**3GPP TSG RAN meeting #90e RP-20xxxx**

**Electronic Meeting, 7-11 December 2020**

**Agenda item:** 9.8.2

**Source:** Email discussion moderator (Intel)

**Title:** Report from Email Discussion [90E][43][60GHz\_OTA]

**Document for:** Discussion and decision

# Introduction

This document provides as summary of the following email discussion during RAN#90-e:

**[90E][43][60GHz\_OTA]**

Goal: Generate an agreeable way forward.

Input contributions covered: 2661

# Discussion

## Background

The following summarizes the key observations and proposals listed in RP-202661:

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| ***Observation #1: OTA test methods are used as a baseline approach for NR mmWave test methodology for RF, RRM, and Demodulation testing.***  ***Observation #2: The existing mmWave OTA UE test methods are applicable to FR2 frequency bands and their extension to carrier frequencies above 52.6 GHz should be further studied***  **Proposal #1: Further study and define NR 52.6-71GHz OTA test methods within the Rel-17 timeframe**   * + **Option 1: Initiate a separate SI in parallel with NR 52.6 – 71 GHz WI**   + **Option 2: Extend the scope of the NR 52.6 – 71 GHz WI to cover the testability aspects**   **Proposal #2: Consider the following SI/WI objectives to enable NR 52.6-71GHz OTA test methods**   * + *Study and define the over the air (OTA) test methods for UE RF, RRM, and demodulation requirements for the 52.6GHz-71GHz frequency range [RAN4]*     - *Extend the applicability of the FR2 OTA test methods in TR 38.810 wherever possible*     - *Identify any changes needed, including general testing and calibration, permitted test methods, multi-path fading propagation conditions, measurement applicability criteria.*     - *Target device types: Handheld UE, laptop, tablet, FWA, vehicular mounted device; other UE types not precluded.* |

## Initial round

### Open issues

The following questions are proposed to be discussed in the initial round:

* Question #1: Whether to further study and define NR 52.6-71GHz OTA test methods within the Rel-17 timeframe
* Question #2: How to organize the NR 52.6-71GHz OTA test methods studies within the Rel-17 timeframe
  + Option 1: Initiate a separate SI to study NR 52.6-71GHz OTA test methods
  + Option 2: Extend the scope of the NR 52.6 – 71 GHz WI to cover the testability aspects
  + Option 3: other options?
* Question #3: Candidate study objectives
  + *Option 1: Study and define the over the air (OTA) test methods for UE RF, RRM, and demodulation requirements for the 52.6GHz-71GHz frequency range [RAN4]*
    - *Extend the applicability of the FR2 OTA test methods in TR 38.810 wherever possible*
    - *Identify any changes needed, including general testing and calibration, permitted test methods, multi-path fading propagation conditions, measurement applicability criteria.*
    - *Target device types: Handheld UE, laptop, tablet, FWA, vehicular mounted device; other UE types not precluded.*
    - *Utilize free space testing configuration for test methods definition.*

### Companies views’ collection

**Question #1: Whether to further study and define NR 52.6-71GHz OTA test methods within the Rel-17 timeframe?**

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| **Company** | **Comments** |
| Qualcomm | Q1: some study is definitely needed as there is a gap in testing for this frequency range. |
| ZTE | It is fine to study in Rel-17 timeframe if TU allowed, however this work should be started until RF core requirements is stable, otherwsie it seems no base are upon for further discussion. |
| Intel | Support to study in Rel-17. Agree with QC that there will be gap in case the test methods are not defined and RAN4 core requirements and RAN5 conformance requirements cannot be defined.  To ZTE: the work can start in May 2020 or later once some progress is made with RF requirements definition. |
| Apple | We suggest seeing 1 or 2 quarters of progress in 52.6 - 71 GHz work item before initiating testability work, since test methodology development for this frequency range will have dependencies on the core requirement definition |
| Huawei, HiSilicon | Before rushing to study in Rel-17 for 52.6-71GHz OTA test methods, we need to have a better understanding whether existing test framework for FR2 can be reused for 52.6-71GHz, which should be based on available RF requirements. However, requirements are not studied yet. |
| Keysight | The decision to extend NR to 71 GHz seems to have been made. It is therefore inevitable that there will be requirements at some point in the future and that those requirements will have to be tested. It is also the case that existing FR2 test system that have to operate down to 24.25 GHz cannot be extended to 71 GHz without significant changes in architecture. It is therefore essential that 3GPP gives the test community a clear and early message that test systems covering the range 52.6 GHz to 71 GHz are expected in order that essential design work can be prioritized. Keysight therefore supports studying this during Rel-17. |
| MTK | Fine to have some study. But we would prefer to first focus on whether the existing FR2 testing framework can be re-used here for 52.6-71GHz. If we later identify new issues for 52.6-71GHz, we can further discuss how and where to discuss new test methods |
| Ericsson | Test methods are clearly needed for the UE (and also the BS). For the BS, our understanding is that developing test methodologies is already part of the performance part of the WI, where the BS conformance spec is written. For the UE if it makes sense to roll together with other OTA issues a SI could make sense. No need to link the UE work in any way with the BS, but regarding timing, considering RAN4 workload it could make sense to start this work at the same time the performance part of the WI starts (which is when the corresponding BS work starts too). |
| vivo | We support to do some study. We also need to consider that the FR2 testability is always started after we have some initial thinking of core requirements. So maybe the starting time need to be further discussed. |

**Question #2: How to organize the NR 52.6-71GHz OTA test methods studies within the Rel-17 timeframe**

* **Option 1: Initiate a separate SI to study NR 52.6-71GHz OTA test methods**
* **Option 2: Extend the scope of the NR 52.6 – 71 GHz WI to cover the testability aspects**
* **Option 3: other options?**

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| **Company** | **Comments** |
| Qualcomm | Q2: Option 3: We believe there are also other OTA testing issues arising from different WIs, there should be a broader discussion on how we handle all of them. Each could be handled in its own WI/SI (basically Option 2 applied independently to each item), however this might not be the most efficient way. Considering that OTA discussions are mainly handled by the same delegates, it should be discussed whether a study item handling all OTA issues in one release should be used. This could be an ongoing SI in which topics are added and concluded one by one. Such handling would offer a wholistic approach which would be very important to achieve a unified testing discussion. Divergence in terms of testing solutions/methodologies would be very harmful for the eco-system. |
| ZTE | Option 2 is more preferred as this 52.6-71GHz OTA test method should be similar as the existing FR2 OTA test.  Given QC’s comments, we are also fine to put all FR2 OTA testing issues in one umbrella SI as OTA delegates should be same for different topics. |
| Apple | We would like to suggest a new option: once sufficient progress is achieved in the 52.6 - 71 GHz work item, specific objectives related to testability in this frequency range can be added to the Rel-17 study on enhanced FR2 test methods (FS\_FR2\_enhTestMethods). The study is already handling the extension of frequency range up to 49 GHz and can further accommodate the expansion of scope following 1 or 2 quarters of progress in the 52.6 – 71 GHz core work item. |
| Intel | Prefer Option 1 to have a separate SI. The SI scope aims to define test methods for RF/RRM/Demod requirements. We assume that the work can progress during the Rel-17 Performance stage. So, in case we add objectives to the WI, there is a risk that the whole WI Core part should be extended in case the test methods work is incomplete by the Core part completion deadline.  We are also OK to put all mmWave OTA testing aspects in one umbrella SI. In this case it makes sense to extend the objectives of Rel-17 FR2 Test Methods enhancements SI. |
| Huawei, HiSilicon | Option 2. The test methods are relevant to the RF requirements specified in the WI. Once the requirements are available, the test methods can be studied. |
| Keysight | Don’t have a strong preference. It may be that there is overlap with existing test systems < 52.6 GHz and the issue of CA should also be considered so the extension to 71 GHz cannot necessarily be handled in isolation of other bands. |
| MTK | Option 3. We prefer to first start the feasibility study in existing ongoing SI to check if FR2 test methods can be re-used first. It seems to us this will bring the least impact in TU budget and is easiest to be handled the same group of OTA experts. Once we have a clear study conclusion, we can know better how to start the following works. |
| vivo | Option3. Existing test methods can be the starting point for higher frequency, we prefer to discuss a proper way to treat the FR2 testability issue.  Now the FR2 upper frequency of the test system has been changed several times from 43.5GHz~49GHz~71GHz. A big picture of FR2 test method project is much helpful for RAN4 FR2 OTA management. |

**Question 3: Candidate study objectives**

* ***Option 1: Study and define the over the air (OTA) test methods for UE RF, RRM, and demodulation requirements for the 52.6GHz-71GHz frequency range [RAN4]***
  + ***Extend the applicability of the FR2 OTA test methods in TR 38.810 wherever possible***
  + ***Identify any changes needed, including general testing and calibration, permitted test methods, multi-path fading propagation conditions, measurement applicability criteria.***
  + ***Target device types: Handheld UE, laptop, tablet, FWA, vehicular mounted device; other UE types not precluded.***
  + ***Utilize free space testing configuration for test methods definition.***

Companies are encouraged to share views on the candidate objectives of the studies and whether proposed Option 1 objectives are acceptable.

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| **Company** | **Comments** |
| Qualcomm | Q3: we mainly agree with the bullets, we believe that FWA and vehicular mounted device can be de-prioritize, at least for now. |
| ZTE | Just wondering in 52.6-71GHz, are we going to define so many device types? If not, we need to consider so many use cases here? |
| Apple | We recommend to have some initial core requirement agreements before properly scoping the study. It is also not clear whether the physical layer design will accommodate a vehicular mounted use case. |
| Intel | Support the objectives.  We are fine to prioritize handheld UE, laptop, tablet type of devices. FWA and vehicular mounted devices can be treated with the 2nd priority. |
| Huawei, HiSilicon | As commented for Q2, it’s too early to consider the detailed objectives as no RF requirements are specified yet. |
| Keysight | The need to test bands other than 52.6 to 71 GHz in the same test system needs to be made clear up front as this will have a major impact on the design of future systems. |
| MTK | Objectives are fine to us. The problem is about the timeline. There could be some dependency to either RAN1 work or RAN4 RF requirement. Some breakdown is needed to know which topics can be studied first and which topics should be started later. |
| vivo | Prioritization of UE type is needed, which is highly related to the system capability. We also suggest to study preliminary MU assessment of the new test methods in RAN4, for 52.6GHz-71GHz frequency range. |

### Summary and recommendation for further discussion

**Question #1: Whether to further study and define NR 52.6-71GHz OTA test methods within the Rel-17 timeframe?**

* Summary of comments
  + 9 companies shared views
  + 6 companies support to perform studies in Rel-17 timeframe. 3 other companies did not object the studies and suggested to wait for further RF requirements progress.
  + 5 companies commented that sufficient progress on RF requirements definition should be achieved before triggering the OTA testability work.
  + 2 companies commented that RAN4 should first assess whether the existing FR2 testing framework can be re-used for 52.6-71GHz
  + 1 company commented that BS OTA test methods need to be considered and can be handled as a part of BS Conformance requirements objectives under the NR 52.6 – 71 GHz WI
  + One company commented that it is essential that 3GPP gives the test community a clear and early message that test systems covering the range 52.6 GHz to 71 GHz are expected.
* Moderator view
  + Majority view is that the work on NR 52.6-71 GHz OTA test methods development needs to be done in Rel-17 timeframe.
  + An early agreement to trigger the work on UE OTA Test Methods for NR 52.6 – 71 GHz in Rel-17 can be helpful to give a message to test systems vendors that such systems will be required.
  + Also, such agreement can be helpful for overall RAN4 TU budget planning.
  + Moderator proposes to confirm that the work shall be done in Rel-17.
    - The work on BS OTA test methods will be performed in the scope of NR 52.6 – 71 GHz WI as a part of conformance requirements definition objective (note: the objectives are already included in the original approved WID)
    - The work on UE OTA test methods can be performed separately. The exact timelines for the work need further discussion.

**Question #2: How to organize the NR 52.6-71GHz OTA test methods studies within the Rel-17 timeframe**

* Summary of comments
  + 9 companies shared views
  + In addition to the proposals shared by moderator, alternative options were proposed to keep all UE mmWave OTA topics under a single SI:
    - Option 3: Use a single “umbrella” study item handling all OTA issues in one release
    - Option 3a: Expand the scope of the ongoing the Rel-17 study on enhanced FR2 test methods (FS\_FR2\_enhTestMethods)
  + Option 1 (separate SI for NR 52.6 – 71 GHz OTA test methods) was supported by 1 company
  + Option 2 (extend the scope of the NR 52.6 – 71 GHz WI) was supported by 2 companies
  + New Options 3 and 3a were supported by 7 companies. (note: the moderator assumption is that proponents of Option 3 are also accepting the Option 3a)
* Moderator views
  + The majority of companies prefer to keep all UE mmWave OTA topics under a single SI. Many companies propose to extend the scope of the ongoing the Rel-17 study on enhanced FR2 test methods which seem to be a viable solution.
  + Moderator recommends the work on NR 52.6-71GHz UE OTA test methods will be performed in the scope of the Rel-17 study on enhanced FR2 test methods SI (FS\_FR2\_enhTestMethods)

**Question 3: Candidate study objectives**

* Summary of views
  + Three companies commented that proposed objectives are fine
  + Several companies proposed objectives update
    - Down-scoping in terms of the set of supported devices (e.g. deprioritize FWA and vehicular mounted devices)
    - Further clarify whether test methods shall be capable to test bands other than 52.6 to 71 GHz in the same test system
    - Add objectives to study preliminary MU assessment
  + Two companies commented that some initial core requirement agreements are required before properly scoping the study
  + One company commented that there could be some dependency on either RAN1 work or RAN4 RF requirement. Some breakdown is needed to know which topics can be studied first and which topics should be started later.
* Moderator views
  + Further adjustment of the objectives is needed at least for the following aspects
    - Prioritization of supported devices (e.g. deprioritize FWA and vehicular mounted devices)
    - Test methods applicability for to test devices with support of FR1, FR2 and 52.6 – 71GHz bands
    - Preliminary MU assessment
  + To address companies views the discussion on the detailed objectives can be postponed to a later stage. A dedicated email discussion can be helpful to make the fine-tuning of the exact objectives.

Based on the initial round feedback moderator makes the following proposal for the intermediate round discussion:

* **Proposal #1: Study and define NR 52.6-71GHz UE OTA test methods in Rel-17** 
  + **Include NR 52.6-71GHz UE OTA test methods objectives in the scope of the Rel-17 NR FR2 Test Methods Enhancements SI (FS\_FR2\_enhTestMethods)**
  + **The timelines of the work shall be further discussed.**
  + **Further discuss and refine detailed objectives of the studies before [RAN #91e].**
* **Proposal #2: Study and define NR 52.6-71GHz BS OTA test methods in Rel-17** 
  + **The work will be done the scope of Rel-17 NR 52.6 – 71 GHz WI as a part of RAN4 BS conformance requirements objective**
  + **The work can progress during the Rel-17 Performance stage**

## Intermediate round

### Companies views’ collection

**Proposal #1: Study and define NR 52.6-71GHz UE OTA test methods in Rel-17**

* **Include NR 52.6-71GHz UE OTA test methods objectives in the scope of the Rel-17 NR FR2 Test Methods Enhancements SI (FS\_FR2\_enhTestMethods)**
* **The timelines of the work shall be further discussed.**
* **Further discuss and refine detailed objectives of the studies before [RAN #91e].**

Companies are encouraged to provide the comments on Proposal #1 including the timelines of the work and further objectives discussion.

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| **Company** | **Comments** |
| CAICT | Sorry for not being able to express our views during the initial round. In general, we support the study of UE OTA test methods for 52.6-71GHz since it has been decided to extend the NR band to higher frequency.  It is beneficial to handheld the OTA topics in the same group. We just want to point out that the target completion date of the FR2 Test Methods Enhancement SI is June/2021, but 52.6-71GHz test methods could be some dependency on RF requirement as mentioned above, therefore, it is hard to make much progress before reaching some conclusions on the core part. So, if we are going to include 52.6-71GHz topics in the scope of this SI, the impact on completion time should be considered.  Regarding the objectives, does the extension of 52.6-71GHz applicability of the test method enhancement is also included in the scope? Need further discussion to clarify the detailed objectives.  Moderator: This may need to be discussed as a part of objectives and can be handled at a later stage |
| Qualcomm | We do not think merging this work in the ongoing FR2 test enhancements SI is a good idea, not clear to use why the moderator made this assumption. That study was triggered by the need to bridge the gaps between requirements and testable values. The nature of this work is completely different.  We believe a broader discussion is needed since there will likely be needs to study testing aspects for other features that are discussed in different WIs. One example is the FeMIMO WI which handles different MIMO enhancements for which testing needs are different. A wholistic approach to understand all testing needs is a must to develop versatile test equipment to reduce testing costs. |
| Apple | We support this proposal.  We also would like to share a comment for CAICT: The completion target of June 2021 for FS\_FR2\_enhTestMethods was determined based on its current scope of objectives during RAN #89, and no additional extension has been proposed since then. Our understanding is that once the detailed objectives for the 52.6 – 71 GHz work are defined, a further extension of the SI can also be contemplated. |
| vivo | Support this proposal.  Extension of the testability from 43.5GHz to 49GHz was added in the scope of the Rel-17 NR FR2 Test Methods Enhancements SI, same approach can be done for 52.6-71GHz. Timeline and detailed objectives can be further discussed. |
| Intel | We support the proposal. In general, the FS\_FR2\_enhTestMethods SI already serves as a placeholder for multiple different subjects coming from different WIs (e.g. extension to 47GHz band) and can be further used as an “umbrella” SI.  With respect to SI timelines, if the objectives are added to the FS\_FR2\_enhTestMethods SI, then the SI timelines need to be extended.  We are also open to discuss an alternative “umbrella” item mentioned by Qualcomm. The focus of this discussion is to identify the approach for 52.6-71GHz handling. Other proposals/objectives can be discussed at a later stage once the respective proposals are brought. |
| Huawei, HiSilicon | We think that it is too early to draw conclusion on where to include the test methods for 52.6-71GHz. Currently, no RF requirements for this frequency range are determined, which definitely have impact on the choice whether existing FR2 test methods can be reused for 52.6-71GHz.  The discussion can be resumed at least one requirement is identified that existing test methods are not applicable, and certainly the decision will be decided in RAN plenary. |
| Samsung | As we learn from the past, decoupling the OTA requirements from OTA test methods is not an easy task. Considering this, additional objectives in existing WI of beyond 52.6GHz will facilitate the RAN4 discussions on both core requirements and also test methods.  Regarding the umbrella item for OTA test methods cross different WI, we think it is premature we can decide to go this direction without knowing the requirements even whether requirements will be defined or not. We can understand the motivation but eventually we have to discuss in case by case manner. Therefore, we suggest to include the test methods in WI of beyond 52.6GHz at this RAN and further discuss other possibility including new umbrella SI in future RAN plenary. |
| ZTE | Support to have test method for 52.6-71GHz, however whether to have new umbrella SI and discuss in the future RAN meeting or to include existing Rel-17 NR FR2 Test Methods Enhancements SI, we think it might be not so urgent to make the decision at this meeting since work should be started at the least after 2021,March, therefore we intend to agree with Samsung’s suggestion. |
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**Proposal #2: Study and define NR 52.6-71GHz BS OTA test methods in Rel-17**

* **The work will be done the scope of Rel-17 NR 52.6 – 71 GHz WI as a part of RAN4 BS conformance requirements objective**
* **The work can progress during the Rel-17 Performance stage**

Companies are encouraged to provide the comments on Proposal #2.

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| **Company** | **Comments** |
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### Summary and recommendation for further discussion

**Proposal #1: Study and define NR 52.6-71GHz UE OTA test methods in Rel-17**

* Summary of comments
  + Four companies supported the moderator proposal to include NR 52.6-71GHz UE OTA test methods objectives in the scope of the Rel-17 NR FR2 Test Methods Enhancements SI. Several companies commented that the SI timelines need to be extended.
  + One company suggested that a new “umbrella” SI for the OTA topics shall be triggered and it cannot be merged with the FS\_FR2\_enhTestMethods SI. Several companies indicated that it can be further discussed.
  + Three companies commented that it is premature draw conclusion on where to include the test methods for 52.6-71GHz
  + Two companies proposed to include the test methods in WI of beyond 52.6GHz at this RAN and further discuss other possibility including new umbrella SI in future.
  + One company commented that impact on non-spectrum RAN4 discussion on TUs should be taken into account.
* Moderator summary
  + Moderator recommends confirming majority companies view that the work on NR 52.6-71 GHz OTA test methods development needs to be done in Rel-17 timeframe.
  + There is no clear consensus on how exactly to organize the work and with several options on the table. The majority of companies prefer to merge this objective into the FS\_FR2\_enhTestMethods SI. Meanwhile, several companies note that there is no urgency to make the final decision right now on how to structure the work. Moderator recommends to keep it open on how to organize the work and come back to this in Q1’21. Updated proposal #1A is provided below capturing the status of the discussion and identified options and actions.
  + Several companies suggested that the objectives can be added as a placeholder to the NR 52.6-71 GHz WI. From moderator point of view in case we reach an agreement to study and define NR 52.6-71GHz UE OTA test methods in Rel-17 in this meeting, then such WID update may not be necessary and will allow avoiding further WID revisions in case we decide to go with a separate SI. So, the recommendation is to confirm Proposal #1 in the fine-tuning round.

**Proposal #1: Agree to study and define NR 52.6-71GHz UE OTA test methods in Rel-17**

* + **Further discus how to handle NR 52.6-71GHz UE OTA test methods objectives in RAN #91e:**
    - **Option 1: Include NR 52.6-71GHz UE OTA test methods objectives in the scope of Rel-17 NR FR2 Test Methods Enhancements SI (FS\_FR2\_enhTestMethods)**
    - **Option 2: Include NR 52.6-71GHz UE OTA test methods objectives in the scope of a new “umbrella” SI on OTA topics (if such new item is approved)**
    - **Option 3: Include NR 52.6-71GHz UE OTA test methods objectives in the scope of Rel-17 NR 52.6-71GHz WI**
  + **Further discuss the timelines of the work.**
  + **Further discuss and refine detailed objectives of the studies before RAN #91e.**

**Proposal #2: Study and define NR 52.6-71GHz BS OTA test methods in Rel-17**

* Summary of views
  + No further comments provided
* Moderator views
  + The proposal is stable and no further discussion needed in the next round. I’ve copied proposal to the conclusion section.

## Fine-tuning round

### Companies views’ collection

**Proposal #1: Agree to study and define NR 52.6-71GHz UE OTA test methods in Rel-17**

* + **Further discus how to handle NR 52.6-71GHz UE OTA test methods objectives in RAN #91e:**
    - **Option 1: Include NR 52.6-71GHz UE OTA test methods objectives in the scope of Rel-17 NR FR2 Test Methods Enhancements SI (FS\_FR2\_enhTestMethods)**
    - **Option 2: Include NR 52.6-71GHz UE OTA test methods objectives in the scope of a new “umbrella” SI on OTA topics (if such new item is approved)**
    - **Option 3: Include NR 52.6-71GHz UE OTA test methods objectives in the scope of Rel-17 NR 52.6-71GHz WI**
  + **Further discuss the timelines of the work.**
  + **Further discuss and refine detailed objectives of the studies before RAN #91e.**

Companies are encouraged to provide the comments on updated Proposal #1 and suggest revisions if needed.

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| **Company** | **Comments** |
| MTK | We are fine with moderator’s suggestion to postpone how to land the work in which WI in next Plenary meeting.  One concern is on RAN4 RF TU, according to thread [09], we have 1.4, 1.25, 0.25, 3.25, 3.25, 3.25, 3.25 RAN4 RF TUs for meetings #98e to #102. And now 4 new Email threads are created for (>4) potential WIs: [47] repeater, [48] ATG, [49] OTA and [50] EMC. All these potential WIs consume RAN4 RF TUs, although we are not sure if all potential WIs discussed above Email threads will be approved. Anyhow, to maintain acceptable workload to RAN4 delegates, our suggestion is to add a condition to Proposal 1, e.g.,   * **Agree to study and define NR 52.6-71GHz UE OTA test methods in Rel-17, if TU allows** |
| Qualcomm | We are fine with the current proposals. Regarding Mediatek’s comments, the testing methodology has to be handled somehow. It is pointless to define all the requirements in 3GPP but not be able to test anything for another few years. There is also the possibility that the testing will influence how/which requirements are defined.  Related to our earlier comment on what container to use for the discussion, we believe that a good approach would be to have some sort of rolling OTA SI that handles all testing issues from all the WIs in a release. The test methodology and setup should take into account all the testing needs to come up with a versatile solution. Given the costs and complexity of OTA testing, we do think it would be feasible to have completely different test solutions for different features in each release. |
| Intel | Agree with proposals  For MTK comment, we agree with QC the testing methodology has to be handled somehow and it is meaningless to define all the requirements in 3GPP, but not be able to test anything for years to come. So, endorsement of the NR 52.6 – 71GHz WI technically means that the respective test methods need to be defined in Rel-17 and the key questions is how to structure the work, when to do it and clarify detailed objectives. In our view a limited amount of TUs is required ~0.25 per meeting based on prior OTA topics discussion experience. |
| R&S | We see benefit in defining the 52.6-71GHz study for test methods and make it dependent on the ongoing Testability Enhancement SI, considering its outcome before defining any new methods for the new frequency range.  We also share the concerns raised in the initial round regarding the need to test different frequency ranges in the same system. This should be clearly identified before initiating any study on the new frequency range since it will heavily affect the OTA test system architecture.  In addition, and considering previous experience where requirements definition was decoupled from the testability discussion, it is useful to consider some sort of parallel work between requirements and test methods in order to minimize the issues that drove the need for the current Testability Enhancement SI. |
| ZTE | We are also fine with moderator’s suggestion and give more time for further consideration and come up with more thoughtful option for better work proceed. |

### Summary and recommendation for further discussion

Moderator summary:

* There was no change in companies views and companies support the proposed way forward.
* One company (MTK) suggested to further check the TUs available for this work in RAN 91e. Two other companies (QC, Intel) shared a view that this is the work that needs to be done in some form to make sure that the whole work on extending NR up to 71GHz becomes meaningful. From moderator point of view this is a business as usual and TUs need to be endorsed in RAN #91 once the work scope/objectives become clear. In addition, the TUs for NR 52.6-71GHz WIs which have 2TU for RF part per meeting may already account this work.
* Additional comments on objectives were provided by R&S that it should be clarified whether there is a “need to test different frequency ranges in the same system”. Moderator recommends taking these inputs into account in RAN #91e discussion.
* Given the received feedback moderator recommends confirming the fine-tuning round proposal #1 as it is.

## Final-round

For the final round moderator captures both BS and UE OTA proposals discussed in the previous round. The proposals seem to be stable and moderator would encourage companies to further comment in case of any further suggested additions.

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| **Proposal #1: Agree to study and define NR 52.6-71GHz UE OTA test methods in Rel-17 only if it is identified that existing FR2 test methods are not applicable for requirements specified for 52.6-71GHz**   * + Further discus how to handle NR 52.6-71GHz UE OTA test methods objectives in RAN #91e **with assumption that existing test methods are not applicable**:     - Option 1: Include NR 52.6-71GHz UE OTA test methods objectives in the scope of Rel-17 NR FR2 Test Methods Enhancements SI (FS\_FR2\_enhTestMethods)     - Option 2: Include NR 52.6-71GHz UE OTA test methods objectives in the scope of a new “umbrella” SI on OTA topics (if such new item is approved)     - Option 3: Include NR 52.6-71GHz UE OTA test methods objectives in the scope of Rel-17 NR 52.6-71GHz WI     - **Option 4: Wait until the core requirements framework is stable**     - **Option 5: Based on existing FR2 test methods, RAN5 to study the different test methods if identified**   + Further discuss the timelines of the work.   **Proposal #2: Study and define NR 52.6-71GHz BS OTA test methods in Rel-17**   * + The work will be done the scope of Rel-17 NR 52.6 – 71 GHz WI as a part of RAN4 BS conformance requirements objective   + The work can progress during the Rel-17 Performance stage |

Companies are encouraged to provide comments on final proposals

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| **Company** | **Comments** |
| Huawei, HiSilicon | From the experience for FR2 testability work, we have observed that having clear agreements on core requirements is extremely important and a necessary pre-requisite for the corresponding test methods. But now the whole work of 52.6 – 71GHz is only carried out in the SI stage, which is far from reaching conclusion on the core requirements. We don't know yet whether existing FR2 test methods can be reused or not, nor we don't have a clear view which aspects should be focused on for the time being. Proposal of new “umbrella” SI may further burden the work load in RAN4. Some work in our view can be done by RAN5 instead of RAN4 after so many test related work has been done in the past. We don't expect that the test methodology will be fundamentally changed. In that sense, RAN5 would be more suitable to take the responsibility.  In short, without clear framework of core requirements, it’s too early to discuss the possibility of a SI for the unseen objectives. |

# Conclusion

Based on the email discussion, the following are proposed:

**Proposal #1: Agree to study and define NR 52.6-71GHz UE OTA test methods in Rel-17 only if it is identified that existing FR2 test methods are not applicable for requirements specified for 52.6-71GHz**

* + **Further discus how to handle NR 52.6-71GHz UE OTA test methods objectives in RAN #91e with assumption that existing test methods are not applicable:**
    - **Option 1: Include NR 52.6-71GHz UE OTA test methods objectives in the scope of Rel-17 NR FR2 Test Methods Enhancements SI (FS\_FR2\_enhTestMethods)**
    - **Option 2: Include NR 52.6-71GHz UE OTA test methods objectives in the scope of a new “umbrella” SI on OTA topics (if such new item is approved)**
    - **Option 3: Include NR 52.6-71GHz UE OTA test methods objectives in the scope of Rel-17 NR 52.6-71GHz WI**
    - **Option 4: Wait until the core requirements framework is stable**
    - **Option 5: Based on existing FR2 test methods, RAN5 to study the different test methods if identified**
  + **Further discuss the timelines of the work.**

**Proposal #2: Study and define NR 52.6-71GHz BS OTA test methods in Rel-17**

* + **The work will be done the scope of Rel-17 NR 52.6 – 71 GHz WI as a part of RAN4 BS conformance requirements objective**
  + **The work can progress during the Rel-17 Performance stage**