

# Service Discovery for Moving Objects

*Service and Neighbor Discovery in ITS*

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@IPMON BoF Side Meeting



# Neighbor discovery in ITS

- Discover the neighbor vehicle and the nearby service  
(**Moving object is Vehicle here**)
- Learn the link-layer address of the selected neighbor vehicle
- *In the dynamic and fragmentation-possible environment--VANET*

- **Assumptions:**

Name: vehicle SHOULD have a temporary name which is related to location

Address: vehicle SHOULD have a global IP address which is more stable



# Why mDNS?

- Suitable for the infrastructure-less environment
  - VANET
- For service discovery
  - Discovery the named service and named vehicle
- Standardized protocol
  - ST-RFC6762, based on DNS
- Neighbor vehicles with the same prefix are **ON THE SAME LINK**
- If in Multi-link scenario, Proxy or other schemes can be used



# SD based on mDNS---- *Ad-hoc based*

- Different modes can be used in different scenarios:
  - **One-shot Multicast DNS Query**
    - **E.g., Locate the specific service**
  - **Continuous Multicast DNS Query**
    - **E.g., Locate the nearby vehicles which are moving**
- Multiple Questions per Query: Locate multiple services/vehicles simultaneously
- Multiple Questions Multicast Responses: update the caches of receivers
- Multiple Questions Unicast Responses: new vehicle joins

# SD based on mDNS----*RSU based*

- Vehicles *MAY* have direct connection with RSU
- RSU is a local DNS server
- RSU maintains the registered vehicle/services or acts as a relay/proxy:
  - **Direct Unicast Queries to Port 5353**
  - or*
  - **Legacy Unicast DNS**

# SD based on mDNS

- **Probing and Announcing on Startup**
- A vehicle starts up, wakes up from stalls, topology changes (after configuration of the name and address):
  - Probe the availability of the service it announced
  - Then, announce the service and its existence
    - Unsolicited multicast DNS response containing, in the Answer Section, all of its service and name and address.....
    - Update the information actively if there is any change

# SD based on mDNS

- **Goodbay~**
- A vehicle will arrive at its destination, stall temporarily or shut down its camera...
  - **Announce the service suspending and its inexistence**
    - **Unsolicited multicast DNS response packet, giving the same RRs (containing its name and address), but TTL of zero**



# Signaling messages

## **TBD:**

- To piggyback link-layer address
- To include Geo-information
- ....

Extension of mDNS RR

## *OR:*

- mDNS service discovery + NDP
- mDNS service discovery + Others





*Thank you for your attention~*

