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LAMPIRAN

LAMPIRAN 1 Isi *skenario.tcl*

```
set opt(nn) 50
# set activity file
set opt(af) $opt(config-path)
append opt(af) /activity50.tcl
# set mobility file
set opt(mf) $opt(config-path)
append opt(mf) /mobility50.tcl
# set start/stop time
set opt(start) 0.0
set opt(stop) 299.99999999999994
# set floor size
set opt(x) 943.96
set opt(y) 1882.18
set opt(min-x) -1.59
set opt(min-y) 1.62
```

LAMPIRAN 2 Isi *mobility.tcl*

```
$node_(0) set X_ 93.26
$node_(0) set Y_ 1609.88
$node_(0) set Z_ 0
$ns_ at 0.0 "$node_(0) setdest 93.26 1609.88 0.00"
$ns_ at 0.1 "$node_(0) setdest 93.29 1609.88 0.25"
$ns_ at 0.2 "$node_(0) setdest 93.33 1609.87 0.49"
$node_(1) set X_ 104.35
$node_(1) set Y_ 1217.06
$node_(1) set Z_ 0
$ns_ at 1.0 "$node_(1) setdest 104.35 1217.06 0.00"
$ns_ at 1.1 "$node_(0) setdest 94.82 1609.85 2.52"
$ns_ at 1.1 "$node_(1) setdest 104.34 1217.09 0.26"
$node_(2) set X_ 489.29
$node_(2) set Y_ 1229.42
$node_(2) set Z_ 0
$ns_ at 2.0 "$node_(2) setdest 489.29 1229.42 0.00"
$ns_ at 2.1 "$node_(0) setdest 98.4 1609.79 4.49"
$ns_ at 2.1 "$node_(1) setdest 103.91 1218.5 2.39"
$node_(3) set X_ 130.17
$node_(3) set Y_ 1127.47
$node_(3) set Z_ 0
$ns_ at 3.0 "$node_(3) setdest 130.17 1127.47 0.00"
$ns_ at 3.1 "$node_(0) setdest 104.05 1609.7 6.61"
$ns_ at 3.1 "$node_(1) setdest 103.01 1221.84 4.39"
$node_(4) set X_ 419.45
$node_(4) set Y_ 727.93
$node_(4) set Z_ 0
$ns_ at 4.0 "$node_(4) setdest 419.45 727.93 0.00"
$ns_ at 4.1 "$node_(0) setdest 111.76 1609.57 8.67"
$ns_ at 4.1 "$node_(1) setdest 101.63 1227.03 6.24"
$node_(5) set X_ 598.56
$node_(5) set Y_ 516.39
$node_(5) set Z_ 0
$ns_ at 5.0 "$node_(5) setdest 598.56 516.39 0.00"
```

```
$ns_ at 5.1 "$node_(0) setdest 121.51 1609.41 10.71"
$ns_ at 5.1 "$node_(1) setdest 99.76 1234.06 8.13"
$node_(6) set X_ 433.71
$node_(6) set Y_ 1123.47
$node_(6) set Z_ 0
$ns_ at 6.0 "$node_(6) setdest 433.71 1123.47 0.00"
$ns_ at 6.1 "$node_(0) setdest 133.23 1609.22 12.21"
$ns_ at 6.1 "$node_(1) setdest 97.4 1242.92 10.06"
$node_(7) set X_ 79.53
$node_(7) set Y_ 1599.23
$node_(7) set Z_ 0
$ns_ at 7.0 "$node_(7) setdest 79.53 1599.23 0.00"
$ns_ at 7.1 "$node_(0) setdest 143.05 1609.06 7.82"
$ns_ at 7.1 "$node_(1) setdest 94.61 1253.69 12.13"
$node_(8) set X_ 598.56
$node_(8) set Y_ 516.39
$node_(8) set Z_ 0
$ns_ at 8.8 "$node_(8) setdest 598.56 516.39 0.00"
$ns_ at 8.9 "$node_(0) setdest 151.06 1610.83 3.83"
$ns_ at 8.9 "$node_(1) setdest 88.25 1277.92 15.51"
$node_(9) set X_ 420.61
$node_(9) set Y_ 1201.58
$node_(9) set Z_ 0
$ns_ at 9.0 "$node_(9) setdest 420.61 1201.58 0.00"
$ns_ at 9.1 "$node_(0) setdest 150.65 1611.45 3.85"
$ns_ at 9.1 "$node_(1) setdest 87.43 1280.97 15.89"
$node_(10) set X_ 310.93
$node_(10) set Y_ 1182.07
$node_(10) set Z_ 0
$ns_ at 10.0 "$node_(10) setdest 310.93 1182.07 0.00"
$ns_ at 10.0 "$node_(2) setdest 448.63 1279.57 15.44"
$ns_ at 10.0 "$node_(3) setdest 116.58 1173.03 13.27"
$node_(11) set X_ 577.51
$node_(11) set Y_ 366.79
$node_(11) set Z_ 0
```

```
$ns_ at 11.0 "$node_(11) setdest 577.51 366.79 0.00"
$ns_ at 11.0 "$node_(2) setdest 438.04 1292.23 17.47"
$ns_ at 11.0 "$node_(3) setdest 112.86 1186.83 15.13"
$node_(12) set X_ 381.02
$node_(12) set Y_ 561.12
$node_(12) set Z_ 0
$ns_ at 12.0 "$node_(12) setdest 381.02 561.12 0.00"
$ns_ at 12.0 "$node_(2) setdest 425.83 1306.32 19.63"
$ns_ at 12.0 "$node_(3) setdest 108.6 1202.43 17.01"
$node_(13) set X_ 101.01
$node_(13) set Y_ 1469.4
$node_(13) set Z_ 0
$ns_ at 13.0 "$node_(13) setdest 101.01 1469.4 0.00"
$ns_ at 13.0 "$node_(2) setdest 411.48 1321.25 21.62"
$ns_ at 13.0 "$node_(3) setdest 103.55 1219.82 18.99"
$node_(14) set X_ 716.04
$node_(14) set Y_ 528.32
$node_(14) set Z_ 0
$ns_ at 14.0 "$node_(14) setdest 716.04 528.32 0.00"
$ns_ at 14.0 "$node_(2) setdest 395.58 1337.29 23.43"
$ns_ at 14.0 "$node_(3) setdest 98.39 1239.21 20.94"
$node_(15) set X_ 420.61
$node_(15) set Y_ 1201.58
$node_(15) set Z_ 0
$ns_ at 15.4 "$node_(15) setdest 420.61 1201.58 0.00"
$ns_ at 15.4 "$node_(2) setdest 373.27 1361.24 21.28"
$ns_ at 15.4 "$node_(3) setdest 90.54 1269.42 23.50"
$node_(16) set X_ 2.53
$node_(16) set Y_ 1619.56
$node_(16) set Z_ 0
$ns_ at 16.0 "$node_(16) setdest 2.53 1619.56 0.00"
$ns_ at 16.0 "$node_(2) setdest 365.3 1369.98 18.59"
$ns_ at 16.0 "$node_(3) setdest 86.76 1283.46 24.72"
$node_(17) set X_ 436.97
$node_(17) set Y_ 1102.01
```

```
$node_(17) set Z_ 0
$ns_ at 17.0 "$node_(17) setdest 436.97 1102.01 0.00"
$ns_ at 17.0 "$node_(2) setdest 354.91 1382.29 14.10"
$ns_ at 17.0 "$node_(3) setdest 80.65 1306.19 22.39"
$node_(18) set X_ 927.48
$node_(18) set Y_ 37.26
$node_(18) set Z_ 0
$ns_ at 18.0 "$node_(18) setdest 927.48 37.26 0.00"
$ns_ at 18.0 "$node_(2) setdest 347.73 1391.45 9.65"
$ns_ at 18.0 "$node_(3) setdest 75.09 1326.83 20.61"
$node_(19) set X_ 707.52
$node_(19) set Y_ 8.52
$node_(19) set Z_ 0
$ns_ at 19.0 "$node_(19) setdest 707.52 8.52 0.00"
$ns_ at 19.0 "$node_(2) setdest 341.05 1395.56 7.95"
$ns_ at 19.0 "$node_(3) setdest 70.21 1344.99 16.85"
$node_(20) set X_ 826.52
$node_(20) set Y_ 542.42
$node_(20) set Z_ 0
$ns_ at 20.0 "$node_(20) setdest 826.52 542.42 0.00"
$ns_ at 20.0 "$node_(3) setdest 66.47 1358.88 12.35"
$ns_ at 20.0 "$node_(4) setdest 457.74 567.55 3.76"
$node_(21) set X_ 40.96
$node_(21) set Y_ 1478.5
$node_(21) set Z_ 0
$ns_ at 21.0 "$node_(21) setdest 40.96 1478.5 0.00"
$ns_ at 21.0 "$node_(3) setdest 63.91 1368.43 7.85"
$ns_ at 21.0 "$node_(4) setdest 460.41 567.79 3.73"
$node_(22) set X_ 110.7
$node_(22) set Y_ 1384.46
$node_(22) set Z_ 0
$ns_ at 22.0 "$node_(22) setdest 110.7 1384.46 0.00"
$ns_ at 22.0 "$node_(3) setdest 66.88 1374.35 7.33"
$ns_ at 22.0 "$node_(4) setdest 459.81 572.08 5.23"
$node_(23) set X_ 276.85
```

```
$node_(23) set Y_ 1504.93
$node_(23) set Z_ 0
$ns_ at 23.0 "$node_(23) setdest 276.85 1504.93 0.00"
$ns_ at 23.0 "$node_(3) setdest 74.27 1375.87 8.16"
$ns_ at 23.0 "$node_(4) setdest 458.35 578.29 7.30"
$node_(24) set X_ 68.41
$node_(24) set Y_ 1638.8
$node_(24) set Z_ 0
$ns_ at 24.0 "$node_(24) setdest 68.41 1638.8 0.00"
$ns_ at 24.0 "$node_(3) setdest 83.36 1377.2 9.98"
$ns_ at 24.0 "$node_(4) setdest 456.43 586.5 9.41"
$node_(25) set X_ 565.62
$node_(25) set Y_ 260.59
$node_(25) set Z_ 0
$ns_ at 25.0 "$node_(25) setdest 565.62 260.59 0.00"
$ns_ at 25.0 "$node_(3) setdest 94.27 1378.81 11.95"
$ns_ at 25.0 "$node_(4) setdest 454.03 596.71 11.37"
$node_(26) set X_ 79.53
$node_(26) set Y_ 1599.23
$node_(26) set Z_ 0
$ns_ at 27.0 "$node_(26) setdest 79.53 1599.23 0.00"
$ns_ at 27.0 "$node_(3) setdest 122.15 1382.84 15.99"
$ns_ at 27.0 "$node_(4) setdest 447.96 622.42 14.19"
$node_(27) set X_ 423.24
$node_(27) set Y_ 1110.04
$node_(27) set Z_ 0
$ns_ at 27.8 "$node_(27) setdest 423.24 1110.04 0.00"
$ns_ at 27.8 "$node_(26) setdest 79.55 1598.38 1.88"
$ns_ at 27.8 "$node_(3) setdest 135.48 1384.59 17.45"
$node_(28) set X_ 154.47
$node_(28) set Y_ 1678.43
$node_(28) set Z_ 0
$ns_ at 28.0 "$node_(28) setdest 154.47 1678.43 0.00"
$ns_ at 28.0 "$node_(3) setdest 139.04 1384.88 17.95"
$ns_ at 28.0 "$node_(4) setdest 444.65 636.25 14.19"
```

```
$node_(29) set X_ 157.87
$node_(29) set Y_ 1598.63
$node_(29) set Z_ 0
$ns_ at 29.0 "$node_(29) setdest 157.87 1598.63 0.00"
$ns_ at 29.0 "$node_(3) setdest 158.11 1386.1 20.01"
$ns_ at 29.0 "$node_(4) setdest 441.34 650.09 14.28"
$node_(30) set X_ 608.96
$node_(30) set Y_ 522.64
$node_(30) set Z_ 0
$ns_ at 30.0 "$node_(30) setdest 608.96 522.64 0.00"
$ns_ at 30.0 "$node_(4) setdest 438.03 663.95 14.22"
$ns_ at 30.0 "$node_(5) setdest 578.48 477.32 2.31"
$node_(31) set X_ 247.72
$node_(31) set Y_ 866.87
$node_(31) set Z_ 0
$ns_ at 31.0 "$node_(31) setdest 247.72 866.87 0.00"
$ns_ at 31.0 "$node_(4) setdest 434.72 677.8 14.18"
$ns_ at 31.0 "$node_(5) setdest 576.23 477.32 2.24"
$node_(32) set X_ 716.04
$node_(32) set Y_ 528.32
$node_(32) set Z_ 0
$ns_ at 32.0 "$node_(32) setdest 716.04 528.32 0.00"
$ns_ at 32.0 "$node_(4) setdest 431.41 691.66 14.22"
$ns_ at 32.0 "$node_(5) setdest 573.97 477.32 2.29"
$node_(33) set X_ 266.58
$node_(33) set Y_ 1281.74
$node_(33) set Z_ 0
$ns_ at 34.0 "$node_(33) setdest 266.58 1281.74 0.00"
$ns_ at 34.0 "$node_(4) setdest 424.96 718.66 11.95"
$ns_ at 34.0 "$node_(5) setdest 569.45 477.31 2.29"
$node_(34) set X_ 208.21
$node_(34) set Y_ 1164.61
$node_(34) set Z_ 0
$ns_ at 35.7 "$node_(34) setdest 208.21 1164.61 0.00"
$ns_ at 35.7 "$node_(33) setdest 267.66 1278.48 3.62"
```

```
$ns_ at 35.7 "$node_(4) setdest 421.67 732.41 7.14"
$node_(35) set X_ 401.02
$node_(35) set Y_ 1331.92
$node_(35) set Z_ 0
$ns_ at 36.3 "$node_(35) setdest 401.02 1331.92 0.00"
$ns_ at 36.3 "$node_(4) setdest 420.11 736.84 8.13"
$ns_ at 36.3 "$node_(5) setdest 564.23 477.31 2.23"
$node_(36) set X_ 483.93
$node_(36) set Y_ 170.73
$node_(36) set Z_ 0
$ns_ at 37.7 "$node_(36) setdest 483.93 170.73 0.00"
$ns_ at 37.7 "$node_(4) setdest 410.18 739.84 8.15"
$ns_ at 37.7 "$node_(5) setdest 561.08 477.31 2.24"
$node_(37) set X_ 354.64
$node_(37) set Y_ 710.07
$node_(37) set Z_ 0
$ns_ at 38.0 "$node_(37) setdest 354.64 710.07 0.00"
$ns_ at 38.0 "$node_(4) setdest 407.71 739.16 8.74"
$ns_ at 38.0 "$node_(5) setdest 560.41 477.31 2.23"
$node_(38) set X_ 423.24
$node_(38) set Y_ 1110.04
$node_(38) set Z_ 0
$ns_ at 39.0 "$node_(38) setdest 423.24 1110.04 0.00"
$ns_ at 39.0 "$node_(4) setdest 398.17 736.54 10.71"
$ns_ at 39.0 "$node_(5) setdest 558.15 477.31 2.21"
$node_(39) set X_ 236.18
$node_(39) set Y_ 1773.33
$node_(39) set Z_ 0
$ns_ at 41.0 "$node_(39) setdest 236.18 1773.33 0.00"
$ns_ at 41.0 "$node_(5) setdest 553.65 477.31 2.29"
$ns_ at 41.0 "$node_(6) setdest 497.28 960.46 14.49"
$node_(40) set X_ 540.71
$node_(40) set Y_ 754.27
$node_(40) set Z_ 0
$ns_ at 42.0 "$node_(40) setdest 540.71 754.27 0.00"
```

```
$ns_ at 42.0 "$node_(5) setdest 551.39 477.31 2.31"
$ns_ at 42.0 "$node_(6) setdest 500.54 946.54 13.57"
$node_(41) set X_ 193.47
$node_(41) set Y_ 978.76
$node_(41) set Z_ 0
$ns_ at 42.2 "$node_(41) setdest 193.47 978.76 0.00"
$ns_ at 42.2 "$node_(39) setdest 234.8 1774.46 2.63"
$ns_ at 42.2 "$node_(40) setdest 540.73 754.19 0.52"
$node_(42) set X_ 551.22
$node_(42) set Y_ 16.95
$node_(42) set Z_ 0
$ns_ at 43.0 "$node_(42) setdest 551.22 16.95 0.00"
$ns_ at 43.0 "$node_(5) setdest 551.39 475.29 2.30"
$ns_ at 43.0 "$node_(6) setdest 503.12 935.65 9.17"
$node_(43) set X_ 251.83
$node_(43) set Y_ 1292.42
$node_(43) set Z_ 0
$ns_ at 44.8 "$node_(43) setdest 251.83 1292.42 0.00"
$ns_ at 44.8 "$node_(5) setdest 551.79 471.27 2.22"
$ns_ at 44.8 "$node_(6) setdest 501.62 923.9 6.15"
$node_(44) set X_ 805.51
$node_(44) set Y_ 162.3
$node_(44) set Z_ 0
$ns_ at 45.0 "$node_(44) setdest 805.51 162.3 0.00"
$ns_ at 45.0 "$node_(5) setdest 551.84 470.83 2.22"
$ns_ at 45.0 "$node_(6) setdest 501.07 922.82 6.10"
$node_(45) set X_ 558.67
$node_(45) set Y_ 477.31
$node_(45) set Z_ 0
$ns_ at 46.5 "$node_(45) setdest 558.67 477.31 0.00"
$ns_ at 46.5 "$node_(35) setdest 340.49 1395.58 7.75"
$ns_ at 46.5 "$node_(36) setdest 464.67 246.85 17.44"
$node_(46) set X_ 459.5
$node_(46) set Y_ 573.43
$node_(46) set Z_ 0
```

```
$ns_ at 47.0 "$node_(46) setdest 459.5 573.43 0.00"
$ns_ at 47.0 "$node_(5) setdest 552.3 466.35 2.30"
$ns_ at 47.0 "$node_(6) setdest 504.04 907.82 9.47"
$node_(47) set X_ 492.29
$node_(47) set Y_ 922.21
$node_(47) set Z_ 0
$ns_ at 47.9 "$node_(47) setdest 492.29 922.21 0.00"
$ns_ at 47.9 "$node_(46) setdest 459.25 574.46 2.08"
$ns_ at 47.9 "$node_(5) setdest 552.5 464.33 2.30"
$node_(48) set X_ 551.22
$node_(48) set Y_ 16.95
$node_(48) set Z_ 0
$ns_ at 48.0 "$node_(48) setdest 551.22 16.95 0.00"
$ns_ at 48.0 "$node_(5) setdest 552.52 464.11 2.23"
$ns_ at 48.0 "$node_(6) setdest 506.45 897.42 11.57"
$node_(49) set X_ 706.3
$node_(49) set Y_ 597.96
$node_(49) set Z_ 0
$ns_ at 49.0 "$node_(49) setdest 706.3 597.96 0.00"
$ns_ at 49.0 "$node_(5) setdest 552.75 461.86 2.24"
$ns_ at 49.0 "$node_(6) setdest 509.32 885.02 13.59"
```

LAMPIRAN 3 Isi *activity.tcl*

```
$ns_ at 0.0 "$g(0) start"; # SUMO-ID: 0
$ns_ at 90.4 "$g(0) stop"; # SUMO-ID: 0
$ns_ at 1.0 "$g(1) start"; # SUMO-ID: 1
$ns_ at 242.4 "$g(1) stop"; # SUMO-ID: 1
$ns_ at 10.0 "$g(10) start"; # SUMO-ID: 10
$ns_ at 120.2 "$g(10) stop"; # SUMO-ID: 10
$ns_ at 11.0 "$g(11) start"; # SUMO-ID: 11
$ns_ at 129.3 "$g(11) stop"; # SUMO-ID: 11
$ns_ at 12.0 "$g(12) start"; # SUMO-ID: 12
$ns_ at 117.6 "$g(12) stop"; # SUMO-ID: 12
$ns_ at 13.0 "$g(13) start"; # SUMO-ID: 13
$ns_ at 50.4 "$g(13) stop"; # SUMO-ID: 13
$ns_ at 14.0 "$g(14) start"; # SUMO-ID: 14
$ns_ at 104.4 "$g(14) stop"; # SUMO-ID: 14
$ns_ at 15.4 "$g(15) start"; # SUMO-ID: 15
$ns_ at 143.5 "$g(15) stop"; # SUMO-ID: 15
$ns_ at 16.0 "$g(16) start"; # SUMO-ID: 16
$ns_ at 156.9 "$g(16) stop"; # SUMO-ID: 16
$ns_ at 17.0 "$g(17) start"; # SUMO-ID: 17
$ns_ at 77.4 "$g(17) stop"; # SUMO-ID: 17
$ns_ at 18.0 "$g(18) start"; # SUMO-ID: 18
$ns_ at 92.8 "$g(18) stop"; # SUMO-ID: 18
$ns_ at 19.0 "$g(19) start"; # SUMO-ID: 19
$ns_ at 118.6 "$g(19) stop"; # SUMO-ID: 19
$ns_ at 2.0 "$g(2) start"; # SUMO-ID: 2
$ns_ at 168.0 "$g(2) stop"; # SUMO-ID: 2
$ns_ at 20.0 "$g(20) start"; # SUMO-ID: 20
$ns_ at 85.2 "$g(20) stop"; # SUMO-ID: 20
$ns_ at 21.0 "$g(21) start"; # SUMO-ID: 21
$ns_ at 96.5 "$g(21) stop"; # SUMO-ID: 21
$ns_ at 22.0 "$g(22) start"; # SUMO-ID: 22
$ns_ at 60.1 "$g(22) stop"; # SUMO-ID: 22
$ns_ at 23.0 "$g(23) start"; # SUMO-ID: 23
$ns_ at 74.3 "$g(23) stop"; # SUMO-ID: 23
```

```
$ns_ at 24.0 "$g(24) start"; # SUMO-ID: 24
$ns_ at 171.4 "$g(24) stop"; # SUMO-ID: 24
$ns_ at 25.0 "$g(25) start"; # SUMO-ID: 25
$ns_ at 174.5 "$g(25) stop"; # SUMO-ID: 25
$ns_ at 27.8 "$g(27) start"; # SUMO-ID: 26
$ns_ at 160.8 "$g(27) stop"; # SUMO-ID: 26
$ns_ at 27.0 "$g(26) start"; # SUMO-ID: 27
$ns_ at 99.9 "$g(26) stop"; # SUMO-ID: 27
$ns_ at 28.0 "$g(28) start"; # SUMO-ID: 28
$ns_ at 130.0 "$g(28) stop"; # SUMO-ID: 28
$ns_ at 29.0 "$g(29) start"; # SUMO-ID: 29
$ns_ at 136.2 "$g(29) stop"; # SUMO-ID: 29
$ns_ at 3.0 "$g(3) start"; # SUMO-ID: 3
$ns_ at 50.5 "$g(3) stop"; # SUMO-ID: 3
$ns_ at 30.0 "$g(30) start"; # SUMO-ID: 30
$ns_ at 245.5 "$g(30) stop"; # SUMO-ID: 30
$ns_ at 31.0 "$g(31) start"; # SUMO-ID: 31
$ns_ at 143.7 "$g(31) stop"; # SUMO-ID: 31
$ns_ at 32.0 "$g(32) start"; # SUMO-ID: 32
$ns_ at 129.3 "$g(32) stop"; # SUMO-ID: 32
$ns_ at 35.7 "$g(34) start"; # SUMO-ID: 33
$ns_ at 76.0 "$g(34) stop"; # SUMO-ID: 33
$ns_ at 34.0 "$g(33) start"; # SUMO-ID: 34
$ns_ at 81.2 "$g(33) stop"; # SUMO-ID: 34
$ns_ at 46.5 "$g(45) start"; # SUMO-ID: 35
$ns_ at 221.8 "$g(45) stop"; # SUMO-ID: 35
$ns_ at 36.3 "$g(35) start"; # SUMO-ID: 36
$ns_ at 75.1 "$g(35) stop"; # SUMO-ID: 36
$ns_ at 37.7 "$g(36) start"; # SUMO-ID: 37
$ns_ at 113.0 "$g(36) stop"; # SUMO-ID: 37
$ns_ at 38.0 "$g(37) start"; # SUMO-ID: 38
$ns_ at 159.4 "$g(37) stop"; # SUMO-ID: 38
$ns_ at 39.0 "$g(38) start"; # SUMO-ID: 39
$ns_ at 133.5 "$g(38) stop"; # SUMO-ID: 39
$ns_ at 4.0 "$g(4) start"; # SUMO-ID: 4
```

```
$ns_ at 129.4 "$g(4) stop"; # SUMO-ID: 4
$ns_ at 42.2 "$g(41) start"; # SUMO-ID: 40
$ns_ at 105.7 "$g(41) stop"; # SUMO-ID: 40
$ns_ at 41.0 "$g(39) start"; # SUMO-ID: 41
$ns_ at 127.2 "$g(39) stop"; # SUMO-ID: 41
$ns_ at 42.0 "$g(40) start"; # SUMO-ID: 42
$ns_ at 223.9 "$g(40) stop"; # SUMO-ID: 42
$ns_ at 43.0 "$g(42) start"; # SUMO-ID: 43
$ns_ at 122.3 "$g(42) stop"; # SUMO-ID: 43
$ns_ at 44.8 "$g(43) start"; # SUMO-ID: 44
$ns_ at 113.6 "$g(43) stop"; # SUMO-ID: 44
$ns_ at 45.0 "$g(44) start"; # SUMO-ID: 45
$ns_ at 133.8 "$g(44) stop"; # SUMO-ID: 45
$ns_ at 47.9 "$g(47) start"; # SUMO-ID: 46
$ns_ at 100.0 "$g(47) stop"; # SUMO-ID: 46
$ns_ at 47.0 "$g(46) start"; # SUMO-ID: 47
$ns_ at 145.1 "$g(46) stop"; # SUMO-ID: 47
$ns_ at 48.0 "$g(48) start"; # SUMO-ID: 48
$ns_ at 139.6 "$g(48) stop"; # SUMO-ID: 48
$ns_ at 49.0 "$g(49) start"; # SUMO-ID: 49
$ns_ at 188.6 "$g(49) stop"; # SUMO-ID: 49
$ns_ at 5.0 "$g(5) start"; # SUMO-ID: 5
$ns_ at 126.5 "$g(5) stop"; # SUMO-ID: 5
$ns_ at 6.0 "$g(6) start"; # SUMO-ID: 6
$ns_ at 83.4 "$g(6) stop"; # SUMO-ID: 6
$ns_ at 7.0 "$g(7) start"; # SUMO-ID: 7
$ns_ at 115.5 "$g(7) stop"; # SUMO-ID: 7
$ns_ at 8.8 "$g(8) start"; # SUMO-ID: 8
$ns_ at 231.5 "$g(8) stop"; # SUMO-ID: 8
$ns_ at 9.0 "$g(9) start"; # SUMO-ID: 9
$ns_ at 77.9 "$g(9) stop"; # SUMO-ID: 9
```

LAMPIRAN 4 Konfigurasi AODV *vanet-routing-compare.cc*

```
void
VanetRoutingExperiment::SetDefaultAttributeValues ()
{
}
.
.
static ns3::GlobalValue g_protocol ("VRCprotocol",
                                    "Routing protocol",
                                    ns3::UintegerValue (2),

ns3::MakeUintegerChecker<uint32_t> ());
static ns3::GlobalValue g_lossModel ("VRClossModel",
                                     "Propagation Loss Model",
                                     ns3::UintegerValue (3),

 ns3::MakeUintegerChecker<uint32_t> ());
.
.
static ns3::GlobalValue g_80211mode ("VRC80211mode",
                                     "802.11 mode
(0=802.11a;1=802.11p)",
                                     ns3::UintegerValue (1),

 ns3::MakeUintegerChecker<uint32_t> ());
static ns3::GlobalValue g_mobility ("VRCmobility",
                                    "Mobility mode 0=random way-
point;1=mobility trace file",
                                    ns3::UintegerValue (1),

ns3::MakeUintegerChecker<uint32_t> ());
.
.
static ns3::GlobalValue g_CSVfileName ("VRCCSVfileName",
                                       "CSV filename (for time se-
ries data)",
                                       ns3::StringValue
("AODV50.output.csv"),
                                       ns3::MakeStringChecker ());
```

```
static ns3::GlobalValue g_CSVfileName2 ("VRCCSVfileName2",
                                        "CSV filename 2 (for over-
all simulation scenario results)",
                                        ns3::StringValue
("AODV50.output2.csv"),
                                        ns3::MakeStringChecker
());

void
VanetRoutingExperiment::SetupScenario ()
{
  if (m_scenario == 1)
    {
      m_traceFile =
"/home/ubuntu/sumo/tools/skenario1/mobility50.tcl";
      m_logFile = "AODV50.log";
      m_mobility = 1;
      m_nNodes = 50;
      m_TotalSimTime = 300.01;
      // m_nodeSpeed = 0;
      // m_nodePause = 0;
      m_CSVfileName = "AODV50.csv";
      m_CSVfileName = "2AODV50.csv";
    }
  else if (m_scenario == 2)
    {
      m_traceFile =
"/home/ubuntu/sumo/tools/skenario2/mobility80.tcl";
      m_logFile = "AODV80.log";
      m_mobility = 1;
      m_nNodes = 80;
      m_TotalSimTime = 300.01;
      // m_nodeSpeed = 0;
      // m_nodePause = 0;
      m_CSVfileName = "AODV80.csv";
      m_CSVfileName = "2AODV80.csv";
    }
    else if (m_scenario == 3)
    {
```

```
      m_traceFile =
"/home/ubuntu/sumo/tools/skenario3/mobility110.tcl";
      m_logFile = "AODV110.log";
      m_mobility = 1;
      m_nNodes = 110;
      m_TotalSimTime = 300.01;
      // m_nodeSpeed = 0;
      // m_nodePause = 0;
      m_CSVfileName = "AODV110.csv";
      m_CSVfileName = "2AODV110.csv";
    }
}
```

LAMPIRAN 5 *Network Performance Calculation*

```
uint32_t SentPackets = 0;
uint32_t ReceivedPackets = 0;
uint32_t LostPackets = 0;
int j=0;
float AvgThroughput = 0;
Time Jitter;
Time Delay;

Ptr<Ipv4FlowClassifier> classifier = Dynamic-
Cast<Ipv4FlowClassifier> (flowmon.GetClassifier ());
  std::map<FlowId, FlowMonitor::FlowStats> stats = monitor-
>GetFlowStats ();

  for (std::map<FlowId, FlowMonitor::FlowStats>::const_iterator
iter = stats.begin (); iter != stats.end (); ++iter)
    {
    Ipv4FlowClassifier::FiveTuple t = classifier->FindFlow (iter-
>first);

NS_LOG_UNCOND("----Flow ID:" <<iter->first);
NS_LOG_UNCOND("Src Addr" <<t.sourceAddress << "Dst Addr "<<
t.destinationAddress);
NS_LOG_UNCOND("Sent Packets=" <<iter->second.txPackets);
NS_LOG_UNCOND("Received Packets =" <<iter->second.rxPackets);
NS_LOG_UNCOND("Lost Packets =" <<iter->second.txPackets-iter-
>second.rxPackets);
NS_LOG_UNCOND("Packet delivery ratio =" <<iter-
>second.rxPackets*100/iter->second.txPackets << "%");
NS_LOG_UNCOND("Packet loss ratio =" << (iter->second.txPackets-
iter->second.rxPackets)*100/iter->second.txPackets << "%");
NS_LOG_UNCOND("Delay =" <<(iter-
>second.timeLastRxPacket.GetSeconds()-iter-
>second.timeFirstTxPacket.GetSeconds()) / iter-
>second.rxBytes<<"ns");
NS_LOG_UNCOND("Jitter =" <<iter->second.jitterSum);
NS_LOG_UNCOND("Throughput =" <<iter->second.rxBytes/(iter-
>second.timeLastRxPacket.GetSeconds()-iter-
>second.timeFirstTxPacket.GetSeconds())<<"Kbps");
```

```
SentPackets = SentPackets +(iter->second.txPackets);
ReceivedPackets = ReceivedPackets + (iter->second.rxPackets);
LostPackets = LostPackets + (iter->second.txPackets-iter-
>second.rxPackets);
AvgThroughput = AvgThroughput + (iter->second.rxBytes /(iter-
>second.timeLastRxPacket.GetSeconds()-iter-
>second.timeFirstTxPacket.GetSeconds())/1024);
Delay = Delay + (iter->second.timeLastRxPacket.GetSeconds()-iter-
>second.timeFirstTxPacket.GetSeconds()) / iter->second.rxBytes;
Jitter = Jitter + (iter->second.jitterSum);

j = j + 1;

}

AvgThroughput = AvgThroughput/j;
NS_LOG_UNCOND("--------Total Results of the simulation----------
"<<std::endl);
NS_LOG_UNCOND("Total sent packets  =" << SentPackets);
NS_LOG_UNCOND("Total Received Packets =" << ReceivedPackets);
NS_LOG_UNCOND("Total Lost Packets =" << LostPackets);
NS_LOG_UNCOND("Packet Loss ratio =" << ((LostPack-
ets*100)/SentPackets)<< "%");
NS_LOG_UNCOND("Packet delivery ratio =" << ((ReceivedPack-
ets*100)/SentPackets)<< "%");
NS_LOG_UNCOND("Average Throughput =" << AvgThroughput<< "Kbps");
NS_LOG_UNCOND("End to End Delay =" << Delay<< "ns");
NS_LOG_UNCOND("End to End Jitter delay =" << Jitter);
NS_LOG_UNCOND("Total Flod id " << j);
monitor->SerializeToXmlFile("AODV50.flowmon", true, true);
```