**3GPP TSG-RAN WG2 Meeting #110 e R2-200xxxx**

**E-meeting, June 1 – 12, 2020**

**Agenda Item:** 6.1.6 (NR\_IAB-Core)

**Source:** LG Electronics

**Title:** E-mail discusson: [AT110-e][047][IAB] Particular issues III UAC

**Document for:** Discussion and Decision

# Introduction

This is to kick-off an email discussion with the following scope and intended outcome:

**[AT110-e][047][IAB] Particular issues III UAC (LG)**

Scope: Address open issues related to access control bypassing, i.e., address R2-2005992, R2-2005525, R2-2005653

Intended outcome: Report with functional Agreements (potentially also TPs).

Deadline: June 5, 0700 UTC

Specifically, this email discussion aims to resolve the followig issues:

* In section 2.2, whether UAC skipping should be effectively realized by AS or NAS
* In section 2.3, how to set establishmentCause and resumeCause
* In section 2.4, when UAC bypassing shouuld be applied

# Discussion

## RAN2 agreements and Liaison

At the RAN2 #109-e meeting, RAN2 made the following agreement for IAB MTs:

* IAB-MTs are not under UAC control.

The agreement means that IAB-MT, being part of an IAB node which is a network node, does not perform access barring check for its access attempts to a cell. RAN2 sent an LS to SA1/CT1 to inform this decision.

RAN2 has received an reply LS [1] from SA, where the updates of TS 22.261 to reflect the RAN2 decision is informed, and the following NOTE is introduced in TS 22.261 below:

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| NOTE2: IAB-MT is not subject to unified access control |

Given the updates of TS 22.271, RAN2 decision on UAC skipping is confirmed to be valid. Currently 38.331 already introduced the following text in red to support UAC bypassing:

|  |
| --- |
| 5.3.14 Unified Access Control 5.3.14.1 General  The purpose of this procedure is to perform access barring check for an access attempt associated with a given Access Category and one or more Access Identities upon request from upper layers according to TS 24.501 [23] or the RRC layer. This procedure does not apply to IAB-MT |

## How to realize bypassing Unified Access Control

While it was confirmed that IAB-MT is not subject to UAC, there are actually two possible approaches in principle to realize “not subject to UAC”, because UAC skipping can be *effectively* realized by either AS or NAS.

* **Approach1 (NAS based)**: IAB MT Access Stratum still applies UAC but NAS ensures via proper setting of Access Category (AC) and Access identify (AI) such that access by IAB MT during UAC is considered as “allowed”
* **Approach2 (AS based)**: IAB MT Access Stratum completely skips UAC (irrespective of AC and AI provided by NAS).

UAC is executed for most of UE access attempts including connection establishment and resume, where UAC is associated with Access Category and Access Identity provided by NAS for the access. Exceptions are the access in response to NG-RAN paging and for RNA update, where a certain Access Category is selected by AS, rather than NAS. Given those, we make the following observations for idle and inactive:

* In case of access in response to NG-RAN paging (inactive),
  + AC ‘0’ is selected by UE AS, and hence the access is considered as “allowed” during UAC.
* In case of access for RNA update (inactive),
  + AC ‘2’ or ‘8’ is chosen by AS, and UE performs UAC associated with this AC and AI. Whether the access cess is allowed or not depends on UAC parameters being broadcast.
* In all other cases (idle and inactive)
  + UE AS performs UAC associated with AC and AI provided by NAS. Whether the access is allowed or not depends on UAC parameters being broadcast.

With the approach1, it is rapporteur view that RAN2 do not need to introduce any special handling to support UAC bypassing for the cases where connection is triggered by upper layers. However, we may still need to take a special treatment for RNA update (where AC ‘8’ is selected by UE AS).

With the approach2, RAN2 may need to introduce a special handing to enable IAB-MT access to completely bypass UAC. RAN2 already introduced the text in 38.331 “This procedure does not apply to IAB-MT”, but the contribution [2] claims further changes as shown below to be done if we go for this option (Note that the changes below are not exhaustive but more can be found in [2] and Annex.C of this contribution)

|  |
| --- |
| 5.3.13 RRC connection resume Upon initiation of the procedure, the UE shall:  1> if the resumption of the RRC connection is triggered by response to NG-RAN paging:  2> if the resumption of the RRC connection is not for IAB-MT;  3> select '0' as the Access Category;  3> perform the unified access control procedure as specified in 5.3.14 using the selected Access Category and one or more Access Identities provided by upper layers;  4> if the access attempt is barred, the procedure ends; |

Even if we take approach1, a special treatment for RNA update may need to be specified to enable effective UAC bypassing in case of RNA update by IAB MT. This implies that approach1 may not work for all cases but requires some approach2 as well. So we can add one additional approach on top of two aforementioned approaches:

* **Approach3 (Mixed)**: To apply approach1 for all possible cases, and to apply approach2 for the rest case including RNA-update.

**Question1a**: Which approach do you think should be adopted to *effectively* enable UAC bypassing by IAB-MTs?

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| --- | --- | --- |
| **Company** | **Answer (Approach1/2/3)** | **Comment** |
| Huawei | Prefer Approach 1, also fine with approach 3 | Rapporteur’s comments make sense.  To clarify our understanding on approach 1: Upper layer provides the AC/AI/Causevalue, which are only used for AS of IAB-MT to determine the cause value. As agreed before, AS will skip the UAC check, even with the provided AC/AI. So, we may need to delete “~~such that access by IAB MT during UAC is considered as “allowed~~” in approach 1.  As to the RNA updated for AC =8, IAB-MT AS just selects 8 as UE, since IAB-MT will not use this AC=8 for its access check anyway. |
| Ericsson | Approach 2 (i.e. maintain the current agreement) | In our opinion there is confusion about the “UAC does not apply to MT” and the role AI/AC plays. Some contributions have assumed that the MT will disregard AI/AC for other purposes if that is needed. However, this is a farfetched assumption.  In our view, that “UAC does not apply” means that the MT does never consider the cell as barred by UAC. Some implementations may completely skip all the procedures which determine the AI/AC and that is ok as long as it does not affect other procedures that may need the AI/AC. A device that needs to determine the AI/AC for some other purpose than UAC will have to perform that determination step.  So ultimately, we are really discussing which steps implementations should perform.  We disagree that there is an issue to solve in this discussion rather than implementation should be done properly following correctly the specifications. |
| KDDI | Approach 2 | We agree with Ericsson. If we adopt approach 1, it impacts core networks. I mean operators have to implement s IAB dedicated UAC features to core networks. That is what we want to avoid. |
| Sony | Approach 2 | We think that it is aligned to the current agreement in RAN2 and avoids impacts to other WGs. |
| Nokia | Approach 1, but see clarifications | We share views with both Huawei and Ericsson it seems even though they indicated different options. In our opinion, AS layer should always skip barring check related to UAC. At the same time, NAS layer has to provide establishment cause to the IAB-MT. In RAN2 we do not regard establishment cause determination as part of UAC procedures, but as far as CT1/SA1 specifications are concerned, this is part of UAC.  The main issue in our opinion is with the establishment cause that is indicated by IAB-MT. Since we agreed no new EC is introduced, then IAB-MT needs to indicate one of the existing ones. If the network bars the cell completely, it may reject IAB-MT if it indicates EC other than mt-Access as it only learns that the request is from IAB-MT in msg5 while RRCReject is sent as msg4. This is explained in our paper in R2-2004685. We think CT1 specifications. We should clarify then that IAB-MT shall always use mt-Access as an EC and the preferred way to is to capture this in NAS specifications as the rules for choosing establishment cause are defined there.  In the procedure for RRC Resume, IAB-MT should choose an access class but it should skip the unified access control procedure. In general – this is not the most important case as RRC INACTIVE is very unlikely to be used for IAB-MT. |
| QC | Approach 2 | Agree with Ericsson |
| CATT | Approach 2 | We think the mentioned proper setting of Access Category (AC) and Access identify (AI) to be considered as “allowed” could be implemented by AS layer itself  Moreover, this is the last meeting in R16, so it is better not request other group to make addition SPEC modification. |
| ZTE | Approach 2 | Approach 1 need to be further discussed in CT1/SA2. Approach 2 seems straightforward and may solve the problem in RAN2’s scope. |
| Futurewei | Approach 1 | Agree with Nokia and Huawei, establishment cause needs to be provided by NAS. |
| LG | Approach 2 | We think the intention of RAN2 decision on bypassing UAC is just to skip barring check at AS, irrespective of AC/AI provided by NAS. . |
| Samsung | Approach 2 | Our understand on former agreement on this issue is that AS based skipping. |
| Perspecta Labs | Approach 1 | Approach 2 could work and Ericsson’s view is feasible but unclear of the implications as essentially the IAB-MT is asked to simply ignore UAC procedures.  Approach 1 is technically the correct approach. Agree with Nokia that we need to populate the Establishment Cause properly and mt-access is the quick way to do it now with the little time left (with CT1 impacts). However, use of mt-access blinds the gNB about how to handle overload conditions, i.e. all mt-access are the same and the gNB does not have a way to protect itself.  The clean way to implement this is to assign a new AI for IAB-MT and a new establishment cause, and the network should refrain from barring that AI/EC except for severe cases of overload. But that approach has been agreed to not be considered for Rel-16. |
| Lenovo | Approach2 | The intention of RAN2 is to skip all procedures associated with UAC regardless of AC/AI is provided by NAS or selected by AS.  In addition, it was agreed that IAB MT does not support inactive state. |
| NEC | Approach2 | Both approaches can work, but we think approach2 is more easy to bypass the UAC procedure for an IAB MT. |

**Question1b**: (Only if the answer to the question1a is Approach1) Do you agree that we do not need to change any further changes in RAN2 specification. If No, please provide the required changes

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| --- | --- | --- |
| **Company** | **Answer (Yes/No)** | **Comment**  **(in case answer is NO, please provide the required changes)** |
| Huawei | No | We need to clarify approach 1 in the spec. The current wording on that UAC does not apply to IAB-MT seems give the wrong impression upper layer will also not provide any AC/AI.  “This procedure does not apply to IAB-MT. The upper layers can provide the Access Category, Access Identity, *establishmentCause* and *resumeCause* to IAB-MT RRC.” |
| Ericsson | Yes | Approach 1 has other implications in SA/CT as it also does have an impact on the setting up of e.g. the establishment cause values. This was never the intention of the agreement which RAN2 reached. |
| KDDI | Yes | We agree with Ericsson. |
| Sony | Yes |  |
| Nokia | Yes | The intention of RAN2 agreement was that IAB-MT may connect to the network even if the cell is barred, e.g. via UAC. This cannot be ensured if the IAB-MT chooses EC other than mt-Access and this has to be captured either in CT1 specs or in RRC. We prefer the former as the rules for choosing EC are based on Access Class as defined in section 4.5.6 of TS 24.501. |
| QC | Yes | Agee with Ericsson |
| Perspecta Labs | Yes | Agree with Ericsson |
| Lenovo | Yes | Agee with Ericsson |
| NEC | Yes | Agee with Ericsson |

In case option2 is adopted, we need to discuss whether and whether we introduce further changes, in addition to what we already have “This procedure does not apply to IAB-MT” in UAC procedure heading section. .

**Question1c**: (Only if the answer to the question1a is Approach2) Do you agree with the direction of changes as proposed in [2]?

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| --- | --- | --- |
| **Company** | **Answer (Yes/No)** | **Comment**  **(in case answer is NO, please provide the required changes)** |
| Ericsson | No | We do not think that there are any changes needed in stage 3 specs. The determination of the AI/AC is something parallel. If it is only needed for UAC, an implementation may simply skip it or may do it anyway. If AI/AC is needed for other purposes, it is obvious that it will determine them but will not consider the cell as barred (by UAC) in any case. |
| KDDI | Yes | If we complete RRC INACTIVE in Rel-16, then we are fine with the changes. |
| Sony |  | We are not keen for introducing a new behaviour for the INACTIVE state in Rel-16 but ok to go with the majority. |
| Nokia |  | The first choice in [2] seems to also be that NAS provides AC/AI and EC. With the alternative approach it is unclear how establishment cause is chosen by IAB-MT. We agree not to address RRC INACTIVE related issues at all. |
| Ericsson | No | Same as Ericsson. We further decided not to do anything for RRC INACTIVE. |
| CATT | No | Since we already agree not do anything for RRC INACTIVE for IAB node, the changes are not needed. |
| ZTE | No | We have agreed to not specify anything new for RRC\_INACTIVE mode. |
| Futurewei |  | Tend to agree with Nokia. With approach 2 it seems we would need to at least address how RRC gets the establishment cause (if it does not come from NAS) |
| LG | No | No changed is required for RRC\_INACTIVE |
| Samsung | No | Stage 2’s description is above stag3. No need of further details on this in stage 3. |
| Lenovo | No | IAB MT does not support inactive state |
| NEC | No | We have agreement that IAB MT does not support inactive state |

**Question1d**: (Only if the answer to the question1a is Approach3) Companies are requested to provide view in which case the approach2 (i.e., enforced UAC bypassing by AS) should be applied?

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| **Company** | **Access case for which approach2 should apply** | **Comment** |
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CT1 is discussing this issue as well, and there are some proposals to enable UAC bypassing by setting a specific AC/AI value for IAB access. CT1 final decision may be pending due to our pending decision on Q1. Hence, it seems good to send an LS to CT1 to inform our decision about this (and with SA1/2 CCed).

**Question2**: Do you agree to send an LS to CT1 to inform RAN2 decision on Question 1?

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| --- | --- | --- |
| **Company** | **Answer (Yes/No)** | **Comment** |
| Huawei |  | Let’s see the need of LS after we finalize our decision. |
| Ericsson | No | RAN2 already sent an LS indicating what RAN2 agreement was. RAN2 delegates can debrief their corresponding colleagues if there is anything to clarify or communicate. At this stage, we see no reason to send another LS. |
| KDDI | No | We share the view with Ericsson. |
| Sony | No | Agree with other companies above that it is early to send the LS |
| Nokia | Yes | We think an LS is needed, but for another purpose, not because of Q1 (although the topics are somewhat related). The main purpose of the LS should be to inform them that IAB-MT should always choose EC = “mt-Access”. We proposed a draft LS in R2-2004686. |
| QC | No | We already sent LS to CT1. Everything has bene clarified. |
| CATT | No | We share the view with Ericsson. |
| ZTE | No | We have already sent LS to inform our intention. |
| Futurewei |  | We think Nokia’s proposal is reasonable |
| Lenovo | No | RAN2 delegates can explain to their colleague. |
| NEC | No | RAN2’s conclusion is crystal clear, no need to ask CT1 for advices. |

Summary#1

From the comments on question1a, it is observed that most companies think we should follow the approach2 that is the current RAN2 agreement.

From the comments on question 1b and 1c, most companies think that no changes are needed to RAN2 specification to follow approach2. More specifically, the proposed changes within the second TP in [2] is considered to handle RRC\_INACTIVE case, but RAN2 agreed that we do not change anything related to RRC\_IDLE.

Based on these, the rapporteur proposes:

**Proposal1: To stick to the current RAN2 agreement on UAC that IAB MT Access Stratum shall consider its access as “allowed” as part of UAC (irrespective of AC and AI provided by NAS)**

**Proposal2: To introduce no further changes to RAN2 specifications on UAC bypassing.**

From the comments on question2, it is observed that majority companies think RAN2 do not need to send an LS to CT1, where as Nokia think sending LS is needed. From rapporteur understanding, the Nokia’s solution is relying on NAS behaviors and can be still addressed in CT1, if needed, without additional RAN2 LS. So, the rapporteur proposes:

**Proposa3: Do not send an LS to CT1 on establishment cause/UAC.**

## EstablishmentCause and ResumeCause

**Connection Setup**

For connection establishment, a normal UE Access Stratum sets the establishment cause to the value as received from upper layers, as specified in 38.331 s5.3.3.3. The cause value is determined based on the mapping between access identity/class and causes as specified in TS 24.501.

|  |
| --- |
| 5.3.3.3 Actions related to transmission of *RRCSetupRequest* message The UE shall set the contents of *RRCSetupRequest* message as follows:  1> set the *ue-Identity* as follows:  2> if upper layers provide a 5G-S-TMSI:  3> set the *ue-Identity* to *ng-5G-S-TMSI-Part1*;  2> else:  3> draw a 39-bit random value in the range 0..239-1 and set the *ue-Identity* to this value;  NOTE 1: Upper layers provide the *5G-S-TMSI* if the UE is registered in the TA of the current cell.  1> set the *establishmentCause* in accordance with the information received from upper layers;  The UE shall submit the *RRCSetupRequest* message to lower layers for transmission. |

EstablishmentCause ::= ENUMERATED {

emergency, highPriorityAccess, mt-Access, mo-Signalling,

mo-Data, mo-VoiceCall, mo-VideoCall, mo-SMS, mps-PriorityAccess, mcs-PriorityAccess,

spare6, spare5, spare4, spare3, spare2, spare1}

For access attempt by IAB MT, there are mainly two options how to set the establishment cause during RRC connection establishment:

* **Option1:** To introduce no special handling for IAB MT for *establishmentCause* setting. That is, IAB MT sets the establishment cause value as indicated by upper layers
* **Option2:** To introduce a special handling for IAB MT for *establishmentCause* setting. IAB MT sets the establishment cause to a *specific* value (e.g., *highPriorityAccess*)

The option1 assumes that, for connection setup, NAS always indicates the cause value to be used by AS. With this option, we do not introduce any special handling for setting *establishmentCause* by IAB MTs during RRC connection establishment.

The option2 enforces Access Stratum of IAB MT to set the establishment cause to a specific value. RAN2 needs to discuss which cause value shall be set for which case.

The following in the box is an excerpt from the contribution [2], where it claims that if AS of IAB-MT follows upper layer indication on AI/AC, then the IAB-MT will necessarily set the cause value to highPriorityAccess. From this rapporteur understanding, the approach in the box below [2] is to set the cause value as indicated by upper layer, i.e., to follow option1.

|  |
| --- |
| IAB-MT does not have other traffic except for OAM traffic, and the purpose of its access is to provide access service to the UE and other IAB-nodes, so IAB-MT can set *highPriorityAccess* as the cause of RRC connection establishment based on the indication from upper layer, |

**Question3a**: Which option do you think should be adopted for IAB MT to set the establishment cause value within RRCSetupRequest?

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| --- | --- | --- |
| **Company** | **Answer (Option1/option2)** | **Comment** |
| Huawei | Option1 | R2 agreed not to introduce new cause value in previous meeting. With option1, we don’t need to check with CT1. AS layer will use whatever upper layer provide. To set *highPriorityAccess*¸ we can rely on the indication provided by upper layer. |
| Ericsson | Option 1 | As said above, there seems to be some confusion about UAC/AC/AI.  AC/AI are used by UAC and to determine the establishment cause. That UAC does not apply to MTs does not mean that AI/AC is ignored. That is a different thing that has never been agreed upon.  So, AC/AI should be determined to set the establishment cause as in legacy. This topic was discussed in our contribution, R2-1913186. By the proper configuration of the AC/AI, the right establishment cause can be selected by the device.  Thus, we do not think that there is a problem here at all.  Legacy mechanisms apply i.e. option 1. |
| KDDI | Option 1 | We share the view with Ericsson. |
| Sony | Option 1 |  |
| Nokia | Option 2 | We share the understanding with Ericsson, but we seem to reach another conclusion. Companies seem to forget that there are rules for how establishment cause is chosen and this is not up to implementation. This is specified in TS 24.501 as indicated above. As clarified in R2-2004685, the IAB-MT’s request can get rejected by the network even if it skips barring check and the only way to make sure this does not happen is to use “mt-Access” or a new establishment cause. Since we agreed not to introduce new EC, then we need to make sure IAB-MT always sets EC to mt-Access. As pointed out above already - we think that the EC should be chosen by NAS as it is done today. At the same time, the EC should always be set to “mt-Access” for IAB-MT to make sure the access attempt is not rejected by the network. So this is rather mix of option 1 and 2. highPriorityAccess |
| QC | Option 1 | Agree with Ericsson |
| CATT | Option 1 | The reason for a RRC connection request of IAB MT could be: NAS signalling (registration or pdu session setup) or OAM traffic. Both of them should come from upper layer |
| ZTE | Option 1 | It is suggested to follow legacy approach, i.e. IAB node sets the establishment cause value as indicated by upper layers. |
| Futurewei | Option 1 | i.e. preferably should be handled by CT1 |
| LG | Option 1 |  |
| Samsung | Option 1 |  |
| Perspecta Labs | Option 1 with clarification | Follow legacy: as indicated by upper layers. However, mt-access is the only EC value that is appropriate since no UAC must be applied. Thus it is a special EC handling (not really Option 1).  Unfortunately both options 1 and 2 are bad choices. Option 2 is worse than option 1 as it dilutes existing functionality programmed for the highPriorityAccess EC. |
| Lenovo | Option1 |  |
| NEC | Option 1 |  |

**Question3b** (Only if the answer to the question3a is option1) Do you agree that, we do not need to change any RAN2 specification to address cause value setting within RRCSetupRequest.

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| --- | --- | --- |
| **Company** | **Answer (Yes/No)** | **Comment**  **(in case answer is NO, please provide the required changes)** |
| Huawei | Agree |  |
| KDDI | Agree |  |
| Nokia | Not if CT1 handles this | This has to be handled somewhere, either in RRC or in CT1 specs. |
| QC | Agree |  |
| CATT | Agree |  |
| ZTE | Agree |  |
| Futurewei |  | Agree with Nokia. If CT1 addresses this in their spec, then we probably don’t need to do anything in RRC. However, if CT1 does not address it, then it seems we would to address it in RRC. |
| LG | Agree |  |
| Samsung | Agree |  |
| Perspecta Labs | Same as Nokia (not if) |  |
| Lenovo | agree |  |
| NEC | Agree |  |

**Question3c** (Only if the answer to the question3a is option2) Please provide your view regarding how to set the cause value

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| --- | --- |
| **Company** | **Comment** |
| Nokia | This should be specified in NAS specifications where the rules for setting EC are already specified (24.501). |
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**Connection Resume**

UE AS needs to set *resumeCause* during RRC connection resume procedure. In case of resume triggered by upper layers, the *resumeCause* is set in accordance with the information received from upper layers, except for the access in response to RAN-paging, RNA-update, and emergency, and there are *resumeCauses* to be set in those exceptional cases.

ResumeCause ::= ENUMERATED {emergency, highPriorityAccess, mt-Access, mo-Signalling,

mo-Data, mo-VoiceCall, mo-VideoCall, mo-SMS, rna-Update, mps-PriorityAccess,

mcs-PriorityAccess, spare1, spare2, spare3, spare4, spare5 }

For resume cause setting by IAB MT access, we have two options:

* **Option1:** To not introduce a special handling for *resumeCause* setting. That is, for resume triggered by upper layers, IAB MT sets the resumeCause value in accordance with the information received from upper layers, and for resume in response to RAN-paging and for RNA-update, existing respective resumeCause is set.
* **Option2**: To introduce a special handling in AS for *resumeCause* setting. That is, IAB MT sets the establishment cause to a *specific* value.
* **Others**: Please specify your preferred behaviours in the table below as part of your company comments.

**Question4a**: Which option do you think should be adopted for resume cause setting by IAB MT?

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| --- | --- | --- |
| **Company** | **Answer (Option1/option2)** | **Comment** |
| Huawei | Option1 |  |
| Ericsson | Option 1 | Same comments as above. There is no reason to do anything special. Nothing is broken in the standard. |
| KDDI | Option1 |  |
| Sony | Option 1 |  |
| Nokia |  | Same approach as previously – this should be handled by CT1, but the cause value should always be “mt-Access”. We can also disregard this since we agreed not to do any RRC INACTIVE special handling for IAB-MT. |
| QC | Up to implementation | We agreed that nothing will be specified for INACTIVE MT. |
| CATT | Option 1 | Same comments as Question3a |
| ZTE | Option 1 |  |
| Futurewei | Option 1 | i.e. preferably should be handled by CT1 |
| LG | Option1 |  |
| Samsung | Option 1 |  |
| Lenovo |  | IAB MT does not support inactive state. |
| NEC | Option 1 |  |

**Question4b** (Only if the answer to the question4a is option1) Do you agree that, we do not need to change any RAN2 specification to address *resumeCause* value setting within *RRCResumeRequest*.

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| --- | --- | --- |
| **Company** | **Answer (Yes/No)** | **Comment**  **(in case answer is NO, please provide the required changes)** |
| Huawei | Agree |  |
| Ericsson | Agree | No changes at all are needed (in this or any of the previous cases). |
| KDDI | Agree |  |
| Sony | Agree |  |
| Nokia |  | Not if CT1 handles that. We can also disregard this since we agreed not to do any RRC INACTIVE special handling for IAB-MT. |
| CATT | Agree |  |
| ZTE | Agree |  |
| Futurewei |  | Agree with Nokia. If CT1 addresses this in their spec, then we probably don’t need to do anything in RRC. However, if CT1 does not address it, then it seems we would to address it in RRC. |
| Samsung | Agree |  |
| NEC | Agree |  |

**Question4c** (Only if the answer to the question4a is option2) Please provide your view regarding how to set the *resumeCause* value

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| --- | --- |
| **Company** | **Comment** |
| Nokia | It should always be set to mt-Access |
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Summary#2

From the comments on question 3a regarding establishmentCause, it is observed that most companies prefer option1, i.e., RAN2 do not need to do anything special on setting establishment cause, given the understanding that the establishment cause is provided by NAS.

There is a different view from Nokia that claims through question1 and 2 that it is important to prevent IAB MT access from being rejected, and therefore establishment cause should be set to be mt-Access, which then necessitates NAS to set the corresponding AC/CI in a specific value.

It is rapporteur view that Nokia’s view is not contradicting to option1, and the Nokia’s concern can be better discussed in CT1, because the solution is based on NAS behaviour. So rapporteur proposes:

**Proposal 4: To introduce no special handling for setting *establishmentCause* in RAN2 specification.**

From the comments on question 4a regarding resumeCause, it is observed that most companies prefer option1, i.e., RAN2 do not need to do anything special on setting resumeCause. This is in line with the RAN2 decision that no additional changes to RRC\_INATIVE should be made for IAB-MT.

**Proposal 5: To introduce no special handling for setting *resumeCause* in RAN2 specification.**

## When UAC bypassing should be applied?

The contribution [3] claims that it is not crystal when IAB-MT should or should not bypass UAC, as different from normal UE. More specifically, the contribution asks:

* Case a) What if a device capable of IAB functionalities goes outside intended IAB network coverage and happens to only identify a cell not supporting IAB operations? Is it possible for the device to access the cell as if it is a normal UEs? If this is possible (e.g. in case the IAB node has normal UE subscription as well), should the device ignore or apply UAC? What about other access control mechanism in such a case?

In addition to the case presented above (case a) and in [3], we can also consider the following case (case b) to ask if IAB node should bypass UAC at the very initial access to the network? That is, should IAB node be allowed to bypass UAC prior to actual IAB operation readiness (i.e. before receiving IAB configuration from CU).

* Casa b) Should the IAB node be able to bypass UAC even before it is ready for IAB operations? Or, Should the IAB node be able to bypass UAC only after it is ready for IAB operation?

Regarding the case b), we note that there is IAB-specific authorization procedure defined in NAS. So, from AS point of view, IAB-MT can determine that it is authorized only after receiving IAB-related RRC configuration.

**Question 5a: (Related to case a) Do you think there is indeed a case where IAB node accesses a cell not *broadcasting iab-Support indication* as if it is a normal UE.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Answer (yes/no)** | **Comment** |
| Huawei |  | “the device to access the cell as if it is a normal UEs” this can be done by implementation. If the “IAB-MT” can act as exactly same as UE by implementation, it can be allowed. There seems no need of standard discussion, since it is just a normal UE. |
| Ericsson | No | We do not understand this section. We do not see case a) or case b)  An IAB is a network node and not a UE. So we do not understand what the purpose of this section is.  An IAB node does not access a cell not broadcasting iab-support IE. It will only access those nodes which do broadcast it. That cell will be considered for cell selection and it will then apply not apply UAC to access it i.e. it will consider it not barred. |
| KDDI | No | We share the view Ericsson, we also think an IAB is a network node and we do not understand the motivation for this either. |
| Sony | No |  |
| Nokia | No | We don’t see the need, but in case such situation happens, the IAB-MT accesses a cell as normal UE and it has to behave like a normal UE, support all the mandatory UE features etc. |
| QC | Yes | RAN3 does not preclude the IAB-MT to act as a normal UE and connect without IAB indication, e.g. to download a specific parent-node list, etc. |
| CATT | No | The field description of “***iab-Support***” in 38.331 spec has clearly stated that a cell is barred for IAB-node if iab-Support is absent.this is also the agreement of RAN2#108.  “if the field is absent, the cell does not support IAB and/or the cell is barred for IAB-node.” |
| ZTE | No | It looks strange for a network deployed IAB node to work as purely normal UE. In this case, it can do nothing but to reselect another IAB capable parent IAB node. |
| Futurewei | Yes | We don’t see any reason to prevent this in the spec (or that it is even possible to prevent it). It is certainly possible by implementation. |
| LG | Yes |  |
| Samsung | No | First, as IAB node, there is no case to connect to the cell with no iab-support as in the current spec.  Second, as not IAB node (i.e., normal UE), connection can be possible to the cell with no iab-support.  These two are independent each other since each case only assumes only one identity of that “device”. And which identity is used first, and whether trying to connect as the second identity on first identity access’s failure can be realized by implementation. But at least, first trial should be as IAB MT. And if that was unsuccessful by the reason above, then the only possible thing is to access as normal UE, which requires to adhere to the spec for normal UE. This switch of the identity (IAB node to normal UE) can be implementation. |
| Lenovo | No | We don’t see the necessity to consider case a and case b. if it is possible, it just follows the behaviour of normal UE. Any change is not needed. |
| NEC | No | We don’t see why the IAB-MT behaviour like a normal UE to access a cell without broadcasting “iab-support” |

If there is indeed a case where an IAB node accesses a cell not broadcasting iab-Support indication as if it is a normal UE, RAN2 should decide whether UAC and other access control mechanism should be applied to the IAB node.

* **Alt1**: IAB node accessing a cell not broadcasting *iab-Support* indication shall ignore UAC and other access control mechanisms *as it does on a cell broadcasting iab-Support indication*.
* **Alt2**: IAB node accessing a cell not broadcasting *iab-Support* indication shall apply UAC and other access control mechanisms *as normal UEs do*.
* **Others**: Please specify your preferred behaviours in the table below as part of your company comments.

**Question 5b: If answer to question5a is yes, companies are requested to express views on the preferred alternative.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Preferred alternative** | **Comments** |
| Huawei | Alt2, but no need of agreement. | It is a UE, rather than IAB-MT from specification perspective. |
| **Nokia** | **2** | **We do not have to capture anything related to this case. Such an access would be an access from a normal UE, not from an IAB-MT.** |
| QC | Alt 2 | Agee with Huawei and Nokia. Nothing to be done. Nothing to be agreed. |
| Futurewei | Alt 2 | If this behaviour is not already clear, we could consider to clarify in stage 2 text |
| LG | Alt 2 | To follow normal UE behaviour. WE can clarify this in stage-2. |
|  |  |  |

**Question 6: (Related to case b) Do you agree that a device be able to bypass UAC even before it is configured to operate as IAB?**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Huawei | Agree. There should be some test before a device claims as an IAB node. If the device passes the test, I can bypass UAC. There should be no big issue. We are also fine to go with majority. |
| QC | The question is not clear. The IAB-node gets configured to operate as IAB after IAB authorization. At this point, it has bypassed UAC already. |
| LG | No |
| **Samsung** | **No. As addressed in Q5a answer, it should be prohibited that first access as normal UE is successful and identity of the “device” is switched to IAB node at least in specification.** |
|  |  |
|  |  |

Summary#3

From the comments on question 5a, it is not clear whether case a) may happen or not. While some companies think we can clarify this in stage-2, majority companies think that nothing should be immediately specified for the case a).

From the comments on question 6, due to the lack of input, it is not clear whether case b) is properly understood by companies, but at the same time, no companies expressed the view that this is something to be further addressed/clarified in RAN2.

Based on these, rapporteur propose:

**Proposal 6. No action is taken in RAN2 to clarify UAC operation in both cases; a) IAB-MT is accessing a cell not broadcasting *iab-Support* indication, and b) IAB-MT capable of IAB is accessing a cell before having been authorized for IAB operation or having been configured with IAB parameters.**

## Other issue?

**Question 7: Companies are requested to provide view on any other issue related to UAC and cause value handling, which is essential to complete IAB WI.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Issue** | **Suggested changes to RAN2 specs** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

# Summary

Summary#1 (section 2.2)

From the comments on question1a, it is observed that most companies think we should follow the approach2 that is the current RAN2 agreement.

From the comments on question 1b and 1c, most companies think that no changes are needed to RAN2 specification to follow approach2. More specifically, the proposed changes within the second TP in [2] is considered to handle RRC\_INACTIVE case, but RAN2 agreed that we do not change anything related to RRC\_IDLE.

Based on these, rapporteur propose:

**Draft Proposal1: To stick to the current RAN2 agreement on UAC that IAB MT Access Stratum shall consider its access as “allowed” as part of UAC, irrespective of AC and AI provided by NAS.**

**Draft Proposal2: To introduce NO further changes to RAN2 specifications on UAC bypassing.**

From the comments on question2, it is observed that majority companies think RAN2 do not need to send an LS to CT1, whereas Nokia thinks sending LS is needed. From the rapporteur understanding, the Nokia’s solution is relying on NAS behaviors, and can be still addressed in CT1, if needed, without additional RAN2 LS. So, the rapporteur proposes:

**Draft Proposa3: Do NOT send an LS to CT1 on establishment cause/UAC.**

Summary#2 (section 2.3)

From the comments on question 3a regarding establishmentCause, it is observed that most companies prefer option1, i.e., RAN2 do not need to do anything special on setting establishment cause, given the understanding that the establishment cause is provided by NAS.

There is a different view from Nokia that claims through question1 and 2 that it is important to prevent IAB MT access from being rejected, and therefore establishment cause should be set to be mt-Access, which then necessitates NAS to set the corresponding AC/CI in a specific value.

It is rapporteur view that Nokia’s view is not contradicting to option1, and the Nokia’s concern can be better discussed in CT1, because the solution is based on NAS behaviour. So the rapporteur proposes:

**Draft Proposal 4: To introduce NO special handling for setting *establishmentCause* in RAN2 specifications.**

From the comments on question 4a regarding resumeCause, it is observed that most companies prefer option1, i.e., RAN2 do not need to do anything special on setting resumeCause. This is in line with the RAN2 decision that no additional changes to RRC\_INATIVE should be made for IAB-MT. So the rapporteur proposes:

**Draft Proposal 5: To introduce NO special handling for setting *resumeCause* in RAN2 specifications.**

Summary#3 (section 2.4)

From the comments on question 5a, it is not clear whether case a) may happen or not. While some companies think we can clarify this in stage-2, majority companies think that nothing should be immediately specified for the case a).

From the comments on question 6, due to the lack of input, it is not clear whether case b) in section 2.4 is properly understood by companies, but at the same time, no companies expressed the view that this is something to be further addressed/clarified in RAN2.

Based on these, the rapporteur proposes:

**Draft Proposal 6. NO action is taken in RAN2 to clarify UAC operation in both cases; a) IAB-MT is accessing a cell not broadcasting *iab-Support* indication, and b) IAB-MT capable of IAB is accessing a cell before having been authorized for IAB operations or before having been configured with IAB parameters.**

# Conclusion

<If there is any suggestion to modify the following (proposal classification and/or re-wording), please give your comments in the table below >

|  |  |
| --- | --- |
| Company | Suggestion |
| Nokia | We think something has to be done for establishment cause setting so that we ensure that IAB-MT connection setup request does not get rejected by the network after UAC was bypassed. This can only be achieved by using mt-Access or a new established cause. We are OK not to do anything in RAN2 on this aspect, which means no new EC is introduced, but in this case CT1 needs t oupdate their specifications to make sure IAB-MT always chooses mt-Access as an EC. We think it will be most efficient to send them LS, but, alternatively, we would be OK to clarify that RAN2 assumes that upper layers should ensure that IAB-MT always chooses mt-Access as an EC for connection setup request. |
| Huawei | **P4 should be clarified:**  **Proposal 4a: To introduce NO special handling for setting *establishmentCause* in RAN2 specifications.**  **Proposal 4b: R2 assumes the upper layers can provide the Access Category/Access Identity and the cause value of establishmentCause for IAB-MT** |

**Class A: Draft Proposals that should be aggregable**

**Draft Proposal1: To stick to the current RAN2 agreement on UAC that IAB MT Access Stratum shall consider its access as “allowed” as part of UAC, irrespective of AC and AI provided by NAS.**

**Draft Proposal2: To introduce NO further changes to RAN2 specifications on UAC bypassing.**

**~~Draft Proposa3: Do NOT send an LS to CT1 on establishment cause/UAC.~~**

The draft proposal 4 is rephrased to reflect the comments provided by Huawei in this section.

**~~Draft Proposal 4: To introduce NO special handling for setting~~ *~~establishmentCause~~* ~~in RAN2 specifications.~~**

**Draft Proposal 4: To introduce NO special handling for setting *establishmentCause* in RAN2 specifications. That is, the establishmentCause is set in accordance with the information received from upper layers as already specified in RAN2 specification.**

**Draft Proposal 5: To introduce NO special handling for setting *resumeCause* in RAN2 specifications.**

**Draft Proposal 6. NO action is taken in RAN2 to clarify UAC operation in both cases; a) IAB-MT is accessing a cell not broadcasting *iab-Support* indication, and b) IAB-MT capable of IAB is accessing a cell before having been authorized for IAB operation or having been configured with IAB parameters.**

**Class B: Draft Proposals that should be further discussed**

The following draft proposal is relocated from Class A, because two companies (Nokia, Huawei) still want to clarify how and which establishmentCause should be set by access stratum. In particular, Nokia claims that mt-Access should be set for IAB acces to prevent connection reject, and this cause value should be indicated by NAS, and for this reason, RAN2 should send an LS to CT1. However, it is the rapporteur view that the solution proposed by Nokia relies on NAS behaviours and hence the issue can be anyway discussed in CT1 regardless of whether we sends an additional LS to CT1 or not. But just for the sake of harmonized decision making, RAN2 is requested to discuss the following:

**Draft Proposa3: Do NOT send an LS to CT1 on establishment cause/UAC.**

Just for the case RAN2 decides to send an LS to CT1, two draft LSs are presented in Annex D. The first draft LS is from Nokia as proposed in R2-2004686, and the other is from LG which is being proposed based on the email discussion outcome. So companies can take a look at those and decide their view if sending an LS is needed and if so, which LS can be sent out.

# Reference

**[1] R2-2005992** Reply LS on UAC applicability to IABs (S1-202274; contact: Nokia) SA1 LS in Rel-16 NR\_IAB-Core To:RAN2, CT1 Cc:RAN3, SA2

**[2]** [**R2-2005525**](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_110-e\Docs\R2-2005525.zip) Clarification on the cause value and not supporting UAC for IAB [ToDo RIL H697] Huawei, HiSilicon discussion Rel-16 NR\_IAB-Core

**[3] R2-2005653** Clarification of access control bypasssing LG France discussion Rel-16

# Annex. A

## Definitions in TS 38.300

**IAB-MT**: IAB-node function that terminates the Uu interface to the parent node using the procedures and behaviours specified for UEs unless stated otherwise. IAB-MT function used in 38series of 3GPP Specifications corresponds to IAB-UE function defined in TS 23.501 [3].

**IAB-node**: RAN node that supports NR access links to UEs and NR backhaul links to parent nodes and child nodes. The IAB-node does not support backhauling via LTE.

# Annex. B

## Mapping between RRC causes and Access Identities/Classes

|  |  |  |  |
| --- | --- | --- | --- |
| Rule # | Access identities | Access categories | RRC establishment cause is set to |
| 1 | 1 | Any category | mps-PriorityAccess |
| 2 | 2 | Any category | mcs-PriorityAccess |
| 3 | 11, 15 | Any category | highPriorityAccess |
| 4 | 12,13,14, | Any category | highPriorityAccess |
| 5 | 0 | 0 (= MT\_acc) | mt-Access |
| 1 (= delay tolerant) | Not applicable (NOTE 1) |
| 2 (= emergency) | emergency |
| 3 (= MO\_sig) | mo-Signalling |
| 4 (= MO MMTel voice) | mo-VoiceCall |
| 5 (= MO MMTel video) | mo-VideoCall |
| 6 (= MO SMS and SMSoIP) | mo-SMS |
| 7 (= MO\_data) | mo-Data |
| 9 (= MO IMS registration related signalling) | mo-Data |
| NOTE 1: A UE using access category 1 for the access barring check will determine a second access category in the range 3 to 7 that is to be used for determination of the RRC establishment cause. See subclause 4.5.2, table 4.5.2.2, NOTE 6.  NOTE 2: See subclause 4.5.2, table 4.5.2.1 for use of the access identities of 0, 1, 2, and 11-15. | | | |

# Annex. C Text Proposal for option 2.

### 5.3.13 RRC connection resume

#### 5.3.13.1 General



Figure 5.3.13.1-1: RRC connection resume, successful



Figure 5.3.13.1-2: RRC connection resume fallback to RRC connection establishment, successful



Figure 5.3.13.1-3: RRC connection resume followed by network release, successful



Figure 5.3.13.1-4: RRC connection resume followed by network suspend, successful



Figure 5.3.13.1-5: RRC connection resume, network reject

The purpose of this procedure is to resume a suspended RRC connection, including resuming SRB(s) and DRB(s) or perform an RNA update.

#### 5.3.13.1a Conditions for resuming RRC Connection for NR sidelink communication

For NR sidelink communication an RRC connection is resumed only in the following cases:

1> if configured by upper layers to transmit NR sidelink communication and related data is available for transmission:

2> if the frequency on which the UE is configured to transmit NR sidelink communication concerns the camped frequency; and if *SIB12* is provided by the cell on which the UE camps; and if the valid version of *SIB12* does not include *sl-TxPoolSelectedNormal* for the frequency; or

2> if the frequency on which the UE is configured to transmit NR sidelink communication is included in *sl-FreqInfoList* within *SIB12* provided by the cell on which the UE camps; and if the valid version of *SIB12* does not include *sl-TxPoolSelectedNormal* for the concerned frequency;

For V2X sidelink communication an RRC connection resume is initiated only when the conditions specified for V2X sidelink communication in subclause 5.3.3.1a of TS 36.331 [10] are met.

NOTE: Upper layers initiate an RRC connection resume. The interaction with NAS is left to UE implementation.

#### 5.3.13.2 Initiation

The UE initiates the procedure when upper layers or AS (when responding to RAN paging or upon triggering RNA updates while the UE is in RRC\_INACTIVE) requests the resume of a suspended RRC connection.

The UE shall ensure having valid and up to date essential system information as specified in clause 5.2.2.2 before initiating this procedure.

Upon initiation of the procedure, the UE shall:

1> if the resumption of the RRC connection is triggered by response to NG-RAN paging:

2> if the resumption of the RRC connection is not for IAB-MT;

3> select '0' as the Access Category;

3> perform the unified access control procedure as specified in 5.3.14 using the selected Access Category and one or more Access Identities provided by upper layers;

4> if the access attempt is barred, the procedure ends;

1> else if the resumption of the RRC connection is triggered by upper layers:

2> if the upper layers provide an Access Category and one or more Access Identities:

3> perform the unified access control procedure as specified in 5.3.14 using the Access Category and Access Identities provided by upper layers;

4> if the access attempt is barred, the procedure ends;

2> set the *resumeCause* in accordance with the information received from upper layers;

1> else if the resumption of the RRC connection is triggered due to an RNA update as specified in 5.3.13.8:

2> if an emergency service is ongoing:

NOTE: How the RRC layer in the UE is aware of an ongoing emergency service is up to UE implementation.

3> select '2' as the Access Category;

3> set the *resumeCause* to *emergency*;

2> else:

3> if the resumption of the RRC connection is not for IAB-MT;

4> select '8' as the Access Category;

2> perform the unified access control procedure as specified in 5.3.14 using the selected Access Category and one or more Access Identities to be applied as specified in TS 24.501 [23];

3> if the access attempt is barred:

4> set the variable *pendingRNA-Update* to *true*;

4> the procedure ends;

1> if the UE is in NE-DC or NR-DC:

2> if the UE does not support maintaining SCG configuration upon connection resumption:

3> release the MR-DC related configurations (i.e., as specified in 5.3.5.10) from the UE Inactive AS context, if stored;

1> if the UE does not support maintaining the MCG SCell configurations upon connection resumption:2> release the MCG SCell(s) from the UE Inactive AS context, if stored;

1> apply the default L1 parameter values as specified in corresponding physical layer specifications, except for the parameters for which values are provided in *SIB1*;

1> apply the default SRB1 configuration as specified in 9.2.1;

1> apply the default MAC Cell Group configuration as specified in 9.2.2;

1> release *delayBudgetReportingConfig* from the UE Inactive AS context, if stored;

1> stop timer T342, if running;

1> release *overheatingAssistanceConfig* from the UE Inactive AS context, if stored;

1> stop timer T345, if running;

1> release *idc-AssistanceConfig* from the UE Inactive AS context, if stored;

1> release *drx-PreferenceConfig* from the UE Inactive AS context, if stored;

1> stop timer T346a, if running;

1> release *maxBW-PreferenceConfig* from the UE Inactive AS context, if stored;

1> stop timer T346b, if running;

1> release *maxCC-PreferenceConfig* from the UE Inactive AS context, if stored;

1> stop timer T346c, if running;

1> release *maxMIMO-LayerPreferenceConfig* from the UE Inactive AS context, if stored;

1> stop timer T346d, if running;

1> release *minSchedulingOffsetPreferenceConfig* from the UE Inactive AS context, if stored;

1> stop timer T346e, if running;

1> release *releasePreferenceConfig* from the UE Inactive AS context, if stored;

1> stop timer T346f, if running;

1> apply the CCCH configuration as specified in 9.1.1.2;

1> apply the *timeAlignmentTimerCommon* included in *SIB1*;

1> start timer T319;

1> set the variable *pendingRNA-Update* to *false*;

1> initiate transmission of the *RRCResumeRequest* message or *RRCResumeRequest1* in accordance with 5.3.13.3.

# Annex D. Draft LS from Nokia, LG

## Draft LS proposed by Nokia

**1. Overall Description:**

In addition to the previous agreement RAN2 informed about in an LS in R2- 2003941 that an IAB-MT does not perform access barring check for its access attempts to a cell, RAN2 has also agreed that an IAB-MT shall always set the establishment cause to mt-Access when establishing a connection with a cell. The reason for this agreement is to avoid the connection from being rejected by the network, e.g. due to overload/barring.

**2. Actions:**

**To CT1 group.**

**ACTION:** RAN2 respectfully asks CT1 to take the above agreement into consideration and update their specifications accordingly, if needed.

## Draft LS proposed by LG

**1. Overall Description:**

RAN2 discussed if the establishment cause of IAB-MT’s access should be set to a particular value. Some companies in RAN2 think that the establishment cause value of IAB-MT’s access should be set to *mt-Access* in order to prevent the access from rejected during connection setup procedure.

Regarding this, RAN2 confirmed that RAN2 will not introduce any special handling on setting the establishment cause value for IAB-MT’s access. That is, the establishment cause in RRCConnectionSetup for IAB-MT’s access is set in accordance with the information provided by upper layers.

**2. Actions:**

**To CT1 group.**

**ACTION:** RAN2 respectfully asks CT1 to take the above RAN2 decisions into consideration for further work, if any.