Simulation Data Editor for Re:sim

SEdit

Manual Part 2: Scenario Data Setting

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Contents

1. Outline of Scenario Data Setting

The scenario is defined as the set of the Event, which is given by the Trigger and Action pair in SEdit.
There are three types of the Event, the System event, Vehicle-object event and Pedestrian-Object event.
The Trigger data for three events is common, and the action data is different among events.

The trigger data assigns the conditions when the Action happen. It is represented by the combination of following trigger elements.

1. Time Trigger
2. Position Tigger
3. Velocity Trigger
4. TTC Trigger
5. Function Extender Trigger
6. External Trigger

The action data specifies what to happen.
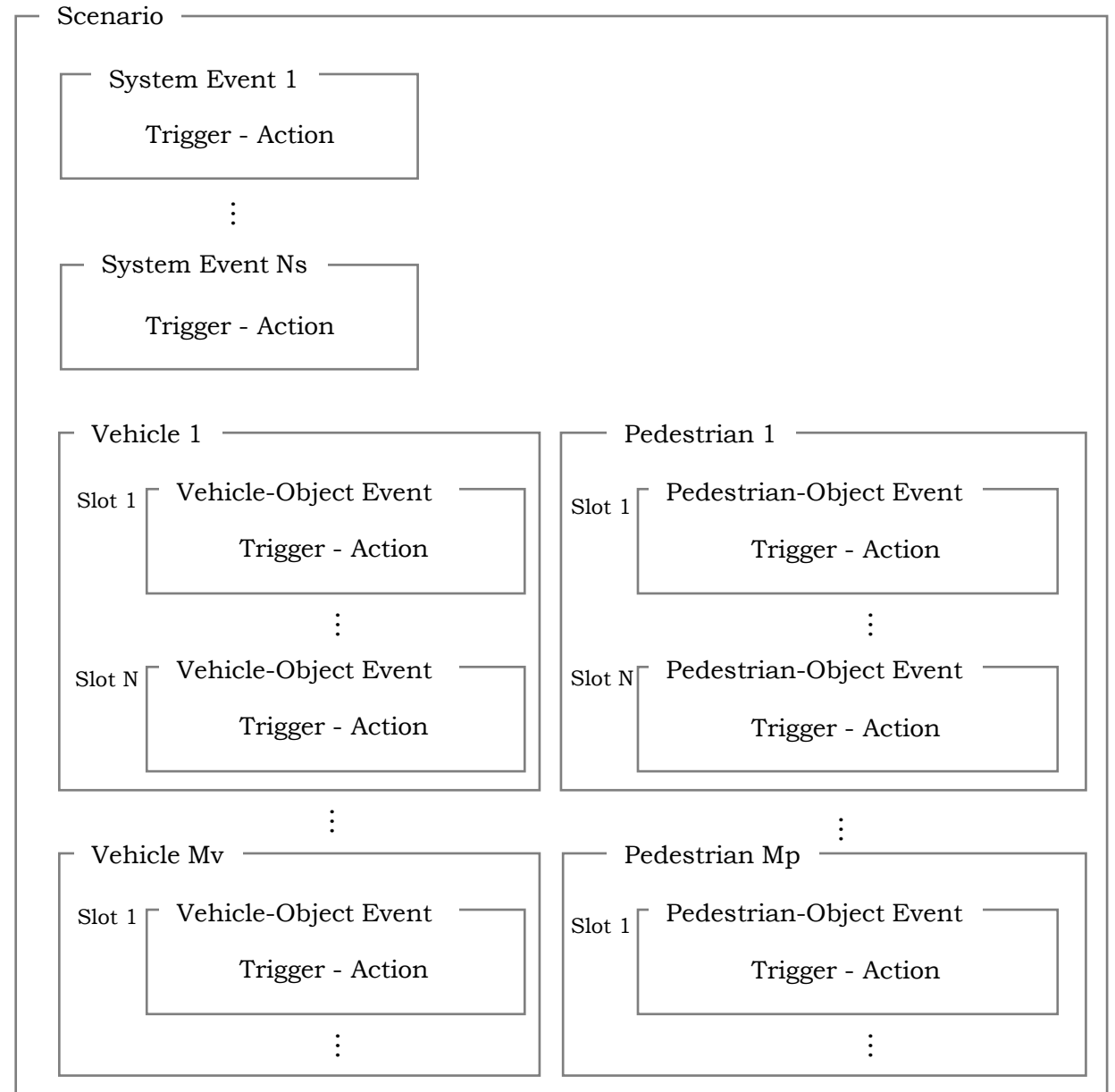The following actions are prepared in SEdit.

| System Event:	Vehicle/Pedestrian Event:
1. Teleportation	1. Appear
2. Change Traffic Signal	2. Control
3. Change Speed Info	3. Send UDP Data
4. Send UDP Data	4. Disappear

The vehicle/pedestrian object have multiple events, it is called Slot in SEdit Scenario Editor.

2. The Graphical User Interface (GUI)

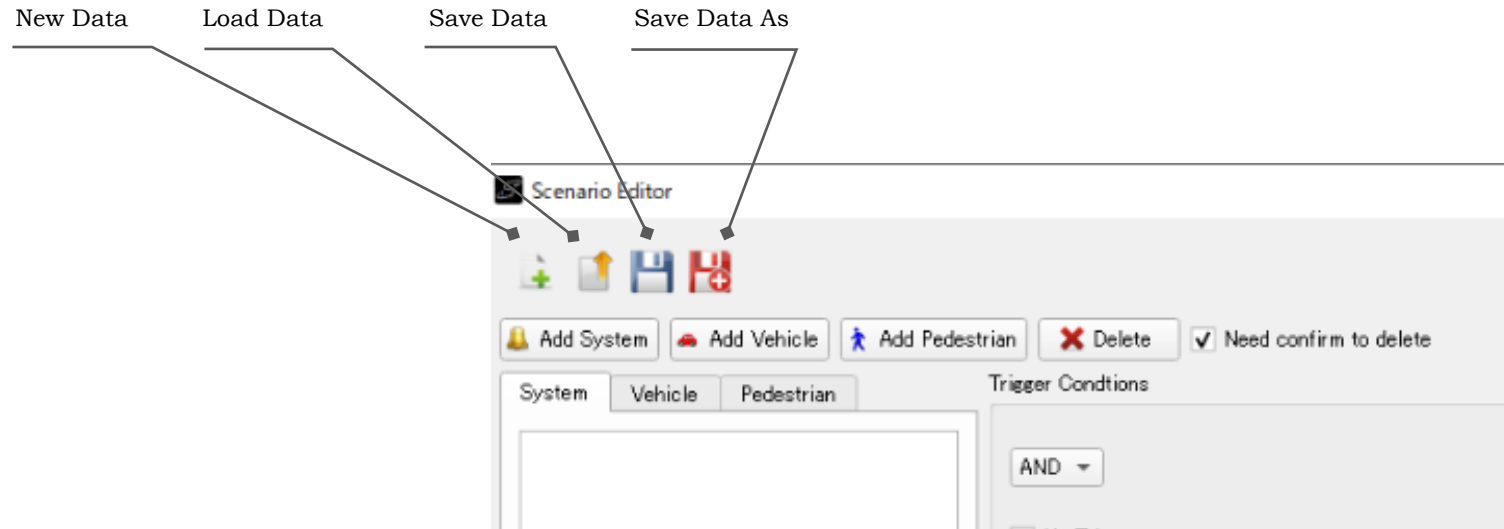The scenario editor can be shown by selecting the "Show Scenario Editor" from the Tool menu.
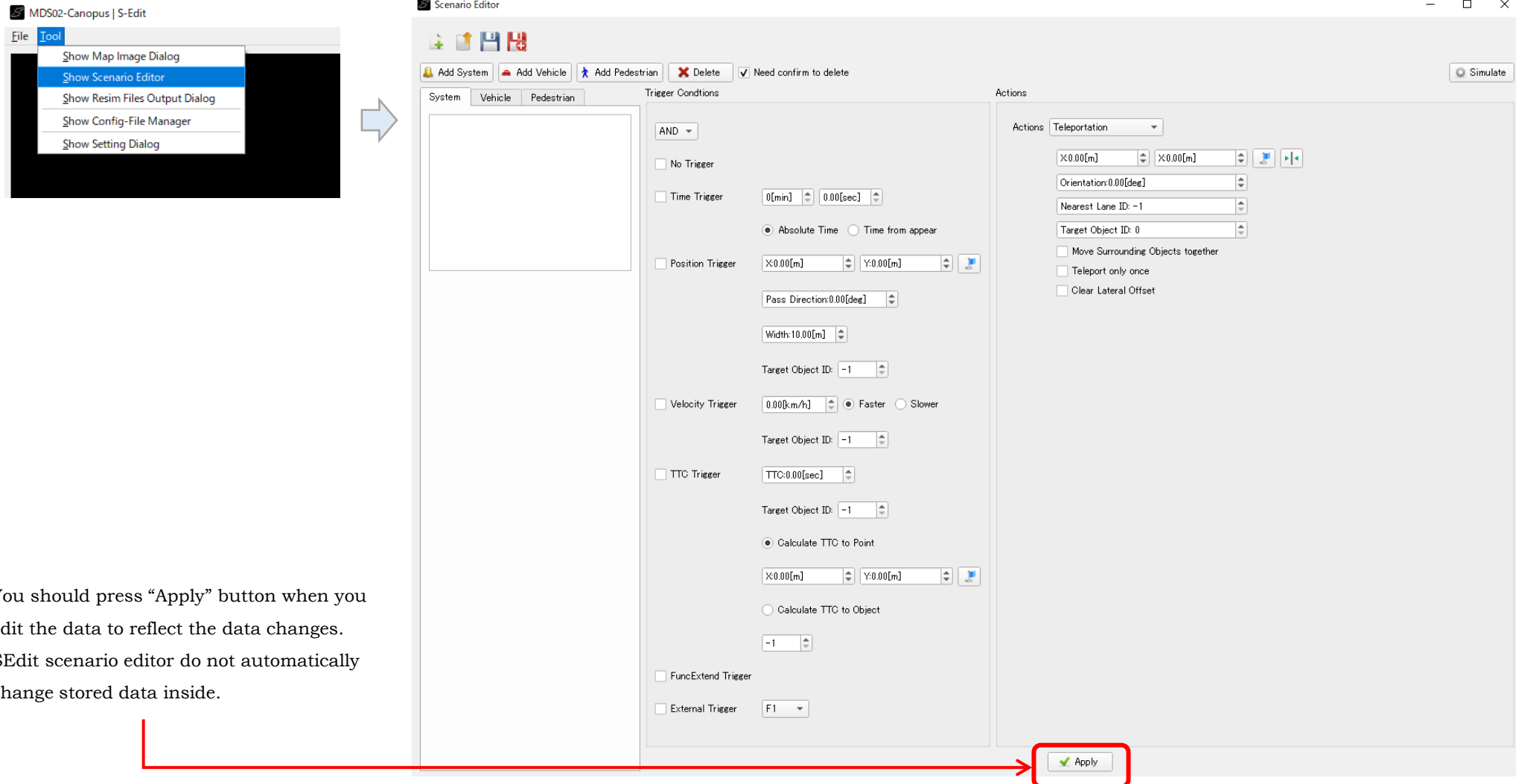
Important

You should press "Apply" button when you edit the data to reflect the data changes. SEdit scenario editor do not automatically change stored data inside.

You can save data to the file as usual.

The extension of the SEdit scenario data file is .ss.txt.

New Data   Load Data   Save Data   Save Data As

Scenario Editor

Add System   Add Vehicle   Add Pedestrian   Delete   ✓ Need confirm to delete

System   Vehicle   Pedestrian

Trigger Condtions

AND ▾

Important   Notice that to load the saved scenario data, you should open the road data file in advance.

3. The Trigger Data Setting

You can select the trigger to use by checking the checkbox.

For multiple checks, the AND/OR combination of the conditions can be set.

☐ No Trigger

The action starts when the simulation starts.

☐ Time Trigger

You can assign the time the action happen.

The option "time from appear" is only valid for vehicle/pedestrian-object events.

☐ Position Trigger

The action will happen when the target object pass the assigned position with
assigned direction. See next page for more detail how to set the trigger.

☐ Velocity Trigger

If the speed of the target object is faster or lower than the assigned value, the action
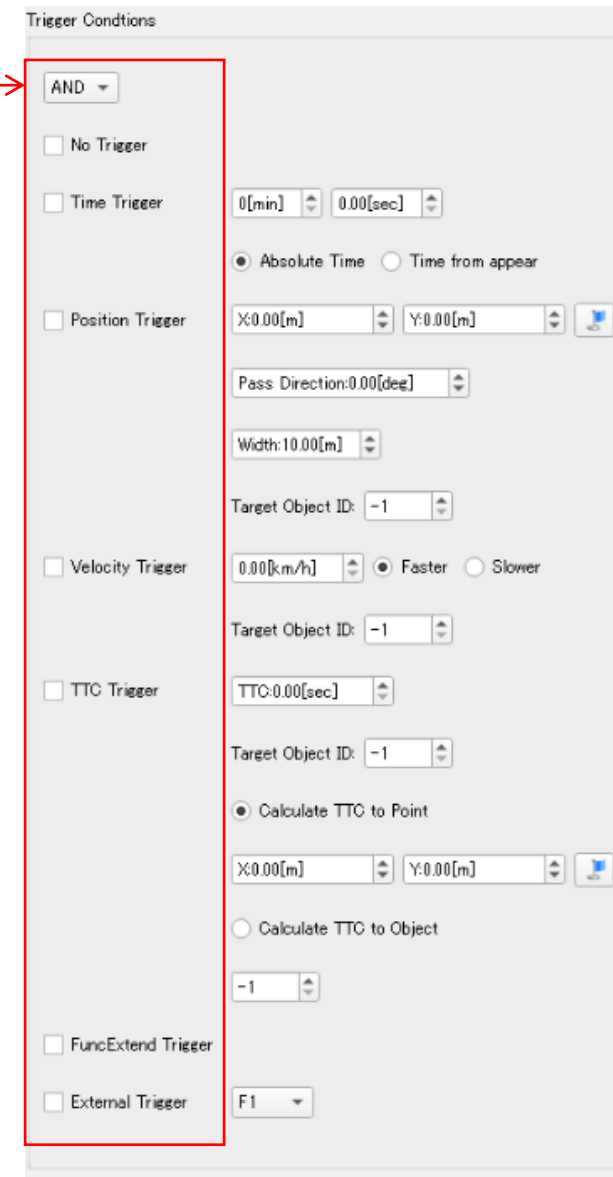will happen.

☐ TTC Trigger

The TTC of the target object to the specific point or to assigned object is calculated,
and if the value of the TTC is smaller than the threshold value, the action happen.
See the following sections for more detail.

☐ FuncExtend Trigger

The function extender program of "Sirius" can initiate the trigger by sending UDP command.

☐ External Trigger

This is the trigger fired by the keyboard operation.

Trigger Condtions

AND ▾

☐ No Trigger

☐ Time Trigger   0[min]   0.00[sec]

     ◉ Absolute Time   ○ Time from appear

☐ Position Trigger   X:0.00[m]   Y:0.00[m]

     Pass Direction:0.00[deg]

     Width:10.00[m]

     Target Object ID: -1

☐ Velocity Trigger   0.00[km/h]   ◉ Faster   ○ Slower

     Target Object ID: -1

☐ TTC Trigger   TTC:0.00[sec]

     Target Object ID: -1

     ◉ Calculate TTC to Point

     X:0.00[m]   Y:0.00[m]

     ○ Calculate TTC to Object

     -1

☐ FuncExtend Trigger

☐ External Trigger   F1

3.1 Details of Position Trigger

You can set the position trigger by following steps.

1. Check the Position Trigger checkbox
2. Press the Blue-Flag button
3. "ALT"+ Left Click the point of map where you want to set the trigger
4. "ALT"+ Left Click another point of map to define the pass direction of target object
5. Set width of object pass judgment
6. Set Target Object ID which initiate the trigger
7. Press "Apply" button to reflect the data

Important If target object ID = -1 for vehicle/pedestrian object event, it means that the target object is itself.

Trigger Condtions

AND ▼

☐ No Trigger

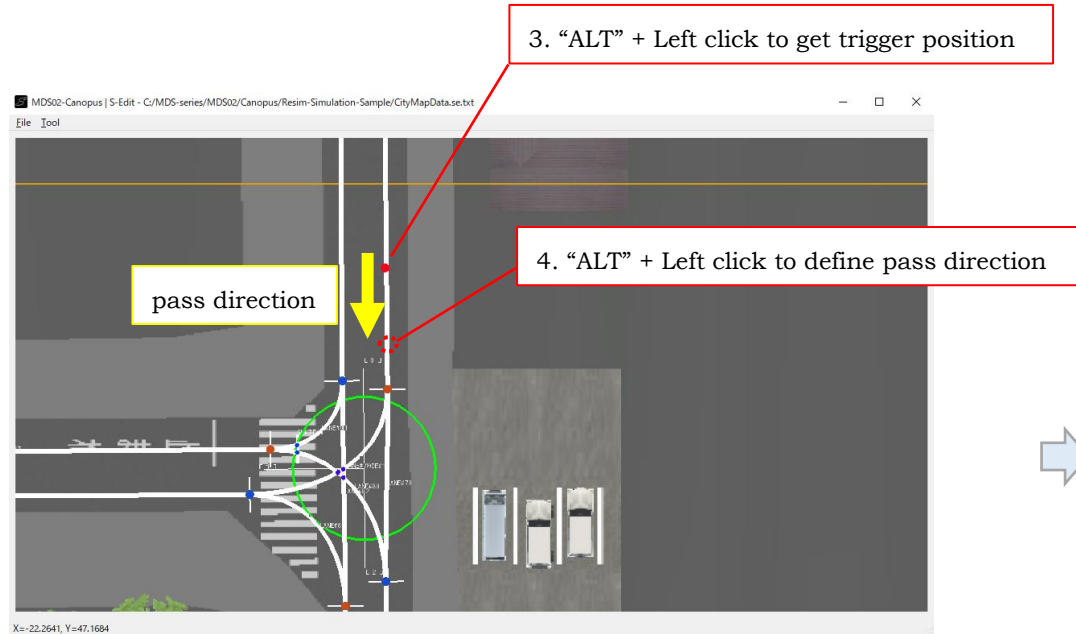☐ Time Trigger   0[min]   0.00[sec]

⦿ Absolute Time   ◯ Time from appear

1.
3.
2.
☑ Position Trigger   X:0.00[m]   Y:0.00[m]

4.
Pass Direction:0.00[deg]

5.
Width:10.00[m]

6.
Target Object ID: -1

3. "ALT" + Left click to get trigger position

4. "ALT" + Left click to define pass direction

pass direction

After Step 4, the position and direction data is set GUI.

Notice that these are temporally, should press "Apply" to fix the data.

Press "Apply" button
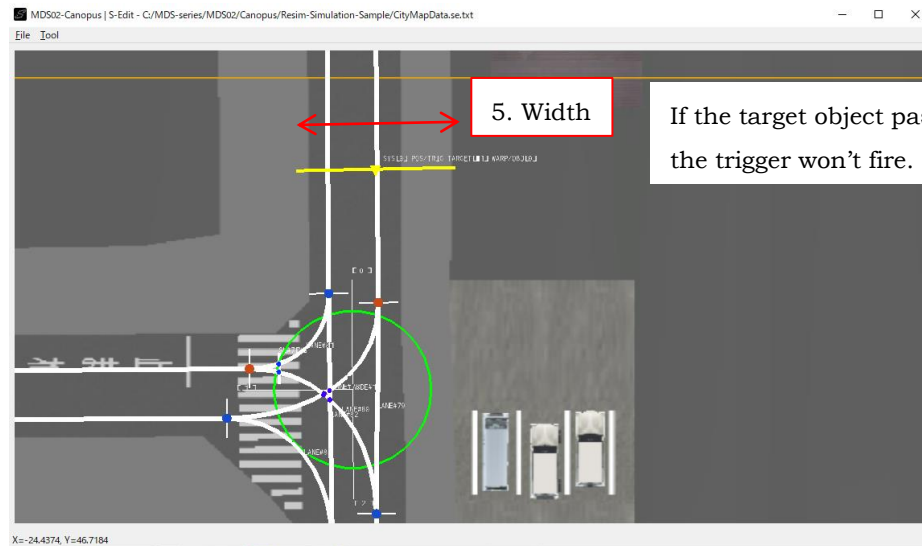
5. Width

If the target object pass the point outside the width, the trigger won't fire.
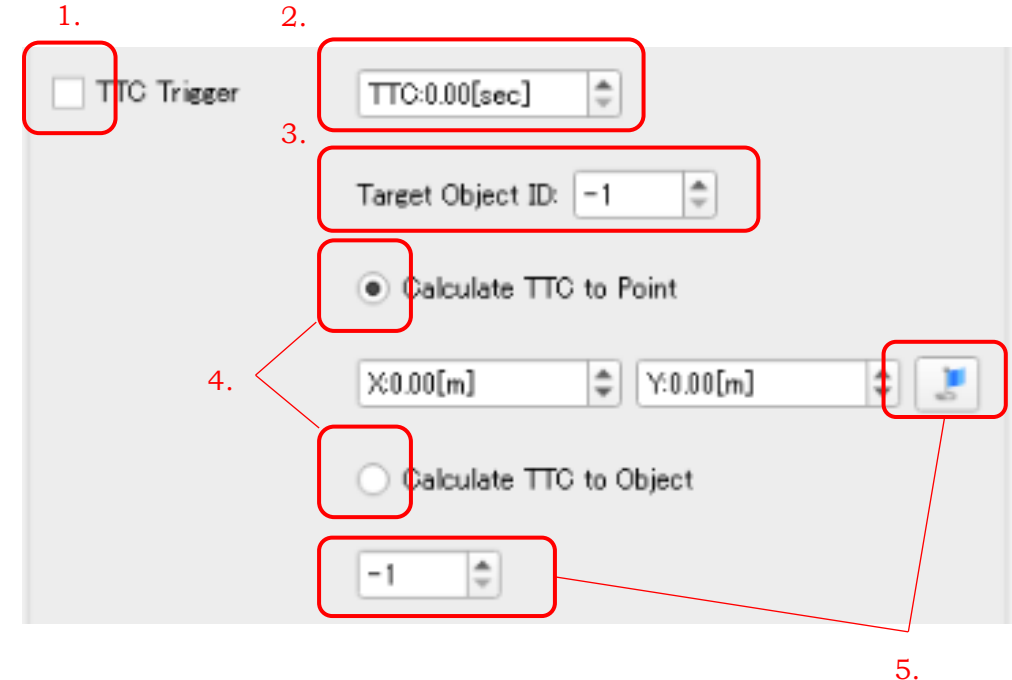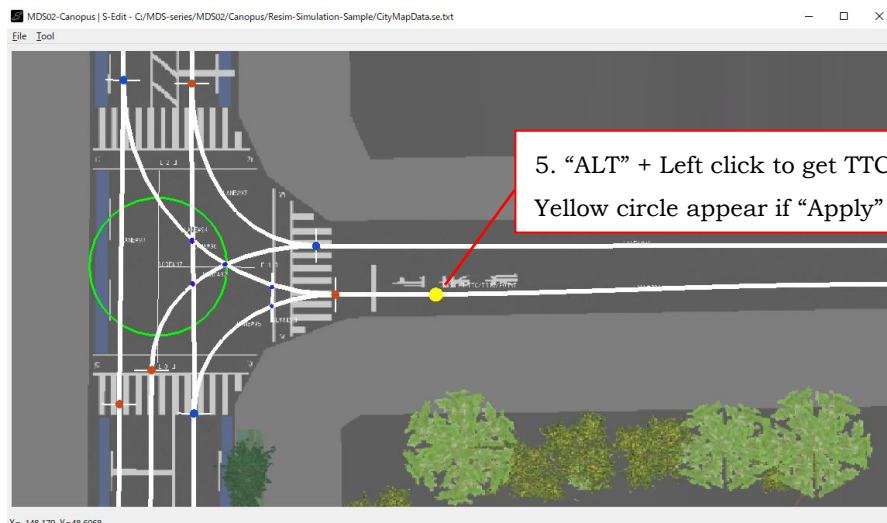
3.2 Details of TTC Trigger

You can set the TTC trigger by following steps.

1. Check the TTC Trigger checkbox
2. Set TTC threshold value
3. Set Target Object ID, the TTC for which is calculated
4. Select calculation reference, point on map or other object
5. In case the reference is the point on map, press Blue-Flag button and "ALT" + Left Click the map

   In case the reference is another object, set object ID
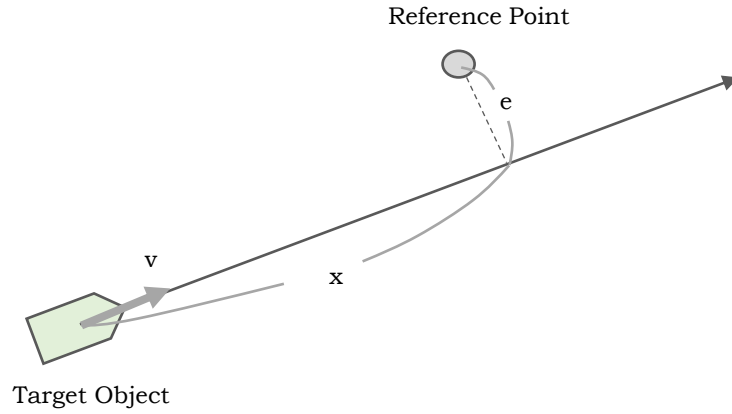6. Press "Apply" button to reflect the data

Important

If target object ID = -1 for vehicle/pedestrian object event, it means that the target object is itself.

The reference object ID can not be -1 if "Calculate TTC to Object" is selected.

1.

2.

TTC Trigger   TTC:0.00[sec]

3.

Target Object ID: -1

● Calculate TTC to Point

4.   X:0.00[m]   Y:0.00[m]

○ Calculate TTC to Object

-1

5.

5. "ALT" + Left click to get TTC reference point.
Yellow circle appear if "Apply" button pressed.

MDS02-Canopus | S-Edit - C:/MDS-series/MDS02/Canopus/Resim-Simulation-Sample/CityMapData.se.txt

File Tool

X=-148.179, Y=48.6068

Calculation of TTC is as follows.

Reference: Point on map

Reference Point

e

v

x

Target Object

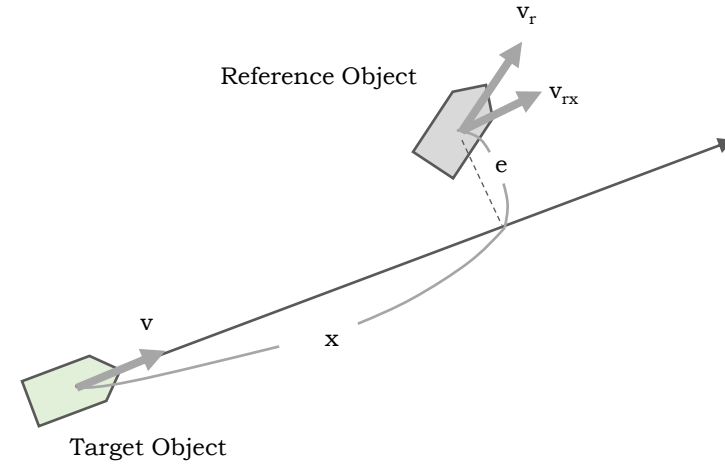If $|e| < 1.5$ and $x > 0.0$ and $v > 0.1$, TTC is calculated as

$$TTC = x \; / \; v$$

and if TTC < TTC_threshold, the TTC trigger fire.

Reference: Other Object

v_r

Reference Object

v_{rx}

e

v

x

Target Object

If $|e| < 1.5$ and $x > 0.0$ and $v_{rel} = v - v_{rx} > 0.1$, TTC is given as
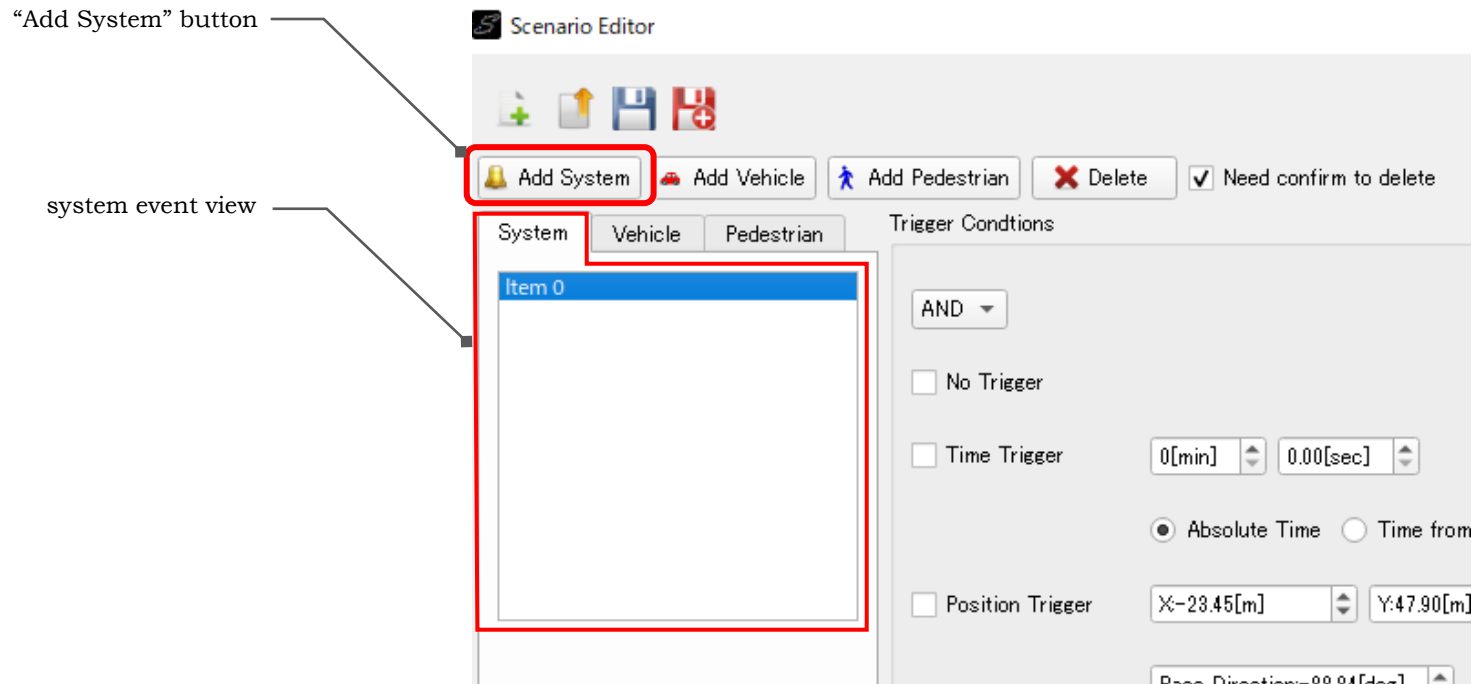
$$TTC = x \; / \; v_{rel}$$

and if TTC < TTC_threshold, the TTC trigger fire.

4. The Actions of System Event

Firstly, create system event by pressing "Add System" button.

The created system event is listed in the system event view.

"Add System" button ——

system event view ——

Important Click the item in the system event view when setting data and apply data to distinguish which event to assign the data.

4.1 Teleportation

This action realize the teleport of the target object with using position trigger from current position to assigned position. Another typical usage is to set initial position of DS vehicle for "Sirius" application.

To set the teleportation goal position and direction, press "Blue-Flag" button and "ALT" + Left click on the map twice.

Press "Fit to the Lane" button if you want to set the position just on the nearest lane.

"Set Teleport goal" button
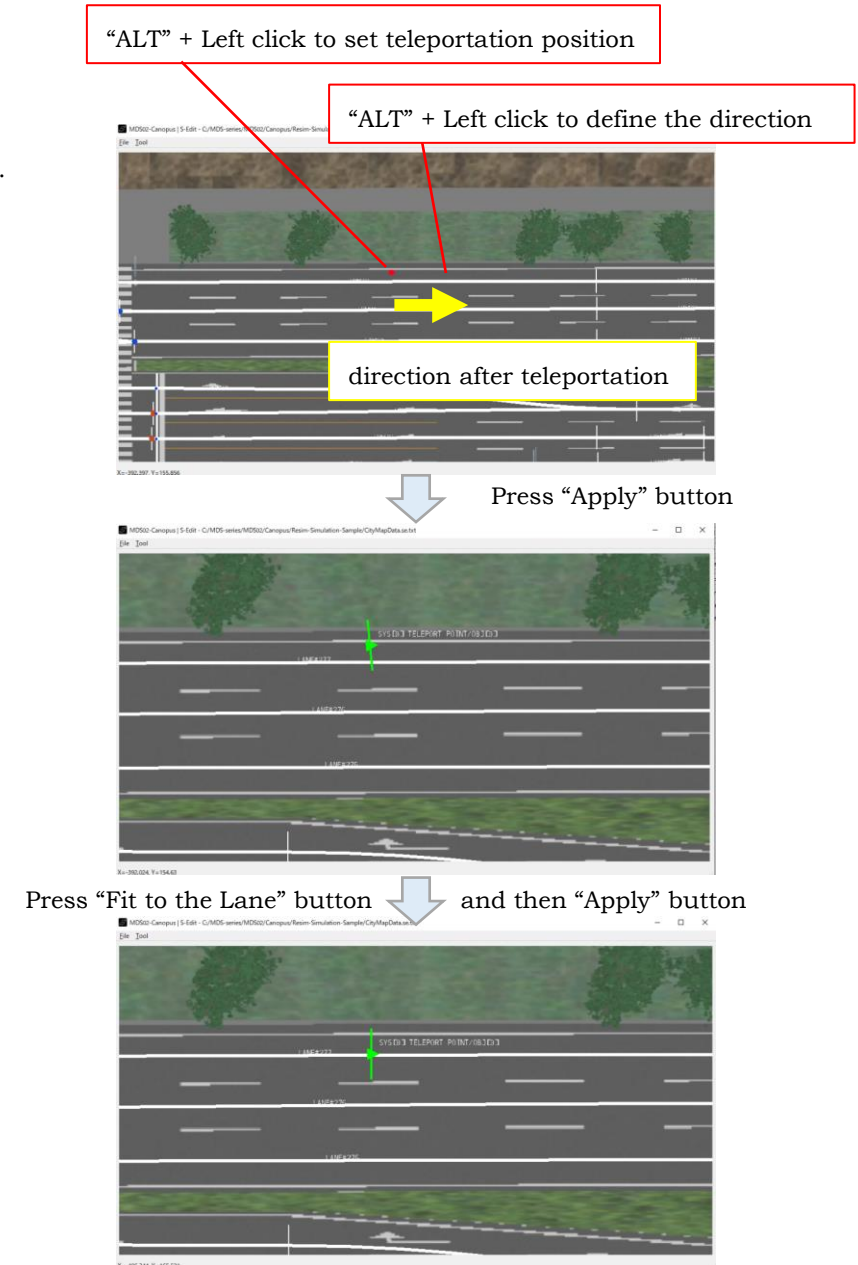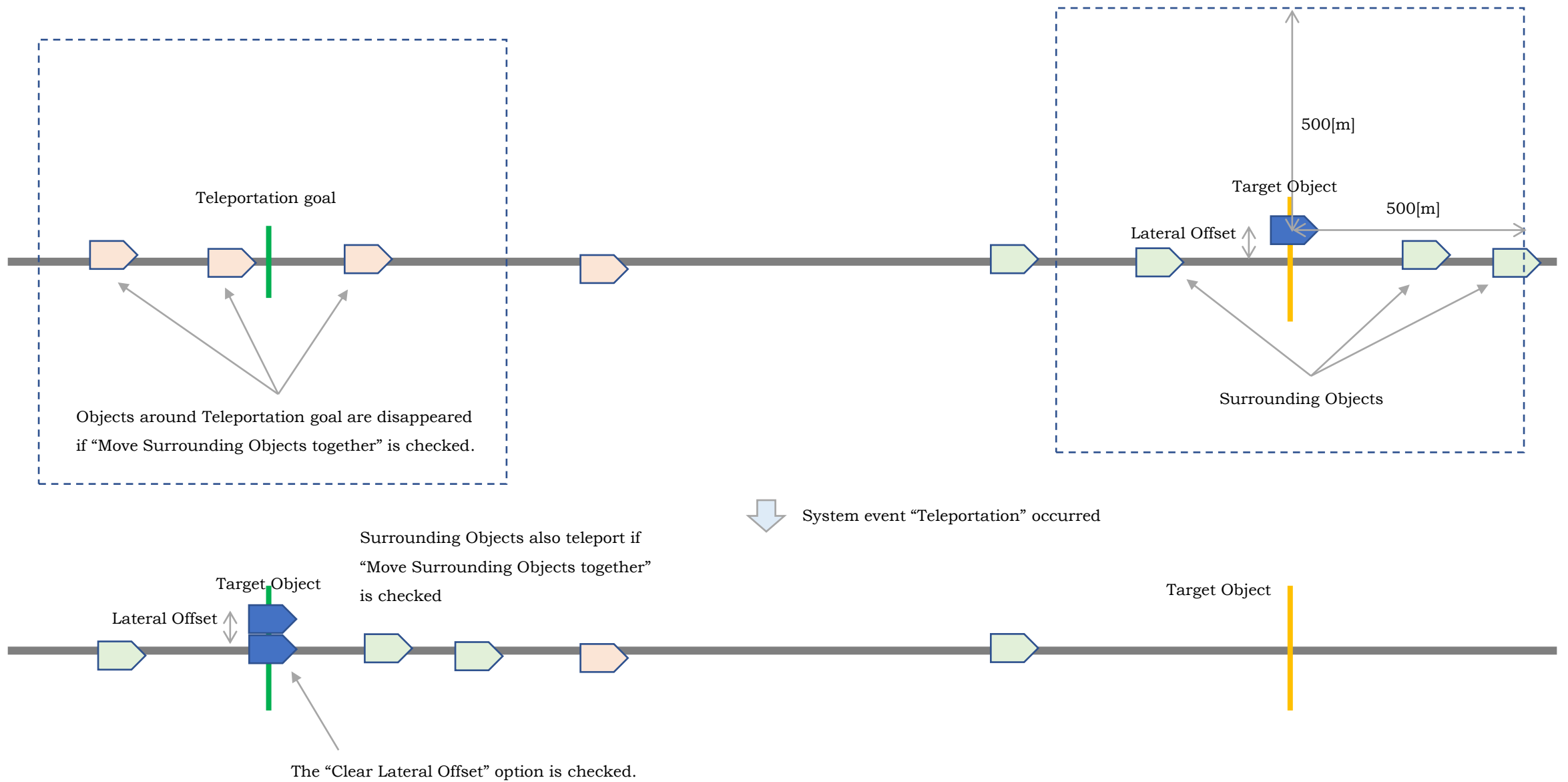
"Fit to the Lane" button
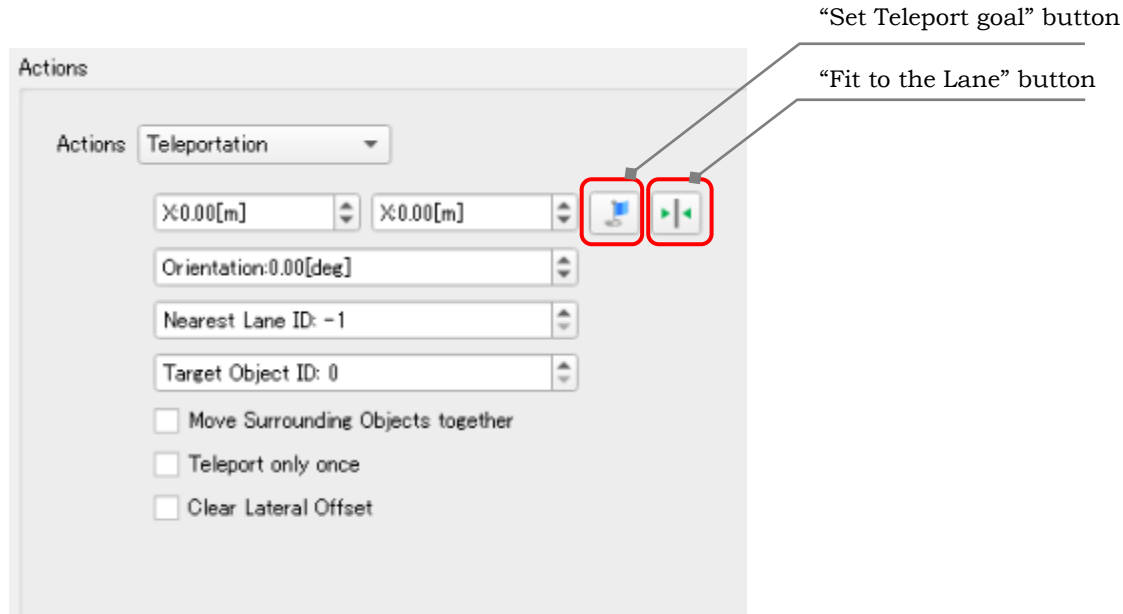
Target Object ID is the ID of the object to be teleported.

The option, "Move Surrounding Objects together" is checked, the surrounding object around target object is also teleported. See next page for more detail.

If the "Teleport only once" is checked, the event do not repeat again.

The "Clear Lateral Offset" option is used to clear lateral offset after teleportation, see next page.


"ALT" + Left click to set teleportation position

"ALT" + Left click to define the direction

direction after teleportation

Press "Apply" button

Press "Fit to the Lane" button and then "Apply" button

Teleportation goal

500[m]

Target Object

Lateral Offset

500[m]

Objects around Teleportation goal are disappeared
if "Move Surrounding Objects together" is checked.

Surrounding Objects

System event "Teleportation" occurred

Surrounding Objects also teleport if
"Move Surrounding Objects together"
is checked

Target Object

Lateral Offset

Target Object

The "Clear Lateral Offset" option is checked.

4.2 Change Traffic Signal

This action can change the signal display of assigned traffic signal(and the traffic signals relating to the same intersection).

To set the target traffic signal, press the "Blue-Flag" button and "ALT" + Left click the traffic signal you want to change the signal display.
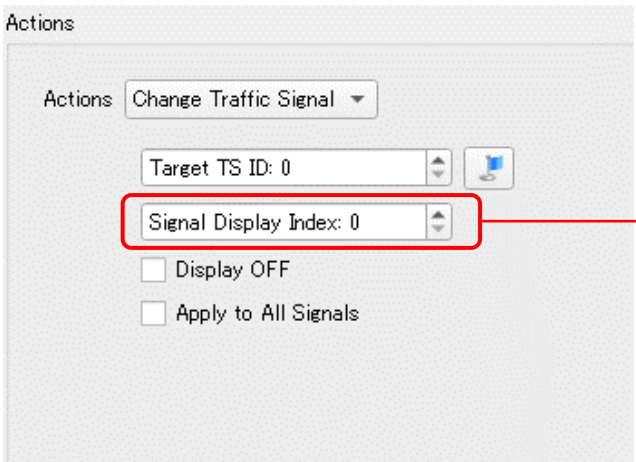
The signal display index is the number of the row - 1 of the display pattern table shown in the Traffic Signal Property dialog.

The "Display OFF" option is used to turn off the traffic signal, which means that the intersection is no more controlled by the traffic signal. If both of "Display OFF" and "Apply to All Signals" are checked, all the traffic signals in the simulation turned off.
These options will not be used so frequently.
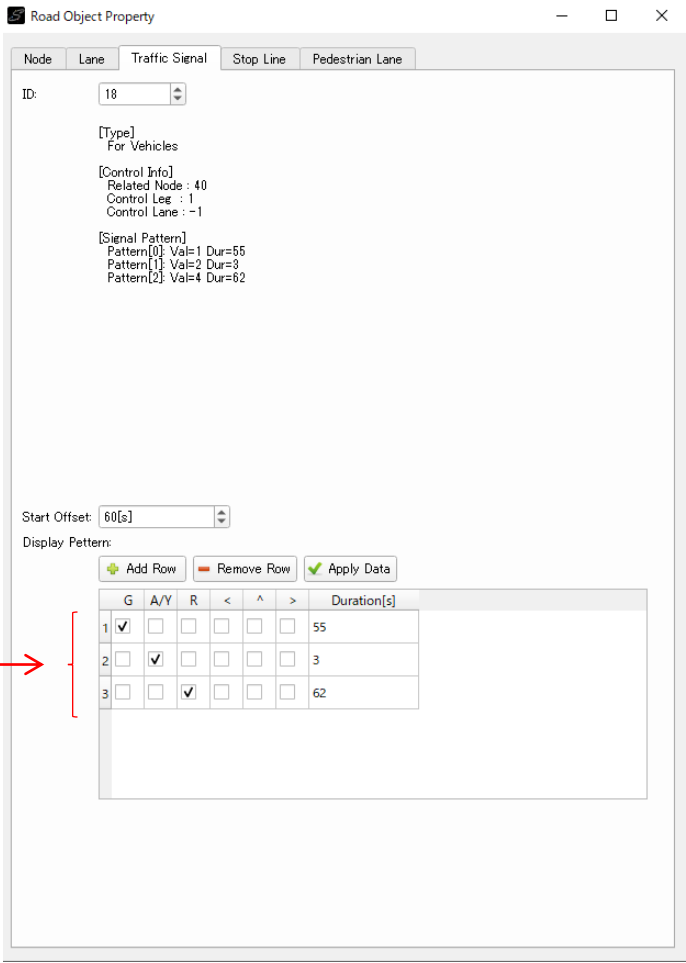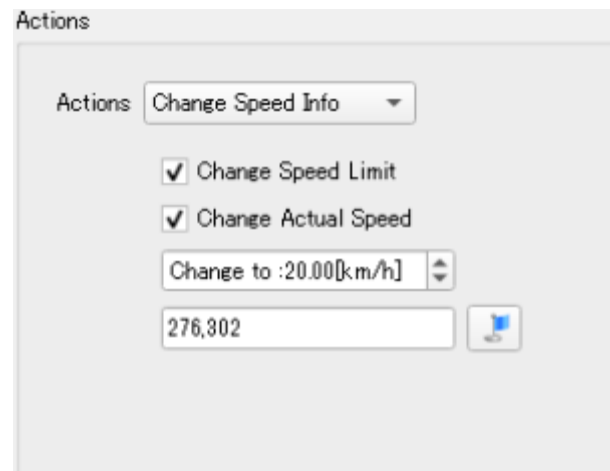
4.3 Change Speed Info

This action can change the speed information given to the lanes.

You can assign Speed Limit and/or Actual Speed.

The target lanes should be set in the entry as shown in the figure below.

You can pick the target lanes by "ALT" + Left click by pressing "Blue-Flag" button.

4.4 Send UDP Data

This action can send the data by UDP packet to assigned IP address and Port number.

This function is provided to work with other application programs and the contents of data to be send is completely depend on the user.

Though the data should be pairs of integer and floating-point number, with comma-separated format as shown in the figure below.

The integer represents the index of data and the floating-point value represent the value of data.

The format of the data send by this action is illustrated as follow.

If the number of (int, float) data pair is N, the total data length would be 8*(N+1) byte.
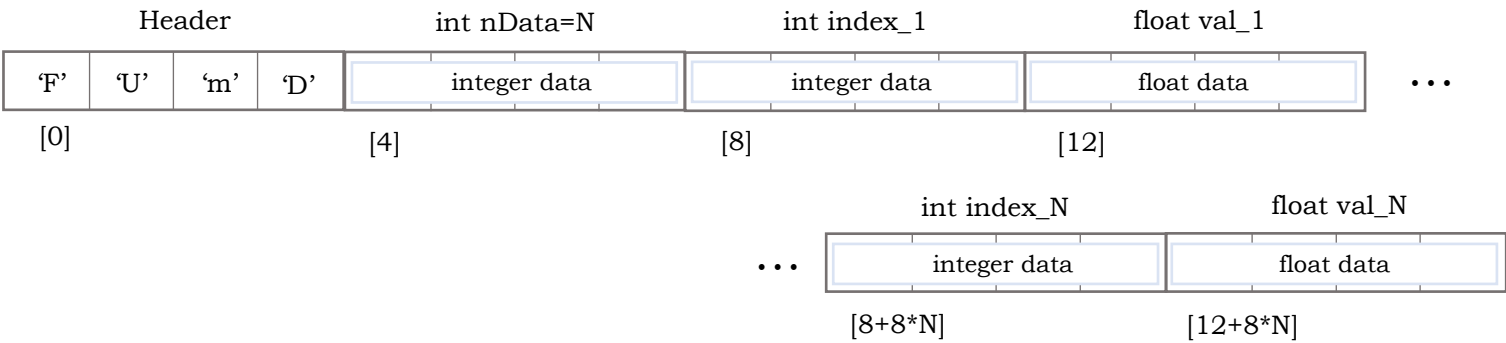
See the Re:sim source code for more detail.

When the "Repeat sending the data" is checked, the trigger is reset and fire again if the trigger condition is satisfied.
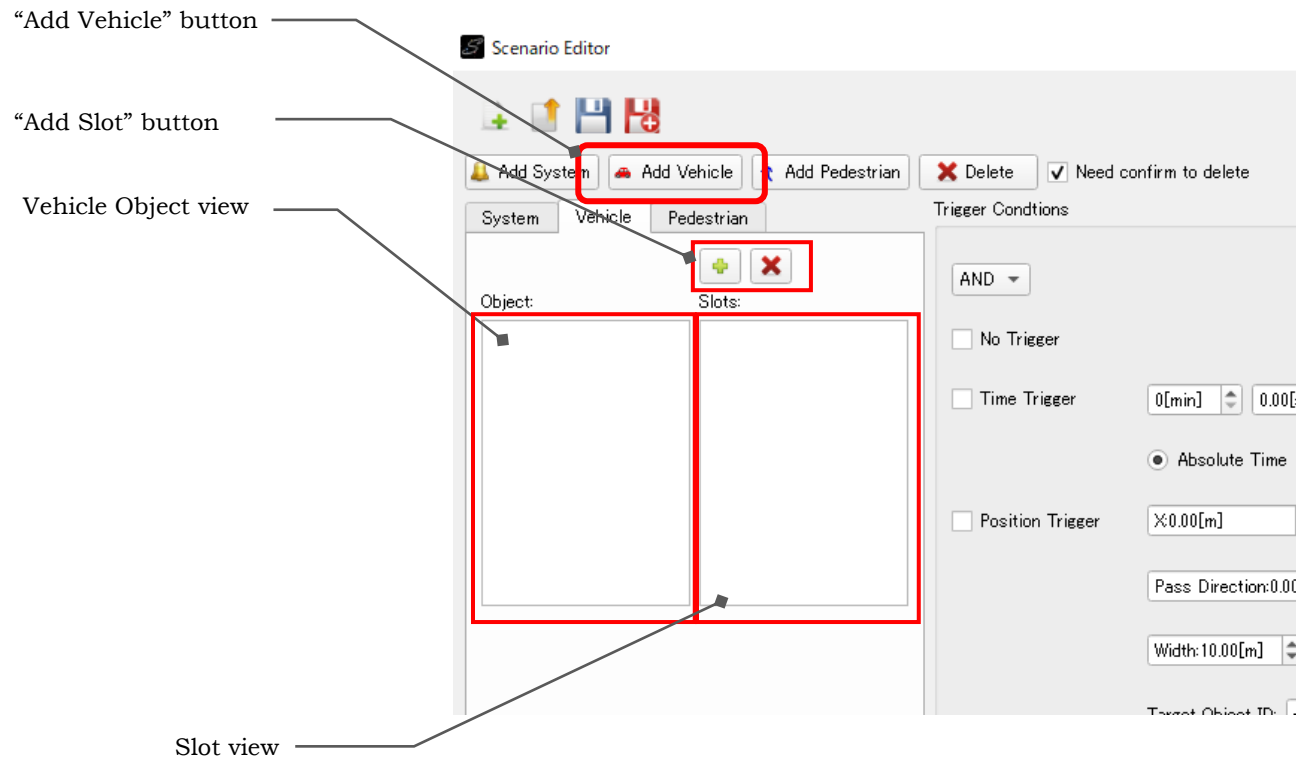
5. The Actions of Vehicle-Object Event

To create vehicle-object event, press "Add Vehicle" button.

The created vehicle-object is listed in the vehicle-object view.

Then click the object in the view, press "Add Slot" button.

The slot of the vehicle-object is listed in the slot view.

"Add Vehicle" button ———

"Add Slot" button ———

Vehicle Object view ———

Slot view ———

Important Click both the object in the vehicle object view and its slot when setting data and apply data to distinguish which object and slot to assign the data.

5.1 Appear

This action is used to generate a vehicle object in the simulation.

The initial position, orientation, speed, and vehicle model ID should be assigned.

In addition, vehicle route information should be provided as either Node-list type data or Path-list type data.
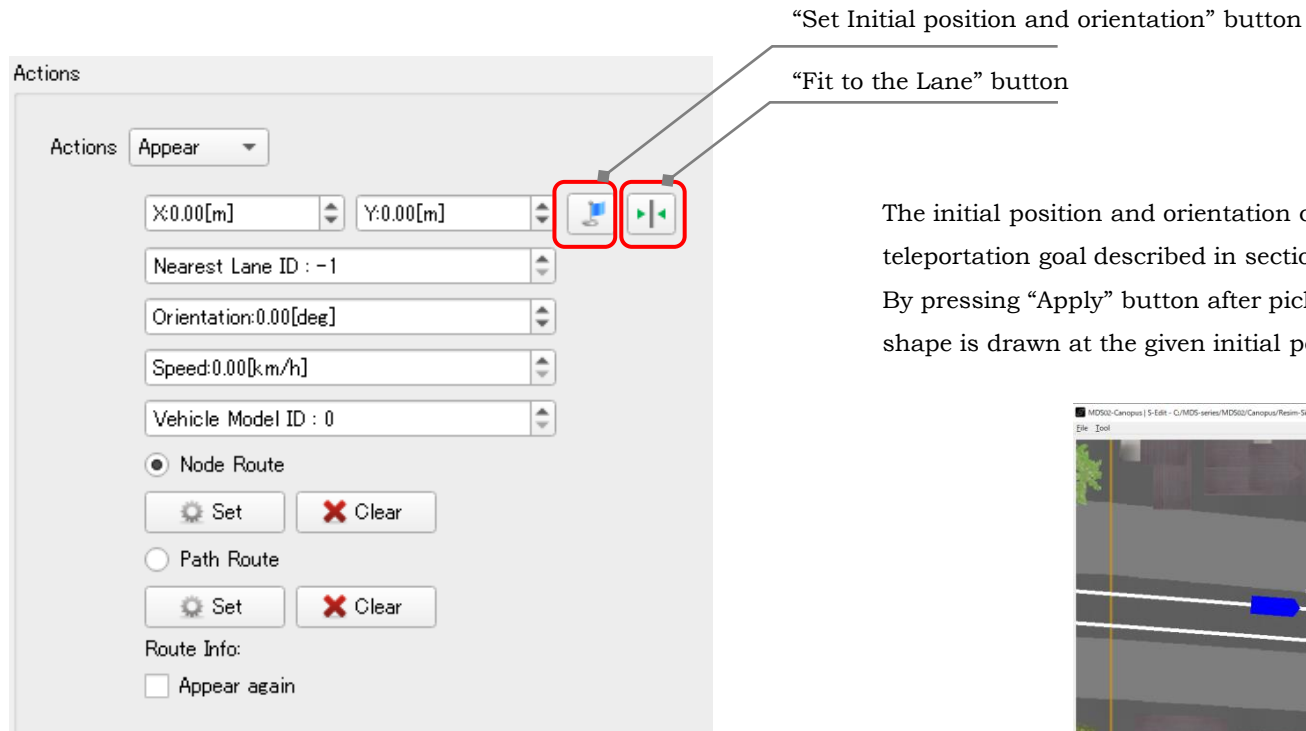
"Set Initial position and orientation" button

"Fit to the Lane" button

The initial position and orientation can be set in the same way as setting teleportation goal described in section 4.1.

By pressing "Apply" button after picking the points on map, the vehicle-shape is drawn at the given initial position and orientation as shown below.
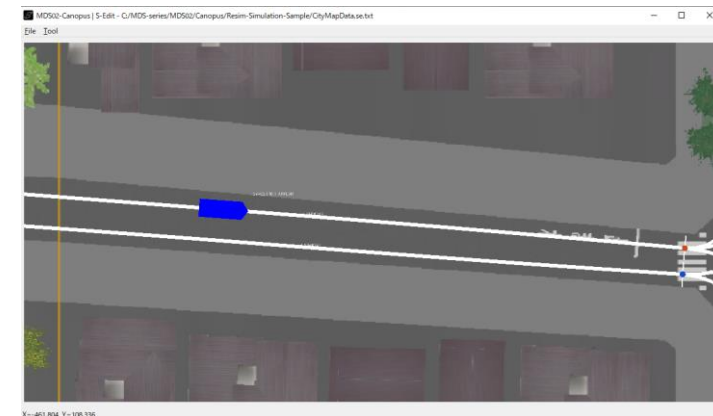
Important   To set Node-list type route data, complete set of road data should be prepared in advanced of scenario data setting.

To set Node-list type route data, press "Set" button and "ALT" + Left click of the nodes in order of the visit.

The yellow line will be drawn during picking the nodes.

To end the node picking, "ALT" + Right click, and the route info is displayed as shown below.

By pressing "Apply" button, the route data is fixed and lane-list to trace is illustrated as follow.

"ALT" + Left click to pick nodes

"ALT" + Right click

"Apply" button

Actions

Actions Appear

X:-497.94[m]   Y:106.58[m]

Nearest Lane ID : 245

Orientation:-4.44[deg]

Speed:0.00[km/h]

Vehicle Model ID : 0

◉ Node Route

⚙ Set   ✖ Clear

○ Path Route

⚙ Set   ✖ Clear

Route Info:
[1] In-Dir = -1, Node = 39, Out-Dir = 0
[2] In-Dir = 1, Node = 37, Out-Dir = 2
[3] In-Dir = 0, Node = 34, Out-Dir = 1
[4] In-Dir = 0, Node = 36, Out-Dir = -1

☐ Appear again

To set Path-list type route data, press "Set" button and "ALT" + Left click on the map to define the paths.

The yellow line will be drawn during picking.

To end this, "ALT" + Right click, and the route info is displayed as shown below.

By pressing "Apply" button, the route data is fixed and lane-list to trace is illustrated as follow.

"ALT" + Left click to pick points

"ALT" + Right click

"Apply" button

Important The initial position and orientation can be set using "Fit to the Lane" function even for the Path-list type route, if after the route data is set.
The nearest Lane ID in this case will be -1.
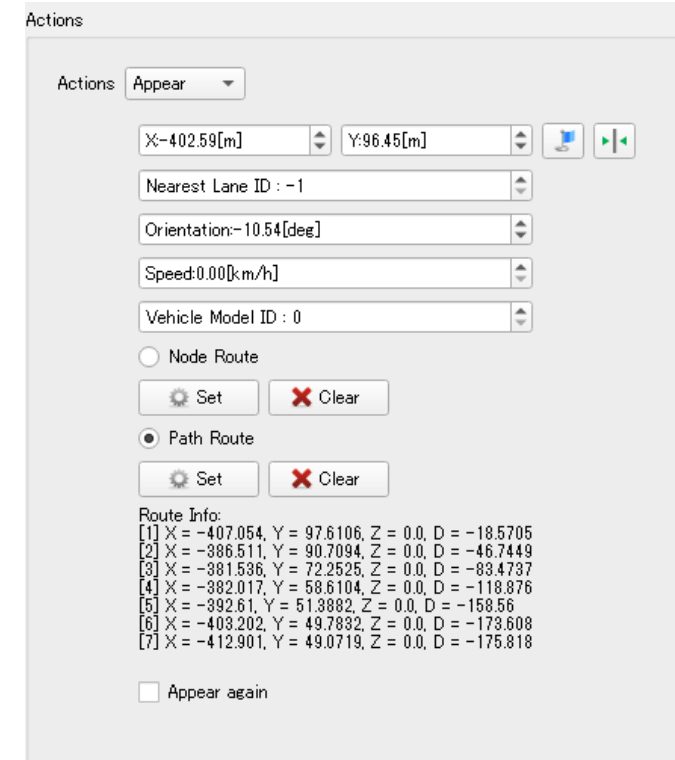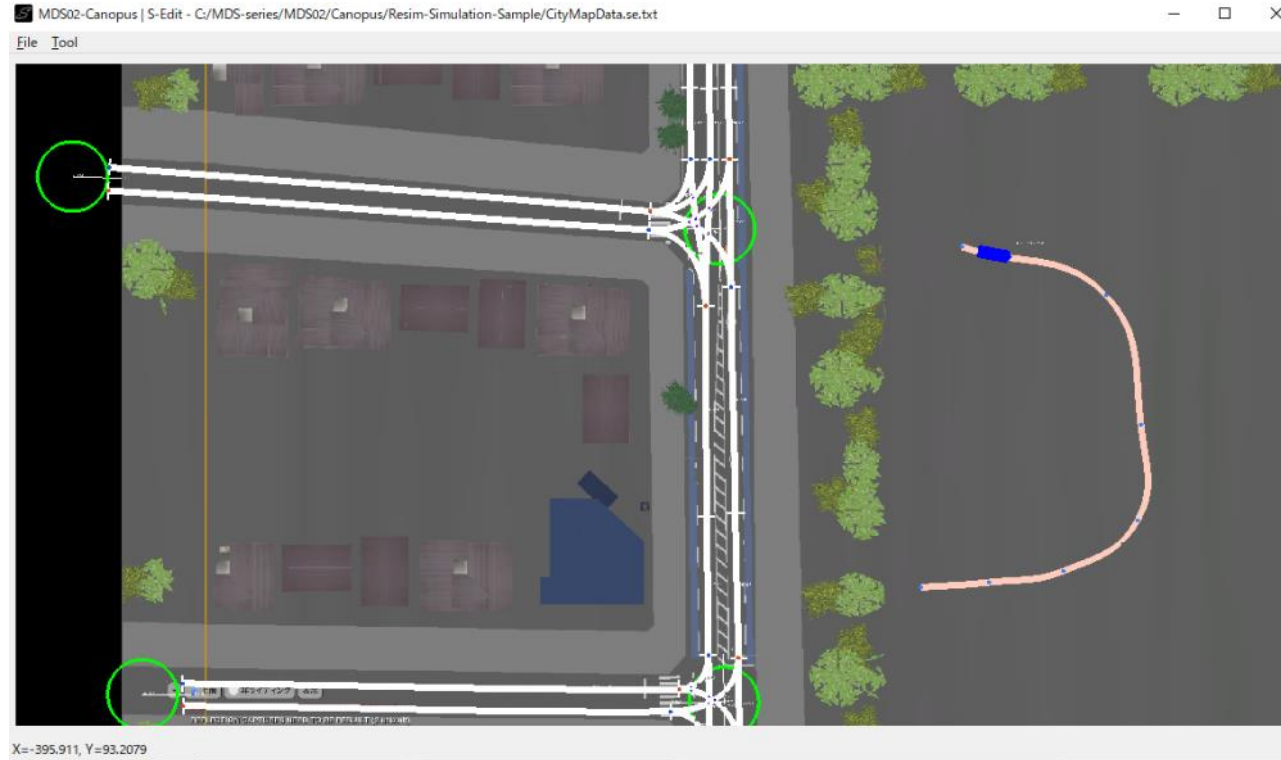
Important The control-mode of the scenario vehicle object is the agent-control.
If other control-mode should be applied, you should prepare the Control action which is explained next subsection.

5.2 Control

This action changes the control mode of the target vehicle object.

In addition, Acceleration/Deceleration and Steering override command can be defined by checking the checkboxes.

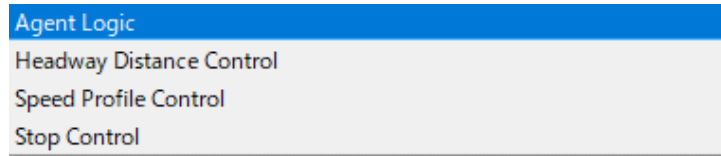You can set these three checkboxes simultaneously though the override commands have the priority to normal control mode of vehicle object.

If "Apply again" is checked, the action is conducted again if the trigger conditions are met.

5.2.1 Change Control Mode

There are four control modes as shown below.

> Agent Logic

Vehicle object moves by Re:sim driver-agent logic.

> Headway Distance Control

Vehicle object conducts headway distance control against the object assigned
by target object ID.
The reference headway distance for headway control is determined as follow.

$$H1 = \text{Headway Distance}$$

$$H2 = \text{Headway Time} \times \text{Vehicle object speed}$$

$$\text{reference headway distance} = (H1 > H2 \ ? \ H1 : \ H2)$$

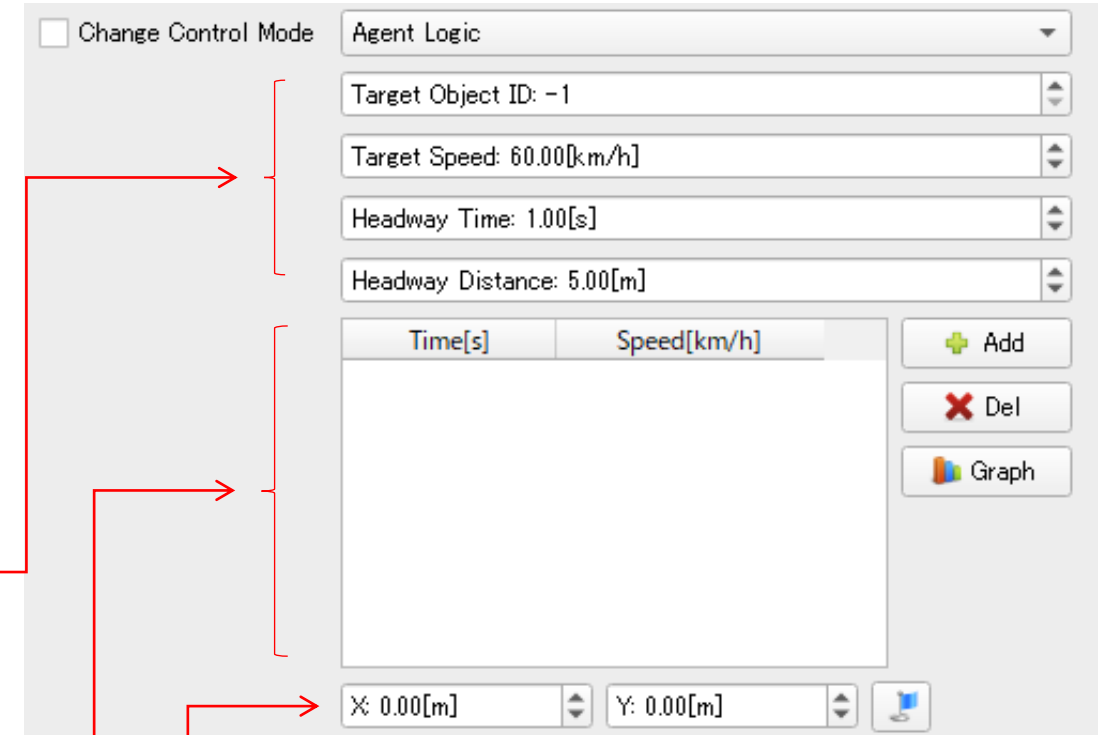If Headway Time and Headway Distance is set 0.0, the setting will be ignored.

> Speed Profile Control

The vehicle object speed will be varied according to the speed profile table data.
See next page for more detail.

> stop Control

The vehicle object will stop at assigned position.
You can pick the point of stop by "Blue-Flag" button and "ALT" + Left click on map.
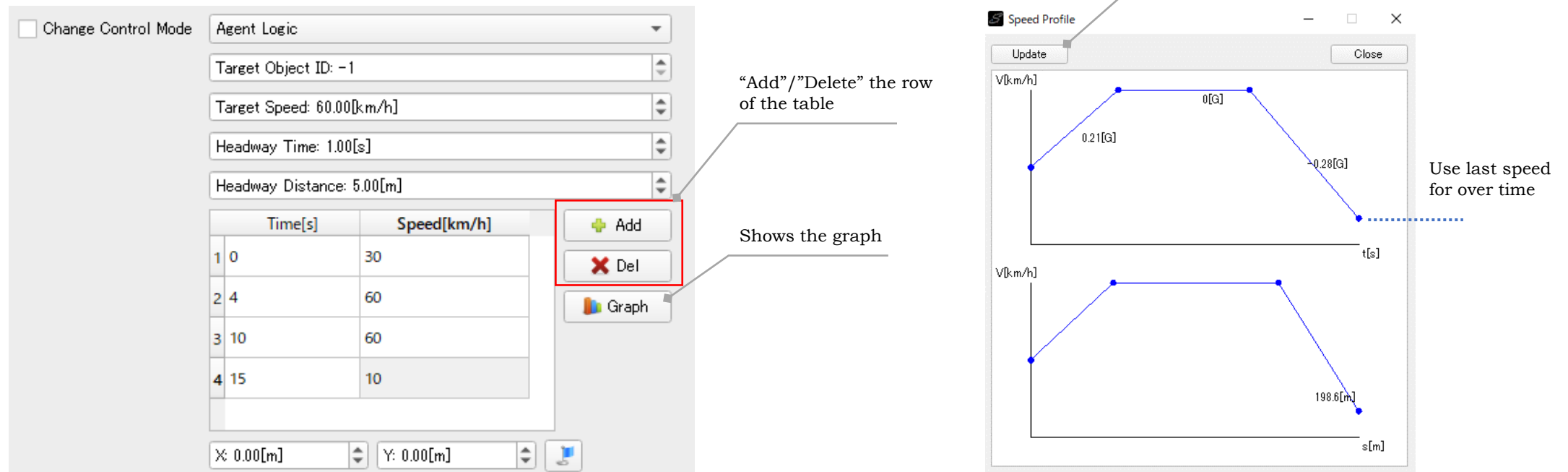

Important The parameters in this dialog, which is not relevant to the selected control mode, is ignored (not used) in Re:sim program.
See Re:sim source code for more detail.

The following figure shows the example of the speed profile data set.

"Add" button insert a row in the table and you can enter the values there.

The data set in the table can be visualized, press "Graph" button to show the time vs. velocity and distance vs. velocity graphs.

If no graph is drawn, press "Update" button.

"Add"/"Delete" the row of the table

Shows the graph

Use last speed for over time

Important If the time over last value given by the table, last value of speed is used as a reference value.

During the speed profile control mode, steering control of the vehicle object is done so that the vehicle object runs along the target lanes provided by the route information.

5.2.2 Accel/Brake, Steering Override

To override Acceleration/Deceleration and Steering inputted to the vehicle, check "Accel/Brake Input" or "Steering Input" and set profile data to the corresponding tables.
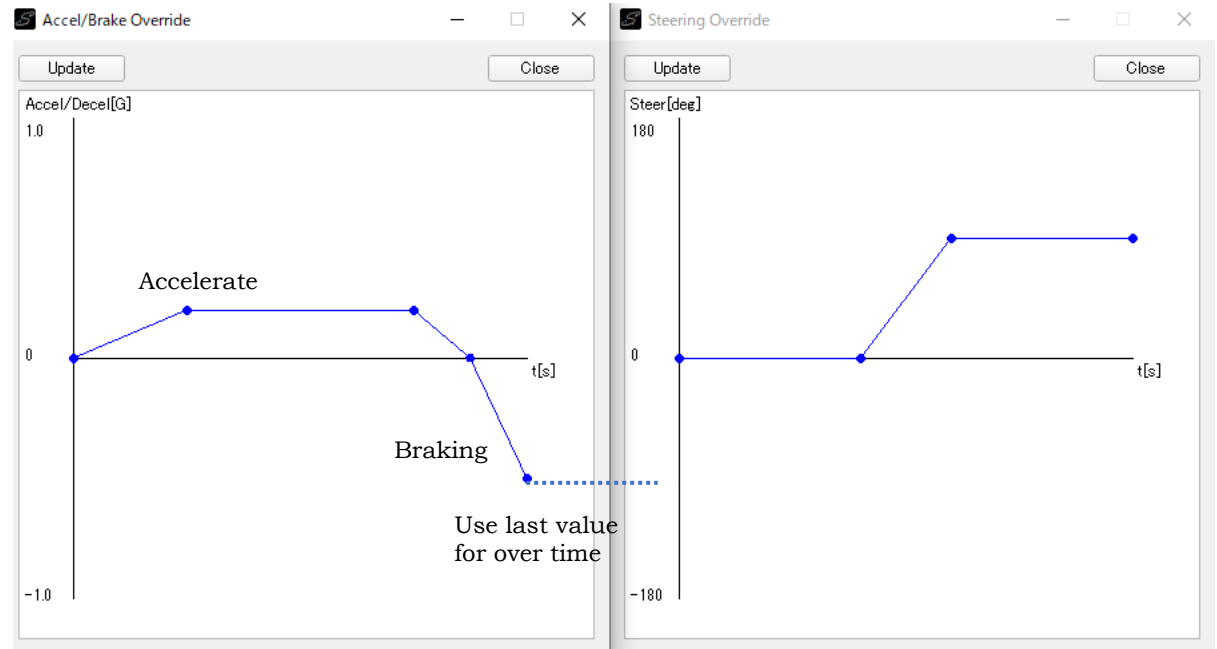
How to set the data in the table is same as speed profile data.

Important The steering override data set in the table is relative to the initial steering angle, which is the steering angle just when the event start.
Thus the absolute steering angle will be:

Absolute steering angle = initial steering angle(angle at event start timing) + steering angle given by the steering override table

5.3 Send UDP Data

This action can send the data by UDP packet to assigned IP address and Port number.

See Section 4.4.

5.4 Disappear

This action is used to leave the vehicle object from the simulation.

If "Apply if appeared again" is checked, this action can be occurred repeatedly.
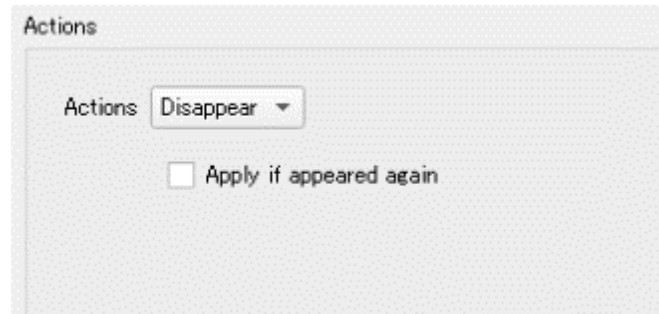
6. The Actions of Pedestrian-Object Event

To create pedestrian-object event, press "Add Pedestrian" button.

The created pedestrian-object is listed in the pedestrian-object view.

Then click the object in the view, press "Add Slot" button.

The slot of the pedestrian-object is listed in the slot view.
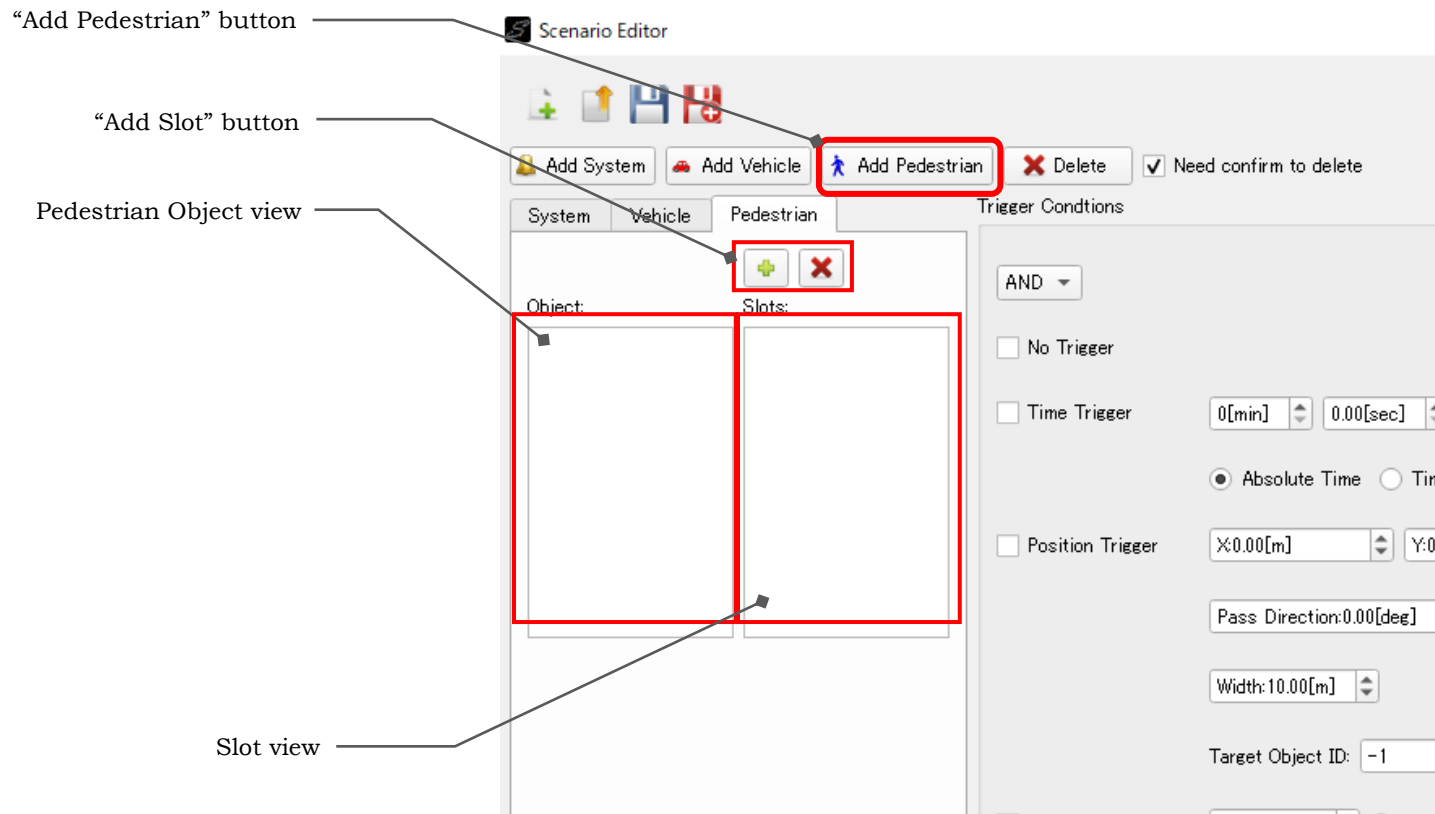
"Add Pedestrian" button

"Add Slot" button

Pedestrian Object view

Slot view

Important   Click both the object in the vehicle object view and its slot when setting data and apply data to distinguish which object and slot to assign the data.

6.1 Appear

This action is used to generate a pedestrian object in the simulation.

The initial position, orientation, speed, and pedestrian model ID should be assigned.

In addition, pedestrian route information should be provided as Path-list type data.
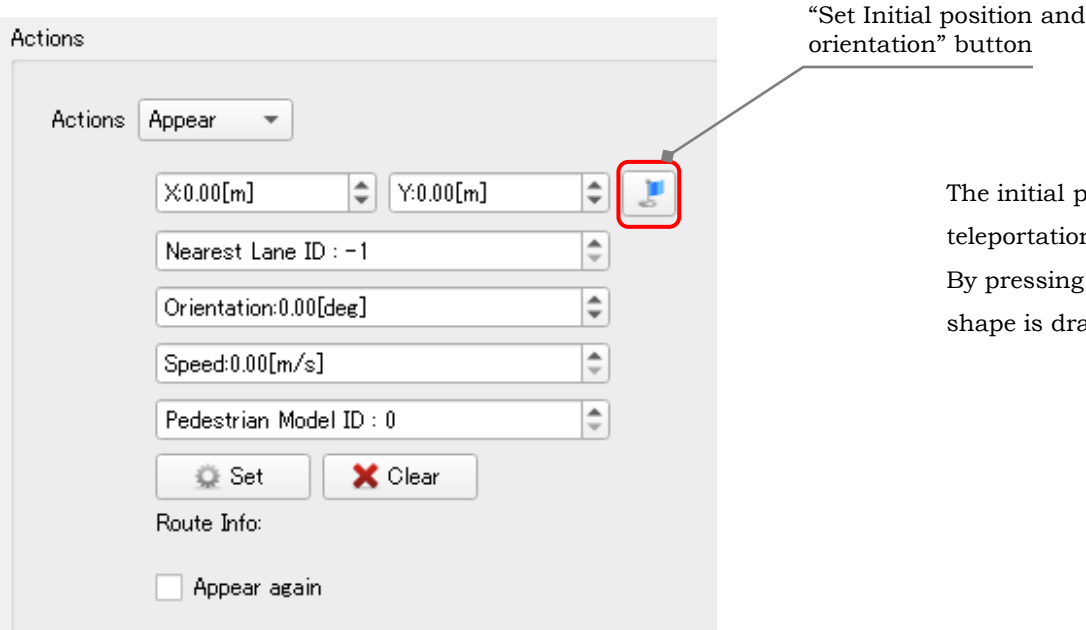
"Set Initial position and orientation" button

The initial position and orientation can be set in the same way as setting teleportation goal described in section 4.1.

By pressing "Apply" button after picking the points on map, the pedestrian-shape is drawn at the given initial position and orientation as shown below.
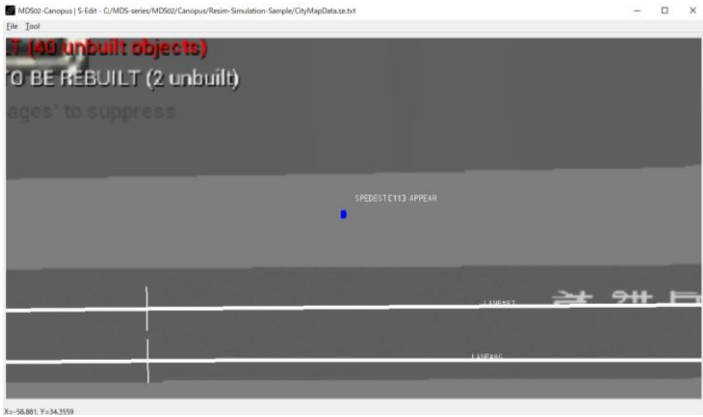
To set Path-list type route data, press "Set" button and "ALT" + Left click on the map to define the paths.

The yellow line will be drawn during picking.

To end this, "ALT" + Right click, and the route info is displayed as shown below.

By pressing "Apply" button, the route data is fixed and the trajectory of pedestrian object to follow is illustrated as follow.

"ALT" + Left click to pick points

"ALT" + Right click

"Apply" button

6.2 Control

This action changes the control mode of the target pedestrian object.

There are four control modes as shown below.
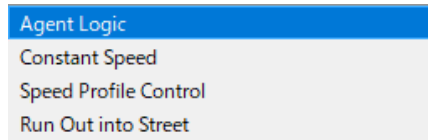
➢ Agent Logic

Pedestrian object moves by Re:sim pedestrian-agent logic.
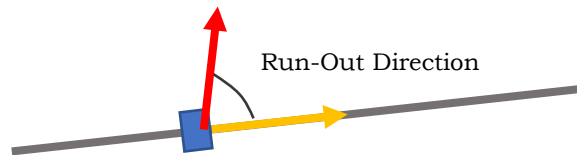
➢ Constant Speed

Pedestrian object moves at given target speed.

➢ Speed Profile Control

The pedestrian object speed will be varied according to the speed profile table data.

➢ Run Out into Street Control

The pedestrian object will move to the direction assigned by Run-Our Direction, relative to the pedestrian path line, just like "Run-Out into the Street"

Run-Out Direction
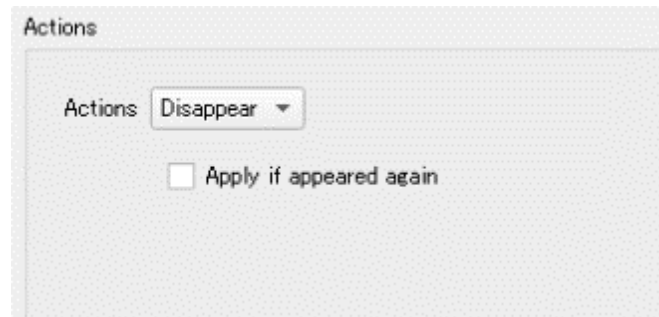
6.3 Send UDP Data

This action can send the data by UDP packet to assigned IP address and Port number.

See Section 4.4.

6.4 Disappear

This action is used to leave the pedestrian object from the simulation.

If "Apply if appeared again" is checked, this action can be occurred repeatedly.

7. How to use SEdit Scenario Data in Re:sim simulation

To use the scenario data, configure Re:sim simulation data with the scenario data file in the Re:sim Files Output dialog.

Check "Assign Scenario Data" and select the scenario file(*.ss.txt) to use.
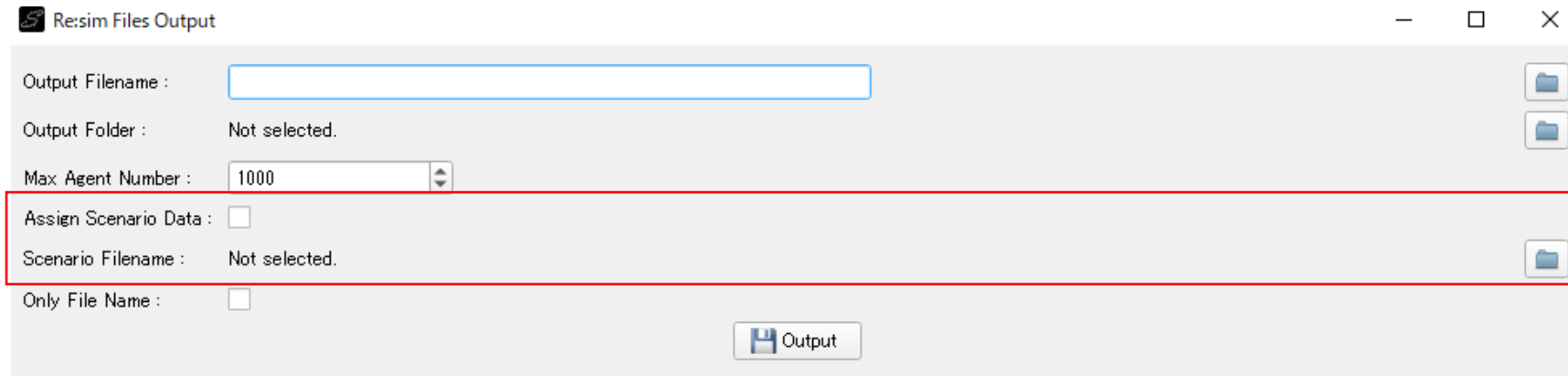
The Re:sim scenario file *.rs.txt (not SEdit scenario file) include necessary data for raise the scenario event.
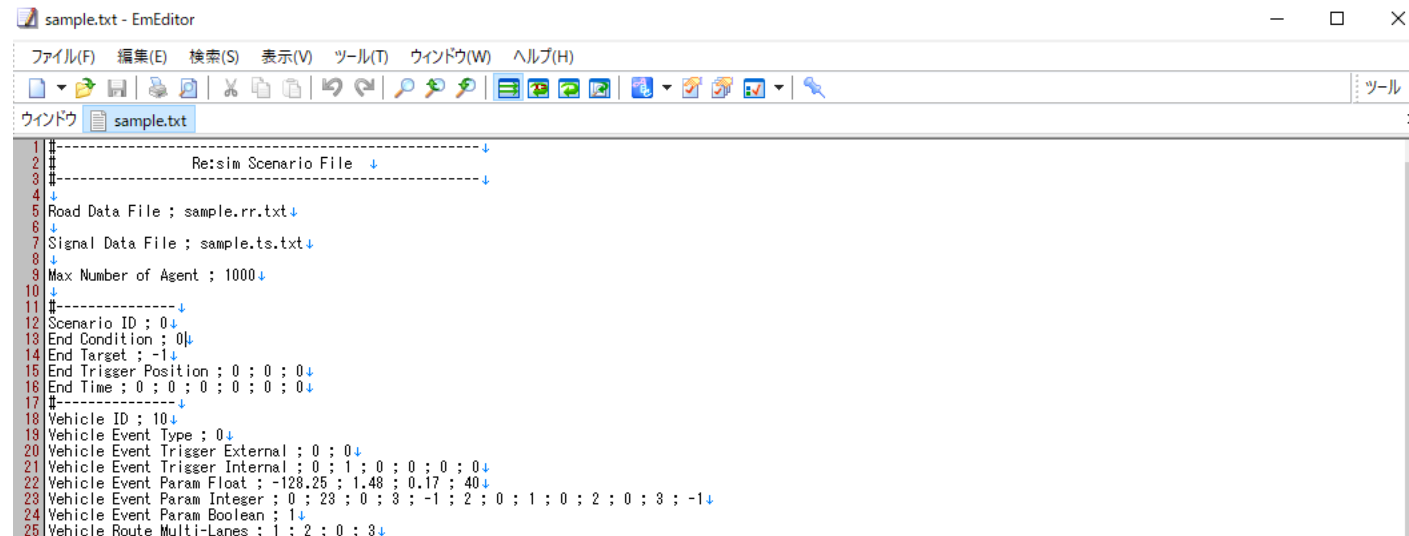
The scenario vehicles and pedestrians are labeled as [snr] in Re:sim simulation, color of the polygons are light green as shown below.