**3GPP TSG-RAN WG4 Meeting # 100-e R4-210XXXX**

**Electronic Meeting, 16th – 27th August, 2021**

**Agenda item:** 9.20.1;9.20.2;

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for [100-e][142] NR\_RedCap

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion (e.g. list of treated agenda items) and provide some guidelines for email discussion if necessary.*

*List of candidate target of email discussion for 1st round and 2nd round*

* 1st round: TBA
* 2nd round: TBA

The following topic will be discussed in 1st round:

1. RAN4 RF Work plan
2. RedCap UE Power class in FR1
3. Operating band in FR1
	1. FDD band
	2. TDD band
	3. SUL band
4. REFSENS for RedCap UE in FR1
	1. 1 RX branch RedCap UE in FDD and TDD
	2. 2 RX branch RedCap UE in HD-FDD
	3. 1 RX branch RedCap UE in HD-FDD
5. Other RX requirement in FR1
6. FR2 aspects
	1. Use case for RedCap UE
	2. New RedCap UE type
	3. Power class for RedCap UE
	4. RF architecture for RedCap UE
	5. TX requirements for RedCap UE
	6. RX requirements for RedCap UE
7. Half-duplex FDD switching time
	1. RX-TX switching time
8. CR on RedCap UE FR1-TX

2nd round will focus the LS reply, WF on different topic

# Topic #1: Work plan

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2114339**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114339.zip) | Ericsson | 3.1 May 2021RAN4#99e (0.25 TU):* Discuss general RF specification impact on UE and BS
* Discuss RF specification structure related to the new RedCap UE type

3.4 August 2021RAN4#100e (0.5 TU):* Continue discussion on RF impact for UE due to reduced bandwidth and RX branches:
	+ FR1 RedCap UE TX output power and Rx requirement
	+ FR2 RedCap UE feasibility
* Start to discuss CR for impacted RF requirements

3.5 November 2021RAN4#101 (0.5 TU):* Continue discussion on RF specification impact for UE
* Continue to discuss/approve CR for impacted RF requirements

3.6 January 2022RAN4#101bis (0.5 TU):* Continue to discuss/approve CR for impacted RF requirements

3.7 February 2022RAN4#102 (0.5 TU):* Finalization of CR
 |

## 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 1-1

*Sub-topic description:*

Work plan itself discuss the timeline of the RAN4 RF work.

*Open issues and candidate options before e-meeting:*

Issue 1-1: Work plan

* Proposals
	+ Option 1: Agree with WP.
	+ Option 2: TBA
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

*One of the two formats, i.e. either example 1 or 2 can be used by moderators.*

**Example 1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| 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** | *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: RedCap UE Power class in FR1

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2114341**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114341.zip) | Ericsson | **Proposal 1: PC3 should be specified for RedCap UE, PC2 could be based on operator request and no need to specify the PC1.5 and PC1.** |
| **R4-2114074** | Nokia, Nokia Shanghai Bell | **Proposal 1: At least power class 3 is supported for RedCap UEs in all the bands. FFS higher power classes.****Proposal 2: A new lower power class is not supported for RedCap UEs in Rel-17.** |

## 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

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 2-1:PC3 support in RedCap UE**

* Proposals
	+ Option 1: Specify PC3 for RedCap UE
	+ Option 2: TBA
* Recommended WF
	+ TBA

### Sub-topic 2-2

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 2-2: PC2 support in RedCap UE**

* Proposals
	+ Option 1: Based on operator request
	+ Option 2: FFS
	+ Option 3: TBA
* Recommended WF
	+ TBA

### Sub-topic 2-3

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 2-3: PC1 and PC1.5 support in RedCap UE**

* Proposals
	+ Option 1: Not supported in RedCap UE
	+ Option 2: FFS
	+ Option 3: TBA
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Example 1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1: Sub topic 2-2:….Others: |

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| 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** | *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: Operating band for RedCap in FR1

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2114341**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114341.zip) | Ericsson | **Proposal#2: FDD and TDD band should be supported for RedCap UE.****Proposal#3: Proponents of adding SUL band combination should clarify this in the RAN plenary with a revised WID.****Proposal#4: There is no V2X mentioned in WID and in TR 38.875. Thus the V2X frequency band should be excluded in the RedCap operation band.** |
| [**R4-2112912**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112912.zip) | ZTE Corporation | **Observation 1. All of the FDD bands in TS38.101-1 could be designed for FD-FDD and HD-FDD FR1 RedCap UE** **Observation 2. Except band n79, all of the TDD bands in TS38.101-1 could be designed for TDD FR1 RedCap UE****Observation 3. All of the TDD bands in TS38.101-2 could be designed for TDD FR2 RedCap UE** |
| [**R4-2113407**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2113407.zip) | Huawei, HiSilicon | **Observation 1: For RedCap UE not capable of full-duplex communication, the RF architectures are similar among the FDD bands including n91/n92/n93/n94, TDD bands and non-simultaneous Rx/Tx SUL band combinations.****Observation 2: For RedCap UE capable of full-duplex communication, the RF architectures are similar among the FDD bands including n91/n92/n93/n94 and simultaneous Rx/Tx SUL band combinations. A duplexer or diplexer is needed comparing with cases not capable of full-duplex communication.****Observation 3: It is allowed to use a duplexer or diplexer in a RedCap UE, so the basic assumptions/cost/applications are not changed for RedCap UE supporting SUL band combinations including simultaneous or non-simultaneous Rx/Tx.****Proposal 1: RedCap UE can support SUL without any technical issues and obstacles from UE implementation’s perspective, since the RF architectures are similar among the FDD, TDD bands and non-simultaneous/simultaneous Rx/Tx SUL band combinations.****Observation 4: Based on the RF architecture analysis above, the capability simultaneousRxTxSUL can be optional for RedCap UE supporting SUL band combinations.****Observation 5: For RedCap UE, 1Tx-1Tx switching period and mechanism on location of the switching periods are same with Tx switching between 2Tx carriers for eMBB UE in Rel-17.****Proposal 2: Since the specification’s impact is limited for RedCap UE supporting SUL band combinations, RedCap UE can support SUL band combinations.****Observation 6: It’s very important to support SUL feature for RedCap UE in order to improve the UL coverage and throughput.****Observation 7: SUL feature has been has been deployed in the field network by some of operators. For RedCap UE, it’s unreasonable to exclude the SUL feature which has been supported by networks.****Proposal 3: To support SUL band combinations for RedCap UE based on the networks’ demand of UL enhancement.****Observation 8: SUL band combinations are allowed for RedCap UE referring to RAN plenary discussion.****Observation 9: For the note “This WI focuses on SA mode and single connectivity with operation in a single band at a time” in the WID, SUL feature can meet the SA mode and single connectivity. It doesn’t violate current WI.****Proposal 4: SUL band combinations has been included in RedCap WI based on RAN plenary discussion.** |
| [**R4-2114075**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114075.zip) | Nokia, Nokia Shanghai Bell | **Proposal 5: No new reference sensitivity power level requirements are specified for a RedCap UE with 1 branch for CA, NR-DC, SUL, and V2X.** |

## 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

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 3-1: FDD band**

* Proposals
	+ Option 1: All FDD band except V2X band n47
	+ Option 2: TBA
* Recommended WF
	+ TBA

### Sub-topic 3-2

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 3-2: TDD band**

* Proposals
	+ Option 1: All TDD band except the n79
	+ Option 2: TBA
* Recommended WF
	+ TBA

### Sub-topic 3-3

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 3-3: SUL band**

* Proposals
	+ Option 1: SUL band and its combination are not included in RedCap Rel-17
	+ Option 2: SUL band and its combination are included in RedCap Rel-17
	+ Option 3: TBA
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Example 1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| 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** | *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 #4: REFSENS for RedCap UE in FR1

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2112385**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112385.zip) | Apple | ***Proposal 1****: Apply 1Rx and 2Rx REFSENS difference in Table 2.1-1 to derive 1Rx REFSENS requirements for FR1 RedCap UE.*

|  |  |
| --- | --- |
| Duplex Mode | 1Rx and 2Rx REFSENS difference (dB) |
| 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| FDD | 2.5 | 3 | 3 | 3 |
| TDD | 2.5 | 2.5 | 2.5 | 2.5 |

***Proposal 2****: The HD-FDD REFSENS requirements are based on duplexer as the reference architecture where the existing FDD band REFSENS requirements can be leveraged to derive the HD-FDD requirements by removing the noise contribution from UL interference****Proposal 3****:* *For all NR FDD bands, the 5MHz REFSENS requirements defined for full-duplex operation can be reused for half-duplex operation.****Proposal 4****: HD-FDD REFSENS for channel BW wider than 5 MHz can be calculated by REFSENS(5MHz) + 10log10(n x NRB/25), where NRB is the maximum transmission bandwidth configuration with n=1 for 15kHz SCS and n=2 for 30kHz SCS.****Proposal 5****: UL configuration for HD-FDD REFSENS requirements is specified with full allocation.* |
| [**R4-2112890**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112890.zip) | Sony | **Observation 1 The number of RX antenna ports specified for RedCap is to be minimum 1, also supporting (optionally) 2 ports.****Observation 2 The number of supported DL MIMO layers are specified to be 2 when 2 RX branches are supported, otherwise 1.****Observation 3 A REFSENS relaxation of 1.7dB for HD-FDD and 2.5dB for FD-FDD and TDD, referred to the values in TS 38.101-1 Table 7.3.2-1, can be used as a starting point for RedCap supporting single RX branch.****Observation 4 For RedCap supporting 2 RX the REFSENS values can be re-used from TS 38.101-1 Table 7.3.2-1.****Observation 5 The limited antenna volume for some of the use cases for RedCap has to be taken into account when defining OTA requirements for RedCap.** |
| [**R4-2112912**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112912.zip) | ZTE Corporation | **Proposal 1. REFSENS requirements for RedCap UE should be defined for FD-FDD and HD-FDD separately.** **Proposal 2. Using a simply way like formula to define the REFSENS requirement for types of RedCap UE.****Proposal 3. For FR1 bands are designed for FR1 RedCap UE:** * **For single Rx FD-FDD/TDD REFSENS: Existing 2Rx REFSENS + [2.5]dB**
* **For single Rx HD-FDD REFSENS: Existing 2Rx REFSENS + [1.7]dB**
* **For 2Rx+HD-FDD REFSENS: Existing 2Rx REFSENS + [0.8]dB**
 |
| [**R4-2112985**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112985.zip) | vivo | **Proposal 1: Select the defined 2Rx requirements as baseline, further define RedCap 1 Rx requirements with a reasonable relaxation value.****Proposal 2: For RedCap UE with FD-FDD and TDD mode, the relaxation value should be [3]dB as a starting point.****Proposal 3: For HD-FDD, consider the improvement due to non-Tx-interaction and removed insertion loss of duplexer. The relaxation value should be further studied.**  |
| [**R4-2113101**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2113101.zip) | Xiaomi | **Proposal 1: RAN4 could define a relaxation value ΔRIB, 1R for the reference sensitivity of 1Rx and HD-FDD with 1 Rx based on the existing single carrier requirement for 2 Rx.****Proposal 2: The reference sensitivity relaxation for FR1 Redcap UE with 1Rx could be specified as below tables:**Table 2.1-2: One antenna port reference sensitivity allowance ΔRIB, 1R

|  |  |  |
| --- | --- | --- |
| NR Band | ΔRIB,1R [dB] | Duplexer mode |
| nX, …, | 3 | FDD |
| nY, …, | 2.5 | TDD |
| nZ, …, | 1.7 | HD-FDD |

**Proposal 3: The reference sensitivity for HD-FDD with 2Rx could reuse the existing single carrier requirement of 2 Rx.****Proposal 4:** **The uplink configuration for reference sensitivity of 1Rx and HD-FDD mode could reuse the uplink configuration for reference sensitivity of 2Rx with the channel bandwidth of 5MHz, 10MHz, 15MHz, and 20MHz.** |
| **R4-2113408** | Huawei, HiSilicon | **Observation 1: Based on the current specification, the REFSENS for two antenna ports is baseline. ΔRIB,4R****is used to derive the REFSENS for four antenna ports.****Proposal 1: The original assumptions can be reused for parameters NF/ SNR/IM and there is no need to consider the sensitivity degradation since the duplex distances are same as LTE for all FDD bands.****Proposal 2: Current REFSENS requirements for two antenna ports can be reused for all the bands of RedCap UE.****Proposal 3: To specify ΔRIB,1R = 3 for bands that RedCap UE supports one Rx antenna port**. |
| [**R4-2114075**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114075.zip) | Nokia, Nokia Shanghai Bell | **Proposal 2: The single carrier reference sensitivity power level requirements for a RedCap UE with 1 Rx branch are determined based on a simulation campaign for DL channel bandwidths and UL transmission bandwidths up to 20 MHz.****Proposal 3: The DL fixed reference channels for FDD and TDD for different modulation formats are reused with a limit of 20 MHz on the channel bandwidth.****Proposal 4: For bands where legacy NR UE is required with 4 Rx antenna ports, the single carrier reference sensitivity power level requirements specified for 2 antenna ports are also applicable for a RedCap UE with 2 Rx branches.****Proposal 5: No new reference sensitivity power level requirements are specified for a RedCap UE with 1 branch for CA, NR-DC, SUL, and V2X.** |
| [**R4-2114341**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114341.zip) | Ericsson | **Proposal#6: Consider the diversity gain of 3 dB adjustment for RedCap UE in FR1 with single RX antenna port.****Proposal#7: For the frequency band mandating to have 4 RX antenna port, the REFSENS for RedCap UE equipped with 2 RX antenna ports should be based on 2 RX antenna ports REFSENS for legacy NR UE.****Proposal#8: Consider the ΔIM modification in Table 1 for 2 RX antenna port REFSENS for RedCap UE operating in HD-FDD mode.****Proposal#9: Consider adjusting diversity gain from 3 dB additionally for 1 RX antenna port REFSENS for RedCap UE operating in HD-FDD mode.** |

## 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 4-1

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 4-1: REFSENS for 1 RX RedCap UE**

* Proposals: Magnitude of gain adjustment compared to REFSENS of 2 RX NR FD-FDD and TDD
	+ Option 1: Reuse the constant gain adjustment of LTE Cat-1bis 2Rx to 1 Rx REFSENS [Apple]

|  |  |
| --- | --- |
| Duplex Mode | 1Rx and 2Rx REFSENS difference (dB) |
| 5 MHz | 10 MHz | 15 MHz | 20 MHz |
| FDD | 2.5 | 3 | 3 | 3 |
| TDD | 2.5 | 2.5 | 2.5 | 2.5 |

* + Option 2: Apply 2.5 dB for FD-FDD and TDD. [Sony, ZTE]
	+ Option 3: Apply 3 dB for FD-FDD and 2.5 dB for TDD [Xiaomi]
	+ Option 3: Constant 3dB gain relaxation [ Vivo, Huawei, Ericsson]
* Recommended WF
	+ TBA

### Sub-topic 4-2

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 4-2: 2 RX RedCap UE in HD-FDD mode**

* Proposals
	+ Option 1: [Apple]
		- For all NR FDD bands, the 5MHz REFSENS requirements defined for full-duplex operation can be reused for half-duplex operation.
		- HD-FDD REFSENS for channel BW wider than 5 MHz can be calculated by REFSENS(5MHz) + 10log10(n x NRB/25), where NRB is the maximum transmission bandwidth configuration with n=1 for 15kHz SCS and n=2 for 30kHz SCS.
	+ Option 2: Relaxation of 0.8 dB of 2 RX REFSENS of NR FDD band[ ZTE]
	+ Option 3: Reuse the 2 RX REFSENS of NR FDD band [Xiaomi]
	+ Option 3: [Ericsson]
		- Consider the ΔIM modification in Table 1 for 2 RX antenna port REFSENS for RedCap UE operating in HD-FDD mode.
	+ Option 4: FFS [Vivo]
* Recommended WF
	+ TBA

### Sub-topic 4-3

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 4-3: 1 RX RedCap UE in HD-FDD mode**

* Proposals
	+ Option 1: Relaxation of 1.7 dB of 2 RX NR FDD band REFSENS[Sony, ZTE, Xiaomi]
	+ Option 2: [Ericsson]
		- Consider the ΔIM modification in Table 1 for 2 RX antenna port REFSENS for RedCap UE operating in HD-FDD mode.
		- Consider adjusting diversity gain from 3 dB additionally for 1 RX antenna port REFSENS for RedCap UE operating in HD-FDD mode.
	+ Option 3: FFS [Vivo]
* Recommended WF
	+ TBA

### Sub-topic 4-4

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 4-4: Uplink Configuration for RedCap UE**

* Proposals
	+ Option 1: UL configuration for HD-FDD REFSENS requirements is specified with full allocation.
	+ Option 2: The uplink configuration for reference sensitivity of 1Rx and HD-FDD mode could reuse the uplink configuration for reference sensitivity of 2Rx with the channel bandwidth of 5MHz, 10MHz, 15MHz, and 20MHz.
	+ Option 3: FFS
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Example 1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| 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** | *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 #2: Other RX requirement in FR1

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2112912**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112912.zip) | ZTE Corporation | ZTE CorporationMaximum input levelProposal 4. Maximum input level requirements shall be kept unchanged for both 1Rx and 2Rx RedCap UE.ACSProposal 5. ACS requirements shall be kept unchanged for both 1Rx and 2Rx RedCap UE.Blocking, Spurious response, Rx IMProposal 6. Blocking, Spurious response and Rx IM requirements shall be kept unchanged for both 1Rx and 2Rx RedCap UE.Spurious emissionsProposal 7. Spurious emissions requirements shall be kept unchanged for both 1Rx and 2Rx RedCap UE. |
| [**R4-2113101**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2113101.zip) | Xiaomi | **Proposal 5: NR UE Rx requirements other than Reference sensitivity could be reused for Redcap UE.** |
| **R4-2114075** | Nokia, Nokia Shanghai Bell | **Proposal 6: The single carrier maximum input level requirements specified for NR UE are also applicable to RedCap UE.****Proposal 7: The single carrier ACS requirements and spurious emissions requirements specified for NR UE are also applicable to RedCap UE.****Proposal 8: The test parameters for measuring ACS, blocking characteristics, spurious response, and intermodulation characteristics specified for NR UE are also applicable to RedCap UE where the single carrier REFSENS values are the corresponding values specified for RedCap UE.** |
|  |  |  |

## 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 5-1

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 5-1: ACS, maximum input level, Blocking, Spurious response, Rx IM,** **Spurious emissions**

* Proposals
	+ Option 1: Reuse the current NR requirement
	+ Option 2: Reuse the current NR requirement and test parameters with RedCap UE REFSENS
	+ Option 3: TBA
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Example 1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| 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** | *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 #2: FR2 aspects

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2112891**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112891.zip) | Sony | **Observation 1 A discussion of reduced device complexity in FR2 have to start with clear use case descriptions.****Observation 2 New power class may be needed for RedCap devices in FR2.**RF architecture* Reduction of RX branches: A simplification of only the baseband architecture, to a single baseband RX (rank 1) may be possible, where benefit of dual polarized antennas in RF domain (diversity gain and possibility to have dual PA) could be maintained
* Reduction of the number of elements in the antenna panel: Specification implication would be relaxed receiver sensitivity and relaxed peak EIRP requirement.
* Reduction of the number of antenna panels: Reduction of the number of antenna panels (i.e., reduced spherical coverage area (%-tile) requirement) could be attractive for some user scenarios
 |
| [**R4-2112984**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2112984.zip) | vivo | **Observation 1**: Min. number of receiver branches is 1, for both FR1 and FR2 RedCap UE.**Proposal 1: RAN4 confirm that the 1 Rx branch is for both FR1 and FR2 RedCap UE****Observation 2**: Tx polarization gain was considered to derive FR2 transmit power requirements.**Proposal 2: The defined values in TS 38.101-2 for transmit power can not be reused for RedCap, [3]dB gain drop need to be considered.** |
| [**R4-2113102**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2113102.zip) | Xiaomi | **Proposal 1: Add new suffix in TS 38.101-2 for Redcap UE requirements and define two types of Redcap UE in new suffix as table 2-1.****Table 2-1 Assumption of Redcap UE types**

|  |  |
| --- | --- |
| **UE Power class** | **Redcap UE type** |
| 1 | Fixed wireless access (FWA) UE |
| 2 | Wearable UE |

**Table 2-2 the characteristics of three use cases for Redcap UE**

|  |  |  |
| --- | --- | --- |
| Use cases | Specific characteristics | General characteristics |
| Industrial wireless sensors | The device is stationaryThe battery should last at least few years | Lower cost and complexitySmall and compact form factorSupporting all FR1/FR2 bands for FDD and TDD |

**Proposal 2: The Rx branch for FR2 Redcap UE can be reduced from two panels to one panel.****Proposal 3: Define the power class for Redcap UE as table 2-2 based on the max TRP limit of 23dBm and max EIRP limit of 43dBm and 4-element assumption, spherical coverage requirement could be defined based on one panel.****Table 2-2 Power class for Redcap UE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **UE type** | **Power class** | **Max TRP** | **Max EIRP** | **Min peak EIRP** | **Spherical coverage** |
| FWA UE | 1 | 23dBm | 43dBm | Reuse normal PC3 | FFS @85% with one panel |
| Wearable UE | 2 | 23dBm | 43dBm | Reuse normal PC3 | FFS @50% with one panel |

**Proposal 4: Other Tx requirements can reuse the requirements of normal PC3 UE.****Proposal 5: For the Rx requirements of Redcap UE** * **Reference sensitivity can reuse the value of normal PC3 handheld UE.**
* **EIS spherical coverage can be defined as Reference sensitivity plus the difference value of min peak EIRP and min EIRP spherical coverage.**
* **Other Rx requirements can reuse the requirements of normal UE.**
 |
| [**R4-2114076**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114076.zip) | Nokia, Nokia Shanghai Bell | **Observation 1: The NR reference sensitivity power level requirements are based on reception with two orthogonal polarizations.****Observation 2: The NR reference sensitivity power level requirements are agnostic to the number of antenna panels.****Observation 3: Reducing the minimum number of Rx branches to 1 for RedCap UE at FR2 corresponds to a single antenna panel.****Observation 4: Reducing the minimum number of Rx branches to 1 for RedCap UE at FR2 may have impact on both transmitter and receiver RF characteristics.****Proposal 1: Reducing the minimum number of Rx branches to 1 at FR2 is interpreted as reception with a single polarization.** |
| [**R4-2114342**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114342.zip) | Ericsson | **Observation-1: Percentile of Spherical coverage for min EIRP and EIS is related to the FR2 UE use case.****Proposal-1: Spherical coverage needs to be revisited based on the operator use case input**.**Observation 2: The polarization gain is band specific and reducing the polarization gain impact both the minimum Peak EIRP and REFSENS.****Observation 3: RAN1 does not prioritize to reduce number of UE (physical) antenna elements and panels in FR2.** |

## 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 6-1

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 6-1: Use case for RedCap UE**

* Proposals
	+ Option 1: consider the below use case for RedCap UE in FR2
* **Table 2-2 the characteristics of three use cases for Redcap UE**

|  |  |  |
| --- | --- | --- |
| Use cases | Specific characteristics | General characteristics |
| Industrial wireless sensors | The device is stationaryThe battery should last at least few years | Lower cost and complexitySmall and compact form factorSupporting all FR1/FR2 bands for FDD and TDD |
| Video surveillance | The device has low mobility |
| Wearables | The battery should last multiple days |

* + Option 2: TBA
* Recommended WF
	+ TBA

### Sub-topic 6-2

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 6-2: new RedCap UE type**

* Proposals
	+ Option 1: Add new suffix in TS 38.101-2 for Redcap UE requirements and define two types of Redcap UE in new suffix as table 2-1.

**Table 2-1 Assumption of Redcap UE types**

|  |  |
| --- | --- |
| **UE Power class** | **Redcap UE type** |
| 1 | Fixed wireless access (FWA) UE |
| 2 | Wearable UE |

* + Option 2: TBA
* Recommended WF
	+ TBA

### Sub-topic 6-3

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 6-3: Power class for RedCap UE in FR2**

* Proposals
	+ Option 1: New power class may be needed
	+ Option 2: Define the power class for Redcap UE as table 2-2 based on the max TRP limit of 23dBm and max EIRP limit of 43dBm and 4-element assumption, spherical coverage requirement could be defined based on one panel.

**Table 2-2 Power class for Redcap UE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **UE type** | **Power class** | **Max TRP** | **Max EIRP** | **Min peak EIRP** | **Spherical coverage** |
| FWA UE | 1 | 23dBm | 43dBm | Reuse normal PC3 | FFS @85% with one panel |
| Wearable UE | 2 | 23dBm | 43dBm | Reuse normal PC3 | FFS @50% with one panel |

* + Option 3: TBA
* Recommended WF
	+ TBA

### Sub-topic 6-4

*Sub-topic description*

*Open issues and candidate options before e-meeting:*

**Issue 6-4: RF architecture for RedCap UE in FR2**

* Proposals
	+ Option 1: Reduction of RX branches: A simplification of only the baseband architecture, to a single baseband RX (rank 1) [Ericsson]
	+ Option 2: Reduction of the number of elements in the antenna panel
	+ Option 3: Reduction of the number of antenna panels [Xiaomi, Nokia]
* Recommended WF
	+ TBA

### Sub-topic 6-5

*Sub-topic description*

TX requirement impact may need to be evaluated depending which RF architecture in issue 6-4 that RAN4 would reach consensus, just for discussion purpose, the impact TX requirement is listed also according to companies preference on different RF architecture.

*Open issues and candidate options before e-meeting:*

**Issue 6-4: TX requirements for RedCap UE in FR2**

* Proposals
	+ Option 1: No TX requirement impact if only baseband branch is reduced.
	+ Option 2: Peak EIRP TX requirement would be impacted if antenna element is reduced.
	+ Option 3: Spherical coverage may be impacted if antenna panel is reduced.
* Recommended WF
	+ TBA

### Sub-topic 6-6

*Sub-topic description*

RX requirement impact may need to be evaluated depending which RF architecture in issue 6-4 that RAN4 would reach consensus, just for discussion purpose, the impact RX requirement is listed also according to companies preference on different RF architecture.

*Open issues and candidate options before e-meeting:*

**Issue 6-4: RX requirements for RedCap UE in FR2**

* Proposals
	+ Option 1:
		- Reference sensitivity can reuse the value of normal PC3 handheld UE.
		- EIS spherical coverage can be defined as Reference sensitivity plus the difference value of min peak EIRP and min EIRP spherical coverage.
		- Other Rx requirements can reuse the requirements of normal UE.
	+ Option 2: EIS and REFSENS could be impacted.
	+ Option 3: TBA
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Example 1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| 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** | *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 #7: Half-duplex FDD switching time

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2114073**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114073.zip) | Nokia, Nokia Shanghai Bell | Proposal 1: The Rx-Tx switching time for HD-FDD RedCap UE is 13 µs. |
| [**R4-2114340**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114340.zip) | Ericsson | Observation 1: The benefit of additional TX/RX switching delay to allow switching ON/OFF one of the two PLLs is unclear for the RedCap use cases. Observation 2: UE complexity reduction techniques and UE power saving techniques are part of different, non-overlapping objectives. Proposal 1: FR1 transition time in Table 4.3.2-3 in TS 38.211 applies to Type A HD-FDD device Tx-Rx switching (transition) time. |
| [**R4-2113406**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2113406.zip) | Huawei, HiSilicon | RAN4 confirms that RAN1’s working assumptions about transition time are applied for RedCap UE not capable of full-duplex and not supporting simultaneous transmission and reception as defined by parameter simultaneousRxTxSUL, e.g. HD-FDD operation, TDD operation, non-simultaneous RxTx for SUL band combinations. |

## 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 7-1

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 7-1: RX-TX switching time**

* Proposals
	+ Option 1: The Rx-Tx switching time for HD-FDD RedCap UE is 13 µs.
	+ Option 2: TBA
* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

**Example 1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |

**Example 2**

Sub topic 1-1

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

Sub topic 1-2

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

### 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** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| 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** | *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 #2: CR on RedCap UE FR1-TX

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2114343**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114343.zip) | Ericsson | Inroduce the new suffix G in 4.3; introduce new operating band chapter for RedCap; introduce RedCap UE bandwidth in note of 5.3.5; introduce the power class chapter for Redcap UE in 6.2.1G |

## Open issues summary

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

Companeies could provide the comments directly in 8.3.2

## Companies views’ collection for 1st round

### Open issues

**Example 1**

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1: Sub topic 1-2:….Others: |

### 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** |
| [**R4-2114343**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_100-e/Docs/R4-2114343.zip) | Company A |
| Company B |
|  |
| YYY | Company A |
| 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** | *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”.*

# 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

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
|  |  |  |

Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)