

IPWAVE Basic Protocols Project @ IETF-104 Hackathon



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Goal of IPWAVE Basic Protocols Project

❖ Implementation of IPv6 Over IEEE 802.11-OCB and **IPv6 Vehicular Neighbor Discovery**

1. Router and Prefix Discovery along with IPv6 Address Autoconfiguration
2. Address Registration and Duplicate Address Detection Procedure
3. Multihop DAD Procedure via V2V Communications

IPWAVE Hackathon Project Poster

IP Wireless Access in Vehicular Environments (IPWAVE) Basic Protocols Project

Champion: Jaehoon Paul Jeong (SKKU)



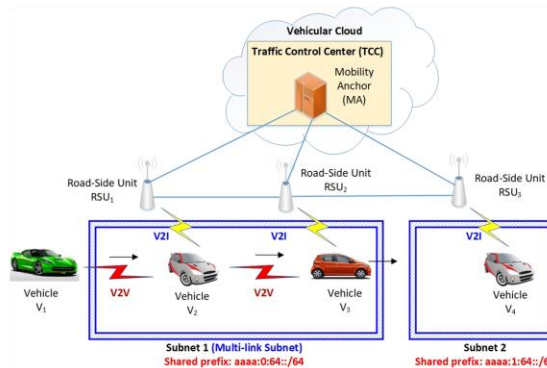
Professors

- Jaehoon Paul Jeong (SKKU)
- Younghan Kim (SSU)

Students

- Zhong Xiang (SKKU)
- Yiwen Chris Shen (SKKU)
- Kyoungjae Sun (SSU)

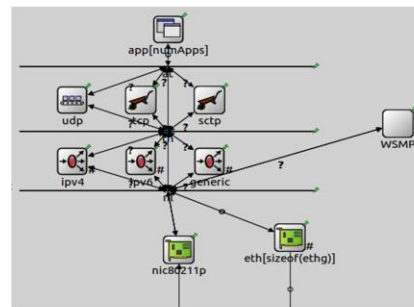
Vehicular Network Architecture



WAVE Stack



Node Structure in OMNeT++



Objective of this Hackathon

- Demonstrate IPWAVE basic protocols
- Discover technology gaps

Where to get code

- Github – Source Code
✓ <https://github.com/ipwave-hackathon-ietf>

Where to get video clip

- Youtube – Demonstration
✓ <https://youtu.be/sKYfa0MC6Jg>

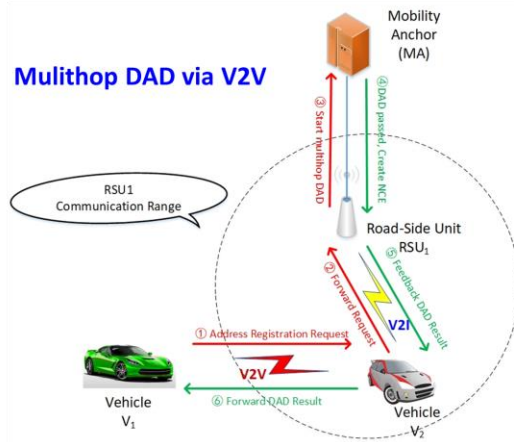
What to pull down to set up an environment

- OS: Ubuntu 16.04
- OMNeT++: 5.4.1
- SUMO: 0.32.0
- Veins: 4.7.1
- INET Framework: 4.0.0

Contents of Implementation

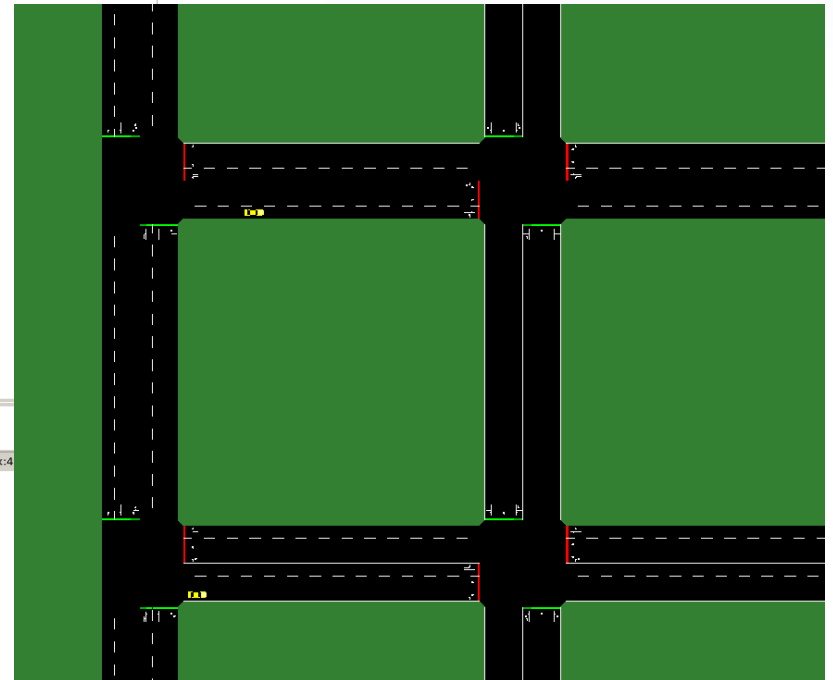
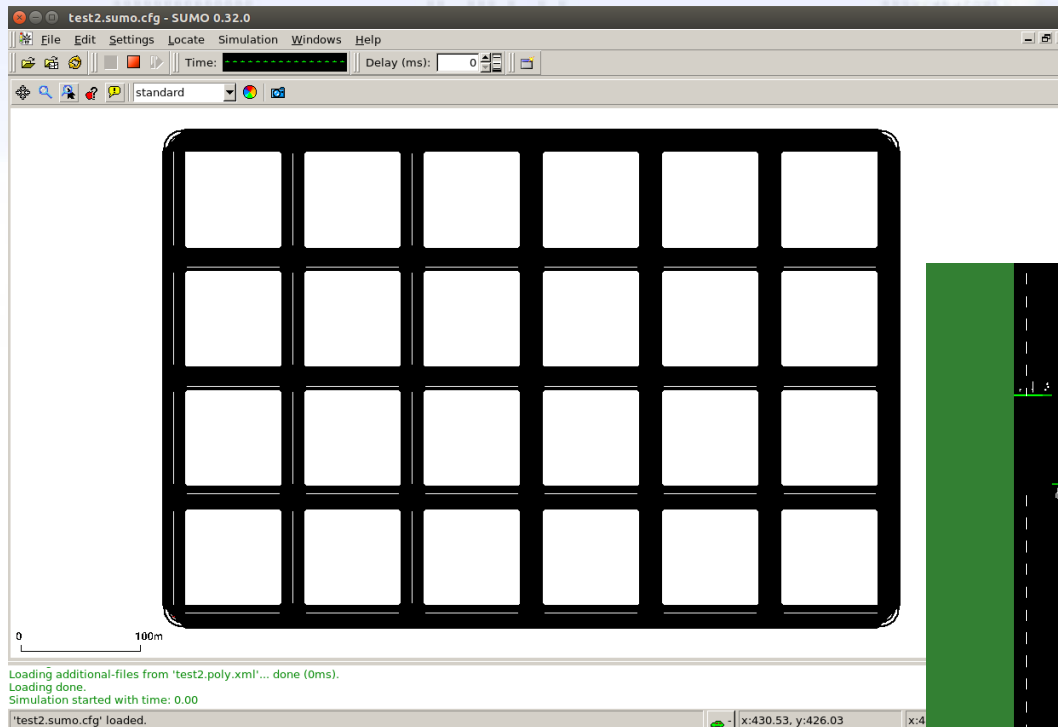
- Transmission of IPv6 Packets over IEEE 802.11-OCB
- IPv6 Neighbor Discovery for IP-Based Vehicular Networks
 - ✓ Router and Prefix Discovery along with IPv6 Address Autoconfiguration
 - ✓ Address Registration and Duplicate Address Detection Process
 - ✓ Multihop DAD Process via V2V communications
- Build IPv6/TCP/UDP protocol stack based on VEINS-4.7.1 and INET-4.0
- Build a basic IPWAVE running scenario via V2I and V2V based on VEINS-4.7.1 and SUMO-0.32.0

Multihop DAD via V2V



Road Network Architecture (1/2)

- ✓ A 7*6 grid map with 3 lanes for a road network



Road Network Architecture (2/2)

✓ Two RSUs :

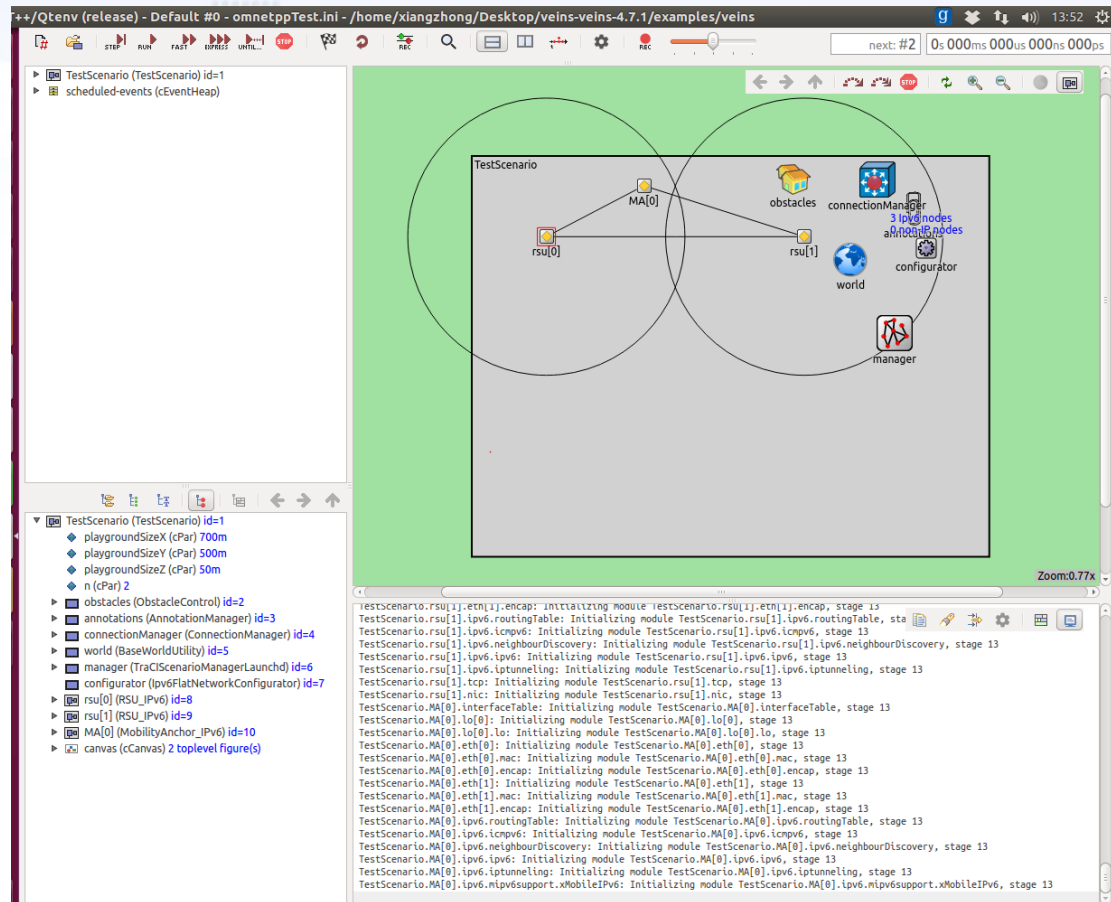
- Belong to one subnet.
- Connect with each other through Ethernet.

✓ Two Vehicles :

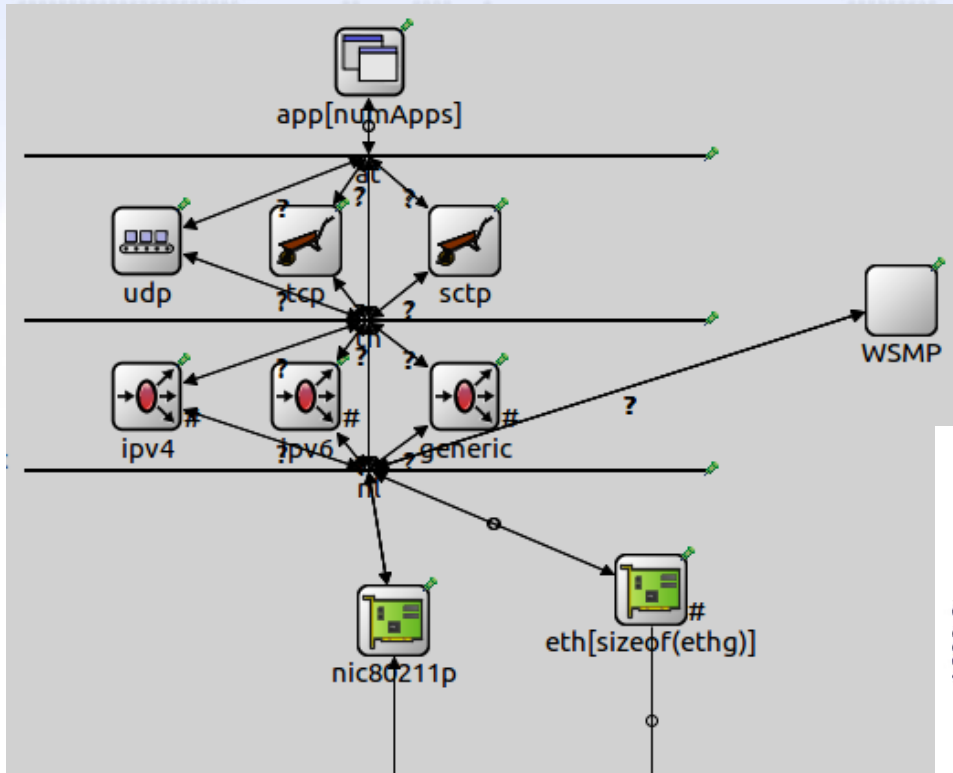
- One is outside the coverage of RSUs.

✓ Mobility Anchor:

- Manage RSUs and Vehicles.

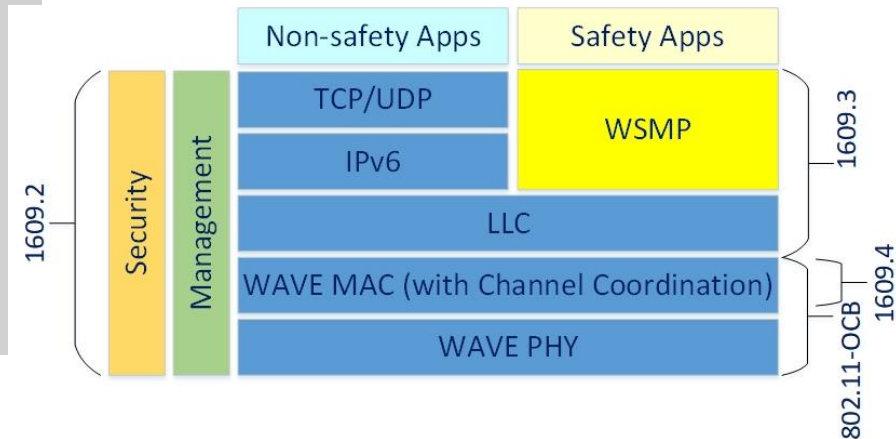


Vehicular Network Architecture



Vehicle Structure

WAVE Stack



Lessons from IETF-104 Hackathon Project

- **Proof of Concept (POC) of IPWAVE-VND Protocol**
 - **IPWAVE- Vehicular Neighbor Discovery (VND)**
- **Design and Implementation of IPWAVE-VND in OMNeT++ and SUMO**
 - **Design of IPWAVE-VND Framework in OMNeT++**
 - **Implementation of IPv6 over IEEE 802.11-OCB**
- **Proposal of Flexible Mobility Management for IPWAVE-VND**
 - **Simplify handover procedure between adjacent RSUs**
 - **Alleviate flow pressure at Mobility Anchor**



Appendix

- Hackathon Development Environment
- Open-Source Depository of IPWAVE Basic Protocols Project
- Demonstration Video Clip of IPWAVE Basic Protocols Project

Hackathon Development Environment

OS	<u>Ubuntu Linux 16.04</u>
OMNeT++	Version 5.4.1
SUMO	Version 0.32.0
Veins	Version 4.7.1
INET Framework	Version 4.0.0

Open-Source Depository of IPWAVE Basic Protocols Project

Github link:

<https://github.com/ipwave-hackathon-ietf>

The screenshot shows the GitHub repository page for `ipwave-hackathon-ietf / ipwave-hackathon-ietf-104`. The repository has 1 Watch, 0 Stars, and 0 Forks. The main navigation bar includes links for Code, Issues (0), Pull requests (0), Projects (0), and Insights. Below the navigation bar, there is a message: "No description, website, or topics provided." The repository statistics bar shows 1 commit, 1 branch, 0 releases, and a "Fetching contributors" status. The "Branch: master" dropdown is set to "master", and there is a "New pull request" button. The "Find File" button is visible, and the "Clone or download" button is highlighted in green. The repository content shows a commit by `chinentori` with the message "First commit" and the latest commit hash `c8cb3ba` dated Mar 18, 2019. The repository structure includes a folder `inet4` and a file `veins-veins-4.7.1` with a "First commit" dated Mar 18, 2019.

ipwave-hackathon-ietf / ipwave-hackathon-ietf-104

Watch 1 Star 0 Fork 0

Code Issues 0 Pull requests 0 Projects 0 Insights

No description, website, or topics provided.

1 commit 1 branch 0 releases Fetching contributors

Branch: master New pull request Find File Clone or download

chinentori First commit Latest commit c8cb3ba Mar 18, 2019

inet4

veins-veins-4.7.1 First commit Mar 18, 2019

Demonstration Video Clip of IPWAVE Basic Protocols Project

Youtube link:

<https://youtu.be/sKYfa0MC6Jg>

