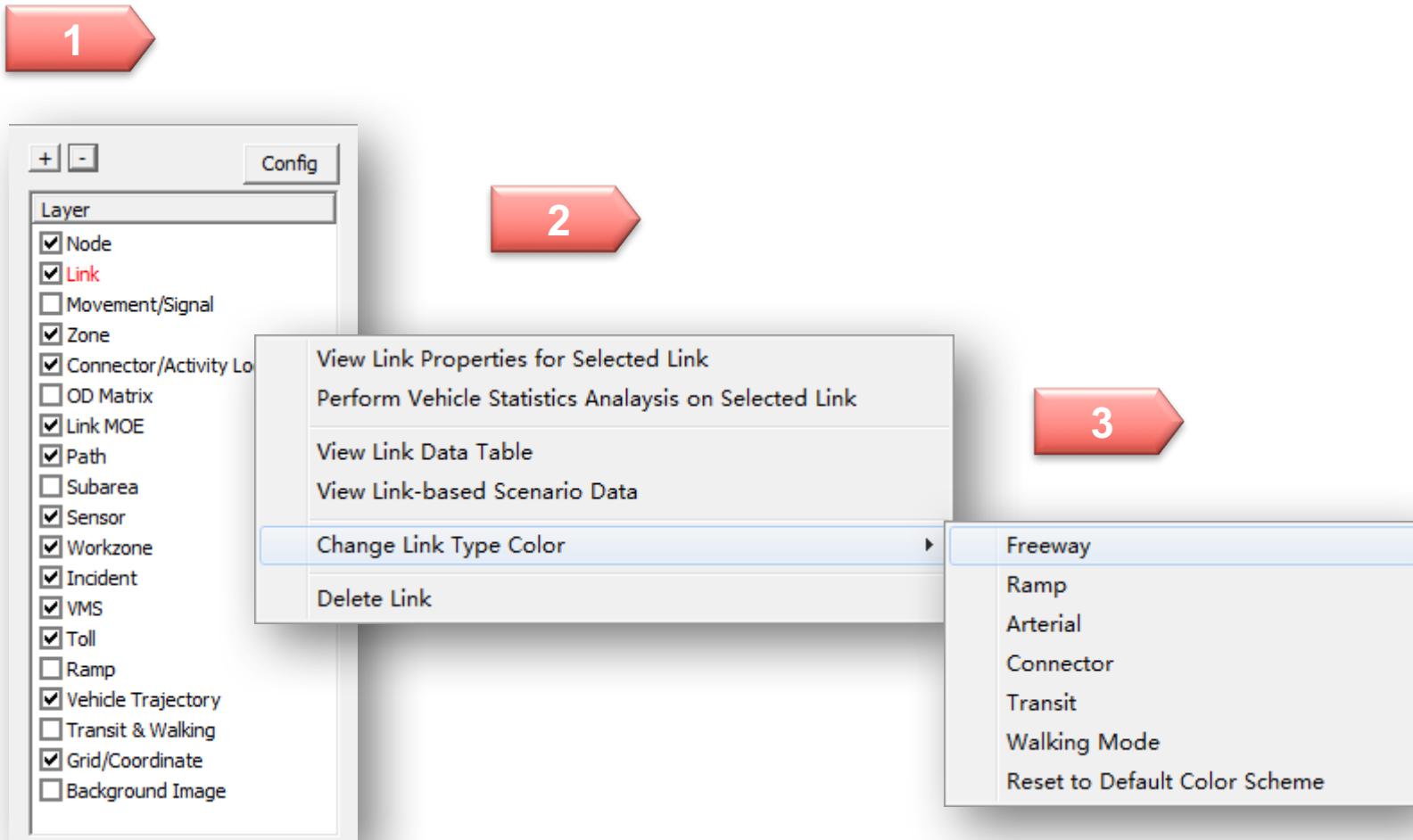
Size of Link: + -

Size of Movement Display Box: + -

Size of Movement Text: + -

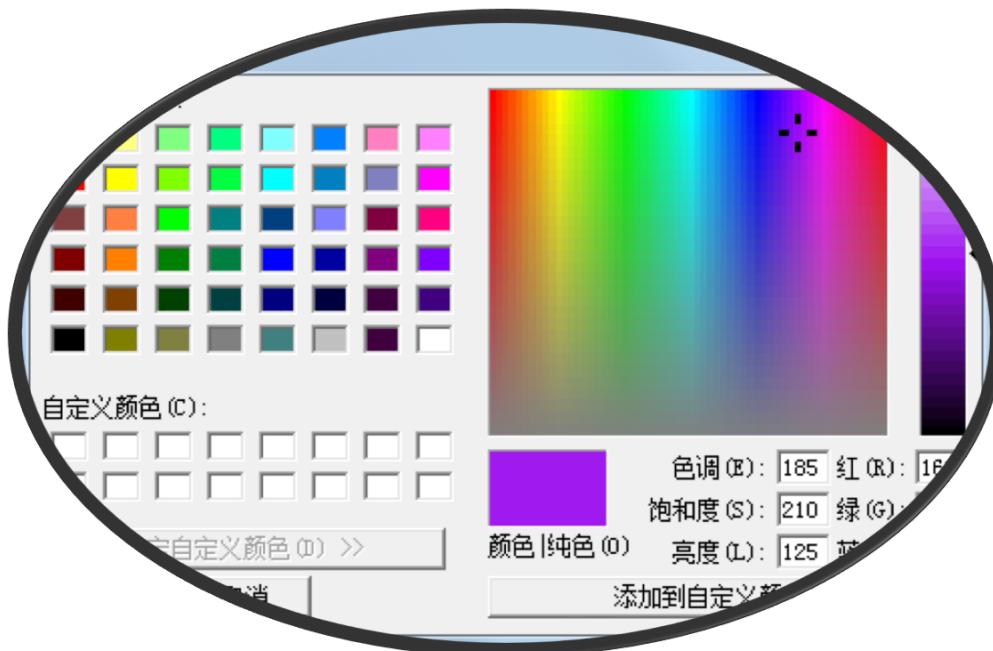
OK

How to change link color?

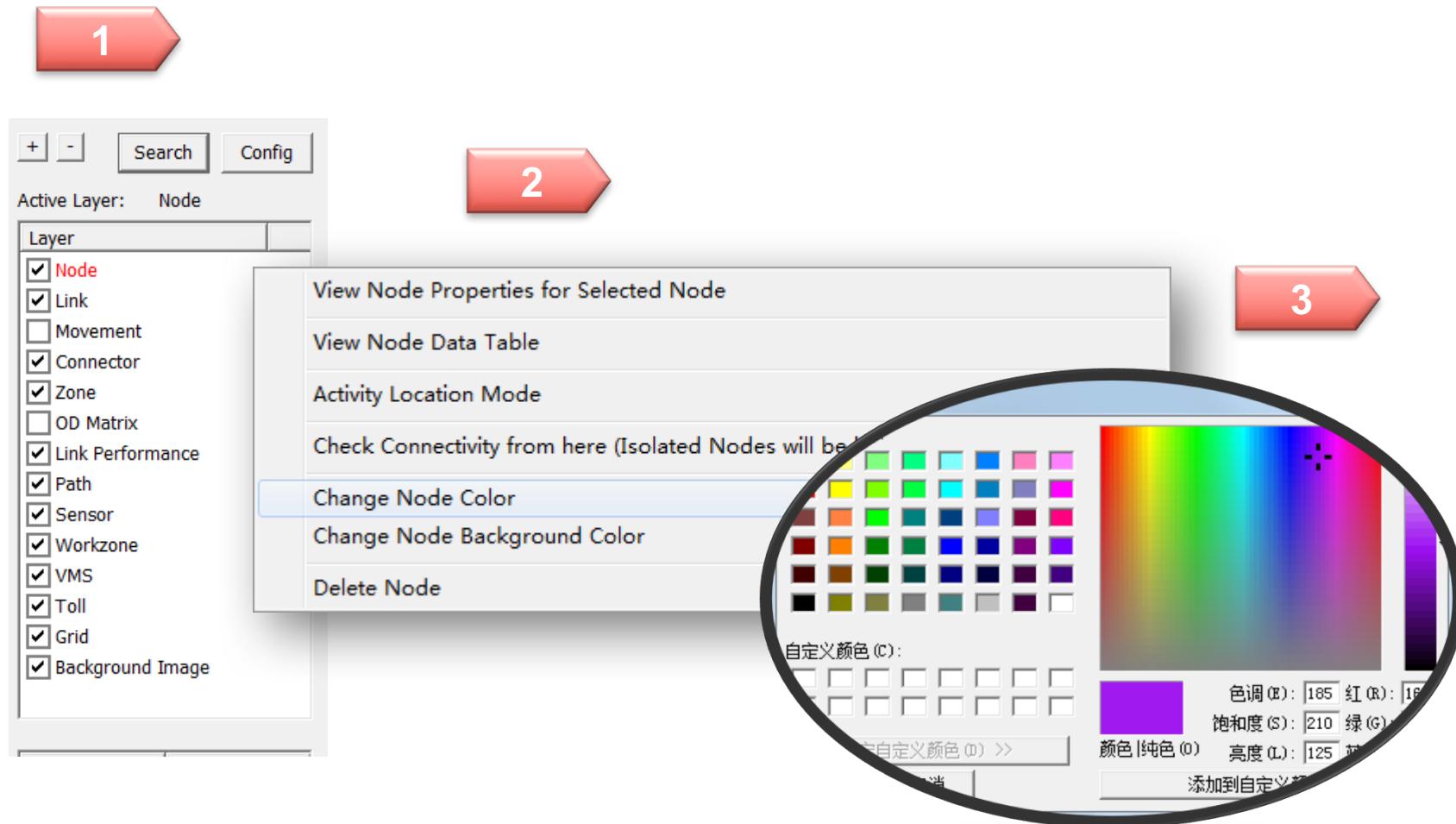


How to change link color?

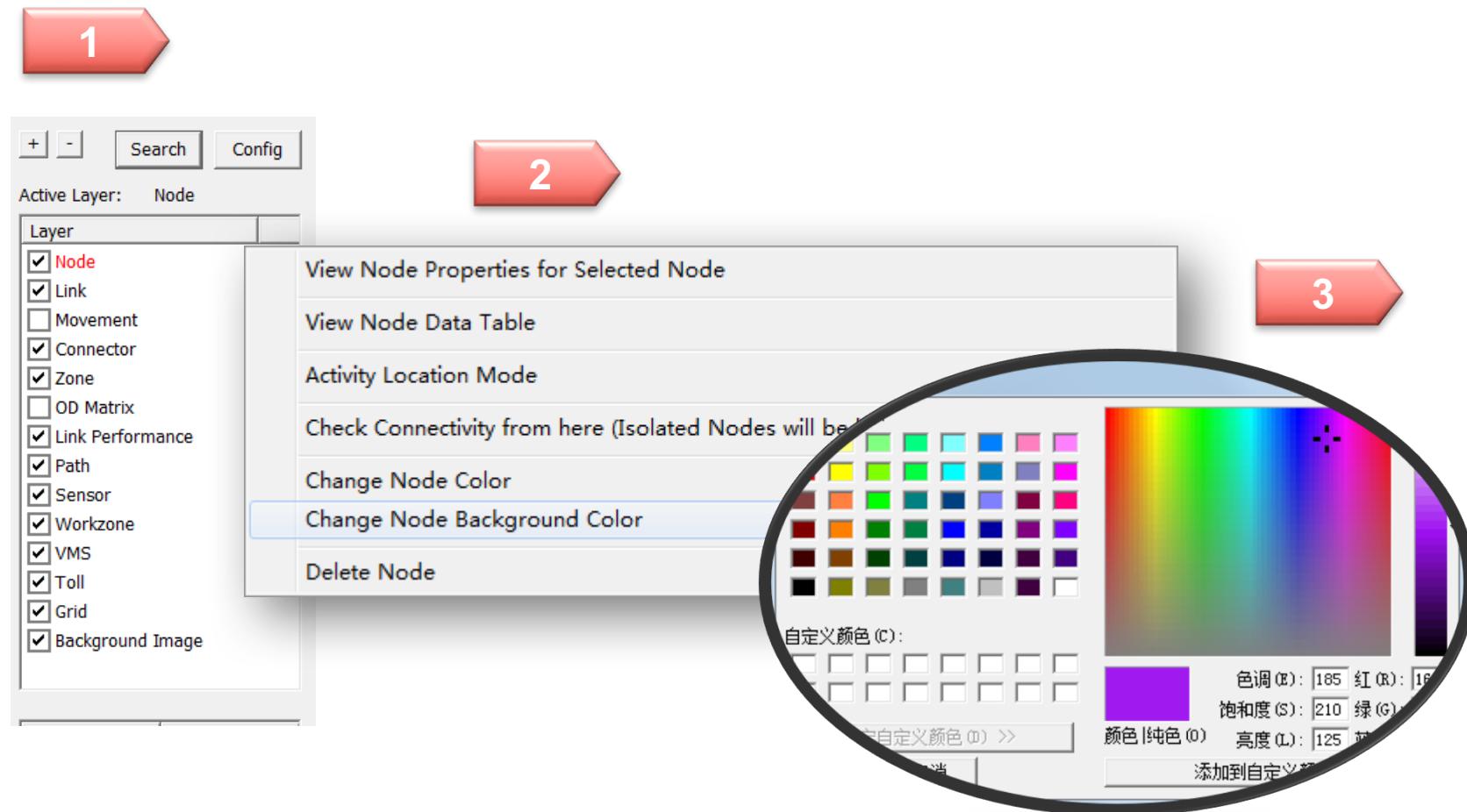
4



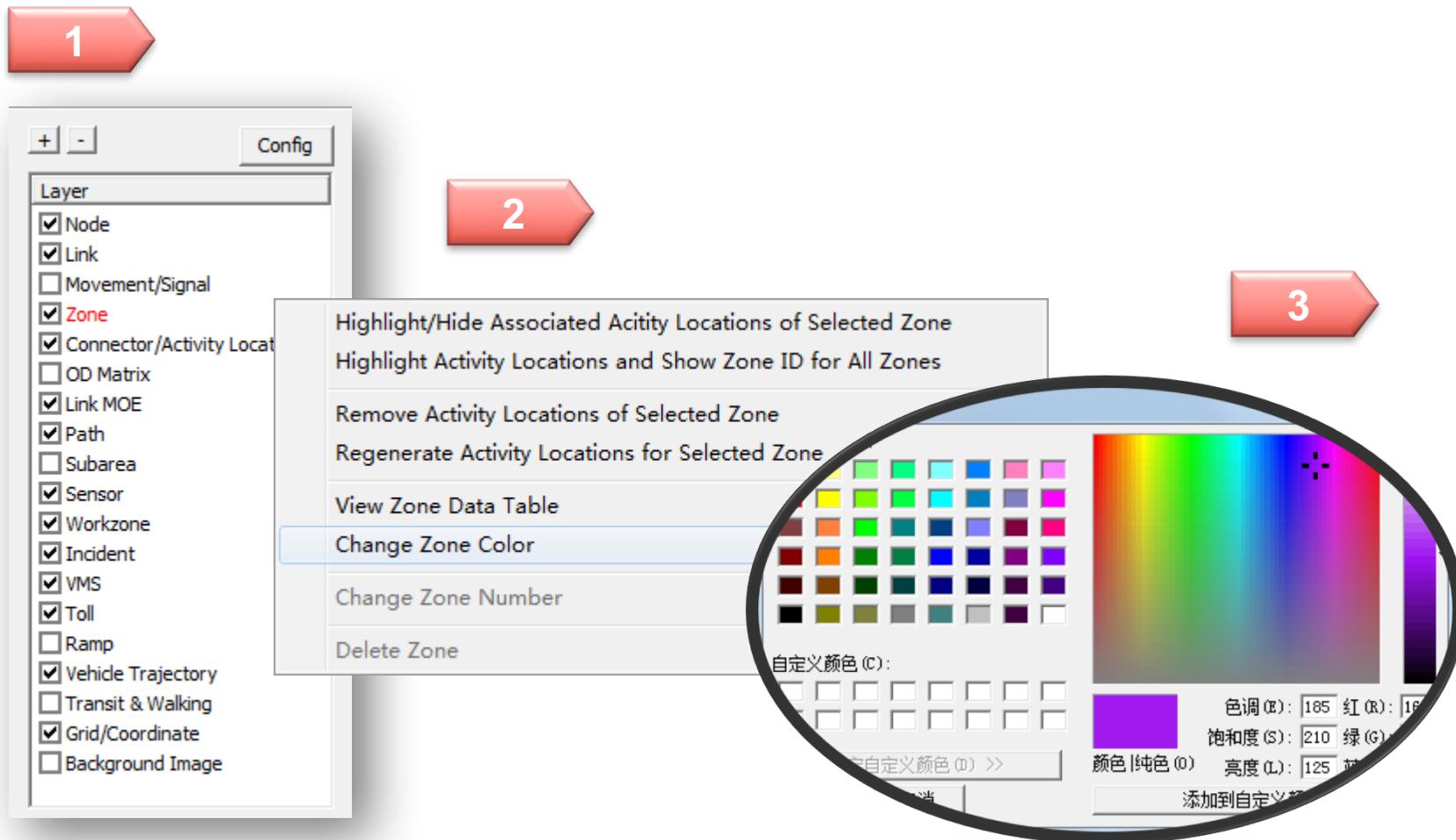
How to change node color?



How to change node background color?



How to change zone color?



How to show/hide grid?

