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

Subnet 1 (Multi-link Subnet)
Shared prefix: aaaa:0:64::/64

Subnet 2
Shared prefix: aaaa:1:64::/64

TCC: Traffic Control Center
MA: Mobility Anchor
CN: Corresponding Node
RSU: Road-Side Unit
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

RS with mobility info.

RA with prefix info.

Configure an IPv6 with prefix info and perform Address Registration.
Handoff within a Multi-link Subnet through PMIPv6
Handoff within a Multi-link Subnet through DMM

1. PBU
2. PBA

Optional: RS with mobility info.
RA with prefix

V2I
V2
Handoff between Multi-link Subnets through PMIPv6

CN1

① DeReg PBU
② PBA
Bi-Dir Tunnel

MA1

③ PBU

MA2

④ PBA
Bi-Dir Tunnel

c-RSU

Optional: RS with mobility Info.

n-RSU

RA with prefix1 (c-RSU)

RA with prefix2 (n-RSU)

V2

V2I
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).