

How to install OMNeT++5.4.1, Veins-4.7.1 and SUMO 0.32 on Ubuntu 18.04

A) OMNeT++

According to [26], OMNeT++ is an extensible, modular, component-based C++ simulation library and framework, primarily for building network simulators. “Network” is meant in a broader sense that includes wired and wireless communication networks, on-chip networks, queueing networks, and so on. Domain-specific functionality such as support for sensor networks, wireless ad-hoc networks, Internet protocols, performance modeling, photonic networks, etc., is provided by model frameworks, developed as independent projects. OMNeT++ offers an Eclipse-based IDE, a graphical runtime environment, and a host of other tools. There are extensions for real-time simulation, network emulation, database integration, SystemC integration, and several other functions. OMNeT++ is distributed under the Academic Public License.

Omnet++ IDE is used as a container for Veins. So, this part will just show where the IDE can be downloaded and mention quickly how to install it.

The simulations were conducted in an Ubuntu 16.04 environnement. Below are the few steps taken to have omnet++ installed:

1. Download the Omnet++ IDE source package omnetpp-5.4.1-src-linux.tgz from the website

<https://omnetpp.org/download>

2. Compile the source package by following the steps below:

- Untar the package:

```
$ tar xvfz omnetpp-5.4.1-src-linux.tgz
```

- Once untared, access the directory omnet-5.4.1 et configure the packet:

```
$/configure
```

Several packets are mandatory for Omnet++. It is possible to found out his dependencies on the Simulation install guide.

- Finally, make to end the installation:

```
$ make
```

The IDE is ready for use and this can be tested by launching some examples projects.

B) Veins

Veins is an open source framework for running vehicular network simulations. It is based on two well-established simulators: OMNeT++, an event-based network simulator, and SUMO, a road traffic simulator. It extends these to offer a comprehensive suite of models for Inter-Vehicular Communication (IVC) simulation [27]. Veins is a framework to integrate in OMNeT++. Follow the steps below in order to get it installed and running:

- Download the framework from the Veins official website. Simulations were conducted with the last stable version in date `veins-4.7.1`
- Unzip the package and open OMNeT++ simulator
- Import Veins to OMNeT++
`File→Import→Existing Project into Workspace→Veins`
- Finally build everything in OMNeT++
`Project→Build All`

Now, Veins is installed and configured. Now, it is possible to run a simulation of vehicles and control communications between them. But neither OMNeT++, nor Veins are able to provide road and traffic. That is why SUMO is needed. Below is a brief description of the SUMO road traffic simulator, its installation and configuration.

C) SUMO

SUMO is an open source, microscopic, multi-modal traffic simulation. It allows to simulate how a given traffic demand which consists of single vehicles moves through a given road network. The simulation allows to address a large set of traffic management topics. It is purely microscopic: each vehicle is modeled explicitly, has an own route, and moves individually through the network. Simulations are deterministic by default but there are various options for introducing randomness [28]. Steps for installation:

- Download SUMO version 0.32.0 from sumo website
`https://sumo.dlr.de/userdoc/Downloads.html`
- Compile the source package by following the steps below:
 - Untar the package

```
$ tar xvfz sumo-src-0.32.0.tar.gz
```

- Once untared, access the directory sumo-src-0.32.0 et configure the packet:

```
$ ./configure
```

- Finally, make to end the installation:

```
$ make
```

Once installed, it is possible to launch it by running the command below in a terminal:

```
$path_to_sumo/sumo-gui
```

A windows should open up and you will see the GUI interface of sumo as shown in the figure below.

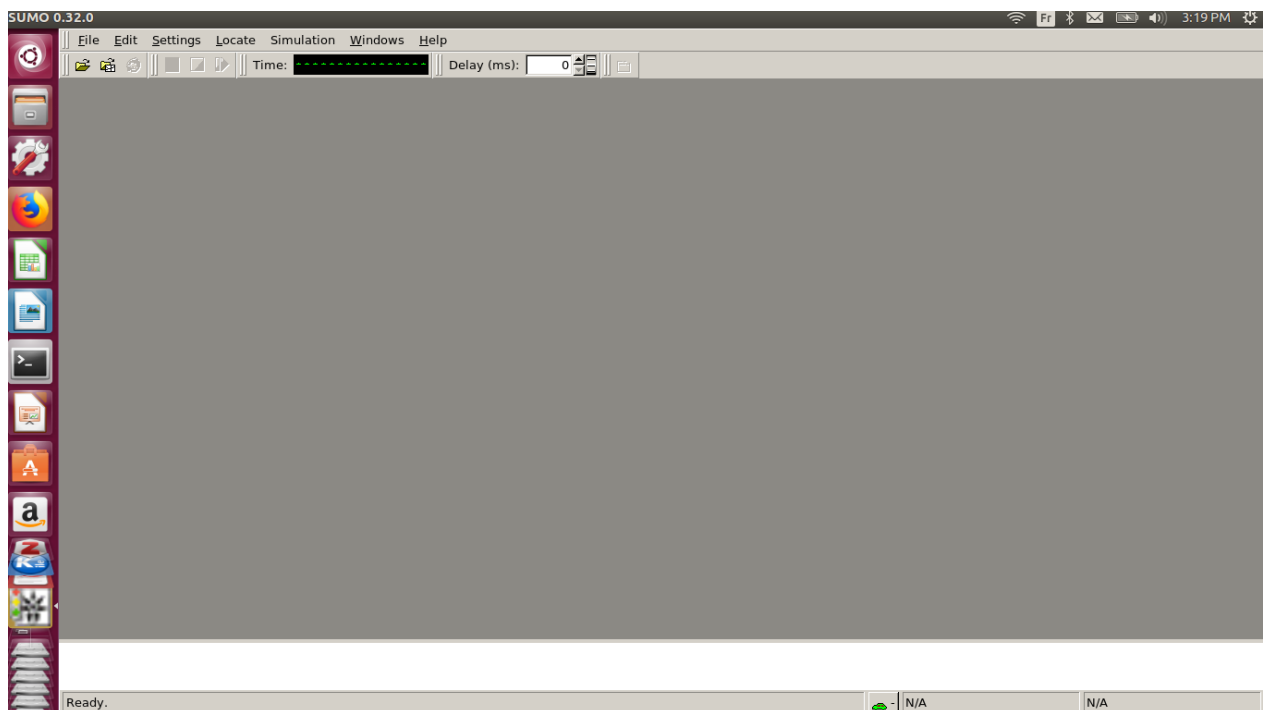


Figure 1: SUMO GUI

Now that all the three simulators are installed and run normally, the next step is to bind Veins and SUMO. In this way, SUMO will provide Veins with routes and mobility needed to vehicles to move in the simulation. This is done with the command below:

```
$ path_to_veins/sumo-launchd.py -vv -c path_to_sumo/bin/sumo
```

For my case for example I have:

```
$ ~/src/veins-veins-4.7.1/sumo-launchd.py -vv -c /usr/bin/sumo
```

This command launches the sumo script located in the veins package. Practically, it opens a socket to bind SUMO and veins. The simulation environment is ready and in Fig 6, we can see the Veins example ran after the setup.

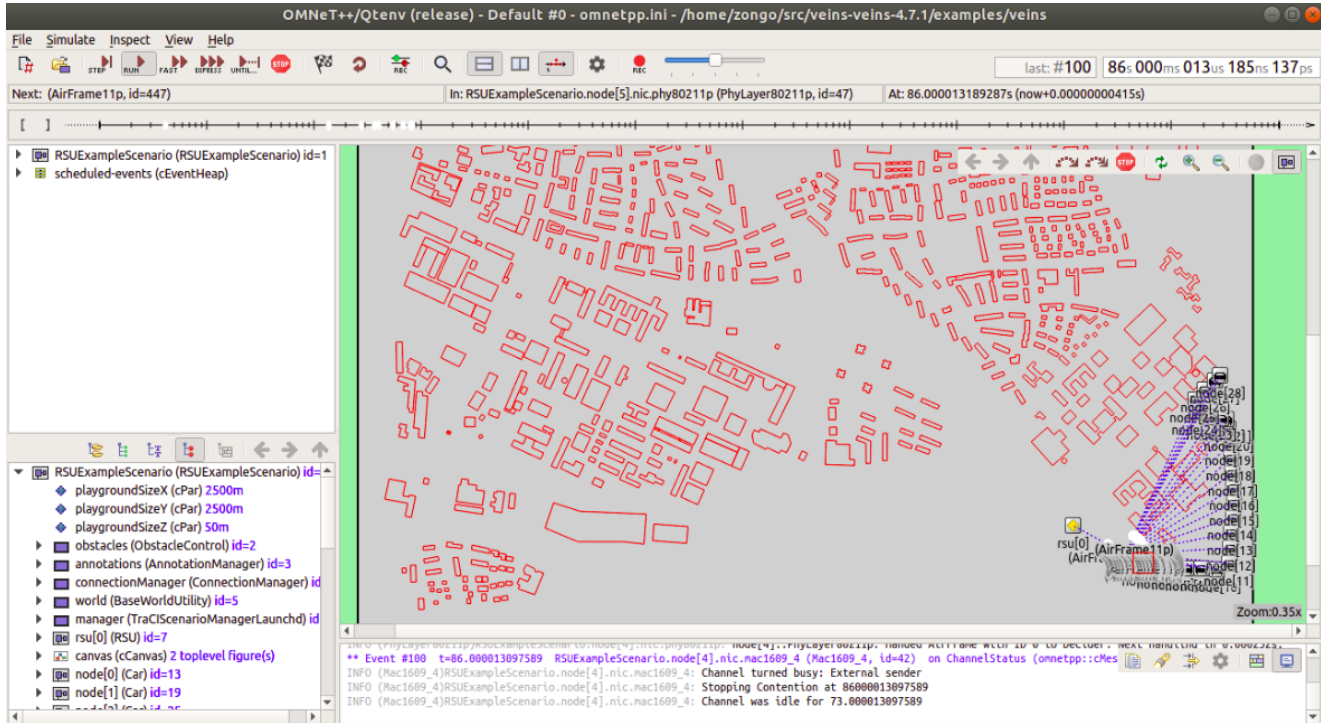


Figure 2: Veins example running o OMNeT++

Conclusion:

The report shows how to install OMNeT++5.4.1, veins-4.7.1 and SUMO-0.32.0 on ubuntu 16.04 / 18.04. A short description is given for each simulator in order to know exactly what is used for what. If someone wants to simulate VANETs, this document is complete for installation.