



# **Vehicular Mobility Management for IP-Based Vehicular Networks**

**(draft-jeong-ipwave-vehicular-mobility-management-00)**

**IETF 104, Prague**

**March 29, 2019**

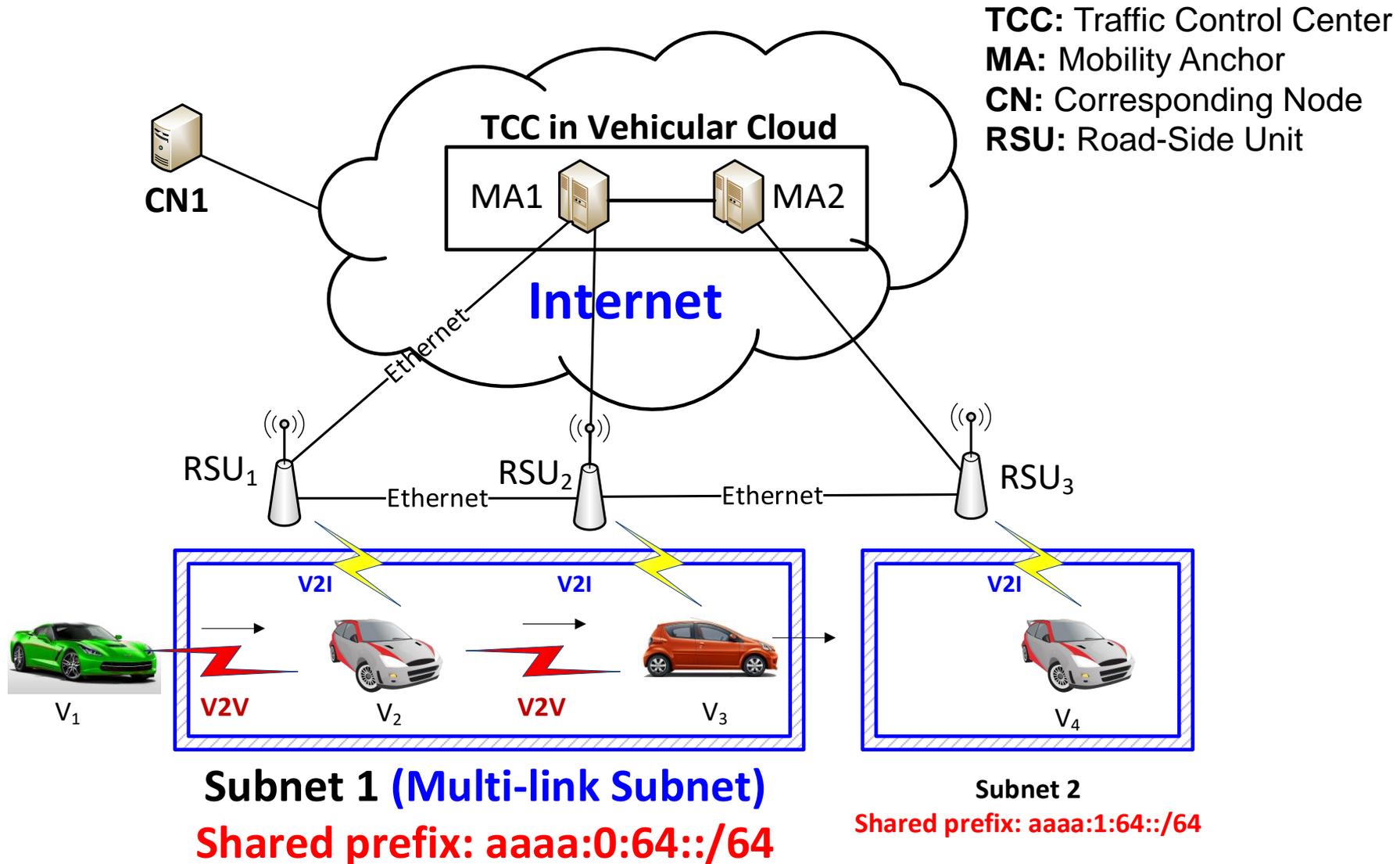
Jaehoon (Paul) Jeong, Yiwen (Chris) Shen, and Zhong Xiang

**Sungkyunkwan University**

# Motivation

- Purposes of This Draft
  - **A Key Work Item** in IPWAVE Problem Statement
    - Vehicular Neighbor Discovery
      - draft-jeong-ipwave-vehicular-neighbor-discovery-06
    - **Vehicular Mobility Management**
      - draft-jeong-ipwave-vehicular-mobility-management-00
    - Vehicular Security and Privacy
  - **Shedding Light on Vehicular Mobility Management**
    - IPWAVE WG can have a more concrete idea on mobility management for vehicular networks.
    - We can have clear requirements and design principles.

# Vehicular Network Architecture



# Requirements of Mobility Management

- Sharing a Single Prefix per Multi-link Subnet (i.e., Prefix Domain)
  - IP Address Registration through Multihop DAD [[draft-jeong-ipwave-vehicular-neighbor-discovery-06](#)]
- Seamless Handoff by Network-Based Mobility Management (MM)
  - MM based on Proxy MIPv6 (PMIPv6)
  - MM based on Distributed MM (DMM)
- Handoff between Multiple Prefix Domains
  - Connectivity Support with the Corresponding Node via V2I
  - Ad Hoc Networking Support with Neighboring Vehicles via V2V

# Design Principles

- **Key Ideas of Mobility Management**

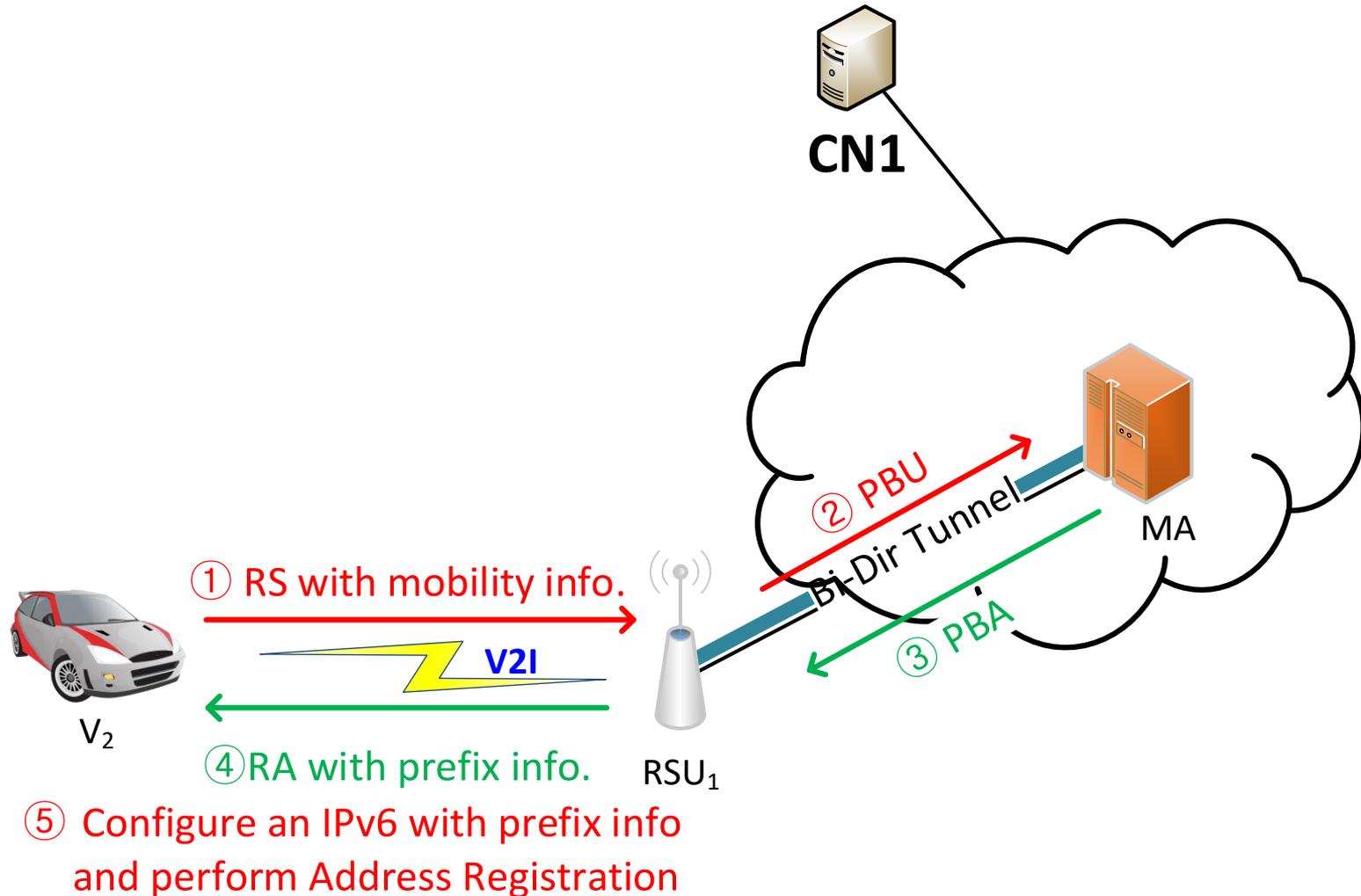
- **Proactive Mobility Management**

- It performs handoff in advance along a vehicle's movement.
    - It uses a vehicle's mobility information (e.g., speed, direction, and position) and trajectory information (i.e., navigation path).
    - It uses L2 information (e.g., Received Channel Power Indicator (RCPI)) for movement detection.

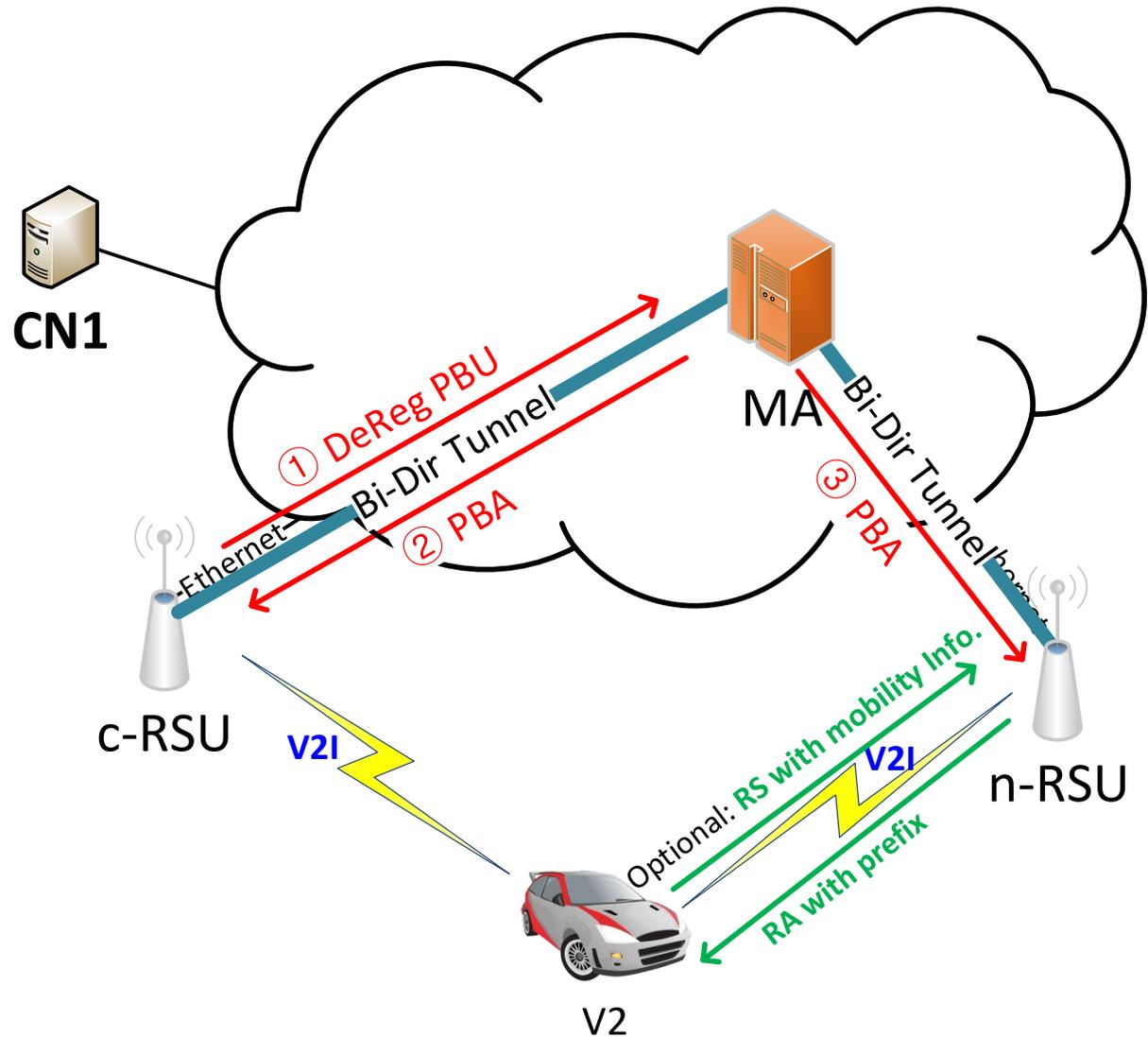
- **Network-Based Mobility Management**

- Network infrastructure (e.g., RSUs and MAs) performs handoff transparent to vehicles.

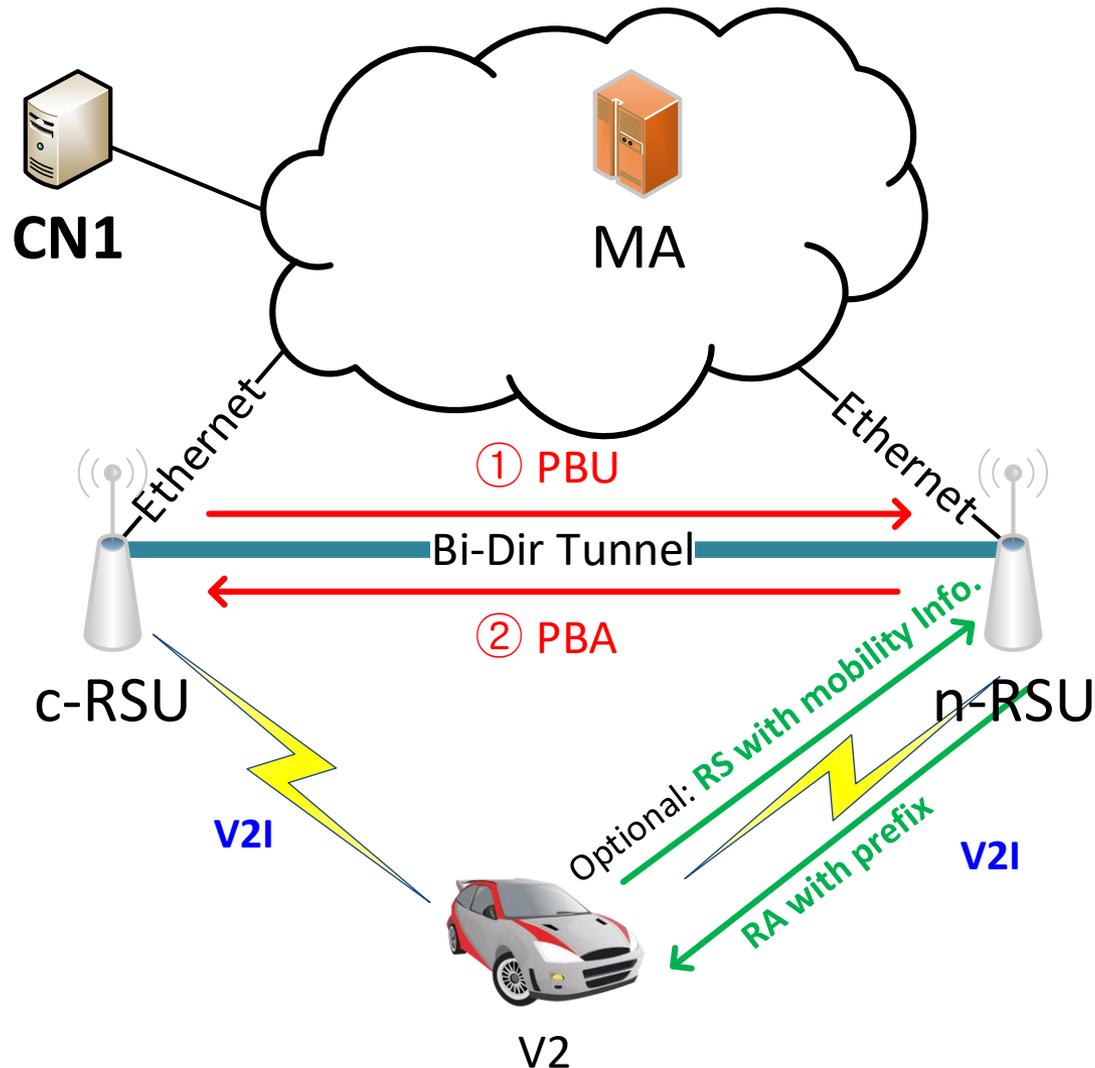
# Network Attachment and IP Address Registration



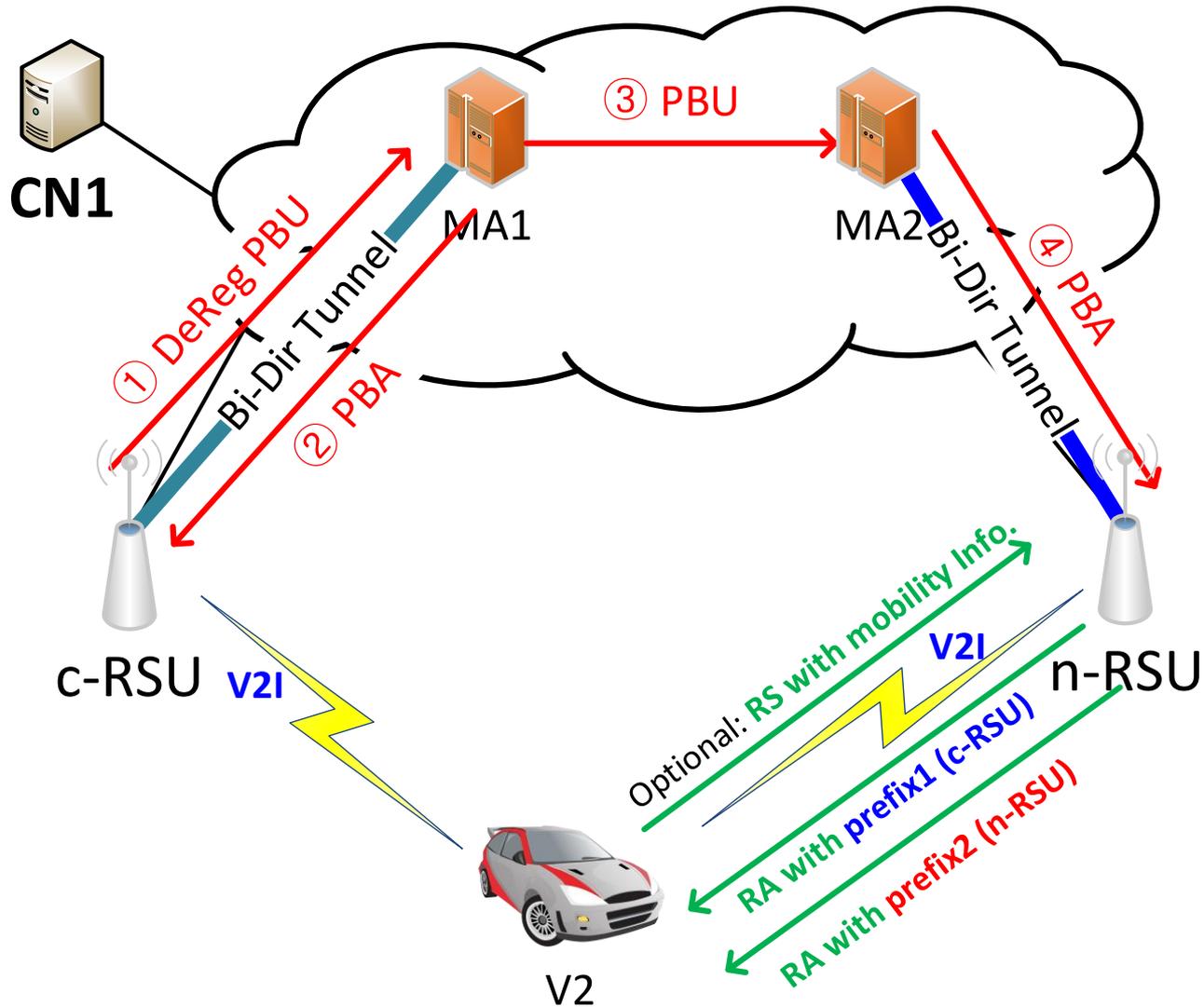
# Handoff within a Multi-link Subnet through PMIPv6



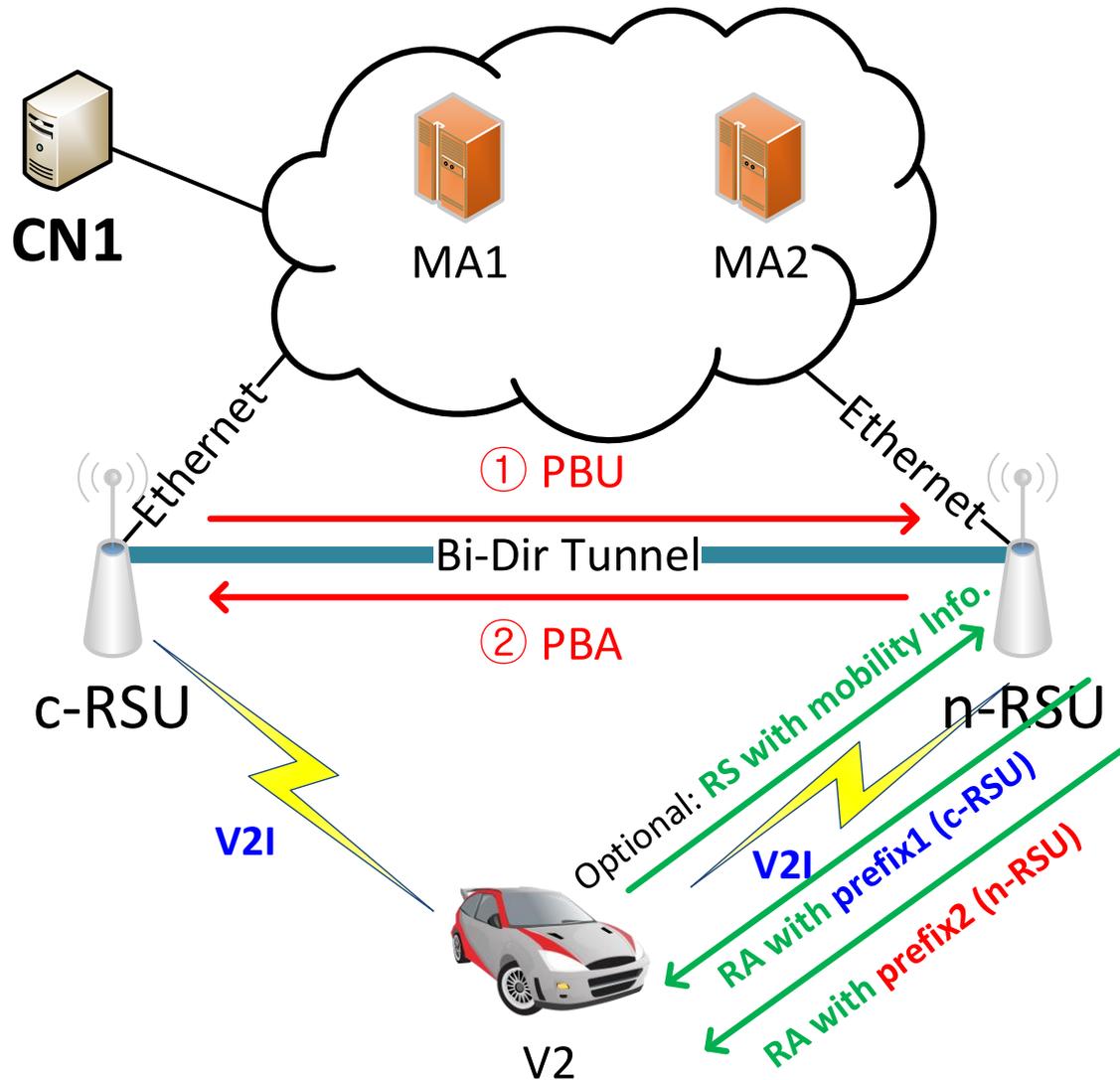
# Handoff within a Multi-link Subnet through DMM



# Handoff between Multi-link Subnets through PMIPv6



# Handoff between Multi-link Subnets through DMM



# Next Steps

- **Enhancement of the Draft**

- We will enhance this draft through the consensus of IPWAVE WG.
- It will can be used to clarify IPWAVE PS document.

- **Proof-of-Concept**

- We will implement Vehicular Mobility Management (VMM) in realistic simulations.
  - Vehicular network simulator is based on OMNeT++, VEINS, and SUMO.
- We have a plan to participate in IETF-105 Hackathon Project (IPWAVE VMM Project).