**Issue 3-2-3: Test case design for entry/exit conditions for case 1/case 3**

* Proposals
* Entry/exit condition evaluation verification
  + Option 1: RAN4 to consider only define test cases for exit conditions, do not define dedicated test cases for evaluation of entry conditions (China Telecom Apple vivo Huawei QC)
  + Option 2: Define test case for entry/exit scenario (oppo ZTE Nokia)
  + Option 3: Not to define test cases for the evaluation requirements for Entry/Exit between different cases (Case#1 and Case#3).(MTK)

*Agreement at ad hoc meeting:*

RAN4 to define at least test cases for exit conditions

FFS on whether to define test cases for evaluation of entry conditions

Recommendation:

* Define a test case to verity when a UE should not enter LP-WUS monitoring mode however enter into LP-WUS mode,
  + Note: the UE enters into LP-WUS monitoring mode should fail the test.

**Issue 3-2-3-1: Detail on cases to be verified for entry/exit conditions for case 1/case 3**

*Working assumption:*

* Define [at least] test cases for evaluation of exit conditions for the following cases.
  + Case 1: UE exit Case 1 to legacy
    - Case 1-a: UE exit Case 1 to legacy where only LP-SS signal is used in the test case.
    - Case 1-b: UE exit Case 1 to legacy where only PSS/SSS signal is used in the test case.
  + Case 2: UE exit Case 3 to legacy
    - Case 2-a: UE exit Case 3 to legacy where only LP-SS signal is used in the test case.
    - Case 2-b: UE exit Case 3 to legacy where only PSS/SSS signal is used in the test case
  + FFS on case 3: UE exit case 1 to case 3

The former conclusions can be revisited if there no appreciate way to be verified

**Issue 3-2-5: Test case design for exit behaviour (exit from case 1 or case 3 to legacy) verification**

* Proposals
  + P1: RAN4 to discuss whether to introduce a new test methodology to verify MR RRM offloading scenario. (CATT)
  + P2: A joint procedures can be considered to verify the exit from offloading to legacy state. For example, a cell reselection procedure can be triggered immediately or after some time after the UE exit from the offloading state. (vivo)
    - P2-1: In detail: The test cases defined for UE exists case 1 to legacy state, could have the following time durations (vivo)
      * T1: at T1 the UE is in case 1 or case 3 and camping on cell 1, cell 2 is not detectable
      * T2: at beginning of T2 the UE exists case 1 or case 3, at the end of T2 the UE is in legacy state, camping on cell 1
      * T3: at the beginning of T3 cell 2 is detectable and the UE should finish cell reselection within T3 and at the end of T3 UE should send preambles on the PRACH on cell 2
  + P3: RAN4 to discuss the test methodology about how to verify MR RRM offloading scenario, such as whether to introduce a new test mode. (Ericsson, Nokia)
  + P4: RAN4 not to define test cases for RRM measurements requirements in Case#1. (MTK)

*Recommendations:*

The test case design for verifying exiting behavior use a method with joint procedures

A procedure (cell reselection) is triggered immediately at the timepoint X when exit from offloading (case 1) to legacy is triggered plus MR wake up period.

A procedure (cell reselection) is triggered immediately at the timepoint X when exit from RRM relaxation (case 3) to legacy is triggered plus [MR wake up period].

**Issue 3-2-4: Test case design for RRM relaxation**

* Proposals
  + P1: For RRM relaxation, the following tests can be considered (oppo CATT China Telecom vivo Huawei Ericsson ZTE)
    - intra-frequency cell re-selection
    - inter-frequency cell re-selection including lower and equal priority re-selection and higher priority re-selection
    - inter-RAT cell re-selection
  + P1-1: For the type of LR used in the 3 RRM relaxation test cases, either OOK based LR or OFDM based LR can be used. (vivo Ericsson)
  + P2: (Nokia)
    - A test case where, if the UE does apply relaxation, the UE will perform inter-frequency measurement (which can be according to the relaxed measurements).
    - An intra-frequency TC where UE still does reselection NOT applying relaxation (as the UE will exit relaxation early enough to trigger reselection using non-relaxed measurement.
  + P3: RAN4 to discuss whether Rel-16 test cases for RRM relaxation based on cell reselection can be applied for Case#3. (MTK)

*Recommendations:*

* For RRM relaxation, define the following tests
  + intra-frequency cell re-selection
  + inter-frequency cell re-selection including lower and equal priority re-selection and higher priority re-selection
  + inter-RAT cell re-selection

**Issue 3-1-1 General aspects**

* Proposals
  + P1: Do not introduce a test mode for LP-WUS/WUR performance part. (Apple vivo)
    - P1-1: The test mode should be used as the last resort (vivo)
  + P2-1:Define test mode / test procedure for LP-WUS / WUR testing (Nokia)
  + P2-2: Define test mode for LP-WUR serving cell measurement tests (oppo)
  + P3: RAN4 to focus on time and delay behavior of RRM offloading, RRM relaxation and LP-WUR monitoring modes. (Apple ZTE)
  + P4: If new test mode is introduced, UE shall perform tests on LP-WUR monitoring at certain occasion. If not, UE shall be initialed in LP-WUR mode directly and perform test at the beginning of a test case. (ZTE)
  + P5: Defining TCs for LPWUS cannot verify whether UE meet the new RRM relaxation requirements in R19 LPWUS or the legacy requirements without RRM relaxation (in both cases UE will pass the test). The TCs are redundant. (MTK)

*Ad-hoc meeting agreement:*

*RAN4 agree to define test cases for LP-WUR WI*

*Recommendations:*

Do not introduce a test mode for LP-WUR performance test

**Issue 3-2-9: On FR1/FR2 for test case**

* Proposals
  + P1: RAN4 to only introduce FR1 based LP-WUS test case. (vivo Apple)
  + P2: RAN4 to introduce both FR1 and FR2 based LP-WUS test case (Ericsson Nokia)
  + P3: At least FR1 based LP-WUS test cases will be introduced. (CATT)

*Recommendations:*

**Issue 1-1-7: On MR measurement behaviour after exiting case 1 (case 3) due to corresponding conditions cannot be met**

**Issue 1-1-3 LP-WUR operation with RedCap**

*Recommendations:*

The MR wake up delay for 1Rx RedCap UE is the same as 2Rx RedCap UE.

**Issue 1-1-6: On whether to consider MR wake up delay after MR exits from case 3 due to relaxation conditions cannot be met**

*Recommendations:*

When the UE is in both RRM relaxation (case 3) and in the LP-WUR monitoring state, and the UE exits from case 3 due to exiting conditions of RRM relaxation is met, MR reuse the existing wake up delay when LR related threshold for case 3 is configured

**Issue 1-1-9: On the serving cell and interference cell LP-SS with opposite sequences for the case when {M, L}={1,6}**