RAN94e-R18Prep-18-Additional_Topological_Improvements-IAB-VMR - Version 0.0.6
RAN

3GPP TSG RAN#94e RP-212678

Electronic Meeting, December 06 - 17, 2021

Agenda Item: 8A.1

Source: Ericsson

Title: Moderator's summary for discussion [RAN94e-R18Prep-18] Additional Topological Improvements – IAM/VMR

Document for: Information & Discussion

1 Introduction

This discussion covers the topic of " Additional Topological Improvements" for the topics of Integrated Access Backhaul and Vehicle mounted relay (IAB/VMR). Guidance, deadlines, and further background can be found in [RP-212608] and [RP-212657].

The goal of the discussion is to discuss and finally provide the scope of the potential WI/SI(s). This should include information on the overall primary / secondary lead WG, the WG(s) involved in each objective, and any potential interaction with SA/CT.

The discussion will be a continuation of the "Additional topological improvements" and will take its final summary as the starting point [RP-211654].

Please avoid any input like "We support / we do not support" without giving additional justification and motivation as this is no "number counting" driven discussion. Instead justify your view with strong technical arguments and/or tangible commercial interests (near & longer terms).

2 Initial Round

Please provide your comments of the initial round in the below feedback forms. The initial round takes place from Wed., Oct. 20, 08:00h UTC to Fri., Oct. 22, 23:59h UTC.

2.1 IAB/VMR Justifications and Background

The RWS discussion in September concluded on the following [RP-211654]:

- Main goal of the Additional Topological Improvements for IAB/VMR is to focus on the mobile-IAB/VMR-nodes mounted on vehicles scenario providing 5G coverage/capacity enhancement to onboard and/or surrounding UEs in Rel-18 as discussed by TR22.839

Please provide your views on aspects that should be captured in the justification part of a potential Work Item Description.

Feedback Form 1: Views on the justification and background of IAB/VMR study

Feedback Form 1:

1 – OPPO

As we mentioned in September discussion, the NTN-related scenario contained in TR22.839 should be excluded from Rel-18 IAB/VMR. We propose to include this clarification in either justification or objectives.

2 – Huawei Technologies France

Maybe there is no need spending much time on justifications, anyway IAB/VMR provides another option for providing indoor or in-car coverage. Also, taking the R17 discussions into account, we may see the possibility that some of ongoing R17 objective may not be finished on time, which also justifies the need of continuation of a R18 item.

3 – LG Electronics Inc.

We are generally fine with the current wording except ”as discussed by TR22.839”. Actually TR22.839 has lots of scenarios including NTN and HAPS, etc., this may mislead that all scenarios in TR22.839 are also included in the scope.

4 – Samsung R&D Institute UK

Main goal looks ok. We have no issue with referencing TR22.839 and we do not think this implies all of the scenarios therein are part of the Rel-18 IAB/VMR scope, but we are ok to make it clearer if LG prefers it.

In terms of justification, we agree with Huawei that we should not spend too much time on it. For us, the goal as defined above is essential in helping increase capacity & coverage by leveraging existing IAB technology, optimized further for mobility and possibly frequent, semi-deterministic handovers. It also helps complete some of the Rel-17 IAB work (still to be seen which aspects and to what extent).

5 – CEWiT

We are ok with the current wording. Mobile-IAB/VMR mounted on vehicles is useful in the following scenarios

1. Providing efficient/reliable mobile connectivity to the passengers inside the vehicle and users outside
2. Setting up temporary gNB for coverage in case of emergency situations like disaster management and military operations
3. Setting up temporary gNB for capacity enhancement in an area in case of a large increase in demand, e.g., in a stadium or festival ground.

6 – ZTE Corporation

We support to focus on the mobile-IAB/VMR-nodes mounted on vehicles scenario providing 5G coverage/-capacity enhancement to onboard and/or surrounding UEs in Rel-18. It doesn’t mean that we should study all the use cases and potential requirements captured in TS 22.839. For example, Non-terrestrial related scenarios shall not be considered in R18 IAB WI.

7 – China Mobile International Ltd

As commented by some other companies, justification seems not so essential. The use cases and scenarios are well known.

8 – Beijing Xiaomi Mobile Software

We think the clarification for ”mobile-IAB/VMR nodes mounted on vehicles .. to onboard and/or surrounding UEs as discussed by TR22.839” is okay. We also believe local breakout to support UEs under the same IAB/VMR in these scenarios is required e.g. in close proximity with the IAB/VMR node.

9 – Nokia Italy

TR 22.839 defines a variety of use cases and scenarios where IAB/VMR with mobility could be applied. There are different deployment and architecture options for how the backhaul would be provided to the relay node, either with terrestrial or non-terrestrial connections. It is therefore essential to prioritize supported use case and deployment scenarios in order to be able to determine concrete requirements that the specifications should meet. With such information, it is possible to assess what can be supported with R16/R17 specifications and what enhancements need to be specified in R18, i.e. those discussed in the objectives -section. The use cases can cover both mobile networks as well as specific networks like those for public safety.

10 – Ericsson LM

Mobile IAB can be based on Rel-17, but we cannot be sure the same can be assumed for VMR. SA2 is currently discussing this. VMR should be first further studied in SA2 as it is open whether VMR can be based on IAB or not. From RAN point of view, VMR is very much undefined, not justifying a SI yet and certainly not a WI. We propose to remove the VMR from the Rel-18 IAB WID until SA2 concludes whether it can be based on IAB architecture.

11 – Apple R&D

12 – Philips International B.V.

We agree with the rapporteur’s formulation. The justification on why work on VMR is very well formulated in TR 22.839 with many different important use cases to be addressed, e.g.:

- VMR are very relevant for emergency situations in which a VMR can be used to provide ad-hoc coverage.
- VMR are very relevant to improve network coverage.

13 – AT&T GNS Belgium SPRL

We agree with the goal description from conclusion of the September RWS (RP-211654). Use cases and justification for VMR are captured well in TR 22.839. We believe that the use of VMR is important in several deployment scenarios, such as for disaster recovery zones, emergency situations, places requiring temporary coverage or capacity enhancements during peak traffic times or localized network outages, for special events or venues, and to provide better service in and around vehicles, such as buses, trains, etc.

Release 17 does enable some level of IAB-node migration, but the Release 17 IAB design enables only basic IAB-node migration for intra-donor case, and for inter-donor case, it hasn’t even been decided to what extent full IAB-node migration will be supported in Release 17. Furthermore, to the extent that IAB-node

migration is supported in Release 17, no attempt has been made to reduce the level of signaling traffic generated at IAB-node migration when child IAB nodes and attached access UEs are migrated to the new donor. So in our view Release 17 is ill-equipped to support Mobile IAB and VMR use cases. Having said that, Release 17 IAB does have all the basic framework elements in place to support enhancements for Mobile IAB and VMR use cases, and can serve as an excellent baseline to start from.

14 – Verizon UK Ltd

Same view as AT&T above. We are fine with the rapporteur's proposal. Mobile IAB / VMR is relevant for several important deployment scenarios including disaster recovery, emergency situations, providing temporary capacity/coverage enhancements for events, and improved service in buses/trains.

15 – Futurewei Technologies

The background and justification are generally understood. However, we share the view of some other companies in that it is useful for prioritize among the use case and deployment scenarios identified in TR 22.839 to define concrete requirements for any WI.

16 – Qualcomm Incorporated

The use cases captured in [RP-211654] are fine. We should include the reference to TS 22.261 which provides a comprehensive discussion of these use cases. As for background/justification, more detail should be provided to motivate the WI and to ensure that it is a well-scoped effort. The in-vehicle-UE-coverage use case, for instance, could apply to rural areas and high vehicle speeds, while the surrounding-UE-coverage use case should apply to low user- and vehicle speeds.

Example:

Mobile-IAB/VMR provides in-vehicle coverage/capacity enhancement, e.g., in presence of high propagation loss through the vehicle's enclosure and/or due to the large distance to the closest cell tower in rural areas. Mobile-IAB/VMR also provides coverage/capacity enhancements to users in the surrounding area in scenarios where users and vehicles move with slow speed (e.g., urban rush hour, special events). These use cases are discussed in TS 22.261.

We may want to capture that for both use cases, access and backhauling should be supported in FR1 and FR2. Further, in-band and out-of-band operation should be supported.

We may want to limit the backhauling by IAB/VMR-nodes to one hop.

Further, UE handover and dual-connectivity should be supported between IAB/VMR-nodes as well as between IAB/VMR-nodes and stationary RAN. This may be obvious but it doesn't hurt to include it.

Regarding VMR: We believe that it should leverage existing Rel-17 architecture with additional implementation variants, e.g., to conduct backhauling over IP/BAP as well as over PDU session. This would also support LBO at the Mobile-IAB/VMR-node without any architecture work.

17 – Intel Deutschland GmbH

Rel-18 IAB/VMR should mainly focus on mobile-IAB/VMR nodes mounted on vehicles providing 5G coverage/capacity enhancement to onboard UEs as discussed by TR22.839. We suggest Rel-18 should first focus on the basic scenario of single-hop relay (i.e. UE <-> mobile IAB <-> IAB-donor CU).

18 – Motorola Mobility France S.A.S

We agree with the rapporteur's proposal that the main focus should be on mobile-IAB/VMR for coverage/capacity enhancements. In addition, several topics left from Release 17 are also of interest, including

RAN1 enhancements on DC and interference management that will be increasingly important in mobile environments. If time allows, UAV-based relays can also be included.

We agree with AT&T's comment that Release 17 IAB is a good starting point for the IAB/VMR WI in Release 18.

19 – Continental Automotive GmbH

We are supportive to IAB/VMR is to focus on the mobile-IAB/VMR-nodes mounted on vehicles scenario, and believe it should be healthy to concretize a bit which specific uses cases out of the ones in TR 22.830 are to be supported. The functionality, in our view should be provided for both FR1 and FR2. Finally, it should be indicated in the justification why the normal UE mobility handled by specs until Rel-17 is insufficient for these proposed use cases with mobile IAB/VMR nodes.

20 – LG Uplus

Similar as other companies, we can see the benefit of the mobile-IAB/VMR from various deployment scenarios such as public transportation relay, disaster recovery, HAPS, UAM (Urban aerial mobility), etc.

2.2 IAB/VMR Objectives

The RWS discussion in September concluded on the following objectives proposals for mobile IAB/VMR in Rel18 [RP-211654]:

- Cell mobility aware handover and neighbor relations [RAN2, RAN3]
- Group mobility enhancement [RAN2, RAN3]
- Authorization and backhaul security [RAN2, RAN3]
- Whether enhancements for PCI collision and RACH conflict avoidance are necessary should be considered [RAN2/3]

The conclusions also mentioned that interactions with SA1, SA2, SA3 and CT should be considered for the R18 mobile IAB/VMR study when needed.

Please provide your views on the above potential objectives. Please comment on the involved WGs and whether an objective is anticipated to have SA/CT impact.

Feedback Form 2: Views on the objectives of a study on IAB/VMR

Feedback Form 2:

1 – OPPO

We are ok to the 1st and 4th bullets.

For the 2nd bullet on group mobility, our understanding is that the potential scope seems either very broad or unclear as of now, e.g., different companies have different starting points to do group mobility, including intra-CU, inter-CU, CU moved down to vehicle and etc. So we prefer to have a more focused/clarified scoping for group mobility, instead of leaving RAN with a chance to end up with supporting most of them (if not all).

For the 3rd bullet on authorization/security, we wonder why RAN2 should be involved and even the leading group.

2 – CATT

We has some concerns on bulllet 3.We are not sure whether this bulllet could be directly studies in RAN2/3.Maybe it could be discussed in RAN2/3 after trigger from SA2/3

3 – vivo Mobile Communication Co.

We are ok with the above objectives, but we wonder if the order of the listed objectives also reveals the priority.

We think bullet 4 should be with high priority compared to bullet 3.

4 – Huawei Technologies France

Here we see some ambiguities on some of objective.

For Cell mobility aware handover, according to R17 discussion, it is common understanding that the mobile IAB node and the descendant and down streaming UEs are aware of the change of cell, thus we need to discuss group mobility enhancements (second objective) in order to reduce signaling load. Thus, some clarifications are needed for this objective.

For neighbor relations, maybe it should be clear to say that study potential enhanced mechanisms to address the lack of neighbor relations due to IAB's moving

In addition, as we already commented during previous discussion, due to IAB's moving, we need mechanisms to address resource separation between the moving IAB and the static base stations, so that the interference could be mitigated to an acceptable extent.

Another issue is, how to avoid the unintended UEs' making access attempts to moving IAB node, this should also be studied.

5 – LG Electronics Inc.

In bullet 3, we wonder whether Authorization and security is RAN2 scope. RAN2 should be removed.

Prefer to remove the bullet 4. In Rel-16, IAB specific RACH resource is introduced and RACH conflict may be handled by operator implementation. PCI collision has similar understanding as RACH conflict avoidance. Why PCI collision and RACH conflict avoidance cannot be handled by operator's configuration.

6 – Sony Europe B.V.

We are OK with objectives. SA WGs will have their own scope and alignment may be needed.

7 – Samsung R&D Institute UK

We are ok with the objectives as detailed above, and we believe they capture all key aspects needed to achieve the main goals.

In terms of whether there is SA/CT impact, we believe the following two objectives may have impact on SA/CT:

- Group mobility enhancement [RAN2, RAN3]
- Authorization and backhaul security [RAN2, RAN3]

8 – CEWiT

We are fine with the objectives of the study mentioned above. We suggest adding

-Enhancements for power control and interference management

Because the gNB moving from one coverage region to another causes dynamic variation in interference. Additional mechanisms like proximity sensing-based interference management and power control are necessary to handle such dynamic variations.

9 – ZTE Corporation

We basically agree with the above proposed objectives for mobile IAB/VMR for Rel-18. And we have the following considerations:

1) For the first objective "Cell mobility aware handover and neighbor relations", we think enhancements on IDLE/inactive mode UE mobility may be also needed as captured in TR 22.839, e.g., to optimize cell selection and minimize unnecessary cell reselection. So it is suggested that "cell mobility aware handover" is changed to "cell mobility aware mobility".

2) For the second objective "Group mobility enhancement", RAN3 should be the leading WG instead of RAN2.

3) For the third objective "Authorization and backhaul security", we think the authorization needs to be discussed in SA2 first. And then RAN3 could discuss the authorization based on SA2 input. For the objective "backhaul security", the motivation and the issue to be solved is not clear. As we know, there is end to end PDCP security protect between UE and donor CU. And F1/non-F1 traffic between IAB node and donor CU could be protected by IPsec.

4) For the forth bullet, we think the PCI collision and RACH conflict could be avoided by proper OAM configuration or up to implementation. It is not necessary to include it in the scope of R18 IAB.

10 – China Mobile International Ltd

In general, we are fine with the objective, but prefer the Rel-18 is a concise WI just focusing the essentail features to support mobile IAB.

11 – Beijing Xiaomi Mobile Software

These 4 bullets are okay for us although the lead group for bullet 3 (auth and sec) should probably be RAN3 for RAN and we can expect SA/CT liaison on this.

We also feel that local UE breakout to support users should be included e.g. in close proximity with VMR is required. We felt this had quite reasonable level of support in previous discussion rounds, and a need to coordinate with other groups is not a reason to not adopt this objective.

12 – Nokia Italy

We are unclear on the spec impact associated with group mobility enhancement. Group mobility has been discussed in Rel.17 related to topology adaptation (as there can be multiple UEs moving with the migrating IAB-node) but no specific enhancements have been agreed.

Additionally, it seems that RAN4 impact should be expected in the context of IAB node mobility with particular concern for RRM conformance testing and demodulation requirements which have not previously been discussed. IAB co-existence evaluations should also be expected as earlier evaluations did not cover moving nodes for which separation distances cannot be guaranteed. This workload would be expected to be extensive and should be reflected in the work objectives and considered as part of time budgeting.

13 – Nokia Italy

In Rel-17 a lengthy discussion took place on potential enhancements for fairness, latency and congestion control but only minimum enhancements could be agreed. Therefore, it does not seem reasonable to use Rel-18 efforts on topics that could not be concluded in Rel.17 despite attempts in multiple meetings. The most relevant Rel-17 leftovers for Rel-18 mobile IAB/VMR would be those related to migration/topology adaptation assuming that not all can be specified in Rel.17; however, the final status of these objectives in Rel-17 is still unclear.

14 – Ericsson LM

RAN2/3 does not specify aspects of "Authorization and backhaul security". This is a matter for SA3. We propose to remove the bullet.

Regarding the 2nd bullet, the scope is very wide. We should clarify that "group mobility" is referring to the mobility of an IAB-node together with served UEs.

The 4th bullet rather refers to a technical problem, resulting from the scenario to be supported. In a WID, we usually list what is to be supported, not what the problem is. Moreover, at this point, the complete list of issues is not known. We propose to remove the bullet.

15 – Apple R&D

16 – Philips International B.V.

We support these topics. We agree with OPPO that RAN2 might not be leading group in the third point, and SA2/SA3 need to be involved.

17 – Verizon UK Ltd

We are fine with the objectives laid out above by the rapporteur and they seem capture the key aspects required to achieve the goals of IAB/WMR.

18 – AT&T GNS Belgium SPRL

Agree in general with the objectives. The conclusions from RWS discussions in September already mention that SA working groups should be involved as necessary, so this is already captured and must be reflected when drafting the SI/WI objectives.

19 – Futurewei Technologies

As mentioned by other companies, a key issue that seems to be missing is how to separate resource allocations between moving IAB nodes and other base stations in order to mitigate potential interference.

The third bullet seems in the scope of SA3 to analyze and determine whether enhancements are needed. At the moment it is not clear what the scope of this activity would be, and which RAN WGs (if any) would need to be involved.

The second bullet seems to be in the scope of RAN3. Based on prior discussions regarding group mobility in Rel. 17 eIAB, and in previous releases, it is doubtful that RAN2 specifications would be impacted.

Regarding the 4th bullet, we tend to agree with E/// that the WID should identify what needs to be supported rather than referring to specific technical problems that may need to be addressed. At this point it is not clear if the issues listed in this bullet are significant, nor if this listing of issues is exhaustive.

20 – Qualcomm Incorporated

For a well-scoped WI, the above objectives require more detail. We propose to include the following aspects (others may be considered):

Cell mobility aware handover and neighbor relations [RAN3-led, RAN2]:

- Signaling enhancements to provide RAN nodes with cell-mobility-related information for UE-handover decisions and UE admission control including information related to the speed, relative bearing, and location of the source and/or target cell as well as indication whether the cell- or cell-beam covers the vehicle's interior vs. exterior.
- Enhancements to the signaling on neighbor information to include information related to cell-mobility and cell- or cell-beam coverage area with respect to the vehicle's interior vs. exterior.

Group mobility enhancements [RAN3-led, RAN2]:

- Enhancements to reduce the number of signaling messages between RAN-nodes as well as between RAN and CN in case multiple UEs are collectively handed over.
- Enhancements to reduce interruption time of UE sessions during backhaul migration.

Authorization and BH security: We are not certain on what needs to be done here.

PCI/RACH collision: There were some doubts whether enhancements for PCI/RACH collision avoidance should be considered. We believe that PCI collision can be minimized through reasonable PCI planning, but it cannot be avoided if Mobile-IAB/VMR nodes travel over long distances and/or come into close mutual proximity. We further believe that existing UE measurements and neighbor cell info exchange can be used for PCI collision detection. PCI reconfiguration is readily available as long as UEs can be handed over to other cells during PCI reconfiguration. It should at least be possible to indicate in the handover request that such handover is imperative due to PCI reconfiguration. Other aspects can be considered as well.

Most of the above objectives are within RAN3 scope. RAN2 may also get involved as the secondary WG. The above objectives are not expected to have major impact on SA/CT WGs.

We agree with Nokia that RAN4 might want to revisit co-existence evaluations due to potentially short distances between Mobile-IAB/VMR nodes among each other or to stationary RAN.

21 – Intel Deutschland GmbH

We are ok with bullet 1, 2, 4, while the objectives need to be clarified and the scope need to be well-defined.

For bullet 1, the term "mobility aware" need to be clarified and the intention behind "neighbor relations" needs to be defined as the objective.

For bullet 2 on group mobility, if only one hop is considered between mobile IAB-node and IAB-donor CU group mobility is mainly used to reduce signaling storm when mobile IAB-node is moving between different IAB-donor CUs.

Regarding to "authorization and backhaul security", it is not clear to us what RAN2/3 should be work on. Which use case in TR22.839 this objective is referring to?

22 – Motorola Mobility France S.A.S

The item on authorization and backhaul security is preferred to be studied in SA3 before discussion in RAN2/RAN3.

23 – LG Uplus

As several companies mentioning, leading group for bullet 3 seems SA3. And, regarding bullet 2, SA/CT would be related as Samsung's saying.

2.3 Legacy UE Support for Mobile IAB/VMR

The RWS discussion in September concluded on the following further potential objectives to be considered [RP-211654]:

- Legacy UE should be able to connect to mobile IAB/VMR. Whether enhancements for Rel-18 UE are allowed needs to be further discussed.

Please provide your views on the above potential objective

Feedback Form 3: Views on Legacy UE Support for IAB/VMR

Feedback Form 3:

1 – OPPO

Although the proposal is neutral on enhancement for Rel-18 UE, we maintain our concern on any potential performance differentiation between new-release UE and early-release UE, caused by a NW-side enhancement. We prefer to have the Rel-18 IAB WID/SID not to differentiate legacy UE and Rel-18 UE.

2 – CATT

From our point of view,support of legacy UE is a basic requirement. And we support to consider necessary enhancements, such as cell (re)selection optimization mentioned in TR22.839.

3 – vivo Mobile Communication Co.

We support this potential objective. Legacy UE should be able to connect to mobile IAB/VMR for the legacy services (before Rel-18) that already supported by network, but whether any enhancement is needed for UE to have the benefits of Rel-18 IAB/VMR (features that enhanced in Rel-18) can be further investigated/justified along with the progress of the WI.

4 – Huawei Technologies France

Yes, at least mobile IAB/VMR should support legacy UEs, i.e. when a legacy UE is served by an IAB node supporting mobile, the ongoing service should not be affected.

5 – LG Electronics Inc.

There should be no limitation to legacy UEs to be able to connect via Mobile-IAB/VMR. If legacy UE cannot use Rel-18, the number of UEs using Rel-18 IAB may be small and this is not good from operating cost perspective. In our view, If the objective is not transparent to legacy UE, this should be deprioritized or removed from the objective.

6 – Sony Europe B.V.

We are ok to start with the assumption that legacy UE is able to connect via mobile IAB/VMR but not all features might work for such UEs.

7 – Samsung R&D Institute UK

We are ok with the above wording of this objective.

8 – CEWiT

The mobile IAB/VMR should provide basic services to legacy UEs

9 – ZTE Corporation

Legacy UE should be able to connect to mobile IAB/VMR. With regard to potential enhancements for Rel-18 UE, we think it may be needed to support cell mobility aware mobility.

10 – China Mobile International Ltd

We are ok with the above wording of this objective.

11 – Beijing Xiaomi Mobile Software

We believe ability of legacy UEs to connect is an important objective to the development of mobile IAB/VMR and should form a baseline target. Regarding the inclusion of possible enhancements for REL18 UEs, then this seems fine as long as the baseline functionality is not broken toward legacy UEs.

12 – Nokia Italy

Transparency to the legacy UEs should be prioritized.

13 – Ericsson LM

IAB Rel-16 and Rel-17 supports Rel-15 UEs. However, the access of legacy UE (pre-Rel-18) to especially a mobile IAB cell should not be a specification constraint. Rel-15 can be a baseline assumption, but this assumption can be revisited depending on the specification impact for supporting it.

14 – Apple R&D

15 – Philips International B.V.

We support enhancements for Rel-18 UE in order to take advantage of the capabilities of VMR. This can improve performance in relevant commercial use cases.

16 – Verizon UK Ltd

Legacy UEs should be able to connect to mobile IAB/VMR. Also these enhancements should preferably continue to be transparent to UE.

17 – AT&T GNS Belgium SPRL

Fully agree with the objective that legacy UEs should be able to connect to Mobile IAB/VMR. Additional enhancements that further improve network efficiency for R18-capable UEs should not be precluded.

18 – Futurewei Technologies

We agree with other companies. Transparency to legacy UEs should be prioritized. If significant functionality is dependent on support of non-backwards compatible features by the UE, then the value and applicability of mobile IAB/VMR will be significantly limited.

Having said this, some use cases in TR22.839 may have very limited applicability (e.g. 5.11.2.2). For scenarios with very limited scope, it may be ok to consider support of non-backwards compatible features by the UE.

19 – Qualcomm Incorporated

Legacy UEs should be able to connect to mobile-IAB/VMR nodes.

We believe that Mobile-IAB/VMR-nodes should be transparent to UEs to differentiate relaying for Uu-based access from SL-based access.

20 – Intel Deutschland GmbH

Mobile IAB should be able to provide connectivity to legacy UEs, which is a sustainable functionality for IAB node since Rel-16.

However, as described in TR22.839, mobile IAB can be deployed on the high-speed train, where user service continuity and quality are facing huge challenges. Hence, we are open to consider optimization at the UE side, while maintaining support for legacy UEs.

21 – Motorola Mobility France S.A.S

We agree that IAB/VMR should be transparent to a legacy UE, and enhancements to Rel-18 UE for enhanced access are not precluded.

22 – Continental Automotive GmbH

Agree with the proposal with the caveat that the legacy UEs should be supported.

23 – LG Uplus

We can agree with this in general.

2.4 Rel-17 Leftovers for Rel-18

The RWS discussion in September concluded on the following further potential objectives to be considered [RP-211654]:

- Rel-17 IAB leftover may be considered in Rel-18 with reasonable justifications.

Please provide your views on the above potential objective

Feedback Form 4: Views on support for Rel17 leftovers as part of Rel18

Feedback Form 4:

1 – TELECOM ITALIA S.p.A.

what is the reason for the topic not being completed in Rel 17? if it is lack of consensus, then we should avoid reopening the discussion in Rel 18.

2 – Beijing Xiaomi Mobile Software

In general this is reasonable, as stated in the question the intent is "with reasonable justification". This however may not be completely confirmable until after REL17 is complete (exceptions and all).

To us the intent is to avoid automatic adoption into the WID of items not supported in REL17, as all objectives should undergo a level of assessment in line with the WID justification and the other objectives of the WID befor consensus approval. We agree to avoidance of automatic inclusion simply because they are leftover, regardless of the reason. The justification of leftovers should also consider impacted WG and time unit requirements amongst evaluation aspects, as per the norm.

3 – OPPO

We prefer not to include such wording in the objectives, because it sounds like a blank check for people to kick in their desired Rel-17 leftover and the judgement of "reasonable justification" can be subjective. We prefer a clearly-defined objective scope, instead of expecting popping-up debates in RAN2/RAN3 or even RANP regarding to additional "justifications". Anyhow, the Rel-17 leftover, if relating to mobile IAB, can certainly be proposed as new in Rel-18 even w/o such objective wording; otherwise, we do not see a reason for Rel-18 to handle Rel-17 tasks.

4 – CATT

The R17 leftovers are optimizations which have been discussed in RAN2/RAN3 for a long time and there is no convergence. We prefer to focus on the real deployment requirement in mobile IAB/WMR.

5 – vivo Mobile Communication Co.

The fairness/latency/congestion bullet was downscoped at last RAN plenary meeting considering limited time budget on Rel-17 IAB WI, some of the topics (especially fairness and latency including IF-1/2/4, IL-1/2/3/5) have been discussed for several rounds but no consensus could be achieved due to the heavily split viewpoints, while other topics (IL-6, IC-1, IC-7) were barely discussed. So we think Rel-17 IAB leftover can be considered in Rel-18, but the included objectives should be carefully justified so that we can avoid the same situation where Rel-17 IAB WI has gone through.

Reference to the issues is given below:

Fairness issues

- IF-1: The scheduler of an IAB node does not have all the information needed (e.g. link quality across multiple hops) to make appropriate upstream or downstream scheduling decisions which take into account the overall route link quality (such as e.g. using downstream link quality measurements to adjust the scheduling weights so as to achieve proportional fairness for different bearers/RLC channels across multiple child-IAB nodes)
- IF-2: Congestion conditions on BH RLC channels carrying UE bearers with same or similar QoS requirements can be unbalanced and some channels may even be congested, thereby leading to some users experiencing longer latency and violating fairness requirement.
- IF-4: IAB node cannot give more resource to those BH RLC CHs that aggregate more bearers and/or carry bearers with higher load per bearer (i.e. IAB node cannot give more resource to those BH RLC CHs with higher aggregate load)

Latency issues

- IL-1: IAB node cannot help ensure that overall or remaining PDB is met for a packet (e.g. by prioritizing bearers with higher number of hops), as it does not have a latency reference for the packets being scheduled, resulting in packets with the same QoS requirement ending up with different latency
- IL-2: IAB node may need to report joint buffer status for LCHs which have rather differing QoS requirements, due to the current (Rel-16) limit on the number of LCGs
- IL-3: Buffer size calculation for pre-emptive BSR may differ for nodes of different vendors as it is left to implementation in Rel-16
- IL-5: The CU is unable to put bearers with lower PDB on routes with less congestion risk (higher resource efficiency) or which are RLF-free
- IL-6: The CU is unable to configure routing based on actual (real-time) latency per BH RLC channel

Congestion issues

- IC-1: Long-term downstream congestion on a single link cannot be alleviated using existing Rel-16 DL HbH flow control mechanisms, without having to rely on dropping packets
- IC-7: CU (not having knowledge of local congestion conditions) cannot update the routing path that is experiencing congestion.

6 – Huawei Technologies France

As commented to the first question, we see some ongoing R17 objective might not be finished on time, and some of them were already dropped from R17, such objectives could be considered as continuations in R18, e.g. UP based solution to congestion mitigation, full migration (if not finished).

7 – LG Electronics Inc.

We don't think this objective is needed for Rel-18.

Considering that Rel-18 IAB targets at different use cases compared to Rel-17 IAB, we are not sure whether Rel-17 IAB leftover is helpful for Rel-18. In addition, we think that work scope of the current proposed objective in Q2 above is already big enough and there should be no room for handling Rel-17 IAB leftovers in Rel-18.

8 – Sony Europe B.V.

Fixed IAB node was in the scope of Rel-17 and some of the topics deprioritized/descoped from rel-17 may be relevant for a mobile node. We think fairness and local rerouting for a mobile node may be considered but these should be targeting realistic scenarios/solutions and not a repeat of rel-17 discussions.

9 – Samsung R&D Institute UK

The current wording prevents automatic inclusion of Rel-17 leftovers, while allowing specific ones to be considered in line with the main goal of the Rel-18 WID. Therefore we think it's a good compromise. Fairness/latency/congestion issues (many of which have been deprioritized for Rel-17, as pointed out above) may become important again (in the context of mobility) and we agree we do not need to have the same discussions again - but we need to keep the door open for any relevant 'unfinished' aspects.

We disagree with statements that Rel-17 leftovers are 'optimizations' - some companies felt this way at the time of Rel-17 discussions, while others were supportive of exploring them further and in fact felt they were essential for WID objectives to be met. There was no consensus, and the Rel-17 WID was modified accordingly. If these topics were 'optimizations', there would have been no need to modify the WID - but clearly they were deemed as essential in meeting the original WID objectives; however there was no consensus, and relevant objectives were deprioritized.

10 – CEWiT

The Rel. 17 leftovers should be considered in Rel. 18. The following topics were part of Rel. 17 (that means the relevance of the topic is justified) and were deferred due to time constraints of Rel. 17. So, we suggest studying these points in Rel. 18 as Rel. 17 leftovers with RAN1 as leading WG.

1. Enhancements to support Simultaneous operation of IAB node in full-duplex mode

a) Capability signalling and activation of the mode

b) Signalling exchanges between parent and IAB node for RS configuration, SI cancellation, and power control

2. Enhancements to support Intra carrier dual connectivity in IAB nodes

11 – ZTE Corporation

For R17 IAB leftover, it should be discussed case by case. For example, some potential Rel-17 leftovers, e.g., enhancements to inter-donor migration procedure and service interruption reduction may be further discussed in R18 IAB since it is aligned with the group mobility. However, for the Rel-17 fairness, latency reduction or congestion control, they are actually optimization instead of basic functionality. It is suggested not to consider these in Rel-18.

12 – Nokia Italy

In Rel-17 a lengthy discussion took place on potential enhancements for fairness, latency and congestion control but only minimum enhancements could be agreed. Therefore, it does not seem reasonable to use Rel-18 efforts on topics that could not be concluded in Rel.17 despite attempts in multiple meetings. The most relevant Rel-17 leftovers for Rel-18 mobile IAB/VMR would be those related to migration/topology adaptation assuming that not all can be specified in Rel.17; however, the final status of these objectives in Rel-17 is still unclear.

13 – Ericsson LM

The bullet should not be an objective in a WID, because features for mobility enhancements for IAB are already mentioned in above objectives. The work is contribution-driven and if a feature is within the WI

scope, it will be discussed, so there is no need for guaranteed airtime for spillovers. We propose to remove the bullet.

14 – Apple R&D

This in general should comprise the items in 2 since the solutions are not independent between static IAB Relays and mobile relays. In fact static relays are a special case of mobile relays. In that aspect, we think covering the leftover parts of Rel17 in Rel18 should be prioritized over defining new features for VMR.

15 – Philips International B.V.

We prefer to prioritize new topics related to VMR, and we can discuss fairness, latency and congestion control also in that context (but perhaps with a bit lower priority)

16 – Verizon UK Ltd

Leftover R-17 objectives could be considered not by default but on a case-by-case basis. Also some of the leftover topics which are relevant in the context of mobile IAB/VMR should be considered based on contributions.

17 – Futurewei Technologies

Rel. 17 leftovers, if any, can be considered on a case-by-case basis

18 – Qualcomm Incorporated

Rel-17 IAB leftovers should only be considered on a case-by-case basis, and they should relate to Mobile-IAB/VMR.

For instance, Mobile-IAB/VMR should support inter-donor migration of the IAB-DU, which is presently under discussion in Rel-17 but it may not or be only partly addressed. This might be acceptable for a stationary deployments, but it is not acceptable for mobile IAB. Without this functionality, all traffic would have to be backhauled to the *same* donor along the vehicle's entire route.

We do not support Rel-18 discussion on fairness, latency and congestion. These issues have been discussed for a long time in Rel-17 without reaching agreements. They are not specific to IAB-node mobility.

19 – AT&T GNS Belgium SPRL

Since for R18 we are talking about topological improvements for Mobile IAB/VMR, those R17 IAB left-over items that help support Mobile IAB/VMR objectives may be considered. This can be decided on a case-by-case basis, but in general leftover items related to topology migration and service interruption reduction may be reasonable to consider.

20 – Intel Deutschland GmbH

Rel-17 IAB leftover objectives or solutions should be discussed case by case. Hence, we don't see there's a need to capture this bullet as one of the objectives in Rel-18 WID.

21 – Motorola Mobility France S.A.S

As mentioned in feedback form 1 on justification, several topics left from Release 17 are of interest, which were partly deprioritized due time limitations in Release 17. In addition to the topics mentioned by other companies, RAN1 enhancements on DC and interference management that will be increasingly important in mobile environments should be included.

22 – Continental Automotive GmbH

In general, we do not prefer considering Rel-17 IAB leftovers in Rel-18 as an objective. If at all it needs to be considered, ”reasonable justifications” should be replaced with ”strong technical/commercial significance”. Case-by-case consideration could be needed and well-justified. Thus, we prefer to remove this bullet.

2.5 Moderator summary of the Initial Round and recommendation for further discussion

Moderator´s Conclusion for Initial Round of discussions on IAB/VMR Justifications and Background

All companies see furhter work on Mobile IAB as justified.

Some companies believe that VMR is not a well defined concept and that it should be better refined in other WGs (e.g. SA2) first, before starting any work in RAN WGs.

The general justification below is supported by the majority of companies (with the exception of parts regarding VMR):

- *Main goal of the Additional Topological Improvements for IAB/VMR is to focus on the mobile-IAB/VMR-nodes mounted on vehicles scenario providing 5G coverage/capacity enhancement to onboard and/or surrounding UEs in Rel-18*

However, many companies believe that more detailed use cases need to be described.

Referencing TR22.839 seems controversial as the TR contains many use cases, not all of which of relevance to the work for Rel18. Many companies suggest not to reference to TR22.839.

Moderator´s Conclusion for Initial Round of discussions on IAB/VMR Objectives

The discussion started from the following objectives:

1. Cell mobility aware handover and neighbor relations [RAN2, RAN3]
2. Group mobility enhancement [RAN2, RAN3]
3. Authorization and backhaul security [RAN2, RAN3]
4. Whether enhancements for PCI collision and RACH conflict avoidance are necessary should be considered [RAN2/3]

A large group of companies see objective 3) as out of scope of RAN WGs. Similarly, a large group of companies see Objective 4) as low priority as it can be addressd by appropriate system management solutions.

On the first 2 objectives, the majority of companies sees RAN3 as the leading WG.

There is a general requirement to refine the objectives for the WID with a more focussed description.

For Objective 1, some companies believe that the main issues concern migration/topology adaptation, neighbour relationship and resource separation to improve interference mitigation. A number of companies foresee the involvement of RAN4 to address, e.g. RRM conformance testing and demodulation requirements.

For Objective 2, some companies stated that ”group mobility” shold be intended as mobility of an IAB-node together with served UEs. Other companies commented that this objective was discussed at length in Rel17 with no agreements achievable. It is therefore wondered if more time needs to be spent in Rel18 on the same subject.

The moderator sees Objectives 1 and 2 as the least controversial and therefore worth pushing further, while Objective 3 and Objective 4 have less support and are even questioned to be in scope of RAN WGs.

Moderator´s Conclusion for Legacy UE Support for Mobile IAB/VMR

All companies stated that Mobile IAB/VMR enhancements should be supported by legacy UEs. One company stated that, for some niche use cases, non-backwards compatible UE enhancements could also be foreseen.

Some companies stated that enhancements introduced for support of Mobile IAB/VMR should be transparent to the UE, while a majority of companies are of the opinion that enhancements for Rel18 UEs may be introduced, so long as these are backwards compatible.

Moderator´s Conclusion for Rel-17 Leftovers for Rel-18

There are diverging opinions on Rel17 topics that could potentially be included in a Rel18 WI.

A common principle shared by many companies is that there shall not be an explicit objective stating that Rel17 leftovers should be driven in Rel18. Rather than that, there should be explicit objectives for solutions that are relevant to the main Rel18 activity focus, i.e. Mobile IAB/VMR. Such objectives may constitute topics that were not treated in Rel17 or not concluded due to lack of time.

The majority of companies believes that topics discussed in Rel17 on which consensus could not be achieved shall not be re-opened in Rel18.

3 Intermediate Round

3.1 Mobile IAB/VMR Justifications and Background

The moderator suggests to expand on the following points in order to seek convergence [Please avoid ”Yes/No” answers and try to provide technical details]:

- Is there enough clarity on what standatdisation enhancements VRM entails?
    - Is the architecture and functionalities needed to support VRM sufficiently clear and can Rel17 be taken as a starting point?
    - What is the most suitable activity to develop support for VRM, a SI or a WI?
- Is it agreable that for Mobile IAB enhancements a WI can be started in Rel18, based on the architecture and functionality of Rel17

- The moderator suggests that use cases are described in a stand-alone way, i.e. without referencing TR22.839.
- The following use case seems agreeable to all companies. Is there any more use cases to prioritise? Can the use case below be refined?
    - Focus on the mobile-IAB/VMR-nodes mounted on vehicles scenario providing 5G coverage/capacity enhancement to onboard and/or surrounding UEs
- Can the following remit of work be agreed:
    - Solutions should apply to FR1 and FR2
    - Solutions should be limted to a single hop backhauling
    - Solutions should support UE HO and DC

Please provide your view on the above points

Feedback Form 4: Intermediate views on Mobile IAB/VMR Justifications and Background

Feedback Form 5:

1 – Qualcomm Incorporated

On VMR and Mobile-IAB:

It should be clarified that VMR is a well-defined concept and has corresponding service requirements documented in TS 22.261. The IAB architecture may be used to satisfy (some of) the goals of VMR. Therefore, we object to use IAB or mobile-IAB to replace the VMR term, as that just mixes up the goal and the tool.

We would like Mobile-IAB/VMR solutions to support two ways of backhauling:

(1) Via IP-over-BAP as defined in Rel-16/17 IAB WIs.

(2) Via PDU session as defined in Rel-15 5GS.

Rel-16 IAB-nodes do already support both ways of transport. Further, based on implementation, the IP-layer or PDU-session layer may carry F1 or NG. This allows the mobile-IAB/VMR-node to either carry an IAB-DU or a gNB.

Neither of the two options require new RAN architecture work, as IAB and gNB are all part of existing RAN architecture.

On use cases: The moderator's main use case is fine.

On remit of work:

- Solutions apply to FR1 and FR2
- In-band and out-of-band operation is supported
- Solutions should support UE HO and DC between vehicles and between vehicle and stationary RAN.
- Solutions should support large travel distances of the mobile-IAB/VMR node.
- Solutions should scale to high densities of mobile-IAB/VMR nodes (e.g., like cabs in busy-hour traffic)
- On hop count: Inter-mobile-IAB/VMR node backhauling is not supported. However, the mobile-IAB/VMR-node can extend a stationary IAB-network.

- Potentially: Coverage of surrounding UEs is only expected for slow-moving Mobile-IAB/VMR nodes.

2 – SHARP Corporation

We agree that specific, limited detailed use cases should be described.

We agree and furthermore a defined limited number of use cases from TR22.839 should be considered.

3 – Continental Automotive GmbH

- In general, we feel there is not enough clarity on what specific standardization enhancements VMR entails.

o The architecture needed to support VMR is clear only to the extent that a mobile IAB node that interfaces with mobile/static surrounding UEs and the core network (CN) is required. Since the MT of the IAB interfaces with the CN in a way similar to that of a UE, the additional functionalities expected of the mobile IAB that are different from a mobile UE, need to be specified in a clearer way.

Rel17 can definitely be taken as the starting point.

o Since the feasibility of VMR using a mobile IAB is clear at a high level, we believe a WI would be appropriate to work on the details of the required features and their implementation, focusing on the most important scenario(s).

- It is agreeable that one WI can be started in Rel18 based on the architecture and functionality of Rel17.

- We are fine with the suggestion that use cases are described without referencing TR22.839, although it is not clear why this is important.

- The use case is fine.

- Agree with points 1 and 3 of the remit of work. Single hop is fine for now but more general cases could also be considered in future.

4 – LG Electronics Inc.

For VMR, as addressed by other company, if SA2 is currently discussing whether VMR can be based on IAB or not, it would be better to wait SA2 further discussion about this and RAN can start VMR based on IAB with the conclusion of SA2 discussion, i.e., RAN starts mobile IAB first and later VMR can be stared when SA2 discussion is finished. If SI for VMR is needed, it is ok to us to have SI for VMR.

Regarding Mobile IAB, as addressed by rapporteur, we think that Mobile IAB enhancements can be started in Rel18, based on the architecture and functionality of Rel17 IAB.

For the use case, the following is fine to us and no need to refine the current wording.

- Focus on the mobile-IAB/VMR-nodes mounted on vehicles scenario providing 5G coverage/capacity enhancement to onboard and/or surrounding Ues

5 – AT&T GNS Belgium SPRL

Fully agree with Qualcomm's view on all aspects.

6 – Futurewei Technologies

It seems there is considerable confusion among companies regarding the exact scope of mobile-IAB and VMR. QCM mentions multiple backhauling options, and seems to indicate that mobile-IAB and somehow VMR are distinct. LGE prefers to wait for SA2's conclusion on VMR, and whether to base it on the IAB architecture. It is not entirely clear whether all of the use cases identified in TR22.839 should be addressed, TR22.839 should only partially addressed, or if in fact TR22.839 can be ignored.

It seems prudent not to launch into a WI with such different views from different companies. Therefore, we think that it would be better to first have a SI, in order to reach consensus on exactly what are the use cases that need to be addressed, and converge on the technical issues that need to be solved.

7 – Motorola Mobility France S.A.S

The link between the donor node and VMR is a Uu link according to TR 22.839, hence making the IAB architecture a suitable candidate for VMR. A WI seems sufficient for specifying mobile-IAB/VMR.

The use cases described in TR 22.839 can be considered as a baseline, and we further agree that a down-selection of the use cases should be considered.

8 – Sony Europe B.V.

We are ok to focus on mobile IAB/VMR addressing coverage/capacity enhancement in a vehicle scenario and to onboard UEs. Regarding the detailed scenarios, we are ok to include FR1 and FR2, single hop, and supporting UE HO. However, not so sure to focus on DC specific enhancements in the first release.

9 – vivo Mobile Communication Co.

Clearly the objectives and goals to be achieved in Rel-18 IAB is the mobility, while the architecture/protocol/expected features for VMR remain obscure to us. We see no rush to have a WI (of VMR) or an integrated WI with IAB If VMR can, after justified by a SI, leverage the IAB architecture/protocol as a starting point, especially when Rel-18 IAB already seems to have a great ambition level on its own.

10 – ZTE Corporation

We think the Rel-17 IAB can be taken as a starting point for VMR. On the other hand, potential architecture enhancement may be considered in order to make the HO procedure transparent to UE.

With regard to the use cases, it is fine to start with the most basic VMR scenario mentioned by moderator in Rel-18. Based on the legacy specification on inter-gNB and intra-gNB migration in Rel-16/17, we think a WI is more suitable for the mobile IAB study in Rel-18. For the other use cases mentioned in VMR, which should be considered in Rel-18 and whether SI or WI is pursued may be further discussed.

11 – Nokia Italy

Our view is that the baseline for VMR enhancement should be Rel-17 IAB, and the relevant enhancements should be those necessary to support essential functionality for node mobility. We support this agenda item as a WI and agree on scope for use case and deployment scenarios, although it is not clear what the motivation is for discarding references to TR22.839.

12 – Intel Deutschland GmbH

- 1st bullet: Rel-16/17 can be taken as baseline for mobile IAB from architecture and functionality point of view.
- 2nd bullet: Yes
- 3rd bullet: Ok.
- 4th bullet: Ok.
- 5th bullet: Ok.

13 – Beijing Xiaomi Mobile Software

We agree with Qualcomm and support the argument that IAB is used to solve VMR requirements and as such prefer to not replace the term VMR with other terminology.

We also agree that clear requirements are captured in TS22.261 based on the VMR study in TR22.839. As to whether a study phase is required then if people are really unsure then maybe we could consider defining the requirements specifically from the RAN point of view as a first step, to provide clear definition of tasks for RAN but only if some people feel it is needed. We believe such a step should be limited and could be within a WID structure, considering the work should be based on the R17 IAB architecture.

We are okay with the use case definition.

And also support the 3 points indicated by the moderator for the work remit

14 – Huawei Technologies France

For VRM, no strong view, since inside car is a use case, but just not sure what additional considerations or issues need to be considered, comparing with mobile IAB. Maybe this could be further justified.

For "*Solutions should be limited to a single hop backhauling*", we think it might be useful to limit the scenario. It is good to clarify this "single hop" means there is only one hop between UE and the mobile IAB-node (i.e. no descendant node), also single hop between mobile IAB-node and donor-DU. This seems aligned with the use case as proposed "*Focus on the mobile-IAB/VMR-nodes mounted on vehicles scenario providing 5G coverage/capacity enhancement to onboard and/or surrounding UEs*".

For others, we don't see any big issues for the moment.

15 – Samsung R&D Institute UK

"Architecture and functionalities" will be the result of the SI/WI work (our preference being a WI), and not the input to it. What we need to agree at this stage are concepts, objectives, targets, interactions between WGs, as usual. So long as the VMR concept is clear to everyone (which may or may not be the case, given the possible confusion/conflation with mobile IAB – please see our comments below) we should focus on the scope of the work for Rel-18.

On the issue of whether TR 22.839 should be referenced, this cuts into the discussion of VMR vs. mobile IAB already raised. VMR is a well-known concept and mobile IAB is one way of enabling it. We strongly support keeping the reference to the TR (especially if we intend to use the term VMR in our own RAN work) but we can be more specific about which use-cases our work will focus on.

"... providing 5G coverage/capacity enhancement to onboard and/or surrounding UEs" - 'and/or' is fine for now, but may cause issues soon. For the WID/SID, we will need to decide if enhancements to BOTH on-board and surrounding UEs are within the scope (we are supportive of this).

16 – CATT

We agree with others that mobile IAB should be the baseline and we could further check what else needs to be considered for VMR on top of mobile IAB.As to the architecture, we think Rel-17 should be the start point

For use cases, we agree to focus on the mobile-IAB/VMR-nodes mounted on vehicles scenario providing 5G coverage/capacity enhancement to onboard and/or surrounding UEs

17 – Philips International B.V.

We agree with Qualcomm. In particular, requirements are in TS 22.261.

18 – Fraunhofer HHI

We are fine with the main use case and remit of work for Rel-18, including those remits listed by Qualcomm, and we are also supportive of their view on surrounding UEs. Also, considering a single hop is fine for Rel-18, but more general cases could also be considered in the future.

19 – Ericsson LM

Regarding the clarity on standardization enhancements for VMR, we think that VMR is a *use case* which mobile IAB could potentially support, similar to, e.g., Rel-17 load balancing or topology redundancy. The mobile IAB use case is providing service to UEs by means of an IAB node mounted onboard a moving vehicle. Whether VMR is to be supported by mobile IAB depends on whether Rel-17 IAB architecture can be used as baseline – the discussion about this is under way in SA2 Study of Architecture Enhancement for Vehicle Mounted Relays (S2-2107310).
Regarding the most suitable activity, if SA2 concludes that the Rel-17 IAB architecture can be the baseline for supporting the VMR use case, then VMR support can be addressed in the Rel-18 WI. Otherwise, mobile IAB and VMR should be decoupled and discussed separately. One example of breaching the Rel-17 IAB architecture would be that a mobile node is a full gNB for the sake of VMR. This would be a massive excursion from the IAB architecture as defined in TS 38.300 and TS 38.401 and, as such, is not acceptable for us, as this is not IAB anymore.

So, we propose to remove all references to VMR until SA2 has concluded if the Rel-17 IAB architecture can be used as the baseline to support the VMR use case.

Regarding whether there can be a Rel-18 IAB WI: if there is a IAB Rel18 WI, it should certainly be based on the Rel-17 IAB architecture.

Regarding the description of use-cases, we agree with the moderator's suggestion to describe use cases in a stand-alone way.

We agree with supporting the scenario of nodes mounted on vehicles providing 5G coverage/capacity enhancement to onboard and/or surrounding UEs in Rel-18 for IAB **but not for VMR**, since SA2 is yet to determine whether the Rel-17 IAB architecture can be the baseline for VMR support. So, SA2 needs to define VMR beforehand before RAN can it include in a WID objective. We should therefore delete reference to VMR from the main Rel-18 goal description. If SA2 has progressed, we can discuss what gaps there are between IAB and what SA2 proposes as use-cases.

Regarding proposed remits of work, we support the bullets, with the following modifications:

- Addition of "including Out-of-band backhauling" in the first bullet.
- Addition of "i.e., a mobile IAB-node can only serve UEs" to the second bullet
- Addition of the following bullet: Solutions should comprise only functional and no architectural/protocols stack changes.

20 – LG Uplus

In general, we are aligned with LGE's opinions.

Further, we are interested in solution to high densities of mobile-IAB/VMR nodes (e.g., like cabs in busy-hour traffic) suggested by QC.

21 – Verizon UK Ltd

We agree to focus on the use case of mobile-IAB/VMR-nodes mounted on vehicles scenario providing 5G coverage/capacity enhancement to onboard and/or surrounding UEs. Rel-17 IAB can be taken as a starting point for VMR use case. R-18 IAB enhancements may be further considered in a manner that is transparent to UE. We see no justification in removing references to TR22.839. On the remit of work, we have the same view as detailed in Qualcomm's comment.

3.2 Mobile IAB/VMR Objectives

The moderator proposes to focus the next round of discussion on the following points:

- It is proposed to remove Objective 3 and Objective 4 from the objectives to be pursued
- Regarding Objective 1 it is proposed to converge on a more refined description of the objective. Main points to be targeted are
  - Migration/topology adaptation
  - Neighbour Relations
  - Resource separation for interference mitigation
- Regarding Objective 2 it is proposed to discuss the following
  - Should Group Mobility be re-discussed in Rel17, given that the same discussion happened in Rel17 with no agreements? [Please take the next discussion on Rel17 leftovers into acocunt]
  - If yes, what are the points not discussed in Rel17 that should be addressed in Rel18?
  - Is it agreable to define group mobility as "mobility of an IAB-node together with its served UEs"

Please provide your view on the above points

Feedback Form 5: Intermediate views on Mobile IAB/VMR Objectives

Feedback Form 6:

1 – Qualcomm Incorporated

We are **fine** with the removal of **objective 3**.

We do **not agree** with the removal of **objective 4**. PCI collision can only be avoided in two manners:

(1) every mobile-IAB/VMR-node holds a separate PCI, which is not used anywhere in the vicinity of this node, or

(2) PCI collision detection and reconfiguration can be applied by mobile-IAB/VMR nodes.

Solution (1) does not scale, i.e., can only be supported on a handful of mobile-IAB/VMR nodes. For that reason, solution (2) should be supported.

Objective 1 should include:

- Cell-mobility-aware handover of UEs. This means: To better control handover to/from/between moving cells, information on the mobility of the source and/or target cell (vehicle speed, direction etc.) should be available at the gNB for UE handover decisions and UE admission control. Also, for UEs connected to moving cells, information on UE-is-inside-vs.-outside should also be included for such UE handover decisions.
- Enhancements to neighbor relations. Example: Cell neighbor information is presently exchanged between CUs to update the NRT. This neighbor info may include information related to the cell's mobility state (i.e., vehicle speed).
- Migration/topology adaptation: This would be part of Rel-17 spill-over, part new. Most likely, we won't be able to address inter-donor IAB-DU migration, alternative 2 in Rel17. We may not even address alternative 1 in Rel-17. Further, reduction of service interruption during topology adaptation needs further work. In Rel-17, these issues have not been too critical since IAB-networks are considered stationary. However, these issues become very relevant when the IAB-node moves and therefore, they should be addressed in Rel-18.

2 – InterDigital

We agree that group mobility should be re-discussed in rel18, as it is a major concern in the case of mobile IAB (e.g. in rel-17, topology adaptation is due to RLF or load balancing and it was not expected to happen as often as in the mobile IAB case).

We agree the definition of the group mobility as "mobility of an IAB-node together with its served UEs", assuming we go only for a one hop mobile IAB network in rel-18 (otherwise, a better definition will be "mobility of an IAB node together with the UEs and IAB nodes that it is serving directly or indirectly)

We do not support the removal of objective 4 (PCI collision and RACH conflict handling). As QCOM has pointed out, it is true that network implementation could handle this (E.g. assigning mobile IAB cells unique PCIs that are not used elsewhere), but that will cause scalability issues.

3 – OPPO

We are fine to removing Objective #3, but share the view from Qualcomm on Objective #4. We are also fine to Objective #1.

For objective #2, we do not think in general the Rel-17 leftover failing Rel-17 discussion should come back in Rel-18. But in case the majority of companies prefer to have group mobility in Rel-18 work, we agree to Moderator that RANP has to down-select a clear/concrete and potentially a different-from-Rel17 architecture/scope so as to make Rel-18 work not to repeat the same failure in Rel-17.

Regarding to definition of "group mobility", we have a concern on the definition in FL's question, because according to Moderator's proposal in 3.1, the UEs served by a mobile IAB/VMR node can include both on-board UE and surrounding UE, and the surrounding UE normally does not share the same mobility characteristics as the on-board UE and mobile IAB/VMR node itself. We wonder whether the proposed definition of "group mobility" means a prerequisite of UE classification/identification between on-board UE and surrounding UEs, which however may out of RAN scope.

4 – SHARP Corporation

For Objective 2, we are fine with the definition of "group mobility" as suggested by the moderator. We should add avoidance/reduction of signaling storms possibly caused by an IAB/VMR handover.

Removal of Objective 3 is OK.

For Objective 4, we have a sympathy on Qualcomm's opinion. Avoidance/mitigation of PCI collisions only by system management may cause scalability issues.

5 – Continental Automotive GmbH

- Agree with the proposal to remove objective 3, but it's not clear why objective 4 should be removed.
- Agree with the proposal on objective 1
- For objective 2

o If group mobility was discussed in Rel17 without agreements, it is better not to discuss it in Rel18, unless there is a strong technical/commercial justification in the particular scenario considered for VMR.

6 – LG Electronics Inc.

Considering that work scope of objective 1 and 2 are pretty big, we are fine to remove objective 3 and 4.

Regarding objective 1, we think that main points to be targeted should be only "Migration/topology adaptation" because this may have many impact to IAB nodes. However, the rest of two points can be handled by network configuration and this may not be difficult.

Regarding objective 2, we think that Rel-18 IAB would consider much faster mobility scenarios than Rel-17 IAB. So, it would be better to start a discussion from scratch for group mobility for Rel-18 IAB.

For definition of group mobility, we are ok with "mobility of an IAB-node together with its served UEs"

7 – AT&T GNS Belgium SPRL

Objective 1: Agree with Qualcomm's views

8 – AT&T GNS Belgium SPRL

Objective 2: We think group mobility needs to the discussed in Rel-18. There wasn't much scope or time in Rel-17 work item to discuss group mobility. Also, since Rel-17 focused mainly on stationary IAB nodes, the work on intra-donor or inter-donor migration was mostly about getting the basics specified. In Rel-18, for the VMR use cases, group mobility becomes more important as this may entail a migrating VMR potentially serving several UEs. We are OK with the moderator's definition of group mobility.

Objective 3: We are OK to remove

Objective 4: Agree with Qualcomm's view. Not OK to remove.

9 – Futurewei Technologies

We are fine to include objectives 1 & 2 as a starting point for discussion. We don't see a need to necessarily restart the discussion on group mobility from scratch. However, as our work is contribution driven, of course any company can propose a solution, which may or may not be aligned with previous discussions and proposals.

Regarding the point raised by QCM on avoidance of PCI collisions, we wonder if the "Neighbour Relations" bullet is inclusive of this topic.

In addition, QCM raised several other issues that they see as worthy of being included in objective 1. OPPO also raised several issues such as the definition of "group mobility". We are not sure that the issues raised are exhaustive, or whether additional technical issues will in fact need to be addressed.

This reinforces our view that we should start with a SI in order to reach consensus on exactly what are the use cases that need to be addressed, and converge on the technical issues that need to be solved.

10 – Motorola Mobility France S.A.S

We agree to remove Objective 3 provisionally before instruction from SA3. As for Objective 4, PCI collision and RACH conflict may be more severe in mobile use case, hence enhancements for avoiding PCI collision and RACH conflict seem needed.

For Objective 1, mobility enhancements should be discussed separately for on-board UEs and surrounding UEs. The enhancements need to be introduced for idle/inactive modes.

For Objective 2, R17 is now focused on discussing partial migration. If full migration is agreed in R17, we may define a baseline migration procedure in R17 and postpone enhancements for group mobility to R18.

11 – Sony Europe B.V.

We are ok to remove objectives 3 and 4.

For objective 1, UE onboarding and Mobile IAB provisioning should be added as an objective.

We are ok to define group mobility as proposed.

12 – vivo Mobile Communication Co.

Ok to remove Objective 3, and share similar view with QC that Objective 4 should be kept.

As for Objective 2, we wonder should we also include descendant nodes as part of the group to be performing mobility, i.e., the group mobility should defined as "mobility of an IAB-node together with its served UEs <u>and descendant node(s)</u>"

13 – ZTE Corporation

We are fine to remove the objective 2 and 4. With regard to the second objective, we think Rel-17 IAB progress is far from satisfactory for group mobility. Actually, Rel-17 IAB focus on the partial migration procedure which assume the migration IAB node, descendant IAB nodes and served UEs does not move. Only the migration IAB node performs HO and the descendant nodes/UEs are still served by source CU, which is not applicable for mobile IAB scenario. With regard to the full migration in Rel-17, very limited time are allocated to it and separate HO procedures are assumed for migration IAB node and descendant UEs. It is not yet clear whether the specification work can be completed in Rel-17. In Rel-18, the full migration with reduced signalling overhead is preferred. In addition, for the group mobility procedure, it is suggested that the served UEs are transparent to the HO procedure. These can be the design goal in Rel-18.

14 – Nokia Italy

We are ok with objective 1.

Regarding objective 2, we are ok with the definition for group mobility, and agree that effort should be made to avoid repeating the same discussion that was had in Rel-17 effort.

Moderator noted expected RAN 4 impacts associated with objectives 1 and 2, but these impacts are not noted in the work scope. We would propose to add RAN 4 objectives for RRM, demod, and co-existence related to mobile IAB.

We are ok with removing objective 3, but agree with others that objective 4 should remain.

15 – Intel Deutschland GmbH

- 1st bullet: Ok to remove objective 3 and 4.
- 2nd bullet: As we replied in the initial round, we think "neighbour relations" should be further clearly defined and scoped to minimize discussion on objectives in WGs.
- 3rd bullet: Firstly, we assume the first question is to about to ask "should group mobility be re-discussed in R18", as Rel-17 objective is not in the scope of this discussion. Secondly, different from Rel-17 (inter-donor CU partial migration, without IAB-DU migration), topology migration for mobile IAB-node mainly takes place between different IAB-donor CUs, where both IAB-MT and IAB-DU are migrated to a different IAB-donor CU. Under this scenario, the migration of mobile IAB-node cannot be transparent to the UEs which are served by the mobile IAB-node. It is more useful to consider group mobility to reduce signaling storm of RRC messages to the served UEs, etc. Considering the main impact is on group of UE's mobility, we think it is more suitable for RAN2 to be the leading group.

16 – Beijing Xiaomi Mobile Software

For objective 2 we believe the scenarios for VMR strongly support greater challenges for mobility of IAB nodes. The definition of the group mobility as "mobility of an IAB-node together with its served UEs" is acceptable and accurate, and we also assume one hop mobile IAB network in rel-18 is fine. Group mobility under the definition here should be included it is a key enhancement for VMR and mobile IAB in general, required to reduce potentially massive signalling loads for a common procedure amongst group members.

Regarding objective 3 as previously indicated we expect the lead to be in other TSGs, if it is clear that any resulting work in RAN from these other groups will be completed without a clear objective in this WID then that is fine.

For objective 4 we agree with Qualcomms observations that PCI collision is a very likely operational issue and support the inclusion of the objective to resolve this with work being led in RAN2

17 – Huawei Technologies France

Maybe objective 4 can be merged into objective 1 by rewording as "basic solution for PCI collision and RACH conflict avoidance;

For objective 1, basically OK.

For objective 2, anyway, R17 discussions partially touched this area, but we didn't take this as a standalone objective and deep analysis are still needed, thus we think this objective should be kept for discussions on further enhancements, fine to define as "mobility of an IAB-node together with its served UEs"

18 – Samsung R&D Institute UK

We are not ok with the removal of objectives 3 and 4. Not quite clear to us why this was proposed, especially given the support expressed, especially for objective 4.

Regarding the proposed 'refinement' to the objective 1, we prefer the original wording.

We further do not agree with the statement that no agreements on group mobility were made in Rel-17. Based on reply LS from RAN1/2/4, RAN3 can see the feasibility of supporting full migration. Therefore we cannot simply say no agreements for group mobility were reached in Rel-17. We should instead say that Group Mobility is the continuation of Rel-17 work on full migration. For Rel-18, one possible enhancement is the full migration based on Alt. 2.

With respect to the concept of group mobility, we think it could also encompass joint mobility of a group of IAB-nodes (e.g. mounted on a train and changing serving cell simultaneously). Or it could be the group mobility of a set of UEs who are being handed over from one mobile relay node to another (i.e. in the case where UEs are stationary but relay nodes are moving).

19 – CATT

We are OK to remove objective 3.However,we think objective 4 should be kept.

For the group mobility, although it was discussed in Rel-17,the situation is different in Rel-18 considering group mobility is a basic feature for mobile IAB. With that, we could not agree to take group mobility as Rel-17 leftover.

20 – Philips International B.V.

If topics are removed, relevant groups should be informed. For instance, if objective 3 is removed since it does not fit the RAN capabilities, then SA2/SA3 should be informed to fill in the gap. Otherwise, we agree with Qualcomm.

21 – Fraunhofer HHI

We believe that Objective 1 [Cell mobility aware handover and neighbor relations] should target:

· UEs in IDLE/inactive mode to enable optimum mIAB cell selection/reselection

· UE in connected mode to achieve reliable connectivity to the mIAB (when a user, e.g. opens a window)

· Minimisation of service interruption during mobility of the UE (e.g. entering or leaving the vehicle)

· Topology changes during mIAB mobility that minimise UE service interruption and signalling overhead

We agree with other companies regarding interference management between mIAB and static RAN nodes. This should be, in our opinion, a separate objective.

We are also fine with removing Objective 3.

We are fine with the definition of group mobility when there is a single hop, as pointed out by InterDigital.

22 – Ericsson LM

We agree to remove Objective 3 and Objective 4. Regarding Objective 4, we would like to point out that we are not against enhancements to PCI collision and RACH conflict avoidance a priori, but we think that these may not be the only enhancements needed, and the full list is to be determined during the WI. In other words, there is no need to lift individual technical issues to the WID level.
Regarding the items listed in Objective 1, the “Migration/topology adaptation” is clear enough and suitable for an objective. The “Resource separation for interference mitigation” should be reformulated to “Mitigation of interference specific to mobility scenarios”. The “Neighbour Relations” is a “tool” to enable the objective, rather than an objective, and, as such, it is too concrete for a WID and should be removed – the same justification as the one we provided above for Objective 4: we should not lift individual technical issues to the WID level, as we may not know all the issues as of today.
Regarding Objective 2, we agree to define group mobility as ”mobility of an IAB-node together with its served UEs”, only if it means that mobile IAB-nodes serve only UEs and not other IAB-nodes. Please note that the Rel-17 did not discuss group mobility per se, but rather group signaling for inter-donor migration. Hence, we propose to abandon the current enumeration of objectives and agree on a generic list of Objectives, as follows:

· Procedures for migration/topology adaptation to enable IAB-node mobility

· Enhancements for mobility of an IAB-node together with its served UEs

Mitigation of interference specific to mobility scenarios, including the avoidance of reference and control signal collisions

23 – LG Uplus

We cannot agree with removing PCI collsion solution (bullet 4).

24 – Verizon UK Ltd

We are fine to start with Objectives 1, 2, and 4.

For objective 1, our thinking is to focus on a) Cell-mobility-aware handover of UEs , b) Enhancements to ANR considering cell mobility.

For Objective 2, group mobility should be considering with the aim of reducing signaling storms.

We are ok to de-prioritize Objective 3.

We cannot remove objective 4 as it is important to have a PCI collision avoidance solution that is scalable.

3.3 Legacy UE Support for Mobile IAB/VMR

The moderator proposes to agree to the following points:

- Solutions to support Mobile IAB/VMR should support legacy UEs at least for basic services
- Solutions providing optimisation for Mobile IAB/VMR may entail UE enhancements, so long as such enhancements are backwards compatible

Please provide your view on the above points

Feedback Form 5: Intermediate views on Legacy UE Support for Mobile IAB/VMR

Feedback Form 7:

1 – Qualcomm Incorporated

We are fine with the moderator's proposals.

2 – InterDigital

We agree with the proposal.

3 – OPPO

To be honest, we start to have concern on the direction of the discussion for legacy UE support. The tone seems to be that, the Rel-18 IAB enhancement would care more about Rel-18 UE but stop the consideration for legacy UE as long as the legacy UE can have it's "basic services" alive. We do not remember any past IAB work in Rel-16/Rel-17 had ever such low supporting level for legacy UE, and we would like to get a clarification what "basic services" means.

We maintain our position that the Rel-18 IAB should not differentiate UEs per release; what is even more critical, Rel-18 IAB should not make legacy UE even perform worse (e.g., for certain non-basic services).

4 – SHARP Corporation

We agree on the moderator proposal.

5 – Continental Automotive GmbH

Agree with these points.

6 – LG Electronics Inc.

The proposed two bullets may be quite redundant and would cause some ambiguity. What is the meaning of the ”so long as such enhancements are backwards compatible” in the second bullet? We think that the meaning of ”backwards compatible” is same as the enhancement is transparent to legacy UE. Why do we have these two bullets with ambiguity? So, we think that one clear wording is sufficient and this should be ”all features of Rel-18 Mobile IAB/VMR should be transparent to legacy UEs”.

7 – AT&T GNS Belgium SPRL

Agree with moderator’s proposals

8 – Futurewei Technologies

We have similar concerns as those expressed by OPPO and LGE as to the ambiguity of these statements, and terms such as ”basic services”. Different companies may have vastly differing views regarding the meaning of such terminology.

It is not clear exactly what UE enhancements companies propose to introduce, and how such enhancements impact could potentially impact the performance of pre-Rel. 18 UEs. So here again, it would perhaps seem prudent to begin with a SI to allow the value and impact of all such proposals to be considered.

9 – Motorola Mobility France S.A.S

We agree with the moderator’s proposal.

10 – Sony Europe B.V.

We are ok with the objectives. However, I don’t understand the backward compatibility aspect as if a UE supports Rel-18 enhancements then there is no fallback possible to Rel-17 or earlier Mobile IAB node as such node wont exist and legacy UE will be able to get the basic service from a mobile relay.

11 – ZTE Corporation

We agree with the proposals suggested by moderator.

12 – Nokia Italy

It should be made clear that solutions supporting legacy UEs are prioritized over solutions requiring UE enhancement. The focus should be achieving feasible solutions that support the maximum number of UEs. Efforts related to optimizations should have low priority.

13 – Intel Deutschland GmbH

Agree.

14 – Beijing Xiaomi Mobile Software

This looks reasonable, as long as we are clear on what basic services means?

Maybe these bullets introduce ambiguity that hasn't existed for the support of legacy UEs in R16/17 IAB?

In the first instance the scope of functions expected to be supported by legacy devices should be clear, do we really need to define it? Probably not?

But by virtue that the new feature provides new functionality it seems clear that legacy devices may potentially not benefit from the optimisation. So in a second instance whether we discount optimisations because they do not support legacy devices? we have some sympathy but also believe that in order to introduce VMR this may not be possible in all instances, so such a barrier is not necessary for function adoption.

15 – Huawei Technologies France

It seems fine.

16 – Samsung R&D Institute UK

We need to be more specific on what these 'basic services' are, especially clarifying what is excluded.

Also we should be more specific on 'so long as such enhancements are backwards compatible'. Does this mean that an IAB/VMR enhanced Rel-18 UE should also connect to a non-IAB/VMR Rel-18 gNB? Or is it Rel-17 gNB? Or a Rel-16/17 IAB-enabled gNB?

17 – CATT

We are OK with the proposal from moderator.

18 – Philips International B.V.

We agree with the moderator.

19 – Fraunhofer HHI

We are fine with the above proposals.

20 – Ericsson LM

In the first bullet, it is not clear for us what "basic service" means – we think that legacy UEs can be provided with the same service as Rel-18 UEs. Is the intended meaning that legacy UEs should be able connect, but that there may exist some IAB-specific Rel-18 features that only Rel-18 UEs may support? We can revisit at a later instance when specification impact is better understood.
Regarding the second bullet, we agree that any enhancements should be backwards compatible. But we should avoid extensive specification efforts just to support legacy UEs.

21 – LG Uplus

We are fine with this.

22 – Verizon UK Ltd

We agree with moderator's proposals.

3.4 Rel-17 Leftovers for Rel-18

The moderator proposes to focus on the following aspects

- Agree not to have an explicit objective to treat Rel17 leftover topics in Rel18
- Agree not to treat in Rel18 any technical topics treated in Rel17 where consensus was not reached, unless such topics are essential for the correct specification of Rel18 solutions
- Agree to handle leftover work from Rel17 on a case by case basis and via detailed objectives on the technical solutions needed

Please provide your view on the above points

Feedback Form 8:

1 – Qualcomm Incorporated

We agree with the moderator's proposals. We propose to further include:

- Topology adaptation enhancements including inter-donor IAB-DU Migration. This is relevant for mobile-IAB since it avoids routing all traffic back to the initial donor-CU, where the vehicle initially established its backhaul connection.
- Enhancements to reduce service interruption for topology adaptation. This is relevant for mobile-IAB since topology adaption happens frequently (opposed to stationary IAB network discussed in Rel-16/17).

2 – InterDigital

In the last RAN plenary, it was agreed to deprioritize the work on fairness and latency enforcement in rel-17. We think this is one item that can be reconsidered in rel-18 (the possible solutions are already on the table after several rounds of discussions in rel-17, so it is worth trying to reach a consensus once again)

Also, CHO and DAPS like enhancements, which were discussed to some extent in rel-17 but no concrete agreements were made will be more relevant in the case of mobile IAB and should be reconsidered. For example, assume a UE capable of DAPs is connected to a mobile IAB that is onboard a train. If IAB nodes remain DAPS incapable as in rel-17 (as so far only the IAB MT's DRBs can be involved in DAPS and not the BH RLC channels), as long as the UE is onboard the train and connected to the mobile IAB node, the UE will experience service interruption every time the IAB node performs a HO (unless there is a lot of buffered data at the IAB node that can be forwarded to the UE while the IAB node performing the HO).

To summarize, we think the rel-17 leftovers to consider are:

- CHO and DAPS enhancement for IAB
- fairness and latency enforcement for multi-hop IAB

3 – OPPO

We support the first two bullets, and think the 3rd bullet somehow opens a door to an escaping from the guidance in the first two bullets. Given the first two bullets already give the Rel-17 leftover a chance to be treated in Rel-18 if the Rel-17 leftover is proved to be essential for Rel-18 enhancement, we do not see a need to include the 3rd bullet.

4 – SHARP Corporation

Any latency considerations that potentially effect CHO should be considered.

5 – Continental Automotive GmbH

Agree to these proposals.

6 – LG Electronics Inc.

In our observation, most of Rel-17 leftovers are not concluded in Rel-17 because it was very controversial and finally no consensus was made, not due to lack of time. Even if Rel-17 leftovers are considered in Rel-18 again, we are still skeptical whether those can be converged in Rel-18 easily and the concern is that this would consume lots of discussion time again and it will reduce precious discussion time for other important features of Rel-18 IAB. So, we think that the first two bullets are sufficient and prefer to remove the third bullet, i.e., ~~Agree to handle leftover work from Rel17 on a case by case basis and via detailed objectives on the technical solutions needed~~.

7 – Futurewei Technologies

We are fine with the rapporteur's proposal.

Also, it seems that the second bullet is somehow inclusive of the third bullet. Therefore, we are also fine to remove the third bullet.

8 – AT&T GNS Belgium SPRL

While in principle the moderator's proposal is reasonable, we want to add that certain items that were discussed but not agreed in R17, will need to be considered in R18 for VMR. Specifically, we believe that inter-donor migration, group mobility, and reduction of service interruption should be included in R18.

9 – Motorola Mobility France S.A.S

We are fine with the moderator's proposal. We would like to emphasize that some of the topics in Rel-17 were down-scoped seemingly due to shortage of time. For example, interference management was only partly addressed in the context of spatial resource management for enhanced duplexing while a recent conclusion was not to pursue further enhancements in Rel-17 since some of the scenarios were not considered essential for the WI objectives. However, the existing solutions for interference management specified primarily for fixed base stations are insufficient and slow for the dynamic scenarios in mobile IAB. We propose to keep the option of revisiting leftover topics open. It is fine to consider those matters case by case.

10 – Sony Europe B.V.

We don't see much benefit of agreeing anything related to Rel-17 leftovers at this stage. in the absence of any agreement each leftover item needs proper discussion and conclusion before it is added as an objective. Some of them might be useful for mobile IAB compared to a fixed node.

11 – vivo Mobile Communication Co.

Agree in general, and the continuation of mobility-related Rel-17 topics shall be prioritized over others.

12 – ZTE Corporation

We agree with the proposals suggested by moderator.

13 – Nokia Italy

We are ok with the proposal, and agree that the third bullet may not be necessary.

14 – Intel Deutschland GmbH

Agree with the proposal.

15 – Beijing Xiaomi Mobile Software

Bullets 2 and 3 appear a little contradictory to us, no need for bullet 2 and in particular support bullet 1 i.e. no need to capture anything in the WID in regard to this point. However the principle of the 3rd bullet is fine, each objective on its own merits.

16 – Huawei Technologies France

The principles seem fine in general. But, the R17 leftover objective should be more clear after stage 3 freeze of R17. Namely that we may need to revise the R18 WID for the R17 leftover part in next year, with more clear objectives.

17 – Samsung R&D Institute UK

We are not OK to exclude all topics where 'consensus was not reached'. What if some of them become essential for meeting Rel-18 IAB/VMR objectives? How can we apriori exclude all such topics?

We are ok with handling 'leftover work from Rel17 on a case by case basis and via detailed objectives on the technical solutions needed', but we would like specific left-over work to be identified and captured in the WID/SID.

18 – Philips International B.V.

We agree with the moderator.

19 – CATT

We are OK with bullet 1 and bullet 2.As to bullet 3,it is not quite clear to us in current stage.Maybe it could be discussed after Rel-17 WI finish.

20 – Fraunhofer HHI

We believe that CHO and DAPS are relevant for the performance of mIAB and thus support InterDigital proposal for inclusion of these into Rel-18 scope. We are also fine with the rest of the proposals.

21 – Ericsson LM

We, in principle, agree with the above bullets. The WID should state the objectives, without explicit references to Rel-17 leftovers. Leftovers should be discussed on a case-by-case basis. For instance, if RAN3 concludes that full migration is not to be supported in Rel-17, it is likely that it needs to be revisited in Rel-18, since it fits well with mobile IAB.

22 – Verizon UK Ltd

R-17 leftovers could be considered on a case by case basis. We should avoid topics that were too controversial in R-17 discussions and consider those that provide value to mobile-IAB/VMR use case. Inter-donor IAB-DU Migration, and reduction of service interruption (CHO/DAPs) enhancements should be considered for R-18.

3.5 Moderator summary of the Intermediate Round and recommendation for further discussion

Moderator´s Conclusion for Intermediate Round of discussions on IAB/VMR Justifications and Background

All companies support to start a WI on Mobile IAB based on Rel17 IAB architectures and protocols.

The main use case to be supported is described in general terms below:

Focus on the mobile-IAB-nodes mounted on vehicles scenario providing 5G coverage/capacity enhancement to onboard and/or surrounding UEs

A majority of companies supports not to reference to 22.839 for the description and support of use cases. Such referencing may lead to the wrong understanding that all use cases in 22.839 are supported. Instead, the WID should spell out use cases descriptions in details.

The following conditions shall be applied to the remit of work for the WI:

- Solutions should apply to FR1 and FR2 including In-band and out-of-band backhauling
- Solutions should be limted to a single hop backhauling, i.e. one hop between UE and the mobile IAB-node (i.e. no descendant node), and one hop between mobile IAB-node and donor-DU
- Solutions should support UE HO and DC

The moderator proposes to agree to the scope above for the definition of the Rel18 WI scope and objectives.

Although there is a majority of company supporting the inclusion of the VMR use case, there is no consensus on it due to a considerable number of companies promoting to further study what VMR entails and whether it can be supported by a Rel17 based mobile IAB solution. Other companies mentioned that the VMR use case is under discussion in SA2 and that RAN3 should wait for SA2´s conclusions before deciding whether VMR can be supported in a Rel18 WI on Mobile IAB.

The moderator proposes to focus the Rel18 WID on Mobile IABs for the time being and to wait for discussions on VMR to progress in other WGs (e.g. SA2). If such discussions conclude before the start of Rel18, a WID modification can be pursued to include support for the VMR use case in the WI (if agreeable). If such discussions do not conclude before the start of Rel18, it can be decided whether a SI on VMR needs to be started in RAN WGs.

Moderator´s Conclusion for Intermediate Round of discussions on IAB/VMR Objectives

All companies agree to remove objective 3 ”Authorization and backhaul security [RAN2, RAN3]”.

All companies agree to keep objective 1, which includes:

- Migration/topology adaptation
- Neighbour Relations
- Resource separation for interference mitigation

Some rewording for objective 1 has been proposed.

A majority of companies propose to keep objective 2 on group mobility and to agree to the definition of group mobility as ”mobility of an IAB-node together with its served UEs”. A number of companies propose to avoid repetitions of Rel17 discussions, i.e. to tackle group moiblity within the context of Mobile IAB, which has not been discussed in Rel17.

A majority of companies are in favour of maintaining Objective 4, which is defined as follows:

”Whether enhancements for PCI collision and RACH conflict avoidance are necessary should be considered [RAN2/3]”

It has been proposed that RAN4 should be involved to ensure that any possible impact on e.g. RRM, demodulation and coexistance is taken into account and addressed. The Moderator believes this is a good objective to be added.

It has been proposed to draft objectives in a more generic way, that does not mention the exact technical issues/solutions to be tckled. The moderator believes this is a good approach that shold be followed and that should include the objectives on which consensus is reached, as per conclusions above

Moderator´s Conclusion for Intermediate Round of discussions on Legacy UE Support for Mobile IAB/VMR

The moderator proposed the following principles to be agreed:

- Solutions to support Mobile IAB/VMR should support legacy UEs at least for basic services
- Solutions providing optimisation for Mobile IAB/VMR may entail UE enhancements, so long as such enhancements are backwards compatible

A considerable majority supports the above principles.

However, some companies questioned what ”basic services” are. Indeed this terminology leads to some ambiguity.

Some othe rcompanies suggested to mention that solutions that are supported by legacy UEs should be prioritised, which captures the spirit of the principles above.

The moderator therefore proposes to modify the principles above as follows, after re-adaptation with respect to the proposals on the VMR use case:

- Solutions for Mobile IAB that support legacy UEs should be prioritised

- Solutions providing optimisation for Mobile IAB may entail UE enhancements, so long as such enhancements are backwards compatible

Moderator´s Conclusion for Intermediate Round of discussions on Rel-17 Leftovers for Rel-18

A majority of companies supported the principles put up by the moderator, with the exception for the last principle, which is proposed to be removed. This leads to the following list of principles that should be put up for agreement:

- Agree not to have an explicit objective to treat Rel17 leftover topics in Rel18
- Agree not to treat in Rel18 any technical topics treated in Rel17 where consensus was not reached, unless such topics are essential for the correct specification of Rel18 solutions

Some companies mentioned specific topics of interest for Rel18, which were handled in Rel17. However, some other companies mentioned that explicit technical problems should be avoided and that it should rather be identified what features are essential to support for Rel18 Mobile IAB

Some companies suggestd that a discussion on Rel17 left overs should be re-opened closer to Rel18 start, so to re-check that what was not completed in rel17 can be taken into account in Rel18, if essential. The moderator believes that the latter is a good principle to put up for agreement.

4 Final Round

4.1 IAB/VMR Justifications and Background

The moderator proposes to agree to the following scope for a Rel18 WI on Mobile IABs

1. Start a WI on Mobile IAB based on Rel17 IAB architectures and protocols.
2. The main use case to be supported is described in general terms below:

   Focus on the mobile-IAB-nodes mounted on vehicles scenario providing 5G coverage/capacity enhancement to onboard and/or surrounding UEs
3. The work shold focus on the following solutions requirements (to be considered also for objectives descriptions)

   a) Solutions should apply to FR1 and FR2 including In-band and out-of-band backhauling
   b) Solutions should be limted to a single hop backhauling, i.e. one hop between UE and the mobile IAB-node (i.e. no descendant node),and one hop between mobile IAB-node and donor-DU
   c) Solutions should support UE HO and DC
4. It is proposed to wait for further progress in other WGs (e.g. SA2) on VMR. If such discussions conclude before the start of Rel18, a WID modification can be pursued to include support for the VMR use case in the WI (if agreeable). If such discussions do not conclude before the start of Rel18, it can be decided whether a SI on VMR needs to be started in RAN WGs.

Please provide your view on the above points.

Feedback Form 9: Final views on Mobile IAB/VMR Justifications and Background

Feedback Form 9:

1 – Qualcomm Incorporated

On 1: We support this proposal.

On 2: SA1 has captured the requirements for VMR in TS 22.261, *Service requirements for the 5G System*, clause 6.42 "Mobile base station relays". Only a subset of these requirements apply to RAN and several requirements of this subset may not be in scope of this Rel-18 RAN WI. We may want to include a reference to this document since it presents an umbrella effort, and potentially consider the requirements therein at a later time. We therefore propose to add:

- *The requirements defined in TS 22.261, section 6.42, may be considered for this use case.*

On 3a: Fine

On 3b: **This needs some revision**. The mobile IAB-node should be able to connect via a stationary IAB network and extend the backhauling. This means that it should be the **last** backhaul hop, not the **only** backhaul hop. The present statement "one hop between mobile IAB-node and donor-DU" is therefore not correct. We propose the following rewording:

- *Solutions should be limited to ~~a~~ single-hop backhauling~~, i.e. one hop~~ between ~~UE and~~ the mobile IAB-node ~~(i.e. no descendant node),and one hop between mobile IAB-node and donor-DU~~ and the stationary RAN.*

On 3c: Fine

On 4: We support this proposal.

2 – SHARP Corporation

We support proposal 1, 2, 3a, 3c and 4. On 3b, as suggested by Qualcomm, it seems to be reasonable to assume that the mobile node directly connects to a stationary DU, regardless of whether the stationary DU is an IAB-DU or a donor-DU.

3 – AT&T GNS Belgium SPRL

Proposal 1: Agree

Proposal 2: Agree

Proposal 3a): Agree

Proposal 3b): This needs to be modified. We agree with Qualcomm's suggestion but would like to further add as follows:

- Solutions should be limited to ~~a~~ single-hop backhauling~~, i.e. one hop~~ between ~~UE and~~ the mobile IAB-node ~~(i.e. no descendant node),and one hop between mobile IAB-node and donor-DU~~ and the stationary RAN (either IAB-DU or donor-DU). Solution design should not preclude future extension to more hops.

Proposal 3c): Agree

4 – OPPO

We are fine with the proposals. Regarding to 3b, the suggestion from Qualcomm seems to allow the mobile IAB node takes another stationary IAB node as its child. Then it seems debatable whether the stationary child IAB node of a mobile IAB node should be functionally treated as mobile IAB node as well (e.g., whether the group mobility applies to the UEs served by stationary child IAB node). As the first phase of mobile IAB, it seems safe to stay with moderator's original proposal.

5 – vivo Mobile Communication Co.

Agree with the moderator's proposal.

6 – Continental Automotive GmbH

We agree with the objectives with the following modification to 3. b):
"Solutions should be limited to a single hop backhauling, i.e. one hop between UE and the mobile IAB-node (i.e. no descendant node).~~,and one hop between mobile IAB-node and donor-DU~~", as the latter restriction would mean that a donor IAB should always be available one-hop away from the mobile IAB.

7 – LG Electronics Inc.

We are fine with the moderator's proposal.

8 – Nokia Italy

We are fine with the moderator's proposals.

9 – Apple R&D

We are fine with the moderator's proposals.

10 – Verizon UK Ltd

We are in general fine with the moderator's proposals. Also we would like to modify Objective 3b as per Qualcomm's /AT&T suggestion above to allow. connecting to a multi-hop stationary IAB network and future multi-hop extension for mobile IAB.

11 – Motorola Mobility France S.A.S

1. Agree.
2. Agree. We propose to use TR 22.839 use cases as the baseline for drafting the use cases in RAN.
3. Agree.
4. Please note that the requirements for VMR are well-defined by SA1. As for the draft WI in SA2, that WI tends to investigate the potential objectives identified by SA2, which are independent from RAN work to a large extent. We propose that RAN WGs launch the discussion on VMR based on the input from SA1 and do not wait for SA2 WI. RAN may liaise with SA on any outstanding matters along the way.

12 – CATT

We are generally fine with the proposal from moderator.For bullet 3b,we think the modification from Qualcomm is reasonalble.

13 – Beijing Xiaomi Mobile Software

We can accept the moderator proposals.

Our understanding regarding SA2 is that they are looking at alternative architectures for VMR as part of their work, and currently considering a gNB alternative to an IAB node which may not impact architectural considerations from a RAN pov. More time for RAN to hear from SA2 is acceptable to conclude on this aspect.

14 – Intel Deutschland GmbH

We are fine with moderator's proposal.

15 – Ericsson LM

We agree with the moderator's proposal, with the following comments:

Regarding 3.b), we are not fine with QC's rewording, as it allows a mobile IAB-node to have descendant IAB-nodes (we have a similar concern as OPPO). We propose an explicit formulation saying that mobile IAB-node cannot serve any descendants – this was in fact captured in moderator's proposal as *"(i.e. no descendant node)"*.

Regarding the distance in hops, from the IAB-donor-DU, we prefer to start off with the assumption that the mobile IAB-node is always one hop away from IAB-donor-DU.

So, we propose that 3.b) is agreed as is.

16 – Samsung R&D Institute UK

On P1 - we are ok.

On P2 - we are ok.

On P3a - we are ok although we assume no normative work is needed for out-of-band backhauling?

On P3b - perhaps this is a matter of getting the wording right, but we do not think we should limit ourselves to single-hop overall. What the moderator may have meant is that only the last hop (between the access node and the UE) is 'mobile' i.e. the mobile IAB node has no descendent nodes. But this mobile IAB node can presumably connect to an IAB network of stationary parent/ancestor nodes. Or does it need to connect to an IAB-enabled gNB (as implied by the moderator)? We don't want to limit the type of connection to the donor node - there could be intermediate nodes in between.

On P3c - we are ok in principle, but more clarification would be desired e.g. solution supports the mobile IAB node's accessing UE's HO, and mobile IAB node's dual connection (and not a UE's DC configuration).

On P4 - we cannot agree with the final sentence ('...it can be decided whether a SI on VMR needs to be started in RAN WGs.') - do we really need a SI on VMR on top of a WI on mobile IAB? VMR is a scenario for mobile IAB, not a separate technology.

17 – Huawei Technologies France

The proposals are basically OK.

18 – Philips International B.V.

On 1, we agree. On 2, we would have preferred to include a more generic architecture and do not limit the work to IAB only. It is beneficial to refer to the requirements in TS 22.261. On 3 and 4, we agree.

19 – Futurewei Technologies

3b could use some rewording, although we think the intent is understood. Otherwise, the proposals seem fine.

20 – ZTE Corporation

We are basically fine with the moderator's proposal.

4.2 IAB/VMR Objectives

Disclaimer: The scope of the Rel17 WI on IAB is rather large and it is revealing to be challenging to complete such work in RAN3. With this in mind, there should be an attempt to keep the work scope within reasonable limits and not to produce a WID whose completion is challenging and not unrealistic.

It is proposed to agree to the following Objectives for a Rel18 WI on Mobile IABs

- Procedures for migration/topology adaptation to enable IAB-node mobility
- Enhancements for mobility of an IAB-node together with its served UEs. Solutions should avoid to touch upon topics where Rel17 discussions already occurred.
- Mitigation of interference specific to mobility scenarios, including the avoidance of reference and control signal collisions (e.g. PCI, RACH)
- RAN4 should be involved to ensure that any possible impact on e.g. RRM, demodulation and coexistance is taken into account and addressed.

Please provide your view on the above points.

Feedback Form 10: Final views on Mobile IAB/VMR Objectives

Feedback Form 10:

1 – Qualcomm Incorporated

We support all four proposals with some minor modifications for clarification.

First bullet: Minor addition for clarification:

Procedures for IAB-node migration/topology adaptation to enable IAB-node mobility

Second bullet: We may want to include UEs that are served by the surrounding RAN and are affected by the mobile IAB-node, and/or IDLE UEs that are not yet served at all. We propose the following modification:

Enhancements for a mobility of an IAB-node together with its served and/or surrounding UEs. Solutions should avoid to touch upon topics where Rel17 discussions already occurred.

Third bullet: We should make clarify that "mobility" relates to the IAB-node:

Mitigation of interference specific to IAB-node mobility scenarios, including the avoidance of reference and control signal collisions (e.g. PCI, RACH)

Fourth bullet: Fine.

2 – SHARP Corporation

We support the proposals.

3 – AT&T GNS Belgium SPRL

First bullet: We prefer Qualcomm's modified proposal

Second bullet: We prefer Qualcomm's modified proposal

Third bullet: We prefer Qualcomm's modified proposal

Fourth bullet: Agree

4 – OPPO

We wonder why the responsible WGs are removed comparing to what the group have before this email discussion thread. We would like to have a confirm that the work has no RAN1 impacts.

5 – vivo Mobile Communication Co.

Support/Agree with the moderator's proposal, maybe we can also add the responsible WG for each bullet.

- Procedures for migration/topology adaptation to enable IAB-node mobility [RAN3, RAN2]
- Enhancements for mobility of an IAB-node together with its served UEs. Solutions should avoid to touch upon topics where Rel17 discussions already occurred. [RAN2, RAN3]
- Mitigation of interference specific to mobility scenarios, including the avoidance of reference and control signal collisions (e.g. PCI, RACH) [RAN2, RAN3]
- RAN4 should be involved to ensure that any possible impact on e.g. RRM, demodulation and coexistance is taken into account and addressed.

6 – Continental Automotive GmbH

We agree with the objectives.

7 – LG Electronics Inc.

We are fine with the moderator's proposal.

8 – Nokia Italy

We support the proposals, but would maybe recommend the following clarification for RAN4 led objectives:
"Define necessary RAN4 requirements on e.g. co-existence, RRM and demodulation for mobile IAB-Nodes"

9 – Apple R&D

We are fine with the moderator's proposals. Also prefer adding the responsible WG(s).

10 – Verizon UK Ltd

We are fine with moderator's proposals. Slight preference for Qualcomm's rewording for bullets 1,2, and 3.

11 – Motorola Mobility France S.A.S

Agree with the proposal with the following change of words, because the word "specific" may imply excluding the specification for non-mobile-IAB nodes, which does not seem the intent.

- Mitigation of interference ~~specific~~ due to IAB-node mobility ~~scenarios~~, […]

12 – CATT

We are fine with the moderator's proposal.

13 – Beijing Xiaomi Mobile Software

In general the proposals are good but we support the amendments from QC for bullets 1, 2 and 3, also Nokia's proposal for RAN4 is useful.

Additionally regarding the second sentence of the second bullet we believe the intent is not to repeat the same discussion for the same scenario. However where scenarios are better defined (or limited) or not the same then this sentence may be unnecessarily limiting i.e. previously discussed topics may swiftly (due to familiarity) resolve the new scenario.

14 – Intel Deutschland GmbH

In general, we agree with the objectives listed above. However, we think "Solutions should avoid touching upon topics where Rel17 discussions already occurred" is not suitable to be captured as objective description. We suggest capturing it in a Note.

15 – Ericsson LM

With respect to moderator's proposal:

We prefer to be more explicit on the last bullet by reformulating it to:

- *"RAN4 should be involved to study impact on RRM, demodulation and coexistence."*

We propose to reword the second bullet to: "*Mitigation of interference due to IAB-node mobility, including the avoidance of reference and control signal collisions (e.g. PCI, RACH)*"

With respect to QC comment for rewording of 2nd bullet to: *"Enhancements for a mobility of an IAB-node together with its served* ***and/or surrounding UEs****. Solutions should avoid to touch upon topics where Rel17 discussions already occurred":*

We wonder what is meant by mobility IAB-node mobile *together with surrounding UEs*, given that the surrounding UEs are served by the surrounding RAN? We propose to leave out this intervention proposed by QC, as it may cause confusion.

With respect to Vivo's comment on leading groups for the second and the third objective:

- Enhancements for mobility of an IAB-node together with its served UEs. Solutions should avoid to touch upon topics where Rel17 discussions already occurred. [RAN2, RAN3]

- Mitigation of interference specific to mobility scenarios, including the avoidance of reference and control signal collisions (e.g. PCI, RACH) [RAN2, RAN3]

We think that, at least for the mobility enhancements, RAN3 should have the lead, since the overall procedure and the bulk of signalling (Xn, F1) is within RAN3 scope – note that in Rel17 RAN3 was the leading group for topology adaptation.

Regarding the interference/signal collision objective, we believe that RAN3 could also be considered as the leading group given that interference mitigation work will likely be on a cell level.

We also think that RAN1 impact cannot be excluded at this point. It is too early to make such a decision.

16 – Samsung R&D Institute UK

We cannot support the second bullet point in its current form. More specifically, we would like the second sentence ('Solutions should avoid to touch upon topics where Rel17 discussions already occurred.') to be removed. This is completely unnecessary in light of agreements to be made in 4.4 (which will cover this case), and is also technically impossible not to 'touch upon' any of the topics which have been discussed in Rel-17. This is oddly limiting and restrictive. We cannot know at this stage which topics may become relevant for our Rel-18 work. As a compromise, we prefer to handle this issue of 'leftovers' in 4.4.

We also cannot support lack of any mention of group mobility, which was supported by many companies in previous rounds.

We are ok with the remaining objectives.

17 – Huawei Technologies France

In general fine. some updates to wording:

1. **"**Enhancements for mobility of an IAB-node together with its served UEs and avoidance of access from surrounding UEs. Solutions should avoid to touch upon topics where Rel17 discussions already occurred but excluded.**"**

18 – Philips International B.V.

As in previous comment, mobility procedures should not be limited to IAB nodes only.

On the second bullet, we support Qualcomm's view.

19 – Futurewei Technologies

We agree with Ericsson that RAN3 should be the lead for mobility enhancements. We also agree with Ericsson's comment that we should not add "and/or surrounding" to the second bullet, as this wording is confusing and open to many possible interpretations.

We agree with Huawei regarding the wording of the statement on guidance for avoiding topics that where discussed already in Rel 17. This should be clarified as applying to topics that were discussed but excluded, otherwise it will be unnecessarily broad. We also agree with Intel that this guidance should be captured as a note.

20 – ZTE Corporation

Actually, there is some overlap between the first bullet and the second bullet. Both of them are addressing the mobility of IAB node. It is suggested to clearly differentiate them.

4.3 Legacy UE Support for Mobile IAB/VMR

It is proposed to agree to the following principles, which will be part of the WI objectives:

- Solutions for Mobile IAB that support legacy UEs should be prioritised
- Solutions providing optimisation for Mobile IAB may entail UE enhancements, so long as such enhancements are backwards compatible

Please provide your view on the above points.

Feedback Form 11: Final views on Legacy UE Support for Mobile IAB/VMR

Feedback Form 11:

1 – Qualcomm Incorporated We support these proposals.
2 – SHARP Corporation We support the proposals.
3 – AT&T GNS Belgium SPRL Agree
4 – OPPO We wonder whether the following wording can be acceptable, since the current wording offers no protection to legacy UE: - Solutions providing optimisation for Mobile IAB may entail UE enhancements, so long as such enhancements are backwards compatible <u>and do not sacrifice legacy UE performance.</u>
5 – vivo Mobile Communication Co. Agree with the moderator's proposal.
6 – Continental Automotive GmbH We agree with these principles.
7 – LG Electronics Inc. We are fine with the moderator's proposal.
8 – Nokia Italy We support the proposal.
9 – Apple R&D We agree with the proposal.
10 – Verizon UK Ltd We agree with the proposal.
11 – Motorola Mobility France S.A.S Agree.

12 – CATT We agree with the proposal
13 – Beijing Xiaomi Mobile Software the moderators proposals are acceptable
14 – Intel Deutschland GmbH In general we agree legacy UEs should be supported by mobile IAB, however, we think whether a solution should be prioritized can be left to WI phase.
15 – Ericsson LM At this point we should not start prioritizing or down-prioritizing between solutions because we do not know what these solutions are. There seem to exist opposite views in the group with respect to legacy/enhancements priority, but all or nearly all companies think that legacy UEs should be able to be served by mobile IAB-nodes. So, we propose that the first bullet captures the current common understanding as follows: - *"Mobile IAB-nodes should be able to serve legacy UEs"*
16 – Samsung R&D Institute UK It is unclear to us whether the backwards compatibility in moderator's proposal refers to the NW side (Rel-16/Rel-17 UEs should be able to connect to a mobile IAB node, which is what Ericsson seem to be implying), or to the UE side (Rel-18 UE should be able to connect to a Rel-16/Rel-17 gNB or an IAB-enabled gNB), or both?
17 – Huawei Technologies France some small updates: Solutions providing optimisation for Mobile IAB may entail R18 UE enhancements, so long as such enhancements are backwards compatible.
18 – Philips International B.V. We agree with the summary of the moderator.
19 – ZTE Corporation We support the proposals.
20 – Futurewei Technologies We like Ericsson's proposed wording for the first bullet.

4.4 Rel-17 Leftovers for Rel-18

It is proposed to agree to the following principles:

- Agree not to have an explicit objective to treat Rel17 leftover topics in Rel18

- Agree not to treat in Rel18 any technical topics treated in Rel17 where consensus was not reached, unless such topics are essential for the correct specification of Rel18 solutions
- The principles above should be re-checked once Rel17 is closed and the level of completion of the Rel17 work is known

Please provide your view on the above points.

Feedback Form 12: Final views on Rel-17 Leftovers for Rel-18

Feedback Form 12:

1 – Qualcomm Incorporated We support these proposals.
2 – SHARP Corporation We support the proposals.
3 – AT&T GNS Belgium SPRL First bullet: Agree Second bullet: We prefer to modify this as follows - Agree not to treat in Rel18 any technical topics treated in Rel17 where consensus was not reached, unless such topics are essential **or beneficial** for the correct specification of Rel18 solutions Third bullet: Agree
4 – OPPO We support the proposals.
5 – vivo Mobile Communication Co. Support the proposals.
6 – Continental Automotive GmbH We agree with these principles.
7 – LG Electronics Inc. We are fine with the moderator's proposal.
8 – Nokia Italy We support the proposal.
9 – Apple R&D We can accept this proposal.

10 – Verizon UK Ltd

We are fine with the proposal.

11 – Motorola Mobility France S.A.S

We do not support #2, but we agree with #1 and #3 in principle. The point of this discussion is whether Rel-17 leftover topics automatically make it to the discussion for Rel-18 WI. The answer is no, as explained in bullet item #1. Then bullet #2 seems redundant or even misleading.

Rel-18 WI will have different objectives pursuing different goals from those of Rel-17 WI. Whether or not a particular topic got consensus in Rel-17 should not automatically put that topic in disadvantage for Rel-18 the same way it is not given an automatic advantage. Supporting the modification by AT&T additionally, we would agree with the following:

- Agree not to have an explicit objective to treat Rel17 leftover topics in Rel18
- Agree to treat Rel17 leftover topics if essential or beneficial for the correct specification of Rel18 solutions
- The principles above should be re-checked once Rel17 is closed and the level of completion of the Rel17 work is known

12 – CATT

We agree with the proposal

13 – Beijing Xiaomi Mobile Software

The bullets 1 and 3 appear fine, although the second principle seems redundant in that consensus drives what is discussed and as such we expect non-essential items to not achieve consensus for inclusion

14 – Intel Deutschland GmbH

Agree.

15 – Ericsson LM

We propose the following rewording to the second bullet, given the purpose of a WID scope:

"*Rel-17 leftovers may be treated if they are within the scope of Rel18*."

16 – Samsung R&D Institute UK

Similarly as Motorola Mobility, Xiaomi, and Ericsson, we have an issue with the second bullet point.

We cannot agree to it in its current form. In fact, there is in our view no need for the second bullet point (as Xiaomi already observed) – first and third bullet points already cover this issue. If we already agree that there is no explicit objective pertaining to Rel-17 'left-overs' (first bullet point, which seems agreeable), then there is really no need to further elaborate this by introducing restrictions (second bullet point) which in our view cannot be observed in their current form.

17 – Huawei Technologies France

some small udpates:

Agree to consider R17 leftovers but not to have an explicit objective to treat Rel17 leftover topics in Rel18

18 – Philips International B.V. We agree with the summary of the moderator.
19 – ZTE Corporation We are fine with the proposals.
20 – Futurewei Technologies We agree with Samsung and Xiaomi. The second bullet can be removed.

5 Final Summary

Firstly, I would like to thank all the companies that contributed to this discussion. There has been a collaborative spirit that allowed a substantial move forward with the outlining of Rel18 work on Mobile IAB.

Below the moderator added the final conclusions on a per topic basis.

5.1 Final Conclusions on IAB/VMR Justifications and Background

The moderator put up for agreement the following proposals defining the scope of work:

1. Start a WI on Mobile IAB based on Rel17 IAB architectures and protocols.
2. The main use case to be supported is described in general terms below:

   Focus on the mobile-IAB-nodes mounted on vehicles scenario providing 5G coverage/capacity enhancement to onboard and/or surrounding UEs
3. The work shold focus on the following solutions requirements (to be considered also for objectives descriptions)
   a) Solutions should apply to FR1 and FR2 including In-band and out-of-band backhauling
   b) Solutions should be limted to a single hop backhauling, i.e. one hop between UE and the mobile IAB-node (i.e. no descendant node),and one hop between mobile IAB-node and donor-DU
   c) Solutions should support UE HO and DC
4. It is proposed to wait for further progress in other WGs (e.g. SA2) on VMR. If such discussions conclude before the start of Rel18, a WID modification can be pursued to include support for the VMR use case in the WI (if agreeable). If such discussions do not conclude before the start of Rel18, it can be decided whether a SI on VMR needs to be started in RAN WGs.

The outcome of the discussion is:

- All Comapnies agree to Proposal 1
- 17 out of 20 companies support proposal 2. 3 Companies would like to widen the use case scope and reference to TS22.261

- All companies support Proposal 3a
- 12 out of 20 companies support proposal 3b. The remaining 8 companies would like proposal 3b to be reworded. The rewording tackles hte possibility of multiple hops, and especially the possiblity of supporting multiple hops within the IAB network that connects the mobile IAB node.
- All companies but 1 agree to Proposal 3c. 1 company asks for more clarifications regarding the proposal
- 18 out of 20 companies agree to Proposal 4. 2 companies support a direct inclusion of the VMR use case in Rel18 work

In light of the above the following is concluded

Agree to the following:

1. **Start a WI on Mobile IAB based on Rel17 IAB architectures and protocols.**
2. **The main use case to be supported is described in general terms below:**

   Focus on the mobile-IAB-nodes mounted on vehicles scenario providing 5G coverage/capacity enhancement to onboard and/or surrounding UEs

   It is FFS whether to reference to use cases in TS22.261
3. **The work should focus on the following solutions´ requirements (to be considered also for objectives description)**
   a) **Solutions should apply to FR1 and FR2 including In-band and out-of-band backhauling**
   b) **Solutions should be limted to a single hop backhauling, i.e. one hop between UE and the mobile IAB-node (i.e. no descendant node). It is FFS whether the mobile IAB node can connect to a one hop or a multiple hop IAB network of stationary parent/ancestor nodes**
   c) **Solutions should support UE HO and DC. It is FFS whether further clarifications are needed**
4. **It is proposed to wait for further progress in other WGs (e.g. SA2) on VMR. If such discussions conclude before the start of Rel18, a WID modification can be pursued to include support for the VMR use case in the WI (if agreeable). If such discussions do not conclude before the start of Rel18, it can be decided whether a SI on VMR needs to be started in RAN WGs.**

5.2 Final Conclusions on IAB/VMR Objectives

The moderator put up for agreement the following objectives for a Rel18 WI on Mobile IABs:

1. Procedures for migration/topology adaptation to enable IAB-node mobility
2. Enhancements for mobility of an IAB-node together with its served UEs. Solutions should avoid to touch upon topics where Rel17 discussions already occurred.
3. Mitigation of interference specific to mobility scenarios, including the avoidance of reference and control signal collisions (e.g. PCI, RACH)
4. RAN4 should be involved to ensure that any possible impact on e.g. RRM, demodulation and coexistance is taken into account and addressed.

The outcome of the discussion is:

- 15 out of 20 companies accept Objective 1. 5 companies suggest some rewording of the objective
- 15 out of 20 companies accept Objective 2. 5 companies would like to add support for surrounding UES served by hte mobile IAB. Some company commented on the wording of the sentence on Rel17 discussions. 1 company is against inclusion of the sentence on Rel17 discussions. There seems to be a majority of companies supporting RAN3 as leading group for this objective.
- 14 out of 20 companies support Objective 3. 6 companies proposed some rewording of the objective for clarificatoin. there seems to be no clear direction on which WG shoudl be leading the Objective
- 18 out of 20 companies are fine with Objective 4. 2 companies propose rewording for clarification.
- Some comments were received concerning the fact that RAN1´s involvement may be needed depending on work progress.

In light of the above the following is concluded.

The following are the objectives for a Rel18 WI on mobile IAB:

1. **Define Procedures for migration/topology adaptation to enable IAB-node mobility [RAN3, RAN2]**
2. **Enhancements for mobility of an IAB-node together with its served UEs. It is FFS whether surrounding UEs shall also be served [RAN3, RAN2]**

   Note: Solutions should avoid to touch upon topics where Rel17 discussions already occurred and where the topic was excluded from Rel17.
3. **Mitigation of interference due to IAB-node mobility, including the avoidance of reference and control signal collisions (e.g. PCI, RACH). If is FFS whether RAN2 or RAN3 should be leading the activity**
4. **RAN4 should be involved to study impact on e.g. RRM, demodulation and coexistance is taken into account and addressed. RAN1 may be involved, depending on work progress.**

5.3 Final Conclusions on Legacy UE Support for Mobile IAB/VMR

The moderator put up for agreement the following principles:

1. Solutions for Mobile IAB that support legacy UEs should be prioritised
2. Solutions providing optimisation for Mobile IAB may entail UE enhancements, so long as such enhancements are backwards compatible

The outcome of the discussion is:

- 17 out of 20 companies support principle 1. 3 companies propose rewording for clarification mainly avoiding prioritisation of solutions

- All companies agree to this principle. 1 company asked for clarifications on the meaning of backwards compatibility. Backwards compatibility is intended both from a network and from a UE point of view (legacy Network procedures are unalthered towards new UEs; legacy UEs are unalthered towards new Network). 1 company suggested a small rewording.

In light of the above the following is concluded.

Agree to the following principles:

1. **Mobile IAB-nodes should be able to serve legacy UEs**
2. **Solutions providing optimisation for Mobile IAB may entail Rel18 UE enhancements, so long as such enhancements are backwards compatible**

5.4 Final Conclusions on Rel-17 Leftovers for Rel-18

The moderator put up for agreement the following principles:

1. Agree not to have an explicit objective to treat Rel17 leftover topics in Rel18
2. Agree not to treat in Rel18 any technical topics treated in Rel17 where consensus was not reached, unless such topics are essential for the correct specification of Rel18 solutions
3. The principles above should be re-checked once Rel17 is closed and the level of completion of the Rel17 work is known

The outcome of the discussion is:

- All company but 1 agree with principle 1. 1 company proposes to reword in a direction that may cover Principle 2.
- 14 out of 20 companies support Principle 2. 3 companies propose to remove the principle. 3 companies propose to reword it.
- All companies support principle 3.

In light of the above the following is concluded.

Agree to the following principles:

1. **Agree not to have an explicit objective to treat Rel17 leftover topics in Rel18**
2. **The principles above should be re-checked once Rel17 is closed and the level of completion of the Rel17 work is known**

Note: Rel17 left over topics may be considered on a case by case basis, if in scope of Rel18 work