**3GPP TSG-RAN WG4 Meeting # 98-bis-e R4-2105671**

**Electronic Meeting, 12th – 20th April, 2021**

**Agenda item:** 5.1.2

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for [98-bis-e][201] NR\_unlic\_RRM\_1

**Document for:** Information

# Introduction

The discussion covers NR-U AIs within 5.1.2.

**When updating this document, please remember to:**

* **use track changes while adding your comments in this document (only updates marked with change marks will be taken into the next version),**
* **change the file name, adding your company name, according to the instructions from RAN4 chair:**
* **Length of file names shall be reduced, e.g.**
	+ **At the beginning of first round, moderators share / ftp / tsg\_ran / WG4\_Radio / TSGR4\_98\_e / Inbox / Drafts / [98e][101] NR\_NewRAT\_SysParameters\Summary\_101\_1st round\_v01.docx**
	+ **After update by company A: Summary\_101\_1st round\_v02\_companyA**
	+ **After update by company B: Summary\_101\_1st round\_v03\_companyA\_companyB**
	+ **After update by company C: Summary\_101\_1st round\_v04\_companyB\_companyC**

## 1st round

The following list of open issues was identified, based on the contributions, for the 1st round.

The following colour marking is used below:

* A topic/issue proposed for discussion in: GTW session 1
* No discussion in the 1st round
* **Topic #1: General (AI 5.1.2.1)**

Sub-topic 1-1: Terminology updates due to DRX, MGRP, CSSF, measurement cycles, etc.

Issue 1-1-1: Terminology updates due to DRX, MGRP, CSSF, measurement cycles, etc.
Issue 1-1-2: Terminology updates due to CSSF

* **Topic #2: RRC connection mobility control (AI 5.1.2.2)**

Sub-topic 2-1: SI reading in RRC release with redirection, RRC re-establishment, and paging interruption requirements

Issue 2-1-1: SI reading with LBT in RRC release with redirection, RRC re-establishment, and paging interruption

* **Topic #3: SCell activation/deactivation (delay and interruption) (AI 5.1.2.3)**

Sub-topic 3-1: Interruptions

Issue 3-1-1: Interruption cases

Issue 3-1-2: Intra-band CA

Issue 3-1-3: Inter-band CA where victims on inter-band CCs and intra-band CCs interruptions and target SCell is unknown

Issue 3-1-4: Inter-band CA where victims on inter-band CCs only (no intra-band victim serving cells) target SCell is unknown

Issue 3-1-5: Inter-band CA regardless of whether the victim cell is on an intra-band or inter-band CC and target SCell is known

Sub-topic 3-2: Way forward to resolve the open issue related to SCell activation requirements when sCellDeactivationTimer is NOT configured

Issue 3-2-1: Way forward to resolve the open issue on SCell activation requirements when sCellDeactivationTimer is NOT configured

Sub-topic 3-3: SCell activation/deactivation when sCellDeactivationTimer is NOT configured

Issue 3-3-1: Applicability of SCell activation requirements when sCellDeactivationTimer is NOT configured

Sub-topic 3-4: SCell activation/deactivation when sCellDeactivationTimer IS configured

Issue 3-4-1: UE behaviour with respect to the timer when sCellDeactivationTimer IS configured

Sub-topic 3-5: Measuring CSI-RS during SCell activation

Issue 3-5-1: Discussions on measuring CSI-RS during SCell activation

* **Topic #4: Active TCI state switching (AI 5.1.2.4)**

Only CRs

* **Topic #5: RLM (AI 5.1.2.5)**
* **Topic #6: Beam management (AI 5.1.2.6)**
* **Topic #7: Measurement requirements (AI 5.1.2.7)**
* **Topic #8: Measurement capability and reporting criteria (AI 5.1.2.8)**

<Nothing to discuss in the 1st round>

* **Topic #9: Timing (AI 5.1.2.9)**

Sub-topic 9-1: DRX impact on timing

Issue 9-1-1: Definition of the reference cell which is not available, with respect to DRX

Issue 9-1-2: For test cases: whether UE is required to determine availability of a reference cell based on SSBs scheduled outside the DRX on duration and within the measurement gaps during last 160ms.

Sub-topic 9-2: Measurement gaps impact on timing

Issue 9-2-1: Definition of the reference cell which is not available, with respect to MGs

* **Topic #10: Other requirements (AI 5.1.2.10)**

## 2nd round

TBD

# Topic #1: General

Contributions from AI 5.1.2.1 are discussed here.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2104430 | ZTE Corporation | **Proposal 1:** Option 1 can be used as a general principle and captured in the WF.**Proposal 2:** The following wording can be used in the spec: “When the UE is jointly configured with SMTC and CSSF, the assumed periodicity of SMTC occasions corresponds to the value of CSSF multiplies the original periodicity”. |
| R4-2106840 | Ericsson | CR 38.133: Terminology updates for NR-U in 38.133 |
| R4-2106841 | Ericsson | CR 36.133: Terminology updates for NR-U in 36.133 |
| R4-2106959 | Huawei, HiSilicon | **Proposal 1:** L\* is the number of SSB/SMTC occasions not available at the UE during the corresponding period, where the occasions are those that are actively used by the UE during the period considering the factors, e.g. DRX, MGRP, CSSF. |
| R4-2107087 | MediaTek inc. | **Proposal 1:** For intra-frequency measurements without measurement gaps (deactivated SCell), intra-frequency measurements with measurement gaps, and inter-frequency measurements, to add the following notes in the requirement: * When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle x CSSF.
* When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP x CSSF.
* When configured with measurement cycles, the UE is not required to determine the availability of SMTC occasions more frequent than once per measurement cycle x CSSF.

**Proposal 2:** For Intra-frequency measurements without measurement gaps, to add the following notes in the requirement: * The UE is not required to determine the availability of SMTC occasions more frequent than once during SMTC period x Kp x CSSF.
* When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle x Kp x CSSF.
 |
| R4-2106839 | Ericsson | **Proposal 1:** For RLM/CBD: The UE is not required to determine the availability of SSB occasions more frequent than once per DRX cycle length, when configured with DRX.**Proposal 2**: For measurement requirements with DRX: the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle.**Proposal 3**: For measurement requirements with CSSF: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSF.**Proposal 4**: For measurements in gaps: The UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.**Proposal 5**: For measurements in measurement cycles: the UE is not required to determine the availability of SMTC occasions more frequent than once per measurement cycle.**Proposal 6**: Remove square brackets in the agreed CRs [4,5] from RAN4#98-e. |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

Background:

In [R4-2103025], for SI reading with LBT in RRC release with redirection, RRC re-establishment, and paging interruption, following was agreed:

|  |
| --- |
| * *Further NR-U terminology clarification*
	+ *General principles to address the impact of DRX, MGRP, CSSF, etc. on the availability definition:*
		- *When configured with measurements in measurement cycles: the UE is not required to determine the availability of SMTC occasions more frequent than once per measurement cycle.*
		- *For measurements in gaps: The UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.*
		- *For measurement requirements with DRX: the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle.*
		- *For RLM/CBD: The UE is not required to determine the availability of SSB occasions more frequent than once per DRX cycle length, when configured with DRX.*
		- *FFS: how to account CSSF impact*
			* + *Option 1: For measurement requirements with CSSF: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSF*
		- *A common approach (but applicable for the relevant issues among DRX, MGRP, etc.) shall be used for all measurements*
* *FFS: how to capture the above in 38.133 and the level of details*
 |

### Sub-topic 1-1: Terminology updates due to DRX, MGRP, CSSF, measurement cycles, etc.

**Issue 1-1-1: Terminology updates due to DRX, MGRP, CSSF, measurement cycles, etc.**

* Proposal 1 (Huawei, HiSilicon): L\* is the number of SSB/SMTC occasions not available at the UE during the corresponding period, where the occasions are those that are actively used by the UE during the period considering the factors, e.g. DRX, MGRP, CSSF.
* Recommended WF
	+ Discuss the proposal

**Issue 1-1-2: Terminology updates due to CSSF**

* Proposals 1 (ZTE Corporation): Option 1 can be used as a general principle and captured in the WF.
* Proposal 2 (ZTE Corporation): The following wording can be used in the spec: “When the UE is jointly configured with SMTC and CSSF, the assumed periodicity of SMTC occasions corresponds to the value of CSSF multiplies the original periodicity”.
* Proposal 3 (Huawei, HiSilicon): L\* is the number of SSB/SMTC occasions not available at the UE during the corresponding period, where the occasions are those that are actively used by the UE during the period considering the factors, e.g. DRX, MGRP, CSSF.
* Proposal 4 (MediaTek):
	+ For intra-frequency measurements without measurement gaps (deactivated SCell), intra-frequency measurements with measurement gaps, and inter-frequency measurements, to add the following notes in the requirement:
		- * + When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle x CSSF.
				+ When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP x CSSF.
				+ When configured with measurement cycles, the UE is not required to determine the availability of SMTC occasions more frequent than once per measurement cycle x CSSF.
	+ For Intra-frequency measurements without measurement gaps, to add the following notes in the requirement:
		- * + The UE is not required to determine the availability of SMTC occasions more frequent than once during SMTC period x Kp x CSSF.
				+ When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle x Kp x CSSF.
* Proposal 5 (Ericsson):
	+ 5a - For measurement requirements with CSSF: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSF.
	+ 5b - Remove square brackets in the agreed CRs [4,5] from RAN4#98-e.
	+ 5c - For RLM/CBD: The UE is not required to determine the availability of SSB occasions more frequent than once per DRX cycle length, when configured with DRX.
	+ 5d - For measurement requirements with DRX: the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle.
	+ 5e - For measurements in gaps: The UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP.
	+ 5f - For measurements in measurement cycles: the UE is not required to determine the availability of SMTC occasions more frequent than once per measurement cycle.
* Recommended WF
	+ Moderator: Proposal 4c, 4d, 4e, and 4f have already been discussed and agreed in R4-2103025 and no need to discuss them further. Only how to account CSSF impact is FFS.
	+ Discuss the proposals related to CSSF.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | **Issue 1-1-1: Terminology updates due to DRX, MGRP, CSSF, measurement cycles, etc.**The “actively used by the UE” is not very clear since those L occasions are the extensions for the ones which cannot be used by UE due to LBT failure. If we can clarify the UE behavior in issue 1-1-2, it can cover the issue 1-1-1.**Issue 1-1-2: Terminology updates due to CSSF**Proposal 4 is a relatively clear option here, and to take into account the additional 1.5 scaling factor in DRX case, we propose an option based on proposal 4, as:Option 4a:* + For intra-frequency measurements without measurement gaps (deactivated SCell), intra-frequency measurements with measurement gaps, and inter-frequency measurements, to add the following notes in the requirement:
		- * + When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle x CSSF x 1.5 for DRX≤320ms or once per DRX cycle x CSSF for DRX >320ms.
				+ When configured with measurement gaps, the UE is not required to determine the availability of SMTC occasions more frequent than once during MGRP x CSSF.
				+ When configured with measurement cycles, the UE is not required to determine the availability of SMTC occasions more frequent than once per measurement cycle x CSSF.
	+ For Intra-frequency measurements without measurement gaps, to add the following notes in the requirement:
		- * + The UE is not required to determine the availability of SMTC occasions more frequent than once during SMTC period x Kp x CSSF.
				+ When configured with DRX, the UE is not required to determine the availability of SMTC occasions more frequent than once per DRX cycle x Kp x CSSF x 1.5 for DRX≤320ms or once per DRX cycle x Kp x CSSF for DRX >320ms.
	+ For RLM: The UE is not required to determine the availability of SSB occasions more frequent than once per L1 indication interval.
	+ For CBD: The UE is not required to determine the availability of SSB occasions more frequent than once per P\*DRX cycle length when configured with DRX.
 |
| ZTE | **Issue 1-1-2:** “For measurement requirements with CSSF: The UE is not required to determine the availability of SMTC occasions more frequent than what is required by CSSF.” can be used as the starting point for later discussions. For the specific wording, we suggest “When the UE is jointly configured with SMTC and CSSF, the assumed periodicity of SMTC occasions corresponds to the value of CSSF multiplies the original periodicity”. Open to discuss other form of wording. |

### CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2106840 (38.133, Ericsson) | Apple: Up to the conclusion in issue 1-1-2. |
| Company B |
|  |
| R4-2106841 (36.133, Erisson) | Apple: Up to the conclusion in issue 1-1-2. |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic 1-1, issue 1-1-1:** | **Issue 1-1-1: Terminology updates due to DRX, MGRP, CSSF, measurement cycles, etc.***Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |
| **Sub-topic 1-1, issue 1-1-2:** | **Issue 1-1-2: Terminology updates due to CSSF***Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

# Topic #2: RRC connection mobility control

Contributions from AI 5.1.2.2 are discussed here.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2106960 | Huawei, HiSilicon | **Proposal 1:** Reuse the assumptions in CGI reading that 6 samples for MIB and 6 samples for SIB1 decoding based on – 3 dB SNR condition.**Proposal 2:** Capture the requirements for SI acquisition as above in the core requirements for RRC release with redirection, RRC re-establishment, and paging interruption. |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 2-1: SI reading in RRC release with redirection, RRC re-establishment, and paging interruption requirements

Background:

In [R4-2103025], for SI reading with LBT in RRC release with redirection, RRC re-establishment, and paging interruption, following was agreed:

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| --- |
| * *FFS: defining a requirement on the minimum number of available samples for SI reading during the RRC release with redirection, RRC re-establishment, and paging interruption at a low operation point, e.g., at -3 dB*
* *For NR-U RRM test cases, TSI,CCA is set as follows, considering the agreed limited set of values for PCCA\_DL:*
	+ *TSI,CCA(PCCA\_DL = 0.25) = X1\*TDBT*
	+ *TSI,CCA(PCCA\_DL = 0.5) = X2\*TDBT*
	+ *TSI,CCA(PCCA\_DL = 0.75) = X3\*TDBT*
	+ *X1=[35], X2=[17], X3=[10]*
	+ *No other margins are needed*
 |

**Issue 2-1-1: SI reading with LBT in RRC release with redirection, RRC re-establishment, and paging interruption**

* Proposals 1 (Huawei, HiSilicon):Reuse the assumptions in CGI reading that 6 samples for MIB and 6 samples for SIB1 decoding based on – 3 dB SNR condition.
* Proposal 2 (Huawei, HiSilicon): Capture the requirements for SI acquisition as below in the core requirements for RRC release with redirection, RRC re-establishment, and paging interruption.

TSI-NR\_CCA=TMIB\_CCA + TSIB1\_CCA ms

* + Where:
	+ TMIB\_CCA = (6+LMIB)\*TSMTC\_CCA is the time period used to acquire MIB message, and TSIB1\_CCA=(6+LSIB1)\* TRMSI\_CCA is the time period used to acquire SIB1 message provided that the SSB for MIB decoding and the PDSCH for SIB1 decoding with SNR ≥-3dB.
	+ TSMTC\_CCA is the periodicity of the SMTC occasion configured for the target frequency; TRMSI\_CCA is the periodicity with which the SIB1 is transmitted by the target Cell.
	+ LMIB and LSIB1 are the unavailable samples during the corresponding period.
* Recommended WF
	+ Discuss the proposals

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | **Issue 2-1-1: SI reading with LBT in RRC release with redirection, RRC re-establishment, and paging interruption:**In legacy licensed RRM requirement for redirection/reestablishment/paging interruption, we did not specify this SI reading delay in the core requirement, and we prefer to reflect this SI reading time in the test case rather than revising the core requirement. |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2106961(Huawei, HiSilicon) | Apple: Up to issue 2-1-1 |
| Company B |
|  |
| R4-2106962 (Huawei, HiSilicon) | Apple: Up to issue 2-1-1 |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic 2-1, issue 2-1-1:** | **Issue 2-1-1: SI reading with LBT in RRC release with redirection, RRC re-establishment, and paging interruption***Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #3: SCell activation/deactivation (delay and interruption)

Contributions from AI 5.1.2.3 are discussed here.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2104826 | Apple | **Proposal 1:** when none of the RRC parameters CO-DurationPerCell-r16, SlotFormatIndicator, and CSI-RS-ValidationWith-DCI-r16 is configured to a UE and all of the CSI reporting resources for being-activated SCell are available, the existing delay requirement of SCell activation with CCA could apply after removing the L4 related extension definitions in CSI reporting delay.**Proposal 2:** SCell activation requirement with CCA is not applicable when one of following condition is met:* None of the RRC parameters CO-DurationPerCell-r16, SlotFormatIndicator, and CSI-RS-ValidationWith-DCI-r16 is configured, but at least one CSI reporting resource for being-activated SCell is not available;
* if RRC parameters CSI-RS-ValidationWith-DCI-r16 is configured, but SlotFormatIndicator and CO-DurationPerCell-r16 are not configured for the being-activated Scell;
* if RRC parameters CO-DurationPerCell-r16 is configured but SlotFormatIndicator is not configured for the being-activated SCell;
* if RRC parameters CO-DurationPerCell-r16 is not configured but SlotFormatIndicator is configured for the being-activated SCell;
 |
| R4-2105005 | Apple | CR: Draft CR on SCell activation requirement for NR-U R16 |
| R4-2106573 | Nokia, Nokia Shanghai Bell | 1. If the UE is configured with consistent LBT failure recovery procedure (section 5.21 of TS 38.321), and the number of consecutive UL LBT failures exceeds the maximum value, the UE will report this with LBT failure to MAC CE and the SCell can be deactivated with SCell deactivation command.
2. Even if the UE is not configured with consistent uplink LBT failure recovery procedure, the network will notice the lack of UL signals (HARQ-ACK for the activation/deactivation command, or CSI reports), and may try to deactivate the SCell with SCell deactivation command.
3. If also DL is blocked and the network cannot send SCell deactivation command (or anything else including reference signals) in DL, RLF will eventually take place due to the lack of DL reference signals.
4. If SCell activation/deactivation requirements are not applicable, the expected UE behaviour is unclear to the network.
5. Agree on Option 2:

SCell activation delay requirements are applicable in Scenario A (CA with NR PCell and NR SCell) with any LBT type and in Scenario B and C (E-UTRAN-NR-U DC/SA NR-U) with LBT type 2C. Requirements are also applicable in all scenarios, if the UE does not experience any UL LBT failures during SCell activation/deactivation. SCell activation delay requirements are applicable when sCellDeactivationTimer is not configured also in Scenarios B and C (EN-DC and SA) LBT types other than 2C. |
| R4-2106844 | Ericsson | **Proposal 1:** Capture in 38.133, the following RAN4 agreement from [1]:* + For unknown target SCell:
		- Scenario with victims on inter-band CCs only (no intra-band victim serving cells): single interruption

**Proposal 2:** * + For the known target SCell:
		- a single interruption applies, regardless of whether the victim cell is on an intra-band or inter-band CC
	+ For unknown target SCell:
		- Scenario with victims on inter-band CCs and intra-band CCs: more than one interruption can be allowed

**Observation 1:** When sCellDeactivationTimer is not configured, the UE may get stuck in one of the phases of the sCell activation procedure until the network realizes this, without being able to stop the procedure or to move to another phase of the SCell activation procedure. This results in wasting the UE power, delaying the SCell activation, and degrading the network performance in general.**Observation 2:** The UE may be able to stop only when the entire network connection for the UE completely fails or it runs out of power, and it seems to be wrong to apply SCell activation requirements until that complete failure point (which is the case now in 38.133).* Observation 3: Some UE may fail the SCell activation requirements, when sCellDeactivationTimer is not configured.

**Proposal 3a (preferred):** Option 1 from the agreed WF [1]:* + The SCell activation requirements for NR-U do not apply when the sCellDeactivationTimer is not configured, when the SCell activation delay exceeds some pre-defined time (e.g., equivalent or comparable to the longest possible value of sCellDeactivationTimer).

**Proposal 3b (a possible compromise proposal):** Option 3 from the agreed WF [1]:* + SCell activation delay requirements are applicable in Scenario A (CA with NR PCell and NR SCell) with any LBT type and in Scenario B and C (E-UTRAN-NR-U DC/SA NR-U) with LBT type 2C. Requirements are also applicable in all scenarios, if the UE does not experience any UL LBT failures during SCell activation/deactivation.
	+ For all other scenarios the SCell activation requirements for NR-U do not apply when the sCellDeactivationTimer is not configured, when the SCell activation delay exceeds some pre-defined time (e.g., equivalent or comparable to the longest possible value of sCellDeactivationTimer).

**Proposal 4:** The SCell deactivation requirements for NR-U do not apply when the sCellDeactivationTimer is not configured.**Proposal 5:** RAN4 decides on requirements applicability when sCellDeactivationTimer is not configured, based on the majority view, since the issue has been discussed for many meetings.Proposal 6: No LS to RAN2 is needed, since requirements applicability is pure RAN4 issue. |
| R4-2106845 | Ericsson | **CR:** Updates in SCell activation in NR-U |
| R4-2106914 | ZTE Corporation | **Proposal 1:** Additional interruptions are needed for active cells outside the band with the SCell being activated.**Observation 1:** The case when the timer sCellDeactivationTimer is not configured is specified in TS 38.331 and the UE behavior is clear.Proposal 2: SCell activation delay requirements are applicable in Scenario A (CA with NR PCell and NR SCell) with any LBT type and in Scenario B and C (E-UTRAN-NR-U DC/SA NR-U) with LBT type 2C. Requirements are also applicable in all scenarios, if the UE does not experience any UL LBT failures during SCell activation/deactivation. SCell activation delay requirements are applicable when sCellDeactivationTimer is not configured also in Scenarios B and C (EN-DC and SA) LBT types other than 2C. |
| R4-2106963 | Huawei, HiSilicon | **Proposal 1:** Consider the interruptions in following Cases:Case 1: For intra-band CA, where victims Cells are all within the same band with the SCell being activated.Case 2: For inter-band CA, two cases to be considered:Case 2a: Inter-band victim Cells only without intra-band victim Cells.Case 2b: Inter-band victim Cells and intra-band victim Cells.**Proposal 2:** For intra-band CA, up to 1+L interruption windows are allowed during SCell activation. The length of up to L interruption windows shall be extended considering the RF tuning.**Observation 1:** Compared with the activation procedure, the issue is even worse for deactivation procedure as NW may not be able to find the UE gets stuck in the deactivation process and the UE may still keep the Cell active which will lead to unnecessary power consumptions.**Observation 3:** According to the current spec, if UE receives the deactivation command, UE may stop the timer even it is configured and it is still running. UE could not self-determinate the deactivation process even the timer is configured.**Proposal 3:** When UE receives SCell deactivation command and sCellDeactivationTimer is configured, UE shall not stop the sCellDeactivationTimer before it expires until the corresponding HARQ feedback is transmitted successfully.**Observation 4:** When the sCellDeactivationTimer is not configured, UE could abandon the activation process when L exceeds the defined limits. **Proposal 4:** When sCellDeactivationTimer is not configured, for the scenarios other than (Scenario A (CA with NR PCell and NR SCell) with any LBT type and in Scenario B and C (E-UTRAN-NR-U DC/SA NR-U) with LBT type 2C), the SCell activation requirements do not apply when the SCell activation delay exceeds the longest possible value of sCellDeactivationTimer. |
| R4-2106964 | Huawei, HiSilicon | **CR:** Draft CR on SCell activation requirements for NR-U |
| R4-2107088 | MediaTek inc. | **Proposal 3:** Revised from the Option 3. * SCell activation delay requirements are applicable in Scenario A (CA with NR PCell and NR SCell) with any LBT type and in Scenario B and C (E-UTRAN-NR-U DC/SA NR-U) with LBT type 2C. Requirements are also applicable in all scenarios, if the UE does not experience any UL LBT failures during SCell activation/deactivation. (from Option 2)

For all other scenarios the SCell activation requirements for NR-U do not apply when the SCell activation delay exceeds some pre-defined time (e.g., equivalent or comparable to the longest possible value of sCellDeactivationTimer). (from Option 1) |
| R4-2107358 | Qualcomm Incorporated | **Proposal 1:** A single interruption applies to any victim cell outside the band with the SCell being activated, irrespective of whether any already active SCell (intra-band w.r.t. the aggressor) is present or not. No further clarification is needed in the spec text.**Observation 1:** The interruption length specified in Section 8.2 of TS 38.133 for intra-band CA include the entire SMTC duration. The UE doesn’t have to wait for the entire interruption duration to declare DL LBT failure and may perform RF re-tuning earlier, if needed.**Observation 2:** The additional complexity in tuning/re-tuning and a loss of network throughput is not justified for any transient power saving and minor performance impact, if any.**Proposal 2:** There is no need to specify additional RF re-tuning time or extend the interruption time because of DL LBT failure during intra-band SCell activation. No further clarification needed in the spec-text**Proposal 3:** Remove the following editor’s note from section 8.3A.2 of 38.133: “Editor’s Note: Whether to differentiate between the cases when there is or isn’t an already active Scell in the same band as the Scell being activated is FFS.”  |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 3-1: Interruptions

Background:

In [R4-2103025], following was agreed:

|  |
| --- |
| * General
	+ Further discuss the following 2 types of interruptions
		- Interruptions on any active cell in the same band with the SCell being activated
		- Interruptions on any active cell outside the band with the SCell being activated
* Interruptions for inter-band CA
	+ For any active cell in the same band with the SCell being activated, the interruption requirements (i.e. number of interruptions and starting point of an interruption) for intra-band CA apply
	+ For any active cell outside the band with the SCell being activated, the interruption requirements are FFS
* For the known target SCell:
	+ - FFS: a single interruption applies, regardless of whether the victim cell is on an intra-band or inter-band CC
* For unknown target SCell:
	+ - Scenario with victims on inter-band CCs only (no intra-band victim serving cells): single interruption
		- Scenario with victims on inter-band CCs and intra-band CCs: FFS
 |

**Issue 3-1-1: Interruption cases**

* Proposals 1 (Huawei, HiSilicon)
* Case 1: For intra-band CA, where victims Cells are all within the same band with the SCell being activated.
* Case 2: For inter-band CA, two cases to be considered:
* Case 2a: Inter-band victim Cells only without intra-band victim Cells.
* Case 2b: Inter-band victim Cells and intra-band victim Cells.
* Recommended WF
	+ Discuss the proposal

**Issue 3-1-2: Intra-band CA**

* Proposals 1 (Huawei, HiSilicon): For intra-band CA, up to 1+L interruption windows are allowed during SCell activation. The length of up to L interruption windows shall be extended considering the RF tuning.
* Proposal 2 (Qualcomm Incorporated): There is no need to specify additional RF re-tuning time or extend the interruption time because of DL LBT failure during intra-band SCell activation. No further clarification needed in the spec-text
* Recommended WF
	+ Discuss the proposal

**Issue 3-1-3: Inter-band CA where victims on inter-band CCs and intra-band CCs interruptions and target SCell is unknown**

* Proposals 1
	+ 1a: (Ericsson):Scenario with victims on inter-band CCs and intra-band CCs: more than one interruption can be allowed.
	+ 1b: (ZTE Corporation): Additional interruptions are needed for active cells outside the band with the SCell being activated.
* Proposal 2 (Qualcomm Incorporated): A single interruption applies to any victim cell outside the band with the SCell being activated, irrespective of whether any already active SCell (intra-band w.r.t. the aggressor) is present or not. No further clarification is needed in the spec text.
* Recommended WF
	+ Discuss the proposals

**Issue 3-1-4: Inter-band CA where victims on inter-band CCs only (no intra-band victim serving cells) target SCell is unknown**

* Proposals 1 (Ericsson):Capture in 38.133, the following RAN4 agreement from [R4-2103025]:
	+ For unknown target SCell:
		- Scenario with victims on inter-band CCs only (no intra-band victim serving cells): single interruption
* Recommended WF
	+ Capture the agreement in 38.133

**Issue 3-1-5: Inter-band CA regardless of whether the victim cell is on an intra-band or inter-band CC and target SCell is known**

* Proposals 1 (Ericsson):Single interruption applies, regardless of whether the victim cell is on an intra-band or inter-band CC.
* Recommended WF
	+ Can proposal 1 be agreed?

### Sub-topic 3-2: Way forward to resolve the open issue related to SCell activation requirements when sCellDeactivationTimer is NOT configured

Background:

Applicability of requirements when sCellDeactivationTimer is not configured has been discussed for many meetings, and options including possible compromise solution was agreed in [R4-2103025].

**Issue 3-2-1: Way forward to resolve the open issue on SCell activation requirements when *sCellDeactivationTimer* is NOT configured**

* Proposals 1 (Ericsson): RAN4 decides on requirements applicability when sCellDeactivationTimer is not configured, based on the majority view, since the issue has been discussed for many meetings.
* Recommended WF
	+ Moderator: since the issue has been going on for many meeting, it is suggested to take decision in this meeting based on majority view.

### Sub-topic 3-3: SCell activation/deactivation when sCellDeactivationTimer is NOT configured

Background:

In [R4-2103025], following was agreed:

|  |
| --- |
| * Applicability of SCell activation requirements when sCellDeactivationTimer is NOT configured
	+ Option 1 (E///, QC, Apple, Huawei/HiSilicon):
		- The SCell activation requirements for NR-U do not apply when the sCellDeactivationTimer is not configured, when the SCell activation delay exceeds some pre-defined time (e.g., equivalent or comparable to the longest possible value of sCellDeactivationTimer).
	+ Option 2 (Nokia, ZTE, MTK):
		- SCell activation delay requirements are applicable in Scenario A (CA with NR PCell and NR SCell) with any LBT type and in Scenario B and C (E-UTRAN-NR-U DC/SA NR-U) with LBT type 2C. Requirements are also applicable in all scenarios, if the UE does not experience any UL LBT failures during SCell activation/deactivation.
		- SCell activation delay requirements are applicable when sCellDeactivationTimer is not configured also in Scenarios B and C (EN-DC and SA) LBT types other than 2C.
* Option 3 (possible compromise solution):
	+ - SCell activation delay requirements are applicable in Scenario A (CA with NR PCell and NR SCell) with any LBT type and in Scenario B and C (E-UTRAN-NR-U DC/SA NR-U) with LBT type 2C. Requirements are also applicable in all scenarios, if the UE does not experience any UL LBT failures during SCell activation/deactivation.
		- For all other scenarios the SCell activation requirements for NR-U do not apply when the sCellDeactivationTimer is not configured, when the SCell activation delay exceeds some pre-defined time (e.g., equivalent or comparable to the longest possible value of sCellDeactivationTimer).
 |

**Issue 3-3-1: Applicability of SCell activation requirements when *sCellDeactivationTimer* is NOT configured**

* Proposals 1a (Ericsson, Huawei/HiSilicon): Option 1 supported
	+ The SCell activation requirements for NR-U do not apply when the sCellDeactivationTimer is not configured, when the SCell activation delay exceeds some pre-defined time (e.g., equivalent or comparable to the longest possible value of sCellDeactivationTimer).
* Proposal 1b (Ericsson): The SCell deactivation requirements for NR-U do not apply when the sCellDeactivationTimer is not configured.
* Proposals 2 (Nokia, ZTE Corporation): Option 2 supported
	+ SCell activation delay requirements are applicable in Scenario A (CA with NR PCell and NR SCell) with any LBT type and in Scenario B and C (E-UTRAN-NR-U DC/SA NR-U) with LBT type 2C. Requirements are also applicable in all scenarios, if the UE does not experience any UL LBT failures during SCell activation/deactivation.
	+ SCell activation delay requirements are applicable when sCellDeactivationTimer is not configured also in Scenarios B and C (EN-DC and SA) LBT types other than 2C.
* Proposals 3a (Ericsson, MediaTek inc): Option 3 (possible compromise solution) can be accepted
	+ SCell activation delay requirements are applicable in Scenario A (CA with NR PCell and NR SCell) with any LBT type and in Scenario B and C (E-UTRAN-NR-U DC/SA NR-U) with LBT type 2C. Requirements are also applicable in all scenarios, if the UE does not experience any UL LBT failures during SCell activation/deactivation.
	+ For all other scenarios the SCell activation requirements for NR-U do not apply when the sCellDeactivationTimer is not configured, when the SCell activation delay exceeds some pre-defined time (e.g., equivalent or comparable to the longest possible value of sCellDeactivationTimer).
* Proposal 3b (Ericsson): No LS to RAN2 is needed, since requirements applicability is pure RAN4 issue.
* Recommended WF
	+ Discuss the proposals

### Sub-topic 3-4: SCell activation/deactivation when sCellDeactivationTimer IS configured

**Issue 3-4-1: UE behaviour with respect to the timer when *sCellDeactivationTimer* IS configured**

Proposals

* Proposal 1 (Huawei/HiSilicon):
	+ When UE receives SCell deactivation command and sCellDeactivationTimer is configured, UE shall not stop the sCellDeactivationTimer before it expires until the corresponding HARQ feedback is transmitted successfully.

Recommended WF

* Discuss the proposal

### Sub-topic 3-5: Measuring CSI-RS during SCell activation

**Issue 3-5-1: Discussions on measuring CSI-RS during SCell activation**

Proposals

* Proposal 1 (Apple):
	+ when none of the RRC parameters CO-DurationPerCell-r16, SlotFormatIndicator, and CSI-RS-ValidationWith-DCI-r16 is configured to a UE and all of the CSI reporting resources for being-activated SCell are available, the existing delay requirement of SCell activation with CCA could apply after removing the L4 related extension definitions in CSI reporting delay.
* Proposal 2 (Apple): SCell activation requirement with CCA is not applicable when one of following condition is met:
	+ None of the RRC parameters CO-DurationPerCell-r16, SlotFormatIndicator, and CSI-RS-ValidationWith-DCI-r16 is configured, but at least one CSI reporting resource for being-activated SCell is not available;
	+ if RRC parameters CSI-RS-ValidationWith-DCI-r16 is configured, but SlotFormatIndicator and CO-DurationPerCell-r16 are not configured for the being-activated Scell;
	+ if RRC parameters CO-DurationPerCell-r16 is configured but SlotFormatIndicator is not configured for the being-activated SCell;
	+ if RRC parameters CO-DurationPerCell-r16 is not configured but SlotFormatIndicator is configured for the being-activated SCell;

Recommended WF

* Discuss the proposals.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Company A | **Issue 3-1-1: Interruption cases****Issue 3-1-2: Intra-band CA****Issue 3-1-3: Inter-band CA where victims on inter-band CCs and intra-band CCs interruptions and target SCell is unknown****Issue 3-1-4: Inter-band CA where victims on inter-band CCs only (no intra-band victim serving cells) target SCell is unknown****Issue 3-1-5: Inter-band CA regardless of whether the victim cell is on an intra-band or inter-band CC and target SCell is known****Issue 3-2-1: Way forward to resolve the open issue on SCell activation requirements when *sCellDeactivationTimer* is NOT configured****Issue 3-3-1: Applicability of SCell activation requirements when sCellDeactivationTimer is NOT configured****Issue 3-4-1: UE behaviour with respect to the timer when *sCellDeactivationTimer* IS configured****Issue 3-5-1: Discussions on measuring CSI-RS during SCell activation** |
| Nokia, Nokia Shanghai Bell | **Issue 3-2-1: Way forward to resolve the open issue on SCell activation requirements when *sCellDeactivationTimer* is NOT configured**Technically the most reasonable solution is preferred.**Issue 3-3-1: Applicability of SCell activation requirements when sCellDeactivationTimer is NOT configured**We support Proposal/Option 2. If Option 1 or Option 3 would be chosen, the UE behavior in the case when SCell activation requirements are not applicable is unclear, which makes the process unpredictable from network point of view. With the requirements being applicable, the UE is already following RAN2 procedures (e.g. consistent UL LBT failure recovery, if configured) and the network will also notice the lack of UL signals if the activation takes too long (i.e. UE is stuck in the process) and can try to deactivate the SCell, so in our view solutions already exist for the discussed problem. We also don’t see the problem as a very common case, since in our understanding UL being occupied would often mean that DL is also occupied, so a situation where the NW can send an SCell activation command in DL, but the UE would not be able to respond in UL does not seem like a very common situation. |
| Apple | **Issue 3-1-1: Interruption cases**Agree with the cases listed by Huawei.**Issue 3-1-2: Intra-band CA**Agree with proposal 1.**Issue 3-1-3: Inter-band CA where victims on inter-band CCs and intra-band CCs interruptions and target SCell is unknown**Agree with proposal 1a. it’s the interruption assumption for case 2b of issue 3-1-1.**Issue 3-1-4: Inter-band CA where victims on inter-band CCs only (no intra-band victim serving cells) target SCell is unknown**Agree with proposal 1. it’s the interruption assumption for case 2a of issue 3-1-1.**Issue 3-1-5: Inter-band CA regardless of whether the victim cell is on an intra-band or inter-band CC and target SCell is known**Agree with proposal 1.**Issue 3-2-1: Way forward to resolve the open issue on SCell activation requirements when *sCellDeactivationTimer* is NOT configured**Agree with proposal 1.**Issue 3-3-1: Applicability of SCell activation requirements when sCellDeactivationTimer is NOT configured**Either proposal 1a or 3a is fine to us.**Issue 3-4-1: UE behaviour with respect to the timer when *sCellDeactivationTimer* IS configured****Issue 3-5-1: Discussions on measuring CSI-RS during SCell activation**Support proposal 1 and 2 according to the received LS from RAN1. When none of the RRC parameters CO-DurationPerCell-r16, SlotFormatIndicator, and CSI-RS-ValidationWith-DCI-r16 is configured to a UE, UE would follow R15 behavior without any presence detection and therefore there is no need to have L4 in the requirement. |
| ZTE | **Issue 3-1-3: Inter-band CA where victims on inter-band CCs and intra-band CCs interruptions and target SCell is unknown**We think that Option 1a and 1b are nearly the same and can be merged. For inter-band scenarios, our understanding is that extra interruptions are still needed, however, this might depend on UE implementations.**Issue 3-3-1: Applicability of SCell activation requirements when sCellDeactivationTimer is NOT configured**Support Option 2. Option 1 is not desirable since no requirements would lead to uncertain / unknown UE behavior and this might cause difficulty for the network. We need to further check Option 3. In our view, there is no issue going with Option 2 since going with Option 2, we already have clear definition from RAN2 so we don’t see big issues here. |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2106845(Ericsson) | Nokia: The CR depends on the outcome of issue 3-3-1. Based on our view for the issue, we can agree on removing the editor’s notes, but not with the additions.  |
| Company B |
|  |
| R4-2106964 (Huawei, HiSilicon) | Company A |
| Company B |
|  |
| R4-2104826(Apple) | Nokia: Is the document number correct? R4-2104826 seems to be a discussion paper. |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
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|  | **Status summary**  |
| **Sub-topic 3-1** | **Issue 3-1-1: Interruption cases****Issue 3-1-2: Intra-band CA****Issue 3-1-3: Inter-band CA where victims on inter-band CCs and intra-band CCs interruptions and target SCell is unknown****Issue 3-1-4: Inter-band CA where victims on inter-band CCs only (no intra-band victim serving cells) target SCell is unknown****Issue 3-1-5: Inter-band CA regardless of whether the victim cell is on an intra-band or inter-band CC and target SCell is known***Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |
| **Sub-topic 3-2** | **Issue 3-2-1: Way forward to resolve the open issue on SCell activation requirements when *sCellDeactivationTimer* is NOT configured***Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |
| **Sub-topic 3-3** | **Issue 3-3-1: Applicability of SCell activation requirements when *sCellDeactivationTimer* is NOT configured***Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |
| **Sub-topic 3-4** | **Issue 3-4-1: UE behaviour with respect to the timer when *sCellDeactivationTimer* IS configured***Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

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| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #4: Active TCI state switching

Contributions from AI 5.1.2.4 are discussed here.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2106965 | Huawei, HiSilicon | CR (38.133); Draft CR on Active TCI state switching for NR-U |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

## Companies views’ collection for 1st round

### Open issues

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| --- | --- |
| **Company** | **Comments** |
|  |  |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2106965 (Huawei, HiSilicon) | Apple: agree |
| Company B |
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## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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|  | **Status summary**  |
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### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

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| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #5: RLM

Contributions from AI 5.1.2.5 are discussed here.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2106966 | Huawei, HiSilicon | CR (38.133): Draft CR on RLM requirements for NR-U |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
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### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2106966 (Huawei, HiSilicon) | Apple: fine |
| Company B |
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## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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|  | **Status summary**  |
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### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

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| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #6: Beam management

Contributions from AI 5.1.2.6 are discussed here.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2106967 | Huawei, HiSilicon | CR (38.133): Draft CR on Beam management requirements for NR-U |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

## Companies views’ collection for 1st round

### Open issues

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| --- | --- |
| **Company** | **Comments** |
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### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2106967 (Huawei, HiSilicon) | Apple: agree with the CR |
| Company B |
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## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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|  | **Status summary**  |
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### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

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| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #7: Measurement requirements

Contributions from AI 5.1.2.7 are discussed here.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2106968 | Huawei, HiSilicon | CR (38.133): Draft CR on measurement requirements for NR-U |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

## Companies views’ collection for 1st round

### Open issues

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| --- | --- |
| **Company** | **Comments** |
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### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2106968 (Huawei, HiSilicon) | Apple: fine with Huawei change, and one more change could be made in the CR for the typo of table 9.2A.7.2-3, it shall be Measurement period for intra-frequency channel occupancy measurements with measurement gaps  |
| Company B |
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## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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|  | **Status summary**  |
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### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

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| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #8: Measurement capability and reporting criteria

Contributions from AI 5.1.2.8 are discussed here.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2106969 | Huawei, HiSilicon | CR (38.133): Draft CR on CSSF updating for NR-U |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

## Companies views’ collection for 1st round

### Open issues

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| --- | --- |
| **Company** | **Comments** |
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### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2106969 (Huawei, HiSilicon) | Apple: some clarifications are needed:1. In section 9.1.5.1, the newly added case could be “Intra-frequency RSSI and channel occupancy measurement with no measurement gap on a carrier subject to CCA when SMTC and RMTC are overlapping and RMTCs are not fully overlapped with measurement gap”
2. In EN-DC and SA CSSF, the PCC and SCC are using different searcher resource, and there for the CSSF counting for RSSI/CO measurement PCC/PSCC and SCC shall be independent. It’s better to have two notations for PCC/PSCC’s and SCC’s CSSF.
3. In CSSF within MG, one more condition shall also be considered: Intra-frequency RSSI/CO measurement with no measurement gap in clause 9.2A.7 when all of the RMTC occasions of this intra-frequency RSSI/CO measurement are overlapped by the measurement gap
 |
| Company B |
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## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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| --- | --- |
|  | **Status summary**  |
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### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #9: Timing

Contributions from AI 5.1.2.9 are discussed here.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2104823 | Apple | **Proposal 1:** the reference cell availability shall be revised as:In the requirements of clause 7.1.2, the term reference cell on a carrier frequency subject to CCA is not available at the UE refers to when at least one SSB is configured by gNB, but the first two successive candidate SSB positions for the same SSB index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the last max{PHY measurement time interval of reference cell, 160 ms}; otherwise the reference cell on the carrier frequency subject to CCA is considered as available at the UE.**Proposal 2:** when UE performs intra-frequency measurement on reference cell without MG, PHY measurement time interval of reference cell in proposal 1 is as below,

|  |  |
| --- | --- |
| DRX cycle | PHY measurement time interval  |
| No DRX | Kp x SMTC period x CSSFintra |
| DRX cycle≤ 320ms | 1.5 x Kp x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | Kp x DRX cycle x CSSFintra |

**Proposal 3:** when UE performs intra-frequency measurement on reference cell with MG, PHY measurement time interval of reference cell in proposal 1 is as below,

|  |  |
| --- | --- |
| DRX cycle | PHY measurement time interval  |
| No DRX  | max(MGRP, SMTC period) x CSSFintra |
| DRX cycle≤ 320ms  | 1.5x max(MGRP, SMTC period, DRX cycle) x CSSFintra |
| DRX cycle>320ms |  (MGRP, DRX cycle) x CSSFintra |

 |
| R4-2105004 | Apple | **CR:** Draft CR on reference cell availability for NR-U R16 |
| R4-2106970 | Huawei, HiSilicon | **Proposal 1:** No clarification related to DRX is needed on availability of a reference cell.**Proposal 2:** The availability of reference cell shall base on the SSB within the DL active BWP which is not overlapping with measurement gaps. |
| R4-2106971 | Huawei, HiSilicon | **CR:** Draft CR on timing requirements for NR-U |
| R4-2107089 | MediaTek inc. | **Proposal 4:** The availability of the reference NR-U cell should be based on “serving SSB outside gap”. **Proposal 5:** If DRX is configured, the availability of the reference NR-U cell is based on DRX cycles. |
| R4-2107138 | Ericsson | **On impact of gaps on timing:****Observation 1:** SSB transmission is cell specific while DRX is UE specific.**Observation 2:** Typically, DRX cycles of different UEs are time offseted for load balancing.**Observation 3:** UE typically performs time-frequency tracking before ON duration in order to receive the PDCCH in the ON duration.**Observation 4:** In legacy NR operation there is no condition to have SSB within ON duration. From UE timing perspective, the situation in NR-U is very similar to the legacy NR.**Observation 5:** UE cannot meet Te requirements if SSB is not available at least once 160 ms.**Proposal 1:** SSB does not have to be within ON duration in a reference cell subject to DL CCA in order to meet UE timing requirements**Proposal 2:** In DRX no MAX{PHY measurement time interval of reference cell, 160 ms} for defining availability of reference cell is needed for UE to meet timing requirements.**Proposal 3:** No clarification related to DRX is needed on the current definition of unavailability of a reference cell on a carrier frequency subject to CCA in section 7.1.1.**On impact of gaps on timing:****Observation 6:** In legacy NR operation there is no condition to have SSB outside the gaps to meet requirements. From UE timing perspective, the situation in NR-U is very similar to the legacy NR. **Proposal 4:** SSB in a reference cell subject to DL CCA does not have to be outside the gaps in order to meet UE timing requirements**Proposal 5:** When gaps are configured then no MAX{PHY measurement time interval of reference cell, 160 ms} for defining availability of reference cell is needed for UE to meet timing requirements.**Proposal 6:** No clarification related to gap is needed on the current definition of unavailability of a reference cell on a carrier frequency subject to CCA in section 7.1.1. |
| R4-2107359 | Qualcomm Incorporated | **Observation 1:** Current NR spec doesn’t consider DRX and/or gaps in determining the availability of a reference cell.**Proposal 1:** No further clarification is required for the reference cell definition in the context of DRX and/or measurement gaps.**Proposal 2:** For test cases, we may agree that the UE is not required to determine the availability of a reference cell based on SSBs scheduled outside the DRX on duration and within the measurement gaps during last 160ms. |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

Background:

* *Reference Cell Definition*
	+ *In the requirements of clause 7.1.2, the term reference cell on a carrier frequency subject to CCA is not available at the UE refers to when at least one SSB is configured by gNB, but the first two successive candidate SSB positions for the same SSB index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the last 160 ms; otherwise the reference cell on the carrier frequency subject to CCA is considered as available at the UE*
* *DRX case: FFS, unless this can also be solved in RAN4#97-e*
* *FFS: when there is no available serving SSB outside gap*

### Sub-topic 9-1: DRX impact on timing

**Issue 9-1-1: Definition of the reference cell which is not available, with respect to DRX**

Proposals

* Proposal 1 (Ericsson, Huawei, HiSilicon, Qualcomm Incorporated): SSB does not have to be within ON duration in a reference cell subject to DL CCA in order to meet UE timing requirements
	+ No clarification related to DRX is needed on the current definition of unavailability of a reference cell on a carrier frequency subject to CCA in section 7.1.1.
* Proposal 3 (MediaTek): If DRX is configured, the availability of the reference NR-U cell is based on DRX cycles.
* Proposal 4 (Apple):

In the requirements of clause 7.1.2, the term reference cell on a carrier frequency subject to CCA is not available at the UE refers to when at least one SSB is configured by gNB, but the first two successive candidate SSB positions for the same SSB index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the last max{PHY measurement time interval of reference cell, 160 ms}; otherwise the reference cell on the carrier frequency subject to CCA is considered as available at the UE.

* + - * when UE performs intra-frequency measurement on reference cell without MG, PHY measurement time interval of reference cell in proposal 1 is as below,

|  |  |
| --- | --- |
| DRX cycle | PHY measurement time interval  |
| No DRX | Kp x SMTC period x CSSFintra |
| DRX cycle≤ 320ms | 1.5 x Kp x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | Kp x DRX cycle x CSSFintra |

* + - * when UE performs intra-frequency measurement on reference cell with MG, PHY measurement time interval of reference cell in proposal 1 is as below,

|  |  |
| --- | --- |
| DRX cycle | PHY measurement time interval  |
| No DRX  | max(MGRP, SMTC period) x CSSFintra |
| DRX cycle≤ 320ms  | 1.5x max(MGRP, SMTC period, DRX cycle) x CSSFintra |
| DRX cycle>320ms |  (MGRP, DRX cycle) x CSSFintra |

Recommended WF

* Discuss the proposals

**Issue 9-1-2: For test cases: whether UE is required to determine availability of a reference cell based on SSBs scheduled outside the DRX on duration and within the measurement gaps during last 160ms.**

Proposals

* Proposal 1 (Qualcomm Incorporated): For test cases, we may agree that the UE is not required to determine the availability of a reference cell based on SSBs scheduled outside the DRX on duration and within the measurement gaps during last 160ms.

Recommended WF

* Discuss the proposals

### Sub-topic 9-2: Measurement gaps impact on timing

**Issue 9-2-1: Definition of the reference cell which is not available, with respect to MGs**

Proposals

* Proposal 1 (Ericsson): SSB in a reference cell subject to DL CCA does not have to be outside the gaps in order to meet UE timing requirements
	+ When gaps are configured then no MAX{PHY measurement time interval of reference cell, 160 ms} for defining availability of reference cell is needed for UE to meet timing requirements.
	+ No clarification related to gap is needed on the current definition of unavailability of a reference cell on a carrier frequency subject to CCA in section 7.1.1.
* Proposal 2 (Huawei/HiSilicon): The availability of reference cell shall base on the SSB within the DL active BWP which is not overlapping with measurement gaps.
* Proposal 3 (MediaTek): The availability of the reference NR-U cell should be based on “serving SSB outside gap”.
* Proposal 4 (Qualcomm Incorporated): For test cases, we may agree that the UE is not required to determine the availability of a reference cell based on SSBs scheduled outside the DRX on duration and within the measurement gaps during last 160ms.
* Proposal 5 (Apple): to consider the cases when DRX is used and/or MG is configured, the reference cell availability shall be revised as:
	+ In the requirements of clause 7.1.2, the term reference cell on a carrier frequency subject to CCA is not available at the UE refers to when at least one SSB is configured by gNB, but the first two successive candidate SSB positions for the same SSB index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the last **max{PHY measurement time interval of reference cell, 160 ms}**; otherwise the reference cell on the carrier frequency subject to CCA is considered as available at the UE.
		- when UE performs intra-frequency measurement on reference cell without MG, PHY measurement time interval of reference cell in proposal 1 is as below,

|  |  |
| --- | --- |
| DRX cycle | PHY measurement time interval  |
| No DRX | Kp x SMTC period x CSSFintra |
| DRX cycle≤ 320ms | 1.5 x Kp x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | Kp x DRX cycle x CSSFintra |

* + - when UE performs intra-frequency measurement on reference cell with MG, PHY measurement time interval of reference cell in proposal 1 is as below,

|  |  |
| --- | --- |
| DRX cycle | PHY measurement time interval  |
| No DRX  | max(MGRP, SMTC period) x CSSFintra |
| DRX cycle≤ 320ms  | 1.5x max(MGRP, SMTC period, DRX cycle) x CSSFintra |
| DRX cycle>320ms |  (MGRP, DRX cycle) x CSSFintra |

Recommended WF

* Discuss the proposals

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | **Issue 9-1-1: Definition of the reference cell which is not available, with respect to DRX**Support proposal 4. This case is quite different from legacy licensed case. In licensed CC, this 160ms condition would not restrict the UE implementation, because UE can be flexible to choose any of the SSBs between DRX cycles to do tracking if it needs. And waking up in DRX inactive time is not for vain in licensed case, because network is always transmitting SSB regardless of DRX active or inactive; and shown in the following figure.  However, in NR-U case, it would introduce restriction on UE implementation. (1) to proposal 1, UE has to wake up within the time range 160ms before the Tx occasion, since the SSBs outside 160ms time range is not guaranteed anyway; (2) to proposal 3, if the long DRX is configured(e.e. 2.56s), UE may be not able to maintain the timing in such long time period without any new timing tracking. The following figure illustrate the restriction at UE.**Issue 9-1-2: For test cases: whether UE is required to determine availability of a reference cell based on SSBs scheduled outside the DRX on duration and within the measurement gaps during last 160ms.**This issue shall be concluded after we have agreements on issue 9-1-1 and issue 9-2-1.**Issue 9-2-1: Definition of the reference cell which is not available, with respect to MGs**Support proposal 5. If serving SSB is outside active BWP, the timing tracking on SSB shall be performed during the MGL. But MG is shared by multiple MOs, if the RF was tuned to other frequency layer for L3 measurement in a certain MGL, the SSB in this MGL could not be used for serving cell time tracking. But in one measurement interval, UE would at least have one available MGL for intra-frequency measurement. We illustrate it in the following figure. |
| ZTE | **Issue 9-2-1: Definition of the reference cell which is not available, with respect to MGs**Can agree with Option 2. |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2105004 (Apple) | Up to the discussion in issue 9-1-1/9-2-1 |
| Company B |
|  |
| R4-2106971(Huawei, HiSilicon) | Up to the discussion in issue 9-1-1/9-2-1 |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic 9-1** | **Issue 9-1-1: Definition of the reference cell which is not available, with respect to DRX****Issue 9-1-2: For test cases: whether UE is required to determine availability of a reference cell based on SSBs scheduled outside the DRX on duration and within the measurement gaps during last 160ms.***Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |
| **Subtopic 9-2** | **Issue 9-2-1: Definition of the reference cell which is not available, with respect to MGs***Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Topic #10: Other requirements

Contributions from AI 5.1.2.10 are discussed here.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2106842 | Ericsson | CR (38.133): NR-U bands |
| R4-2106972 | Huawei, HiSilicon | CR (36.133): Draft CR on core requirements maintenance of IDLE mode inter-RAT measurement for NR-U TS 36.133 |
| R4-2106973 | Huawei, HiSilicon | CR (36.133): Draft CR on PSCell Addition requirements for NR-U |
| R4-2106974 | Huawei, HiSilicon | CR (38.133):Draft CR on SI acquisition for paging interruption for NR-U |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  |  |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2106842 (Ericsson) | Apple: fine |
| Company B |
|  |
| R4-2106972 (Huawei, HiSilicon) | Company A |
| Company B |
|  |
| R4-2106973 (Huawei, HiSilicon) | Company A |
| Company B |
|  |
| R4-2106974(Huawei, HiSilicon) | Apple: propose to reflect this SI reading time in testing setup, like the licensed case. |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
|  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents