**3GPP TSG-RAN WG4 Meeting # 102-e R4-2207070**

**Electronic Meeting, 21 Feb. – 03 March, 2022**

**Agenda item:** 10.20.3.2; 10.20.3.3 & 10.20.3.4

**Source:** Moderator (vivo)

**Title:** Email discussion summary for [229] NR\_redcap\_RRM\_2

**Document for:** Information

# Introduction

This email discussion is for R17 NR RedCap WI and the scope covers the following agenda items:

* AI 10.20.3.2 Extended DRX enhancements
* AI 10.20.3.3 RRM measurement relaxations
* AI 10.20.3.4 Others except for contributions related to NCD-SSB

Based on the latest approved WI in [RP-211574], the objectives of the WI for the above AIs are duplicated as below:



During email discussion companies are encourages to:

* Provide comments on all interested topics/sub-topics at one time
* Ensure that comments are based on the latest version of the document by checking the folder before uploading
* Use “Track changes” to help identify added comments/changes
* Based on meeting guidance from RAN4 chair when changing the file name, adding your company name

[R4-2203590](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203590.zip) and related proposals from [R4-2205409](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205409.zip), [R4-2205629](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205629.zip) and R4-2206078 are treated in section 3 as well.

# Topic #1: Extended DRX enhancements

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| T-doc number | Company | Proposals / Observations |
| [R4-2203588](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203588.zip) | ZTE Corporation | Proposal 1: Do not use M1 when DRX = 0.32 and 0.64s.  **Proposal 2: Do not use M2 when DRX = 0.32s (follow agreement for M1).** |
| R4-2203790 | Apple | ***Proposal 1: keep M1 in the FR1/FR2 Nserv when DRX = 0.32 and 0.64s:***   1. ***M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle≤ 0.64s,*** 2. ***otherwise M1=1.***   ***Proposal 2: define serving cell requirements for eDRX length larger than 10.24s as below,***   1. ***FR1 Nserv for 10.24s<eDRX cycle≤10485.76s***  |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR1* | *Nserv [number of DRX cycles]* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 1.28 (1)*** | ***1*** | ***M1\*N1\*2*** | | ***0.64*** | ***≥ 1.28 (1) (M1=1) or ≥ 2.56 (2) (M1=2)*** | ***M1\* N1\*2*** | | ***1.28*** | ***≥ 2.56 (2)*** | ***N1\*2*** | | ***2.56*** | ***≥ 5.12 (4)*** | ***N1\*2*** | | ***Note 1: PTW length is derived based on***  ***Note 2: M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle≤ 0.64s, otherwise M1=1.*** | | | | |  1. ***FR2 Nserv for 10.24s<eDRX cycle≤10485.76s***  |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR2* | *Nserv [number of DRX cycles]* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 5.12 (4) (M1=1) or ≥ 10.24 (8) (M1=2)*** | ***8*** | ***M1\*N1\*2*** | | ***0.64*** | ***≥ 6.4 (5) (M1=1) or ≥ 12.8 (10) (M1=2)*** | ***5*** | ***M1\*N1\*2*** | | ***1.28*** | ***≥ 10.24 (8)*** | ***4*** | ***N1\*2*** | | ***2.56*** | ***≥ 15.36 (12)*** | ***3*** | ***N1\*2*** | | ***Note 1: PTW length is derived based on***  ***Note 2: M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle≤ 0.64s, otherwise M1=1.*** | | | | |   ***Proposal 3: keep M2 in the FR1/FR2 intra-frequency cell reselection requirement when DRX = 0.32:***   * ***M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms,*** * ***otherwise M2=1.***   ***Proposal 4: No need to split PTW to 2 gears for small DRX cycle (0.32s and 0.64s) when defining requirements.***  ***Proposal 5: For both FR1 and FR2,***   * ***the lower bound of PTW length in intra-frequency cell measurement of IDLE mode is .*** * ***the lower bound of PTW length in inter-frequency cell measurement of IDLE mode is .***   ***Proposal 6: the intra-frequency cell measurement requirement with eDRX for RedCap UE in IDLE mode is as followings, and same requirement applies to inter-frequency case except M2.***  ***FR1 Tdetect,EUTRAN\_Intra, Tmeasure,EUTRAN\_Intra and Tevaluate,E-UTRAN\_intra  when eDRX<= 10.24s***   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *Scaling Factor (N1) FR1* | *Tdetect,NR\_Intra [s] (number of eDRX cycles)* | *Tmeasure,NR\_Intra [s] (number of eDRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of eDRX cycles)* | | ***2.56*** | ***1*** | ***58.88 x N1 (23 x N1)*** | ***2.56 x N1 (1 x N1)*** | ***7.68 x N1 (3 x N1)*** | | ***5.12*** | ***102.4 x N1 (20 x N1)*** | ***5.12 x N1 (1 x N1)*** | ***10.24 x N1 (2 x N1)*** | | ***10.24*** | ***102.4 x N1 (10 x N1)*** | ***10.24 x N1 (1 x N1)*** | ***20.48 x N1 (2 x N1)*** |   ***FR1 Tdetect,EUTRAN\_Intra, Tmeasure,EUTRAN\_Intra and Tevaluate,E-UTRAN\_intra  when eDRX≥ 20.48s***   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *FR1 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of DRX cycles)* | *Tmeasure,NR\_Intra [s] (number of DRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of DRX cycles)* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 1.28 (1)*** | ***1*** |  | ***0.32 x N1 x M2 (1 x N1 x M2)*** | ***0.64 x N1 x M2 (2 x N1 x M2)*** | | ***0.64*** | ***≥ 1.28 (1)*** | ***0.64 x N1 (1 x N1)*** | ***1.28 x N1 (2 x N1)*** | | ***1.28*** | ***≥ 2.56 (2)*** | ***1.28 x N1 (1 x N1)*** | ***2.56 x N1 (2 x N1)*** | | ***2.56*** | ***≥ 5.12 (4)*** | ***2.56 x N1 (1 x N1)*** | ***5.12 x N1 (2 x N1)*** | | ***Note 1: PTW length is derived based on***  ***Note 2: M2=1.5 if SMTC periodicity of measured intra-frequency cell > 20 m and DRX cycle=0.32s, otherwise M2=1.*** | | | | | | |   ***FR2 Tdetect,EUTRAN\_Intra, Tmeasure,EUTRAN\_Intra and Tevaluate,E-UTRAN\_intra  when eDRX<= 10.24s***   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *FR2 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of eDRX cycles)* | *Tmeasure,NR\_Intra [s] (number of eDRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of eDRX cycles)* | | ***2.56*** | ***3*** | ***58.88 x N1 (23 x N1)*** | ***2.56 x N1 (1 x N1)*** | ***7.68 x N1 (3 x N1)*** | | ***5.12*** | ***102.4 x N1 (20 x N1)*** | ***5.12 x N1 (1 x N1)*** | ***10.24 x N1 (2 x N1)*** | | ***10.24*** | ***102.4 x N1 (10 x N1)*** | ***10.24 x N1 (1 x N1)*** | ***20.48 x N1 (2 x N1)*** |   ***FR2 Tdetect,EUTRAN\_Intra, Tmeasure,EUTRAN\_Intra and Tevaluate,E-UTRAN\_intra  when eDRX ≥ 20.48s***   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *FR2 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of DRX cycles)* | *Tmeasure,NR\_Intra [s] (number of DRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of DRX cycles)* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 5.12 (4) (M2=1) or ≥ 7.68 (6) (M2=1.5)*** | ***8*** |  | ***0.32 x N1 x M2 (1 x N1 x M2)*** | ***0.64 x N1 x M2 (2 x N1 x M2)*** | | ***0.64*** | ***≥ 6.4 (5)*** | ***5*** | ***0.64 x N1 (1 x N1)*** | ***1.28 x N1 (2 x N1)*** | | ***1.28*** | ***≥ 10.24 (8)*** | ***4*** | ***1.28 x N1 (1 x N1)*** | ***2.56 x N1 (2 x N1)*** | | ***2.56*** | ***≥ 15.36 (12)*** | ***3*** | ***2.56 x N1 (1 x N1)*** | ***5.12 x N1 (2 x N1)*** | | ***Note 1: PTW length is derived based on***  ***Note 2: M2=1.5 if SMTC periodicity of measured intra-frequency cell > 20 m and DRX cycle=0.32s, otherwise M2=1.*** | | | | | | |   ***Proposal 7: the measurement cycle for inactive mode requirement with eDRX shall be specified based on the paging monitoring cycle of T from RAN2 agreements summarized in table 1.***  Table 1. Summary of RAN2 agreement for paging monitoring cycle T   |  |  |  |  | | --- | --- | --- | --- | | IDLE eDRX[s] | Inactive eDRX[s] | Outside CN PTW or during CN PTW | T | | >10.24 | Not configured | During CN PTW | Shortest value of default paging cycle and UE specific DRX cycle if configured by upper layer | | >10.24 | Not configured | Outside CN PTW | RAN paging cycle. | | >10.24 | ≤10.24 | During CN PTW | Shortest value of default paging cycle and UE specific DRX cycle if configured by upper layer | | >10.24 | ≤10.24 | Outside CN PTW | INACTIVE eDRX cycle | | ≤10.24 | Not configured | NA | Shortest of RAN paging cycle and IDLE eDRX cycle | | ≤10.24 | ≤10.24 | NA | The shortest of IDLE eDRX cycle and INACTIVE eDRX cycle. | |
| R4-2204246 | Xiaomi | Proposal 1: For FR2 eDRX requirements:   * N1=3 for UE configured with eDRX\_IDLE cycle no longer than 10.24s, e.g. 10.24s, 5.12s, 2.56s; * Keep the legacy N1 value of FR2 for UE configured with eDRX\_IDLE cycle larger than 10.24s.   Proposal 2: RAN4 to define the measurement requirements inactive mode UE configured with eDRX based on the paging monitoring cycle of T agreed in RAN2.   |  |  |  |  | | --- | --- | --- | --- | | IDLE eDRX[s] | Inactive eDRX[s] | Outside CN PTW or during CN PTW | T | | >10.24 | Not configured | During CN PTW | Shortest of UE specific DRX cycle, if configured by upper layer, RAN paging cycle and default paging cycle | | >10.24 | Not configured | Outside CN PTW | RAN paging cycle | | >10.24 | ≤10.24 | During CN PTW | Shortest of UE specific DRX cycle, if configured by upper layer, INACTIVE eDRX cycle and default paging cycle. | | >10.24 | ≤10.24 | Outside CN PTW | INACTIVE eDRX cycle | | ≤10.24 | Not configured | NA | shortest of RAN paging cycle and IDLE eDRX cycle | | ≤10.24 | ≤10.24 | NA | Shortest of IDLE eDRX cycle and INACTIVE eDRX cycle; i.e., INACTIVE eDRX cycle | |
| R4-2204285 | OPPO | Proposal 1: For RRC\_IDLE RedCap UE, serving cell requirements for eDRX length larger than 10.24s could be specified as Table 1 and Table 2.  **Table 1: Nservfor UE configured with eDRX\_IDLE cycle for FR1**   |  |  |  |  | | --- | --- | --- | --- | | eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | Nserv [number of DRX or eDRX cycles Note 3] | | 2.56 | N/A | N/A | 2 | | 5.12 | N/A | N/A | 2 | | 10.24 | N/A | N/A | 2 | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥1.28 (1) | M1\*2 | | 0.64 | ≥1.28 (1) | M1\*2 | | 1.28 | ≥2.56 (2) | 2 | | 2.56 | ≥5.12 (4) | 2 |   **Table 2: Nservfor UE configured with eDRX\_IDLE cycle for FR2**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | Scaling Factor (N1) | Nserv [number of DRX or eDRX cycle] | | 2.56 | N/A | N/A | 3 | N1\*2 | | 5.12 | N/A | N/A | N1\*2 | | 10.24 | N/A | N/A | N1\*2 | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥5.12 (4) | 8 | M1\*N1\*2 | | 0.64 | ≥6.4 (5) | 5 | M1\*N1\*2 | | 1.28 | ≥10.24 (8) | 4 | N1\*2 | | 2.56 | ≥15.36 (12) | 3 | N1\*2 | |
| R4-2204325 | vivo | **Observation 1: the number of measurements for Nserv does not need be finished within one eDRX cycle. How many samples collected within one PTW window are defined. Based on it, how many eDRX cycle where Nserv can be finished depends on the configuration of PTW window within one eDRX cycle.**  **Proposal 1: For the open issues for parameters for the serving cell eDRX requirements, use N1 = 3 when eDRX <= 10.24s; consider use M1 and N1 = [8 5 4 3] for DRX [ 0.32 0.64 1.28 2.56]ms when eDRX>10.24s.**  **Proposal 2: suggest the performance requirements are defined below for remaining requirements for Nserv for FR1 and FR2 respectively:**  **Nserv for eDRX length up to 10.24s (FR2)**   |  |  |  | | --- | --- | --- | | *eDRX cycle length [s]* | *FR2 Scaling Factor (N1)* | *Nserv [number of eDRX cycles]* | | ***2.56*** | ***3*** | ***N1\*2*** | | ***5.12*** | | ***10.24*** |   *FR1 Nserv for 10.24s<eDRX cycle≤10485.76s*   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR1* | *Nserv [number of DRX cycles]* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ≥1.28\*M1 (1\*M1) | ***1*** | ***N1\*2\*M1*** | | ***0.64*** | ≥1.28\*M1 (1\*M1) | ***N1\*2\*M1*** |   *FR2 Nserv for 10.24s<eDRX cycle≤10485.76s*   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR2* | *Nserv [number of DRX cycles]* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | *≥5.12\*M1 (4*\*M1*)* | *8* | ***N1\*2\*M1*** | | ***0.64*** | *≥6.4\*M1 (5*\*M1*)* | *5* | ***N1\*2\*M1*** | | ***1.28*** | *≥10.24 (8)* | *4* | ***N1\*2*** | | ***2.56*** | *≥15.36 (12)* | *3* | ***N1\*2*** |   **Proposal 3: For the open issues for parameters for the cell reselection for eDRX requirements, consider use M2 when DRX = 0.32s, N1 = [8 5 4 3] for DRX [ 0.32 0.64 1.28 2.56]ms when eDRX>10.24s and do not consider split PTW to 2 gears.**  **Proposal 4: FR1 and FR2 intra-frequency cell reselection requirements for Redcap with eDRX:**  **FR1 Cell reselection requirements for RedCap UE**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *Scaling Factor (N1) FR1* | *Tdetect,NR\_Intra [s] (number of eDRX cycles)* | *Tmeasure,NR\_Intra [s] (number of eDRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of eDRX cycles)* | | ***2.56*** | ***1*** | ***58.88 x N1 (23 x N1)*** | ***2.56 x N1 (1 x N1)*** | ***7.68 x N1 (3 x N1)*** | | ***5.12*** | ***117.76 x N1 (23 x N1)*** | ***5.12 x N1 (1 x N1)*** | ***10.24 x N1 (2 x N1)*** | | ***10.24*** | ***235.52 x N1 (23 x N1)*** | ***10.24 x N1 (1 x N1)*** | ***20.48 x N1 (2 x N1)*** |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *FR1 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of DRX cycles)* | *Tmeasure,NR\_Intra [s] (number of DRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of DRX cycles)* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥1.28\*M2 (1\*M2)*** | ***1*** | ***(23)*** | ***0.32 x N1\*M2 (1 x N1\*M2)*** | ***0.64 x N1 \*M2 (2 x N1\*M2)*** | | ***0.64*** | ***≥1.28 (1)*** | ***0.64 x N1 (1 x N1)*** | ***1.28 x N1 (2 x N1)*** | | ***1.28*** | ***≥2.56 (2)*** | ***1.28 x N1 (1 x N1)*** | ***2.56 x N1 (2 x N1)*** | | ***2.56*** | ***≥5.12 (4)*** | ***2.56 x N1 (1 x N1)*** | ***5.12 x N1 (2 x N1)*** |   **FR2 Cell reselection requirements for RedCap UE**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *FR2 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of eDRX cycles)* | *Tmeasure,NR\_Intra [s] (number of eDRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of eDRX cycles)* | | ***2.56*** | ***3*** | ***58.88 x N1 (23 x N1)*** | ***2.56 x N1 (1 x N1)*** | ***7.68 x N1 (3 x N1)*** | | ***5.12*** | ***102.4 x N1 (23 x N1)*** | ***5.12 x N1 (1 x N1)*** | ***10.24 x N1 (2 x N1)*** | | ***10.24*** | ***153.6 x N1 (23 x N1)*** | ***10.24 x N1 (1 x N1)*** | ***20.48 x N1 (2 x N1)*** |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *FR2 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of DRX cycles)* | *Tmeasure,NR\_Intra [s] (number of DRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of DRX cycles)* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥5.12 (4\*M2)*** | ***8*** | ***(23)*** | ***0.32 x N1\*M2 (1 x N1\*M2)*** | ***0.64 x N1\*M2 (2 x N1\*M2)*** | | ***0.64*** | ***≥6.4 (5)*** | ***5*** | ***0.64 x N1 (1 x N1)*** | ***1.28 x N1 (2 x N1)*** | | ***1.28*** | ***≥10.24 (8)*** | ***4*** | ***1.28 x N1 (1 x N1)*** | ***2.56 x N1 (2 x N1)*** | | ***2.56*** | ***≥15.36 (12)*** | ***3*** | ***2.56 x N1 (1 x N1)*** | ***5.12 x N1 (2 x N1)*** |   **Proposal 5: when idle eDRX is longer than 10.24s, prefer the inactive UE requirements are based on inactive DRX or inactive eDRX when inactive eDRX is configured, i.e., option 1.**  **Proposal 6: when idle eDRX is no longer than 10.24s, prefer the inactive UE requirements are based on inactive eDRX or inactive DRX when inactive eDRX is not configured, i.e., option 1.**  **Proposal 7: Define inactive state serving cell and intra-frequency measurement requirements as table below:**  Inactive state Nserv when idle state eDRX 2.56<eDRX cycle≤10485.76s FR1   |  |  |  | | --- | --- | --- | | *eDRX cycle length [s]* | *Scaling Factor (N1) FR1* | *Nserv [number of eDRX cycles]* | | ***2.56*** | ***1*** | ***N1\*2*** | | ***5.12*** | | ***10.24*** |   Inactive state Nserv when idle state eDRX 2.56<eDRX cycle≤10485.76s FR2   |  |  |  | | --- | --- | --- | | *eDRX cycle length [s]* | *Scaling Factor (N1) FR2* | *Nserv [number of eDRX cycles]* | | ***2.56*** | ***3*** | ***N1\*2*** | | ***5.12*** | | ***10.24*** |   Inactive state Tdetect,EUTRAN\_Intra, Tmeasure,EUTRAN\_Intra and Tevaluate,E-UTRAN\_intra when idle state eDRX 2.56<eDRX cycle≤10485.76s FR1   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *FR1 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of eDRX cycles)* | *Tmeasure,NR\_Intra [s] (number of eDRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of eDRX cycles)* | | ***2.56*** | ***1*** | ***58.88 x N1 (23 x N1)*** | ***2.56 x N1 (1 x N1)*** | ***7.68 x N1 (3 x N1)*** | | ***5.12*** | ***102.4 x N1 (20 x N1)*** | ***5.12 x N1 (1 x N1)*** | ***15.36 x N1 (3 x N1)*** | | ***10.24*** | ***153.6 x N1 (15 x N1)*** | ***10.24 x N1 (1 x N1)*** | ***30.72 x N1 (3 x N1)*** |   Inactive state Tdetect,EUTRAN\_Intra, Tmeasure,EUTRAN\_Intra and Tevaluate,E-UTRAN\_intra when idle state eDRX 2.56<eDRX cycle≤10485.76s FR1   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *FR2 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of eDRX cycles)* | *Tmeasure,NR\_Intra [s] (number of eDRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of eDRX cycles)* | | ***2.56*** | ***3*** | ***58.88 x N1 (23 x N1)*** | ***2.56 x N1 (1 x N1)*** | ***7.68 x N1 (3 x N1)*** | | ***5.12*** | ***102.4 x N1 (20 x N1)*** | ***5.12 x N1 (1 x N1)*** | ***15.36 x N1 (3 x N1)*** | | ***10.24*** | ***153.6 x N1 (15 x N1)*** | ***10.24 x N1 (1 x N1)*** | ***30.72 x N1 (3 x N1)*** |   **Proposal 8: The inter-frequency measurement requirements for inactive state Redcap UE are the same as these of intra-frequency measurement requirements.** |
| R4-2204540 | Nokia, Nokia Shanghai Bell | 1. N1 = 3 for eDRX cycle length ≤ 10.24s. 2. For 20.48s ≤ eDRX cycle length, N1= 8 for DRX= 0.32s; N1 = 5 for DRX=0.64s; N1 = 4 for DRX= 1.28s; N1 = 3 for DRX =2.56s; 3. In FR2, there is limited power saving in the configuration of eDRX cycles equal to 20.48s and 40.96s, when compared to the configuration of eDRX cycles of 5.12s or 10.24s. The exact power saving, though, depends on the exact combination of eDRX and DRX cycle, and our view is that requirements could be specified also for 20.48s and 40.96s eDRX cycles, even if some configurations are not as beneficial as others. 4. Define Nserv for 20.48 ≤ eDRX\_IDLE\_cycle ≤ 10485.76s in FR1 as:  |  |  |  |  |  | | --- | --- | --- | --- | --- | | eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | Scaling Factor (N1) for FR1 | Nserv [number of DRX cycles] | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 1.28 (1) | 1 | N1\*2 | | 0.64 | ≥ 2.56 (2) | N1\*2 | | 1.28 | ≥ 2.56 (2) | N1\*2 | | 2.56 | ≥ 5.12 (4) | N1\*2 |      1. Define Nserv for 20.48 ≤ eDRX\_IDLE\_cycle ≤ 10485.76s in FR2 as:  |  |  |  |  |  | | --- | --- | --- | --- | --- | | eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | Scaling Factor (N1) for FR2 | Nserv [number of DRX cycles] | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 5.12 (4) | 8 | N1\*2 | | 0.64 | ≥ 6.4 (5) | 5 | N1\*2 | | 1.28 | ≥ 10.24 (8) | 4 | N1\*2 | | 2.56 | ≥ 15.36 (12) | 3 | N1\*2 |  1. Define Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra when eDRX\_IDLE\_cycle ≤ 10.24 in FR1 as:  |  |  |  |  |  | | --- | --- | --- | --- | --- | | eDRX cycle length [s] | Scaling Factor (N1) FR1 | Tdetect,NR\_Intra [s] (number of eDRX cycles) | Tmeasure,NR\_Intra [s] (number of eDRX cycles) | Tevaluate,NR\_Intra  [s] (number of eDRX cycles) | | 2.56 | 1 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) | | 5.12 | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 10.24 x N1 (2 x N1) | | 10.24 | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 20.48 x N1 (2 x N1) |  1. Define Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra when when eDRX\_IDLE\_cycle ≤ 10.24 in FR2 as:  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **eDRX cycle length [s]** | **Scaling Factor (N1)** | **Tdetect,NR\_Intra [s] (number of eDRX cycles)** | **Tmeasure,NR\_Intra [s] (number of eDRX cycles)** | **Tevaluate,NR\_Intra**  **[s] (number of eDRX cycles)** | | 2.56 |  | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) | | 5.12 | 3 | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 10.24 x N1 (2 x N1) | | 10.24 |  | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 20.48 x N1 (2 x N1) |  1. Define Tdetect,EUTRAN\_Intra, Tmeasure,EUTRAN\_Intra and Tevaluate,E-UTRAN\_intra  when 20.48 ≤ eDRX cycle in FR1 as:  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | FR1 Scaling Factor (N1) | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 1.28 (1) | **1** | (23) | 0.32 x N1  (1 x N1) | 0.64 x N1  (2 x N1) | | 0.64 | ≥ 1.28 (1) | 0.64 x N1  (1 x N1) | 1.28 x N1  (2 x N1) | | 1.28 | ≥ 2.56 (2) | 1.28 x N1  (1 x N1) | 2.56 x N1  (2 x N1) | | 2.56 | ≥ 5.12 (4) | 2.56 x N1  (1 x N1) | 5.12 x N1  (2 x N1) |  1. Define Tdetect,EUTRAN\_Intra, Tmeasure,EUTRAN\_Intra and Tevaluate,E-UTRAN\_intra  when 20.48 ≤ eDRX cycle in FR2 as:  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | FR1 Scaling Factor (N1) | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 1.28 (1) | 8 | (23) | 0.32 x N1  (1 x N1) | 0.64 x N1  (2 x N1) | | 0.64 | ≥ 1.28 (1) | 5 | 0.64 x N1  (1 x N1) | 1.28 x N1  (2 x N1) | | 1.28 | ≥ 2.56 (2) | 4 | 1.28 x N1  (1 x N1) | 2.56 x N1  (2 x N1) | | 2.56 | ≥ 5.12 (4) | 3 | 2.56 x N1  (1 x N1) | 5.12 x N1  (2 x N1) | |
| R4-2204909 | Huawei, Hisilicon | **Proposal 1: In FR1 for RRC\_IDLE RedCap UE, Nservwhen eDRX\_IDLE cycle is configured can be specified in Table 1, where M1 is applied for eDRX=0.32s and 0.64s.**  Table 1: Nservfor idle UE configured with eDRX\_IDLE cycle in FR1   |  |  |  |  | | --- | --- | --- | --- | | eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | Nserv [number of DRX or eDRX cycles Note 3] | | 2.56 | N/A | N/A | 2 | | 5.12 | N/A | N/A | 2 | | 10.24 | N/A | N/A | 2 | | 10.24 < eDRX\_IDLE cycle length ≤10485.76 | 0.32 | ≥1.28 (1) | 2\*M1 | | 0.64 | ≥2.56 (2) | 2\* M1 | | 1.28 | ≥2.56 (2) | 2 | | 2.56 | ≥5.12 (4) | 2 | | NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.  NOTE 2: The eDRX\_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].  NOTE 3: Number of eDRX cycles when eDRX\_IDLE cycle length equals 2.56s, 5.12s and 10.24s, number of DRX cycles otherwise. | | | |   **Proposal 2: In FR2 for RRC\_IDLE RedCap UE, Nservwhen eDRX\_IDLE cycle is configured can be specified in Table 2. And there is no requirements for the configuration where PTW is smaller than 5.12s.**  Table 2: Nservfor idle UE configured with eDRX\_IDLE cycle in FR2   |  |  |  |  |  | | --- | --- | --- | --- | --- | | eDRX\_IDLE cycle length [s] | Scaling Factor (N1) for FR2 | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | Nserv [number of DRX or eDRX cycles Note 3] | | 2.56 | 3 | N/A | N/A | 2\*N1 | | 5.12 | 3 | N/A | N/A | 2\*N1 | | 10.24 | 3 | N/A | N/A | 2\*N1 | | 10.24 < eDRX\_IDLE cycle length ≤10485.76 | 8 | 0.32 | ≥5.12 (4) | 2\*N1 | | 5 | 0.64 | ≥6.4 (5) | 2\*N1 | | 4 | 1.28 | ≥10.24 (8) | 2\*N1 | | 3 | 2.56 | ≥15.36 (12) | 2\*N1 | | NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.  NOTE 2: The eDRX\_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].  NOTE 3: Number of eDRX cycles when eDRX\_IDLE cycle length equals 2.56s, 5.12s and 10.24s, number of DRX cycles otherwise. | | | | |   **Observation 1: The following principles are used for defining cell reselection requirements when idle eDRX is configured for idle RedCap UE:**  **- measurement and criteria R evaluation are supposed to be performed within one PTW, and**  **- for small DRX cycle (0.32s and 0.64s), split PTW to 2 gears:**  **-For PTW length =1.28s, UE performs measurements per DRX cycle;**  **-For PTW length larger than 1.28s, UE performs measurements per 2\*DRX cycle.**  **Proposal 3: For RRC\_IDLE RedCap UE, Tdetect, Tmeas and Tevaluate when Edrx\_Idle is configured in FR1 can be specified in Table 3.**  Table 3. For RRC\_IDLE RedCap UE, Tdetect, Tmeas and Tevaluate when eDRX\_Idle is configured in FR1   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **eDRX\_IDLE cycle length [s]** | **DRX cycle length [s]** | **PTW length [s] (number of 1.28s periods)** | **Scaling Factor (N1)** | **Tdetect,NR\_ [s] (number of DRX cycles)** | **Tmeasure,NR [s] (number of DRX cycles)** | **Tevaluate,NR [s] (number of DRX cycles)** | | **FR1** | | 2.56 | - | - | 1 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 5.12 x N1 (2 x N1) | | 5.12 | - | - | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 10.24 x N1 (2 x N1) | | 10.24 | - | - | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 20.48 x N1 (2 x N1) | | 10.24< eDRX\_IDLE cycle length ≤10485.76 | 0.32 | =1.28 (1) | (23 x N1) | 0.32 x N1 x M2  (1 x N1 x M2) | 0.64 x N1 x M2  (2 x N1 x M2) | | ≥2.56 (2) | 0.64 x N1 x M2  (2 x N1 x M2) | 1.28 x N1 x M2  (4 x N1 x M2) | | 0.64 | =1.28 (1) | 0.64 x N1 (1 x N1) | 1.28 x N1 (2 x N1) | | ≥2.56 (2) | 1.28 x N1 (2 x N1) | 2.56 x N1 (4 x N1) | | 1.28 | ≥2.56 (2) | 1.28 x N1 (1 x N1) | 2.56 x N1 (2 x N1) | | 2.56 | ≥5.12 (4) | 2.56 x N1 (1 x N1) | 5.12 x N1 (2 x N1) |   **Proposal 4: For RRC\_IDLE RedCap UE, Tdetect, Tmeas and Tevaluate when eDRX\_Idle is configured in FR2 can be specified in Table 4.**  Table 4. For RRC\_IDLE RedCap UE, Tdetect, Tmeas and Tevaluate when Edrx\_Idle is configured in FR2   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **eDRX\_IDLE cycle length [s]** | **DRX cycle length [s]** | **PTW length [s] (number of 1.28s periods)** | **Scaling Factor (N1)** | **Tdetect,NR\_ [s] (number of DRX cycles)** | **Tmeasure,NR [s] (number of DRX cycles)** | **Tevaluate,NR [s] (number of DRX cycles)** | | **FR2** | | 2.56 | - | - | 3 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 5.12 x N1 (2 x N1) | | 5.12 | - | - | 3 | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 10.24 x N1 (2 x N1) | | 10.24 | - | - | 3 | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 20.48 x N1 (2 x N1) | | 10.24< eDRX\_IDLE cycle length ≤10485.76 | 0.32 | ≥7.68 (6)  & <15.36 (12) | 8 | (23 x N1) | 0.32 x N1 x M2  (1 x N1 x M2) | 0.64 x N1 x M2  (2 x N1 x M2) | | ≥15.36 (12) | 0.64 x N1 x M2  (2 x N1 x M2) | 1.28 x N1 x M2  (4 x N1 x M2) | | 0.64 | ≥6.4 (5)  & <12.8 (10) | 5 | 0.64 x N1 (1 x N1) | 1.28 x N1 (2 x N1) | | ≥12.8 (10) | 1.28 x N1 (2 x N1) | 2.56 x N1 (4 x N1) | | 1.28 | ≥10.24 (8) | 4 | 1.28 x N1 (1 x N1) | 2.56 x N1 (2 x N1) | | 2.56 | ≥15.36 (12) | 3 | 2.56 x N1 (1 x N1) | 5.12 x N1 (2 x N1) |   **Proposal 5: When idle eDRX is longer than 10.24s, measurement requirements can be defined based on inactive DRX/eDRX, and no PTW is considered.**  **Proposal 6: When idle eDRX is no longer than 10.24s, measurement requirements can be defined based on inactive DRX/eDRX cycle.**  **Proposal 7: For RRC\_Inactive RedCap UE, Nservwhen eDRX\_IDLE cycle is configured can be specified in Table 6-1 and 6-2.**  Table 6-1: Nservfor inactive Redcap UE configured with eDRX\_IDLE cycle, (Frequency range FR1)   |  |  |  | | --- | --- | --- | | eDRX\_IDLE cycle length [s] | DRX or eDRX INACTIVE cycle length[s] | Nserv [number of DRX or eDRX cycles] | | 2.56 ≤eDRX\_IDLE cycle length ≤10485.76 | 0.32 | 4 | | 0.64 | 4 | | 1.28 | 2 | | 2.56 | 2 | | 5.12 | 2 | | 10.24 | 2 |   Table 6-2: Nservfor inactive Redcap UE configured with eDRX\_IDLE cycle, (Frequency range FR2)   |  |  |  |  | | --- | --- | --- | --- | | eDRX\_IDLE cycle length [s] | DRX or eDRX INACTIVE cycle length[s] | Scaling Factor (N1) | Nserv [number of DRX or eDRX cycles] | | 2.56 ≤eDRX\_IDLE cycle length ≤10485.76 | 0.32 | 8 | 4\* N1 | | 0.64 | 5 | 4\* N1 | | 1.28 | 4 | 2\* N1 | | 2.56 | 3 | 2\* N1 | | 5.12 | 3 | 2\* N1 | | 10.24 | 3 | 2\* N1 |   **Proposal 8: For RRC\_Inactive RedCap UE, Tdetect, Tmeas and Tevaluate when Edrx\_Idle is configured can be specified in Table 7.**  **Table 7: Tdetect, Tmeas and Tevaluate for inactive Redcap UE configured with eDRX\_IDLE cycle**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | eDRX\_IDLE cycle length [s] | DRX or eDRX INACTIVE cycle length [s] | Scaling Factor (N1) | | Tdetect,NR\_Inter [s] (number of DRX or eDRX cycles) | Tmeasure,NR\_Inter [s] (number of DRX or eDRX cycles) | Tevaluate,NR\_Inter [s] (number of DRX or eDRX cycles) | | FR1 | FR2Note1 | | 2.56 ≤eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | 1 | 8 | 11.52 x N1 x 1.5 (36 x N1 x 1.5) | 1.28 x N1 x 1.5 (4 x N1 x 1.5) | 5.12 x N1 x 1.5 (16 x N1 x 1.5) | | 0.64 |  | 5 | 17.92x N1 (28 x N1) | 1.28 x N1 (2 x N1) | 5.12 x N1 (8 x N1) | | 1.28 |  | 4 | 32 x N1 (25 x N1) | 1.28 x N1 (1 x N1) | 6.4 x N1 (5 x N1) | | 2.56 |  | 3 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) | | 5.12 |  | 3 | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 15.36 x N1 (3 x N1) | | 10.24 |  | 3 | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 30.72 x N1 (3 x N1) | |
| R4-2204910 | Huawei, Hisilicon | CR |
| R4-2204998 | CMCC | **Proposal 1: N1 = 3 for eDRX = 5.12 and 10.24s for FR2**  **Proposal 2: M1 is not used for DRX=0.32 and 0.64s for FR1 PTW length (N1=1)**  **Proposal 3: N1 for FR2 Nserv requirements: [8 5 4 3] for DRX [0.32 0.64 1.28 2.56]**  **Cell reselection eDRX requirements**  FR1 Tdetect,EUTRAN\_Intra, Tmeasure,EUTRAN\_Intra and Tevaluate,E-UTRAN\_intra  when eDRX<= 10.24s   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *Scaling Factor (N1) FR1* | *Tdetect,NR\_Intra [s] (number of eDRX cycles)* | *Tmeasure,NR\_Intra [s] (number of eDRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of eDRX cycles)* | | ***2.56*** | ***1*** | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) | | ***5.12*** | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 10.24 x N1 (2x N1) | | ***10.24*** | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 20.24 x N1 (2x N1) |   FR1 Tdetect,EUTRAN\_Intra, Tmeasure,EUTRAN\_Intra and Tevaluate,E-UTRAN\_intra  when 10.24 < eDRX   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *FR1 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of DRX cycles)* | *Tmeasure,NR\_Intra [s] (number of DRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of DRX cycles)* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ≥1.28 (1) | ***1*** | (23) | 0.32 x N1(1 x N1) | 0.64 x N1(2 x N1) | | ***0.64*** | ≥1.28 (1) | 0.64 x N1(1 x N1) | 1.28 x N1(2 x N1) | | ***1.28*** | ≥2.56 (2) | 1.28 x N1(1 x N1) | 2.56 x N1(2 x N1) | | ***2.56*** | ≥5.12 (4) | 2.56 x N1(1 x N1) | 5.12 x N1(2 x N1) |   FR2 Tdetect,EUTRAN\_Intra, Tmeasure,EUTRAN\_Intra and Tevaluate,E-UTRAN\_intra  when eDRX<= 10.24s   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *FR2 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of eDRX cycles)* | *Tmeasure,NR\_Intra [s] (number of eDRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of eDRX cycles)* | | ***2.56*** | ***3*** | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) | | ***5.12*** | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 10.24 x N1 (2x N1) | | ***10.24*** | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 20.24 x N1 (2x N1) |   FR2 Tdetect,EUTRAN\_Intra, Tmeasure,EUTRAN\_Intra and Tevaluate,E-UTRAN\_intra  **when 20.48 *≤*  eDRX**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *FR2 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of DRX cycles)* | *Tmeasure,NR\_Intra [s] (number of DRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of DRX cycles)* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ≥1.28 (1) | ***8*** | (23) | 0.32 x N1(1 x N1) | 0.64 x N1(2 x N1) | | ***0.64*** | ≥1.28 (1) | ***5*** | 0.64 x N1(1 x N1) | 1.28 x N1(2 x N1) | | ***1.28*** | ≥2.56 (2) | ***4*** | 1.28 x N1(1 x N1) | 2.56 x N1(2 x N1) | | ***2.56*** | ≥5.12 (4) | ***3*** | 2.56 x N1(1 x N1) | 5.12 x N1(2 x N1) |   **Proposal 3: Do not consider M2** **when DRX = 0.32s**  **Proposal 4: N1 for FR2 intra-frequency cell reselection requirements: [8 5 4 3] for DRX [0.32 0.64 1.28 2.56]** |
| R4-2205510 | Ericsson | ***Observation 1: In legacy Idle mode, UE will wake-up itself to perform serving cell evaluation, neighbour cell measurements for cell reselection, and paging monitoring in each DRX cycle.***  ***Observation 2: In normal DRX mode, the number of DRX cycles of*** ***both Tmeasure and Tevaluate values are decreased with longer DRX cycle length.***  ***Observation 3: If the UE is configured with eDRX\_IDLE cycle in LTE, the search time is update to MAX(10 s, one eDRX\_IDLE cycle).***  ***Proposal 1: When eDRX\_IDLE cycles without PTW, define the number of eDRX cycles as Tmeasure =1 and Tevaluate = 2 for eDRX cycle length up-to 10.24s.***  ***Proposal 2: When eDRX\_IDLE cycles without PTW, define N1=3 for all RedCap power classes.***  ***Proposal 3: When eDRX\_IDLE cycles with PTW, Tdetect, Tmeasure and Tevaluate in legacy eDRX design can be resued in RedCap eDRX for FR1.***   * ***Tdetect = 23 DRX cycles*** * ***Tmeasure = 1 DRX cycle*** * ***Tevaluate = 2 DRX cycles***   ***Proposal 4: When eDRX\_IDLE cycles with PTW, N1 value is as follow for all UE power class.***   * ***N1 = 8 for DRX cycle = 0.32s*** * ***N1 = 5 for DRX cycle = 0.64s*** * ***N1 = 4 for DRX cycle = 1.28s*** * ***N1 = 3 for DRX cycle = 2.56s***   ***Proposal 5: When eDRX\_IDLE cycles with PTW, define the scaling factor M1, M2 equaling 1.***  ***Proposal 6: When eDRX\_IDLE cycles with PTW, all the eDRX configurations are valid.***  ***Proposal 7: When eDRX\_IDLE cycles with PTW, RAN4 not to split the PTW to 2 gears.***  ***Proposal 8: When UE is configured with eDRX\_IDLE cycle, RAN4 to introduce the max function for timer T = max(10s, one eDRX\_IDLE cycle) in FR1 for initiating the cell selection.***  ***Proposal 9: When UE is configured with eDRX\_IDLE cycle, RAN4 to introduce the max function for timer T = max(10s, K1\*N1\*eDRX\_IDLE cycle) in FR2 for initiating the cell selection when eDRX cycle is less than 20.48s, where, K1=2.***  ***Otherwise, T = max(81.92s, one eDRX\_IDLE cycle).***  ***Proposal 10: RAN4 to define Inactive mode requirement based on paging cycle agreed in RAN2.***   |  |  |  | | --- | --- | --- | | IDLE eDRX | Inactive eDRX | T | | >10.24 | N/A | Within PTW: Min{UE specific DRX cycle(if configured by upper layer), RAN paging cycle, default paging cycle} | | Outside PTW: RAN paging cycle | | <=10.24 | Within PTW: min{UE specific DRX cycle (if configured by upper layer) , INACTIVE eDRX cycle and default paging cycle}. | | Outside PTW: INACTIVE eDRX cycle | | <=10.24 | N/A | min{RAN paging cycle, IDLE eDRX cycle} | | <=10.24 | min{IDLE eDRX cycle, INACTIVE eDRX cycle} | |
| R4-2206083 | MediaTek inc. | **Proposal 1: Support the design of separate tables for the eDRX requirements, one for eDRX with PTW and the other for eDRX without PTW*.***  **Proposal 2: RAN4 shall keep eDRX for FR2 requirements as FFS.**  **Proposal 3: Send a feedback to RAN2 with update on the issues related to eDRX with FR2.**  **Proposal 4: The eDRX\_IDLE cycles requirements for Nserv in 5G NR RedCap devices for FR1 are the following:**  Table 4.2.2.x1-x1: Nserv for UE operating with eDRX\_IDLE cycle without PTW for FR1   |  |  | | --- | --- | | **eDRX cycle length [s]** | **Nserv [number of DRX cycles]** | | 2.56 | 2 | | 5.12 | 2 | | 10.24 | 2 |   Table 4.2.2.x1-x2: Nserv for UE operating with eDRX\_IDLE cycle with PTW and PH for FR1   |  |  |  |  | | --- | --- | --- | --- | | **eDRX cycle length [s]** | **DRX cycle length [s]** | **PTW length [s]**  **(number of DRX cycles)** | **Nserv [number of DRX cycles]** | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 1.28 (4) | M1\***2** | | 0.64 | ≥ M1 \* 1.28 (M1 \* 2) | M1\***2** | | 1.28 | ≥ 2.56 (2) | 2 | | 2.56 | ≥ 5.12 (2) | 2 | | Note 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs. | | | |   **Proposal 5: The eDRX\_IDLE cycles requirements for Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra in 5G NR RedCap devices for FR1 are the following:**  Table 4.2.2.x2-x1: Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra for UE operating with eDRX\_IDLE cycle without PTW for FR1   |  |  |  |  | | --- | --- | --- | --- | | eDRX cycle length [s] | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) | | 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) | | 5.12 | 117.76 (23) | 5.12 (1) | 10.24 (2) | | 10.24 | 235.52 (23) | 10.24 (1) | 20.48 (2) |   Table 4.2.2.x2-x2: Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra for UE configured with eDRX\_IDLE cycle with PTW and PH for FR1   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of DRX cycles) | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 1.28 (4) | Note 3 (23 x M2) | 0.32 x M2 (1 x M2) | 0.64 x M2 (2 x M2) | | 0.64 | ≥ 1.28 (2) | Note 3 (23) | 0.64 (1) | 1.28 (2) | | 1.28 | ≥ 2.56 (2) |  | 1.28 (1) | 2.56 (2) | | 2.56 | ≥ 5.12 (2) |  | 2.56 (1) | 5.12 (2) | | Note 1: M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms; otherwise M2=1. If different SMTC periodicities are configured for different cells, the SMTC periodicity in this note is the one used by the cell being identified. During PSS/SSS detection, the periodicity of the SMTC configured for the intra-frequency carrier is assumed, and if the actual SSB transmission periodicity is greater than the SMTC configured for the intra-frequency carrier, longer Tdetect, NR\_intra is expected.  Note 2: The number of DRX cycles in this table is given for the DRX cycles within PTWs.  Note 3: The time is calculated depending on the number *N* of DRX cycles as follows: | | | | | |   **Proposal 6: The eDRX\_IDLE cycles requirements for Tdetect,NR\_Inter, Tmeasure,NR\_Inter and Tevaluate,NR\_Inter in 5G NR RedCap devices for FR1 are the following:**   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | eDRX cycle length [s] | Tdetect,NR\_Inter [s] (number of DRX cycles) | | | Tmeasure,NR\_Inter [s] (number of DRX cycles) | | Tevaluate,NR\_Inter [s] (number of DRX cycles) | | | | 2.56 | 58.88 (23) | | | 2.56 (1) | | 7.68 (3) | | | 5.12 | 117.76 (23) | | | 5.12 (1) | | 10.24 (2) | | | 10.24 | 235.52 (23) | | | 10.24 (1) | | 20.48 (2) | | | eDRX\_IDLE cycle length [s] | | DRX cycle length [s] | PTW length [s]  (number of DRX cycles) | | Tdetect,NR\_Inter [s] (number of DRX cycles) | | Tmeasure,NR\_Inter [s] (number of DRX cycles) | | Tevaluate,NR\_Inter [s] (number of DRX cycles) | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | | 0.32 | ≥ 1.28 (4) | | Note 3 (**23** x 1.5) | | 0.32 x 1.5 (1 x 1.5) | | 0.64 x 1.5 (**2** x 1.5) | | 0.64 | ≥ 1.28 (2) | | Note 3 (23) | | 0.64 (1) | | 1.28 (2) | | 1.28 | ≥ 2.56 (2) | |  | | 1.28 (1) | | 2.56 (2) | | 2.56 | ≥ 5.12 (2) | |  | | 2.56 (1) | | 5.12 (2) | | Note 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.  Note 2: The eDRX\_IDLE cycle lengths are as specified in Section 10.5.5.xx of TS 24.008 [6].  Note 3: The time is calculated depending on the number *N* of DRX cycles as follows: | | | | | | | | | |   **Proposal 7: The eDRX\_IDLE cycles requirements for Tdetect,EUTRAN, Tmeasure,EUTRAN, and Tevaluate,EUTRAN in 5G NR RedCap devices for FR1 are the following:**   |  |  |  |  | | --- | --- | --- | --- | | eDRX cycle length [s] | Tdetect,EUTRAN [s] (number of DRX cycles) | Tmeasure,EUTRAN [s] (number of DRX cycles) | Tevaluate,EUTRAN  [s] (number of DRX cycles) | | 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) | | 5.12 | 117.76 (23) | 5.12 (1) | 10.24 (2) | | 10.24 | 235.52 (23) | 10.24 (1) | 20.48 (2) |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of DRX cycles) | Tdetect,EUTRAN [s] (number of DRX cycles) | Tmeasure,EUTRAN [s] (number of DRX cycles) | Tevaluate,EUTRAN  [s] (number of DRX cycles) | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥1.28 (4) | (23) | 0.32 (1) | 0.64 (2) | | 0.64 | ≥ 1.28 (2) | 0.64 (1) | 1.28 (2) | | 1.28 | ≥2.56 (2) | 1.28 (1) | 2.56 (2) | | 2.56 | ≥5.12 (2) | 2.56 (1) | 5.12 (2) | | Note 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.  Note 2: The eDRX\_IDLE cycle lengths are as specified in Section 10.5.5.xx of TS 24.008 [6]. | | | | | |   **Proposal 8: For evaluation of serving cell in INACTIVE MODE requirements in Table 4.2.2.x1-x1 shall apply*.***  **Proposal 9: For evaluation of intra-frequency NR cell in INACTIVE MODE requirements in Table 4.2.2.x2-x1 shall apply*.***  **Proposal 10: For evaluation of inter-frequency NR cell in INACTIVE MODE requirements in Table 4.2.2.x3-x1 shall apply.**  **Proposal 11: For evaluation of inter-RAT E-UTRAN NR cell in INACTIVE MODE requirements in Table 4.2.2.x4-x1 shall apply.** |

## Open issues summary

### Sub-topic 1-1 General aspects on eDRX enhancements

**Issue 1-1-1: eDRX Requirements table**

* Proposals
  + Option 1: Support the design of separate tables for the eDRX requirements, one for eDRX with PTW and the other for eDRX without PTW.(MTK)
* Recommended WF
  + Requirements for eDRX have already been done by this way. Suggest no more discussion on this issue

### Sub-topic 1-2 Idle state serving cell eDRX requirements

**Issue 1-2-1: Nserv and N1 for eDRX length up to 10.24s (FR2)**

Moderator Note: The following is used for Nserv (FR2) requirement based on R4-2202672. The left issue is N1 value.

|  |  |  |
| --- | --- | --- |
| *eDRX cycle length [s]* | *FR2 Scaling Factor (N1)* | *Nserv [number of eDRX cycles]* |
| ***2.56*** | ***[TBD]*** | ***N1\*2*** |
| ***5.12*** |
| ***10.24*** |

Option 1: N1 = 3 for eDRX = 5.12 and 10.24s. (CMCC Nokia Ericsson Huawei xiaomi vivo)

* Recommended WF
  + Suggest agree N1 = 3 for eDRX = 5.12 and 10.24s for FR2 Nserv requirements

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Agree the recommended WF. |
| Huawei | It seems Edrx=2.56s is missing. Agree with the recommended WF with adding 2.56s eDRX. |
| Apple | Fine with the recommended WF. For 2.56/5.12/10.24s eDRX, N1=3. |
| CMCC | OK with recommended WF and add 2.56 |
| Xiaomi | Agree with the recommended WF, support N1 = 3 for eDRX = 2.56, 5.12 and 10.24s |
| OPPO | Agree with the recommended WF |
| vivo | To Huawei, N1= 3 for 2.56s has already been agreed at previous meeting.  Agree the recommended WF |
| MediaTek | Support recommended WF. |
| Nokia | Agree to the recommended WF. |

**Issue 1-2-2: Serving cell requirements for eDRX length larger than 10.24s**

* Option 1: (Apple oppo vivo)
  + Option 1a: Only support requirements for FR1 (MTK)

***FR1 Nserv for 10.24s<eDRX cycle≤10485.76s***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR1* | *Nserv [number of DRX cycles]* |
| ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 1.28 (1)*** | ***1*** | ***M1\*N1\*2*** |
| ***0.64*** | ***≥ 1.28 (1) (M1=1) or ≥ 2.56 (2) (M1=2)*** | ***M1\* N1\*2*** |
| ***1.28*** | ***≥ 2.56 (2)*** | ***N1\*2*** |
| ***2.56*** | ***≥ 5.12 (4)*** | ***N1\*2*** |
| ***Note 1: PTW length is derived based on***  ***Note 2: M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle≤ 0.64s, otherwise M1=1.*** | | | | |

***FR2 Nserv for 10.24s<eDRX cycle≤10485.76s***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR2* | *Nserv [number of DRX cycles]* |
| ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 5.12 (4) (M1=1) or ≥ 10.24 (8) (M1=2)*** | ***8*** | ***M1\*N1\*2*** |
| ***0.64*** | ***≥ 6.4 (5) (M1=1) or ≥ 12.8 (10) (M1=2)*** | ***5*** | ***M1\*N1\*2*** |
| ***1.28*** | ***≥ 10.24 (8)*** | ***4*** | ***N1\*2*** |
| ***2.56*** | ***≥ 15.36 (12)*** | ***3*** | ***N1\*2*** |
| ***Note 1: PTW length is derived based on***  ***Note 2: M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle≤ 0.64s, otherwise M1=1.*** | | | | |

* Option 2: (Nokia)

***FR1 Nserv for 10.24s<eDRX cycle≤10485.76s***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | Scaling Factor (N1) for FR1 | Nserv [number of DRX cycles] |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 1.28 (1) | 1 | N1\*2 |
| 0.64 | ≥ 2.56 (2) | N1\*2 |
| 1.28 | ≥ 2.56 (2) | N1\*2 |
| 2.56 | ≥ 5.12 (4) | N1\*2 |

***FR2 Nserv for 10.24s<eDRX cycle≤10485.76s***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | Scaling Factor (N1) for FR2 | Nserv [number of DRX cycles] |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 5.12 (4) | 8 | N1\*2 |
| 0.64 | ≥ 6.4 (5) | 5 | N1\*2 |
| 1.28 | ≥ 10.24 (8) | 4 | N1\*2 |
| 2.56 | ≥ 15.36 (12) | 3 | N1\*2 |

* Recommended WF
  + Focus on Issue 1-2-2-1. As agreed at R4-2202672, “Note 1” in tables in option 1 should be included in the final round.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Option 2  The reason to not use M1 is captured in Issue 1-2-2-1. |
| Huawei | Support Option 1. When DRX cycle is small, i.e., 0.32s and 0.64s, M1 can still be applied for power saving purpose. |
| Apple | Option 1 to consider legacy power saving for small DRX cycles as commented by companies in last meeting. |
| CMCC | Option2. M1 is not needed considering this is within the PTW. |
| Xiaomi | Prefer option 1 to consider M1. |
| OPPO | Prefer option 1. |
| vivo | Depends on outcome of 1-2-2-1 |
| MediaTek | Support Option 1. We believe M1 scaling factor is necessary to be included. |
| Nokia | Option 2. |

**Issue 1-2-2-1: FR1 PTW length (N1=1), whether M1 should be considered for FR1/FR2 Nserv when DRX = 0.32 and 0.64s**

* Option 1: Keep M1 (M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle≤ 0.64s) (Apple MTK vivo)
* Option 2: Do not use M1(CMCC Nokia Ericsson ZTE)
* Option 3: Keep M1 for FR1 and do not use M1 for FR2 (Huawei)
* Recommended WF
  + TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Option 2.  M1, M2 are additionally introduced for UE’s power saving in short DRX cycles. The main benefits for power saving are UE’s deep sleep outside PTW in eDRX design. It’s reasonable to speed up the measurement within PTW to get a long deep sleep duration outside PTW. |
| Huawei | Option 3 is a tradeoff between option 1 and option 2.  In FR1, M1 can be used for power saving. In FR2, situation has some difference. Firstly due to scaled RX beam number (N1), the lower bound of PTW is larger compared with FR1. It means that there are no requirements for the configuration PTW is smaller than lower bound in FR2. Multiplied by M1 would increase the PTW lower bound. Secondly the channel quality is more sensitive in FR2, M2 would elongate the measurement delay. |
| Apple | We support option 1 to consider legacy power saving for small DRX cycles as commented by companies in last meeting, but can compromise to option 3 as middle ground. |
| CMCC | Option 2. Same reason as last issue. |
| Xiaomi | Prefer Option 1, and can comprise to Option 3. |
| OPPO | Option 1 is fine. |
| vivo | Option 1 and can compromise to option 3 |
| MediaTek | The deep sleep concept applies for a UE with a total transition period between sleep and active larger than 20ms as agreed in 3GPP RAN1 for power saving and provided in clause 8.1 in [TR 38.840]. This means that the UE can be in deep sleep whether in the PTW between the DRX or outside PTW. Hence, we don’t fully understand the comment from Ericsson on the deep sleep is only for outside the PTW. Thus, we support Option 1: Keep M1. |
| ZTE | Support Option 2, similar understanding as Ericsson. In FR2 especially the delay would be too long with both scaling factors. |
| Nokia | Option 2 |

**Issue 1-2-2-2: N1 for FR2 Nserv requirements**

Option 1: N1= 8 for DRX= 0.32s; 5 for DRX=0.64s; 4 for DRX= 1.28s; 3 for DRX =2.56s (Apple CMCC Nokia Ericsson Huawei xiaomi vivo)

* Recommended WF
  + Suggest to agree option 1 for issue 1-2-2-2

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Option 1. |
| Huawei | Agree with recommended WF. |
| Apple | Option 1. |
| CMCC | Support recommended WF |
| Xiaomi | Support the recommended WF |
| OPPO | Support the recommended WF |
| vivo | Option 1 |
| MediaTek | Agree with recommended WF. |
| Nokia | Agree to the recommended WF. |

**Issue 1-2-2-3: FR2 serving cell requirements for RedCap UE with eDRX cycle when eDRX = 20.48s (and 40.96s)**

* Option 1: The eDRX cycles with PTW (20.48s and 40.96s) are not feasible. Besdies, three more eDRX cycles with PTE are overlapped with eDRX without PTW. RAN4 shall keep eDRX for FR2 requirements as FFS and inform RAN2 with update on the issues related to eDRX with FR2 (MTK)
* Recommended WF

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Not agree option 1.  We don’t think the arguments in option 1 is valid. Based on option 1’s logic, the power consumption will also be higher for long eDRX with short DRX configuration than short eDRX with long DRX configuration.  However, when RAN2 designs all eDRX configurations, it is of course important that such values would make a difference with respect to UE power consumption, but it would be also good to note that sometimes same power consumption outcome can be achieved with a combination of different parameters.  We think eDRX configuration can bring power saving gain compared with DRX configuration in Idle mode. Thus, RAN4 shall define the requirements for eDRX in FR2. |
| Huawei | Ericsson’s comments are reasonable. |
| Apple | Agree with Ericsson’s view. |
| CMCC |  |
| Xiaomi | Agree with Ericsson’s view. |
| vivo | We think the concern of option 1 could be addressed by R4-2204540(Nokia), R4-2204325(vivo) and Ericsson’s comment.  Do not agree with option 1 |
| MediaTek | We believe Ericsson is missing the logic of our proposal. We kindly suggest that Ericsson to refer to our contribution paper section 2.3 [R4-2206083] for numerical example on why the use of 20.48s and 40.96s are not feasible. Also, we have provided a figure in our contribution paper (please refer to figure 2) to illustrate how the eDRX 20.48s is not feasible for that given scenario. We copied the figure in here for your convenient.    Now, from the above figure it is clear that the eDRX cycle 20.48s has more wakeup occasions compared to using short eDRX without PTW, hence the power consumption is higher. In addition, for the deep sleep concept please refer to our comment in issue 1-2-2-1.  Furthermore, to **Ericsson** comment ‘Based on option 1’s logic, the power consumption will also be higher for long eDRX with short DRX configuration than short eDRX with long DRX configuration’, we would like to highlight that based on our logic we have the following numerical results:   * Case X: long eDRX with short DRX (e.g. eDRX **327.68s** with DRX **0.32s**), the number of wake-up occasions is equal to M1\*2\*N1 = 2\*2\*8 = **32**, which is the same number of wake-upsin a period of time equal to 327.68s. * Case Y: short eDRX with long DRX (e.g. eDRX **20.48s** with DRX **2.56s**), the number of wake-up occasions in a single eDRX is equal to 2\*N1 = 2\*3 = 6. Then, the number of wake-up occasions in a 327.68s period of time is equal to 6\*327.68s/20.48s = 6\*16 = **96** wake-up occasions.   Based on our logic, from these analysis it is clear that Case Y (short eDRX with long DRX with 96 wake-ups) has more power consumption compared to Case X (long eDRX with short DRX with 32 wake-ups). Hence, we don’t think Ericsson comment is valid. Thus, we are still in support for Option 1. |
| Nokia | We do not agree with Option 1. Despite the fact that some combination of parameters are more beneficial than others to the UE power consumption, RAN 2 has already designed the different eDRX configurations. And as Ericsson commented, same power consumption can be achieved with a different combination of parameters. We do not agree that we should not define requirements for the cases in which eDRX cycles with PTW are overlapping with eDRX cycles without PTW. Both options are possible and should have requirements. |

### Sub-topic 1-3 Idle state cell reselection eDRX requirements

**Issue 1-3-1: FR1 Cell reselection requirements for RedCap UE with eDRX cycle (intra frequency) when eDRX ≤10.24s**

* Option 1 (Apple)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *eDRX cycle length [s]* | *Scaling Factor (N1) FR1* | *Tdetect,NR\_Intra [s] (number of eDRX cycles)* | *Tmeasure,NR\_Intra [s] (number of eDRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of eDRX cycles)* |
| ***2.56*** | ***1*** | ***58.88 x N1 (23 x N1)*** | ***2.56 x N1 (1 x N1)*** | ***7.68 x N1 (3 x N1)*** |
| ***5.12*** | ***102.4 x N1 (20 x N1)*** | ***5.12 x N1 (1 x N1)*** | ***10.24 x N1 (2 x N1)*** |
| ***10.24*** | ***102.4 x N1 (10 x N1)*** | ***10.24 x N1 (1 x N1)*** | ***20.48 x N1 (2 x N1)*** |

* Option 2 (CMCC Nokia MTK vivo)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| eDRX cycle length [s] | Scaling Factor (N1) FR1 | Tdetect,NR\_Intra [s] (number of eDRX cycles) | Tmeasure,NR\_Intra [s] (number of eDRX cycles) | Tevaluate,NR\_Intra  [s] (number of eDRX cycles) |
| 2.56 | 1 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) |
| 5.12 | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 10.24 x N1 (2 x N1) |
| 10.24 | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 20.48 x N1 (2 x N1) |

* Option 3 (Huawei)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| eDRX cycle length [s] | Scaling Factor (N1) FR1 | Tdetect,NR\_Intra [s] (number of eDRX cycles) | Tmeasure,NR\_Intra [s] (number of eDRX cycles) | Tevaluate,NR\_Intra  [s] (number of eDRX cycles) |
| 2.56 | 1 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 5.12 x N1 (2 x N1) |
| 5.12 | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 10.24 x N1 (2 x N1) |
| 10.24 | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 20.48 x N1 (2 x N1) |

* Recommended WF
  + Could companies check whether compromise to option 2?

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Option 2.  Could company supporting option 1 to further clarify the reason to shorten the Tdetect for eDRX=5.12 and 10.24s? |
| Huawei | In option 3, 5.12 x N1 (2 x N1) is derived from LTE (below table).  Table 4.2.2.3-2: Tdetect,EUTRAN\_Intra, Tmeasure,EUTRAN\_Intra and Tevaluate,E-UTRAN\_intra for UE configured with eDRX\_IDLE cycle [TS 36.133]   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s] (number of 1.28s periods) | Tdetect,EUTRAN\_Intra [s] (number of DRX cycles) | Tmeasure,EUTRAN\_Intra [s] (number of DRX cycles) | Tevaluate,E-UTRAN\_intra  [s] (number of DRX cycles) | | 5.12 ≤ eDRX\_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | (23) | 0.32 (1) | 0.64 (2) | | 0.64 | ≥1.28 (1) | 0.64 (1) | 1.28 (2) | | 1.28 | ≥2.56 (2) | 1.28 (1) | 2.56 (2) | | 2.56 | ≥5.12 (4) | 2.56 (1) | 5.12 (2) |   Option 2 is also fine to us, with 3 samples for 2.56s DRX in Tevaluate. |
| Apple | Option 1. In option 1, the Tdetect of 20/10 eDRXs is reused from LTE NB-IoT requirement,  Table  Description automatically generated  Since for NB cell reselection requirement we already had 5.12/10.24s DRX cases with 20 and 10 DRXs detection time respectively, here for RedCap eDRX case of 5.12s and 10.24s, we could also reuse that. However, if all companies agree with option 2, we can compromise too. |
| CMCC | Option2 |
| Xiaomi | Fine with both Option 2 and Option 3. |
| OPPO | Option 2. |
| vivo | @Huawei, 2 is our original proposal as well however the majority of previous meeting is 3 which is reflected in the compromise option – option 2.  Ok with option 2 which is the majority view |
| Ericsson | Based on Apple’s clarification, we support option 1 instead of option 2.  It’s better to reuse the requirement from LTE to avoid NR performance worse than LTE. |
| MediaTek | We support Option 2.  To Huawei, the logic from LTE can be applied for eDRX 5.12s and eDRX 10.24s, however, 2.56s is re-sed from existing NR requirements and reducing the Tevaluate for RedCap UE means the latter has to be more accurate to achieve Tevaluate with two samples only. We believe the requirements for eDRX 2.56s should be more relaxed or at least the same requirements compared to DRX 2.56s.  Also, based on Apple comment we can support Option 1 too. |
| Nokia | Option 2 |
| Qualcomm | Support Option 2. |

**Issue 1-3-2: FR2 Cell reselection requirements for RedCap UE with eDRX cycle (intra frequency) when eDRX ≤10.24s**

* Option 1 (Apple)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *eDRX cycle length [s]* | *FR2 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of eDRX cycles)* | *Tmeasure,NR\_Intra [s] (number of eDRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of eDRX cycles)* |
| ***2.56*** | ***3*** | ***58.88 x N1 (23 x N1)*** | ***2.56 x N1 (1 x N1)*** | ***7.68 x N1 (3 x N1)*** |
| ***5.12*** | ***102.4 x N1 (20 x N1)*** | ***5.12 x N1 (1 x N1)*** | ***10.24 x N1 (2 x N1)*** |
| ***10.24*** | ***102.4 x N1 (10 x N1)*** | ***10.24 x N1 (1 x N1)*** | ***20.48 x N1 (2 x N1)*** |

* Option 2 (CMCC Nokia vivo)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **eDRX cycle length [s]** | **Scaling Factor (N1)** | **Tdetect,NR\_Intra [s] (number of eDRX cycles)** | **Tmeasure,NR\_Intra [s] (number of eDRX cycles)** | **Tevaluate,NR\_Intra**  **[s] (number of eDRX cycles)** |
| 2.56 |  | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) |
| 5.12 | 3 | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 10.24 x N1 (2 x N1) |
| 10.24 |  | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 20.48 x N1 (2 x N1) |

* Option 3 (Huawei)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **eDRX cycle length [s]** | **Scaling Factor (N1)** | **Tdetect,NR\_Intra [s] (number of eDRX cycles)** | **Tmeasure,NR\_Intra [s] (number of eDRX cycles)** | **Tevaluate,NR\_Intra**  **[s] (number of eDRX cycles)** |
| 2.56 |  | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 5.12 x N1 (2 x N1) |
| 5.12 | 3 | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 10.24 x N1 (2 x N1) |
| 10.24 |  | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 20.48 x N1 (2 x N1) |

* Recommended WF
  + Could companies check whether compromise to option 2?

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Option 2.  Could company supporting option 1 to further clarify the reason to shorten the Tdetect for eDRX=5.12 and 10.24s? |
| Huawei | Same comments as issue 1-3-1. Again, clarify the first row for Tevaluate in option3, i.e., 5.12 x N1 (2 x N1). This follows the sample number in LTE.  Either option 3 or option 2 is fine. |
| Apple | Support Option 1. As commented to issue 1-3-1, in option 1, the Tdetect of 20/10 eDRXs is reused from LTE NB-IoT requirement,  Table  Description automatically generated  Since for NB cell reselection requirement we already had 5.12/10.24s DRX cases with 20 and 10 DRXs detection time respectively, here for RedCap eDRX case of 5.12s and 10.24s, we could also reuse that. However, if all companies agree with option 2, we can compromise too. |
| CMCC | Option2 |
| Xiaomi | Fine with both Option 2 and Option 3. |
| OPPO | Option 2. |
| vivo | Same comments as previous one.  Ok with option 2 |
| Ericsson | Based on Apple’s clarification, we support option 1 instead of option 2.  It’s better to reuse the requirement from LTE to avoid NR performance worse than LTE. |
| MediaTek | We support Option2 and we have the same questions regarding option 3 as in our comment in issue 1-3-1. Also, based on Apple comment we can support Option 1 too. |
| Nokia | Option 2 |
| Qualcomm | Support Option 2 |

**Issue 1-3-3: FR1 Cell reselection requirements for RedCap UE with eDRX cycle (intra frequency) when eDRX >10.24s**

* Option 1 (Apple MTK)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *FR1 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of DRX cycles)* | *Tmeasure,NR\_Intra [s] (number of DRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of DRX cycles)* |
| ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 1.28 (1)*** | ***1*** |  | ***0.32 x N1 x M2 (1 x N1 x M2)*** | ***0.64 x N1 x M2 (2 x N1 x M2)*** |
| ***0.64*** | ***≥ 1.28 (1)*** | ***0.64 x N1 (1 x N1)*** | ***1.28 x N1 (2 x N1)*** |
| ***1.28*** | ***≥ 2.56 (2)*** | ***1.28 x N1 (1 x N1)*** | ***2.56 x N1 (2 x N1)*** |
| ***2.56*** | ***≥ 5.12 (4)*** | ***2.56 x N1 (1 x N1)*** | ***5.12 x N1 (2 x N1)*** |
| ***Note 1: PTW length is derived based on***  ***Note 2: M2=1.5 if SMTC periodicity of measured intra-frequency cell > 20 m and DRX cycle=0.32s, otherwise M2=1.*** | | | | | | |

* Option 2 (vivo)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *FR1 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of DRX cycles)* | *Tmeasure,NR\_Intra [s] (number of DRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of DRX cycles)* |
| ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥1.28\*M2 (1\*M2)*** | ***1*** | ***(23)*** | ***0.32 x N1\*M2 (1 x N1\*M2)*** | ***0.64 x N1 \*M2 (2 x N1\*M2)*** |
| ***0.64*** | ***≥1.28 (1)*** | ***0.64 x N1 (1 x N1)*** | ***1.28 x N1 (2 x N1)*** |
| ***1.28*** | ***≥2.56 (2)*** | ***1.28 x N1 (1 x N1)*** | ***2.56 x N1 (2 x N1)*** |
| ***2.56*** | ***≥5.12 (4)*** | ***2.56 x N1 (1 x N1)*** | ***5.12 x N1 (2 x N1)*** |

* Option 3 (CMCC Nokia)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | FR1 Scaling Factor (N1) | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 1.28 (1) | **1** | (23) | 0.32 x N1  (1 x N1) | 0.64 x N1  (2 x N1) |
| 0.64 | ≥ 1.28 (1) | 0.64 x N1  (1 x N1) | 1.28 x N1  (2 x N1) |
| 1.28 | ≥ 2.56 (2) | 1.28 x N1  (1 x N1) | 2.56 x N1  (2 x N1) |
| 2.56 | ≥ 5.12 (4) | 2.56 x N1  (1 x N1) | 5.12 x N1  (2 x N1) |

* Option 4 (Huawei)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 10.24< eDRX\_IDLE cycle length ≤10485.76 | 0.32 | =1.28 (1) |  | (23 x N1) | 0.32 x N1 x M2  (1 x N1 x M2) | 0.64 x N1 x M2  (2 x N1 x M2) |
| ≥2.56 (2) | 0.64 x N1 x M2  (2 x N1 x M2) | 1.28 x N1 x M2  (4 x N1 x M2) |
| 0.64 | =1.28 (1) | 0.64 x N1 (1 x N1) | 1.28 x N1 (2 x N1) |
| ≥2.56 (2) | 1.28 x N1 (2 x N1) | 2.56 x N1 (4 x N1) |
| 1.28 | ≥2.56 (2) | 1.28 x N1 (1 x N1) | 2.56 x N1 (2 x N1) |
| 2.56 | ≥5.12 (4) | 2.56 x N1 (1 x N1) | 5.12 x N1 (2 x N1) |

* Recommended WF
  + TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Option 3.  The same reason as issue 1-2-2-1, 1-3-3-1, 1-3-3-2. |
| Huawei | Clarify the motivation of option 4  One example is provided: when PTW is 10.28s, and DRX cycle is 0.32s,   * According to option 1, one DRX cycle is required for Tmeasure. It means UE needs to perform measurements per DRX cycle within PTW. * The motivation of option 4 is to save power. Then the additional gear- 2 samples are required for Tmeasure. Then UE performs measurements per **2** DRX cycle within PTW. * Therefore the power assumption gain can be achieved by option 4. * However considering the progress of the WI, we can compromise to option 1. |
| Apple | Option 1. The reason to have M2 is same as M1 in issue 1-2-2. |
| CMCC | Option3 |
| Xiaomi | Prefer Option 1. |
| OPPO | Option 1 is fine. |
| vivo | @Apple, is M2 for PTW length when DRX = 0.32 s is missed in option 1 or it is the original intention? The only difference between option 1 and 2 is whether M2 is used for PTW length calculation when Drx = 0.32s |
| MediaTek | We support Option 1 and we believe it is important to keep the M2 scaling factor for the same reasons mentioned in our previous comments. |
| Apple | @vivo, thanks for your question! Our understanding is: the evaluation time is : 0.64 x N1 x M2 (2 x N1 x M2)=0.64\*1.5 (when M2=1.5 applies), and then PTW length is =1.28s. When M2 doesn’t applies, 0.64 x N1 x M2=0.64, and then PTW length is =1.28s. So no matter M2=1.5 or 1, the PTW length for DRX=0.32s is ≥ 1.28s. |
| Nokia | Option 3, but it depends on the conclusion of issue 1-3.3.1. We can compromise to Option 1, if RAN4 agrees to have M2. |

**Issue 1-3-3-1 Whether to consider M2 when DRX = 0.32s**

* Option 1 included (M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms, otherwise M2=1.(Apple Huawei MTK vivo)
* Option 2: Do not include M2 (CMCC Nokia Ericsson ZTE)
* Recommended WF
  + TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Option 2.  The same reason as issue 1-2-2-1. |
| Huawei | Option 1 for power saving |
| Apple | Option 1. The reason to have M2 is same as M1 in issue 1-2-2. |
| CMCC | Option2. The same reason as not having M1. |
| Xiaomi | Option 1. |
| OPPO | Option 1. |
| vivo | Suggest to reuse the conclusion of 1-2-2-1 once that conclusion is available. |
| MediaTek | We support Option 1. We can follow the outcome of issue 1-2-2-1 in here. |
| ZTE | Support Option 2. In FR2 especially the delay would be too long with both scaling factors. |
| Nokia | Option 2. |

**Issue 1-3-3-2 Whether split PTW to 2 gears for small DRX cycle (0.32s and 0.64s) when defining requirements**

* Option 1: Yes (Huawei)
* Option 2: No (Apple CMCC Nokia Ericsson)
* Recommended WF
  + Could option 2 be agreed?

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Option 2.  We don’t support option 1 because the key benefit for power saving in eDRX design is UE will go to ‘deep sleep’ in the time duration outside PTW. Therefore, if we want to have the better power saving gain, the PTW design shall be as short as possible. Considering PTW is the function of Tevaluate, if the design is to extend the Tmeasure and Tevaluate will result in a worse power consumption design. Therefore, RAN4 not to split the PTW to 2 gears for small DRX cycle in eDRX with PTW. |
| Huawei | To Ericsson, herein one example is given:  At DRX cycle 0.32s, when PTW is far larger than 1.28s, e.g., 10.28s, UE needs to perform measurements per DRX cycle within PTW. So we propose that when PTW is large, UE can wake up per 2DRX cycles. The power saving gain is obvious.  To proceed, option 2 is fine. |
| Apple | Option 2. |
| CMCC | Option 2 |
| Xiaomi | Option 2 |
| OPPO | Option 2. |
| vivo | @huawei, thanks for the compromise. We support option 2 as well. |
| MediaTek | We may need more time to study the effectiveness of Option 1 and due to the short period left we suggest to progress with Option 2. |
| Nokia | Option 2. |

**Issue 1-3-4: FR2 Cell reselection requirements for RedCap UE with eDRX cycle (intra frequency) when eDRX >20.48s**

* Option 1 (Apple vivo)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *FR2 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of DRX cycles)* | *Tmeasure,NR\_Intra [s] (number of DRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of DRX cycles)* |
| ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 5.12 (4) (M2=1) or ≥ 7.68 (6) (M2=1.5)*** | ***8*** |  | ***0.32 x N1 x M2 (1 x N1 x M2)*** | ***0.64 x N1 x M2 (2 x N1 x M2)*** |
| ***0.64*** | ***≥ 6.4 (5)*** | ***5*** | ***0.64 x N1 (1 x N1)*** | ***1.28 x N1 (2 x N1)*** |
| ***1.28*** | ***≥ 10.24 (8)*** | ***4*** | ***1.28 x N1 (1 x N1)*** | ***2.56 x N1 (2 x N1)*** |
| ***2.56*** | ***≥ 15.36 (12)*** | ***3*** | ***2.56 x N1 (1 x N1)*** | ***5.12 x N1 (2 x N1)*** |
| ***Note 1: PTW length is derived based on***  ***Note 2: M2=1.5 if SMTC periodicity of measured intra-frequency cell > 20 m and DRX cycle=0.32s, otherwise M2=1.*** | | | | | | |

* Option 2 (CMCC Nokia)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | FR1 Scaling Factor (N1) | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 1.28 (1) | 8 | (23) | 0.32 x N1  (1 x N1) | 0.64 x N1  (2 x N1) |
| 0.64 | ≥ 1.28 (1) | 5 | 0.64 x N1  (1 x N1) | 1.28 x N1  (2 x N1) |
| 1.28 | ≥ 2.56 (2) | 4 | 1.28 x N1  (1 x N1) | 2.56 x N1  (2 x N1) |
| 2.56 | ≥ 5.12 (4) | 3 | 2.56 x N1  (1 x N1) | 5.12 x N1  (2 x N1) |

* Option 3 (Huawei)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 10.24< eDRX\_IDLE cycle length ≤10485.76 | 0.32 | ≥7.68 (6)  & <15.36 (12) | 8 | (23 x N1) | 0.32 x N1 x M2  (1 x N1 x M2) | 0.64 x N1 x M2  (2 x N1 x M2) |
| ≥15.36 (12) | 0.64 x N1 x M2  (2 x N1 x M2) | 1.28 x N1 x M2  (4 x N1 x M2) |
| 0.64 | ≥6.4 (5)  & <12.8 (10) | 5 | 0.64 x N1 (1 x N1) | 1.28 x N1 (2 x N1) |
| ≥12.8 (10) | 1.28 x N1 (2 x N1) | 2.56 x N1 (4 x N1) |
| 1.28 | ≥10.24 (8) | 4 | 1.28 x N1 (1 x N1) | 2.56 x N1 (2 x N1) |
| 2.56 | ≥15.36 (12) | 3 | 2.56 x N1 (1 x N1) | 5.12 x N1 (2 x N1) |

* Recommended WF
  + Conclusions of issue 1-3-3-1 on M2 and 1-3-3-2 on “split PTW to 2 gears” will be reused for Issue 1-3-4 based on WF R4-2202672

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Option 2. |
| Huawei | option 1. The same reason as issue 1-3-3. |
| Apple | Support option 1. For option 2, in last meeting RAN4 agreed that,   * + For both FR1 and FR2, when eDRX>10.24s is used at NR RedCap UE in IDLE mode     - the number of samples needed for Nserv of serving cell measurement (measured in DRX cycles) must be contained in a single PTW length.     - the number of samples needed for Tmeasure,NR /Tevaluate,NR of intra-freq or inter-freq cell measurement (measured in DRX cycles) must be contained in a single PTW length,     - the number of samples needed for Tdetect,NR of intra-freq or inter-freq cell measurement (measured in DRX cycles) could be splitted into different PTWs   For DRX=0.32s, Tevaluate,NR\_Intra = 0.64\*N1=0.64\*8=4\*1.28s; and in option 2 the PTW is defined as ≥1.28s (we think it shall be ≥ 4\*1.28s if no M2), so it does not comply with the last meeting agreement. |
| CMCC | Option 2 |
| Xiaomi | Option 1 |
| OPPO | Option 1. |
| vivo | Option 1. Agree with apple the PTW length of option 2 is no correct. |
| Ericsson | Based on Apple’s comments, we notice that the PTW length in option 2 is unreasonable. Thus, we propose to update option 2 to option 2a.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | FR1 Scaling Factor (N1) | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 5.12 (4) | 8 | (23) | 0.32 x N1  (1 x N1) | 0.64 x N1  (2 x N1) | | 0.64 | ≥ 6.4 (5) | 5 | 0.64 x N1  (1 x N1) | 1.28 x N1  (2 x N1) | | 1.28 | ≥ 10.24 (8) | 4 | 1.28 x N1  (1 x N1) | 2.56 x N1  (2 x N1) | | 2.56 | ≥ 15.36 (12) | 3 | 2.56 x N1  (1 x N1) | 5.12 x N1  (2 x N1) | |
| MediaTek | Option 1 is agreeable. |
| Nokia | Thanks Apple, for noticing that. We would be Ok to go with Option 2, and make the correction mentioned by Apple in their comment. |

**Issue 1-3-4-1: FR2 Cell reselection requirements for RedCap UE with eDRX cycle (intra frequency) when eDRX = 20.48s (and 40.96s)**

* Option 1: The eDRX cycles with PTW (20.48s and 40.96s) are not feasible. RAN4 shall keep eDRX for FR2 requirements as FFS and inform RAN2 with update on the issues related to eDRX with FR2 (MTK)
* Option 2: No issue (Apple CMCC Nokia Ericsson Huawei vivo)
* Recommended WF
  + Could option 2 be a compromise?

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericson | Option 2.  The same reason as issue 1-2-2-3. |
| Huawei | Option 2. |
| Apple | Option 2. |
| CMCC | Option 2 |
| Xiaomi | Option 2 |
| OPPO | Option 2. |
| vivo | We support option 2 |
| MediaTek | Please refer to MediaTek comment in issue 1-2-2-3. We support Option 1. |
| Nokia | Option 2, similar comment as in issue 1-2-2-3. |

**Issue 1-3-4-2: N1 for FR2 intra-frequency cell reselection requirements**

* Option 1: [8 5 4 3] for DRX [0.32 0.64 1.28 2.56] (Apple CMCC Nokia Ericsson Huawei xiaomi vivo)
* Recommended WF
  + Suggest to agree option 1.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Option 1. |
| Huawei | Support with recommended WF. |
| Apple | Option 1. |
| CMCC | Option 1 |
| Xiaomi | Option 1 |
| OPPO | Option 1. |
| vivo | Support with recommended WF. |
| MediaTek | Recommended WF is agreeable. |
| Nokia | Option 1. |

**Issue 1-3-5 Timer for initiating Cell selection in Idle mode**

* Proposals
* Option 1: (Ericsson)
  + When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T = max(10s, one eDRX\_IDLE cycle) in FR1 for initiating the cell selection;
  + When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T = max(10s, K1\*N1\*eDRX\_IDLE cycle) in FR2 for initiating the cell selection when eDRX cycle is less than 20.48s, where, K1=2. Otherwise, T = max(81.92s, one eDRX\_IDLE cycle
* Recommended WF
  + TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Option 1.  This issue is similar as the Idle mode remaining issue in R15.  In current NR Idle mode, it specifies that UE shall initiate cell selection procedures for the selected PLMN after 10s if the UE has not found any new suitable cell.  In LTE eDRX, the timer is update to T=MAX(10 s, one eDRX\_IDLE cycle) if the UE is configured with eDRX\_IDLE cycle.  In NR FR1, if the UE is configured with eDRX\_IDLE cycle, the timer shall be updated to T=MAX(10 s, one eDRX\_IDLE cycle) similar as legacy LTE eDRX.  In NR FR2, if the UE is configured with eDRX\_IDLE cycle and the eDRX\_IDLE cycle is less than 20.48s, considering Rx beam sweeping factor N1, the evaluation time Nserv, Tevaluate are much larger than one eDRX cycle. Thus, the requirement shall be updated to introduce the max function for the timer T= max(10s, K1\*N1\*eDRX cycle), where, K1=2.  If the UE is configured with eDRX\_IDLE cycle and the eDRX\_IDLE cycle is larger than 10.24s, the eDRX cycle is longer enough. Thus, the timer is update to T=MAX(10s, one eDRX\_IDLE cycle). |
| Huawei | agree with the FR1 part of opion1 and not agree with FR2 part.  For FR1, max(10s, one eDRX\_IDLE cycle) seems reasonable.  For FR2, a uniform way is preferred as LTE, T= max(10s, N1\*eDRX cycle). As UE shall camp on the old serving during T, then T shall not be too long, otherwise UE performance would degarade. As eDRX is configured, UE can perform measurement and evaluation up to UE implementation. In other words, UE is not required to perform evaluation according to Tevalute. |
| Apple | We agree with Huawei’s comment. |
| vivo | Ok with option 1. For FR2, prefer Huawei’s suggestion. |
| Ericsson | To Huawei,  For eDRX<20.48s, it looks fine for Huawei’s version T= max(10s, N1\*eDRX cycle).  However, if eDRX>20.48s, we don’t think it’s reasonable to consider N1 into the equation also. It should be max(FFS, one eDRX\_IDLE cycle). The FFS value should be derived based on the agreed max value when eDRX<20.48s in FR2. |
| MediaTek | Agree on the first bullet for FR1.  For FR2, we may need to further check so we will provide further comment later during the meeting. |
| Nokia | This issue is being discussed in many different work items (NR\_ext\_to\_71GHz, NR-unlic maintenance and legacy Rel-15). In general, our position is to wait for the conclusion at least in Rel-15.  However, for the RedCap WI given the eDRX cycles, we can already agree to make the change in the timer, as proposed by Ericsson to FR1, but we agree to Huawei’s remarks regarding FR2. |

**Issue 1-3-6: Cell reselection requirements for RedCap UE with eDRX cycle (inter frequency)**

* Proposals
* Option 1: (MTK)

Tdetect,NR\_Inter, Tmeasure,NR\_Inter and Tevaluate,NR\_Inter for UE operating with eDRX\_IDLE cycle without PTW for FR1

|  |  |  |  |
| --- | --- | --- | --- |
| eDRX cycle length [s] | Tdetect,NR\_Inter [s] (number of DRX cycles) | Tmeasure,NR\_Inter [s] (number of DRX cycles) | Tevaluate,NR\_Inter [s] (number of DRX cycles) |
|
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |
| 5.12 | 117.76 (23) | 5.12 (1) | 10.24 (2) |
| 10.24 | 235.52 (23) | 10.24 (1) | 20.48 (2) |

Tdetect,NR\_Inter, Tmeasure,NR\_Inter and Tevaluate,NR\_Inter for UE configured with eDRX\_IDLE cycle with PTW and PH for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of DRX cycles) | Tdetect,NR\_Inter [s] (number of DRX cycles) | Tmeasure,NR\_Inter [s] (number of DRX cycles) | Tevaluate,NR\_Inter [s] (number of DRX cycles) |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 1.28 (4) | Note 3 (**23** x 1.5) | 0.32 x 1.5 (1 x 1.5) | 0.64 x 1.5 (**2** x 1.5) |
| 0.64 | ≥ 1.28 (2) | Note 3 (23) | 0.64 (1) | 1.28 (2) |
| 1.28 | ≥ 2.56 (2) |  | 1.28 (1) | 2.56 (2) |
| 2.56 | ≥ 5.12 (2) |  | 2.56 (1) | 5.12 (2) |
| Note 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.  Note 2: The eDRX\_IDLE cycle lengths are as specified in Section 10.5.5.xx of TS 24.008 [6].  Note 3: The time is calculated depending on the number *N* of DRX cycles as follows: | | | | | |

Tdetect,EUTRAN, Tmeasure,EUTRAN, and Tevaluate,EUTRAN for UE operating with eDRX\_IDLE cycle without PTW

|  |  |  |  |
| --- | --- | --- | --- |
| eDRX cycle length [s] | Tdetect,EUTRAN [s] (number of DRX cycles) | Tmeasure,EUTRAN [s] (number of DRX cycles) | Tevaluate,EUTRAN  [s] (number of DRX cycles) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) |
| 5.12 | 117.76 (23) | 5.12 (1) | 10.24 (2) |
| 10.24 | 235.52 (23) | 10.24 (1) | 20.48 (2) |

Tdetect,EUTRAN, Tmeasure,EUTRAN, and Tevaluate,EUTRAN for UE operating with eDRX\_IDLE cycle with PTW and PH

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of DRX cycles) | Tdetect,EUTRAN [s] (number of DRX cycles) | Tmeasure,EUTRAN [s] (number of DRX cycles) | Tevaluate,EUTRAN  [s] (number of DRX cycles) |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥1.28 (4) | (23) | 0.32 (1) | 0.64 (2) |
| 0.64 | ≥ 1.28 (2) | 0.64 (1) | 1.28 (2) |
| 1.28 | ≥2.56 (2) | 1.28 (1) | 2.56 (2) |
| 2.56 | ≥5.12 (2) | 2.56 (1) | 5.12 (2) |
| Note 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.  Note 2: The eDRX\_IDLE cycle lengths are as specified in Section 10.5.5.xx of TS 24.008 [6]. | | | | | |

* Recommended WF
  + Based on WF R4-2120325, same as the corresponding requirements proposed for intra-frequency, respectively will be used. Not necessary to discuss any more.

### Sub-topic 1-4 eDRX requirements for inactive state

**Issue 1-4-1: Inactive state requirements when idle eDRX is longer than 10.24s**

* + Option 1: The inactive UE requirements are based on inactive DRX or inactive eDRX when inactive eDRX is configured (Huawei vivo)
  + Option 2: Based on the paging monitoring cycle of T agreed in RAN2 (Apple Ericsson xiaomi)
  + Option 3: Use corresponding idle state requirements. (MTK)

|  |  |  |  |
| --- | --- | --- | --- |
| IDLE eDRX[s] | Inactive eDRX[s] | Outside CN PTW or during CN PTW | T |
| >10.24 | Not configured | During CN PTW | Shortest value of default paging cycle and UE specific DRX cycle if configured by upper layer |
| >10.24 | Not configured | Outside CN PTW | RAN paging cycle. |
| >10.24 | ≤10.24 | During CN PTW | Shortest value of default paging cycle and UE specific DRX cycle if configured by upper layer |
| >10.24 | ≤10.24 | Outside CN PTW | INACTIVE eDRX cycle |

* Recommended WF
  + TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | From our understanding, RAN4 shall support the agreed paging cycle to define the requirement, but for the specific requirement, it seems not too much difference between option 1 and option 2.  RAN4 can define requirements based on separate DRX and eDRX values and further clarify it should follow RAN2’s agreements on which DRX or eDRX will be used in different scenarios. |
| Huawei | Support option 1.  In essence, the NR inactive DRX/eDRX cycle is the same as LTE inactive DRX. In LTE eMTC, when idle eDRX is configured, the measurement requirements for inactive UE are defined based on inactive DRX only and without considering PTW. We think this principle shall be followed (both Option 1 and option 2 are aligned with principle).  RAN2’s agreements are summarized as below. T is used for UE to receive paging which determined by many parameters. T would be different in difference cases. However from measurement point of view, it is no need for UE to perform measurement on each paging occasion. The simple way for UE implementation is to perform measurement only based on inactive eDRX cycle which is aligned with LTE. Then UE is not required to execute such enormous logic judgement according to T.   |  |  |  | | --- | --- | --- | | IDLE eDRX | Inactive eDRX | T | | >10.24 | N/A | Within PTW: Min{UE specific DRX cycle(if configured by upper layer), RAN paging cycle, default paging cycle} | | Outside PTW: RAN paging cycle | | <=10.24 | Within PTW: min{UE specific DRX cycle (if configured by upper layer) , INACTIVE eDRX cycle and default paging cycle}. | | Outside PTW: INACTIVE eDRX cycle | | <=10.24 | N/A | min{ RAN paging cycle, IDLE eDRX cycle} | | <=10.24 | min{IDLE eDRX cycle, INACTIVE eDRX cycle} | |
| Apple | We support option 2. RAN2 has clear definition for PO cycle, and we think UE could wake up to do the measurement based on PO monitoring cycle which would not cause additional power consumption. Even though in some extreme cases UE may not able to receive PO and SSB at the same time(PO and SSB multiplexing pattern 2/3 in FR2), using PO cycle as measurement periodicity to perform RR measurement would not bring extra power consumption in our view. |
| Xiaomi | Prefer Option 2 to define measurement requirement based on paging cycle. |
| vivo | Agree with Ericssion that most of time option 1 and 2 will be same. Could we agree the following 2 cased which we believe option 1 and 2 will result in the same results.   |  |  |  |  | | --- | --- | --- | --- | | >10.24 | Not configured | Outside CN PTW | RAN paging cycle. | | >10.24 | ≤10.24 | Outside CN PTW | INACTIVE eDRX cycle | |
| MediaTek | We support Option 1. Also, Huawei’s comment makes sense to us.  Besides, Option 3 was meant for eDRX design so please ignore it. |
| Nokia | Option 2 |
|  |  |

**Issue 1-4-2: Inactive state requirements when idle eDRX is no longer than 10.24s**

* + Option 1: The inactive UE requirements are based on inactive eDRX or inactive DRX when inactive eDRX is not configured (Huawei vivo)
  + Option 2: Based on the paging monitoring cycle of T agreed in RAN2 (Apple Ericsson xiaomi)
  + Option 3: Use corresponding idle state requirements. (MTK)

|  |  |  |  |
| --- | --- | --- | --- |
| IDLE eDRX[s] | Inactive eDRX[s] | Outside CN PTW or during CN PTW | T |
| ≤10.24 | Not configured | NA | Shortest of RAN paging cycle and IDLE eDRX cycle |
| ≤10.24 | ≤10.24 | NA | The shortest of IDLE eDRX cycle and INACTIVE eDRX cycle. |

* Recommended WF
  + TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | From our understanding, RAN4 shall support the agreed paging cycle to define the requirement, but for the specific requirement, it seems not too much difference between option 1 and option 2.  RAN4 can define requirements based on separate DRX and eDRX values and further clarify it should follow RAN2’s agreements on which DRX or eDRX will be used in different scenarios. |
| Huawei | Support option 1. The same comments as issue 1-4-1. |
| Apple | We support option 2. RAN2 has clear definition for PO cycle, and we think UE could wake up to do the measurement based on PO monitoring cycle which would not cause additional power consumption. Even though in some extreme cases UE may not able to receive PO and SSB at the same time(PO and SSB multiplexing pattern 2/3 in FR2), using PO cycle as measurement periodicity to perform RR measurement would not bring extra power consumption in our view.  Option 1 mentioned “when inactive eDRX is not configured”, so inactive eDRX shall not be used for measurement requirement in option 1 (maybe just copy/paste typo in option 1). |
| Xiaomi | Prefer Option 2 to define measurement requirement based on paging cycle. |
| vivo | Option 1 and for this case can compromise to option 2. |
| MediaTek | We support Option 1. Also, Huawei’s comment makes sense to us.  Besides, Option 3 was meant for eDRX design so please ignore it. |
| Nokia | Option 2 |

**Issue 1-4-3: Inactive state requirements**

* Option 1 (Huawei)

Table 6-1: Nservfor inactive Redcap UE configured with eDRX\_IDLE cycle, (Frequency range FR1)

|  |  |  |
| --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX or eDRX INACTIVE cycle length[s] | Nserv [number of DRX or eDRX cycles] |
| 2.56 ≤eDRX\_IDLE cycle length ≤10485.76 | 0.32 | 4 |
| 0.64 | 4 |
| 1.28 | 2 |
| 2.56 | 2 |
| 5.12 | 2 |
| 10.24 | 2 |

Table 6-2: Nservfor inactive Redcap UE configured with eDRX\_IDLE cycle, (Frequency range FR2)

|  |  |  |  |
| --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX or eDRX INACTIVE cycle length[s] | Scaling Factor (N1) | Nserv [number of DRX or eDRX cycles] |
| 2.56 ≤eDRX\_IDLE cycle length ≤10485.76 | 0.32 | 8 | 4\* N1 |
| 0.64 | 5 | 4\* N1 |
| 1.28 | 4 | 2\* N1 |
| 2.56 | 3 | 2\* N1 |
| 5.12 | 3 | 2\* N1 |
| 10.24 | 3 | 2\* N1 |

**Table 7: Tdetect, Tmeas and Tevaluate for inactive Redcap UE configured with eDRX\_IDLE cycle**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| eDRX\_IDLE cycle length [s] | DRX or eDRX INACTIVE cycle length Note1 [s] | Scaling Factor (N1) | | Tdetect,NR\_Inter [s] (number of DRX or eDRX cycles) | Tmeasure,NR\_Inter [s] (number of DRX or eDRX cycles) | Tevaluate,NR\_Inter [s] (number of DRX or eDRX cycles) |
| FR1 | FR2Note1 |
| 2.56 ≤eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | 1 | 8 | 11.52 x N1 x 1.5 (36 x N1 x 1.5) | 1.28 x N1 x 1.5 (4 x N1 x 1.5) | 5.12 x N1 x 1.5 (16 x N1 x 1.5) |
| 0.64 |  | 5 | 17.92x N1 (28 x N1) | 1.28 x N1 (2 x N1) | 5.12 x N1 (8 x N1) |
| 1.28 |  | 4 | 32 x N1 (25 x N1) | 1.28 x N1 (1 x N1) | 6.4 x N1 (5 x N1) |
| 2.56 |  | 3 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) |
| 5.12 |  | 3 | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 15.36 x N1 (3 x N1) |
| 10.24 |  | 3 | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 30.72 x N1 (3 x N1) |

* Recommended WF
  + Focus on 1-4-1 and 1-4-2 firstly.

**Issue 1-4-4: Inactive state eDRX inter-frequency requirements**

* + Option 1: The inter-frequency measurement requirements for inactive state Redcap UE are the same as these of intra-frequency measurement requirements (vivo)

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Fine with option 1. |
| Huawei | Fine with option 1. |
| Apple | Option 1. |
| Xiaomi | Fine with option 1. |
| vivo | Option 1 |
| MediaTek | Option 1 is agreeable. |
| Nokia | Option 1 is ok |

## 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.*

### 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 |
| R4-2204910 | MediaTek  Based on RAN2 agreement, the INACTIVE mode shall cover eDRX up to 10.24s, however, the tables in this draft CR is covering all available CR.   * Remove: 2.56 ≤eDRX\_IDLE cycle length ≤10485.76.   There should be a “\_RedCap” in all parameters’ names. |
| Nokia  Some values in the tables are still being discussed, so they should be in []’s.  We have an editorial comment.  The style of table captions is not consistent in the CR (In some cases, the font is Arial, in others it is Times New Roman) we suggest to follow TS 38.133 style. |
|  |
| 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 #1-2 | **Issue 1-2-1: Nserv and N1 for eDRX length up to 10.24s (FR2)**  Moderator Note: The following is used for Nserv (FR2) requirement based on R4-2202672. The left issue is N1 value.   |  |  |  | | --- | --- | --- | | *eDRX cycle length [s]* | *FR2 Scaling Factor (N1)* | *Nserv [number of eDRX cycles]* | | ***2.56*** | ***[TBD]*** | ***N1\*2*** | | ***5.12*** | | ***10.24*** |   Option 1: N1 = 3 for eDRX = 5.12 and 10.24s. (CMCC Nokia Ericsson Huawei xiaomi vivo)   * Recommended WF   + Suggest agree N1 = 3 for eDRX = 5.12 and 10.24s for FR2 Nserv requirements   All companies are OK with recommended WF.  Tentative agreement: agree with N1 = 3 for eDRX = 5.12 and 10.24s for FR2 Nserv requirements  **Issue 1-2-2: Serving cell requirements for eDRX length larger than 10.24s**   * Option 1: (Apple oppo vivo)   + Option 1a: Only support requirements for FR1 (MTK)     ***FR1 Nserv for 10.24s<eDRX cycle≤10485.76s***   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR1* | *Nserv [number of DRX cycles]* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 1.28 (1)*** | ***1*** | ***M1\*N1\*2*** | | ***0.64*** | ***≥ 1.28 (1) (M1=1) or ≥ 2.56 (2) (M1=2)*** | ***M1\* N1\*2*** | | ***1.28*** | ***≥ 2.56 (2)*** | ***N1\*2*** | | ***2.56*** | ***≥ 5.12 (4)*** | ***N1\*2*** | | ***Note 1: PTW length is derived based on***  ***Note 2: M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle≤ 0.64s, otherwise M1=1.*** | | | | |   ***FR2 Nserv for 10.24s<eDRX cycle≤10485.76s***   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR2* | *Nserv [number of DRX cycles]* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 5.12 (4) (M1=1) or ≥ 10.24 (8) (M1=2)*** | ***8*** | ***M1\*N1\*2*** | | ***0.64*** | ***≥ 6.4 (5) (M1=1) or ≥ 12.8 (10) (M1=2)*** | ***5*** | ***M1\*N1\*2*** | | ***1.28*** | ***≥ 10.24 (8)*** | ***4*** | ***N1\*2*** | | ***2.56*** | ***≥ 15.36 (12)*** | ***3*** | ***N1\*2*** | | ***Note 1: PTW length is derived based on***  ***Note 2: M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle≤ 0.64s, otherwise M1=1.*** | | | | |  * Option 2: (Nokia)   ***FR1 Nserv for 10.24s<eDRX cycle≤10485.76s***   |  |  |  |  |  | | --- | --- | --- | --- | --- | | eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | Scaling Factor (N1) for FR1 | Nserv [number of DRX cycles] | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 1.28 (1) | 1 | N1\*2 | | 0.64 | ≥ 2.56 (2) | N1\*2 | | 1.28 | ≥ 2.56 (2) | N1\*2 | | 2.56 | ≥ 5.12 (4) | N1\*2 |   ***FR2 Nserv for 10.24s<eDRX cycle≤10485.76s***   |  |  |  |  |  | | --- | --- | --- | --- | --- | | eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | Scaling Factor (N1) for FR2 | Nserv [number of DRX cycles] | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 5.12 (4) | 8 | N1\*2 | | 0.64 | ≥ 6.4 (5) | 5 | N1\*2 | | 1.28 | ≥ 10.24 (8) | 4 | N1\*2 | | 2.56 | ≥ 15.36 (12) | 3 | N1\*2 |  * Recommended WF   + Based on GTW agreement, continue discussion at 2nd round with updated proposal.   **Issue 1-2-2-1: FR1 PTW length (N1=1), whether M1 should be considered for FR1/FR2 Nserv when DRX = 0.32 and 0.64s**   * Option 1: Keep M1 (M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle≤ 0.64s) (Apple MTK vivo) * Option 2: Do not use M1(CMCC Nokia Ericsson ZTE) * Option 3: Keep M1 for FR1 and do not use M1 for FR2 (Huawei) * Recommended WF   + TBA   GTW Agreement: Keep M1 for FR1 and do not use M1 for FR2  **Issue 1-2-2-2: N1 for FR2 Nserv requirements**  Option 1: N1= 8 for DRX= 0.32s; 5 for DRX=0.64s; 4 for DRX= 1.28s; 3 for DRX =2.56s (Apple CMCC Nokia Ericsson Huawei xiaomi vivo)   * Recommended WF   + Suggest to agree option 1 for issue 1-2-2-2   All companies are ok with option 1.  Tentative Agreement: option 1  **Issue 1-2-2-3: FR2 serving cell requirements for RedCap UE with eDRX cycle when eDRX = 20.48s (and 40.96s)**   * Option 1: The eDRX cycles with PTW (20.48s and 40.96s) are not feasible. Besdies, three more eDRX cycles with PTE are overlapped with eDRX without PTW. RAN4 shall keep eDRX for FR2 requirements as FFS and inform RAN2 with update on the issues related to eDRX with FR2 (MTK) * Option 2: Not agree with option 1 (Ericsson, Huawei, xiaomi, vivo, Nokia) * Recommended WF   + Discussion at 2nd round. Could proponent of option 1 maximize the common part without different views? |
| Sub-topic #1-3 | **Issue 1-3-1: FR1 Cell reselection requirements for RedCap UE with eDRX cycle (intra frequency) when eDRX ≤10.24s**   * Option 1 (Apple)  |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *Scaling Factor (N1) FR1* | *Tdetect,NR\_Intra [s] (number of eDRX cycles)* | *Tmeasure,NR\_Intra [s] (number of eDRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of eDRX cycles)* | | ***2.56*** | ***1*** | ***58.88 x N1 (23 x N1)*** | ***2.56 x N1 (1 x N1)*** | ***7.68 x N1 (3 x N1)*** | | ***5.12*** | ***102.4 x N1 (20 x N1)*** | ***5.12 x N1 (1 x N1)*** | ***10.24 x N1 (2 x N1)*** | | ***10.24*** | ***102.4 x N1 (10 x N1)*** | ***10.24 x N1 (1 x N1)*** | ***20.48 x N1 (2 x N1)*** |  * Option 2 (CMCC Nokia MTK vivo)  |  |  |  |  |  | | --- | --- | --- | --- | --- | | eDRX cycle length [s] | Scaling Factor (N1) FR1 | Tdetect,NR\_Intra [s] (number of eDRX cycles) | Tmeasure,NR\_Intra [s] (number of eDRX cycles) | Tevaluate,NR\_Intra  [s] (number of eDRX cycles) | | 2.56 | 1 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 7.68 x N1 (3 x N1) | | 5.12 | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 10.24 x N1 (2 x N1) | | 10.24 | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 20.48 x N1 (2 x N1) |  * Option 3 (Huawei)  |  |  |  |  |  | | --- | --- | --- | --- | --- | | eDRX cycle length [s] | Scaling Factor (N1) FR1 | Tdetect,NR\_Intra [s] (number of eDRX cycles) | Tmeasure,NR\_Intra [s] (number of eDRX cycles) | Tevaluate,NR\_Intra  [s] (number of eDRX cycles) | | 2.56 | 1 | 58.88 x N1 (23 x N1) | 2.56 x N1 (1 x N1) | 5.12 x N1 (2 x N1) | | 5.12 | 117.76 x N1 (23 x N1) | 5.12 x N1 (1 x N1) | 10.24 x N1 (2 x N1) | | 10.24 | 235.52 x N1 (23 x N1) | 10.24 x N1 (1 x N1) | 20.48 x N1 (2 x N1) |   **Option 1 (Apple MTK Ericsson)**  **Option 2 (Huawei Apple CMCC xiaomi oppo vivo MTK Nokia QC)**  **Option 3 (Xiaomi)**   * Recommended WF: During 1st round option 2 is ok for most of companies and other companies also do not have strong view.   Tentative agreement: agree option 2.  **Issue 1-3-2: FR2 Cell reselection requirements for RedCap UE with eDRX cycle (intra frequency) when eDRX ≤10.24s**  **Option 1 (Apple MTK Ericsson)**  **Option 2 (Huawei Apple CMCC xiaomi oppo vivo MTK Nokia QC)**  **Option 3 (Xiaomi)**   * Recommended WF: Same situation as 1-3-1. Suggest the following tentative agreement.   Tentative agreement: agree option 2.  **Issue 1-3-3: FR1 Cell reselection requirements for RedCap UE with eDRX cycle (intra frequency) when eDRX >10.24s**   * Option 1 (Apple MTK)  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *FR1 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of DRX cycles)* | *Tmeasure,NR\_Intra [s] (number of DRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of DRX cycles)* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 1.28 (1)*** | ***1*** |  | ***0.32 x N1 x M2 (1 x N1 x M2)*** | ***0.64 x N1 x M2 (2 x N1 x M2)*** | | ***0.64*** | ***≥ 1.28 (1)*** | ***0.64 x N1 (1 x N1)*** | ***1.28 x N1 (2 x N1)*** | | ***1.28*** | ***≥ 2.56 (2)*** | ***1.28 x N1 (1 x N1)*** | ***2.56 x N1 (2 x N1)*** | | ***2.56*** | ***≥ 5.12 (4)*** | ***2.56 x N1 (1 x N1)*** | ***5.12 x N1 (2 x N1)*** | | ***Note 1: PTW length is derived based on***  ***Note 2: M2=1.5 if SMTC periodicity of measured intra-frequency cell > 20 m and DRX cycle=0.32s, otherwise M2=1.*** | | | | | | |  * Option 2 (vivo)  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *FR1 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of DRX cycles)* | *Tmeasure,NR\_Intra [s] (number of DRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of DRX cycles)* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥1.28\*M2 (1\*M2)*** | ***1*** | ***(23)*** | ***0.32 x N1\*M2 (1 x N1\*M2)*** | ***0.64 x N1 \*M2 (2 x N1\*M2)*** | | ***0.64*** | ***≥1.28 (1)*** | ***0.64 x N1 (1 x N1)*** | ***1.28 x N1 (2 x N1)*** | | ***1.28*** | ***≥2.56 (2)*** | ***1.28 x N1 (1 x N1)*** | ***2.56 x N1 (2 x N1)*** | | ***2.56*** | ***≥5.12 (4)*** | ***2.56 x N1 (1 x N1)*** | ***5.12 x N1 (2 x N1)*** |  * Recommended WF: Based on GTW conclusion only options with M2 are listed for 2nd round. The only difference between option 1 and 2 is the PTW length when DRX = 0.32s.   **Issue 1-3-3-1 Whether to consider M2 when DRX = 0.32s**   * Option 1 included (M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms, otherwise M2=1.(Apple Huawei MTK vivo) * Option 2: Do not include M2 (CMCC Nokia Ericsson ZTE)   GTW Agreement: Keep M2 for FR1 and do not use M2 for FR2  **Issue 1-3-3-2 Whether split PTW to 2 gears for small DRX cycle (0.32s and 0.64s) when defining requirements**   * Option 1: Yes (Huawei) * Option 2: No (Apple CMCC Nokia Ericsson)   All companies are fine with option 2.  Tentative agreement: option 2  **Issue 1-3-4: FR2 Cell reselection requirements for RedCap UE with eDRX cycle (intra frequency) when eDRX >20.48s**   * Option 2a (Ericsson)  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | FR1 Scaling Factor (N1) | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 5.12 (4) | 8 | (23) | 0.32 x N1  (1 x N1) | 0.64 x N1  (2 x N1) | | 0.64 | ≥ 6.4 (5) | 5 | 0.64 x N1  (1 x N1) | 1.28 x N1  (2 x N1) | | 1.28 | ≥ 10.24 (8) | 4 | 1.28 x N1  (1 x N1) | 2.56 x N1  (2 x N1) | | 2.56 | ≥ 15.36 (12) | 3 | 2.56 x N1  (1 x N1) | 5.12 x N1  (2 x N1) | |
|  | * Recommended WF: based on GTW agreement where M2 should not be used for FR2 and tentative agreement on “split PTW to 2 gears”, option 2a proposed in the 1st round comment is the only one left. Is option 2a agreeable except when eDRX = 20.48 (Issue 1-3-4-1)?   **Issue 1-3-4-1: FR2 Cell reselection requirements for RedCap UE with eDRX cycle (intra frequency) when eDRX = 20.48s (and 40.96s)**   * Option 1: The eDRX cycles with PTW (20.48s and 40.96s) are not feasible. RAN4 shall keep eDRX for FR2 requirements as FFS and inform RAN2 with update on the issues related to eDRX with FR2 (MTK) * Option 2: No issue (Apple CMCC Nokia Ericsson Huawei vivo xiaomi oppo) * Recommended WF: Is it ok to have eDRX = 20.48 in the table and use TBD for all related requirements if there is no consensus on 2nd discussion?   **Issue 1-3-4-2: N1 for FR2 intra-frequency cell reselection requirements**   * Option 1: [8 5 4 3] for DRX [0.32 0.64 1.28 2.56] (Apple CMCC Nokia Ericsson Huawei xiaomi vivo)   **All companies are ok with option 1.**  Tentative agreement: option 1  **Issue 1-3-5 Timer for initiating Cell selection in Idle mode**   * Proposals * Option 1: (Ericsson)   + When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T = max(10s, one eDRX\_IDLE cycle) in FR1 for initiating the cell selection;   + When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T = max(10s, K1\*N1\*eDRX\_IDLE cycle) in FR2 for initiating the cell selection when eDRX cycle is less than 20.48s, where, K1=2. Otherwise, T = max(81.92s, one eDRX\_IDLE cycle * Option 2 (Huawei Apple vivo Nokia)   + When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T = max(10s, one eDRX\_IDLE cycle) in FR1 for initiating the cell selection;   + When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T= max(10s, N1\*eDRX cycle) in FR2 for initiating the cell selection when eDRX cycle is less than 20.48s * Option 3 (MTK)   + When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T = max(10s, one eDRX\_IDLE cycle) in FR1 for initiating the cell selection;   + FFS on FR2 * Recommended WF   + Is it possible to compromise to option 2? |
| Sub-topic #1-3 | **Issue 1-4-1: Inactive state requirements when idle eDRX is longer than 10.24s**   * + Option 1: The inactive UE requirements are based on inactive DRX or inactive eDRX when inactive eDRX is configured (Huawei vivo MTK)   + Option 2: Based on the paging monitoring cycle of T agreed in RAN2 (Apple Ericsson xiaomi Nokia)  |  |  |  |  | | --- | --- | --- | --- | | IDLE eDRX[s] | Inactive eDRX[s] | Outside CN PTW or during CN PTW | T | | >10.24 | Not configured | During CN PTW | Shortest value of default paging cycle and UE specific DRX cycle if configured by upper layer | | >10.24 | Not configured | Outside CN PTW | RAN paging cycle. | | >10.24 | ≤10.24 | During CN PTW | Shortest value of default paging cycle and UE specific DRX cycle if configured by upper layer | | >10.24 | ≤10.24 | Outside CN PTW | INACTIVE eDRX cycle |  * Recommended WF   Could we agree the following 2 cased which we believe option 1 and 2 will result in the same results.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | IDLE eDRX[s] | | Inactive eDRX[s] | | Outside CN PTW or during CN PTW | | T | | >10.24 | Not configured | | Outside CN PTW | | RAN paging cycle. | | | >10.24 | ≤10.24 | | Outside CN PTW | | INACTIVE eDRX cycle | |   **Issue 1-4-2: Inactive state requirements when idle eDRX is no longer than 10.24s**   * + Option 1: The inactive UE requirements are based on inactive eDRX or inactive DRX when inactive eDRX is not configured (Huawei vivo MTK)   + Option 2: Based on the paging monitoring cycle of T agreed in RAN2 (Apple Ericsson xiaomi vivo Nokia)  |  |  |  |  | | --- | --- | --- | --- | | IDLE eDRX[s] | Inactive eDRX[s] | Outside CN PTW or during CN PTW | T | | ≤10.24 | Not configured | NA | Shortest of RAN paging cycle and IDLE eDRX cycle | | ≤10.24 | ≤10.24 | NA | The shortest of IDLE eDRX cycle and INACTIVE eDRX cycle. |  * Recommended WF   + TBA   **Issue 1-4-4: Inactive state eDRX inter-frequency requirements**   * + Option 1: The inter-frequency measurement requirements for inactive state Redcap UE are the same as these of intra-frequency measurement requirements (vivo)   **All companies are ok with option 1.**  **Tentative agreement: option 1** |

### 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 |
| R4-2204910 | To be revised |

## Discussion on 2nd round (if applicable)

### Sub-topic 1-1 General aspects on eDRX enhancements

### Sub-topic 1-2 Idle state serving cell eDRX requirements

**Issue 1-2-2: Serving cell requirements for eDRX length larger than 10.24s**

* Option 1: (Apple oppo vivo)
  + Option 1a: Only support requirements in option 1 for FR1 (MTK)

***FR1 Nserv for 10.24s<eDRX cycle≤10485.76s***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR1* | *Nserv [number of DRX cycles]* |
| ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 1.28 (1) (M1=2)*** | ***1*** | ***M1\*N1\*2*** |
| ***0.64*** | ***≥ 2.56 (2) (M1=2)*** | ***M1\* N1\*2*** |
| ***1.28*** | ***≥ 2.56 (2)*** | ***N1\*2*** |
| ***2.56*** | ***≥ 5.12 (4)*** | ***N1\*2*** |
| ***Note 1: PTW length is derived based on***  ***Note 2: M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle≤ 0.64s, otherwise M1=1.*** | | | | |

***FR2 Nserv for 10.24s<eDRX cycle≤10485.76s***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR2* | *Nserv [number of DRX cycles]* |
| ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 5.12 (4)*** | ***8*** | ***N1\*2*** |
| ***0.64*** | ***≥ 6.4 (5)*** | ***5*** | ***N1\*2*** |
| ***1.28*** | ***≥ 10.24 (8)*** | ***4*** | ***N1\*2*** |
| ***2.56*** | ***≥ 15.36 (12)*** | ***3*** | ***N1\*2*** |
| ***Note 1: PTW length is derived based on*** | | | | |

* Recommended WF
  + Based on GTW agreement, could company check option 1 agreeable?

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Based on GTW conclusion M1 shall be kept for FR1, but the conditions to apply M1 shall be still there, our understanding is as following:  ***FR1 Nserv for 10.24s<eDRX cycle≤10485.76s***   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR1* | *Nserv [number of DRX cycles]* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 1.28 (1)*** | ***1*** | ***M1\*N1\*2*** | | ***0.64*** | ***≥ 1.28 (1) (M1=1) or ≥ 2.56 (2) (M1=2)*** | ***M1\* N1\*2*** | | ***1.28*** | ***≥ 2.56 (2)*** | ***N1\*2*** | | ***2.56*** | ***≥ 5.12 (4)*** | ***N1\*2*** | | ***Note 1: PTW length is derived based on***  ***Note 2: M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle≤ 0.64s, otherwise M1=1.*** | | | | |   ***FR2 Nserv for 10.24s<eDRX cycle≤10485.76s***   |  |  |  |  |  | | --- | --- | --- | --- | --- | | *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR2* | *Nserv [number of DRX cycles]* | | ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 5.12 (4)*** | ***8*** | ***N1\*2*** | | ***0.64*** | ***≥ 6.4 (5)*** | ***5*** | ***N1\*2*** | | ***1.28*** | ***≥ 10.24 (8)*** | ***4*** | ***N1\*2*** | | ***2.56*** | ***≥ 15.36 (12)*** | ***3*** | ***N1\*2*** | | ***Note 1: PTW length is derived based on*** | | | | | |
| Ericsson | Agree with Apple. |
| MediaTek | Agree with Apple. |
| Huawei | Fine with Apple’s proposal. |
| Qualcomm | Agree with Apple’s proposal |
| vivo | Agree with Apple’s suggestion |
| Xiaomi | Agree with Apple’s proposal |
| Nokia | Agree with Apple |
|  |  |

**Tentative agreement: the following table are agreed:**

***FR1 Nserv for 10.24s<eDRX cycle≤10485.76s***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR1* | *Nserv [number of DRX cycles]* |
| ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 1.28 (1)*** | ***1*** | ***M1\*N1\*2*** |
| ***0.64*** | ***≥ 1.28 (1) (M1=1) or ≥ 2.56 (2) (M1=2)*** | ***M1\* N1\*2*** |
| ***1.28*** | ***≥ 2.56 (2)*** | ***N1\*2*** |
| ***2.56*** | ***≥ 5.12 (4)*** | ***N1\*2*** |
| ***Note 1: PTW length is derived based on***  ***Note 2: M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle≤ 0.64s, otherwise M1=1.*** | | | | |

***FR2 Nserv for 10.24s<eDRX cycle≤10485.76s***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *Scaling Factor (N1) for FR2* | *Nserv [number of DRX cycles]* |
| ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 5.12 (4)*** | ***8*** | ***N1\*2*** |
| ***0.64*** | ***≥ 6.4 (5)*** | ***5*** | ***N1\*2*** |
| ***1.28*** | ***≥ 10.24 (8)*** | ***4*** | ***N1\*2*** |
| ***2.56*** | ***≥ 15.36 (12)*** | ***3*** | ***N1\*2*** |
| ***Note 1: PTW length is derived based on*** | | | | |

**Issue 1-2-2-3: FR2 serving cell requirements for RedCap UE with eDRX cycle when eDRX = 20.48s (and 40.96s)**

* Option 1: The eDRX cycles with PTW (20.48s and 40.96s) are not feasible. Besdies, three more eDRX cycles with PTE are overlapped with eDRX without PTW. RAN4 shall keep eDRX for FR2 requirements as FFS and inform RAN2 with update on the issues related to eDRX with FR2 (MTK)
* Option 1a: Can we add Option 1a: add a note to exclude the case of eDRX 20.48s with DRX 0.32s in FR2?   
  To our understanding, the above option is not feasible and we can compromise to it. (MTK)
* Option 2: Not agree with option 1 (Ericsson, Huawei, xiaomi, vivo, Nokia)
* Recommended WF
  + Could company check the new option (option 1a) is agreeable or not?

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Since M1 is not used in FR2 case, the PTW length could be 5.12s which is ¼ of eDRX=20.48s. Don’t see issue for eDRX=20.48s case. We support option 2, but if majority companies support option 1a we can compromise as well. |
| Ericsson | Support option 2.  Firstly, we don’t agree MTK’s evaluation for power saving. If we base on this method from MTK, the power consumption will also be higher for long eDRX with short DRX configuration than short eDRX with long DRX configuration. For example, eDRX 327.68s with DRX 0.32s and eDRX 81.92s and DRX 2.56s.  As we mentioned when RAN2 designs all eDRX configurations, it is important that such values would make a difference with respect to UE power consumption, but it would be also good to note that sometimes same power consumption outcome can be achieved with a combination of different parameters.  We think eDRX configuration can still bring power saving gain compared with DRX configuration in Idle mode. Thus, RAN4 shall define the requirements for all eDRX values in FR2. |
| MediaTek | In here we provide comment to Apple and Ericsson: we assess the feasibility of eDRX cycles with PTW in FR2 as follows:  **Case 1**: In this case we find the number of wake-up occasions in a single eDRX with PTW, so we can use it to assess the feasibility and benefits of eDRX in FR2. Now, the Nserv formula with PTW for FR2, with eDRX cycle = 20.48s and DRX cycle = 0.32s, is given as: 2\*N1.   * The number of DRX cycles within a single eDRX within the PTW is equal to: 2\*8 = 16 DRX cycles = 16\*0.32s = 5.12s. This means the UE shall has 16 awake (on) occasions within a single eDRX with PTW. The representation of eDRX cycle of 20.48s with PTW if depicted in the figure below.   **Case 2**: In this case, we assess the feasibility of eDRX cycles (20.48s) calculating the number of wake-up occasions for the lowest eDRX without PTW (i.e. 2.56s) for a period of time equal to the length of eDRX with PTW (i.e. 20.48s). Then, we compare it to the number of wake-up occasions that we found in case 1.   1. The number of DRX cycles (2.56s) within eDRX = 20.48s is equal to = 20.48s/2.56s = 8 occasions. This is depicted in the figure below. Furthermore, the deep sleep concept applies for a UE with a total transition period between sleep and active larger than 20ms as agreed in 3GPP RAN1 for power saving and provided in clause 8.1 in [TR 38.840]. This means that the UE can be in deep sleep whether in the PTW between the DRX or outside PTW.    * The representative comparison of case 1 and case 2a is depicted in figure below.    * Given that (8 << 16) means the new eDRX with PTW (20.48s) in FR2 has more power consumption compared to the lowest eDRX = 2.56s due to the higher number of wake-up occasions. In other words, eDRX = =20.48s has the same power consumption as DRX cycle **1.28s** (depicted in figure blow [c]), where the latter is not considered in eDRX range. Thus, eDRX = 20.48s is not feasible to be supported because it has more power consumption compared to lowest eDRX cycle = **2.56s**.   A picture containing graphical user interface  Description automatically generated  To Ericsson, we provided numerical analsysis for your comment in the first round so not sure why the question is repeated again, hence we copy our comment from the first round.  ‘Based on option 1’s logic, the power consumption will also be higher for long eDRX with short DRX configuration than short eDRX with long DRX configuration’, we would like to highlight that based on our logic we have the following numerical results:   * Case X: long eDRX with short DRX (e.g. eDRX **327.68s** with DRX **0.32s**), the number of wake-up occasions is equal to 2\*N1 = 2\*8 = **16**, which is the same number of wake-upsin a period of time equal to 327.68s. * Case Y: short eDRX with long DRX (e.g. eDRX **20.48s** with DRX **2.56s**), the number of wake-up occasions in a single eDRX is equal to 2\*N1 = 2\*3 = 6. Then, the number of wake-up occasions in a 327.68s period of time is equal to 6\*327.68s/20.48s = 6\*16 = **96** wake-up occasions.   Based on our logic, from these analysis it is clear that Case Y (short eDRX with long DRX with 96 wake-ups) has more power consumption compared to Case X (long eDRX with short DRX with 16 wake-ups). Hence, we don’t think Ericsson comment is valid.  In summary, we have provided all numerical analysis, time representation plots, and answers to support our argument in here. Therefore, it is reasonable to ask companies to compromise to option 1a, which is to exclude the eDRX that has more consumption than eDRX 2.56s. To clarify Option 1a, is not meant to remove 20.48s from the table, however, we need to add a note to exclude the only one scenario that is not feasible. |
| Ericsson | To MTK,  I guess you didn’t check our comments carefully.  Just use your examples above.   * Case X: long eDRX with short DRX (e.g. eDRX **327.68s** with DRX **0.32s**), the number of wake-up occasions is equal to 2\*N1 = 2\*8 = **16**, which is the same number of wake-upsin a period of time equal to 327.68s. * Case Y: short eDRX with long DRX (e.g. eDRX 163.84**s** with DRX **2.56s**), the number of wake-up occasions in a single eDRX is equal to 2\*N1 = 2\*3 = 6. Then, the number of wake-up occasions in a 327.68s period of time is equal to 6\*327.68s/163.84s = 6\*2 = **12** wake-up occasions.   Based on Mediatek’s logic, from these analysis it is clear that Case Y (short eDRX with long DRX with 16 wake-ups) has less power consumption compared to Case X (long eDRX with short DRX with 24 wake-ups).  We can use Meediatek’s logic to preclude for all eDRX values, but we think the most important thing for eDRX is that eDRX will have benefits compared with DRX.  If Mediatek thinks it needs some optimization for the configuration, it’s better to discuss it in possible RedCap further power saving WI in the future.  We should first define eDRX requirement as the basline in the 1st RedCap version. |
| Huawei | We tend to agree with Ericsson’s comments and don’t re-visit the eDRX configuration in RAN2. We prefer option 2. |
| vivo | Ok with option 2 |
| Xiaomi | Prefer Option 2 |
| Nokia | Support option 2. RAN4 should define requirements for all eDRX values defined by RAN2. We agree with Ericsson’s comments. |
|  |  |

Tentative agreement: agree option 2 with the case (eDRX cycle = 20.48s and DRX cycle = 0.32s) for FFS

### Sub-topic 1-3 Idle state cell reselection eDRX requirements

**Issue 1-3-3: FR1 Cell reselection requirements for RedCap UE with eDRX cycle (intra frequency) when eDRX >10.24s**

* Option 1 (Apple MTK)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *FR1 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of DRX cycles)* | *Tmeasure,NR\_Intra [s] (number of DRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of DRX cycles)* |
| ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥ 1.28 (1)*** | ***1*** |  | ***0.32 x N1 x M2 (1 x N1 x M2)*** | ***0.64 x N1 x M2 (2 x N1 x M2)*** |
| ***0.64*** | ***≥ 1.28 (1)*** | ***0.64 x N1 (1 x N1)*** | ***1.28 x N1 (2 x N1)*** |
| ***1.28*** | ***≥ 2.56 (2)*** | ***1.28 x N1 (1 x N1)*** | ***2.56 x N1 (2 x N1)*** |
| ***2.56*** | ***≥ 5.12 (4)*** | ***2.56 x N1 (1 x N1)*** | ***5.12 x N1 (2 x N1)*** |
| ***Note 1: PTW length is derived based on***  ***Note 2: M2=1.5 if SMTC periodicity of measured intra-frequency cell > 20 m and DRX cycle=0.32s, otherwise M2=1.*** | | | | | | |

* Option 2 (vivo)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *eDRX cycle length [s]* | *DRX cycle length [s]* | *PTW length [s]*  *(number of 1.28s periods)* | *FR1 Scaling Factor (N1)* | *Tdetect,NR\_Intra [s] (number of DRX cycles)* | *Tmeasure,NR\_Intra [s] (number of DRX cycles)* | *Tevaluate,NR\_Intra*  *[s] (number of DRX cycles)* |
| ***20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76*** | ***0.32*** | ***≥1.28\*M2 (1\*M2)*** | ***1*** | ***(23)*** | ***0.32 x N1\*M2 (1 x N1\*M2)*** | ***0.64 x N1 \*M2 (2 x N1\*M2)*** |
| ***0.64*** | ***≥1.28 (1)*** | ***0.64 x N1 (1 x N1)*** | ***1.28 x N1 (2 x N1)*** |
| ***1.28*** | ***≥2.56 (2)*** | ***1.28 x N1 (1 x N1)*** | ***2.56 x N1 (2 x N1)*** |
| ***2.56*** | ***≥5.12 (4)*** | ***2.56 x N1 (1 x N1)*** | ***5.12 x N1 (2 x N1)*** |

* Recommended WF: Based on GTW conclusion only options with M2 are listed for 2nd round. The only difference between option 1 and 2 is the PTW length when DRX = 0.32s.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Option 1. Copy/paste our analysis from 1st round: Our understanding is: the evaluation time is : 0.64 x N1 x M2 (2 x N1 x M2)=0.64\*1.5 (when M2=1.5 applies), and then PTW length is =1.28s. When M2 doesn’t applies, 0.64 x N1 x M2=0.64, and then PTW length is =1.28s. So no matter M2=1.5 or 1, the PTW length for DRX=0.32s is ≥ 1.28s. |
| Ericsson | Option 1.  Agree with Apple. |
| MediaTek | Option 1. We have the same understanding as Apple and E///. |
| Huawei | Fine with option 1. |
| vivo | ok with Apple’s analysis. Ok with option 1. |
| Xiaomi | Fine with option 1. |
| Nokia | Option 1, we agree with Apple |

Tentative agreement: option 1

**Issue 1-3-4: FR2 Cell reselection requirements for RedCap UE with eDRX cycle (intra frequency) when eDRX >20.48s**

* Option 2a (Ericsson)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | FR2 Scaling Factor (N1) | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 5.12 (4) | 8 | (23) | 0.32 x N1  (1 x N1) | 0.64 x N1  (2 x N1) |
| 0.64 | ≥ 6.4 (5) | 5 | 0.64 x N1  (1 x N1) | 1.28 x N1  (2 x N1) |
| 1.28 | ≥ 10.24 (8) | 4 | 1.28 x N1  (1 x N1) | 2.56 x N1  (2 x N1) |
| 2.56 | ≥ 15.36 (12) | 3 | 2.56 x N1  (1 x N1) | 5.12 x N1  (2 x N1) |

* Recommended WF: Recommended WF: based on GTW agreement where M2 should not be used for FR2 and tentative agreement on “split PTW to 2 gears”, option 2a proposed in the 1st round comment is the only one left. Is option 2a agreeable except when eDRX = 20.48 (Issue 1-3-4-1)?

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Support option 2a but based on previous meeting agreement please also add a note in the table, as,   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | FR1 Scaling Factor (N1) | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) | | 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 5.12 (4) | 8 | (23) | 0.32 x N1  (1 x N1) | 0.64 x N1  (2 x N1) | | 0.64 | ≥ 6.4 (5) | 5 | 0.64 x N1  (1 x N1) | 1.28 x N1  (2 x N1) | | 1.28 | ≥ 10.24 (8) | 4 | 1.28 x N1  (1 x N1) | 2.56 x N1  (2 x N1) | | 2.56 | ≥ 15.36 (12) | 3 | 2.56 x N1  (1 x N1) | 5.12 x N1  (2 x N1) | | Note 1: PTW length is derived based on | | | | | | | |
| Ericsson | Fine to add the Note 1.  We can further check it in the CR directly. |
| MediaTek | Fine with Option 2a.  Question to Apple before we agree on the note, is the note just to clarify how we derived the PTW length? If yes, then we are fine with it. |
| Huawei | Fine with option 2a. |
| vivo | Ok with option 2a with the note added by Apple. The note should be added based on previous agreement. |
| Xiaomi | Fine with Option2a and the Note 1 by Apple |
| Nokia | Support option 2a, with the changes proposed by Apple. |
|  |  |
|  |  |

Tentative agreement: requirements in the following table are agreed:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| eDRX cycle length [s] | DRX cycle length [s] | PTW length [s]  (number of 1.28s periods) | FR2 Scaling Factor (N1) | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) |
| 20.48 ≤ eDRX\_IDLE cycle length ≤ 10485.76 | 0.32 | ≥ 5.12 (4) | 8 | (23) | 0.32 x N1  (1 x N1) | 0.64 x N1  (2 x N1) |
| 0.64 | ≥ 6.4 (5) | 5 | 0.64 x N1  (1 x N1) | 1.28 x N1  (2 x N1) |
| 1.28 | ≥ 10.24 (8) | 4 | 1.28 x N1  (1 x N1) | 2.56 x N1  (2 x N1) |
| 2.56 | ≥ 15.36 (12) | 3 | 2.56 x N1  (1 x N1) | 5.12 x N1  (2 x N1) |
| Note 1: PTW length is derived based on | | | | | | |

**Issue 1-3-4-1: FR2 Cell reselection requirements for RedCap UE with eDRX cycle (intra frequency) when eDRX = 20.48s (and 40.96s)**

* Option 1: The eDRX cycles with PTW (20.48s and 40.96s) are not feasible. RAN4 shall keep eDRX for FR2 requirements as FFS and inform RAN2 with update on the issues related to eDRX with FR2 (MTK)
* Option 2: No issue (Apple CMCC Nokia Ericsson Huawei vivo xiaomi oppo)
* Recommended WF: Is it ok to have eDRX = 20.48 in the table and use TBD for all related requirements if there is no consensus on 2nd discussion?

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Option 2 without M2. |
| Ericsson | Option 2. |
| MediaTek | Same comment from issue 1-2-2-3.  To clarify Option 1a, is not meant to remove 20.48s from the table, however, we need to add a note to exclude the only one scenario that is not feasible. |
| Huawei | Option 2. |
| vivo | Ok with option 2. |
| Xiaomi | Prefer Option2 |
| Nokia | Option 2 |

Tentative agreement: agree option 2 with the case (eDRX cycle = 20.48s and DRX cycle = 0.32s) for FFS

**Issue 1-3-5 Timer for initiating Cell selection in Idle mode**

* Proposals
* Option 1: (Ericsson)
  + When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T = max(10s, one eDRX\_IDLE cycle) in FR1 for initiating the cell selection;
  + When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T = max(10s, K1\*N1\*eDRX\_IDLE cycle) in FR2 for initiating the cell selection when eDRX cycle is less than 20.48s, where, K1=2. Otherwise, T = max(81.92s, one eDRX\_IDLE cycle
* Option 2 (Huawei Apple vivo Nokia)
  + When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T = max(10s, one eDRX\_IDLE cycle) in FR1 for initiating the cell selection;
  + When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T= max(10s, N1\*eDRX cycle) in FR2 for initiating the cell selection when eDRX cycle is less than 20.48s
* Option 3 (MTK)
  + When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T = max(10s, one eDRX\_IDLE cycle) in FR1 for initiating the cell selection;
  + FFS on FR2
* Recommended WF
  + Is it possible to compromise to option 2?

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Option 2. |
| Ericsson | Option 2a,   * When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T = max(10s, one eDRX\_IDLE cycle) in FR1 for initiating the cell selection; * When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T= max(10s, N1\*eDRX cycle) in FR2 for initiating the cell selection when eDRX cycle is less than 20.48s * When UE is configured with eDRX\_IDLE cycle, introduce the max function for timer T= max(10s, eDRX cycle) in FR2 for initiating the cell selection when eDRX cycle is larger than 10.24s   When eDRX is larger than 10.24s, the cell reselecetion measurements will be finished in the single PTW within only one eDRX. It should be same as FR1. |
| MediaTek | Support Option 2. |
| Qualcomm | Support option 2. Also fine with Option 2a. |
| vivo | Ok with option 2 and 2a |
| Xiaomi | Fine with Option 2 and 2a |
| Nokia | Option 2a is Ok. |

Tentative agreement: option 2a

### Sub-topic 1-4 eDRX requirements for inactive state

**Issue 1-4-1: Inactive state requirements when idle eDRX is longer than 10.24s**

* + Option 1: The inactive UE requirements are based on inactive DRX or inactive eDRX when inactive eDRX is configured (Huawei vivo MTK)
  + Option 2: Based on the paging monitoring cycle of T agreed in RAN2 (Apple Ericsson xiaomi Nokia)

|  |  |  |  |
| --- | --- | --- | --- |
| IDLE eDRX[s] | Inactive eDRX[s] | Outside CN PTW or during CN PTW | T |
| >10.24 | Not configured | During CN PTW | Shortest value of default paging cycle and UE specific DRX cycle if configured by upper layer |
| >10.24 | Not configured | Outside CN PTW | RAN paging cycle. |
| >10.24 | ≤10.24 | During CN PTW | Shortest value of default paging cycle and UE specific DRX cycle if configured by upper layer |
| >10.24 | ≤10.24 | Outside CN PTW | INACTIVE eDRX cycle |

* Recommended WF

Could we agree the following 2 cased where we believe option 1 and 2 will result in the same results.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IDLE eDRX[s] | | Inactive eDRX[s] | | Outside CN PTW or during CN PTW | | T |
| >10.24 | Not configured | | Outside CN PTW | | RAN paging cycle. | |
| >10.24 | ≤10.24 | | Outside CN PTW | | INACTIVE eDRX cycle | |

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Option 2 and also fine with recommended WF. |
| Ericsson | Fine with recommended WF. |
| MediaTek | Fine with recommended WF for the outside CN PTW, however, the current WF only address subset of scenarios. For simplicity and testability, we suggest to follow the same rules for inside and outside PTW (i.e. remove column three). |
| Huawei | We don’t understand why only outside PTW is considered in the recommended WF. UE in active mode shall monitor both CN (e)DRX and RAN (e)DRX. Even if idle eDRX is larger than 10.24s. UE still needs to monor inactive DRX or inactive eDRX within PTW.  Regarding UE perform measurement per T or per inactive DRX, we prefer use inactive (e)DRX. The reason is that T is used for UE to receive paging which determined by many parameters. T would be different in difference cases. However from measurement point of view, it is no need for UE to perform measurement on each paging occasion. The simple way for UE implementation is to perform measurement only based on inactive eDRX cycle which is aligned with LTE. Then UE is not required to execute such enormous logic judgement according to T.  In summary, option 1 is supportive. However if all companies insist to use T, we can compromise. But we think PTW shall NOT be considered.  In addition, if T is used, how to derive T, we suggest to directly refer to RAN2 spec. |
| vivo | Ok with option 1 and can compromise to option 2 |
| Xiaomi | Prefer Option2 |
| Nokia | Option 2 |

Tentative agreement: no consensus

**Issue 1-4-2: Inactive state requirements when idle eDRX is no longer than 10.24s**

* + Option 1: The inactive UE requirements are based on inactive eDRX or inactive DRX when inactive eDRX is not configured (Huawei vivo MTK)
  + Option 2: Based on the paging monitoring cycle of T agreed in RAN2 (Apple Ericsson xiaomi vivo Nokia)

|  |  |  |  |
| --- | --- | --- | --- |
| IDLE eDRX[s] | Inactive eDRX[s] | Outside CN PTW or during CN PTW | T |
| ≤10.24 | Not configured | NA | Shortest of RAN paging cycle and IDLE eDRX cycle |
| ≤10.24 | ≤10.24 | NA | The shortest of IDLE eDRX cycle and INACTIVE eDRX cycle. |

* Recommended WF TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Option 2. In option 1, if inactive eDRX is not configiured, how it could be based on inactive eDRX? |
| Ericsson | Fine with recommended WF.  To apple, from our understanding, if inactive eDRX is not configiured, it should be based on inactive DRX. |
| MediaTek | For the first row, the condition of ‘Shortest of RAN paging cycle and IDLE eDRX cycle’ is meaningless because RAN paging cycle can never be larger than the IDLE eDRX cycle. Hence, we suggest to simplify it to: ‘RAN paging cycle’. Fine with the second row. |
| Huawei | Option 1 or the recommended WF is fine.  In addition, if T is used, how to derive T, we suggest to directly refer to RAN2 spec. |
| vivo | Ok with option 1 and can compromise to option 2 |
| Xiaomi | Prefer Option 2 |
| Nokia | Option 2 |

Tentative agreement: No consensus, FFS at maintenance stage

# Topic #2: RRM measurement relaxations

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| T-doc number | Company | Proposals / Observations |
| R4-2203589 | ZTE Corporation | Proposal 1: UE is allowed to meet the requirements that are most relaxed out of Rel-16 and Rel-17 requirements.  Proposal 2: The UE behavior is left to UE implementation when multiple criteria of Rel-16 and Rel-17 are satisfied. |
| R4-2203791 | Apple | ***Proposal 1: as a working assumption RAN4 to consider the following scenarios/criterion for Rel-17 RedCap RRM relaxation in IDLE/inactive mode. After receiving RAN2 reply LS, RAN4 could revise the requirement accordingly.***  ***Proposal 2: In IDLE/Inactive mode, when both rel-16 and rel-17 RRM relaxation criteria are met, UE is allowed to meet the requirements that are most relaxed out of Rel-16 and Rel-17 requirements.***  ***Proposal 3: use scaling factor K1\_RedCap=8 to relax the RRM requirement when Rel-17 single criteria (stationary) is satisfied.***  ***Proposal 4: use a fixed long measurement period of 8 hours for requirement relaxation*** ***when both Rel-17 criteria are satisfied.***  ***Proposal 5: Even though we don’t need to go to the details of the requirement for RRM relaxation with eDRX at this stage, we propose to agree the principle that the relaxed RRM measurement period for PHY filtering shall not cross different PTW windows.***  ***Proposal 6: In RRC connected mode, only Rel-17 stationary criteria shall be considered for Rel-17 RRM relaxation method at RedCap UE.***  ***Proposal 7: On RRM relaxation for RRC\_CONNECTED mode, the relaxation method of stationary criterion for idle/inactive mode could be used as baseline for connected mode UE.***  ***Proposal 8: The measurement used for evaluating the R17 stationary criteria in CONNECTED mode shall meet the existing intra-frequency measurement requirements (delay and accuracy). No need to introduce any extra UE behavior definition for this R17 stationary criteria evaluation in CONNECTED mode.***  ***Proposal 9: Do not discuss the issue related to CGI reading requirement in RAN4.***  ***Proposal 10: for granularity of RRM measurement relaxations, RAN4 to only focus on UE level measurement relaxation for requirement design.*** |
| R4-2204247 | Xiaomi | **Proposal 1: The applicable scenarios where both Rel-16 relaxation criteria and Rel-17 relaxation criteria are configured are:**   |  |  |  | | --- | --- | --- | | **No** | **Rel-16 relaxation criterion** | **Rel-17 relaxation criterion** | | 1 | Rel-16 low mobility | Rel-17 stationary | | 3 | Rel-16 low mobility & Rel-16 not-at-cell-edge | Rel-17 stationary | | 4 | Rel-16 low-mobility | Rel-17 stationary & Rel-17 not-at-cell-edge | | 5 | Rel-16 not-at-cell-edge | Rel-17 stationary & Rel-17 not-at-cell-edge | | 6 | Rel-16 low mobility & Rel-16 not-at-cell-edge | Rel-17 stationary & Rel-17 not-at-cell-edge |   **Proposal 2: The issue of relaxation when both Rel-16 and Rel-17 relaxation criteria are satisfied could be left to UE implementation.**  **Proposal 3: Use scaling factor 8 for relaxation when only Rel-17 stationary criterion is satisfied in IDLE/INACTIVE mode.**  **Proposal 4: UE stop the measurements for a period of 2 or 8 hours when both Rel-17 stationary criterion and Rel-17 not-at-cell edge criterion are satisfied in IDLE/INACTIVE mode.**  Proposal 5: For RRC\_CONNECTED mode RedCap UE fulfilling Rel-17 stationary criterion, how to define new relaxation methods for RedCap UE up to RAN2 decision. |
| R4-2204286 | OPPO | ***Proposal 1: It is up to UE implementation to select either Rel-16 or Rel-17 relaxation operation if UE is configured with R16 and R17 relaxation criteria.***  ***Proposal 2: When single Rel-17 criteria is satisfied, define larger scaling factor K\_RedCap =6.***  ***Proposal 3: When both Rel-17 stationary and Rel-17 not-at-cell-edge criteria are satisfied, longer measurement period(s) are expected as 8 hours.*** |
| R4-2204326 | vivo | **Observation 1: The Rel-17 stationary criteria is stricter compared with Rel-16 low mobility criteria hence once it is fulfilled, more relax on RRM measurement is reasonable compared with that of when Rel-16 low mobility criteria is fulfilled.**  **Proposal 1: when both Rel-16 and Rel-17 criteria are configured, consider the following scenarios:**   |  |  |  |  | | --- | --- | --- | --- | | 7 | Rel-16 low mobility | Rel-17 stationary | Allowed | | 8 | Rel-16 not-at-cell-edge | Rel-17 stationary | NO | | 9 | Rel-16 low mobility & Rel-16 not-at-cell-edge | Rel-17 stationary | NO | | 10 | Rel-16 low-mobility | Rel-17 stationary & Rel-17 not-at-cell-edge | Allowed | | 11 | Rel-16 not-at-cell-edge | Rel-17 stationary & Rel-17 not-at-cell-edge | Allowed | | 12 | Rel-16 low mobility & Rel-16 not-at-cell-edge | Rel-17 stationary & Rel-17 not-at-cell-edge | Allowed |   **Proposal 2: For issue 2-1-2, option 3 should not be considered since disabling Rel-16 RRM relaxation when Rel-17 criteria are satisfied is a new UE behavior and has not been discussed. In addition option 3 has the same effect as that of option 1.**  **Proposal 3: For issue 2-1-2, we prefer option 1, When both Rel-16 and Rel-17 relaxation criteria are configured, use option 1 for the RRM relaxation requirements, i.e., UE is allowed to meet the requirements that are most relaxed out of Rel-16 and Rel-17 requirements.**  **Proposal 4: Prefer to use 8 or 6 as the value of the scaling factor when Rel-17 stationary criterion is configured alone and fulfilled**  **Proposal 5: Use 4 or 8 hours for the value of the long measurement period.**  **Proposal 6: For the scenario for RRM relaxation for RRC\_CONNECTED mode, use option 1.**  **Proposal 7: Determine whether to specify Redcap RRM relaxation requirements or not at Rel-17 timeframe.** |
| R4-2204911 | Huawei, Hisilicon | **Proposal 1: UE is allowed to perform RRM measurement relaxation with larger fixed scaling factor Kstationary=4,**   * **When UE is configured with Rel-17 stationary criterion and UE has fulfilled, or** * **when both Rel-17 stationary and Rel-17 not at the cell edge criterion are configured and *combineRelaxedMeasCondition* not configured, and UE has fulfilled only Rel-17 stationary criterion**   **Proposal 2: When R17 stationary and R17 at-at-cell edge criterion is fulfilled, UE can stop measurement for a longer interval, e.g., 2 hours.**  **Proposal 3: Scenario#8, #10 and #11 for mixed R17 criterion and R16 criterion are valid.**  **Proposal 4:** **When UE fulfils both mixed R16 and R17 relaxation criteria, it is up to UE implementation to select either Rel-16 or Rel-17 relaxation operation.**  **Proposal 5: No new UE behaviour of RRM measurement relaxation is needed for RedCap UE in connected mode.** |
| R4-2204999 | CMCC | **Proposal 1: UE is allowed to meet the requirements that are most relaxed out of Rel-16 and Rel-17 requirements.**  **Proposal 2: scaling factor =4 when Rel-17 single criteria (stationary) is satisfied.**  **Proposal 3: the value of one fixed long measurement period =2 hours when both Rel-17 criteria are satisfied.**  **Proposal 4: No new UE behaviour of RRM measurement relaxation is needed for RedCap UE in connected mode**  **Proposal 5: No new UE requirements are needed on how to evaluate RRM relaxation criteria at RRC\_CONNECTED mode.** |
| R4-2205632 | Ericsson | **Proposal #1:** For the case when a UE is configured with both Rel-16 and Rel-17 relaxation criteria and UE has fulfilled both criteria the UE is allowed to meet the requirements that are the most relaxed out of Rel-16 and Rel-17 requirements.  **Proposal #2:** There is no need to introduce any transition requirements for relaxed measurements for switching between IDLE/INACTIVE and CONNECTED states.  **Proposal #3:** For a UE fulfilling the Rel-17 stationary criterion, the scaling factor is set to 4.  **Proposal #4:** For a UE fulfilling both Rel-17 stationary criterion and Rel-17 not-at-cell edge criterion, relaxed requirements are defined using a fixed long time period (T) in which the UE can stop its measurements for cell reselection, where T = 2 hours.  **Proposal #5:** Rel-16/17 relaxed measurement requirements can be applied with eDRX cycles up to 10.24 seconds, without any PTW.  **Proposal #6:** If relaxation is supported for eDRX cycles above 10.24 seconds, RAN4 to discuss the maximum eDRX cycles (X) with PTW up to which UE is allowed to apply Rel-16/17 relaxed measurement requirements is X ms, where value of X is FFS.  **Proposal #7:** No need to discuss relaxation of higher priority carriers until reply LS is received.  **Proposal #8:** No need to define explicit relaxation requirements in CONNECTED for RedCap.  **Proposal #9:** The UE in CONNECTED mode shall evaluate the configured relaxation criteria every Nth DRX cycle, where N is TBD.  **Proposal #10:** The measurement used for evaluating the relaxation criteria in CONNECTED mode shall fulfill the corresponding measurement requirements (delay and accuracy).  **Proposal #11:** The UE may evaluate the relaxation criteria, but shall not report fulfillment of the relaxation criteria if it is performing or configured to perform CGI reading measurements. |
| R4-2205939 | Nokia, Nokia Shanghai Bell | 1. RAN4 to not consider scenarios 8 but consider scenarios 10 and 11 in case both Rel-16 and Rel-17 relaxation criteria are configured for NC measurement relaxations in Idle/Inactive state. 2. In case multiple relaxation criteria of Rel-16 and Rel-17 are satisfied in Idle/Inactive state, i.e. for scenario 6, 9, 10 or 11, UE is allowed to meet the requirements that are most relaxed out of Rel-16 and Rel-17 requirements. 3. Select scaling factor K=6 when Rel-17 single criteria (stationary) is satisfied. 4. Select fixed long measurement period T=2 h when both Rel-17 criteria are satisfied. 5. RAN4 to wait on RAN2’s feedback regarding methodology related to higher priority inter-frequency layers for measurement relaxation. 6. For RRC\_Connected state, RAN4 to only consider the scenario, where Rel-17 stationary criterion alone is configured, for NC measurement relaxation. 7. When entering RRC\_Connected state, the UE should move to non-relaxed measurement mode and check whether the Rel-17 stationary criterion configured in RRC\_Connected state is satisfied. 8. In RRC\_Connected state, the UE applies the same relaxation method as in Idle / Inactive state in case the Rel-17 stationary criterion is satisfied, i.e. the scaling factor-based NC measurement relaxation using the scaling factor in terms of number of DRX cycles received via dedicated signalling. 9. The evaluation period for the Rel-17 stationary criterion in RRC\_Connected state is configurable by dedicated signalling and covers scaling factors lower or equal to that for RRC\_Idle / RRC\_Inactive state, i.e. 2 to 6. 10. The UE may evaluate the relaxation criteria but shall not report fulfillment of the relaxation criteria if it is performing or configured to perform CGI reading measurements. Whether UE shall report that relaxation criteria are no longer fulfilled, when performing CGI reading, can be FFS. 11. Whether to introduce granularity of RRM measurement relaxations by specifying further relaxations for specific bad beams, bad cells, bad frequencies and/or bad inter-RAT carriers should be investigated by RAN4 for Rel-18 enhancements. 12. RAN4 can proceed with normative work for NC measurement relaxations also for RRC\_Connected state. |
| R4-2206084 | MediaTek inc. | **Proposal 1: Support a new relaxation factor (J2) to be used in the DRX cycles requirements for the stationary criterion and rel-17 not-at-cell edge criterion in IDLE/INACTIVE mode, where J2 > K1, J2 = 5.**  **Proposal 2: The DRX cycle requirements for Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra for the stationary in intra-frequency, inter-frequency and inter-RAT are the following:**  **Proposal 3: The stationary evaluation of intra-frequency, inter-frequency and inter-RAT for NR cell in INACTIVE mode requirements shall apply the same requirements in Table 4.2.2.g1-g1, Table 4.2.2.g1-g2, and Table 4.2.2.g1-g3, respectively.**  **Proposal 4: Support extending the time period to at least 8 hours in which the UE can stop its measurements for cell reselection in IDLE/INACTIVE mode, when both stationary criterion and rel-17 not-at-cell edge criterion are satisfied.**  **Proposal 5: RAN4 may not introduce any new RRM relaxation in CONNECTED mode.**  **Proposal 6: When both rel-16 and rel-17 RRM relaxation criteria are met, the UE shall perform rel-17 RRM relaxation method.**  **Proposal 7: A note shall be added to the rel-17 RRM relaxation to mention that when rel-17 RRM relaxation criterion is fulfilled then the rel-16 RRM relaxation shall be disabled.** |
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## 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 General aspects for RRM measurement relaxation for Redcap

**Issue 2-1-1: Scenario to be considered for Rel-17 RRM relaxation for Redcap when both Rel-16 and Rel-17 criteria are configured agreed at RAN4 101bis-e**

**Moderator Note: update case number to align with agreed LS R4-2202675**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Rel-16 relaxation criterion** | **Rel-17 relaxation criterion** | **Applicability** |
| 7 | Rel-16 low mobility | Rel-17 stationary | Allowed |
| 8 | Rel-16 not-at-cell-edge | Rel-17 stationary | NO |
| 9 | Rel-16 low mobility & Rel-16 not-at-cell-edge | Rel-17 stationary | * Option 1: Not allowed(Apple Nokia vivo) * Option 2: Allowed (xiaomi Huawei) |
| 10 | Rel-16 low-mobility | Rel-17 stationary & Rel-17 not-at-cell-edge | Allowed |
| 11 | Rel-16 not-at-cell-edge | Rel-17 stationary & Rel-17 not-at-cell-edge | * Option 1: Allowed (Apple xiaomi Huawei Nokia vivo) |
| 12 | Rel-16 low mobility & Rel-16 not-at-cell-edge | Rel-17 stationary & Rel-17 not-at-cell-edge | * Option 1: Allowed (Apple xiaomi Huawei Nokia vivo) |

* Recommended WF
  + Agree that case 11 and 12 are allowed (option 1 for case 11 and 12).
  + For the case 9, based on RAN2 agreement the Rel-16 not-at-cell-edge criteria cannot be configured with Rel-17 stationary criteria, could companies compromise to option 1？

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| **Company** | **Comments** |
| Ericsson | Recommended WF is agreeable, i.e. to confirm that relaxation in cases 11 and 12 are possible. Not clear what “option 1” is referring to. |
| Huawei | For case 9, fine with recommended WF. |
| Apple | Fine with recommended WF. |
| CMCC | OK with recommended WF |
| Xiaomi | For scenario 9, the relaxation level of UE fulfilling Rel-17 stationary, e.g. longer measurement period, is far less than the relaxation level of UE fulfilling Rel-16 low mobility & Rel-16 not-at-cell-edge, e.g. up to 1 hour. We think it is reasonable to allow the scenario 9 considering the potential more relaxed measurement. But we can comprise to the option 1 following majority view. |
| OPPO | OK with recommended WF |
| vivo | Fine with recommended WF. |
| MediaTek | For case 9: support option 2.  For case 11 and 12: support option 1. |
| Nokia | We support the recommended WF. |
| Qualcomm | We support Option 2 for case 9 and Option 1 for case 11 and 12.  For case 9, configuration of Rel-16 low mobility & Rel-16 not-at-cell-edge is different from Rel-16 low mobility only and shall be allowed to be configured with Rel-17 Stationary |

**Issue 2-1-2: Relaxation when multiple criteria of Rel-16 and Rel-17 are satisfied**

* Proposals
  + Option 1: UE is allowed to meet the requirements that are most relaxed out of Rel-16 and Rel-17 requirements. (ZTE Apple CMCC Ericsson Nokia vivo)
  + Option 2: Up to UE implementation (ZTE xiaomi oppo Huawei)
  + Option 3: The UE shall perform Rel-17 RRM relaxation method (MTK )
    - Option 3a: A note shall be added to the rel-17 RRM relaxation to mention that when rel-17 RRM relaxation criterion is fulfilled then the rel-16 RRM relaxation shall be disabled (MTK)
* Recommended WF
  + Providing Rel-17 requirements are more relaxed compared with that of Rel-16, could companies compromise to option 1?

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| **Company** | **Comments** |
| Ericsson | We support the recommended WF from moderator, i.e. to agree on option 1. |
| Huawei | Support option 2. If UE selects the more relaxed requirements when both mixed R16/R17 relaxation criteria are fulfilled, the requirements will be distinguished case by case. It is, to some extent, complicated to specify requirements. From UE perspective, whether UE would like to choose the relaxed requirements is up to UE implementation. It is better to provide more room for implementation freedom. |
| Apple | Option 1. |
| CMCC | Option 1 |
| Xiaomi | Support Option 2 but can comprise to majority view. |
| OPPO | Option2. Agree with Huawei’s comment. |
| vivo | Prefer option 1 |
| MediaTek | We can compromise to option 1 if the wording ‘is allowed to’ is changed to ‘shall’, hence the option 1 is re-written as:  Option 1: UE shall meet the requirements that are most relaxed out of Rel-16 and Rel-17 requirements |
| ZTE | Prefer MTK’s suggestion. Also fine with Option 2. |
| Nokia | We support the recommended WF. |

**Issue 2-1-3 Requirements for transition when UE moves between different R17 states**

* Proposals
  + Option 1: No need to introduce transition requirements for relaxed measurements for switching between IDLE/INACTIVE and CONNECTED states (Ericsson)
* Recommended WF
  + postpone the discussion until conclusion on RRM relaxation for CONNECTED state are clear

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| **Company** | **Comments** |
| Ericsson | Our understanding is that there is no relaxation states in CONNECTED mode. In CONNECTED mode, the UE simply evaluates whether the configured relaxation criteria is met or not and reports it back to the NW. There is no explicit relaxation as in IDLE/INACTIVE modes. Therefore we don’t see any need to define transition requirements for transition between IDLE/INACTIVE and CONNECTED mode. |
| Apple | Fine with the recommended WF. |
| CMCC | OK with recommended WF |
| Xiaomi | Fine with the recommended WF |
| Mediatek | We agree with Ericsson comment, however, we can compromise to the recommended WF. |
| Nokia | We support the recommended WF. |
| Qualcomm | Support the recommended WF |

### Sub-topic 2-2 RRM measurement relaxation for Redcap at Idle/Inactive state

**Issue 2-2-1: Scaling factor value when Rel-17 single criteria (stationary) is satisfied**

* Proposals
  + Option 1: 8 (Apple xiaomi vivo)
  + Option 2: 4 (Huawei CMCC Ericsson)
  + Option 3: 6 (oppo Nokia vivo)
  + Option 4: 5 (MTK)
* Recommended WF
  + Could companies compromise to option 3 (6) based on (8\*3 + 4\*3+6\*3+5)/10 = 5.9 which closet to 6

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| **Company** | **Comments** |
| Ericsson | We support option 2. Option 2 is already more relaxed than the relaxation allowed in Rel-16 power saving for low mobility criterion. Impact on any further relaxation needs be carefully evaluated. |
| Huawei | Option 2. |
| Apple | Support option 1 but can compromise to recommended WF. |
| CMCC | Support option 2 and agree with Ericsson that option2 is already relaxed. The recommended WF by calculating company numbers and proposed factors are not a proper way to conclude the number. |
| Xiaomi | Fine with the recommended WF to comprise to Option3. |
| OPPO | Fine with the recommended WF |
| vivo | Ok with recommended WF. |
| MediaTek | Support recommended WF. |
| Nokia | We support the recommended WF. |
| Qualcomm | Fine with the recommended WF |

**Issue 2-2-2: The value of the one fixed long measurement period when both Rel-17 criteria are satisfied**

* Proposals
  + Option 1: 8 hours (Apple oppo MTK xiaomi vivo)
  + Option 2: 2 hours (Huawei CMCC Ericsson Nokia xiaomi)
  + Option 3: 4 hours (vivo)
* Recommended WF
  + Is it ok to consider a value x and 2 hours < x < 8 hours; or compromise to option 3?

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| **Company** | **Comments** |
| Ericsson | We support option 2. Option 2 is already more relaxed than the relaxation allowed in Rel-16 power saving for UE fulfilling low mobility criterion and not-at-cell edge criterion. Impact on any further relaxation needs be carefully evaluated. |
| Huawei | Option 2. |
| Apple | Support option 1 but can compromise to recommended WF. |
| CMCC | Option 2. 2 hours is already relaxed. |
| Xiaomi | Fine with the recommended WF to comprise to Option3. |
| OPPO | Fine with the recommended WF |
| vivo | Ok with option 1 and recommended WF. |
| MediaTek | We understand there mobility use-case in RedCap, however, the other two use cases defined in the work item description (WID) are actually stationary and hence we believe we should compromise in here to cover the stationary scenario too. Therefore, we think 2 and 4 hours is very low compared to 24 hours from LTE NB-IoT and our suggestion to use 8 hours is already a compromise. Besides, this relaxation is for neighboring cell measurements so if the UE experience change in it is movement status (i.e. from stationary to mobility) from it is serving cell measurements, then the UE can change it is measurements state for neighboring cells too, hence we don’t see there is any risk in having sleep for 8 hours. Thus, we support Option 1. |
| Nokia | We support option 2. We agree it is relaxed by factor of 2 versus Rel-16 power saving. If not agreeable, we suggest selecting 3 hours according to recommended WF. |
| Qualcomm | We agree with Mediatek that 8 hours is already a compromise and Support Option 1 |

**Issue 2-2-3: Principle on RRM relaxation under eDRX**

* Proposals
  + Option 1: The relaxed RRM measurement period for PHY filtering shall not cross different PTW windows. (Apple)
  + Option 2a: Rel-16/17 relaxed measurement requirements can be applied with eDRX cycles up to 10.24 seconds, without any PTW;
  + Option 2b: If relaxation is supported for eDRX cycles above 10.24 seconds, discuss the maximum eDRX cycles (X) with PTW up to which UE is allowed to apply Rel-16/17 relaxed measurement requirements is X ms, where value of X is FFS. (Ericsson)

Moderator Note: Option 1, option 2a and option 2b are not exclusive each other.

* Recommended WF
  + TBA

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| --- | --- |
| **Company** | **Comments** |
| Ericsson | The requirements should be developed stepwise. First RAN4 needs to agree on whether to define requirements for the case when UE is configured with both eDRX and meets the relaxation criteria. If so, then RAN4 needs to decide whether eDRX cycle should be up to 10.24 seconds or higher. If up to 10.24 seconds, then there is no PTW which means option 1 is not relevant. We support that relaxation can be applied when UE is configured with eDRX cycle up to a certain level. Based on the agreement, option 1 can be discussed. |
| Huawei | Option 2a is reasonable. For eDRX which is not larger than 10.24s, the workload of applying R17 measurement relaxation is not large. For eDRX which is larger than 10.24s, the power saving gain is already achieved, further relaxation is not necessary. |
| Apple | Support option 1 if RAN4 concludes measurement could be relaxed when PTW is used, otherwise, option 2a is fine. |
| vivo | Prefer not consider RRM relaxation over eDRX especially when PTW is used at Rel-17. Fine with option 2a |
| MediaTek | Same comment as Ericsson. Also, we have a slight preference that we discuss eDRX for rel-16 power saving at the same time with rel-17 stationary RRM relaxation. |
| Nokia | Option 2a is supported. Option 1 and option 2b are more in scope of RAN2. RAN4 to request guidance from RAN2 here. |
|  |  |

**Issue 2-2-4: Inter-frequency measurement Relaxation when only Rel-17 stationarity criterion is met and Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ**

* Proposals:
  + - Option 1: wait for RAN2’s reply LS is (Ericsson Nokia)
* Recommended WF
* Wait for RAN2 reply LS

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| **Company** | **Comments** |
| Ericsson | Since a LS related to the higher priority carrier was sent to RAN2 at last meeting, no need to discuss it further in RAN4 until response is received. Until that the basic assumption should be that higher-priority carriers are not relaxed. |
| Huawei | Fine with the recommended WF. |
| Apple | Fine with the recommended WF. |
| Xiaomi | Fine with the recommended WF. |
| vivo | Fine with the recommended WF. |
| MediaTek | Agree with recommended WF. |
| Nokia | We support the recommended WF. |

### Sub-topic 2-3 RRM measurement relaxation for Redcap at CONNECTED state

**Issue 2-3-1: On RRM relaxation criteria for RRC\_CONNECTED mode**

* Proposals
  + Option 1: only consider scenario 4 (Rel-17 stationary configured alone) of the idle state scenario list in Connected state.(Apple xiaomi Nokia vivo)
  + Option 2: When entering RRC\_Connected state, the UE should move to non-relaxed measurement mode and check whether the Rel-17 stationary criterion configured in RRC\_Connected state is satisfied. (Nokia)

Moderator Note: option 1 and 2 are not exclusive each other

* Recommended WF
  + TBA

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| --- | --- |
| **Company** | **Comments** |
| Ericsson | Our understanding is that there is no relaxation states in CONNECTED mode. In CONNECTED mode, the UE simply evaluates whether the configured relaxation criteria is met or not and reports it back to the NW. There is no explicit relaxation as in IDLE/INACTIVE modes. Therefore we don’t see any need to agree on the above options. |
| Huawei | Agree with Ericsson’s comments. No need to discuss the issue as RAN2 has already specify the UE behavior and RAN4 would not define relaxed requirements when UE satisfy stationary creterio. |
| Apple | We can compromise to Ericsson’s comment which means UE only reports when condition is met and let network to perform reconfiguration for power saving purpose in RRC\_connected mode. |
| CMCC | Agree with Ericsson’s comment. |
| vivo | Prefer Option 1 |
| MediaTek | Same comment as Ericsson and Huawei. |
| Nokia | We support both option 1 and option 2. In our view, we need to define the relaxation criteria applicable in connected mode, this is what option 1 does. Option 2 can also be considered under issue 2-3-2. |

**Issue 2-3-2: On RRM relaxation principles for RRC\_CONNECTED mode**

* Proposals
  + Option 1: The relaxation method of stationary criterion for idle/inactive mode could be used as baseline for connected mode UE (Apple Nokia )
    - Option 1a: the UE applies the same relaxation method as in Idle / Inactive state in case the stationary criterion only is satisfied, i.e. the scaling/relaxation factor-based NC measurement relaxation using the scaling/relaxation factor received via dedicated signalling. (Nokia)
  + Option 2: No new UE behaviour of RRM measurement relaxation is needed for RedCap UE in connected mode (Huawei CMCC Ericsson MTK)
    - Option 2a: how to define new relaxation methods for RedCap UE up to RAN2 decision (xiaomi)
* Recommended WF
  + TBA

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| --- | --- |
| **Company** | **Comments** |
| Ericsson | We support option 2. As explained in the earlier issues, unlike IDLE/INACTIVE mode there is no explicit relaxation in CONNECTED mode. In our understanding option 1 is not aligned with any RAN2 agreements. |
| Huawei | Support option 2.  According to RAN2 agreement, the existing RRM measurement framework can be used as baseline for enabling and disabling RRM relaxations for UEs in RRC Connected. In other words, network can configure related parameters to relax UE’s measurement if needed. For example, network can configure long SMTC periodicity or large DRX cycle length to UE. The agreements in RAN2 also mean that from RAN2 perspective, the measurement relaxation in connected mode is completed.  Furthermore for Redcap UE, typically the duration UE in connected mode is short. Redcap UE can quickly enter to RRC idle/inactive mode to save more power. The strong justification of introducing new relaxation methods is not foreseen. |
| Apple | We support option 1 but as commented on issue 2-3-1, we can compromise to option 2 which means UE only reports when condition is met and let network to perform reconfiguration for power saving purpose in RRC\_connected mode. |
| CMCC | Option 2 |
| Xiaomi | Option 2 and 2a |
| OPPO | Option 2 is fine |
| vivo | Prefer option 1 |
| MediaTek | Support option 2 and we have the same comment as Ericsson. |
| Nokia | We support option 1 and option 1a. The scaling factor can be signalled in connected and thus have a different value compared to idle / inactive. |
| Qualcomm | Fine with option 2 |

**Issue 2-3-3 On how to evaluate RRM relaxation criteria at RRC\_CONNECTED mode**

* Proposals
  + Option 1: No new UE behaviour/requirements are needed on how to evaluate RRM relaxation criteria at RRC\_CONNECTED mode (CMCC Apple)
  + Option 2: Evaluation period on the configured relaxation criteria is configured by NW at CONNECTED mode; (Ericsson Nokia)
    - Option 2a: Evaluation is every Nth DRX cycle, where N is TBD; The measurement used for evaluating the relaxation criteria in CONNECTED mode shall fulfill the corresponding measurement requirements (delay and accuracy). (Ericsson)
    - Option 2b: The evaluation period covers scaling factors lower or equal to that for RRC\_Idle / RRC\_Inactive state, i.e. 2 to 6 (Nokia)
* Recommended WF
  + TBA

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| --- | --- |
| **Company** | **Comments** |
| Ericsson | Our proposal is not correctly capture. We support option 2a. To clarify our proposal, it does not propose to introduce NW indicating the evaluation period for the configured relaxation criteria. We support option 2a to ensure that the measurements used for evaluating the configured relaxation criteria are valid measurements. The valid measurements in this case are considered to be those fulfilling the requirements associated with those, e.g. measurement period and accuracy. Otherwise, the reported result make not be reliable. |
| Huawei | Option 1. Same comments as issue 2-3-2. |
| Apple | Option 1. In current RRM spec we have intra-frequency measurement delay applied for DRX based serving cell measurement, and therefore we think no extra definition is needed for RRM relaxation criteria evaluation in connected mode. |
| CMCC | Option 1. The results used for evaluating RRM relaxation criteria should meet RAN4 requirements, this should be common understanding. |
| Xiaomi | Option 1 |
| vivo | Option 1. |
| MediaTek | From RAN2 CR [R2-2203354],  The relaxed measurement criterion for a stationary UE is fulfilled when:  - (SrxlevRefStationaryConnected – Srxlev) < SSearchDeltaP-StationaryConnected,  Therefore, there is no need to discuss this issue and follow RAN2 procedure. |
| Nokia | Option 2 and 2b. A lower value N than defined for idle/inactive should also be configurable. |

**Issue 2-3-4 Whether UE shall report fulfilment of relaxation when performing CGI reading?**

* Proposals
  + Option 1: The UE may evaluate the relaxation criteria, but shall not report fulfillment of the relaxation criteria if it is performing or configured to perform CGI reading measurements (Ericsson Nokia)
  + Option 2: Do not discuss the issue related to CGI reading requirement in RAN4 (Apple)
* Recommended WF
  + Could companies check RAN2’s agreement on CGI to see whether option 2 is agreeable or not.

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| --- | --- |
| **Company** | **Comments** |
| Ericsson | RAN4 has earlier agreed that RedCap UE can support CGI reading which is a CONNECTED mode procedure in release 17. In CONNECTED, the UE can be configured with measurement relaxation criteria. What should the UE do if UE meets the relaxation criteria while it is performing the CGI reading? Should the UE still report that it has met the relaxation criteria and ready for relaxation? Our view is that UE should not report that it has met relaxation criteria in this case if it is performing CGI reading. Alternatively, it should delay the reporting until the CGI reading is completed. If we don’t clarify it in the specification, requirements for the UE in this case is not clear. Therefore we support option 1. |
| Huawei | Option 2. |
| Apple | Option 2. For RRM relaxation, RAN2 agreed that  Do not discuss the issue related to CGI reading requirement. |
| vivo | Ok with option 2 |
| MediaTek | Option 2.  If the NW configures the UE to only monitor a reduced number of neighboring cells, then the UE shall only read the CGI of those new configured neighboring cells. No need to optimize for CGI. |
| Nokia | Option 1. |
|  |  |

**Issue 2-3-5: Granularity of RRM measurement relaxations**

* Proposals
  + Option 1: Investigation on future or Rel-18 on relaxations for specific bad beams, bad cells, bad frequencies and/or bad inter-RAT carriers (Nokia)
  + Option 2: RAN4 to only focus on UE level measurement relaxation for requirement design (Apple)
* Recommended WF
  + Suggest do not consider granularity such as specific bad beams, bad cells, bad frequencies and/or bad inter-RAT carriers within Rel-17 time frame.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | We are fine with the recommended WF from moderator. |
| Huawei | We don’t think new requirements for RRM measurement relaxation are needed for connected UE in RAN4. |
| Apple | Fine with recommended WF. |
| CMCC | Support recommended WF |
| Xiaomi | Support recommended WF |
| vivo | Fine with recommended WF. |
| MediaTek | Fine with recommended WF. |
| Nokia | We can agree to the recommended WF. |

**Issue 2-3-6: RAN2 impact on RRM relaxation for RRC\_CONNECTED mode**

* Proposals
  + Option 1: Start RAN4’s work on RRC\_Connected stage (Nokia)
* Recommended WF
  + Discussion on CONNECTED state requirements have started, suggest focus on issue 2-3-1 to 2-3-5 and no more discussion on 2-3-6

|  |  |
| --- | --- |
| **Company** | **Comments** |
| MediaTek | Support recommended WF. |
| Nokia | We support the recommended WF. |
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### Sub-topic 2-4 Rel-17 Redcap RRM relaxation requirements

**Issue 2-4-1: Idle state relaxation requirements for the stationary criteria in intra-frequency, inter-frequency and inter-RAT**

* Proposals
  + Option 1: MTK
* Table 4.2.2.g1-g1: Tdetect,NR\_Intra, Tmeasure,NR\_Intra and Tevaluate,NR\_Intra for UE operating with DRX\_IDLE (DRX\_INACTIVE) cycle without PTW for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DRX cycle length [s] | Scaling Factor (N1) | | Tdetect,NR\_Intra [s] (number of DRX cycles) | Tmeasure,NR\_Intra [s] (number of DRX cycles) | Tevaluate,NR\_Intra  [s] (number of DRX cycles) |
|  | FR1 | FR2Note1 |
| 0.32 | 1 | 8 | 11.52 x N1 x M2 x J2 (36 x N1 x M2 x J2) | 1.28 x N1 x M2 x J2 (4 x N1 x M2 x J2) | 5.12 x N1 x M2 x J2 (16 x N1 x M2 x J2) |
| 0.64 |  | 5 | 17.92 x N1 x J2 (28 x N1 x J2) | 1.28 x N1 x J2 (2 x N1 x J2) | 5.12 x N1 x J2 (8 x N1 x J2) |
| 1.28 |  | 4 | 32 x N1 x J2 (25 x N1 x J2) | 1.28 x N1 x J2 (1 x N1 x J2) | 6.4 x N1 x J2 (5 x N1 x J2) |
| 2.56 |  | 3 | 58.88 x N1 x J2 (23 x N1 x J2) | 2.56 x N1 x J2 (1 x N1 x J2) | 7.68 x N1 x J2 (3 x N1 x J2) |
| Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1 or 5, N1 = 8 for all DRX cycle length.  Note 2: M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms; otherwise M2=1.  Note 3: J2 = 5 (or TBD) (J2>K1) is the measurement relaxation factor applicable for UE fulfilling the *StationaryEvalutation* criterion. | | | | | |

* Table 4.2.2.g1-g2: Tdetect,NR\_Inter, Tmeasure,NR\_Inter and Tevaluate,NR\_Inter for UE operating with DRX\_IDLE (DRX\_INACTIVE) cycle without PTW for FR1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DRX cycle length [s] | Scaling Factor (N1) | | Tdetect,NR\_Inter [s] (number of DRX | Tmeasure,NR\_Inter [s] (number of DRX cycles) | Tevaluate,NR\_Inter [s] (number of DRX cycles) |
|  | FR1 | FR2Note1 | cycles) |  |  |
| 0.32 | 1 | 8 | 11.52 x N1 x 1.5 x J2 (36 x N1 x 1.5 x J2) | 1.28 x N1 x 1.5 x J2 (4 x N1 x 1.5 x J2) | 5.12 x N1 x 1.5 x J2 (16 x N1 x 1.5 x J2) |
| 0.64 |  | 5 | 17.92x N1 x J2 (28 x N1 x J2) | 1.28 x N1 x J2 (2 x N1 x J2) | 5.12 x N1 x J2 (8 x N1 x J2) |
| 1.28 |  | 4 | 32 x N1 x J2 (25 x N1 x J2) | 1.28 x N1 x J2 (1 x N1 x J2) | 6.4 x N1 x J2 (5 x N1 x J2) |
| 2.56 |  | 3 | 58.88 x N1 x J2 (23 x N1 x J2) | 2.56 x N1 x J2 (1 x N1 x J2) | 7.68 x N1 x J2 (3 x N1 x J2) |
| Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1 or 5, N1 = 8 for all DRX cycle length.  Note 2: J2 = 5 (or TBD) (J2>K1) is the measurement relaxation factor applicable for UE fulfilling the *StationaryEvalutation*. | | | | | |

* Table 4.2.2.g1-g3: Tdetect,EUTRAN, Tmeasure,EUTRAN, and Tevaluate,EUTRAN for UE operating with DRX\_IDLE (DRX\_INACTIVE) cycle without PTW for FR1

|  |  |  |  |
| --- | --- | --- | --- |
| DRX cycle length [s] | Tdetect,EUTRAN [s] (number of DRX cycles) | Tmeasure,EUTRAN [s] (number of DRX cycles) | Tevaluate,EUTRAN  [s] (number of DRX cycles) |
| 0.32 | 11.52 x J2 (36 x J2) | 1.28 x J2 (4 x J2) | 5.12 x J2 (16 x J2) |
| 0.64 | 17.92 x J2 (28 x J2) | 1.28 x J2 (2 x J2) | 5.12 x J2 (8 x J2) |
| 1.28 | 32 x J2 (25 x J2) | 1.28 x J2 (1 x J2) | 6.4 x J2 (5 x J2) |
| 2.56 | 58.88 x J2 (23 x J2) | 2.56 x J2 (1 x J2) | 7.68 x J2 (3 x J2) |
| Note 1: J2 = 5 (or TBD) (J2>K1) is the measurement relaxation factor applicable for UE fulfilling the *StationaryEvalutation* criterion. | | | |

* Recommended WF
  + Discuss directly in the corresponding CR after scaling factor is fixed. Not necessary to discuss at this section.

**Issue 2-4-2: Inactive state relaxation requirements for the stationary criteria in intra-frequency, inter-frequency and inter-RAT**

* Proposals
  + Option 1: The stationary evaluation of intra-frequency, inter-frequency and inter-RAT for NR cell in INACTIVE mode requirements shall apply the same requirements as that of the idle state, respectively (MTK)
* Recommended WF
  + Option 1 has already been agreed at WF R4-2202672, no more discussion any more.

## Companies views’ collection for 1st round

### Open issues

### 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#2-1 | **Issue 2-1-1: Scenario to be considered for Rel-17 RRM relaxation for Redcap when both Rel-16 and Rel-17 criteria are configured agreed at RAN4 101bis-e**  **Moderator Note: update case number to align with agreed LS R4-2202675**   |  |  |  |  | | --- | --- | --- | --- | | **No** | **Rel-16 relaxation criterion** | **Rel-17 relaxation criterion** | **Applicability** | | 7 | Rel-16 low mobility | Rel-17 stationary | Allowed | | 8 | Rel-16 not-at-cell-edge | Rel-17 stationary | NO | | 9 | Rel-16 low mobility & Rel-16 not-at-cell-edge | Rel-17 stationary | * Option 1: Not allowed(Huawei Apple CMCC xiaomi oppo Nokia vivo) * Option 2: Allowed (xiaomi MTK QC) | | 10 | Rel-16 low-mobility | Rel-17 stationary & Rel-17 not-at-cell-edge | Allowed | | 11 | Rel-16 not-at-cell-edge | Rel-17 stationary & Rel-17 not-at-cell-edge | * Option 1: Allowed (Apple xiaomi Huawei Nokia vivo) | | 12 | Rel-16 low mobility & Rel-16 not-at-cell-edge | Rel-17 stationary & Rel-17 not-at-cell-edge | * Option 1: Allowed (Apple xiaomi Huawei Nokia vivo) |  * Recommended WF   + Continue discuss case 9 at 2nd round   Tentative agreement: case 11 and 12 are allowed  **Issue 2-1-2: Relaxation when multiple criteria of Rel-16 and Rel-17 are satisfied**   * Proposals   + Option 1: UE is allowed to meet the requirements that are most relaxed out of Rel-16 and Rel-17 requirements. (ZTE Apple CMCC Ericsson Nokia vivo)   + Option 2: Up to UE implementation (ZTE xiaomi oppo Huawei)   + Option 3: The UE shall perform Rel-17 RRM relaxation method (MTK )     - Option 3a: A note shall be added to the rel-17 RRM relaxation to mention that when rel-17 RRM relaxation criterion is fulfilled then the rel-16 RRM relaxation shall be disabled (MTK)   GTW agreement: UE is allowed to meet the requirements that are the most relaxed out of Rel-16 and Rel-17 requirements  **Issue 2-1-3 Requirements for transition when UE moves between different R17 states**   * Proposals   + Option 1: No need to introduce transition requirements for relaxed measurements for switching between IDLE/INACTIVE and CONNECTED states (Ericsson) * Recommended WF   + postpone the discussion until conclusion on RRM relaxation for CONNECTED state are clear   No companies against recommended WF  Tentative agreement: no more discussion at 2nd round |
| Sub-topic#2-2 | **Issue 2-2-1: Scaling factor value when Rel-17 single criteria (stationary) is satisfied**   * Proposals   + Option 1: 8 (Apple)   + Option 2: 4 (Ericsson Huawei CMCC)   + Option 3: 6 (oppo Nokia vivo Apple xiaomi MTK Nokia QC) * Recommended WF   + *Could option 3 be a compromise?*   **Issue 2-2-2: The value of the one fixed long measurement period when both Rel-17 criteria are satisfied**   * Proposals   + Option 1: 8 hours (Apple MTK xiaomi QC)   + Option 2: 2 hours (Huawei CMCC Ericsson Nokia)   + Option 3: 4 hours (vivo Apple xiaomi oppo)   + Option 4: 3 hours (Nokia) * Recommended WF   + *TBA*   **Issue 2-2-3: Principle on RRM relaxation under eDRX**   * Proposals   + Option 1: The relaxed RRM measurement period for PHY filtering shall not cross different PTW windows. (Apple)   + Option 2a: Rel-16/17 relaxed measurement requirements can be applied with eDRX cycles up to 10.24 seconds, without any PTW; （Huawei vivo Nokia）   + Option 2b: If relaxation is supported for eDRX cycles above 10.24 seconds, discuss the maximum eDRX cycles (X) with PTW up to which UE is allowed to apply Rel-16/17 relaxed measurement requirements is X ms, where value of X is FFS. (Ericsson)   Moderator Note: Option 1, option 2a and option 2b are not exclusive each other.   * Recommended WF   + Is option 2a agreeable since no company against it? Continue discuss option 1 at 1 and 2b.   **Issue 2-2-4: Inter-frequency measurement Relaxation when only Rel-17 stationarity criterion is met and Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ**   * Proposals:   + - Option 1: wait for RAN2’s reply LS is (Ericsson Nokia) * Recommended WF * Wait for RAN2 reply LS   All companies are ok with the recommended WF.  Tentative agreement: wait for RAN2 LS and no more discussion at this meeting. |
| Sub-topic#2-3 | **Issue 2-3-1: On RRM relaxation criteria for RRC\_CONNECTED mode**   * Proposals   + Option 1: only consider scenario 4 (Rel-17 stationary configured alone) of the idle state scenario list in Connected state.(Apple Nokia vivo)   + Option 3: no relaxation states in CONNECTED mode (Ericsson Huawei CMCC Apple)   Moderator Note: option 1 and 2 are not exclusive each other;   * Recommended WF   + TBA   **Issue 2-3-2: On RRM relaxation principles for RRC\_CONNECTED mode**   * Proposals   + Option 1: The relaxation method of stationary criterion for idle/inactive mode could be used as baseline for connected mode UE (Apple Nokia vivo)     - Option 1a: the UE applies the same relaxation method as in Idle / Inactive state in case the stationary criterion only is satisfied, i.e. the scaling/relaxation factor-based NC measurement relaxation using the scaling/relaxation factor received via dedicated signalling. (Nokia)   + Option 2: No new UE behaviour of RRM measurement relaxation is needed for RedCap UE in connected mode (Huawei CMCC Ericsson MTK Apple xiaomi oppo QC)     - Option 2a: how to define new relaxation methods for RedCap UE up to RAN2 decision (xiaomi) * Recommended WF   + TBA   **Issue 2-3-3 On how to evaluate RRM relaxation criteria at RRC\_CONNECTED mode**   * Proposals   + Option 1: No new UE behaviour/requirements are needed on how to evaluate RRM relaxation criteria at RRC\_CONNECTED mode (Huawei CMCC Apple xiaomi vivo)   + Option 2: Evaluation period on the configured relaxation criteria is configured by NW at CONNECTED mode; (Nokia)     - Option 2b: The evaluation period covers scaling factors lower or equal to that for RRC\_Idle / RRC\_Inactive state, i.e. 2 to 6 (Nokia)   + Option 3: Evaluation is every Nth DRX cycle, where N is TBD; The measurement used for evaluating the relaxation criteria in CONNECTED mode shall fulfill the corresponding measurement requirements (delay and accuracy). (Ericsson)   + Option 4: following RAN2 agreement (MTK) * Recommended WF   + Could companies check option 4, i.e., whether RAN2 has conclusion on this issue.   **Issue 2-3-4 Whether UE shall report fulfilment of relaxation when performing CGI reading?**   * Proposals   + Option 1: The UE may evaluate the relaxation criteria, but shall not report fulfillment of the relaxation criteria if it is performing or configured to perform CGI reading measurements (Ericsson Nokia)   + Option 2: Do not discuss the issue related to CGI reading requirement in RAN4 (Apple Huawei vivo MTK ) * Recommended WF   + TBA   **Issue 2-3-5: Granularity of RRM measurement relaxations**   * Proposals   + Option 1: Investigation on future or Rel-18 on relaxations for specific bad beams, bad cells, bad frequencies and/or bad inter-RAT carriers (Nokia)   + Option 2: RAN4 to only focus on UE level measurement relaxation for requirement design (Apple) * Recommended WF   + Suggest do not consider granularity such as specific bad beams, bad cells, bad frequencies and/or bad inter-RAT carriers within Rel-17 time frame.   No company disagree with recommended WF  Tentative agreement: agree recommended WF  **Issue 2-3-6: RAN2 impact on RRM relaxation for RRC\_CONNECTED mode**   * Proposals   + Option 1: Start RAN4’s work on RRC\_Connected stage (Nokia) * Recommended WF   + Discussion on CONNECTED state requirements have started, suggest focus on issue 2-3-1 to 2-3-5 and no more discussion on 2-3-6   Tentative agreement: no more discussion on 2nd round |
| Sub-topic#2-4 | **Issue 2-4-1: Idle state relaxation requirements for the stationary criteria in intra-frequency, inter-frequency and inter-RAT**   * Proposals   + Option 1: MTK * Recommended WF   + Discuss directly in the corresponding CR after scaling factor is fixed. Not necessary to discuss at this section.   **Issue 2-4-2: Inactive state relaxation requirements for the stationary criteria in intra-frequency, inter-frequency and inter-RAT**   * Proposals   + Option 1: The stationary evaluation of intra-frequency, inter-frequency and inter-RAT for NR cell in INACTIVE mode requirements shall apply the same requirements as that of the idle state, respectively (MTK) * Recommended WF   + Option 1 has already been agreed at WF R4-2202672, no more discussion any more. |

### 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”.*

### Sub-topic 2-1 General aspects for RRM measurement relaxation for Redcap

**Issue 2-1-1: Scenario to be considered for Rel-17 RRM relaxation for Redcap when both Rel-16 and Rel-17 criteria are configured agreed at RAN4 101bis-e**

**Moderator Note: update case number to align with agreed LS R4-2202675**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Rel-16 relaxation criterion** | **Rel-17 relaxation criterion** | **Applicability** |
| 7 | Rel-16 low mobility | Rel-17 stationary | Allowed |
| 8 | Rel-16 not-at-cell-edge | Rel-17 stationary | NO |
| 9 | Rel-16 low mobility & Rel-16 not-at-cell-edge | Rel-17 stationary | * Option 1: Not allowed(Huawei Apple CMCC xiaomi oppo Nokia vivo) * Option 2: Allowed (xiaomi MTK QC) |
| 10 | Rel-16 low-mobility | Rel-17 stationary & Rel-17 not-at-cell-edge | Allowed |
| 11 | Rel-16 not-at-cell-edge | Rel-17 stationary & Rel-17 not-at-cell-edge | * Option 1: Allowed (Apple xiaomi Huawei Nokia vivo) |
| 12 | Rel-16 low mobility & Rel-16 not-at-cell-edge | Rel-17 stationary & Rel-17 not-at-cell-edge | * Option 1: Allowed (Apple xiaomi Huawei Nokia vivo) |

* Recommended WF
  + Continue discuss case 9 at 2nd round

Tentative agreement: case 11 and 12 are allowed

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Case 9 is not allowed based on our reading of RAN2 conclusion. |
| Mediatek | Case 9: should be allowed because the agreement from RAN2 is regarding the combination of these two criteria. RAN2 doesn’t preclude independent configuration of rel-16 and rel-17 mechanisms. For example, the NW might want to trigger RRM relaxation for surveillance camera regardless it is in centre or at cell edge. However, if we exclude case 9, the NW will lose the ability to do so.  Support option 2. |
| Qualcomm | We support Option 2 for case 9. Configuration of Rel-16 low mobility & Rel-16 not-at-cell-edge is different from Rel-16 low mobility only and shall be allowed to be configured irrespective of whether Rel-17 Stationary criterion is configured or not. |
| vivo | Ok with option 1 and 2 |
| Ericsson | We have a similar view as MTK and Qualcomm, i.e. the case 9 is supported from RAN2 perspective. |
| Xiaomi | We think RAN2 didn’t preclude case 9, prefer Option2, but can comprise to Option 1 if it is the marjority view. |
| Nokia | Case 9 is not allowed according RAN2#115-e agreement:  Introduce separate Rel-17 not-at-cell-edge threshold, and the new threshold is only associated with Rel-17 stationary criterion (if configured). If configured with a not-at-cell-edge criterion, the R17 stationary criterion can only be configured together with the R17 not-at-cell-edge criterion, not with the R16 one. |

Tentative agreement:

### Sub-topic 2-2 RRM measurement relaxation for Redcap at Idle/Inactive state

**Issue 2-2-1: Scaling factor value when Rel-17 single criteria (stationary) is satisfied**

* Proposals
  + Option 1: 8 (Apple)
  + Option 2: 4 (Ericsson Huawei CMCC)
  + Option 3: 6 (oppo Nokia vivo Apple xiaomi MTK Nokia QC)
* Recommended WF
  + *Could option 3 be a compromise?*

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Can compromise to option 3. |
| MediaTek | Support recommended WF from moderator. |
| Huawei | Can compromise to option 3. |
| Qualcomm | Support Option 3. |
| vivo | Ok with option 3. |
| Ericsson | As a compromise, we can accept option 3 (scaling factor 6) for the issue 2-2-1 and option 2 for issue 2-2-2 (2 hours fixed period), i.e. both together. |
| Xiaomi | Support Option 3. |
| Nokia | Option 3. |

Tentative agreement: option 3

**Issue 2-2-2: The value of the one fixed long measurement period when both Rel-17 criteria are satisfied**

* Proposals
  + Option 1: 8 hours (Apple MTK xiaomi QC)
  + Option 2: 2 hours (Huawei CMCC Ericsson Nokia)
  + Option 3: 4 hours (vivo Apple xiaomi oppo)
  + Option 4: 3 hours (Nokia)
* Recommended WF
  + *TBA*

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Support option 1, but can compromise to option 3. |
| MediaTek | We support option 1 and could compromise to option 3. |
| Huawei | Support otpoin 2. Two long measurement period would bring risk for mobility performance. |
| Qualcomm | Support Option 1 but can compromise to option 3. |
| vivo | Ok with option 3. |
| Ericsson | We have similar view as Huawei. We also support option 2. Also the additional power saving by extending the measurement periodicity is questionable, and it may also have negative impact on the mobility performance. As a compromise, we can accept option 3 (scaling factor 6) for the issue 2-2-1 and option 2 for issue 2-2-2 (2 hours fixed period), i.e. both together. |
| Xiaomi | Fine with both option 1 and Option 3. |
| Nokia | Support option 2. Can compromise to both option 3 and 4. |

Tentative agreement: No consensus

**Issue 2-2-3: Principle on RRM relaxation under eDRX**

* Proposals
  + Option 1: The relaxed RRM measurement period for PHY filtering shall not cross different PTW windows. (Apple)
  + Option 2a: Rel-16/17 relaxed measurement requirements can be applied with eDRX cycles up to 10.24 seconds, without any PTW; （Huawei vivo Nokia）
    - Option 2a-1: UE shall meet the requirements where corresponding scaling factor of RRM relaxation applies on top of eDRX requirements when particular RRM criteria is satisfied. .
    - Option 2a-2: Other options.
  + Option 2b: If relaxation is supported for eDRX cycles above 10.24 seconds, discuss the maximum eDRX cycles (X) with PTW up to which UE is allowed to apply Rel-16/17 relaxed measurement requirements is X ms, where value of X is FFS. (Ericsson)

Moderator Note: Option 1, option 2a and option 2b are not exclusive each other.

* Recommended WF
  + Is option 2a agreeable? If option 2a is agreeable could company further check what requirements apply under option 2a, i.e., option 2a-1 or other options?
  + Continue discuss option 1 at 1 and 2b at 2nd round.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Option 2a is for the case without PTW (and option 2a-1 is the most traightforward one, we can agree with it), and we support option 1 if PTW is used.  But if option 1 cannot be concluded in this meeting, at least we need to make FFS for the case with PTW. |
| MediaTek | We are fine with Option 2a |
| Huawei | Option 2a is fine. We don’t expect complicated feature combiniation at this phase. |
| Qualcomm | We are fine with Option 2a |
| vivo | Ok with option 2a, ok with option 2a-1 |
| Ericsson | We also support opton 2a in this meeting. In this case, the UE shall be allowed to apply the relaxed requirements since there is no PTW. |
| Xiaomi | Fine with option 2a |
| Nokia | Support options 2a and 2a1. The savings are lesser in case of longer eDRX cycles and PTW, so this can be down-prioritized or even removed from R17. |

Tentative agreement: Option 2a and Option 2a-1 are agreed. FFS on option 1 at maintenance stage.

### Sub-topic 2-3 RRM measurement relaxation for Redcap at CONNECTED state

**Issue 2-3-1: On RRM relaxation criteria for RRC\_CONNECTED mode**

* Proposals
  + Option 1: only consider scenario 4 (Rel-17 stationary configured alone) of the idle state scenario list in Connected state.(Apple Nokia vivo)
  + Option 3: no relaxation states in CONNECTED mode (Ericsson Huawei CMCC Apple)

Moderator Note: option 1 and 2 are not exclusive each other;

* Recommended WF
  + TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Option 1 and 3. |
| MediaTek | We support option 3. There is no enough time to check the details of option 1. |
| Huawei | Support option 3. |
| vivo | Option 1 and can compromise to option 3. |
| Ericsson | We support option 3. |
| Xiaomi | Option 3 |
| Nokia | Support options 1 and 3. |

Tentative agreement: Suggest to agree Option 3

**Issue 2-3-2: On RRM relaxation principles for RRC\_CONNECTED mode**

* Proposals
  + Option 1: The relaxation method of stationary criterion for idle/inactive mode could be used as baseline for connected mode UE (Nokia vivo)
    - Option 1a: the UE applies the same relaxation method as in Idle / Inactive state in case the stationary criterion only is satisfied, i.e. the scaling/relaxation factor-based NC measurement relaxation using the scaling/relaxation factor received via dedicated signalling. (Nokia)
  + Option 2: No new UE behaviour of RRM measurement relaxation is needed for RedCap UE in connected mode (Huawei CMCC Ericsson MTK Apple xiaomi oppo QC)
    - Option 2a: how to define new relaxation methods for RedCap UE up to RAN2 decision (xiaomi)
* Recommended WF
  + TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Aple | Based on the 1st round discussion, we support Option 2, please remove us from the proponent of option 1. |
| MediaTek | Option 2. |
| Huawei | Option 2. |
| Qualcomm | Support option 2 |
| vivo | Can compromise to option 2. |
| Ericsson | Like many other companies, we also support option 2 that there is no need for RAN4 to define any explicit relaxed measurement requirements in CONNECTED mode. |
| Xiaomi | Option 2 |
| Nokia | We still believe a configurable relaxation factor in RRC connected state is beneficial but we can compromise to option 2 for the sake of progress. |

Tentative agreement: Option 2 is agreed.

**Issue 2-3-3 On how to evaluate RRM relaxation criteria at RRC\_CONNECTED mode**

* Proposals
  + Option 1: No new UE behaviour/requirements are needed on how to evaluate RRM relaxation criteria at RRC\_CONNECTED mode (Huawei CMCC Apple xiaomi vivo)
  + Option 2: Evaluation period on the configured relaxation criteria is configured by NW at CONNECTED mode; (Nokia)
    - Option 2b: The evaluation period covers scaling factors lower or equal to that for RRC\_Idle / RRC\_Inactive state, i.e. 2 to 6 (Nokia)
  + Option 3: Evaluation is every Nth DRX cycle, where N is TBD; The measurement used for evaluating the relaxation criteria in CONNECTED mode shall fulfill the corresponding measurement requirements (delay and accuracy). (Ericsson)
  + Option 4: following RAN2 agreement (MTK)
* Recommended WF
  + Could companies check option 4, i.e., whether RAN2 has conclusion on this issue.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Option 1 but can compromise to option 4 if RAN2 would have conclusion on it. |
| Mediatek | Support Option 4, this is already captured in the RAN2 running CR [R2-2203354]. |
| Huawei | Option 1. |
| vivo | Option 1 |
| Ericsson | The measurements used for evaluating the configured relaxation criteria should be valid measurement, therofer UE needs to fulfill the existing measurement requirements on measurement period and accuracy when evaulting the criteria. This is reasonable to assume that the measurement used for evaluating the relaxation criteria shall meet the existing measurement requirements. |
| Xiaomi | Option 1 |
| Nokia | Based on issue 2-3-2, we can compromise to option 1. |

Tentative agreement: No consensus

**Issue 2-3-4 Whether UE shall report fulfilment of relaxation when performing CGI reading?**

* Proposals
  + Option 1: The UE may evaluate the relaxation criteria, but shall not report fulfillment of the relaxation criteria if it is performing or configured to perform CGI reading measurements (Ericsson Nokia)
  + Option 2: Do not discuss the issue related to CGI reading requirement in RAN4 (Apple Huawei vivo MTK )
* Recommended WF
  + TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Option 2, as we commented in 1st round, RAN2 had conclusion to not discuss CGI with RRM relaxation. |
| MediaTek | Option 2. |
| Huawei | Option 2. |
| Qualcomm | Option 2 |
| vivo | Option 2 |
| Ericsson | Support option 1. The expected behaviour should be clarified in the specification. Since RedCap UE can support CGI reading and also relaxation at the same time, it should be clear in the specification whether the UE can report fulfillment of criteria or not when UE is performing the measuemnt. If we don’t clarify anything, then what would be the expected behaviour? Can compaines explain this? |
| Nokia | A clarification is needed here in the RRM spec. Therefore, we support option 1. |

Tentative agreement: No consensus

### Sub-topic 2-4 Rel-17 Redcap RRM relaxation requirements

# Topic #3: Others

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| T-doc number | Company | Proposals / Observations |
| R4-2204248 | Xiaomi | CR |
| R4-2204328 | vivo | Reply LS  RAN4 concludes that there is no RAN4 specification impact when performing new RSRP measurement in a DL BWP associated with CD-SSB before Msg1/A retransmission based on UE implementation. |
| R4-2204912 | Huawei, Hisilicon | Proposal 1: Make some additional clarification on UE transmit timing requirements:  “If a RedCap UE in idle/inactive mode is configured with a separate initial BWP associated with no SSB (CD or NCD) for RACH, UE is not required to meet Te requirements before Msg1/A retransmission.” |
| R4-2204913 | Huawei, Hisilicon | Draft CR |
| R4-2205000 | CMCC | Proposal 6: RAN4 should only provide feedback to RAN2 if any RAN4 defined feature is considered as “not applicable” to RedCap UE.  Proposal 7: Be default, all non-RedCap features should be applicable to RedCap UE unless it requires more than single carrier operation, no matter whether RAN4 defines requirements or not. |
| R4-2205623 | Ericsson | Draft CR |
| R4-2205633 | Ericsson | Proposal #1: RAN4 to respond to RAN2 LS on UE capability as follows:   |  |  | | --- | --- | | Rel-15/Rel-16 features in TS 38.133 | RedCap RRM requirements applicability in R17 | | Dual connectivity and carrier aggregation | Not applicable | | 2-step RA | Applicable | | NR measurements with autonomous gaps | Applicable | | Rel-17 features in TS 38.133 |  | | SDT | Applicable | | *Note: RAN4 will not define any RRM requirements for RedCap UE for other release 16 features which are not listed above in release 17.* | | |
| [R4-2205409](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205409.zip) | ZTE | Proposal 4: Regarding RAN2 LS on RSRP measurement, RAN4 wait for potential new agreement in RAN1 to proceed. |
| [R4-2205629](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205629.zip) | Ericsson | Proposal 12: RAN4 specify the condition UE is expected to perform new RSRP measurement in a DL BWP associated with CD-SSB before Msg1/MsgA retransmission when the PRACH configuration period is X [ms] or more, and/or frequency distance between CD-SSB and separate initial DL BWP for RedCap is Y [MHz] or more. FFS for X and Y.   * + Example of X: 80ms for fading case; no need new RSRP measurement for stationary UEs.   + Example of Y: 20MHz for FR1, 100MHz for FR2. |
| R4-2206078 | MTK | Proposal 9: Support that RAN4 to capture the high speed measurements requirements in the RedCap rel-17 specification. |
| [R4-2203590](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203590.zip) | ZTE | Proposal 1: Reply to the RAN2 LS [1] using our previous conclusions captured in the WF [2] and WF [3]. |
|  |  |  |

## Open issues summary

### Sub-topic 3-1 On Redcap UE capabilities

**Issue 3-1-1: Scope of features to be included in the reply LS**

* Proposals
  + Option 1: (CMCC)
    - RAN4 should only provide feedback to RAN2 if any RAN4 defined feature is considered as “not applicable” to RedCap UE.
    - Be default, all non-RedCap features should be applicable to RedCap UE unless it requires more than single carrier operation, no matter whether RAN4 defines requirements or not
* Recommended WF
  + TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Our view is that Rel-15 NR requirements are the baseline. Then which Rel-16 features to support for Rel-17 RedCap is discussed and agreed on case by case manner. This means, by default all rel-16 features are not supported unless explicitly agreed. This was the previous RAN4 agreement copied below [R4-2108359]:   * *“RedCap requirements are developed with NR release 15 RRM requirements as baseline. Which release 16 features to be considered for RedCap are discussed in case by case manner after sufficient progress is made in the WI.”*   Also in [R4-2115358]:  *“When discussing possible combinations of Rel-16 features and RedCap, we should by default assume that the features are not applicable and then identify which features (such as R16 CSI-RS based L3 measurement, L1-SINR measurement, SFTD measurement, CGI reading, 2-step RACH, and PL-RS change, etc.) can be combined with RedCap case by case based on justification.”* |
| Huawei | We agree with the first bullet in option 1. Open to discuss the second bullet. |
| Apple | We are fine with Ericsson’s view because that’s agreement in RAN4. Our understanding is we are discussing whether the RAN4 requirement is applicable to RedCap UE or not rather than discussing whether feature is appliable to RedCap UE or not. |
| vivo | Fine with Ericsson’s comments |
| MediaTek | Same comment as Ericsson. |
| ZTE | Do not agree with the proposal, especially the second bullet, as it is directly contradictory to a previous WF: (also pointed out by Ericsson)  *“When discussing possible combinations of Rel-16 features and RedCap, we should by default assume that the features are not applicable and then identify which features (such as R16 CSI-RS based L3 measurement, L1-SINR measurement, SFTD measurement, CGI reading, 2-step RACH, and PL-RS change, etc.) can be combined with RedCap case by case based on justification.”* |
| Nokia | We support first bullet in option 1. Which features non-applicable to single carrier operation other than DC and CA need to be communicated to RAN2, needs further investigation. |

**Issue 3-1-2: UE capabilities in Reply LS**

* Proposals: Moderator
  + Option 1: RAN4 to respond to RAN2 LS on UE capability as follows (Ericsson)

|  |  |
| --- | --- |
| **Rel-15/Rel-16 features in TS 38.133** | **RedCap RRM requirements applicability in R17** |
| Dual connectivity and carrier aggregation | Not applicable |
| 2-step RA | Applicable |
| NR measurements with autonomous gaps | Applicable |
| **Rel-17 features in TS 38.133** |  |
| SDT | Applicable |
| *Note: RAN4 will not define any RRM requirements for RedCap UE for other release 16 features which are not listed above in release 17.* | |

* + Option 2: Reply to the RAN2 LS [1] using our previous conclusions captured in the WF [R4-2115358 2] and WF [R4-2120410 3] (ZTE)
  + Option 3: Support that RAN4 to capture the high speed measurements requirements in the RedCap rel-17 specification (MTK)
* Recommended WF
  + TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | We support option 1. Option 1 and option 2 are related and not conflicting. We think they can be merged. |
| Huawei | As we commented, RAN4 should provide feedback to RAN2 if any RAN4 defined feature is considered as “not applicable” to RedCap UE. The wording in incoming LS [R2-2109218] is duplicated:   |  | | --- | | RAN2 would like to ask RAN1 and RAN4 whether there are any Rel-15 and/or Rel-16 UE features or capabilities which should not be applicable for RedCap UEs? | |
| Apple | Option 1. |
| OPPO | Option 1 is fine. |
| vivo | Option 1 is ok |
| MediaTek | It is important to inform RAN2 on any features that is not applicable and capturing DC/CA may not be that informative because it is already in the WID. Also, we have the agreement on to consider rel-16 features case by case after a study. Hence, we expect to capture all the applicable rel-16 features and mention that the rest rel-16 are not applicable. |
| ZTE | Similar view as MTK, we should tell RAN2 that all other R16 features are not applicable. I guess this is also what Ericsson proposal is saying, though through a different wording by “requirements will not be defined”. I think it’s better to explicitly say they are not supported, which is aligned with a previous WF, so no harm to put it in the LS.  Can agree on Option 1 if we can revise the note to:  *Note: Other release 16 features which are not listed above are considered not supported in release 17.* |
| Nokia | RAN4 can indicate to RAN2, for which features interworking with RedCap functionality has not been investigated from RRM perspective. |
| Qualcomm | Fine with option 1 |

### Sub-topic 3-2 Reply LS for R2- 2201760

**Issue 3-2-1: Whether there are impacts on RAN4 specs when performing new RSRP measurement in a DL BWP associated with CD-SSB before Msg1/A retransmission based on UE implementation**

* Proposals
  + Option 1: No impact (vivo)
  + Option 2: Yes (Huawei)
    - Option 2a: If a RedCap UE in idle/inactive mode is configured with a separate initial BWP associated with no SSB (CD or NCD) for RACH, UE is not required to meet Te requirements before Msg1/A retransmission.” (Huawei)
  + Option 3: Specify the condition UE is expected to perform new RSRP measurement in a DL BWP associated with CD-SSB before Msg1/MsgA retransmission when the PRACH configuration period is X [ms] or more, and/or frequency distance between CD-SSB and separate initial DL BWP for RedCap is Y [MHz] or more. FFS for X and Y.
    - Example of X: 80ms for fading case; no need new RSRP measurement for stationary UEs.
    - Example of Y: 20MHz for FR1, 100MHz for FR2.
  + Option 4： Regarding RAN2 LS on RSRP measurement, RAN4 wait for potential new agreement in RAN1 to proceed. (ZTE)
* Recommended WF
  + TBA

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | We support option 3.  Regarding option 1, we agree that there is no impact as long as the maximum separation between the BWP where the UE is configured to perform PRACH and initial BWP where CD-SSBs are transmitted is less than 20 MHz and 100 MHz for FR1 and FR2 respectively. RedCap UE can be served by BS using very large BW e.g. 100 MHz in FR1. Therefore in practice the frequency separation between the BWPs can be very large. This may require the RedCap UE to acquire again AGC (e.g. to receive Msg2), time tracking etc., before transmitting the RACH. Therefore the maximum frequency separation to meet the HO requirements can be limited to certain value i.e. same as the UE BW of 20 MHz in FR1 and 100 MHz in FR2. Otherwise, UE may need more processing, e.g. additional time to perform the AGC etc.  Regarding option 2, we don’t see any need to modify the timing requirements. There is always a measurement associated with the PRACH and this requires the UE to retune and measure on the SSB. Therefore the UE still needs to meet the Te requirements.  Regarding option 4, our view is that RAN4 can still continue the discussions which are within the RAN4 scope. |
| Huawei | Support option 2.  In legacy, after MSG1 transmission, the UE monitors RAR in a configured RAR window  ra-ResponseWindow ENUMERATED {sl1, sl2, sl4, sl8, sl10, sl20, sl40, sl80},  According to TS38.213, UE would re-transmit PRACH no later than msec after the last symbol of the RAR window if UE does not correctly receive RAR message.As there is always SSB in initial BWP, UE can perform SSB based RSRP measurement during RAR window when SSB is available.  For Redcap UE, the situation changes. When a RedCap UE is on a separate initial DL BWP associated with no SSB (CD or NCD) for RACH. Then in some cases, **there is a risk for UE to miss RA response during RAR window if UE retune RF chain to CD-SSB to measure SSB**. It is up to UE implementation to use the old RSRP or old timing in this case. Therefore we added a clarification that “UE is not required to meet Te requirements before Msg1/A retransmission.’  To Ericsson, as above explain, UE is not able to retune/measure SSB during RAR window. |
| Apple | We are fine with option 2. |
| vivo | Agree with Huawei’s comment that during RAR window a UE may not able to have SSB measurement. However whether an old sample cannot meetin Te requirement need more study. |
| MediaTek | We believe in the LS is covered that the UE may not has time to achieve a new SSB measurements for different reasons and Huawei has highlighted one of them (i.e. due to RF re-tuning and hence the UE is not required to meet the Te requirements). Thus, we agree with RAN2, this should be left to UE implementation. |
| ZTE | Actually this is related to a RAN1 assumption on whether IDEL/INACTIVE UEs can use NCD-SSBs. If RAN1 revise their previous agreement (which says no) then the issue will be solved. Slightly prefer Option 4. |
| Nokia | This issue is related to issue 3-1-1 in thread 228. In our view, the conclusion for issue 3-1-1 can be informed to RAN 2 in the reply LS. |

## Companies views’ collection for 1st round

### Open issues

### 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 |
| R4-2204248 | Nokia: This draft CR is discussed in thread 228. |
| Company B |
|  |
| R4-2205623 | Nokia: This draft CR is discussed in thread 228. |
| 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#3-1 | **Issue 3-1-1: Scope of features to be included in the reply LS**   * Proposals   + Option 1: (CMCC)     - RAN4 should only provide feedback to RAN2 if any RAN4 defined feature is considered as “not applicable” to RedCap UE. (Huawei Nokia)     - Be default, all non-RedCap features should be applicable to RedCap UE unless it requires more than single carrier operation, no matter whether RAN4 defines requirements or not   + Option 2: Our view is that Rel-15 NR requirements are the baseline. Then which Rel-16 features to support for Rel-17 RedCap is discussed and agreed on case by case manner. This means, by default all rel-16 features are not supported unless explicitly agreed. (Ericsson Apple vivo MTK ZTE)   Tentative agreement: Since this issue is purely related to LS. Suggest directly discuss all related issues in the LS and no more discussion in the email thread at 2nd round  **Issue 3-1-2: UE capabilities in Reply LS**   * Proposals: Moderator   + Option 1: RAN4 to respond to RAN2 LS on UE capability as follows (Ericsson Apple oppo vivo QC)  |  |  | | --- | --- | | **Rel-15/Rel-16 features in TS 38.133** | **RedCap RRM requirements applicability in R17** | | Dual connectivity and carrier aggregation | Not applicable | | 2-step RA | Applicable | | NR measurements with autonomous gaps | Applicable | | **Rel-17 features in TS 38.133** |  | | SDT | Applicable | | *Note: RAN4 will not define any RRM requirements for RedCap UE for other release 16 features which are not listed above in release 17.* | |  * + Option 2: Reply to the RAN2 LS [1] using our previous conclusions captured in the WF [R4-2115358 2] and WF [R4-2120410 3] (ZTE)   + Option 3: Support that RAN4 to capture the high speed measurements requirements in the RedCap rel-17 specification (MTK)   + Option 4: RAN4 should provide feedback to RAN2 if any RAN4 defined feature is considered as “not applicable” to RedCap UE (Huawei Nokia)   Tentative agreement: Suggest directly discuss all related issues in the LS. No more discussion in the email thread at 2nd round |
| Sub-topic#3-2 | **Issue 3-2-1: Whether there are impacts on RAN4 specs when performing new RSRP measurement in a DL BWP associated with CD-SSB before Msg1/A retransmission based on UE implementation**   * Proposals   + Option 1: No impact (vivo)   + Option 2: Yes (Huawei Apple)     - Option 2a: If a RedCap UE in idle/inactive mode is configured with a separate initial BWP associated with no SSB (CD or NCD) for RACH, UE is not required to meet Te requirements before Msg1/A retransmission.” (Huawei)   + Option 3: Specify the condition UE is expected to perform new RSRP measurement in a DL BWP associated with CD-SSB before Msg1/MsgA retransmission when the PRACH configuration period is X [ms] or more, and/or frequency distance between CD-SSB and separate initial DL BWP for RedCap is Y [MHz] or more. FFS for X and Y. (Ericsson)     - Example of X: 80ms for fading case; no need new RSRP measurement for stationary UEs.     - Example of Y: 20MHz for FR1, 100MHz for FR2.   + Option 4： Regarding RAN2 LS on RSRP measurement, RAN4 wait for potential new agreement in RAN1 to proceed. (ZTE)   + Option 5: conclusion for issue 3-1-1 can be reused here (Nokia)   + Option 6: up to UE implementation (MTK) * Recommended WF   + TBA. |

### 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 |
| R4-2204248 | This draft CR is handled in thread 228. |
| R4-2205623 | This draft CR is handled in thread 228. |

## Discussion on 2nd round (if applicable)

**Issue 3-2-1: Whether there are impacts on RAN4 specs when performing new RSRP measurement in a DL BWP associated with CD-SSB before Msg1/A retransmission based on UE implementation**

* Proposals
  + Option 1: No impact (vivo)
  + Option 2: Yes (Huawei Apple)
    - Option 2a: If a RedCap UE in idle/inactive mode is configured with a separate initial BWP associated with no SSB (CD or NCD) for RACH, UE is not required to meet Te requirements before Msg1/A retransmission.” (Huawei)
  + Option 3: Specify the condition UE is expected to perform new RSRP measurement in a DL BWP associated with CD-SSB before Msg1/MsgA retransmission when the PRACH configuration period is X [ms] or more, and/or frequency distance between CD-SSB and separate initial DL BWP for RedCap is Y [MHz] or more. FFS for X and Y. (Ericsson)
    - Example of X: 80ms for fading case; no need new RSRP measurement for stationary UEs.
    - Example of Y: 20MHz for FR1, 100MHz for FR2.
  + Option 4： Regarding RAN2 LS on RSRP measurement, RAN4 wait for potential new agreement in RAN1 to proceed. (ZTE)
  + Option 5: conclusion for issue 3-1-1 can be reused here (Nokia)
  + Option 6: up to UE implementation (MTK)
* Recommended WF
  + TBA.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| MediaTek | We support option 6. |
| Huawei | Option 2 and option 6 are not conflict. We confirm that it is up to UE implementation (option 6), and option 2 is just trying to capture the confirmation in spec. The justification of adding a note on Te is interpreted as below:  In legacy, after MSG1 transmission, the UE monitors RAR in a configured RAR window  ra-ResponseWindow ENUMERATED {sl1, sl2, sl4, sl8, sl10, sl20, sl40, sl80},  According to TS38.213, UE would re-transmit PRACH no later than msec after the last symbol of the RAR window if UE does not correctly receive RAR message.As there is always SSB in initial BWP, UE can perform SSB based RSRP measurement during RAR window when SSB is available.  For Redcap UE, the situation changes. When a RedCap UE is on a separate initial DL BWP associated with no SSB (CD or NCD) for RACH. Then in some cases, **there is a risk for UE to miss RA response during RAR window if UE retune RF chain to CD-SSB to measure SSB**. It is up to UE implementation to use the old RSRP or old timing in this case. Therefore we added a clarification that “UE is not required to meet Te requirements before Msg1/A retransmission.’ |
| Qualcomm | We support option 2a and 6 |
| vivo | We see views are diverse and to our understanding the issue and reply LS is not urgent and suggest FFS at maintenance stage. |
| Ericsson | In order to avoid different UE behvior due to ‘up to UE implemetaion’, we still think RAN4 need to clarify the impact if a RedCap UE in IDLE/INACTIVE is configured with a separate initial BWP associated with no CD-SSB before Msg1/MsgA retransmission. Therefore we support option 2. However, please note this issue is also being discussed in RAN1. |
| Nokia | Option 2 and Option 4. However, for identifying the impact we propose to wait on further RAN1 and RAN2 agreements and assess this issue in the maintenance phase. |
|  |  |

Tentative Agreement: No consensus and FFS

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| Title | Source | Comments |
| WF on eDRX and RRM measurement relaxations requirements for Redcap UE | vivo |  |
| Reply LS on RSRP measurement before Msg1 or MsgA retransmission | vivo | To: RAN2  Cc: RAN1 |
| LS on RRM relaxation for Redcap | vivo | To: RAN2 |
| Reply LS on UE capabilities for RedCap from RRM perspective | Ericsson | To: RAN2  CC: RAN1 |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| [R4-2203588](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203588.zip) | On extended DRX enhancements for RedCap | ZTE Corporation | Noted |  |
| R4-2203790 | Discussion on RRM requirement with eDRX for RedCap | Apple | Noted |  |
| R4-2204246 | Further discussion on RRM requirements for extended DRX enhancements for RedCap | Xiaomi | Noted |  |
| R4-2204285 | Discussion on eDRX requirements for RedCap UE | OPPO | Noted |  |
| R4-2204325 | On remaining issues for Redcap eDRX | vivo | Noted |  |
| R4-2204540 | Discussion on eDRX enhancements for RedCap | Nokia, Nokia Shanghai Bell | Noted |  |
| R4-2204909 | Discussion on Extended DRX enhancements for RedCap UE | Huawei, Hisilicon | Noted |  |
| R4-2204910 | Draft CR on measurement requirements for Redcap UE in inactive mode | Huawei, Hisilicon | Revised |  |
| R4-2204998 | On Extended DRX cycle for RedCap UE | CMCC | Noted |  |
| R4-2205510 | Discussions on eDRX requirements for RedCap | Ericsson | Noted |  |
| R4-2206083 | Extended DRX in IDLE mode and INACTIVE mode | MediaTek inc. | Noted |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| R4-2203589 | Discussions on RRM measurement relaxations for RedCap UEs | ZTE Corporation | Noted |  |
| R4-2203791 | Discussion on RRM relaxation requirement for RedCap | Apple | Noted |  |
| R4-2204247 | Further discussion on RRM measurement relaxations for RedCap UE | Xiaomi | Noted |  |
| R4-2204286 | RRM measurement relaxations for RedCap UE | OPPO | Noted |  |
| R4-2204326 | On remaining issues for Redcap RRM relaxation | vivo | Noted |  |
| R4-2204911 | Discussion on RRM measurement relaxations for RedCap UE | Huawei, Hisilicon | Noted |  |
| R4-2204999 | On RRM measurement relaxation for RedCap UE | CMCC | Noted |  |
| R4-2205632 | Discussions on RRM measurement relaxations | Ericsson | Noted |  |
| R4-2205939 | On RRM measurement relaxation for neighbouring cells | Nokia, Nokia Shanghai Bell | Noted |  |
| R4-2206084 | RRM measurements relaxation for stationary criterion | MediaTek inc. | Noted |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| R4-2204328 | Reply LS on RSRP measurement before Msg1 or MsgA retransmission | vivo | Noted |  |
| R4-2204912 | Discussion on RSRP measurement before Msg1 or MsgA retransmission | Huawei, Hisilicon | Noted |  |
| R4-2205000 | On NCD-SSB measurement and RedCap capabilitiles | CMCC | Noted |  |
| R4-2205633 | RRM Discussions on RedCap UE capabilities | Ericsson | Noted |  |
| [R4-2203590](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203590.zip) | Reply LS on capability related assumptions for RedCap | ZTE | Noted |  |

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 |
| R4-2206974 | WF on eDRX and RRM measurement relaxations requirements for Redcap UE | vivo | Return to |  |
| R4-2206975 | Reply LS on RSRP measurement before Msg1 or MsgA retransmission | vivo | Noted |  |
| R4-2206976 | LS on RRM relaxation for Redcap | vivo | Agreeable |  |
| R4-2206977 | Reply LS on UE capabilities for RedCap from RRM perspective | Ericsson | Agreeable |  |
| R4-2204910 | Draft CR on measurement requirements for Redcap UE in inactive mode | Huawei, Hisilicon | Return to |  |

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 |
| vivo | Xusheng wei | Xusheng.wei@vivo.com |
| Huawei | Jing Han | Hw.hanjing@huawei.com |
| Apple | Jie Cui | Jie\_cui@apple.com |
| MediaTek | Waseem Ozan | Waseem.ozan@mediatek.com |
| Nokia | Erika Almeida | erika.almeida@nokia.com |
| Nokia | Juergen Hofmann | juergen.hofmann@nokia.com |

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)