**Simulating a network in NetSim with an external mobility file**

**Overview**: Users have the option of using inbuilt mobility models or interfacing external mobility files to NetSim. An example application on where External mobility files are used is in VANET simulations. Here VANET simulators such as SUMO is used to create the vehicular network and set the road and traffic conditions. Per these settings the simulation is run in SUMO and a mobility file is generated. This file is then taken as an input by NetSim and the networking / communication effects are simulated and measured in NetSim.

**Format**: The name of the trace File generated should be kept as mobility.txt and it should be in the NetSim Mobility File format. The user can generate the trace file by any traffic simulator and modify it as per the NetSim mobility file format.

Shown below is the format for NetSim Mobiliy File -

#

#nodes: 5 max x = 1000.0, max y: 1000.0

#

$node\_(0) set X\_ 0.6642883828044

$node\_(0) set Y\_ 0.2309939067026

$node\_(0) set Z\_ 0.0

$node\_(1) set X\_ 50.6642883828044

$node\_(1) set Y\_ 50.2309939067026

$node\_(1) set Z\_ 0.0

$node\_(2) set X\_ 100.1527892303775

$node\_(2) set Y\_ 100.0017151661647

$node\_(2) set Z\_ 0.0

$node\_(3) set X\_ 150.3207048718017

$node\_(3) set Y\_ 150.7817679768309

$node\_(3) set Z\_ 0.0

$node\_(4) set X\_ 200.6792971281983

$node\_(4) set Y\_ 200.2182340231691

$node\_(4) set Z\_ 0.0

$time 0.0 "$node\_(0) 0.00 0.00 0.00"

$time 0.0 "$node\_(1) 50.0 50.0 0.0"

$time 0.0 "$node\_(2) 100 100 0"

$time 0.0 "$node\_(3) 150 150 0"

$time 0.0 "$node\_(4) 200 200 0"

$time 0.05 "$node\_(0) 50 0 0"

$time 0.05 "$node\_(1) 100 50 0"

...

...

...

In the NetSim Mobility file we initially specify

nodes – the total number of nodes in the scenario.

max x – the maximum grid length of x axis

max y – the maximum grid length of y axis

$node(node\_id) set X\_ x\_coord

$node(node\_id) set Y\_ y\_coord

$node(node\_id) set Z\_ z\_coord

This is to set the Initial position for each device in the scenario.

node\_id – It is one less than the ID of the device in NetSim GUI (DeviceId-1).

X\_coord, y\_coord, z\_coord – The Initial x, y, z coordinates of the device.

$time n "$node\_(node\_id) x\_coord y\_coord z\_coord"

This is to set the device positions with respect to time.

At time n the x,y,z coordinates of device node\_id is specified.

**Format conversion of NS2 Movements file to NetSim Mobility File:**

VANET simulators such as SUMOP can output the mobility file per the ns2movements file format. The steps below explain how to make a ns2movements.tcl file compatible with NetSim Mobility file format

NS2 mobility file format: .tcl

NetSim mobility file format: .txt

Sample ns2mobility.tcl

$node\_(0) set X\_ 5.1

$node\_(0) set Y\_ 495.05

$node\_(0) set Z\_ 0

$ns\_ at 0.0 "$node\_(0) setdest 5.1 495.05 0.00"

$node\_(1) set X\_ 994.9

$node\_(1) set Y\_ 504.95

$node\_(1) set Z\_ 0

$ns\_ at 0.0 "$node\_(1) setdest 994.9 504.95 0.00"

$node\_(2) set X\_ 504.95

$node\_(2) set Y\_ 5.1

$node\_(2) set Z\_ 0

$ns\_ at 0.0 "$node\_(2) setdest 504.95 5.1 0.00"

$node\_(3) set X\_ 495.05

$node\_(3) set Y\_ 994.9

$node\_(3) set Z\_ 0

$ns\_ at 0.0 "$node\_(3) setdest 495.05 994.9 0.00"

$ns\_ at 1.0 "$node\_(0) setdest 7.38 495.05 2.28"

$ns\_ at 1.0 "$node\_(1) setdest 993.27 504.95 1.63"

$ns\_ at 1.0 "$node\_(2) setdest 504.95 7.64 2.54"

$ns\_ at 1.0 "$node\_(3) setdest 495.05 993.07 1.83"

$ns\_ at 2.0 "$node\_(0) setdest 11.91 495.05 4.53"

$ns\_ at 2.0 "$node\_(1) setdest 989.77 504.95 3.50"

$ns\_ at 2.0 "$node\_(2) setdest 504.95 12.2 4.56"

$ns\_ at 2.0 "$node\_(3) setdest 495.05 989.24 3.83"

Step 1: Create a new text file and initially specify the following details:

#

#nodes: 4 max x = 1000.0, max y: 1000.0

#

Step 2: Cut and paste the initial postions of all the four devices together in the beginning.

#

#nodes: 4 max x = 1000.0, max y: 1000.0

#

$node\_(0) set X\_ 5.1

$node\_(0) set Y\_ 495.05

$node\_(0) set Z\_ 0

$node\_(1) set X\_ 994.9

$node\_(1) set Y\_ 504.95

$node\_(1) set Z\_ 0

$node\_(2) set X\_ 504.95

$node\_(2) set Y\_ 5.1

$node\_(2) set Z\_ 0

$node\_(3) set X\_ 495.05

$node\_(3) set Y\_ 994.9

$node\_(3) set Z\_ 0

Step 3: The device positions of each device with respect to time can come below.

#

#nodes: 4 max x = 1000.0, max y: 1000.0

#

$node\_(0) set X\_ 5.1

$node\_(0) set Y\_ 495.05

$node\_(0) set Z\_ 0

$node\_(1) set X\_ 994.9

$node\_(1) set Y\_ 504.95

$node\_(1) set Z\_ 0

$node\_(2) set X\_ 504.95

$node\_(2) set Y\_ 5.1

$node\_(2) set Z\_ 0

$node\_(3) set X\_ 495.05

$node\_(3) set Y\_ 994.9

$node\_(3) set Z\_ 0

$ns\_ at 0.0 "$node\_(0) setdest 5.1 495.05 0.00"

$ns\_ at 0.0 "$node\_(1) setdest 994.9 504.95 0.00"

$ns\_ at 0.0 "$node\_(2) setdest 504.95 5.1 0.00"

$ns\_ at 0.0 "$node\_(3) setdest 495.05 994.9 0.00"

$ns\_ at 1.0 "$node\_(0) setdest 7.38 495.05 2.28"

$ns\_ at 1.0 "$node\_(1) setdest 993.27 504.95 1.63"

$ns\_ at 1.0 "$node\_(2) setdest 504.95 7.64 2.54"

$ns\_ at 1.0 "$node\_(3) setdest 495.05 993.07 1.83"

$ns\_ at 2.0 "$node\_(0) setdest 11.91 495.05 4.53"

$ns\_ at 2.0 "$node\_(1) setdest 989.77 504.95 3.50"

$ns\_ at 2.0 "$node\_(2) setdest 504.95 12.2 4.56"

$ns\_ at 2.0 "$node\_(3) setdest 495.05 989.24 3.83"

Step 4: Save this file in the name mobility.txt and place it in NetSim bin path so as to provide it as input for file based mobility.