**3GPP TSG-SA Meeting #101 SP-231071**

**Bangalore, India, September 11-15, 2023** **(revision of S2-2318474)**

**Source: vivo (Moderator)**

**Title: New SID on Architecture Enhancements for Vehicle Mounted Relays (VMR) Phase 2**

**Document for: Approval**

**Agenda Item: 7.4**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

Title: Study on Architecture Enhancements for Vehicle Mounted Relays Phase 2

Acronym: VMR\_Ph2

Unique identifier: TBD

Potential target Release: Rel-19

# 1 Impacts

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Affects: | UICC apps | ME | AN | CN | Others (specify) |
| Yes |  | X | X | X |  |
| No | X |  |  |  | X |
| Don't know |  |  |  |  |  |

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

### This work item is a …

|  |  |
| --- | --- |
| X | Study  |
|  | Normative – Stage 1 |
|  | Normative – Stage 2 |
|  | Normative – Stage 3 |
|  | Normative – Other\* |

**\* Other = e.g. testing**

## 2.2 Parent Work Item

For a brand-new topic, use “N/A” in the table below. Otherwise indicate the parent Work Item.

|  |
| --- |
| Parent Work / Study Items  |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
|  |  |  | N/A |

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 930021 | Stage 1 of Vehicle-Mounted Relays | Stage 1 for VMR in Rel-18 |
| 980019 | Architecture Enhancements for Vehicle Mounted Relays | Stage 2 for VMR in Rel-18 |
| 850009 | Architecture enhancements for the support of Integrated access and backhaul (IAB) | Baseline IAB architecture support.  |
| 941009 | Mobile IAB (Integrated Access and Backhaul) for NR | RAN aspects of the VMR feature in Rel-18. |
| xxxx | Additional Topological Enhancements | RAN aspects related the VMR feature in Rel-19 |

# 3 Justification

In Rel-18, SA2 conducted a study followed by a work item on VMR (Vehicle-Mounted Relays). During the study, it was agreed to limit the scope of the work to the IAB (Integrated Access and Backhaul) architecture, whereby the IAB-node consist of an IAB-MT and an IAB-DU, with the IAB-DU establishing an F1 interface with a donor CU over a wireless link.

There are however other architecture options to achieve the functionality of vehicle-mounted relay, for instance the so-called “Velcro” solution whereby the relay node consists of a UE co-located with a full gNB, with the gNB in the relay establishing N2 and N3 interface to an AMF residing in the 5GC over a PDU session.

These architecture options which have not yet been studied by SA2 may be better suited to certain deployment scenarios for vehicle-mounted relays, for instance using the VMR where IAB is not widely supported, or the scenario in which the relay process local traffic in the vehicle to provide onboard services with low latency.

This study has high dependency with RAN aspects and coordination with RAN is needed. Per the endorsed RAN Rel-19 summary: RP-231540, the RAN3 topic on Additional Topological Enhancements seemly covers the VMR\_Ph2 work.

Note: This part will be updated and synchronized per the progress in RAN.

Additionally, the following other functionalities were not included in the Rel-18 work:

* NTN backhauling, to provide coverage e.g. on vessels, aircrafts and in other areas without TN coverage
* Extension of UAV functionality to relay to provide service to non-UAV-capable UEs in helicopter or drones
* a scenario where the backhaul (midhaul) MNO is different from the VMR provider.

It is therefore proposed to further study the above-mentioned items which were not specified in Rel-18.

# 4 Objective

The aim of this study work is to investigate and identify potential architecture and system level enhancements to further evolve the functionalities of base station relays mounted on vehicles. Specifically, the objectives include:

* WT-1: Identify gaps for supporting the architecture with a gNB onboard of a relay and the use of a PDU session for the wireless backhauling of the N2/N3 interfaces.
* WT-2: Study whether and how to enable mobility for a gNB onboard of a relay using a PDU session for the wireless backhauling of the N2/N3 interfaces.
* WT-3: Identify whether and how architecture enhancements for the selected option(s) to enable authorization and configuration of relay
* WT-4: Identify whether and how architecture enhancements for the selected option(s) to enable QoS support over the backhaul
* WT-5: Identify whether and how architecture enhancements for the selected option(s) to enable Cell ID/TAC management
* WT-6: Identify whether and how architecture enhancements to enable support for UE location services and emergency services
* **(FFS)** WT-7: Identify whether and how the architecture is enhanced to enable NTN backhaul for VMR, by reusing the existing NTN technologies.
* WT-8: void
* **(FFS)** WT-9: Specify architecture enhancements for the selected option(s) to extend VMR functionality to UAVs e.g. to properly identify and serve the UEs onboard

Note: Coordination between RAN is needed due to the dependency with RAN.

Note: WT-7/9 focus on VMR aspect only and coordinate with FS\_5GSAT\_ARCH\_Ph3 and FS\_UAS\_Ph3.

## TU estimates and dependencies

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Work Task ID** | **TU Estimate****(Study)** | **TU Estimate****(Normative)** | **RAN Dependency****(Yes/No/Maybe)**  | **Inter Work Tasks Dependency**  |
| WT#1 | 1 | 1 | Yes | - |
| WT#2 | 1 | 1 | Yes |  |
| WT#3 | 1 | 0.5 | No | Depends on WT#1 and #2 |
| WT#4 | 0.5 | 0.5 | No | Depends on WT#1 and #2 |
| WT#5 | 0.5 | 0.5 | Maybe | Depends on WT#1 and #2 |
| WT#6 | 1 | 0.5 | Maybe | Depends on WT#1 and #2 |
| WT#7 | 1 | 1 | Maybe | Depends on WT#1 and #2 |
| WT#8 | void | void | void | void |
| WT#9 | 0.5 | 0.5 | Maybe | Depends on WT#1 and #2 |
|  |  |  |  |  |

**Total TU estimates for the study phase: 6.5**

**Total TU estimates for the normative phase: 5.5**

**Total TU estimates: 6.5 + 5.5 = 12**

# 5 Expected Output and Time scale

|  |
| --- |
| New specifications {One line per specification. Create/delete lines as needed} |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Rapporteur |
| Internal TR | 23.xyz | Study on architecture enhancements for vehicle-mounted relays Phase 2 | TSG#103Jun. 2024 | TSG#104Jun. 2024 | TBD |
|  |  |  |  |  |  |

|  |
| --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
|  |  |  |  |
|  |  |  |  |

# 6 Work item Rapporteur(s)

TBD

# 7 Work item leadership

SA2

# 8 Aspects that involve other WGs

The following aspects involving other WGs may arise related to this SID:

- SA3 for Security aspects

- SA5 for charging and management aspects

- RAN aspects

# 9 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| Qualcomm Incorporated |
| Dish |
| IIT Bombay |
| ? |