[98-bis-e][306] NR_47GHz_Band_BSRF_NWM - Version 0.0.1
RAN4

3GPP TSG-RAN WG4 Meeting # 98-bis-e

Electronic meeting, April 12-20, 2021

R4-2105977

Agenda Item: 7.27.4.1

Source: Moderator (Nokia)

Document for: Information

1 Topic#1: BS conformance testing

BS conformance requirements are discussed under Topic#1.

1.1 Companies' contributions summary

Table 1: Companies' contributions summary

T-doc number	Company	Proposals / Observations
R4-2106890	Ericsson	47GHz band - Measurement uncertainties for BS requirements
R4-2107038	Nokia, Nokia Shanghai Bell	TP to TR 38.847: BS conformance aspects
R4-2107039	Nokia, Nokia Shanghai Bell	Draft CR to 38.141-2: Introduction of n262
R4-2107077	Keysight Technologies UK Ltd	47 GHz band TT for NR BS RF requirement

1.2 Open issues summary

Tx MU values were agreed during RAN4#98-e. Open Rx MU values are summarized in Table 2:

Table 2: Summary of Rx MU

Rx test	**TS 38.141-2 24.25-29.5 GHz**	**TS 38.141-2 37-40 GHz**	**Keysight R4-2107077**	**Ericsson R4-2106890**
Reference sensitivity	2.4	2.4	3.8	2.4
ACS	3.4	3.4	5.5	3.4
IBB	3.4	3.4	5.5	3.4
OOBB	4.1	4.1		
Rx IM	3.9	3.9	6.1	3.9
In-channel selectivity	3.4	3.4	5.5	3.4

1.2.1 Sub-topic 1-1 Rx MU

Issue 1-1: Provide company view on MU for reference sensitivity

Issue 1-2: Provide company view on MU for ACS

Issue 1-3: Provide company view on MU for IBB

Issue 1-4: Provide company view on MU for OOBB

Issue 1-5: Provide company view on MU for Rx IM

Issue 1-6: Provide company view on MU for in-channel selectivity

1.3 Companies views' collection for 1st round

1.3.1 Open issues

Feedback Form 1: Rx MU

Item	Company	Comments
1	Keysight Technologies UK Ltd	[Keysight] We can not agree with the same value as below 43.5GHz for 47GHz band, not be able to compromise. We need to emphasize again that there is no vector Signal Generator available in market and mixer approach which we proposed in previous meeting was disagreed (note, mixer approach is only method possible today). Even we proposed estimated number for vector Signal Generator performance for 47GHz band, it doesn't exist today. If anybody wants to run test today, one can do is to use mixer, and can't get proposed uncertainty from test system. Because this MU is mostly driven by TE number, TE vender proposed value should be used. For now, realistic approach is to put square bracket on our proposed values. Later, when we (Keysight and R&S) have actual working instrument, revisit the value and make appropriate adjustment using published number on datasheet.
2	Nokia Germany	While we prefer to adopt numbers as proposed in R4-2106890, we would be fine to increase them slightly (0.1-0.2dB) as done for Tx. Proposed numbers in R4-2107077 are too high which would make requirements pointless. From comment above it is not clear when updated numbers could be updated from working instrument. Would they be provided before WI is supposed to be completed?
3	Ericsson Limited	Thanks to Keysight for the effort reviewing the MU budget and improving the initial proposal. Nevertheless, we think the new proposed values are still too high (close to 6dB): the corresponding tested requirements would not be meaningful anymore. Keysight mentioned (in R4-2107077) that the "use of mixer for up conversion... is denied". We'd like to clarify this was not our view. We think it would be possible to considerably minimize, and even remove the MU due to such mixer from the overall MU budget, this would require some careful design and a proper calibration of the TE. Has Keysight investigated this option instead of excluding the mixer usage?
4	Keysight Technologies UK Ltd	[Keysight2] For Ericsson, can you please clarify, without having vector Signal Generator nor "mixer to up convert signal", how to generate Rx stimulus (modulated) in this frequency? For Nokia, situation for Tx and Rx in this frequency is very different. While Tx test setup has all necessary equipment available already (unless I missed something) Rx has no Signal Generator to provide modulated stimulus as of today.
5	Ericsson Limited	To Keysight: As commented earlier, we don't deny using a mixer to up convert (R4-2107077 seems suggesting BS vendor didn't want this), this is perfectly fine. And we think using such mixer won't add much MU by doing a proper calibration.

Item	Company	Comments
6	Keysight Technologies UK Ltd	[Keysight3] For Ericsson, all these calculation provided is under assumption of "well calibrated" condition. Please see the fact that, 47GHz is milimeter wave higher frequency even CW only generator has higher uncertainty, also with range of frequency coverage and wider modulation bandwidth/flatness variation, etc. there are enough reason mixer to get less uncertainty with this frequency with modulated signal. Unfortunately, there is no magic. we all hope to see smaller value but I need to provide realistic view.
7	Huawei Technologies Sweden AB	In order to progress the discussion: could we clarify the exact RX OTA test setup(s) which is envisioned (including e.g. mixer), preferably with the figure, so that other companies can further analyze and verify the MU budget for next meeting, including possible calibration techniques? With this, we could also possibly check with other TE vendors.
8	T-Mobile USA Inc.	We appreciate the issues raised by Keysight, but think that the values are too high to make requirements meaningful. We think it would be better to set better requirements and work with the supply chain to provide the necessary components.
9	Ericsson Limited	Answering last Keysight comment: To avoid any misunderstanding: of course, we consider TEs are calibrated when doing the measurements. But here, we expect another calibration step would be done with the all test setup, including the mixer then. Our assumption is that if we use existing TE and assume that the MU contribution from the mixer is removed by calibration of the whole test setup then the total MU can be the existing MU plus a small contribution from the mixer.
10	Dish Network	We also appreciate the issues raised by Keysight, but agree with T-Mobile that the values are too high to be meaningful.
11	Keysight Technologies UK Ltd	[Keysight4] For Huawei, set up is the same as described in existing TR and TS document but we can explain more detail in next meeting. For other TE comment, I just remind and encouraged my friend Alex@R&S (we are working together on this topic but he is shy to add comment). the value we provided for estimated vector SG number is common value from two company. For T-mobile and Dish, we appreciate your comment and understand your concern. However what we are providing is current real. For Ericsson, if you have new calibration to consider, please provide more detail. we can evaluate towards next meeting.

1.3.2 CRs/TPs comments collection

Table 3: Comments collection

CR/TP number
R4-2107038

R4-2107039

Feedback Form 2: Comments to R4-2107038

Item	Company	Comments

Feedback Form 3: Comments to R4-2107039

Item	Company	Comments

1.4 Summary for 1st round

1.4.1 Open issues

Table 4: Sub-topic 1-1 summary

	Status summary
Sub-topic 1-1	Four companies indicated concerns on values proposed in R4-2107077. Since they are too high, they would make requirements meaningful. Suggestion has been given to consider mixer usage with careful design and proper calibration so proposed MU is reduced. Since there is still a large difference between proposals, it is suggested companies contribute further in the next meeting in order to reach consensus on realistic MU which would also make requirements meaningful. Interested companies are encouraged to provide further details on how to reduce MU (including from mixer by calibration of the whole test setup).

1.4.2 CRs/TPs

Table 5: CR/TP summary

CR/TP number	**CRs/TPs status update recommendation**
R4-2107038	To be approved
R4-2107039	To be endorsed

2 Recommendations for Tdocs

2.1 1st round

Existing Tdocs

Table 6: 1st round Tdoc recommendation

Tdoc number	**Source**	**Recommendation**
R4-2106890	Ericsson	Noted
R4-2107038	Nokia, Nokia Shanghai Bell	Approved
R4-2107039	Nokia, Nokia Shanghai Bell	Endorsed
R4-2107077	Keysight Technologies UK Ltd	Noted