IETF-118 6MAN WG

Basic Support for IPv6 Networks Operating over 5G Vehicle-to-Everything Communications

November 6, 2023

draft-jeong-6man-ipv6-over-5g-v2x-02

Jaehoon (Paul) Jeong, Bien Aime Mugabarigira,

Yiwen (Chris) Shen, Alexandre Petrescu, and Sandra Cespedes

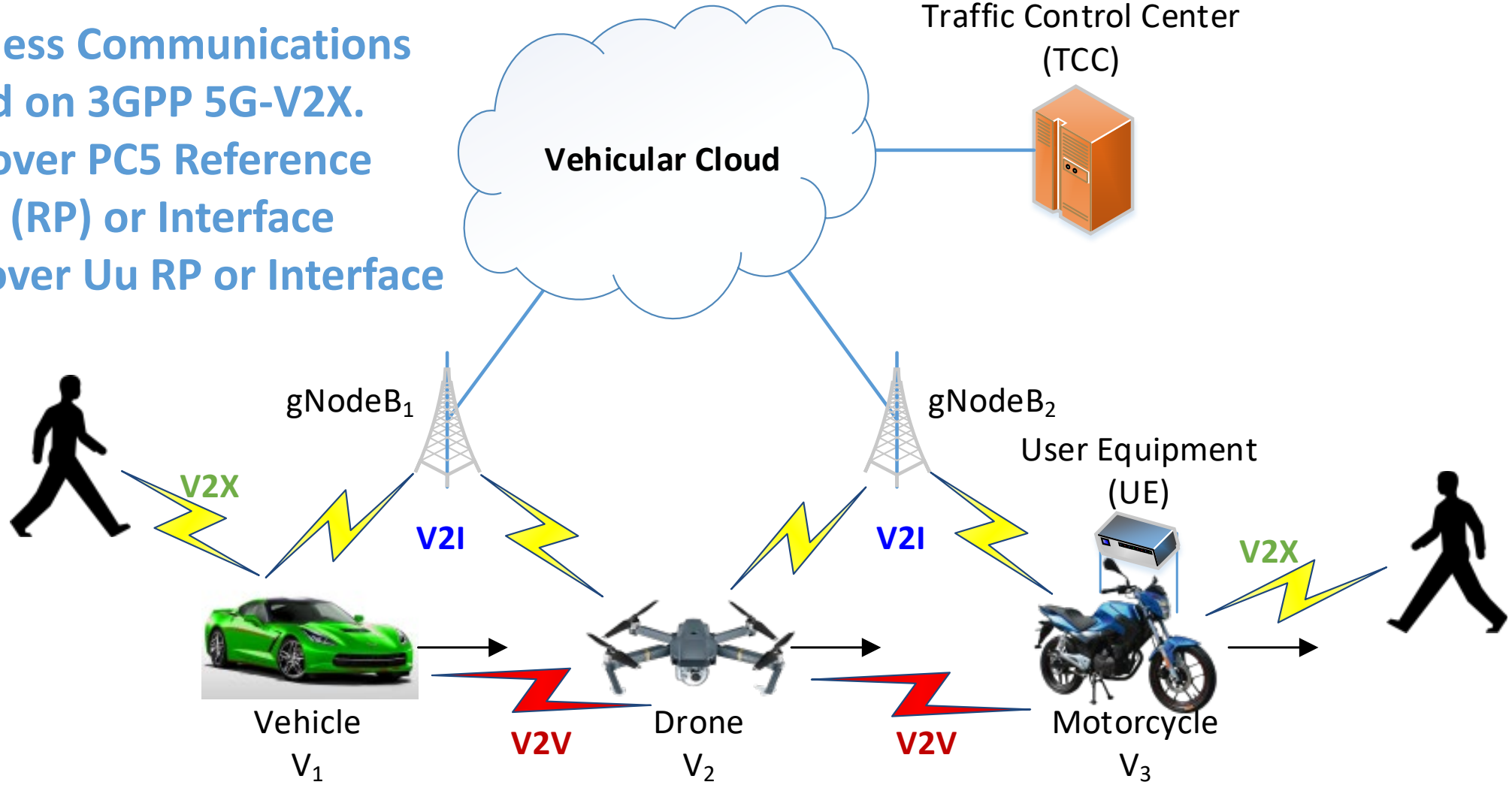
Email: pauljeong@skku.edu

IETF

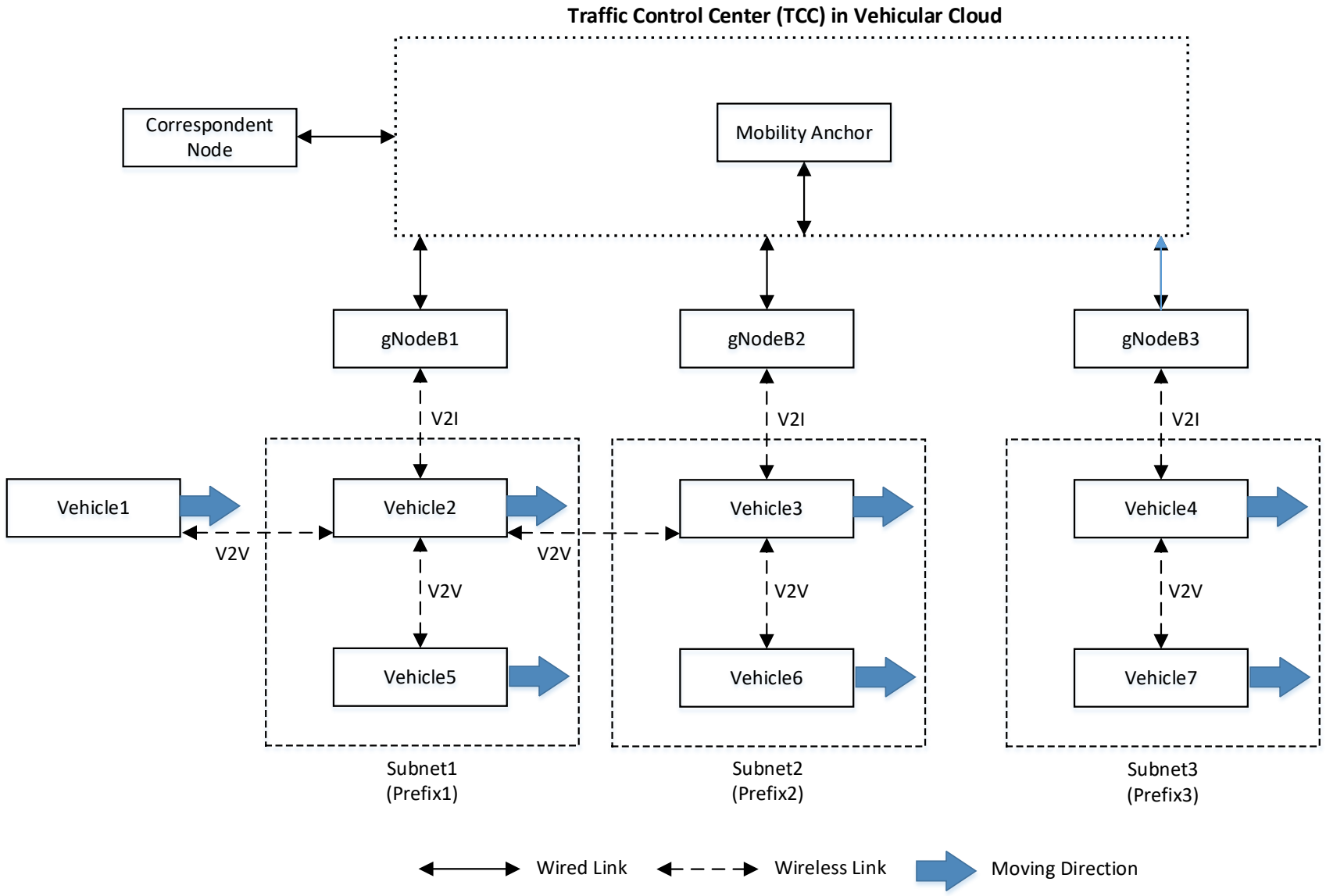
성균관대학교 SUNG KYUN KWAN UNIVERSITY

IPv6-Over-5G-V2X Networks

- Wireless Communications based on 3GPP 5G-V2X.
- V2V over PC5 Reference Point (RP) or Interface
- V2I over Uu RP or Interface

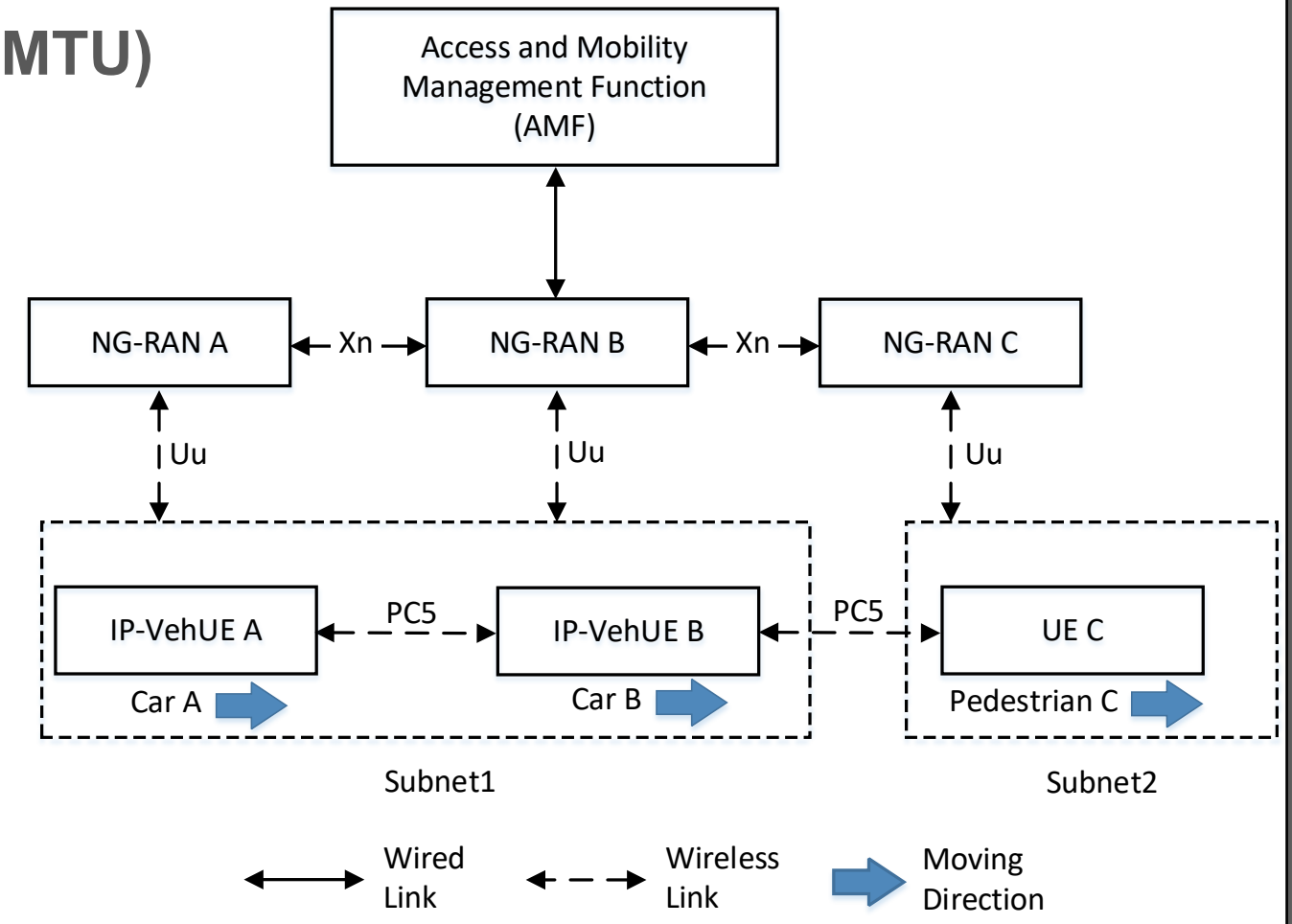


IPv6 Vehicular Networks with 5G V2X



IPv6 Networking over 5G V2X Links

- Maximum Transmission Unit (MTU)
- Frame Format
- Link-Local Addresses
- Subnet Structure
- Stateless Address Autoconfiguration (SLAAC)



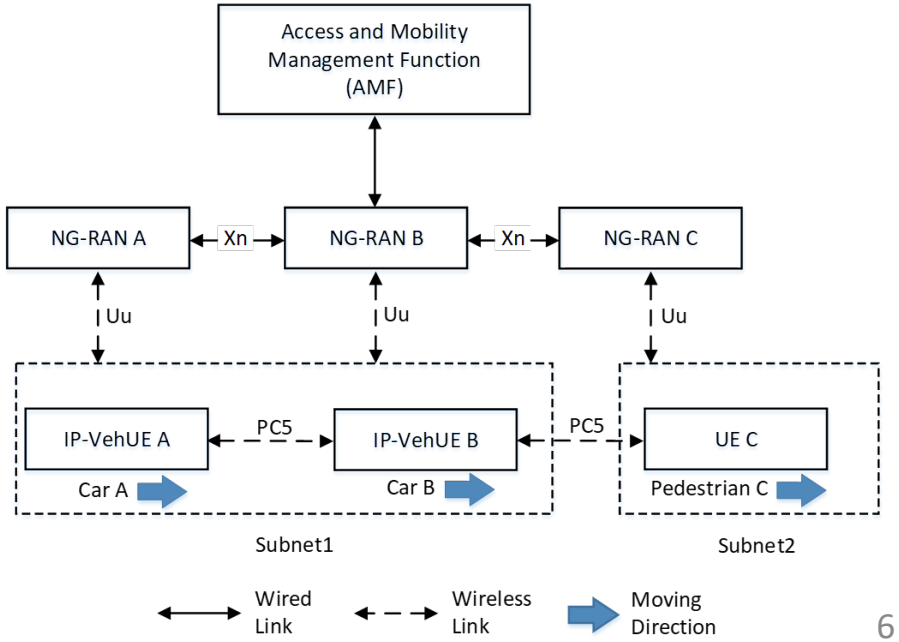
IPv6 Networking over 5G V2X Links

- **Maximum Transmission Unit (MTU)**
  - The default MTU for IP packets on 5G V2X links over both PC5 and Uu RPs is inherited from [RFC2464], which is 1500 octets.
  - As defined in [RFC8200], the 5G V2X links must offer a minimum MTU of 1280 octets to the IPv6 layer.

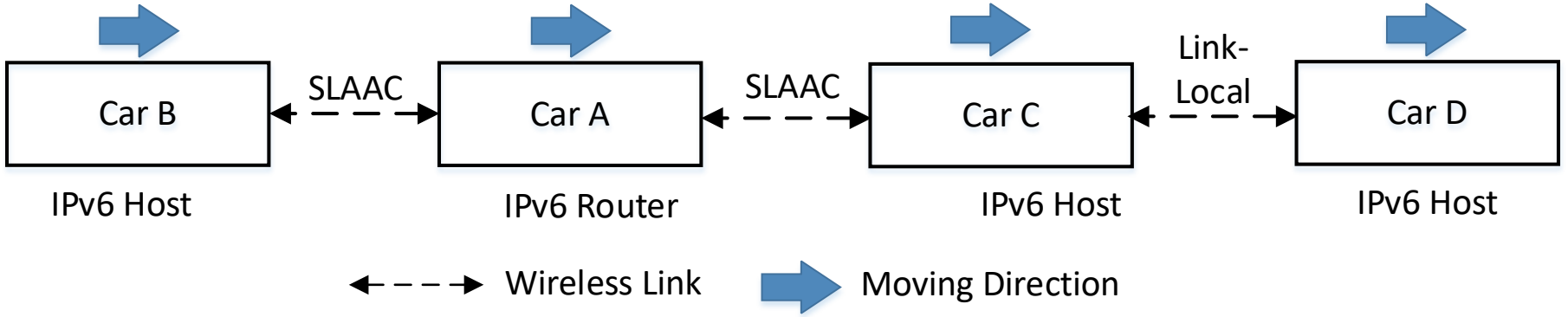
- **Frame Format**
  - IPv6 packets over 5G V2X links follow the general frame format according to the protocol stack defined by 3GPP.

IPv6 Networking over 5G V2X Links

- **Link-Local Addresses**
  - IPv6-based 5G V2X uses link-local addresses for IPv6 packets.
  - To avoid conflicts between link-local address in wireless vehicle networks, the interface identifier used by each IP-VehUE is ensured to be unique through addressing[RFC4291][RFC4193] [RFC7136].
- **Subnet Structure**
  - The 5G-V2X subnet structure supports multi-link subnets for efficient V2V and V2I communications [I-D.jeong-ipwave-vehicular-neighbor-discovery].



IPv6 Stateless Address Autoconfiguration (SLAAC) (1/2)



- When using IPv6 link-local addresses, an IP-VehUE forms the link-local addresses locally without Duplicate Address Detection (DAD) [3GPP TS23287].

- When using SLAAC, an IP-VehUE uses an IPv6 prefix sent by another IP-VehUE acting as an IPv6 default router.

IPv6 Stateless Address Autoconfiguration (SLAAC) (2/2)

- **Issues to solve for IPv6 SLAAC are as follows:**
  - Which VehUE shall be the IPv6 router for the role to assign IPv6 addresses/prefixes if multiple VehUEs can be or want to be an IPv6 router?
  - For a VehUE acting as an IPv6 router, how many IPv6 addresses/prefixes will it assign?
    How much will the role of an IPv6 router burden the IPv6 router VehUE?
  - For a VehUE receiving IPv6 addresses/prefixes from an IPv6 router VehUE, how many IPv6 addresses/prefixes will it have on the movement?
  - If a VehUE (e.g., Car D) does not have any connection with an IPv6 router VehUE, it will only use an IPv6 link-local address for communications.
    In this case, multihop routing is triggered to forward IPv6 packets.
    How will this scenario affect the IPv6 networking among VehUEs?

Next Steps

- **Is this draft valuable to work on it in 6MAN WG?**
- **If so, may this draft be adopted as a WG item now?**
  Or is it needed to develop this draft more?
- **In this IETF-118 IPMON hackathon project, we showed the feasibility for Drones' Safe Flying with IPv4-Over-5G-V2X.**
  - We will work on IPv6-Over-5G-V2X for Drones' Safe Flying for IETF 119.
- **We welcome your comments and feedback ☺**