SA2 Rel-19 23Q3 moderated discussion - VMR Enhancements - Version 0.0.1

SA2

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1 Introduction

The work tasks listed in section 2 are based on the following tdocs including work tasks/objectives related to enhancements for VMR.

SWS-230016: AT&T

-Enable multi-hop relay for VMR

-Specify architecture enhancements for the selected option(s) to enable authorization of relay

-Specify architecture enhancements for the selected option(s) to enable QoS support over the backhaul

-Specify architecture enhancements for the selected option(s) to enable Cell ID/TAC management

-Specify architecture enhancements for the selected option(s) to enable support for UE location services and emergency services

SWS-230021: ETRI, SK Telecom, KT, LG Uplus

- Support of height measurement event for m-IAB/VMR mounted in aerial vehicles

-Support for NTN backhaul, to provide service on aircrafts, UAMs and other areas without TN coverage

-EPC connectivity to m-IAB/VMR for EN-DC support (depending on the outcome of R19 m-IAB where standalone is being specified and EN-DC is down prioritized)

SWS-230012: Qualcomm

- WT#1: Identify gaps for supporting the architecture with a full gNB/CU onboard of a relay and the use of a PDU session for the wireless backhauling of the N2/N3 interfaces.

- WT#2: Enable mobility for a full gNB/CU onboard of a relay using a PDU session for the wireless backhauling of the N2/N3 interfaces.

- WT#3: Specify architecture enhancements for the selected option(s) to enable authorization of relay

- WT#4: Specify architecture enhancements for the selected option(s) to enable QoS support over the backhaul

-WT#5: Specify architecture enhancements for the selected option(s) to enable Cell ID/TAC management

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- WT#6: Specify architecture enhancements for the selected option(s) to enable support for UE location services and emergency services

- WT#7: Specify architecture enhancements for the selected option(s) to enable NTN backhaul for VMR

- WT#8: Specify architecture enhancements for the access to onboard services/edge computing

- WT#9: Specify architecture enhancements for the selected option(s) to extend UAV functionality to VMR

SWS-230030: LG Electronics

-Dual connectivity with MBSR and without MBSR

-Dynamic control of MBSR by VPLMN

SWS-230030: Firstnet

-VMR Enhancements (multi-hop)

2 Scoping

2.1 Work Tasks based on input to and outcome of the Workshop

The initial set of Work Tasks for discussion, based on the input to the workshop and SP-230759 are as follows:

WT-1: Identify gaps for supporting the architecture with a full gNB/CU onboard of a relay and the use of a PDU session for the wireless backhauling of the N2/N3 interfaces.

WT-2: Enable mobility for a full gNB/CU onboard of a relay using a PDU session for the wireless backhauling of the N2/N3 interfaces.

WT-3: Specify architecture enhancements for the selected option(s) to enable authorization of relay

WT-4: Specify architecture enhancements for the selected option(s) to enable QoS support over the backhaul

WT-5: Specify architecture enhancements for the selected option(s) to enable Cell ID/TAC management

WT-6: Specify architecture enhancements for the selected option(s) to enable support for UE location services and emergency services

WT-7: Specify architecture enhancements for the selected option(s) to enable NTN backhaul for VMR

WT-8: Specify architecture enhancements for the access to onboard services/edge computing

WT-9: Specify architecture enhancements for the selected option(s) to extend UAV functionality to VMR

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WT-10: Multi-hop VMR

Feedback Form 1: Which of the above Work Tasks should be in scope of Rel-19?

1 – Qualcomm Incorporated

WT-1 to WT-10 are in scope of SA2 Rel-19.

WT-10 may be of lower priority as it could be naturally support and only requires some optimization.

Simpler architecture options with a full gNB/CU in the relay and a PDU session used for the backhaul may enable faster and easier deployment than IAB (i.e. Rel-18 VMR). Additionally, these other architecture options may be better suited for specific uses cases such as NTN backhauling and onboard services, and should therefore be investigated.

2 – Nokia UK

WT1: OK in rel-19, this architecture is more promising than IAB based one as no RAN upgrade is needed to support IAB PLM-wide. Small rewording needed

WT2: necessary for the feature to work small rewording needed

WT3: necessary for the feature to work

WT4: may need some study but not high priority.

WT5: Not in SA2 scope to configure TA, Cell IDs in gNB, however like for rel-18 we can wait for RAN output and in normative phase refer to such output.

WT6: necessary in rel-19 to at least meet regulations

WT7: we suggest this is lower priority in rel-19

WT8: in scope but please clarify this is for the gNB in the VMR architecture

WT9: Not a priority but if it can work with low effort, it can be done as part of WT3/WT2?

WT10: SA2 should not work on this unless this is RAN driven in rel-19. Please clarify whether this is for the new architecture approach only.

3 – HuaWei Technologies Co.

Before going to the scope-level discussion, we'd better firstly clarify the following aspects:

1. The necessity of having a new architecture after the initial release of VMR, and the potential impacts to SA2.

2. Whether the WTs mentioned in the end (#7-10) are based on the new architecture or based on the Rel-18 IAB based architecture.

3. Whether the WTs (including #7-10) are with clear SA1 requirement.

In addition, we would like to ask for clarification regarding WT#7-9, and it would be beneficial if more details could be added:

WT#7: on NTN backhaul for VMR, whether it is for access backhaul, or N3 backhaul?

WT#8: This should not be in the scope. In addition, it 1) is not the issue for VMR and 2) would be another new architecture compared with WT#1.

WT#9: what would be the exact functionality enhancements for the UAV use case (e.g., height measurement), compared with the non-UAV one?

4 – Ericsson LM

Most of the WTs above have strong RAN dependency and need to be synched with the outcome of RAN Rel-19 study discussion.

WT-1/WT-2 are mainly about the components of the relay node and how it can fit into the mobility scenario. These WTs are very much RAN centric and shall be synched with outcome of the RAN study discussion.

WT-3/WT-4/WT-5/WT-6 indicate enhancement. However, it's not clear what are the gaps after Rel-18 VMR work, if RAN agrees to study the relay node defined in WT-1/WT-2 in Rel-19.

WT-7 seems about backhaul using NTN. This is rather transparent to the CN after the NTN work introduced in Rel-17/Rel-18. It's RAN centric work. It shall also be further clarified what is the architecture for this work task.

WT-8 is not clearly defined on what is the missing in terms of accessing onboard service, if RAN agrees to study the relay node defined in WT-1/WT-2 in Rel-19 (e.g., what is the gap of existing edge computing service).

WT-9 is about supporting of UAV functionality in relay node. It has high RAN dependency and needs to be synched with outcome of RAN study discussion. It needs to be clarified what are the gaps for supporting UAV functionality considering current supported functions in RAN node and UE.

WT-10 Multi-hop is a RAN centric work and rather transparent to the CN. In Rel-18 work, SA2 excluded the multi-hop while RAN WGs do not exclude the support of multi-hop. The work shall be driven by RAN to see if there is any gap to support Multi-hop.

5 – FirstNet

WT-4 to enable QoS is important for public safety since it is essential for supporting mission critical services.

WT-10 to support multi-hop is crucial for public safety since it will help extending coverage

6 – AT&T GNS Belgium SPRL

WT-10 if RAN doesn't exclude multi-hop support in rel18, SA2 should include multi-hop support in rel19.

7 – LG Electronics France

WT-1, WT-2, WT-3, WT-4, WT-5, WT-6 and WT-8

Additional opinions on the study are as below:

- We are fine with the direction of a full gNB onboard of a relay. Anyhow, this architecture has strong RAN dependencies which means synchronization and coordination with RAN Rel-19 package discussion/outcome are required.

- We have no strong view to progress the study on a full gNB onboard of a relay in Rel-19, so are fine to progress it in the later release.

8 – Dish Network

WT-1, WT-2, WT-3, WT-4, WT-5, WT-6 for Rel-19

We see the business value for this new VMR architecture !

9 – Samsung R&D Institute India

WT#1/WT#2 . The new architecture options looks interesting, for now we are neutral and open for any study.

WT#3 to WT#5: First we need to conlude in this release by study if we need a new architecture over existing VMR functionalities, thus pushing the enhancements as much as possible to later release when we have concrete baseline of architecture is preferred in our view. Some features have RAN dependency too.

WT#6: If we choose to goahead with thiw new architecture. In our view system must support UE location services and emergency services due to regulatory reasons.

WT#7 to WT#10. Not sure the enhancements are targeted for existing architecture or new proposed one. Scope needs to be clarified. Not priority for now.

WT#10: Have a RAN dependency. Needs to co-ordinate with RAN WG

10 – Beijing Xiaomi Mobile Software

WT-1, 2, 3, 4, 5, 6, 7, 8 can be considerred in the scope of R19.

WT- 9&10: low priority.

Additional comments

WT-7 to WT-10: whether the enhancements are based on R18 existing architecture or the newly proposed should be further clarified.

11 – SKY Perfect JSAT Corporation

Most of these WTs should be synchronized with the study discussion of RAN Rel-19.

WT-7: This should be be in the scope of Rel-19.

WT-8: This should be be in the scope of Rel-19. It may need some studies whether on-board services/edge computing can fit into the VMR architecture.

12 – IIT Bombay

Propose to add additional flexibility to WT-1 and WT-2 here to include DU onboard a relay and backhaul F1 interface over the PDU session.

13 – Datang Mobile Com. Equipment

[CATT]□

WT-1 to WT-9 are in scope of SA2 Rel-19.

WT-1: The described architecture needs to be clarified (e.g. if only CU onboard, where DUs are deployed), and should not rule out the possibility of other architectures. So the rewording is needed.

WT-2: The described architecture needs to be clarified.

WT-3 to WT-7□"the selected option(s)" needs to be clarified.

WT-7: whether this WT includes the DU onboard for NTN?

WT-10 is a high RAN dependency. We can live with it if RAN drives it.

Feedback Form 2: Can any of the Work Tasks above be combined/merged?

1 – Qualcomm Incorporated

No.

The work tasks are addressing different aspects of supporting the vehicle mounted relays based on a full gNB/CU onboard.

2 – Nokia UK

in principle some tasks could be merged if their solution is simple enough (e.g. maybe NTN and UAV could share part of the solution?). bit for this discussion it is best to not merge.

3 – HuaWei Technologies Co.

Probably after clarifying Form 1, we could figure out the proper scoping. It is recommended to make 1st form clearer at first.

4 – Ericsson LM

In general, we need to clarify Form 1 first before we consider the proper combination/merge of the WTs.

Feedback Form 3: Should any of the Work Tasks above be reworded? If so, propose the required rewording.

1 – Qualcomm Incorporated

WT-10 can be reworded as follows:

WT-10: Specify architecture enhancements required for the selected option(s) to support multi-hop VMR. (lower priority)

2 – Nokia UK

All task need rewording where "gNB/CU" appears: we prefer this is simply "gNB" as we cannot just place the CU on the Vehicle. E.g.

WT-2: Enable mobility for a full gNB~~/CU~~ onboard of a relay using a PDU session for the wireless backhauling of the N2/N3 interfaces.

WT8 and WT10 do not clearly state the work is for the new architecture so the scope is not clear. We propose rewording to clarify this. e.g.

WT-8: Specify architecture enhancements <u>for the selected architecture option(s)</u> for the access to onboard services/edge computing

WT9 seem to need the following rewording

WT-9: Specify architecture enhancements for the selected option(s) to extend VMR ~~UAV~~ functionality to ~~UAVs~~

3 – Ericsson LM

If RAN WG agrees to study the support of WT-1/WT-2, SA2 shall first consider to identify/investigate the gaps we have in the architecture in relation to WT-3/WT-4/WT-5/WT-6.

WT-3: identify whether and how the architecture is enhanced to enable authorization of relay, if RAN WG agrees to study WT-1/WT2.

WT-4: identify whether and how the architecture is enhanced to enable QoS support over the backhaul, if RAN WG agrees to study WT-1/WT2.

WT-5: identify whether and how the architecture is enhanced to enable Cell ID/TAC management, if RAN WG agrees to study WT-1/WT2.

WT-6: identify whether and how the architecture is enhanced to enable support for UE location services and emergency services, if RAN WG agrees to study WT-1/WT2.

4 – LG Electronics France

We agree with Nokia that using ”gNB” instead of ”gNB/CU”.

WT-3 can be reworded to add ”configuration” aspect as below:

- WT-3: Specify architecture enhancements for the selected option(s) to enable authorization **and configuration**of relay

WT-8 reads not clear because ”onboard services/edge computing” is unclear. So, the following rewording is proposed:

- WT-8: Specify architecture enhancements for the **selected option(s) to control UE**access to **VMR**~~onboard services/edge computing~~

5 – IIT Bombay

We suggest following text for WT-1 and WT-2. Suggested modifications have been highlighted in bold.

WT-1: Identify gaps for supporting the architecture with a full gNB/CU/**DU** onboard of a relay and the use of a PDU session for the wireless backhauling of the N2/N3/**F1** interfaces.

WT-2: Enable mobility for a full gNB/CU/**DU** onboard of a relay using a PDU session for the wireless backhauling of the N2/N3/**F1** interfaces.

6 – Datang Mobile Com. Equipment

[CATT]:

Since the architecture of DU deployed on the satellite has not been discussed before, the IAB architecture also has gaps, and the DU onboard case cannot be removed directly.

It seems that “the selected option(s)” in WT-3 to WT-7 applies to the architecture described in WT1, we propose to clarify e.g.:

WT-7: identify whether and how the architecture is enhanced to enable NTN backhaul for VMR

Or

Rewording” gNB/CU” to “gNB/CU/DU” as IIT Bombay proposed.

2.2 Additional Work Tasks

As well as the initial set of Work Tasks in section 2.1 companies can request to add additional Work Tasks. The naming of these additional Work Tasks should follow the format: WT-company name-# (eg

WT-Samsung-1) so that other participants can reference them.

Feedback Form 4: Are there any additional Work Tasks that should be part of Rel-19?

1 – Qualcomm Incorporated No additional WT needed.
2 – Nokia UK No additional WT needed.
3 – Dish Network No additional WT needed
4 – Samsung R&D Institute India No additional WT needed
5 – Datang Mobile Com. Equipment [CATT]: No additional WT needed

Feedback Form 5: If there are any additional Work Tasks required, describe them

3 Dependencies

These feedback forms will help define the dependencies between Work Tasks, dependencies of Work Tasks on other Working Groups (SA, RAN or CT), and dependencies on other potential SA2 Rel-19 SIDs and WIDs. The Work Tasks can be from the list in section 2.1, or any additional Work Tasks identified in the feedback in section 2.2.

Feedback Form 6: Describe the dependencies that any of the Work Tasks have on other 3GPP Working Groups

1 – Qualcomm Incorporated WT-1, WT-2, WT-5, WT-7, WT-10 may have dependency on RAN WGs.
2 – Nokia UK dependencies on SA5 (OAM and charging) and RAN may exist for at least some tasks. in particular WT5, WT10 seems to require RAN to lead the efforts.

3 – HuaWei Technologies Co.

We see some potential dependency to SA3/SA5 and RAN WGs.

4 – Ericsson LM

The WTs listed in clause 2.1 have strong RAN dependency or shall be driven by RAN, thus they shall be synched with RAN study discussion outcome. There are probably further dependency with SA3/SA5.

5 – LG Electronics France

The architecture with a full gNB onboard of a relay and the use of a PDU session for the wireless back-hauling of the N2/N3 interfaces has strong RAN dependencies, so all WTs have RAN dependencies.

6 – Beijing Xiaomi Mobile Software

WT-1, 2, 5, 6, 7,10 have RAN dependency.

7 – Datang Mobile Com. Equipment

[CATT]:

All WTs have RAN dependency.

Feedback Form 7: Describe dependencies between the Work Tasks

1 – Qualcomm Incorporated WT-2 to 10 has dependency on WT-1.
2 – Nokia UK all WT4-10 depend on WT1,2,3.
3 – LG Electronics France WT-2 to WT-10 have dependency on WT-1.
4 – Beijing Xiaomi Mobile Software WT-2 to WT-10 have dependency on WT-1.
5 – Datang Mobile Com. Equipment [CATT]: WT-2 to WT-10 have dependency on WT-1.

Feedback Form 8: Describe any dependencies on potential work/study items that might be created as a result of the other Q3 moderated discussions.

1 – Qualcomm Incorporated WT-7 may have relationship with the Satellite Access discussion.
2 – HuaWei Technologies Co. We suggest we first clarify the form 1, and there could be some potential overlapping with the potential candidate architecture of 5G Femto.
3 – LG Electronics France WT-7 has dependency with ’Satellite Architecture Enhancements’. WT-9 may have dependency with ’UAS enhancements’.
4 – Beijing Xiaomi Mobile Software WT-7 has dependency with ’Satellite Architecture Enhancements’.

WT-9 may have dependency with 'UAS enhancements'.

5 – Datang Mobile Com. Equipment

[CATT]:

WT-7 has a relationship with 'Satellite Architecture Enhancements'.

WT-9 may have a relationship with 'UAS enhancements'.

4 Partitioning

These questions will help determine whether there is one, or more than one, Study Item, Work Item or TEI-19 item to be created from these Work Tasks.

Feedback Form 9: Should there be more than one SID, WID or TEI-19 item created based on the Work Tasks?

1 – Qualcomm Incorporated

One SID/WID should be created based on the work task 1-10.

2 – Nokia UK

One SID/WID should be created only

3 – LG Electronics France

One SID is sufficient.

Additional opinions on the study are as below:

- We are fine with the direction of a full gNB onboard of a relay. Anyhow, this architecture has strong RAN dependencies which means synchronization and coordination with RAN Rel-19 package discussion/outcome are required.

- We have no strong view to progress the study on a full gNB onboard of a relay in Rel-19, so are fine to progress it in the later release.

Feedback Form 10: If the answer to the above question is yes, describe how the Work Tasks should be partitioned into different items.

1 – Qualcomm Incorporated

One WID/SID is sufficient, and no partitioning is required.