

New Rel-18 Study Proposal on *Vehicle Relays*

Motivations, main aspects and use cases

Motivations

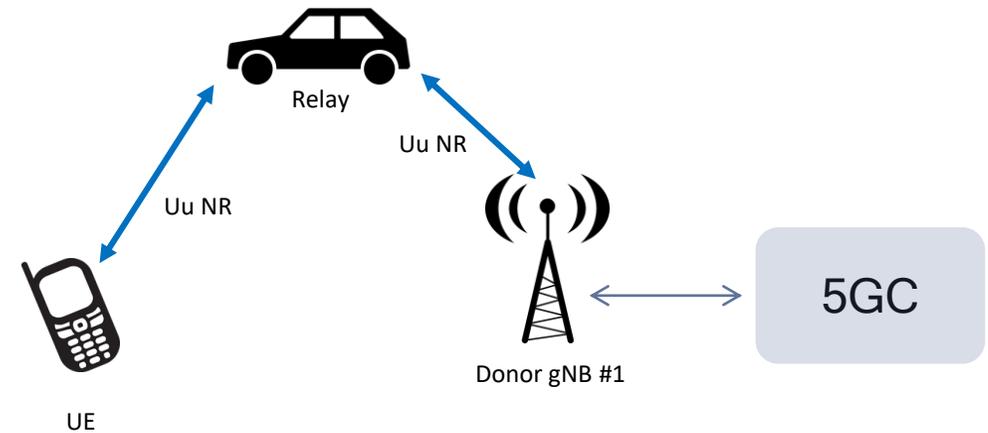
Why Vehicle-mounted Relays?

A convenient and efficient way to extend / improve 5G outdoor coverage & capacity:

- Less costs, constraints and limitations, versus installing (additional) fixed base stations
- Vehicle relays can provide best/optimal coverage to users/UEs inside or near the vehicles
- Some vehicles have a convenient itinerary/mobility, known or predictable (e.g. bus, tram)
- Vehicle relays can use better Tx/Rx capabilities and macro coverage, than nearby UEs
- Vehicle relays can exploit less stringent power and battery constraints, compared to UEs
- Incentives can be given to vehicle makers/owners to install and use relays on their vehicles

High-level concept and Connectivity aspects

- Vehicles are provided with on board (base station) Relays
- Relays get coverage from macro network (“donor gNBs”)
- Relays provide coverage & connectivity to UEs, in the vehicle and/or in the vicinity



- Radio link between Relay and donor gNB: **Uu NR**
- Radio link between Relay and UE: **Uu NR**
- Donor gNBs connect to the 5GC
- Single-hop Relay as main/baseline scenario
 - Multi-hop maybe considered

Considerations on existing 3GPP requirements

Existing use cases / requirements and potential gaps

Some existing requirements on 5G relays cover part of the target use cases, e.g.

- TS 22.261
 - support and general requirements for wireless self-backhauling (sec. 6.12);
 - support and some performance requirements for in vehicle relays (sec. 7.1):
 - includes users in vehicles using onboard base station, and KPIs (e.g. user data rate)
 - reference/original use cases are described in SMARTER TRs (e.g. 22.891, 22.863)

Missing use cases, requirements and gaps should be studied, e.g. on:

- use cases of vehicle relays serving users/devices outside the vehicle
- service continuity requirements, for different mobility events/scenarios
- requirements and policies for control, access and use of the relays

NOTE (added to the SID): overlapping with other studies/work on relays (e.g. IAB) should be avoided.

Annex slides

- Examples of use cases & scenarios

Examples of Use cases

Connectivity to devices outside the vehicle

Pedestrians around low-speed or parked vehicles

- *E.g. buses or taxi/cars moving in downtown streets, or vehicles (temporarily) parked outside stadiums or other popular locations*



Mobile camera feeding video through nearby vehicle

- *E.g. camera from motorbike(s) following sporting race use relay from alongside vehicle*



Examples of Use cases

Connectivity to devices inside the vehicle

Users in a car/taxi



Users in a bus/tram



Users in a train



Incentives to install and use vehicle relays

Few example scenarios

#1: Free/discounted 5G services for vehicle owner

- Vehicle manufacturer installs “relay functionality” in vehicle
 - Relay capability can be an add-on feature/value for the buyer
- MNO offers vehicle owner special deal (e.g. free 5G data) if/when relay is turned on
 - Relay configuration and operation would be under control of the MNO
 - E.g. can be limited to certain geographical areas, time, users, etc.

#2: Coverage/capacity extension as wholesale

- Fleet owner installs relays in their vehicle
- Fleet owner sells relay service to MNO
 - E.g. for extra capacity in specific locations or events
 - Using MNO’s spectrum or own spectrum



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