**3GPP TSG-RAN WG4 Meeting # 98-e R4-200XXXX**

**Electronic Meeting, 25th Jan – 5th Feb 2021**

**Agenda item:** 7.1.6

**Source:** Nokia, Nokia Shanghai Bell

**Title:** Email discussion summary for [98e][206] NR\_unlic\_RRM\_2

**Document for:** Information

# Introduction

This is the document for the email discussion of the following items under the NR-U RRM agenda (email discussion with the flag [98e][206] NR\_unlic\_RRM\_2):

7.1.6 RRM perf. requirements (38.133)

7.1.6.1 General

7.1.6.2 Common RRM test configuration

7.1.6.3 Test cases

7.1.6.3.1 General

7.1.6.3.2 RRC IDLE, cell re-selection

7.1.6.3.3 HO delay and interruptions

7.1.6.3.4 RRC Re-establishment

7.1.6.3.5 RRC Connection Release with Redirection

7.1.6.3.6 Timing (transmit timing and TA)

7.1.6.3.7 BWP switching delay and interruptions

7.1.6.3.8 PSCell addition/release (delay and interruption)

7.1.6.3.9 Interruptions

7.1.6.3.10 RLM

7.1.6.3.11 Beam management

7.1.6.3.12 Intra-frequency, inter-frequency and inter-RAT measurement requirements

7.1.6.3.13 Accuracy requirements for NR-U intra-frequency, inter-frequency and inter-RAT measurements

The discussion on this thread is organized in the following topics:

* Topic #1: NR-U RRM test configurations
  + Sub-topic 1-1: General configuration of the RRM tests
  + Sub-topic 1-2: General issues on LBT models
  + Sub-topic 1-3: DL LBT model during RRM tests
  + Sub-topic 1-4: UL LBT model during RRM tests
* Topic #2: NR-U RRM test cases
  + Sub-topic 2-1: Test case list
  + Sub-topic 2-2: Test case details for cell re-selection
  + Sub-topic 2-3: Test case details for handover
  + Sub-topic 2-4: Test case details for RRC re-establishment
  + Sub-topic 2-5: Test case details for RRC connection release with re-direction
  + Sub-topic 2-6: Test case details for timing
  + Sub-topic 2-7: Test case details for BWP switching
  + Sub-topic 2-8: Test case details for TCI state switching delay
  + Sub-topic 2-9: Test case details for Interruptions
  + Sub-topic 2-10: Test case details for SCell activation/deactivation
  + Sub-topic 2-11: Test case details for RLM
  + Sub-topic 2-12: Test case details for link recovery
  + Sub-topic 2-13: Test case details for RRM measurements: Intra-frequency, inter-frequency and inter-RAT
  + Sub-topic 2-14: Test case details for RSSI and CO measurements
  + Sub-topic 2-15: Test case details for SFTD measurements
  + Sub-topic 2-16: Test case details for SFTD measurement accuracy
* Topic #3: Spec structure and applicability rules
  + Sub-topic 3-1: Differentiation between UEs supporting LBE, FBE or both
  + Sub-topic 3-2: Specification structure for test cases

Because of the massive number of contributions and proposals under the agenda items discussed in this document, the moderator proposes the following prioritization for the discussion:

**First round:** Concentrate on the discussion on test case configurations on general level, specification structure and test case list i.e. the following topics:

* Topic #1 NR-U RRM test configurations
  + All subtopics with highest priority on
    - Issue 1-1-4: Cell configuration SCS and channel bandwidth
* Topic #2 NR-U RRM test cases:
  + Sub-topic 2-1
* Topic #3 Spec structure and applicability rules
* Comments to CRs and Draft CRs may be done, but they will only be agreed/endorsed in the second round.

**Second round:** Continue on the topics listed for the first round, and if time allows, expand the discussion to cover also test case details i.e.:

* Topic #2: Sub-topics 2-2 – 2-16
* CRs and Draft CRs.

This work is organized using the Big CR approach, and a Big Draft CR is to be endorsed in after the meeting as described in the chairman’s meeting’s arrangements document.

*Moderator’s Note: Companies are welcomed to comment any of the sub-topics and issues in this document already on the first round, but the focus of the discussion (also in GTW) should be on the topics listed for the first round above.*

# Topic #1: NR-U RRM test configurations

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| [**R4-2101647**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101647.zip)  Huawei, HiSilicon | Proposal 1: Consider to have particular test cases to verify the correct UE behavior for the following cases:   * Initiating the measurements on neighbour upon exceeding Mp and Mq in Cell reselection * Initiate cell selection procedures for the selected PLMN upon L1 exceeding L1,max in RRC release with redirection * Report RSRP\_0 upon L1 exceeding L1,max for L1-RSRP measurement | Issue 1-3-11 |
| Proposal 2: For the test cases no particular behavior to be verified, exceeding Lmax shall be avoided in each test cases. | Issue 1-3-10 Option 2 |
| Observation 1: It is hard to guarantee that there will be certain number of consecutive unavailable SSBs with the probability model to verify the particular UE behavior. | - |
| Observation 2: It is hard to avoid exceeding the Lmax, which will lead to an invalid test as UE may abandon or terminate the procedure using the probability model. | - |
| Proposal 3: Consider the LBT model as a repetitive pattern of n available SSBs for every m SSB occasions. | Issue 1-2-2 Option 2 |
| [**R4-2101648**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101648.zip)  Huawei, HiSilicon | Observation 1: For NR-U, the symbols containing SSBs depends on the LBT model, FBE/LBE and ssb-PositionQCL configurations. | - |
| Proposal 1: New RMSI COREST reference channel configurations shall be added for NR-U | Issue 1-1-10 Proposal 1 |
| Proposal 2: Define test cases for 15 KHz SCS with channel bandwidth of 20 MHz. | Issue 1-1-4 Option 1 |
| Proposal 3: Add the corresponding configurations for 15 KHz SCS with 20MHz CBW. | Implicit in the Issue 1-1-4 |
| [**R4-2102921**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102921.zip)  Qualcomm Inc. | Proposal 1. Support Option 1 as the baseline DL LBT model for LBE test cases:   * RAN4 to adopt the following DL LBT model:   + Define a probability equal to P1 for the transmission of the DRS in the first candidate position.   + In case of LBT failure for transmission in the first candidate position, define a probability equal to P2 for the transmission in the second candidate position for a given SSB index. | Issue 1-3-1, option 1 |
| Observation 1. It would be nice to reflect the superior performance of NR-U as compared to LTE-LAA in handling the LBT failures | - |
| Proposal 2. RAN4 to define P1 and P2 such that the overall LBT failure rate is reflected to be lower than LTE-LAA | Issue 1-3-2 Option 1 |
| Observation 2. It would be safe to assume that the LBT failure rate for first candidate is same as that for LTE-LAA. | - |
| Proposal 3. RAN4 to define P1 = 0.75 (same as that defined for LTE-LAA) | Issue 1-3-3 Option 1a |
| Observation 3. If DL LBT is unsuccessful for the first candidate position, the channel can be assumed to be busy for the second candidate position with a significantly high probability. | - |
| Proposal 4. Suggest RAN4 to define P2 < P1. | Issue 1-3-3 Option 1 |
| Observation 4: With P1 defined as 0.75, P2 = 0.5 and P2 =0.25 appears to be two good candidates satisfying all the identified criteria:   * Reflects the superior performance of NR-U as compared to LTE-LAA * Does not increase the test time by a significant amount * More realistic model with P2<P1 (P2=0.25 may be a little pessimistic) | - |
| Proposal 5. Suggest RAN4 to define P2 = 0.5 | Issue 1-3-3 Option 1a |
| Proposal 6. Support Option 1 as the baseline DL LBT model for FBE non-DRX test cases:   * RAN4 to define a DL LBT model that considers a probability of P for the transmission of each DRS. Only the first SSB candidate position for a given SSB index shall be considered in these tests. | Issue 1-3-5 Option 1 |
| Observation 5. Similar to LBE case, it would be nice to reflect the superior performance of NR-U as compared to LTE-LAA in handling the LBT failures. | - |
| Observation 6. FBE is used when the operator can guarantee a controlled environment (no WiFi neighbors), implying that the rate of LBT failure is extremely small in FBE mode | - |
| Proposal 7. Suggest that RAN4 defines SSB transmission probability in FBE to be higher than SSB transmission probability in LBE   * P(FBE) > P(LBE) = P1 + (1-P1)\*P2 | Issue 1-3-6 Option 1 |
| Observation 7. Although the above proposal indicates a higher test time for FBE based test cases, it would be nice to reflect the benefits and use cases of FBE based channel access for IIot use-cases. | - |
| Proposal 8. Suggest RAN4 to define P(FBE) = 0.95 | Issue 1-3-7 Option 1 |
| Observation 8. For RRM purposes, the UL transmission occasions are always scheduled/configured for a UE and hence can be blocked by the test equipment, for test purposes, by transmitting a OCNG noise signal in the UL resource. | - |
| Observation 9. Since the test equipment may not transmit and monitor the UL resource at the same time, it can monitor the next UL resource where it doesn’t transmit the OCNG signal. | - |
| Proposal 9. Suggest RAN4 to adopt a baseline UL LBT model as:   * Use DL FBE model to transmit a full band/LBT BW OCNG noise pattern in one or more of the scheduled/configured UL resource with probability P.   + P is FFS * The test equipment keeps a count of the number of UL LBT failures it may cause. * When the OCNG signal is transmitted, the test equipment does not monitor the UL resource in which the OCNG is transmitted. * When the OCNG signal is not transmitted, the test equipment monitors the UL resource for the desired UL signal. * Based on whether it receives the signal or not, the test equipment declares the test case pass/fail | Issue 1-4-3 Option 1 |
| Observation 10. During random access, the uncertainty in the UE calculated UL transmission power may cause decoding failure at the test equipment leading to falsely assuming an UL LBT failure and failing the test case. | - |
| Proposal 10. Test equipment to configure preambleReceivedTargetPower for msg1 and msgA-PreambleReceivedTargetPower for msgA to the highest value for UL LBT test cases. | Issue 1-4-4 Option 1 |
| Observation 11. It is a good idea to choose one typical test tase to test the same requirement, e.g., delay in acquiring PRACH resource across multiple RRM features. | - |
| Observation 12. List of features impacted with UL LBT failure   * Handover to target cell using CCA   + Delay in acquiring PRACH resource * RRC re-establishment using CCA   + Delay in acquiring PRACH resource * Random access   + Delay in acquiring PRACH resource * RRC connection release with re-direction   + Delay in acquiring PRACH resource * BWP switch delay on consistent UL LBT recovery   + Additional delay in acquiring PRACH resource as in Handover * SCell activation   + Additional delay in transmission of CSI reporting due to CCA failure * Event triggered measurement reporting delay   + Additional delay due to UL LBT failure not defined   + FFS: Assume it similar to above-mentioned SCell activation case * MAC CE based TCI state switch delay   + Delay in sending HARQ feedback transmissions | - |
| Proposal 11. RAN4 to define one typical test case to test – Additional delay in acquiring PRACH resource due to UL LBT failures for the following requirements:   * Handover to target cell using CCA * RRC re-establishment using CCA * FFS: Random access * RRC connection release with re-direction * BWP switch delay on consistent UL LBT recovery | Issue 1-4-5 |
| Proposal 12a. (With no particular reason but as a matter of choice) Suggest RAN4 to test – Additional delay in acquiring PRACH resource due to UL LBT failures in the following requirement:   * Handover to target cell using CCA | Issue 1-4-5 |
| Proposal 12b. (Based on Proposal 12a) Suggest RAN4 to not test – Additional delay in acquiring PRACH resource due to UL LBT failures in the following requirements:   * RRC re-establishment using CCA * FFS: Random access * RRC connection release with re-direction * BWP switch delay on consistent UL LBT recovery | Issue 1-4-5 |
| Proposal 13. RAN4 to discuss whether to include UL LBT failures for the following cases:   * SCell activation   + Additional delay in transmission of CSI reporting due to CCA failure * Event triggered measurement reporting delay   + Additional delay due to UL LBT failure not defined   + FFS: Assume it similar to above-mentioned SCell activation case * MAC CE based TCI state switch delay   + Delay in sending HARQ feedback transmissions | Issue 1-4-6 |
| Observation 13. LBT failures are based on one of the probabilistic models | - |
| Observation 14. Most of the Lmax values are defined for consecutive LBT failures | - |
| Observation 15. There is significant impact on the test-time if Lmax values are to be considered in the test cases. | - |
| Observation 16. Most of the requirements fall into one of the following category w.r.t LBT failures and have little to no value in getting tested:   * + Restart the procedure, e.g. measurements   + Abandon the procedure, e.g. SCell activation   + Controlled by timer, e.g. Handover | - |
| Observation 17. NR-U has a long list of test cases to be covered, unnecessary test cases or test cases with little value should be avoided. | - |
| Proposal 14: RAN4 to avoid designing test cases with exceeding max allowed LBT failures for NR-U. | Issue 1-3-10 Option 1 |
| Observation 18. FBE and LBE mode of operations are both optional UE capabilities and UE can signal capability to support either FBE or LBE or both LBE and FBE. | - |
| Observation 19: Separate models are defined for FBE and LBE channel access in NR-U | - |
| Proposal 15: RAN4 to define separate test cases for LBE and FBE whenever an LBT failure dependent requirement is tested. | Issue 1-2-1 Option 2 |
| Proposal 16a: Only FBE based test cases apply to a UE that signals FBE only capability. | Issue 3-1-3 Option 1 |
| Proposal 16b: Only LBE based test cases apply to a UE that signals LBE only capability. | Issue 3-1-2 Option 1 |
| Proposal 16c: A UE that signals both FBE and LBE capability need to test only LBE test cases | Issue 3-1-1 Option 2 |
| [**R4-2100772**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100772.zip)  MediaTek inc. | Proposal 1: For SCell activation in NR-U, exceeding Lmax should be avoided. | Issue 1-3-11 |
| Proposal 2: For SFTD measurement NR-U, exceeding Lmax should be avoided. | Issue 1-3-11 |
| Proposal 3: For intra-frequency and inter- frequency measurement for NR-U, exceeding LPSS/SSS,gaps,max should be avoided. | Issue 1-3-11 |
| Proposal 4: For test cases with DRX in use, the LBT can be modelled as either all SMTCs are with available SSBs or all SMTCs are with no SSBs available during one DRX cycle. | Issue 1-3-9 Option 1 |
| Proposal 5: Test configurations of NR FDD is not applicable to NR-U test cases. | Issue 1-1-2 Option 1 |
| Observation 1: Only 30 kHz SSB SCS has been applied for initial access. For NR-U SA UEs and NR-U PCell, NR-U PSCell, 15 kHz SSB SCS are not applicable. | - |
| Proposal 6: Test configurations for NR-U test cases are based on 30kHz SSB SCS. | Issue 1-1-4 Option 3 |
| [**R4-2100834**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100834.zip)  ZTE Corporation | Proposal 1: LBT failures exceeding Lmax shall be tested when there is new UE behavior defined for such scenarios. | Issue 1-3-10 Option 2 |
| Proposal 2: For the cell-reselection test cases, Mp consecutive DRX cycles with LBT failures of the serving cell should be also tested. | Issue 1-3-11 Proposal 5 |
| Proposal 3: If a UE claims to support both modes then the UE shall pass tests for both modes. De-prioritize the discussion if needed since this shall be seen as a corner case. | Issue 3-1-1 Option 1 |
| [**R4-2101133**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101133.zip)  Nokia | Proposal 1: For LBE test cases in non DRX: RAN4 to adopt the following DL LBT model: 1) Define a probability equal to P1 for the transmission of each SSB index in the first candidate position. 2) In case of LBT failure for transmission of a given SSB index in the first candidate position, define a probability equal to P2 for the transmission of a given SSB index in the second candidate position.. | Issue 1-3-1 Option 1 |
| Proposal 2: Define P1 = P2 = 0.75 for LBE. | Issue 1-3-3 Option 2 |
| Proposal 3: For FBE test cases in non-DRX: RAN4 to define a DL LBT model that considers a probability of P for the transmission of each frame. Only the first SSB candidate position for a given SSB index shall be considered in these tests. | Issue 1-3-5 Option 1 |
| Proposal 4: Define P = 0.9 for FBE. | Issue 1-3-7 Option 2 |
| Observation 1: A number of NR-U requirements consider the delay caused by UL LBT failures, as follows:  Table 1 – Requirements in 38.133 which are impacted by UL LBT failure   |  |  | | --- | --- | | Clause with UL LBT failure impact | Comments | | 6.1B NR Handover | UL LBT failure is considered in the time uncertainty for acquiring the first available PRACH occasion | | 6.2.1A RRC re-establishment with CCA delay requirement | The number of consecutive SSB to PRACH occasions not available due to UL LBT failure is considered in the delay uncertainty | | 6.2.3.2.3 RRC connection release with redirection to NR carrier subject to CCA | The number of consecutive SSB to PRACH occasions not available due to UL LBT failure is considered in the delay uncertainty | | 8.3A.2 SCell Activation and Deactivation in carriers with CCA | UL LBT failures are considered in THARQ. | | 8.6.4 BWP switch delay on consistent UL LBT recovery | The consistent UL LBT detection / recovery mechanism will trigger the active BWP switch. | | 8.10A Active TCI state switching delay with CCA | UL LBT failures are considered in THARQ. | | 9.2A NR Intra-frequency measurements with CCA | UL LBT failures are considered in the reporting delay | | 9.3A NR Inter-frequency measurements with CCA | UL LBT failures are considered in the reporting delay | | - |
| Observation 2: One way to test UL LBT failure at the UE is by the test equipment injecting a sufficiently high interference precisely at the time the UE should transmit. | - |
| Proposal 5: UL LBT failure to be tested in a typical test case for each scenario (A, B or C) | Issue 1-4-1 Option 1 |
| Proposal 6: If RAN4 agrees to test UL LBT in the RRM tests, an UL LBT type configuration needs to be defined. | Issue 1-4-2 Option 1 |
| Proposal 7: The test cases shall assume only TDD operation in unlicensed bands. | Issue 1-1-2 Option 1 |
| Proposal 8: RAN4 to define RRM test cases with 20 MHz and 40 MHz carriers subject to CCA. | Issue 1-1-4 Option 2 |
| Proposal 9: RAN4 to define RRM test cases with 15 kHz and 30 kHz NR-U cells. | Issue 1-1-4 Option 2 |
| Proposal 10: Combining proposals 7, 8 and 9, we propose to define following two test configurations for NR-U cells:  1. NR with CCA 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode  2. NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | Issue 1-1-4 Option 2 |
| Proposal 10: RAN4 to discuss which combinations of E-UTRA, NR and NR-U configurations are to be included in the test cases. | Issue 1-1-5 Proposal 1 |
| Observation 3: The NR-U WID introduced two new, longer PRACH sequences (LRA = 1151 with ΔfRA = 15 kHz and LRA = 571 with ΔfRA = 30 kHz). | - |
| Proposal 11: For handover and RRC re-establishment cases, RAN4 to assume PRACH configuration 1 and 2 as baseline for NR-U tests, as specified in Annex A.3.8.2 in TS 38.133. | Issue 1-1-6 |
| Proposal 12: For the random access test case: RAN4 to discuss the PRACH configuration after the core requirements are defined | Issue 1-1-6 |
| Proposal 13: RAN4 to discuss defining a new test configuration with the new PRACH sequences introduced in NR Rel-16. | Issue 1-1-6 |
| Proposal 14: RAN4 to discuss the DRS transmission window duration to be used in the SSB configuration. | Issue 1-1-7 Proposal 1 |
| Proposal 15: RAN4 to define the following SSB configuration to be used in the 15 kHz NR-U test cases:   |  |  | | --- | --- | | SSB Parameters | Values | | Channel bandwidth | 20 MHz | | SSB SCS | 15 kHz | | SSB periodicity (TSSB) | 20 ms | | Number of SSB indexes per SS-burst | 1 | | DRS transmission window duration | [1] ms | | Highest SS/PBCH block index | 0 | | Symbol numbers containing SSB Note 2 | 2-5 and 4-7 | | Slot numbers containing SSB Note 2 | 0 | | SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | | RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | | Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | | | Issue 1-1-8 Proposal 2 |
| Proposal 16: RAN4 to define the following SSB configuration to be used in the 30 kHz NR-U test cases:     |  |  | | --- | --- | | SSB Parameters | Values | | Channel bandwidth | 40 MHz | | SSB SCS | 30 kHz | | SSB periodicity (TSSB) | 20 ms | | Number of SSB indexes per SS-burst | 1 | | DRS transmission window duration | [1] ms | | Highest SS/PBCH block index | 0 | | Symbol numbers containing SSB Note 2 | 2-5 Note 2 | | Slot numbers containing SSB Note 3 | 0 and 1 | | SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 | | RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 | | Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: Symbol 2-5 is chosen (1 SSB/slot).  Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves | | | Issue 1-1-8 Proposal 3 |
| Proposal 17: For NR-U test case configuration with 20 MHz BW and 15 kHz SCS (Proposal 10), define new configurations for PDSCH reference measurement channel, CORESET reference channel and Dedicated CORESET RMC configuration with 20 MHz BW and 15 kHz subcarrier spacing. | Issue 1-1-9 Proposal 1  Issue 1-1-10 Proposal 1 |
| [**R4-2101430**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101430.zip)  Ericsson | Proposal 1: RAN4 define NR-U RRM test cases with SCS=30kHz for both SSB and data transmission. | Issue 1-1-4 Option 3 |
| Proposal 2: For NR-U RRM tests, define the following discovery burst transmission (DBT) window configurations under CCA:   * DBT Window duration: 5ms * DBT Periodicity: 20ms | Issue 1-1-7 Proposal 2 |
| Proposal 3: For NR-U RRM tests, define new SSB configurations corresponding to the introduced DBT window configurations.   * SCS=30kHz with SS Block pattern case C. | Issue 1-1-8 Proposal 1 |
| Proposal 4: Configure PBCH DMRS sequence index with =1. | 3c. Test configurations – other |
| Proposal 5: Define new RMC for CORESET for RMSI scheduling under CCA to transmit Type0-PDCCH in the discovery burst.   * SCS=30kHz * Refers to TS38.213 Table 13-4A Index 4 (i.e., 2 OFDM symbols, RB offset = 0). * Refers to TS38.213 Table 13-11 Index 0 (i.e., O=0, M=1) | Issue 1-1-10 Proposal 3 |
| Proposal 6: Define new RMC for PDSCH for slots with RMSI under CCA   * SCS=30kHz * Reuse the same configuration as RMC for PDSCH for slots with RMSI (i.e., Type A, 24PRB, MCS4, dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1, etc.) | Issue 1-1-9 Proposal 2 |
| Proposal 7: Define new RMC for PDSCH for slots without RMSI under CCA   * SCS=30kHz * Reusing SR.2.1 TDD (i.e., Type A, 24PRB, MCS4, dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2, etc.) | Issue 1-1-9 Proposal 3 |
| Proposal 8: For NR-U RRM tests, RMC is transmitted during the RMC transmission burst:   * The length of the RMC transmission burst in slots is defined as N. The RMC burst transmission format is determined according to the steps below:   1. Select N randomly from a given set of the number of slots S1 = {[1,3,5,8]} with equal probability as the total length of RMC burst transmission format.   2. A uniform random variable from 0 to 1 is generated. If the random variable is less than PCCA\_DL, a burst of N fully occupied slots is transmitted. Otherwise, the RMC transmission burst is muted and the muting duration is the same as the number N of slots for determined burst format. * RMC transmission burst is scheduled outside DBT window. * RAN4 discuss further the number of slots in S1. | Issue 1-1-11 |
| Proposal 9: NR-U RRM tests does not configure tdd-UL-DL-ConfigurationCommon using RRC configuration. DL scheduling is configured by DCI 1\_1 slot by slot. | Issue 1-1-12 |
| Proposal 10: Reuse the existing OCNG patterns in A.3.2.1 for NR-U RRM tests. | Issue 1-1-13 |
| Proposal 11: Reuse the existing TCI state configuration in A.3.16.2 for NR-U RRM tests. | Issue 1-1-13 |
| Proposal 12: Reuse the existing CSI-RS configurations in A.3.13.2 and A.3.17.1.2 for NR-U RRM tests. If necessary RAN4 define new CSI-RS configuration e.g. transmitted inside DBT window. | Issue 1-1-13 |
| Proposal 13: Define new subclause for antenna configurations with unlicensed bands. For 4Rx UE, apply the same applicability rule as Rel-15 RRM test. | Issue 1-1-14 |
| [**R4-2102527**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102527.zip)  Ericsson | Observation 1: NR-U and LAA/eLAA have many similarities, but there are also some differences, including the terminology. | - |
| Observation 2: For NR-U, a more flexible configuration is desired, to accommodate the demand for testing in various environments, to model LBE-like and FBE-like networks, DL CCA and UL CCA, to model consistent UL CCA failures, etc. | - |
| Proposal 1: For NR-U, define a parameter for CCA success probability, PCCA, to model the probability of successful attempt for acquiring the channel and transmitting the necessary signals. | Issue 1-3-1 Option 2  Issue 1-3-5 Option 2 |
| Proposal 2: CCA success probability PCCA is defined among cell-specific test parameters in each test cases (the access probability can be different at different BS locations). | Issue 1-2-3 Option 1  Issue 1-3-1 Option 3  Issue 1-3-7 Option 3 |
| Proposal 3: The SSB shifting can be modelled by randomly selecting a candidate SSB location from the set of allowed candidate SSB locations. No need to model SSB shifting for non-congested channels. | Issue 1-3-1 Option 3 |
| Proposal 4: The probability parameter PCCA is not a single fixed value in the specification; the value(s) are configured to a relevant setting in each test. | Issue 1-2-3 Option 1  Issue 1-3-4 Option 1  Issue 1-3-8 Option 1 |
| Proposal 5: The CCA model specifies possible values for PCCA. RAN4 to further discuss:   * Option 1: The CCA model specifies a continuous range of possible values (one or more specific values from the range are configured in each test), e.g., PCCAÎ[0%, 100%] * Option 2: The CCA model specifies a discrete set of possible values (one or more specific values from the set are chosen in each test). | Issue 1-2-3 Option 1a and 1b |
| Proposal 6: One probability value (per transmitter) applies at any time point during a test; one or more probability values can be configured in the entire test, one value PCCA,i per time interval Ti where i≥1 and the multiple time intervals (when i>1) do not overlap (e.g., PCCA=1.0 in T1 and PCCA=0.75 in T2). | Issue 1-2-5 Option 1 |
| Proposal 7: In each test case, the following parameters shall be present in the tables:   * network indication of the channel occupancy in SIB1, * UE capability for the channel access mode indicative of that the UE supports the network-indicated channel occupancy. | Issue 1-1-1 Option 1 |
| Proposal 8: The configuration of the CCA model (e.g., parameter PCCA,i) in the test shall match the network-indicated channel occupancy in time interval Ti. during which the requirement is tested. | Issue 1-1-1 Proposal 2 |
| Proposal 9: For the semi-static channel access, there is no need to configure SSB shift within the discovery burst transmission window. | Issue 1-3-5 Option 3 |
| Proposal 10: At least at a low Es/Iot (e.g., Es/Iot<-6 dB), the probability of CCA success is higher for the semi-static channel occupancy compared to that for dynamic channel occupancy:   * PCCA,semi-static,i > PCCA,dynamic,I, when Es/Iot<X, * PCCA,semi-static,i = PCCA,dynamic,I, when Es/Iot≥X,   where X=TBD (e.g., X=-6 dB). | Issue 1-2-4 Option 1 |
| Proposal 11: Test parameter values for FBE and LBE (e.g., signaling-related) are specified in the same test case (a note to clarify their applicability can be added, if needed). | Issue 1-2-1 Option 1 |
| Proposal 12: For PCCA, it is the actual value that matters, there is no need to call it “FBE” or “LBE”; if needed, multiple PCCA values can be specified in the same test. | Issue 1-2-1 Option 1 |
| Proposal 13: For UL CCA, the modelling approach is based on a probability PCCA\_UL,i of successful access during the corresponding time Ti of the time interval i. | Issue 1-2-6 Option 1 |
| Proposal 14: In the same time interval i, PCCA\_UL,I and PCCA\_DL,i can have different values. | Issue 1-2-7 Option 1 |
| Proposal 15: Consistent UL CCA failures are modelled by means of a low PCCA\_UL,i (e.g., 0%) during the relevant time interval Ti within the test. | Issue 1-4-7 Option 1 |

## Open issues summary and view’s collection for the 1st round

### Sub-topic 1-1: General configuration of the RRM tests

**Issue 1-1-1: Channel occupancy parameters**

The following proposals were made concerning channel occupancy parameters:

* Proposal 1 (Ericsson): In each test case, the following parameters shall be present in the tables:
  + network indication of the channel occupancy in SIB1,
  + UE capability for the channel access mode indicative of that the UE supports the network-indicated channel occupancy.
* Proposal 2 (Ericsson): The configuration of the CCA model (e.g., parameter PCCA,i) in the test shall match the network-indicated channel occupancy in time interval Ti. during which the requirement is tested.

Recommended way forward for the first round:

* Can we agree with proposals 1 and 2?

Companies’ comments 1st week:

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| --- | --- |
| **Company** | **Comments** |
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**Issue 1-1-2: Applicability of NR FDD test configurations**

Consider the following proposal concerning the applicability of NR FDD test configurations:

* Option 1 (Nokia, Mediatek?): NR FDD test configurations do not apply to the configuration of NR-U cells, but may apply to the configuration of NR cells in NR-U test cases.
* Option 2: NR FDD test configurations do not apply to the configuration of NR-U and NR cells in NR-U test cases.

Recommended way forward for the first round:

* Can we agree on Option 1?

Companies’ comments 1st week:

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| --- | --- |
| **Company** | **Comments** |
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**Issue 1-1-3: SCS for data and SSB**

Considering that proposals on SCS are not clear differentiating SSB and data, discuss on the following options:

* Option 1: Configure the same SCS for data and SSB.
* Option 2: Allow configuration of different SCS for SSB and data.

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Agreement: Configure the same SCS for data and SSB.

Recommended way forward for the first round:

* No need for further discussion

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-1-4: Cell configuration SCS and channel bandwidth on carrier frequency with CCA**

RAN4 to consider the following options of SCS and channel bandwidths for the cell configurations of NR-U RRM test cases:

* Option 1 (Huawei?):
  + 15 kHz SSB SCS with 20 MHz bandwidth
* Option 2 (Nokia):
  + NR with CCA 15 kHz SSB SCS, 20 MHz bandwidth, TDD duplex mode
  + NR with CCA 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
* Option 3 (Ericsson, Mediatek?)
  + RAN4 define NR-U RRM test cases with SCS=30kHz for both SSB and data transmission.
    - FFS bandwidths

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Agreement

* + RAN4 define NR-U RRM test cases with SCS=30kHz for both SSB and data transmission and 40 MHz bandwidth.

Recommended way forward for the first round:

* No need for further discussion

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-1-5: E-UTRA, NR and NR-U configurations**

* Proposal 1 (Nokia): RAN4 to discuss which combinations of E-UTRA, NR and NR-U configurations are to be included in the test cases, i.e. agree which of the Rel-15 NR and LTE configurations are to be tested with the NR-U configurations discussed under Issue 1-1-4.
  + NR configurations in Rel-15 test cases:
    - NR1: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
    - NR2: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
    - NR3: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
  + LTE configurations in Rel-15 test cases
    - LTE FDD
    - LTE TDD

Recommended way forward for the first round:

* On the first round, companies are invited to indicate in the comment section, which of the configurations for NR and LTE need to be included in NR-U test cases that have NR and/or E-UTRA cells. Further discussion about combinations of NR-U/NR/LTE cells depends on agreements in Issue 1-1-4.

Companies’ comments 1st week:

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| --- | --- |
| **Company** | **Comments** |
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**Issue 1-1-6: PRACH test configuration**

RAN4 to consider the following proposals on PRACH configuration:

* Proposal 1 (Nokia): For handover and RRC re-establishment cases, RAN4 to assume PRACH configuration 1 and 2 as baseline for NR-U tests, as specified in Annex A.3.8.2 in TS 38.133.
* Proposal 2 (Nokia): For the random access test case: RAN4 to discuss the PRACH configuration after the core requirements are defined.
* Proposal 3 (Nokia): RAN4 to discuss defining a new test configuration with the new PRACH sequences introduced in NR Rel-16.

Recommended way forward for the first round:

* Can we agree on Proposals 1-3?

Companies’ comments 1st week:

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| --- | --- |
| **Company** | **Comments** |
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**Issue 1-1-7: DRS/DBT transmission window duration**

RAN4 to consider the proposals below:

* Proposal 1 (Nokia): RAN4 to discuss the DRS transmission window duration to be used in the SSB configuration.
  + Consider DRS transmission window duration of 1ms and SSB periodicity of 20 ms.
* Proposal 2 (Ericsson): For NR-U RRM tests, define the following discovery burst transmission (DBT) window configurations under CCA:
  + DBT Window duration: 5ms
  + DBT Periodicity: 20ms

Recommended way forward for the first round:

* Can we agree on Proposals 1 and 2?

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-1-8: SSB test configuration**

RAN4 to consider the following proposals on SSB configuration:

* Proposal 1 (Ericsson): For NR-U RRM tests, define new SSB configurations corresponding to the introduced DBT window configurations.
  + SCS=30kHz with SS Block pattern case C.
* Proposal 2 (Nokia): RAN4 to define the following SSB configuration to be used in the 15 kHz NR-U test cases:

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 20 MHz |
| SSB SCS | 15 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSB indexes per SS-burst | 1 |
| DRS transmission window duration | [1] ms |
| Highest SS/PBCH block index | 0 |
| Symbol numbers containing SSB Note 2 | 2-5 and 4-7 |
| Slot numbers containing SSB Note 2 | 0 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

* Proposal 3 (Nokia): RAN4 to define the following SSB configuration to be used in the 30 kHz NR-U test cases:

|  |  |
| --- | --- |
| SSB Parameters | Values |
| Channel bandwidth | 40 MHz |
| SSB SCS | 30 kHz |
| SSB periodicity (TSSB) | 20 ms |
| Number of SSB indexes per SS-burst | 1 |
| DRS transmission window duration | [1] ms |
| Highest SS/PBCH block index | 0 |
| Symbol numbers containing SSB Note 2 | 2-5 Note 2 |
| Slot numbers containing SSB Note 3 | 0 and 1 |
| SFN containing SSB | SFN mod (max(TSSB,10ms)/10ms) = 0 |
| RB numbers containing SSB within channel BW | (RBJ, RBJ+1,.…, RBJ+19)Note 1 |
| Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].  Note 2: Symbol 2-5 is chosen (1 SSB/slot).  Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves. | |

Recommended way forward for the first round:

* Can we agree on Proposals 1 to 3?

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-1-9: RMCs for PDSCH**

Considering the RMCs for PDSCH, consider the following proposals:

* Proposal 1 (Nokia): For NR-U test case configuration with 20 MHz BW and 15 kHz SCS, define new configurations for PDSCH reference measurement channel.
* Proposal 2 (Ericsson): Define new RMC for PDSCH for slots with RMSI under CCA
  + SCS=30kHz
  + Reuse the same configuration as RMC for PDSCH for slots with RMSI (i.e., Type A, 24PRB, MCS4, dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1, etc.)
* Proposal 3 (Ericsson): Define new RMC for PDSCH for slots without RMSI under CCA
  + SCS=30kHz
  + Reusing SR.2.1 TDD (i.e., Type A, 24PRB, MCS4, dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2, etc.)

Recommended way forward for the first round:

* Can we agree on Proposals 1 to 3?

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-1-10: CORESET**

Considering the RMCs that are not for PDSCH, consider the following proposals:

* Proposal 1 (Huawei): New RMSI COREST reference channel configurations shall be added for NR-U.
* Proposal 2 (Nokia): For NR-U test case configuration with 20 MHz BW and 15 kHz SCS, define new configurations for CORESET reference channel and Dedicated CORESET RMC configuration with 20 MHz BW and 15 kHz subcarrier spacing.
* Proposal 3 (Ericsson): Define new RMC for CORESET for RMSI scheduling under CCA to transmit Type0-PDCCH in the discovery burst.
  + SCS=30kHz
  + Refers to TS38.213 Table 13-4A Index 4 (i.e., 2 OFDM symbols, RB offset = 0).
  + Refers to TS38.213 Table 13-11 Index 0 (i.e., O=0, M=1)

Proposed way forward for the first round:

* To be discussed based on the outcome of Issue 1-1-4.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-1-11: RMC transmission burst**

Considering the length of transmission bursts for NR-U tests, consider the following proposal:

* Proposal 1 (Ericsson): For NR-U RRM tests, RMC is transmitted during the RMC transmission burst:
  + The length of the RMC transmission burst in slots is defined as N. The RMC burst transmission format is determined according to the steps below:
    1. Select N randomly from a given set of the number of slots S1 = {[1,3,5,8]} with equal probability as the total length of RMC burst transmission format.
    2. A uniform random variable from 0 to 1 is generated. If the random variable is less than PCCA\_DL, a burst of N fully occupied slots is transmitted. Otherwise, the RMC transmission burst is muted and the muting duration is the same as the number N of slots for determined burst format.
  + RMC transmission burst is scheduled outside DBT window.
  + RAN4 discuss further the number of slots in S1.

Recommended way forward for the first round:

* Please discuss further the proposal above stating if it can be agreed.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-1-12: TDD UL/DL configuration**

Considering the TDD UL/DL configuration, consider the following proposal:

* Proposal 1 (Ericsson): NR-U RRM tests does not configure tdd-UL-DL-ConfigurationCommon using RRC configuration. DL scheduling is configured by DCI 1\_1 slot by slot.

Recommended way forward for the first round:

* Please discuss further the proposal above stating if it can be agreed.

Companies’ comments 1st week:

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| --- | --- |
| **Company** | **Comments** |
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**Issue 1-1-13: Existing configuration to be reused**

Considering the existing configuration from NR tests that might be reused, consider the following proposals:

* Proposal 1 (Ericsson): Reuse the existing OCNG patterns in A.3.2.1 for NR-U RRM tests..
* Proposal 2 (Ericsson): Reuse the existing TCI state configuration in A.3.16.2 for NR-U RRM tests.
* Proposal 3 (Ericsson): Reuse the existing CSI-RS configurations in A.3.13.2 and A.3.17.1.2 for NR-U RRM tests. If necessary RAN4 define new CSI-RS configuration e.g. transmitted inside DBT window.

Recommended way forward for the first round:

* Discuss on the proposals above indicating which ones can be agreed considering that the proposals are not mutually exclusive.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-1-14: Antenna configurations**

Considering the existing configuration from NR tests that might be reused, consider the following proposals:

* Proposal 1 (Ericsson): Define new subclause for antenna configurations with unlicensed bands. For 4Rx UE, apply the same applicability rule as Rel-15 RRM test.

Recommended way forward for the first round:

* Please discuss further the proposal above stating if it can be agreed.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-1-15: PBCH DMRS**

Considering the configuration of PBCH, consider the following proposal:

* Proposal 1 (Ericsson): Configure PBCH DMRS sequence index with =1.

Recommended way forward for the first round:

* Please discuss further the proposal above stating if it can be agreed.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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### Sub-topic 1-2: General issues on LBT models

**Issue 1-2-1: Differentiation between FBE and LBE**

Proposals

* Option 1 (Ericsson): If needed, test parameter values for FBE and LBE (e.g., signaling-related) are specified in the same test case (a note to clarify their applicability can be added, if needed).
  + For PCCA, it is the actual value that matters, there is no need to call it “FBE” or “LBE”; if needed, multiple PCCA values can be specified in the same test.
* Option 2 (Qualcomm): Define separate test cases for LBE and FBE whenever an LBT failure dependent requirement is tested.

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Agreement: If needed, test parameter values for FBE and LBE (e.g., signaling-related) are specified in the same test case (a note to clarify their applicability can be added, if needed).

Recommended way forward for the first round:

* No need for further discussion

Companies’ comments 1st week:

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

**Issue 1-2-2: General approach for DL LBT/CCA models**

How should the DL LBT models be defined?

* Option 1: Describe LBT models as a random process defined
* Option 2 (Huawei): Consider the LBT model as a repetitive pattern of n available SSBs for every m SSB occasions.
* Option 3 (Ericsson): For NR-U, define a parameter for CCA success probability, PCCA, to model the probability of successful attempt for acquiring the channel and transmitting the necessary signals.

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Agreement:

DL LBT modelling procedures

Option 1: Probabilistic model. Define a parameter for CCA success probability, PCCA, to model the probability of successful attempt for acquiring the channel and transmitting the necessary signals.

Option 2: Deterministic LBT pattern with a repetitive pattern of n available SSBs for every m SSB occasions

Option 1 approach is used as a baseline approach. Option 2 can be used for selected test cases to guarantee proper UE behavior.

Recommended way forward for the first round:

* No need for further discussion

Companies’ comments 1st week:

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

**Issue 1-2-3: General approach for defining parameters of LBT models**

How should the parameters of DL LBT models be defined?

* Option 1 (Ericsson): The probability parameter PCCA is not a single fixed value in the model but a variable; the value(s) are configured to a relevant setting in each test. The specific PCCA values should be defined among cell-specific test parameters in each test case (the access probability can be different at different BS locations). The CCA model only specifies possible values for PCCA. The possible values for PCCA may be defined as
  + 1): The CCA model specifies a continuous range of possible values (one or more specific values from the range are configured in each test), e.g., PCCAÎ[0%, 100%], or
  + 2): The CCA model specifies a discrete set of possible values (one or more specific values from the set are chosen in each test).
* Option 2: Common parameters should be defined for all test cases.

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Agreement: Probabilistic DL LBT model

* The probability parameter PCCA is not a single fixed value in the model but a variable; the value(s) are configured to a relevant setting in each test.
* The specific PCCA values should be defined among cell-specific test parameters in each test case.
* The CCA model specifies a discrete set of possible values
  + One or more specific values from the set are chosen in each test
  + One value can be chosen as a default one and will apply to most of test cases
* The set of values
  + Option 1: {0%, 25%, 50%, 75%, 100%}
  + Other options are not precluded

Recommended way forward for the first round:

* No need for further discussion

Companies’ comments 1st week:

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| --- | --- |
| **Company** | **Comments** |
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**Issue 1-2-4: General approach for defining parameters of LBT models**

How should the parameters of DL LBT models be defined?

* Proposal 1 (Ericsson): At least at a low Es/Iot (e.g., Es/Iot<-6 dB), the probability of CCA success is higher for the semi-static channel occupancy compared to that for dynamic channel occupancy:
  + PCCA,semi-static,i > PCCA,dynamic,I, when Es/Iot<X,
  + PCCA,semi-static,i = PCCA,dynamic,I, when Es/Iot≥X,

where X=TBD (e.g., X=-6 dB)..

Recommended way forward for the first round:

* Discuss on the proposal above indicating if it can be agreed.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-2-5: DL LBT models parameter variation**

Should the parameters of DL LBT models be allowed to vary during a test?

* Option 1 (Ericsson): One probability value (per transmitter) applies at any time point during a test; one or more probability values can be configured in the entire test, one value PCCA,i per time interval Ti where i≥1 and the multiple time intervals (when i>1) do not overlap (e.g., PCCA=1.0 in T1 and PCCA=0.75 in T2).
* Option 2: DL LBT model parameters are kept constant during a test.

Recommended way forward for the first round:

* Discuss on the options above indicating which one can be agreed.

Companies’ comments 1st week:

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| --- | --- |
| **Company** | **Comments** |
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**Issue 1-2-6: UL LBT models parameter variation**

Should the parameters of UL LBT models be allowed to vary during a test?

* Option 1 (Ericsson): For UL CCA, the modelling approach is based on a probability PCCA\_UL,i of successful access during the corresponding time Ti of the time interval i.
* Option 2: UL LBT model should be kept constant during a test.

Recommended way forward for the first round:

* Discuss on the options above indicating which one can be agreed.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-2-7: LBT failure probability differences between UL and DL**

Should the probability of LBT failure for UL and DL be allowed to differ for a test or time instant within a test?

* Option 1 (Ericsson): Yes
* Option 2: No

Recommended way forward for the first round:

* Discuss on the options above indicating which one can be agreed.

Companies’ comments 1st week:

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| --- | --- |
| **Company** | **Comments** |
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### Sub-topic 1-3: DL LBT model during RRM tests

**Issue 1-3-1a: DL LBT model for LBE operation**

* Option 1 (Qualcomm, Nokia): DL-LBE-Model 1:
  + For LBE test cases in non DRX: RAN4 to adopt the following DL LBT model: 1) Define a probability equal to P1 for the transmission of the DRS in the first candidate position. 2) In case of LBT failure for transmission in the first candidate position, define a probability equal to P2 for the transmission in the second candidate position for a given SSB index.
* Option 2 (Ericsson): DL-LBE-Model 2:
  + At least at a low Es/Iot (e.g., Es/Iot<-6 dB), the probability of CCA success is higher for the semi-static channel occupancy compared to that for dynamic channel occupancy:
    - PCCA,semi-static,i > PCCA,dynamic,I, when Es/Iot<X,
    - PCCA,semi-static,i = PCCA,dynamic,I, when Es/Iot≥X,
  + where X=TBD (e.g., X=-6 dB).

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Agreement:

DL LBT model for LBE and FBE operation:

1) Define a probability equal to P1 for the transmission of the DRS in the first candidate position.

2) In case of LBT failure for transmission in the first candidate position, define a probability equal to P2 for the transmission in the second candidate position for a given SSB index.

Different probabilities can be used for LBE and FBE operation

Note: in case significant issues with this model are identified then the model with independent probabilities for LBT failure can be considered

Recommended way forward for the first round:

* No need for further discussion

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-3-1b: How to model different SSB candidate positions on DL-LBE-Model 2**

When considering the DL-LBE-Model 2, consider the following proposal on how to model the different SSB candidate positions:

* Proposal 1: The SSB shifting can be modelled by randomly selecting a candidate SSB location from the set of allowed candidate SSB locations. No need to model SSB shifting for non-congested channels.

Recommended way forward for the first round:

* This proposal relates to the second part of the model DL-LBE-Model 2 and it doesn’t relate to the model in Proposal 1 in issue 1-2-1a. Please comment on whether that proposal can be agreed.

Companies’ comments 1st week:

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| --- | --- |
| **Company** | **Comments** |
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**Issue 1-3-2: DL-LBE-Model 1 general idea for the definition of P1 and P2**

Should RAN4 define P1 and P2 such that the overall LBT failure rate is reflected to be lower than LTE-LAA

* Option 1 (Qualcomm): Yes
* Option 2: No

Recommended way forward for the first round:

* Discuss on the options above indicating which one can be agreed.

Companies’ comments 1st week:

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| --- | --- |
| **Company** | **Comments** |
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**Issue 1-3-3: DL-LBE-Model 1 parameters**

If Option 1 in Issue 1-3-1 is agreed, which parameters should be considered:

* Option 1 (Qualcomm): P1=0.75, P2<P1
  + Option 1a (Qualcomm): P1=0.75, P2=0.5
* Option 2 (Nokia): P1 = P2 = 0.75

Recommended way forward for the first round:

* Discuss on the options above indicating which one can be agreed.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**~~Issue 1-3-4: Should the common CCA model define a single probability value or a variable (set to actual values in test cases)? DL-LBE-Model 2 parameters~~**

* ~~Option 1 (Ericsson): The probability parameter P~~~~CCA~~ ~~is not a single fixed value in the specification; the value(s) are configured to a relevant setting in each test.~~
* ~~Option 2: Fixed P~~~~CCA~~~~.~~
  + ~~Moderator’s note: in case of choosing Option 2, please discuss which value should be used for P~~~~CCA~~~~.~~

~~Recommended way forward for the first round:~~

* ~~Discuss on the options above indicating which one can be agreed.~~

Moderator’s note: Issue 1-3-4 is already covered in Issue 1-2-3.

**Issue 1-3-5: DL LBT model for FBE operation**

* Option 1a (Qualcomm): DL-FBE Model 1:
  + DL LBT model, in FBE non-DRX test cases: RAN4 to define a DL LBT model that considers a probability of P for the transmission of each **DRS**. Only the first SSB candidate position for a given SSB index shall be considered in these tests.
* Option 1b ( Nokia): DL-FBE Model 1:
  + DL LBT model, in FBE non-DRX test cases: RAN4 to define a DL LBT model that considers a probability of P for the transmission of each **frame**. Only the first SSB candidate position for a given SSB index shall be considered in these tests.
* Option 2 (Ericsson): DL-FBE Model 2:
  + At least at a low Es/Iot (e.g., Es/Iot<-6 dB), the probability of CCA success is higher for the semi-static channel occupancy compared to that for dynamic channel occupancy:
    - PCCA,semi-static,i > PCCA,dynamic,I, when Es/Iot<X,
    - PCCA,semi-static,i = PCCA,dynamic,I, when Es/Iot≥X,
    - where X=TBD (e.g., X=-6 dB).
  + For the semi-static channel access, there is no need to configure SSB shift within the discovery burst transmission window.

Recommended way forward for the first round:

* Discuss on the options above indicating which one can be agreed.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-3-6: DL-FBE-Model 1 general idea for the definition of the SSB transmission probability**

If Option 1 in Issue 1-3-5 is agreed, should RAN4 define a SSB transmission probability in FBE to be higher than SSB transmission probability in LBE: P(FBE) > P(LBE) = P1 + (1-P1)\*P2?

* Option 1 (Qualcomm): yes
* Option 2: No

Recommended way forward for the first round:

* Discuss on the options above indicating which one can be agreed.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-3-7: DL-FBE-Model 1 SSB transmission probability**

If Option 1 in Issue 1-3-5 is agreed, which parameters should be considered:

* Option 1 (Qualcomm): Define P(FBE) = 0.95
* Option 2 (Nokia): P(FBE) = 0.9
* Option 3 (Ericsson): Defined among cell-specific test parameters in each test cases (the access probability can be different at different BS locations).

Recommended way forward for the first round:

* Discuss on the options above indicating which one can be agreed.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**~~Issue 1-3-8: DL-FBE-Model 2 parameters~~**

* ~~Option 1 (Ericsson): The probability parameter P~~~~CCA~~ ~~is not a single fixed value in the specification; the value(s) are configured to a relevant setting in each test.~~
* ~~Option 2: Fixed P~~~~CCA~~~~.~~
  + ~~Moderator Note: in case of choosing Option 2, please discuss which value should be used.~~

~~Recommended way forward for the first round:~~

* ~~Discuss on the options above indicating which one can be agreed.~~

Moderator’s note: Issue 1-3-8 is already covered in Issue 1-2-3.

**Issue 1-3-9: DL LBT model when DRX is in use**

Considering the following options for DL LBT model when DRX is in use:

* Option 1 (MediaTek): For test cases with DRX in use, the LBT can be modelled as either all SMTCs are with available SSBs or all SMTCs are with no SSBs available during one DRX cycle.
* Other options?

Recommended way forward for the first round:

* Discuss on the option above indicating if it can be agreed or if another option should be considered.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-3-10: General approach in exceeding Lmax values during RRM tests**

Considering the approach when exceeding Lmax during the RRM tests, please consider the following options:

* Option 1 (Qualcomm): Avoid designing test cases with exceeding max allowed LBT failures for NR-U.
* Option 2 (Huawei, ZTE): For the test cases no particular behaviour to be verified, exceeding Lmax shall be avoided.

Recommended way forward for the first round:

* Discuss on the options above indicating which one can be agreed.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-3-11: List of test cases in which exceeding Lmax values may be considered**

As a part of the discussion, please fill-in the table indicating which of the following test cases should or should not exceed Lmax

* Proposal 1 (Huawei): Consider having particular test cases to verify the correct UE behaviour for the following cases:
  + Initiating the measurements on neighbour upon exceeding Mp and Mq in Cell reselection
  + Initiate cell selection procedures for the selected PLMN upon L1 exceeding L1,max in RRC release with redirection
  + Report RSRP\_0 upon L1 exceeding L1,max for L1-RSRP measurement
* Proposal 2 (MediaTek): For SCell activation in NR-U, exceeding Lmax should be avoided.
* Proposal 3 (MediaTek): For SFTD measurement NR-U, exceeding Lmax should be avoided.
* Proposal 4 (MediaTek): For intra-frequency and inter- frequency measurement for NR-U, exceeding LPSS/SSS,gaps,max should be avoided.
* Proposal 5 (ZTE): For the cell-reselection test cases, Mp consecutive DRX cycles with LBT failures of the serving cell should be also tested.

Recommended way forward for the first round:

* Discuss on the proposals above indicating which ones can be agreed considering that the proposals are not mutually exclusive.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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### Sub-topic 1-4: UL LBT model during RRM tests

**Issue 1-4-1: Need for an UL LBT model**

Should RAN4 choose one typical test case to check this functionality?

* Option 1 (Nokia): Yes, RAN4 can choose one typical test case to check this functionality.
* Option 2: No, the UL LBT functionality should be tested in all requirements that depend on UL LBT failures.

Recommended way forward for the first round:

* Discuss on the options above indicating which one can be agreed.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-4-2: UL LBT model configuration**

About the LBT model configuration, please consider the following option:

* Option 1 (Nokia): If RAN4 agrees to test UL LBT in the RRM tests, an UL LBT type configuration needs to be defined.
* Option 2 (Ericsson): basic principles:
  + For UL CCA, the modelling approach is based on a probability PCCA\_UL,i of successful access during the corresponding time Ti of the time interval i.
  + Prior to each UL transmission burst within a time interval i of the test:
    - Generate a uniform random variable *p* from the range [0, 1].
    - If p<PCCA\_UL,i, then the energy generated by the test system in the corresponding portion of UL slot is equal to or below the energy detection threshold [TBD]; otherwise the energy generated by the test system in the portion of UL slot is above the energy detection threshold [TBD].
  + Consistent UL CCA failures are modelled by means of a low PCCA\_UL,i (e.g., 0%) during the relevant time interval Ti within the test.
  + In the same time interval i, PCCA\_UL,I and PCCA\_DL,i can have different values.

Recommended way forward for the first round:

* Discuss on the option above indicating if it can be agreed.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-4-3: UL LBT model**

The following model is proposed as an option for the UL LBT model:

* Option 1 (Qualcomm): baseline UL LBT model as:
  + Use DL FBE model to transmit a full band/LBT BW OCNG noise pattern in one or more of the scheduled/configured UL resource with probability P.
    - P is FFS
  + The test equipment keeps a count of the number of UL LBT failures it may cause.
  + When the OCNG signal is transmitted, the test equipment does not monitor the UL resource in which the OCNG is transmitted.
  + When the OCNG signal is not transmitted, the test equipment monitors the UL resource for the desired UL signal.
  + Based on whether it receives the signal or not, the test equipment declares the test case pass/fail
* Option 2 (Ericsson): basic principles:
  + For UL CCA, the modelling approach is based on a probability PCCA\_UL,i of successful access during the corresponding time Ti of the time interval i.
  + Prior to each UL transmission burst within a time interval i of the test:
    - Generate a uniform random variable *p* from the range [0, 1].
    - If p<PCCA\_UL,i, then the energy generated by the test system in the corresponding portion of UL slot is equal to or below the energy detection threshold [TBD]; otherwise the energy generated by the test system in the portion of UL slot is above the energy detection threshold [TBD].
  + Consistent UL CCA failures are modelled by means of a low PCCA\_UL,i (e.g., 0%) during the relevant time interval Ti within the test.
  + In the same time interval i, PCCA\_UL,I and PCCA\_DL,i can have different values.
* Other options

Recommended way forward for the first round:

* Discuss on the option above indicating if it can be agreed or if another option should be considered.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-4-4: PRACH configuration in test-cases subject to UL LBT**

The following option is proposed for the PRACH configuration when using an UL LBT mode:

* Option 1 (Qualcomm): Test equipment to configure preambleReceivedTargetPower for msg1 and msgA-PreambleReceivedTargetPower for msgA to the highest value for UL LBT test cases.
* Other options

Recommended way forward for the first round:

* Discuss on the option above indicating if it can be agreed or if another option should be considered.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-4-5: Which test cases should include additional delay in acquiring PRACH resource due to UL LBT failures**

As a part of the discussion, please comment on which of the following proposals related to that topic can be agreed:

* Proposal 1 (Qualcomm): RAN4 to define one typical test case to test – Additional delay in acquiring PRACH resource due to UL LBT failures for the following requirements:
  + Handover to target cell using CCA
  + RRC re-establishment using CCA
  + FFS: Random access
  + RRC connection release with re-direction
  + BWP switch delay on consistent UL LBT recovery
* Proposal 2 (Qualcomm): Suggest RAN4 to test – Additional delay in acquiring PRACH resource due to UL LBT failures in the following requirement:
  + Handover to target cell using CCA
* Proposal 3 (Qualcomm): (Based on proposal 2) Suggest RAN4 to not test – Additional delay in acquiring PRACH resource due to UL LBT failures in the following requirements:
  + RRC re-establishment using CCA
  + FFS: Random access
  + RRC connection release with re-direction
  + BWP switch delay on consistent UL LBT recovery

Recommended way forward for the first round:

* Discuss if the proposals above can be agreed, and what should be added/removed from the test case list.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-4-6: Which test cases should include UL LBT failures**

As a part of the discussion, please comment on the following proposal related to test cases to include UL LBT failures:

* Proposal 1 (Qualcomm): RAN4 to discuss whether to include UL LBT failures for the following cases:
  + SCell activation
    - Additional delay in transmission of CSI reporting due to CCA failure
  + Event triggered measurement reporting delay
  + Additional delay due to UL LBT failure not defined
    - FFS: Assume it similar to above-mentioned SCell activation case
  + MAC CE based TCI state switch delay
    - Delay in sending HARQ feedback transmissions
* Proposal 2 (Nokia):

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| --- | --- |
| Clause with UL LBT failure impact | Comments |
| 6.1B NR Handover | UL LBT failure is considered in the time uncertainty for acquiring the first available PRACH occasion |
| 6.2.1A RRC re-establishment with CCA delay requirement | The number of consecutive SSB to PRACH occasions not available due to UL LBT failure is considered in the delay uncertainty |
| 6.2.3.2.3 RRC connection release with redirection to NR carrier subject to CCA | The number of consecutive SSB to PRACH occasions not available due to UL LBT failure is considered in the delay uncertainty |
| 8.3A.2 SCell Activation and Deactivation in carriers with CCA | UL LBT failures are considered in THARQ. |
| 8.6.4 BWP switch delay on consistent UL LBT recovery | The consistent UL LBT detection / recovery mechanism will trigger the active BWP switch. |
| 8.10A Active TCI state switching delay with CCA | UL LBT failures are considered in THARQ. |
| 9.2A NR Intra-frequency measurements with CCA | UL LBT failures are considered in the reporting delay |
| 9.3A NR Inter-frequency measurements with CCA | UL LBT failures are considered in the reporting delay |

Recommended way forward for the first round:

* Discuss if the proposal can be agreed, and what should be added/removed from the test case list.

Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 1-4-7: Consistent UL CCA failures**

Should consistent UL CCA failures be modelled and how?

* Option 1 (Ericsson): Consistent UL CCA failures are modelled by means of a low PCCA\_UL,i (e.g., 0%) during the relevant time interval Ti within the test.

Recommended way forward for the first round:

* Discuss on the option above indicating if it can be agreed. Please consider relation to Issue 1-2-6 when answering here.

Companies’ comments 1st week:

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

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

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| [**R4-2101431**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101431.zip)  Ericsson  draftCR | **Draft CR: RMC for NR-U test cases** |
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| [**R4-2102528**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102528.zip)  Ericsson  draftCR | **CCA model in NR-U test cases** |
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## Summary for 1st round

### Open issues

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

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|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

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|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

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

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

## Discussion on 2nd round (if applicable)

Please continue discussion in open issues summary, after the 2nd week/round delimiter.  
Please also continue the TP/CR discussions above.

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #2: NR-U RRM test cases

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

## Companies’ contributions summary

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| **AI 7.1.6.3.1, Test cases, General** | | |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| [**R4-2100773**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100773.zip)  MediaTek inc. | Proposal 1: A.9 is also used for the test cases for when Pcell is in FR1 and no SCell under CCA has been configured, e.g. inter-frequency measurement under CCA. | Issue 3-2-1 |
| Proposal 2: For cell reselection, tests for “4. NR-U -> NR(FR1)” and “5. NR(FR1) -> NR-U” are not necessary while the case of “Cell reselection to FR1 inter-frequency NR when CCA is used on the serving and target cell” has been tested. | Issue 2-1-1 |
| Proposal 3: For cell reselection, tests for “6. NR-U - > E-UTRAN (FDD,TDD)” are not necessary while the case of “Cell reselection to FR1 intra-/inter-frequency NR when CCA is used on the serving and target cell” has been tested. | Issue 2-1-1 |
| Proposal 4: For handover, tests for target cells without CCA (case 8, 9, 10) are not necessary while UE has passed R15 tests. | Issue 2-1-2 |
| Proposal 5: For inter-frequency handover, tests for “from NR to NR-U (case 6, 7)” are not necessary while UE has passed the tests for “from NR-U to NR-U (case 3, 5)”. | Issue 2-1-2 |
| Proposal 6: For inter-frequency handover, only to test either known cell or unknown cell. | Issue 2-1-2 |
| Proposal 7: Tests for “Redirection from NR in FR1 with CCA to NR in FR1 with CCA” are not necessary, while UE has passed the tests of “Redirection from NR in FR1 to NR in FR1 with CCA”. | Issue 2-1-5 |
| Proposal 8: Legacy DCI/timer/RRC-based BWP switching tests on NR-U cell are not necessary while UE has passed the corresponding R15 tests. | Issue 2-1-7 |
| Proposal 9: Not to specify test cases for unknown case PSCell addition/release delay. | Issue 2-1-8 |
| Proposal 10: Test cases for the interruption as the legacy requirement are not necessary, while UE has passed the lacy tests. | Issue 2-1-10 |
| Proposal 11: For Intra-frequency measurement accuracy/procedure test cases, test configuration of “NR-U SCC, with NR-U PCC” is not needed while it can be replaced by “NR-U SCC, with NR PCC (FR1)” and “NR-U PCC”. | Issue 2-1-11, Issue 2-1-14 |
| Proposal 12: For Intra-frequency measurement accuracy/procedure test cases, test configuration of “NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)” is not needed while it can be replaced by “NR-U PSCC, with E-UTRAN PCC (FDD,TDD)”. | Issue 2-1-11, Issue 2-1-14 |
| Proposal 13: Test cases for SS-RSRQ/SS-SINR measurement accuracy under CCA are not necessary. | Issue 2-1-14 |
| [**R4-2100833**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100833.zip)  ZTE Corporation | Observation 1: Procedures for 2-step RACH under NR-U have already been captured in RAN2 specifications. | - |
| Proposal 1: RAN4 shall define in Rel-16 test cases for 2-step RA in NR-U as it is already a supported feature in R16. | Issue 2-1-4 |
| [**R4-2101134**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101134.zip)  Nokia | Proposal 1: RAN4 to define cell-reselection test cases for: NR(FR1) -> NR-U, NR-U -> NR(FR1) and NR-U - > E-UTRAN (FDD,TDD). | Issue 2-1-1 |
| Proposal 2: RAN4 to define contention based and non-contention based test cases for at least 4 step RA type in NR-U. | Issue 2-1-4 |
| Proposal 3: RAN4 to define inter-frequency measurement procedure test cases also for SS-RSRQ and SS-SINR measurements. | Issue 2-1-12 |
| Proposal 4: RAN4 to define inter-frequency measurement accuracy test cases also for SS-RSRQ and SS-SINR measurements. | Issue 2-1-15 |
| [**R4-2102524**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102524.zip)  Ericsson | Return to;  Moderator’s note: This paper proposes a list of test cases resembling the Table 2-1-2 in section 2.2.1. The proposals from this paper were reflected in issues of Sub-topic 2-1 and the list of test cases will be updated as a result of the discussion during this meeting. | Sub-topic 2-1 |

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| **AI 7.1.6.3.2, Test cases, RRC IDLE, cell re-selection** | | |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| [**R4-2100839**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100839.zip)  ZTE Corporation | Proposal 1: RAN4 shall define test cases for cases 1-6 under cell re-selection. | Issue 2-1-1 |
| [**R4-2102244**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102244.zip)  Ericsson | Observation #1: Not possible to verify the requirement that UE shall trigger cell detection on all configured carriers after two unsuccessful measurement attempts. | - |
| Observation #2: Not possible to verify the requirement on minimum spacing between two measurements used in the filtering. | - |
| Proposal #1: RAN4 to agree on test cases for following types of cell reselections:   * NR-U → E-UTRAN, * NR-U → NR (FR1) * NR (FR1) →o NR-U | Issue 2-1-1 |
| Proposal #2: The standalone cell reselection test cases are defined based on the test configurations shown in Table 1, Table 2 and Table 3. | Issue 2-2-1 |
| Proposal #3: Cell specific test parameters should contain following new or modified parameters to account for the LBT impact:   * DL CCA model * UL CCA model * DBT Window Configuration * DL CCA probability PCCA\_DL * UL CCA probability PCCA\_UL * New RMCs | Issue 2-2-2 |
| Proposal #4: Reselection test shall verify that maximum allowed CCA failures for Md, Mm and Me. | Issue 2-2-3 |

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| **AI 7.1.6.3.3, Test cases, HO delay and interruptions** | | |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| [**R4-2100840**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100840.zip)  ZTE Corporation | Proposal 1: Define test cases for all scenarios corresponding to core requirements for handover in NR-U. | Issue 2-1-2 |
| [**R4-2102242**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102242.zip)  Ericsson | Proposal #1: RAN4 to agree on test cases for following types of handovers:   * NR-U to NR-U, inter-frequency known cell * NR (FR1) to NR-U for known and unknown cases * NR-U to NR (FR1) for known and unknown cases * NR-U to E-UTRAN * E-UTRAN to NR-U | Issue 2-1-2 |
| Proposal #2: Handover test case configurations are aligned with the configurations used in IDLE mode cell reselection test cases. | Issue 2-3-1 |
| Proposal #3: Cell specific test parameters should contain following new or modified parameters to account for the LBT impact:   * DL CCA model * UL CCA model * DBT Window Configuration * DL CCA probability PCCA\_DL * UL CCA probability PCCA\_UL * New RMCs | Issue 2-3-2 |
| Proposal #4: Handover delay verified in test requirements is expressed using a formula containing L1, L1’, L2 and L3 depending on the type of test case, and the total delay is limited by T304 timer. | Issue 2-3-3 |

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| **AI 7.1.6.3.4, Test cases, RRC re-establishment** | | |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| [**R4-2102647**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102647.zip)  Ericsson | Proposal 1: At least the following NR-U to NR-U RRC re-establishment tests to verify core requirements in clause 6.2.1A, TS 38.133, are defined:   * TC1: Intra-frequency RRC Re-establishment in FR1 with known target cell subject to CCA * TC2: Inter-frequency RRC Re-establishment in FR1 with unknown target cell subject to CCA * TC3: Intra-frequency RRC Re-establishment in FR1 with unknown target cell subject to CCA | Issue 2-3-1 |
| Proposal 2: NR-U to NR-U RRC re-establishment tests are defined for the following configuration related to SSB SCS and BW for both serving and target cells:   |  |  | | --- | --- | | Configuration | Description | | 1 | With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | Issue 2-3-2 |
| Proposal 3: NR-U to NR-U RRC re-establishment tests are defined for the following LBT configuration/setting:   1. Serving cell: PCCA\_UL=1 and PCCA\_DL=1 in all test times  * Target cell: PCCA\_UL=1 and PCCA\_DL< 1 (e.g. 0.5) in all test times | Issue 2-3-3 |

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| **AI 7.1.6.3.5, Test cases, RRC connection release with re-direction** | | |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| **[R4-2100842](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100842.zip)**  ZTE Corporation | Proposal 1: Define test cases for the scenario of NR-U to NR-U corresponding to core requirements for RRC Connection Release with redirection. | Issue 2-1-5 |
| [**R4-2102648**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102648.zip)  Ericsson | Proposal 1: At least the following NR-U to NR-U RRC connection release with redirection test to verify core requirements in clause 6.2.3.2.3, TS 38.133, is defined:   * TC1: Redirection from NR with CCA in FR1 to NR in CCA in FR1 | Issue 2-5-1 |
|  | Proposal 2: NR-U to NR-U RRC connection release with redirection tests are defined for the following configuration related to SSB SCS and BW for both serving and target cells:   |  |  | | --- | --- | | Configuration | Description | | 1 | With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | Issue 2-5-2 |
|  | Proposal 3: NR-U to NR-U RRC connection release with redirection test is defined for the following LBT configuration/setting:   * Serving cell: PCCA\_UL=1 and PCCA\_DL=1 in all test times * Target cell: PCCA\_UL=1 and PCCA\_DL< 1 (e.g. 0.75) in all test times | Issue 2-5-3 |
|  | Proposal 4: In NR-U to NR-U RRC connection release with redirection test ensure that number of DL LBT failures (L1) in target cell does not exceed L1,max ; L1,max is defined in Table 6.2.3.2.3-1, TS 38.133. | Issue 2-5-3 |

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| **AI 7.1.6.3.6, Test cases, Timing** | | |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| [**R4-2100843**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100843.zip)  ZTE Corporation | Proposal 1: Define test cases on TA only for NR-U PCell. | Issue 2-1-6 |
| [**R4-2102649**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102649.zip)  Ericsson | Proposal 1: At least the following UE transmit timing tests to verify core requirements in clause 7.1, TS 38.133, are defined:   * TC1: UE Transmit Timing Test with NR PSCell subject to CCA in EN-DC * TC2: UE Transmit Timing Test with NR PCell subject to CCA in SA | Issue 2-6-1 |
| Proposal 2: The UE transmit timing tests are defined for the following configuration related to SSB SCS and BW in EN-DC and SA:  Table 1: Configuration related to SSB SCS and BW in UE tranmit timing tests in EN-DC   |  |  | | --- | --- | | Config | Description | | 1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz | | 2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz | | Note 1: The UE is only required to be tested in one of the supported test configurations. | |   Table 2: Configuration related to SSB SCS and BW in UE transmit timing tests in SA   |  |  | | --- | --- | | Configuration | Description | | 1 | With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | Issue 2-6-1 |
| Proposal 3: UE transmit timing tests are defined for the following LBT configuration/setting in SpCell:   * PCCA\_UL=1 and PCCA\_DL < 1 depending on SSB periodicity (e.g. 0.5% for TSSB=20 ms) in all test times | Issue 2-6-2 |
| Proposal 4: At least the following UE timing advance adjustment accuracy tests to verify core requirements in clause 7.3, TS 38.133, are defined. The tests are applicale for UE supporting only FR1 bands subject to CCA.   * TC1: UE Transmit Timing Test with NR PSCell subject to CCA in EN-DC * TC2: UE Transmit Timing Test with NR PCell subject to CCA in SA | Issue 2-1-6 |
| Proposal 5: The timing advance adjustment accuracy tests are defined for the following configuration related to SSB SCS and BW in EN-DC and SA:  Table 1: Configuration related to SSB SCS and BW in UE timing advance tests in EN-DC   |  |  | | --- | --- | | Config | Description | | 1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz | | 2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz | | Note 1: The UE is only required to be tested in one of the supported test configurations. | |   Table 2: Configuration related to SSB SCS and BW in UE advance timing tests in SA   |  |  | | --- | --- | | Configuration | Description | | 1 | With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | Issue 2-6-3 |
| Proposal 6: UE timing advance adjustment accuracy tests are defined for the following LBT configuration/setting in SpCell:   * PCCA\_UL=1 and PCCA\_DL =1 in all test times | Issue 2-6-4 |

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| **AI 7.1.6.3.7, Test cases, BWP switching delay and interruptions** | | |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| [**R4-2100841**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100841.zip)  ZTE Corporation | Proposal 1: The DCI/timer/RRC-based BWP switching can be tested only by UEs supporting NR-U SA mode. The other test cases can be de-prioritized. | Issue 2-1-7 |
| [**R4-2102651**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102651.zip)  Ericsson | Proposal 1: At least the following tests to verify BWP switching requirements under consistent UL LBT failure in clause 8.6.4, TS 38.133, are defined:   1. TC1: UL active BWP switch delay with consistent UL LBT failure on PSCell subject to UL CCA in EN-DC 2. TC2: UL active BWP switch delay with consistent UL LBT failure on PCell subject to UL CCA in SA | Issue 2-1-7 |
| Proposal 2: The tests for BWP switching under consistent UL failure are defined for the following configuration related to SSB SCS and BW in EN-DC and SA:  Table 1: Configuration related to SSB SCS and BW in EN-DC   |  |  | | --- | --- | | Config | Description | | 1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz | | 2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz | | Note 1: The UE is only required to be tested in one of the supported test configurations. | |   Table 2: Configuration related to SSB SCS and BW iin SA   |  |  | | --- | --- | | Configuration | Description | | 1 | With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | Issue 2-7-1 |
| Proposal 3: The tests on BWP switching under consistent UL failure are defined for the following LBT configuration/setting in SpCell:  Table 3: LBT settings in UL and DL BWPs in SpCell   |  |  |  | | --- | --- | --- | | Active BWP in SpCell | PCCA\_UL | PCCA\_DL | | UL active BWP before active BWP switching (UL BWP-1) | 0 | 1 | | UL active BWP after active BWP switching (UL BWP-2) | 1 | 1 | | DL active BWP before active BWP switching (DL BWP-1) | 1 | 1 | | DL active BWP after active BWP switching (DL BWP-2) | 1 | 1 | | Issue 2-7-2 |
| Proposal 4: Periodic SRS is configured in the SpCell to enable the UE to detect consistent UL LBT failure in the SpCell. | Issue 2-7-2 |

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| **AI 7.1.6.3.8, Test cases, PSCell addition/release** | | |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| [**R4-2100838**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100838.zip)  ZTE Corporation | Proposal 1: When defining test cases for features in NR-U, R15 UE test cases shall be taken as baseline. | Issue 2-1-8 |
| Proposal 2: Define test cases for known cells in PSCell addition. | Issue 2-1-8 |
| [**R4-2102370**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102370.zip)  Ericsson | Proposal 1: In Rel-16, test case for NR-U PSCell addition and release is ony introduced for the known cell case. | Issue 2-1-8 |
| Proposal 2: In Rel-16 NR-U, test cases for active TCI state switching are introduced for the following cases:   1. EN-DC, NR PSCell under CCA, known TCI state, MAC-based triggering 2. EN-DC, NR PSCell under CCA, known TCI state, RRC-based triggering 3. NR SA, PCell under CCA, known TCI state, MAC-based triggering 4. NR SA, PCell under CCA, known TCI state, RRC-based triggering 5. NR SA, SCell under CCA, known TCI state, MAC-based triggering 6. NR SA, SCell under CCA, known TCI state, RRC-based triggering | Issue 2-8-1 |
| Proposal 3: It shall be investigated whether some of the test cases for active TCI state switching are redundant for UE supporting both EN-DC and NR SA scenarios for NR-U. | Issue 2-1-9 |

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| **AI 7.1.6.3.9, Test cases, Interruptions** | | |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| [**R4-2102368**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102368.zip)  Ericsson | Proposal 1 : During interruption tests, a deactivated Scell measurement cycle of 160ms is used | Issue 2-9-1 |
| Proposal 2 : LBT model is configured in interruption tests, with a channel access success probability P=[0.75] | Issue 2-9-2 |
| Proposal 3 : The interruption requirements are verified in tests with the following phases  T1 : UE is configured with PCell and PScell if applicable, and measures/reports candidate Scell such that it will be known in T2  T2 : Scell is added, interruption requirement verified  T3 : Scell is activated, interruption requirement verified  T4 : Scell is deactivated, interruption requirement verified  T5 : Deactivated Scell measurement interruption requirement is verified  T6 : Scell is released, interruption requirement verified | Issue 2-9-3 |
| Proposal 4: Define test cases for SCell (de)activation of known SCell in NR-U for both measurement cycles 160 and 320ms. | Issue 2-10-1 |
| Proposal 5: Test cases for SCell (de)activation testing with NR PCC in FR1 with SCC under CCA are modeled with only DL CCA in SCell. | Issue 2-10-2 |
| Proposal 6: Test cases for SCell (de)activation testing with NR PCC under CCA with SCC under CCA are modeled with DL CCA in SCell and UL CCA in PCell. | Issue 2-10-2 |
| Proposal 7: Test cases for SCell (de)activation testing with NR PSCC under CCA with SCC under CCA are modeled with DL CCA in SCell and UL CCA in PSCell. | Issue 2-10-2 |
| Proposal 8: For UL CCA model in SCell (de)activation testing, PCCA\_UL = [0.75] is used for all time intervals. | Issue 2-10-2 |
| Proposal 9: For DL CCA model in SCell (de)activation testing, PCCA\_DL = [0.75] is used for all time intervals. | Issue 2-10-2 |

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| **AI 7.1.6.3.10, Test cases, RLM** | | |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| [**R4-2102529**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102529.zip)  Ericsson | Proposal 1: the following sections for NR-U RLM are added: | Issue 2-11-1 |
| Proposal 2: For RLM out-of-sync, Test 1 and Test 2 (with different SNR combinations) are developed for testing both requirements. | Issue 2-11-2 |
| Proposal 3: For RLM out-of-sync, Test 1 SNRs: (1 dB, [-7 dB], [-15 dB]). | Issue 2-11-2 |
| Proposal 4: For RLM out-of-sync, Test 2 SNRs: (1 dB, [-3 dB], [-7 dB]). | Issue 2-11-2 |
| Proposal 5: Test configurations for NR PCell (Scenario C) and NR PSCell (Scenario B) in all NR-U RLM test cases:   * <TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz> Note: in Scenario B, the above configuration is further combined with LTE FDD and LTE TDD, resulting in two configurations in test cases for Scenario B. | Issue 2-11-3 |
| Proposal 6: DL CCA model for RLM in-sync:   * T1: DL PCCA=1.0, * T2-T5: DL PCCA=TBD. | Issue 2-11-4 |
| Proposal 7: UL CCA model for RLM in-sync: UL PCCA=1.0 in T1-T5. | Issue 2-11-4 |
| Proposal 8: DL CCA model for RLM out-of-sync:   * T1: DL PCCA=1.0, * T2, T3: DL PCCA=TBD. | Issue 2-11-4 |
| Proposal 9: UL CCA model for RLM out-of-sync: UL PCCA=1.0 in T1-T3. | Issue 2-11-4 |
| Proposal 10: Use PCCA=0.75 and PCCA=0.5 in RLM out-of-sync test cases. | Issue 2-11-5 |
| Proposal 11: Use PCCA=0.6 in RLM in-sync test cases. | Issue 2-11-5 |
| Proposal 12: For NR-U, all relevant test cases (e.g., RLM test cases) have to also cover 4 RX UEs (similar to legacy Rel-16 NR). | Issue 2-11-5 |

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| **AI 7.1.6.3.11, Test cases, Beam management** | | |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| [**R4-2101432**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101432.zip)  Ericsson | Proposal 1: Define the following BFD and LR test cases for NR-U:  A.10.3.4.1 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in non-DRX mode  A.10.3.4.2 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in DRX mode  A.11.4.4.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode  A.11.4.4.2 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode | Issue 2-12-1 |
| Proposal 2: Define the test cases with 1) BFD-RS SSB Es/Iot ≥ -7 dB and 2) BFD-RS SSB Es/Iot < -7 dB to verify the different evaluation period. | Issue 2-12-2 |
| Proposal 3: For the case with BFD-RS SSB Es/Iot < -7 dB, set SSB Es/Iot = -3dB in T2 and set SSB Es/Iot = -12dB in T2/T2/T3, by reusing the test cases defined in Rel-15. | Issue 2-12-2 |
| Proposal 4: For the case with BFD-RS SSB Es/Iot ≥ -7 dB, set SSB Es/Iot = [-1]dB in T2 and set SSB Es/Iot = [-7]dB in T2/T2/T3. | Issue 2-12-2 |
| Proposal 5: SNR test points for BFD and LR tests with CCA should be adjusted for UEs capable of 4Rx, i.e., set SNR 3dB lower than the tests for 2Rx UEs. | Issue 2-12-3 |
| Proposal 6: BFD and LR tests specify the DL/UL CCA success rate given by PCCA\_DL and PCCA\_UL. | Issue 2-12-3 |
| Proposal 7: BFD and LR tests set different PCCA according to the assumed channel access mode, i.e., LBE and FBE. Set higher DL CCA success rate (e.g. 0.75) for FBE and lower DL CCA success rate (e.g. 0.5) for LBE during the tests. | Issue 2-12-3 |
| Proposal 8: Assume no UL CCA failure during the BFD and LR tests, that is, PCCA\_UL=1.0. | Issue 2-12-3 |
| Proposal 9: Define the following L1-RSRP measurement procedure test cases for NR-U:  A.9.3.3.1 SSB based L1-RSRP measurement when DRX is not used (SA SCell with NR PCell)  A.9.3.3.2 SSB based L1-RSRP measurement when DRX is used (SA SCell with NR PCell)  A.10.4.3.1 SSB based L1-RSRP measurement on PSCC when DRX is not used (EN-DC PSCell)  A.10.4.3.2 SSB based L1-RSRP measurement on PSCC when DRX is used (EN-DC PSCell)  A.10.4.3.3 SSB based L1-RSRP measurement on SCC when DRX is not used (EN-DC SCell with LTE PCell and NR-U PSCell)  A.10.4.3.4 SSB based L1-RSRP measurement on SCC when DRX is used (EN-DC SCell with LTE PCell and NR-U PSCell)  A.11.5.4.1 SSB based L1-RSRP measurement when DRX is not used (SA PCell)  A.11.5.4.2 SSB based L1-RSRP measurement when DRX is used (SA PCell)  A.11.5.4.3 SSB based L1-RSRP measurement on SCC when DRX is not used (SA SCell with NR-U PCell)  A.11.5.4.4 SSB based L1-RSRP measurement on SCC when DRX is used (SA SCell with NR-U PCell) | Issue 2-12-4 |
| Proposal 10: For L1-RSRP measurement procedure tests with CCA, reuse the same Es/Ioc as Rel-15 tests. | Issue 2-12-5 |
| Proposal 11: For NR-U L1-RSRP measurement procedure tests with DRX and non-DRX cases, RAN4 sets the same T1/T2 and reporting timing requirements as Rel-15 test, that is,  T1=5s, T2=1s.  TReport=80 slots (Periodic L1-RSRP reporting with PUCCH)  The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement. | Issue 2-12-5 |
| Proposal 12: L1-RSRP measurement procedure tests specify the DL/UL CCA success rate given by PCCA\_DL and PCCA\_UL. | Issue 2-12-6 |
| Proposal 13: L1-RSRP measurement procedure tests set PCCA\_DL < 1 (e.g., 0.75). Set the common PCCA\_DL applicable for both FBE and LBE. | Issue 2-12-6 |
| Proposal 14: RAN4 discuss whether L1-RSRP measurement procedure tests consider UL CCA failure or not during the tests. If not considered, set PCCA\_UL=1.0 in the test cases. | Issue 2-12-6 |

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| **AI 7.1.6.3.12, Test cases, Intra-frequency, inter-frequency and inter-RAT measurement requirements** | | |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| [**R4-2100836**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100836.zip)  ZTE Corporation | Proposal 1: When defining test cases for features in NR-U, R15 UE test cases shall be taken as baseline. | Issue 2-1-12 |
| Proposal 2: RAN4 shall define test cases for SS-SINR and SS-RSRQ for inter-frequency and inter-RAT measurements. | Issue 2-1-12 |
| [**R4-2102531**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102531.zip)  Ericsson | Observation 1: RAN4 has already agreed to define test cases for intra-frequency and inter-RAT SS-RSRQ and SS-SINR, but inter-frequency test cases for SS-RSRQ and SS-SINR are still FFS. | - |
| Proposal 1: RAN4 specifies test cases for inter-frequency SS-RSRQ and SS-SINR measurements. | Issue 2-1-12 |
| Proposal 2: RAN4 specifies test cases for inter-frequency SS-RSRQ and SS-SINR measurements accuracy. | Issue 2-1-14 |
| Proposal 3: The inter-frequency SS-RSRQ and SS-SINR measurement and measurement test cases for NR-U include:   |  | | --- | | Inter-frequency SS-RSRQ, SS-SINR on: | |  NR-U inter-frequency, with NR PCC (FR1) | |  NR-U inter-frequency, with NR-U PCC | |  NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | |  NR (FR1) inter-frequency, with NR-U PCC | |  NR (FR1) inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) | | Issue 2-1-12 |
| Proposal 4: RAN4 defines test cases for E-UTRA-NR-U RSRP/RSRQ measurements. | Issue 2-1-12 |
| Proposal 5: RAN4 defines test cases for E-UTRA-NR-U RSRP/RSRQ measurements accuracy. | Issue 2-1-14 |
| Proposal 6: The following test cases are defined for NR-U intra-frequency RRM measurements for PCC, SCC, and PSCC:   * SA event triggered reporting test without gaps under non-DRX, * SA event triggered reporting test without gaps under DRX, * SA event triggered reporting test with per-UE gaps under non-DRX, * SA event triggered reporting test with per-UE gaps under DRX. | Issue 2-13-1 |
| Proposal 7: Each test case (among RRM measurements test cases) is conducted for three A3 measurement quantities: SS-RSRP, SS-RSRQ, SS-SINR. | Issue 2-13-1 |
| Proposal 8: Test configurations for RRM measurements:  Scenario A:   |  |  | | --- | --- | | Configuration | Description | | 1 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | 2 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | 3 | Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | NOTE: The UE is only required to be tested in one of the supported test configurations. | |   Scenario B:   |  |  | | --- | --- | | Configuration | Description | | 1 | LTE FDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | 2 | LTE TDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | NOTE: The UE is only required to be tested in one of the supported test configurations. | |   Scenario C:   |  |  | | --- | --- | | Configuration | Description | | 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |   Inter-RAT E-UTRAN-NR-U:   |  |  | | --- | --- | | Configuration | Description | | 1 | LTE FDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | 2 | LTE TDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | NOTE: The UE is only required to be tested in one of the supported test configurations. | | | Issue 2-13-2 |
| Proposal 9: UL CCA model in RRM measurements test cases: PCCA\_UL=1.0 in all time intervals (T1 and T2). | Issue 2-13-3 |
| Proposal 10: DL CCA model in RRM measurements test cases: PCCA\_DL=[0.75] in all time intervals (T1 and T2). | Issue 2-13-3 |
| Proposal 11: In RSSI and CO test cases, the test configurations are the same as for RRM measurement:  Scenario A:   |  |  | | --- | --- | | Configuration | Description | | 1 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | 2 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | 3 | Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | NOTE: The UE is only required to be tested in one of the supported test configurations. | |   Scenario B:   |  |  | | --- | --- | | Configuration | Description | | 1 | LTE FDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | 2 | LTE TDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | NOTE: The UE is only required to be tested in one of the supported test configurations. | |   Scenario C:   |  |  | | --- | --- | | Configuration | Description | | 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |   Inter-RAT E-UTRAN-NR-U:   |  |  | | --- | --- | | Configuration | Description | | 1 | LTE FDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | 2 | LTE TDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | NOTE: The UE is only required to be tested in one of the supported test configurations. | | | Issue 2-14-1 |
| Proposal 12: In RSSI and CO test cases, UL CCA model: PCCA\_UL=1.0 | Issue 2-14-2 |
| Proposal 13: In RSSI and CO test cases, DL CCA model: PCCA\_DL=1.0 | Issue 2-14-2 |
| Proposal 14: Number of cells in RSSI/CO test cases:   * Scenario A: * Intra-frequency RSSI/CO: 2 cells (PCell, SCell) * Inter-frequency RSSI/CO: 2 cells (PCell, SCell) and 1 inter-frequency for RSSI/CO * Scenario B:   + Intra-frequency RSSI/CO: 2 cells (E-UTRAN PCell, NR PSCell)   + Inter-frequency RSSI/CO: 2 cells (E-UTRAN PCell, NR PSCell) and 1 inter-frequency for RSSI/CO * Scenario C:   + Intra-frequency RSSI/CO: 1 cell (PCell)   + Inter-frequency RSSI/CO: 1 cell (PCell) and 1 inter-frequency for RSSI/CO * Standalone Inter-RAT E-UTRAN-NR-U:   + Inter-RAT RSSI/CO: 1 cell (E-UTRAN PCell) and 1 inter-RAT frequency for RSSI/CO | Issue 2-14-3 |
| Proposal 15: The following test coverage is proposed for intra-frequency RSSI and CO test cases:   * RSSI:   + Test 1: Non-DRX, SMTC and RMTC are overlapping   + Test 2: DRX, SMTC and RMTC are not overlapping * CO:   + Test 1: DRX, SMTC and RMTC are overlapping   + Test 2: Non-DRX, SMTC and RMTC are not overlapping | Issue 2-14-4 |
| Proposal 16: The following test coverage is proposed for inter-frequency RSSI and CO test cases:   * RSSI:   + Non-DRX * CO:   + DRX | Issue 2-14-4 |
| Proposal 17: Include the following missing RSSI and CO test cases (based on the requirements in TS 36.133) into the earlier agreed test case list:   |  | | --- | | E-UTRA-NR-U RSSI measurements requirements: | |         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC | |         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC | | E-UTRA-NR-U CO measurements requirements: | |         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC | |         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC | | E-UTRA-NR-U RSSI measurement accuracy requirements: | |         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC | |         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC | | E-UTRA-NR-U CO measurement accuracy requirements: | |         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC | |         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC | | Issue 2-1-13, Issue 2-1-16 |
| Proposal 18: The following test configurations are used for inter-RAT SFTD reporting delay test with NR target under CCA   |  |  | | --- | --- | | Config | Description | | 1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | 2 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | Note: The UE is only required to be tested in one of the supported test configurations | | | Issue 2-15-1 |
| Proposal 19: Inter-RAT SFTD reporting delay test cases are based on SFTD reporting only, i.e. no additional SS-RSRP reporting. | Issue 2-15-2 |
| Proposal 20: Test case for inter-RAT SFTD reporting delay for SFTD between EUTRA PCell and NR neighbour cell on NR carrier under CCA is modelled with DL CCA on the NR carrier. | Issue 2-15-3 |
| Proposal 21: For DL CCA model in inter-RAT SFTD reporting delay test, PCCA\_DL = [0.75] is used as initial assumption. | Issue 2-15-3 |

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| **AI 7.1.6.3.13, Test cases, Accuracy requirements for Intra-frequency, inter-frequency and inter-RAT measurements** | | |
| **T-doc number/company** | **Proposals / Observations** | **Issue mapping** |
| [**R4-2100837**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100837.zip)  ZTE Corporation | Proposal 1: When defining test cases for features in NR-U, R15 UE test cases shall be taken as baseline. |  |
| Proposal 2: RAN4 shall define test cases for SS-SINR and SS-RSRQ for intra-frequency, inter-frequency and inter-RAT measurement accuracy. | Issue 2-1-15, Issue 2-1-16 |
| [**R4-2102371**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102371.zip)  Ericsson | Proposal 1: Add NR unlicensed bands to SFTD accuracy requirements in TS 36.133 clause 9.1.27. | Core part proposal? |
| Proposal 2: The following test configurations for NR-U Inter-RAT SFTD accuracy testing are to be supported:   |  |  | | --- | --- | | Config | Description | | 1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | 2 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | | Note: The UE is only required to be tested in one of the supported test configurations | | | Issue 2-16-1 |
| Proposal 3: In test cases for NR-U Inter-RAT SFTD measurement accuracy, as initial assumption the NR target cell is modelled with DL CCA PCCA\_DL = [0.75]. | Issue 2-16-2 |

## Open issues summary and view’s collection for the 1st round

*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: Test case list

*Sub-topic description:*

*Continue discussion on the test case list for NR-U RRM. Discussion is based on the test case list that was agreed in R4-2017089 in RAN4#97e meeting and the proposed updated list in R4-2102524.*

*Issues discussed under this sub-topic:*

*Issue 2-1-1: Test cases on RRC\_IDLE, cell re-selection*

*Issue 2-1-2: Test cases on handover delay and interruptions*

*Issue 2-1-3: Test cases on RRC re-establishment*

*Issue 2-1-4: Test cases on Random access*

*Issue 2-1-5: Test cases on RRC release with re-direction*

*Issue 2-1-6: Test cases on timing*

*Issue 2-1-7: Test cases on BWP switching and interruption*

*Issue 2-1-8: Test cases on PSCell addition/release delay*

*Issue 2-1-9: Test cases on active TCI state switching delay*

*Issue 2-1-10: Test cases for interruptions*

*Issue 2-1-11: Test cases for intra-frequency measurement procedure*

*Issue 2-1-12: Test cases for inter-frequency measurement procedure*

*Issue 2-1-13a: Test cases for inter-RAT measurement procedure*

*Issue 2-1-13b: Test cases for inter-RAT measurement procedure: RSSI and CO*

*Issue 2-1-14a: Test cases for accuracy for NR-U intra-frequency measurements – SS-RSRQ/SS-SINR*

*Issue 2-1-14b: Test cases for accuracy for NR-U intra-frequency measurements – NR-U SCC with NR-U PCC, and N-RU SCC with NR-U PSCC and E-UTRAN PCC*

*Issue 2-1-15: Test cases for accuracy for NR-U inter-frequency measurements*

*Issue 2-1-16a: Test cases for accuracy for NR-U inter-RAT measurements*

*Issue 2-1-16b: Test cases for accuracy for NR-U inter-RAT measurements: RSSI and CO*

*Please note that the discussion under sub-topic 2-1 is about which test cases are to be introduced for NR-U. The details of the test cases are to be discussed under other sub-topics of Topic #2. Below is a table with the agreed and proposed test cases with issue mapping to help with tracking the proposals.*

Table 2-1-1: Colour coding for Table 2-1-2.

|  |
| --- |
| **Colour coding for the test case table below** |
| Test case marked as FFS in RAN4#97e |
| Test case proposed to be added in this meeting |
| Test case agreed in RAN4#97e, but proposed to be removed in this meeting |

Table 2-1-2: Issue and sub-topic mapping for RRM test cases, with colour coding described in Table 2-1-1, reflecting the status of the agreements *before* the decisions of RAN4 #98 NOTE: This table is only for information and for helping to keep track of Issues versus test case list. Please make your comments under the Issues, not directly in the table.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Group of requirements** | **Test cases** |  | **Requirements section** | **Agreed** | **Issue nbr for whether to include on TC list** | **Sub-topic nbr for detailed discussion** |
| RRC\_IDLE, cell re-selection | NR-U -> NR-U | intra-frequency | 4.2A | Yes |  | 2-2 |
| inter-frequency | Yes |  |
| NR(FR1) -> NR-U |  | FFS | 2-1-1 |
| NR-U -> NR(FR1) |  | FFS | 2-1-1 |
| NR-U - > E-UTRAN (FDD,TDD) |  | FFS | 2-1-1 |
| E-UTRAN (FDD,TDD) -> NR-U |  | TS 36.133 | Yes |  |
| RRC\_INACTIVE, cell re-selection | Not needed |  | 5.1A |  |  | - |
| HO (delay and interruptions) | NR-U-> NR-U | intra-frequency, known | 6.1B | Yes |  | 2-3 |
| intra-frequency, unknown | Yes |  |
| inter-frequency, unkown | Yes |  |
| Inter-frequency, known | FFS | 2-1-2 |
| NR(FR1) -> NR-U | known | 6.1B | FFS | 2-1-2 |
| unkown | FFS | 2-1-2 |
| NR-U -> NR(FR1) | known |  | FFS | 2-1-2 |
| unknown | 6.1.1.2 | FFS | 2-1-2 |
| NR-U - > E-UTRAN (FDD,TDD) |  | 6.1.2.1 | FFS | 2-1-2 |
| E-UTRAN (FDD,TDD) -> NR-U |  | TS 36.133 | Yes |  |
| RRC Re-establishment | NR-U-> NR-U |  | 6.2.1A | Yes |  | 2-4 |
| NR(FR1) -> NR-U |  | FFS | 2-1-3 |
| Random access | (*requirements not available yet, being discussed in thread 205*) |  | 6.2.2A [1] | Depends on CORE requirements |  | - |
| Contention-based and non-contention based RA: |  |  |  |
|         to NR-U PCell |  | FFS | 2-1-4 |
|         to NR-U PSCell |  | FFS | 2-1-4 |
| RRC Connection Release with Redirection |         NR-U-> NR-U |  | 6.2.3.2.3 | Yes |  | 2-5 |
|         NR(FR1) -> NR-U |  | FFS | 2-1-5 |
| Timing (transmit timing) |         NR-U PCell |  | 7.1, 7.3 | Yes |  | 2-6 |
|         NR-U PSCell |  | Yes |  |
| Timing (timing advance) |         NR-U PCell |  | FFS | 2-1-6 |
|         NR-U PSCell |  | FFS | 2-1-6 |
| BWP switching delay and interruptions |        E-UTRAN – NR-U PSCell UL active BWP switch based on persistent UL LBT failure |  | 8.6 | Yes |  | 2-7 |
|        NR-U – NR-U PCell UL active BWP switch based on persistent UL LBT failure |  | Yes |  |
| Legacy DCI/timer/RRC-based BWP switching on NR-U SCell, with: |  |  |  |
|         NR PCC (PCC) |  | FFS | 2-1-7 |
|         NR-U PCC |  | FFS | 2-1-7 |
|         NR-U PSCC and E-UTRAN PCC (FDD, TDD) |  | FFS | 2-1-7 |
| RLM (in-syn and out-of-sync) |         On NR-U PSCC, with E-UTRAN PCC (FDD,TDD) | OOS, non-DRX | 8.1A | Yes |  | 2-11 |
| IS, non-DRX | Yes |  |
| OOS, DRX | Yes |  |
| IS, DRX | Yes |  |
|         On NR-U PCC | OOS, non-DRX | Yes |  |
| IS, non-DRX | Yes |  |
| OOS, DRX | Yes |  |
| IS, DRX | Yes |  |
| BM |         On NR-U PCC |  | 8.5A | Yes |  | 2-12 |
|         On NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |  |
| SCell activation/deactivation delay |         NR PCC (FR1) | known | 8.3A | Yes |  | 2-10 |
| unknown | Yes |  |
|         NR-U PCC | known | Yes |  |
| unknown | Yes |  |
|         NR-U PSCC and E-UTRAN PCC (FDD, TDD) | known | Yes |  |
| unknown | Yes |  |
| PSCell addition/release delay | NR-U PSCell with E-UTRA PCC | konwn | TS 36.133 | Yes |  |
| unknown | FFS | 2-1-8 |
| Active TCI state switching delay | For known and unknown target TCI state in NR-U, on: |  | 8.10A |  |  | - |
|         NR-U PCC |  | FFS | 2-1-9 |
|         NR-U SCC, with NR PCC (FR1) |  | FFS | 2-1-9 |
|         NR-U PSCC, with E-UTRAN PCC (FDD, TDD) |  | FFS | 2-1-9 |
| Interruptions | Due to NR-U SCell addition/release, with: |  | 8.2.1, 8.2.2 |  |  | 2-9 |
|         NR PCC (FR1) |  | FFS | 2-1-10 |
|         NR-U PCC |  | FFS | 2-1-10 |
|         NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | FFS | 2-1-10 |
| Due to NR-U SCell activation/deactivation, with: |  | 8.2.1, 8.2.2 |  |  |
|         NR PCC (FR1) |  | Yes |  |
|         NR-U PCC |  | Yes |  |
|         NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | Yes |  |
| During measurements no deactivated NR-U SCell, with: |  | 8.2.1, 8.2.2 |  |  |
|         NR PCC (FR1) |  | FFS | 2-1-10 |
|         NR-U PCC |  | FFS | 2-1-10 |
|         NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | FFS | 2-1-10 |
| Due to inter-RAT SFTD measurements between: |  | TS 36.133 |  |  |
|         NR-U PCell and E-UTRAN PCell (FDD,TDD) |  | Yes |  |
| Due to NR-U PSCell addition/release, with: |  | TS 36.133 | Yes |  |
|         E-UTRA PCell |  | Yes |  |
| Intra-frequency measurement procedure (SS-RSRP, SS-RSRQ, SS-SINR, L1-RSRP, RSSI, CO) | Intra-frequency SS-RSRP, measurements on: |  | 9.2A.5, 9.2A.6 |  |  | 2-13 |
|         NR-U SCC, with NR PCC (FR1) |  | Yes |  |
|         NR-U PCC |  | Yes |  |
|         NR-U SCC, with NR-U PCC |  | Yes | 2-1-11 |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |  |
|         NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC |  | Yes | 2-1-11 |
| Intra-frequency SS-RSRQ, SS-SINR measurements on: |  | 9.2A.5, 9.2A.6 |  |  |
|         NR-U SCC, with NR PCC (FR1) |  | Yes |  |
|         NR-U PCC |  | Yes |  |
|         NR-U SCC, with NR-U PCC |  | Yes | 2-1-11 |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |  |
|         NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC |  | Yes | 2-1-11 |
| L1-RSRP measurements on: |  | [9.5.4A] |  |  |
|         NR-U SCC, with NR PCC (FR1) |  | Yes |  |
|         NR-U PCC |  | Yes |  |
|         NR-U SCC, with NR-U PCC |  | Yes | 2-1-11 |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |  |
|         NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC |  | Yes | 2-1-11 |
| Intra-frequency RSSI measurements on: |  | 9.2A.7.1 |  |  |
|         NR-U SCC, with NR PCC (FR1) |  | Yes |  |
|         NR-U PCC |  | Yes |  |
|         NR-U SCC, with NR-U PCC |  | Yes | 2-1-11 |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |  |
|         NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC |  | Yes | 2-1-11 |
| Intra-frequency CO measurements on: |  | 9.2A.7.2 |  |  |
|         NR-U SCC, with NR PCC (FR1) |  | Yes |  |
|         NR-U PCC |  | Yes |  |
|         NR-U SCC, with NR-U PCC |  | Yes | 2-1-11 |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |  |
|         NR-U SCC measurements, with E-UTRAN PCC (FDD,TDD) and NR-U PSCC |  | Yes | 2-1-11 |
| Inter-frequency measurement procedure (SS-RSRP, SS-RSRQ, SS-SINR, SFTD, RSSI, CO) | Inter-frequency SS-RSRP measurements on: |  | 9.3A.4, 9.3A.5 |  |  | 2-13 |
|         NR-U inter-frequency, with NR PCC (FR1) |  | Yes |  |
|         NR-U inter-frequency, with NR-U PCC |  | Yes |  |
|         NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | Yes |  |
|         NR (FR1) inter-frequency, with NR-U PCC |  | Yes |  |
|         NR (FR1) inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | Yes |  |
| Inter-frequency SS-RSRQ, SS\_SINR measurements on: |  | FFS | 2-1-12 |
|         NR-U inter-frequency, with NR PCC (FR1) |  | FFS | 2-1-12 |
|         NR-U inter-frequency, with NR-U PCC |  | FFS | 2-1-12 |
|         NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | FFS | 2-1-12 |
|         NR (FR1) inter-frequency, with NR-U PCC |  | FFS | 2-1-12 |
|         NR (FR1) inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | FFS | 2-1-12 |
| Inter-frequency RSSI measurements on: |  | 9.3A.8 |  |  |
|         NR-U inter-frequency, with NR PCC (FR1) |  | Yes |  |
|         NR-U inter-frequency, with NR-U PCC |  | Yes |  |
|         NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | Yes |  |
| Inter-frequency CO measurements on: |  | 9.3A.9 |  |  |
|         NR-U inter-frequency, with NR PCC (FR1) |  | Yes |  |
|         NR-U inter-frequency, with NR-U PCC |  | Yes |  |
|         NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | Yes |  |
| Inter-RAT measurement procedure (SFTD, E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR, E-UTRA-NR-U RSSI and CO, NR-U-E-UTRA RSRP/RSRQ) | Inter-RAT SFTD between: |  | TS 36.133 |  |  | 2-15 |
|         E-UTRAN PCell (FDD,TDD) and NR-U neighbor |  | Yes |  |
| NOTE: under the condition of stationary paths |  | Yes |  |
| NR-U-E-UTRA RSRP/RSRQ (needed for HO): |  | 9.4.2, 9.4.3 |  |  |
|         On E-UTRA (FDD,TDD), with NR-U PCC |  | FFS | 2-1-13a |
|         On E-UTRA (FDD,TDD), with NR-U PSCC |  | FFS | 2-1-13a |
| E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR: |  | TS 36.133 |  |  |
|         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC |  | Yes |  |
|         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC |  | Yes |  |
| E-UTRA-NR-U RSSI measurements requirements: |  | TS 36.133 |  |  | 2-14 |
|         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC |  | FFS | 2-1-13b |
|         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC |  | FFS | 2-1-13b |
| E-UTRA-NR-U CO measurements requirements: |  | TS 36.133 |  |  |
|         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC |  | FFS | 2-1-13b |
|         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC |  | FFS | 2-1-13b |
| Accuracy for NR-U intra-frequency measurements (SS-RSRP, SS-RSRQ, SS-SINR, L1-RSRP, RSSI, CO) | Intra-frequency absolute and relative accuracies for SS-RSRP on: |  | [10.1.27] |  |  | - |
|         NR-U SCC, with NR PCC (FR1) |  | Yes |  |
|         NR-U PCC |  | Yes |  |
|         NR-U SCC, with NR-U PCC |  | Yes | 2-1-14b |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |  |
|         NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | Yes | 2-1-14b |
| Intra-frequency absolute accuracies for SS-RSRQ on: |  | [10.1.29] |  |  |
|         NR-U SCC, with NR PCC (FR1) |  | FFS | 2-1-14a |
|         NR-U PCC |  | FFS | 2-1-14a |
|         NR-U SCC, with NR-U PCC |  | FFS | 2-1-14a & b |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | FFS | 2-1-14a |
|         NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | FFS | 2-1-14a & b |
| Intra-frequency absolute accuracies for SS-SINR on: |  | [10.1.31] |  |  |
|         NR-U SCC, with NR PCC (FR1) |  | FFS | 2-1-14a |
|         NR-U PCC |  | FFS | 2-1-14a |
|         NR-U SCC, with NR-U PCC |  | FFS | 2-1-14a & b |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | FFS | 2-1-14a |
|         NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | FFS | 2-1-14a & b |
| Absolute and relative accuracies for L1-RSRP on: |  | [10.1.33] |  |  |
|         NR-U SCC, with NR PCC (FR1) |  | Yes |  |
|         NR-U PCC |  | Yes |  |
|         NR-U SCC, with NR-U PCC |  | Yes |  |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |  |
|         NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | Yes |  |
| Intra-frequency RSSI on: |  | [10.1.34.1] |  |  |
|         NR-U SCC, with NR PCC (FR1) |  | Yes |  |
|         NR-U PCC |  | Yes |  |
|         NR-U SCC, with NR-U PCC |  | Yes |  |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |  |
|         NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | Yes |  |
| Intra-frequency CO on: |  | [10.1.35.1] |  |  |
|         NR-U SCC, with NR PCC (FR1) |  | Yes |  |
|         NR-U PCC |  | Yes |  |
|         NR-U SCC, with NR-U PCC |  | Yes |  |
|         NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |  |
|         NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | Yes |  |
| Accuracy for NR-U inter-frequency measurements (SS-RSRP, SS-RSRQ, SS-SINR, SFTD, RSSI, CO) | Inter-frequency absolute and relative accuracies for SS-RSRP on: |  | [10.1.28] |  |  | - |
|         NR-U neighbor, with NR PCC (FR1) |  | Yes |  |
|         NR-U neighbor, with NR-U PCC |  | Yes |  |
|         NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |  |
| Inter-frequency absolute and relative accuracies for SS-RSRQ on: |  | [10.1.30] |  |  |
|         NR-U neighbor, with NR PCC (FR1) |  | FFS | 2-1-15 |
|         NR-U neighbor, with NR-U PCC |  | FFS | 2-1-15 |
|         NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | FFS | 2-1-15 |
| Inter-frequency absolute and relative accuracies for SS-SINR on: |  | [10.1.32] |  |  |
|         NR-U neighbor, with NR PCC (FR1) |  | FFS | 2-1-15 |
|         NR-U neighbor, with NR-U PCC |  | FFS | 2-1-15 |
|         NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | FFS | 2-1-15 |
|         NR (FR1) inter-frequency, with NR-U PCC |  | FFS | 2-1-15 |
|         NR (FR1) inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD) |  | FFS | 2-1-15 |
| Inter-frequency RSSI on: |  | [10.1.34.2] |  |  |
|         NR-U neighbor, with NR PCC (FR1) |  | Yes |  |
|         NR-U neighbor, with NR-U PCC |  | Yes |  |
|         NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |  |
| Inter-frequency CO on: |  | [10.1.35.2] |  |  |
|         NR-U neighbor, with NR PCC (FR1) |  | Yes |  |
|         NR-U neighbor, with NR-U PCC |  | Yes |  |
|         NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD) |  | Yes |  |
| Accuracy for inter-RAT measurements (SFTD, E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR, E-UTRA-NR-U RSSI and CO, NR-U-E-UTRA RSRP/RSRQ) | Inter-RAT SFTD between: |  | TS 36.133 |  |  | 2-16 |
|         E-UTRAN PCell (FDD,TDD) and NR-U neighbor |  | Yes |  |
| NOTE: under the condition of stationary paths |  |  |  |
| E-UTRA RSRP/RSRQ (needed for HO) with: |  | 10.2.2, 10.2.3 |  |  | - |
|         NR-U PCC |  | FFS | 2-1-16a |
|         NR-U PSCC |  | FFS | 2-1-16a |
| E-UTRA-NR-U SS-RSRP/SS-RSRQ/SS-SINR: |  | TS 36.133 |  |  |
|         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC |  | Yes |  |
|         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC |  | Yes |  |
|  | E-UTRA-NR-U RSSI measurement accuracy requirements: |  | TS 36.133 |  |  | - |
|  |         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC |  | FFS | 2-1-16b |
|  |         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC |  | FFS | 2-1-16b |
|  | E-UTRA-NR-U CO measurement accuracy requirements: |  | TS 36.133 |  |  |
|  |         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC |  | FFS | 2-1-16b |
|  |         On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC |  | FFS | 2-1-16b |

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

**Issue 2-1-1: Test cases on RRC\_IDLE, cell re-selection**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2100839 (ZTE), R4-2101134 (Nokia), R4-2100773 (MediaTek)*

Should the test cases left FFS for RRC IDLE mode cell re-selection be included in the NR-U test case list?

* + Option 1 (Ericsson, Nokia, ZTE): Add the following test cases on the test case list for NR-U:
    - RRC\_IDLE, cell re-selection
      1. NR (FR1) -> NR-U
      2. NR-U -> NR (FR1)
      3. NR-U - > E-UTRAN (FDD,TDD)
  + Option 2 (MediaTek): The test cases listed in Option 1 for NR-U are *not* necessary:
    - 1) and 2) in case test case for “Cell reselection to FR1 inter-frequency NR when CCA is used on the serving and target cell” has been passed.
    - 3) in case test case for “Cell reselection to FR1 intra-/inter-frequency NR when CCA is used on the serving and target cell” has been passed
* Recommended WF
  + Discuss the listed options. Can majority view (Option 1) be agreed?

Issue 2-1-1 Companies’ comments 1st week:

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

**Issue 2-1-2: Test cases on handover delay and interruptions**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2100840 (ZTE), R4-2101134 (Nokia), R4-2100773 (MediaTek)*

Should the test cases left FFS for handover be included in the NR-U test case list?

* + Option 1 (Ericsson, Nokia, ZTE): Add the following test cases on the test case list for NR-U:
    - Handover

1) NR-U -> NR-U, Inter-frequency, known

2a) NR (FR1) -> NR-U, known

2b) NR (FR1) -> NR-U, unknown

3a) NR-U -> NR (FR1), known

3b) NR-U -> NR (FR1), known

4) NR-U - > E-UTRAN (FDD,TDD)

* + Option 2 (MediaTek): The test cases listed in Option 1 for NR-U are *not* necessary:
    - 1), 2a) and 2b) in case the UE has passed test cases for NR-U to NR-U handovers.
    - 3a), 3b) and 4) in case the UE has passed R-15 tests.
* Recommended WF
  + Discuss the listed options. Can majority view (Option 1) be agreed?

Issue 2-1-2 Companies’ comments 1st week:

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

**Issue 2-1-3: Test cases on RRC re-establishment**

*The listed proposals are discussed in R4-2102524 (Ericsson)*

* Proposal 1 (Ericsson): Add the following test case on the test case list for NR-U:
  + RRC re-establishment
    - NR (FR1) -> NR-U
* Recommended WF
  + Can Option 1 be agreed?

Issue 2-1-3 Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 2-1-4: Test cases on Random access**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2101134 (Nokia), R4-2101134 (ZTE)*

Background: Random access requirements have not yet been introduced in the core part.

* Proposal 1 (Ericsson, Nokia): Add the following test cases on the test case list for NR-U:
  + Random access

1) to NR-U PCell

2) to NR-U PSCell

* Proposal 2:
  + Option 2.1 (ZTE, [Nokia]): Define random access test cases for 4-step *and* 2-step RA in Rel-16.
  + Option 2.2 (): Define random access test cases *only* for 4 step RA in Rel-16.
* Recommended WF
  + Discuss the proposals further in the comment section. Can Option 1-1 for Proposal 1 be agreed? Which option to choose for Proposal 2?

Issue 2-1-4 Companies’ comments 1st week:

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

**Issue 2-1-5: Test cases on RRC connection release with re-direction**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2100773 (MediaTek), R4-2100842 (ZTE)*

Should the test cases left FFS for RRC connection release with re-direction be included in the NR-U test case list?

* Option 1 (Ericsson): Add the following test case on the test case list for NR-U:
  + RRC connection release with re-direction
    - NR (FR1) -> NR-U
* Option 2 (MediaTek): The test case listed in Option 1 for NR-U is *not* necessary if the UE has passed test case for “Redirection from NR in FR1 to NR in FR1 with CCA”.
* Option 3 (ZTE): Define test cases for the scenario of NR-U to NR-U corresponding to core requirements for RRC Connection Release with redirection.
* Recommended WF
  + Discuss the options in the comment section. NOTE: Option 3 is already agreed in the last meeting.

Issue 2-1-5 Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 2-1-6: Test cases on timing**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2100843 (ZTE)*

Which test cases for timing should be added on the NR-U test case list?

* Proposal 1: (Ericsson, ZTE): Add the following test case on the test case list for NR-U:
  + Timing (timing advance)
    - NR-U PCell
* Proposal 2 (Ericsson): Add the following test case on the test case list for NR-U:
  + Timing (timing advance)
    - NR-U PSCell
* Recommended WF
  + Discuss the proposals in the comment section. Can Proposals 1-2 be agreed?

Issue 2-1-6 Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 2-1-7: Test cases on BWP switching and interruption**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2100841 (ZTE), R4-2100773 (MediaTek)*

Should the test cases left FFS for BWP switching be included in the NR-U test case list?

* Option 1 (Ericsson): Add the following test cases on the test case list for NR-U:
  + BWP switching delay and interruption
    - NR PCC (PCC)
    - NR-U PCC
    - NR-U PSCC and E-UTRAN PCC (FDD, TDD)
* Option 2 (MediaTek): Legacy DCI/timer/RRC-based BWP switching tests on NR-U cell are *not* necessary while UE has passed the corresponding R15 tests.
* Option 3 (ZTE): The DCI/timer/RRC-based BWP switching can be tested only by UEs supporting NR-U SA mode. The other test cases can be de-prioritized.
* Recommended WF
  + Discuss the options in the comment section.

Issue 2-1-7 Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 2-1-8: Test cases on PSCell addition/release delay**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2102370 (Ericsson), R4-2100773 (MediaTek), R4-2100841 (ZTE)*

Should the test case for PSCell addition/release delay for unknown cell be included in the NR-U test case list?

* Proposal 1 (Ericsson, MediaTek, ZTE): Do *not* define the following test case for NR-U:
* PSCell addition/release delay
  + NR-U PSCell with E-UTRA PCC, unknown
* Recommended WF
  + Discuss the proposal in the comment section. Can Proposal 1 be agreed?

Issue 2-1-8 Companies’ comments 1st week:

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

**Issue 2-1-9: Test cases on active TCI state switching delay**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2102370 (Ericsson)*

Which test cases on TCI state switching delay should be included on the NR-U test case list?

* Proposal 1:
  + Option 1.1 (Ericsson): Add the following test cases on the test case list for NR-U:
    - TCI state switching delay
      * NR-U PCC
      * NR-U SCC, with NR PCC (FR1)
      * NR-U PSCC, with E-UTRAN PCC (FDD, TDD)
* Proposal 2:
  + Option 2.1 (Ericsson): It shall be investigated whether some of the test cases for active TCI state switching are redundant for UE supporting both EN-DC and NR SA scenarios for NR-U.
* Recommended WF
  + Discuss the proposals in the comment section. Can Proposal 1 be agreed? What are the company views on Proposal 2?

Issue 2-1-9 Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 2-1-10: Test cases for interruptions**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2100773 (MediaTek)*

Should the test cases left FFS for interruptions be included in the NR-U test case list?

* Option 1 (Ericsson): Add the following test cases on the test case list for NR-U:
  + Interruptions
    - 1a. Due to NR-U SCell addition/release, with:
      * NR PCC (FR1)
      * NR-U PCC
      * NR-U PSCC and E-UTRAN PCC (FDD,TDD)
    - 1b. During measurements no deactivated NR-U SCell, with:
      * NR PCC (FR1)
      * NR-U PCC
      * NR-U PSCC and E-UTRAN PCC (FDD,TDD)
* Option 2 (MediaTek): Test cases for the interruption as the legacy requirement are not necessary, while UE has passed the legacy tests.
* Recommended WF
  + Discuss the options in the comment section.

Issue 2-1-10 Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 2-1-11: Test cases for intra-frequency measurement procedure**

*The listed proposals are discussed in R4-2100773 (MediaTek)*

Should the test cases agreed in RAN4#97e for intra-frequency measurement procedure with the cell setup discussed in the proposals below be included on the test case list for NR-U?

* Proposal 1
  + Option 1.1 (MediaTek): For Intra-frequency measurement procedure test cases, test configuration of “NR-U SCC, with NR-U PCC” is not needed while it can be replaced by “NR-U SCC, with NR PCC (FR1)” and “NR-U PCC”.
  + Option 1.2: Keep the agreed test cases for intra-frequency measurement procedure.
* Proposal 2
  + Option 2.1 (MediaTek) For Intra-frequency measurement procedure test cases, test configuration of “NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)” is not needed while it can be replaced by “NR-U PSCC, with E-UTRAN PCC (FDD,TDD)”.
  + Option 2.2: Keep the agreed test cases for intra-frequency measurement procedure.
* Recommended WF
  + Discuss the proposals in the comment section.

Issue 2-1-11 Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 2-1-12: Test cases for inter-frequency measurement procedure**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2102531 (Ericsson), R4-2101134 (Nokia), R4-2100836 (ZTE)*

Should the test cases left FFS for SS-RSRQ and SS-SINR inter-frequency measurements be included in the NR-U test case list?

* Proposal 1 (Ericsson, Nokia, ZTE): Add the following test cases on the test case list for NR-U:
  + Inter-frequency SS-RSRQ, SS-SINR measurements on:
    - NR-U inter-frequency, with NR PCC (FR1)
    - NR-U inter-frequency, with NR-U PCC
    - NR-U inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)
    - NR (FR1) inter-frequency, with NR-U PCC
    - NR (FR1) inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)
* Recommended WF
  + Can Proposal 1 be agreed?

Issue 2-1-12 Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 2-1-13a: Test cases for inter-RAT measurement procedure**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2102531 (Ericsson), R4-2100836 (ZTE)*

Should the test cases left FFS for inter-RAT RSRP/RSRQ measurements be included on the NR-U test case list?

* Proposal 1 (Ericsson, ZTE): Add the following test cases on the test case list for NR-U:
  + Inter-RAT measurement procedure
    - NR-U-E-UTRA RSRP/RSRQ (needed for HO):
      * On E-UTRA (FDD,TDD), with NR-U PCC
      * On E-UTRA (FDD,TDD), with NR-U PSCC
* Recommended WF
  + Discuss the proposals in the comment section. Can Proposal 1 be agreed?

Issue 2-1-13a Companies’ comments 1st week:

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| --- | --- |
| **Company** | **Comments** |
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**Issue 2-1-13b: Test cases for inter-RAT measurement procedure: RSSI and CO**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2102531 (Ericsson)*

Should test cases for inter-RAT RSSI and CO measurements be included on the NR-U test case list?

* Proposal 1 (Ericsson): Add the following test cases on the test case list for NR-U:
  + Inter-RAT measurement procedure
    - E-UTRA-NR-U RSSI measurements requirements:
      * On NR-U neighbor, with E-UTRA (FDD,TDD) PCC
      * On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC
    - E-UTRA-NR-U CO measurements requirements:
      * On NR-U neighbor, with E-UTRA (FDD,TDD) PCC
      * On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC
* Recommended WF
  + Discuss the proposals in the comment section. Can Proposal 1 be agreed?

Issue 2-1-13b Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 2-1-14a: Test cases for accuracy for NR-U intra-frequency measurements – SS-RSRQ/SS-SINR**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2100837 (ZTE), R4-2100773 (MediaTek)*

Should the test cases left FFS for intra-frequency SS-RSRQ and SS-SINR measurement accuracy be included in the NR-U test case list?

* Proposal 1
  + Option 1.1 (Ericsson, ZTE): Add the following test cases on the test case list for NR-U:
    - Accuracy for NR-U intra-frequency measurements
      * 1a. Intra-frequency absolute accuracies for SS-RSRQ on:
        + NR-U SCC, with NR PCC (FR1)
        + NR-U PCC
        + NR-U SCC, with NR-U PCC
        + NR-U PSCC, with E-UTRAN PCC (FDD,TDD)
        + NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)
      * 1b. Intra-frequency absolute accuracies for SS-SINR on:
        + NR-U SCC, with NR PCC (FR1)
        + NR-U PCC
        + NR-U SCC, with NR-U PCC
        + NR-U PSCC, with E-UTRAN PCC (FDD,TDD)
        + NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)
  + Option 1.2 (MediaTek): Test cases for SS-RSRQ/SS-SINR measurement accuracy under CCA are not necessary.
* Recommended WF
  + Discuss the proposals and options in the comment section.

Issue 2-1-14a Companies’ comments 1st week:

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

**Issue 2-1-14b: Test cases for accuracy for NR-U intra-frequency measurements – NR-U SCC with NR-U PCC, and N-RU SCC with NR-U PSCC and E-UTRAN PCC**

Should the test cases agreed in RAN4#97e for intra-frequency measurement accuracy with the cell setup discussed in the proposals below be included on the test case list for NR-U?

* Proposal 1
  + Option 2.1 (MediaTek): For Intra-frequency measurement accuracy test cases, test configuration of “NR-U SCC, with NR-U PCC” is not needed while it can be replaced by “NR-U SCC, with NR PCC (FR1)” and “NR-U PCC”.
  + Option 2.2: Keep the agreed test cases for intra-frequency measurement accuracy.
* Proposal 2
  + Option 3.1 (MediaTek) For Intra-frequency measurement accuracy test cases, test configuration of “NR-U SCC, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)” is not needed while it can be replaced by “NR-U PSCC, with E-UTRAN PCC (FDD,TDD)”.
  + Option 3.2: Keep the agreed test cases for intra-frequency measurement accuracy.
* Recommended WF
  + Discuss the proposals and options in the comment section.

Issue 2-1-14b Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 2-1-15: Test cases for accuracy for NR-U inter-frequency measurements**

*The listed proposals are discussed in R4-2102524 (Ericsson), R4-2100837 (ZTE), R4-2101134 (Nokia), R4-2100773 (MediaTek)*

Should the test cases left FFS for inter-frequency SS-RSRQ and SS-SINR measurement accuracy be included in the NR-U test case list?

* Option 1 (Ericsson, ZTE, Nokia): Add the following test cases on the test case list for NR-U:
  + Accuracy for NR-U inter-frequency measurements
    - 1a. Inter-frequency absolute and relative accuracies for SS-RSRQ on:
      * NR-U neighbor, with NR PCC (FR1)
      * NR-U neighbor, with NR-U PCC
      * NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD)
    - 1b. Inter-frequency absolute and relative accuracies for SS-SINR on:
      * NR-U neighbor, with NR PCC (FR1)
      * NR-U neighbor, with NR-U PCC
      * NR-U neighbor, with NR-U PSCC, with E-UTRAN PCC (FDD,TDD)
      * NR (FR1) inter-frequency, with NR-U PCC
      * NR (FR1) inter-frequency, with NR-U PSCC and E-UTRAN PCC (FDD,TDD)
* Option 2 (MediaTek): Test cases for SS-RSRQ/SS-SINR measurement accuracy under CCA are not necessary.
* Recommended WF
  + Discuss the options in the comment section.

Issue 2-1-15 Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 2-1-16a: Test cases for accuracy for NR-U inter-RAT measurements**

*The listed proposals are discussed in R4-2102524 (Ericsson)*

Should the test cases left FFS for inter-RAT E-UTRA RSRP/RSRQ measurement accuracy be included in the NR-U test case list?

* Proposal 1 (Ericsson): Add the following test cases on the test case list for NR-U:
  + Accuracy for NR-U inter-RAT measurements
    - 1a. NR-U - E-UTRA RSRP/RSRQ (needed for HO) with:
      * NR-U PCC
      * NR-U PSCC
* Recommended WF
  + Discuss the proposals in the comment section. Can Proposal 1 be agreed?

Issue 2-1-16a Companies’ comments 1st week:

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| --- | --- |
| **Company** | **Comments** |
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**Issue 2-1-16b: Test cases for accuracy for NR-U inter-RAT measurements: RSSI and CO**

*The listed proposals are discussed in R4-2102524 (Ericsson)*

Should the test cases for E-UTRA-NR-U RSSI and CO measurement accuracy be included in the NR-U test case list?

* Proposal 1 (Ericsson): Add the following test cases on the test case list for NR-U:
  + 1b. E-UTRA-NR-U RSSI measurement accuracy requirements:
    - On NR-U neighbor, with E-UTRA (FDD,TDD) PCC
    - On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC
  + 1c. E-UTRA-NR-U CO measurement accuracy requirements:
    - On NR-U neighbor, with E-UTRA (FDD,TDD) PCC
    - On NR-U neighbor, with E-UTRA (FDD,TDD) PCC and NR-U PSCC
* Recommended WF
  + Discuss the proposals in the comment section. Can Proposal 1 be agreed?

Issue 2-1-16b Companies’ comments 1st week:

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| **Company** | **Comments** |
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### Sub-topic 2-2: Test case details for cell re-selection

*Sub-topic description: Proposals related to SFTD measurement test cases are discussed under this sub-topic:*

*Issue 2-2-1: Test configurations for cell re-selection*

*Issue 2-2-2: Cell specific test parameters for cell re-selection*

*Issue 2-2-3: Test requirements for cell re-selection*

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

**Issue 2-2-1: Test configurations for cell re-selection**

*The listed proposals are discussed in R4-2102244 (Ericsson)*

Which test configurations are to be included for cell re-selection test cases?

* Proposal 1 (Ericsson): The standalone cell reselection test cases are defined based on the test configurations shown in Table 1, Table 2 and Table 3.

|  |  |
| --- | --- |
| 1 | With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table 1 Configuration for cell change from NR-U to NR-U

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell with CCA | Description of a cell without CCA |
| 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table 2 Configuration for cell change from NR-U to NR

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell without CCA | Description of a cell with CCA |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table 3 Configuration for cell change from NR to NR-U

* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussion is to agree on test configurations on a general level i.e. issues on Sub-topic 1.1.

Issue 2-2-1 Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 2-2-2: Cell specific test parameters for cell re-selection**

*The listed proposals are discussed in R4-2102244 (Ericsson)*

Which cell specific test parameters should be included in cell re-selection test cases to account for LBT impact?

* Proposal 1 (Ericsson): Cell specific test parameters should contain following new or modified parameters to account for the LBT impact:
  + DL CCA model
  + UL CCA model
  + DBT Window Configuration
  + DL CCA probability PCCA\_DL
  + UL CCA probability PCCA\_UL
  + New RMCs
* Recommended WF
  + Discuss the proposal in the comment section. Can Proposal 1 be agreed?

Issue 2-2-2 Companies’ comments 1st week:

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| **Company** | **Comments** |
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**Issue 2-2-3: Test requirements for cell re-selection**

*The listed proposals are discussed in R4-2102244 (Ericsson)*

How to define test requirements for cell re-selection?

* Proposal 1 (Ericsson): Reselection test shall verify that maximum allowed CCA failures for Md, Mm and Me.
* Recommended WF
  + Discuss the proposal in the comment section. Can Proposal 1 be agreed?

Issue 2-2-3 Companies’ comments 1st week:

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| **Company** | **Comments** |
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### Sub-topic 2-3: Test case details for handover

*Sub-topic description: Proposals related to handover test cases are discussed under this sub-topic:*

*Issue 2-3-1: Test configurations for handover test cases*

*Issue 2-3-2: Cell specific test parameters for handover test cases*

*Issue 2-3-3: Test requirements for handover*

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

**Issue 2-3-1: Test configurations for handover test cases**

*The listed proposals are discussed in R4-2102242 (Ericsson)*

Which test configurations are to be included in handover test cases?

* Proposal 1 (Ericsson): Handover test case configurations are aligned with the configurations used in IDLE mode cell reselection test cases.
* For cell change from NR-U to NR-U:

|  |  |
| --- | --- |
| 1 | With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  With CCA: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table 1 Configuration for cell change from NR-U to NR-U

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell with CCA | Description of a cell without CCA |
| 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode |
| 2 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table 2 Configuration for cell change from NR-U to NR

|  |  |  |
| --- | --- | --- |
| Configuration | Description of a cell without CCA | Description of a cell with CCA |
| 1 | 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Table 3 Configuration for cell change from NR to NR-U

* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussion is to agree on test configurations on a general level i.e. issues on Sub-topic 1.1.

Issue 2-3-1 Companies’ comments 1st week:

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

**Issue 2-3-2: Cell specific test parameters for handover test cases**

*The listed proposals are discussed in R4-2102242 (Ericsson)*

Which cell specific test parameters should be included in handover test cases to account for LBT impact?

* Proposal 1 (Ericsson): Cell specific test parameters should contain following new or modified parameters to account for the LBT impact:
  + - DL CCA model
    - UL CCA model
    - DBT Window Configuration
    - DL CCA probability PCCA\_DL
    - UL CCA probability PCCA\_UL
    - New RMCs
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussion is to agree on test configurations on a general level i.e. issues on Sub-topic 1.1.

Issue 2-3-2 Companies’ comments 1st week:

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

**Issue 2-3-3: Test requirements for handover**

*The listed proposals are discussed in R4-2102242 (Ericsson)*

How to define test requirements for handover test cases?

* Proposal 1: (Ericsson): Handover delay verified in test requirements is expressed using a formula containing L1, L1’, L2 and L3 depending on the type of test case, and the total delay is limited by T304 timer.
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussion is to agree on test configurations on a general level i.e. issues on Sub-topic 1.1.

Issue 2-3-3 Companies’ comments 1st week:

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

### Sub-topic 2-4: Test case details for RRC re-establishment

*Sub-topic description: Proposals related to RRC re-establishment test cases are discussed under this sub-topic:*

*Issue 2-4-1: Test cases to be introduced for RRC re-establishment*

*Issue 2-4-2: Test configurations for RRC re-establishment test cases*

*Issue 2-4-3: LBT (CCA) model for RRC re-establishment test cases*

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

**Issue 2-4-1: Test cases to be introduced for RRC re-establishment**

*The listed proposals are discussed in R4-2102647 (Ericsson)*

Which test cases are to be included for RRC re-establishment?

* Proposal 1 (Ericsson): At least the following NR-U to NR-U RRC re-establishment tests to verify core requirements in clause 6.2.1A, TS 38.133, are defined:
  + TC1: Intra-frequency RRC Re-establishment in FR1 with known target cell subject to CCA
  + TC2: Inter-frequency RRC Re-establishment in FR1 with unknown target cell subject to CCA
  + TC3: Intra-frequency RRC Re-establishment in FR1 with unknown target cell subject to CCA
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussion is to agree on test configurations on a general level i.e. issues on Sub-topic 1.1.

Issue 2-4-1 Companies’ comments 1st week:

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

**Issue 2-4-2: Test configurations for RRC re-establishment test cases**

*The listed proposals are discussed in R4-2102647 (Ericsson)*

Which test configurations are to be included for RRC re-establishment test cases?

* Proposal 1: (Ericsson): NR-U to NR-U RRC re-establishment tests are defined for the following configuration related to SSB SCS and BW for both serving and target cells:

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussion is to agree on test configurations on a general level i.e. issues on Sub-topic 1.1.

Issue 2-4-2 Companies’ comments 1st week:

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

**Issue 2-4-3: LBT (CCA) model for RRC re-establishment test cases**

*The listed proposals are discussed in R4-2102647 (Ericsson)*

How to define the details of LBT (CCA) model for RRC re-establishment test cases?

* Proposal 1 (Ericsson): NR-U to NR-U RRC re-establishment tests are defined for the following LBT configuration/setting:
  + - Serving cell: PCCA\_UL=1 and PCCA\_DL=1 in all test times
    - Target cell: PCCA\_UL=1 and PCCA\_DL< 1 (e.g. 0.5) in all test times
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3.

Issue 2-4-3 Companies’ comments 1st week:

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

### Sub-topic 2-5: Test case details for RRC connection release with re-direction

*Sub-topic description: Proposals related to RRC connection release with re-direction test cases are discussed under this sub-topic:*

*Issue 2-5-1: Test cases to be introduced for RRC connection release with re-direction*

*Issue 2-5-2: Test configurations for RRC connection release with re-direction test cases*

*Issue 2-5-3: LBT (CCA) model for RRC connection release with re-direction test cases*

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

**Issue 2-5-1: Test cases to be introduced for RRC connection release with re-direction**

*The listed proposals are discussed in R4-2102648 (Ericsson)*

Which test cases are to be introduced for RRC connection release with re-direction?

* Proposal 1: (Ericsson): At least the following NR-U to NR-U RRC connection release with redirection test to verify core requirements in clause 6.2.3.2.3, TS 38.133, is defined:
  + - TC1: Redirection from NR with CCA in FR1 to NR in CCA in FR1
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussion is to agree on test configurations on a general level i.e. issues on Sub-topic 1.1.

Issue 2-5-1 Companies’ comments 1st week:

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

**Issue 2-5-2: Test configurations for RRC connection release with re-direction test cases**

*The listed proposals are discussed in R4-2102648 (Ericsson)*

Which test configurations are to be included in test cases for RRC connection release with re-direction?

* Proposal 1 (Ericsson): NR-U to NR-U RRC connection release with redirection tests are defined for the following configuration related to SSB SCS and BW for both serving and target cells:

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussion is to agree on test configurations on a general level i.e. issues on Sub-topic 1.1.

Issue 2-5-2 Companies’ comments 1st week:

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

**Issue 2-5-3: LBT (CCA) model for RRC connection release with re-direction test cases**

*The listed proposals are discussed in R4-2102648 (Ericsson)*

How to define the details of LBT (CCA) model for test cases for RRC connection release with re-direction?

* Proposal 1 (Ericsson): NR-U to NR-U RRC connection release with redirection test is defined for the following LBT configuration/setting:
  + - Serving cell: PCCA\_UL=1 and PCCA\_DL=1 in all test times
    - Target cell: PCCA\_UL=1 and PCCA\_DL< 1 (e.g. 0.75) in all test times
* Proposal 2 (Ericsson): In NR-U to NR-U RRC connection release with redirection test ensure that number of DL LBT failures (L1) in target cell does not exceed L1,max ; L1,max is defined in Table 6.2.3.2.3-1, TS 38.133.
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3.

Issue 2-5-3 Companies’ comments 1st week:

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

### Sub-topic 2-6: Test case details for timing

*Sub-topic description: Proposals related to timing test cases are discussed under this sub-topic:*

*Issue 2-6-1: Test configurations for UE transmit timing test cases*

*Issue 2-6-2: LBT (CCA) model for UE transmit timing test cases*

*Issue 2-6-3: Test configurations for UE timing advance adjustment accuracy test cases*

*Issue 2-6-4: LBT (CCA) model for UE timing advance adjustment accuracy test cases*

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

**Issue 2-6-1: Test configurations for UE transmit timing test cases**

*The listed proposals are discussed in R4-2102649 (Ericsson)*

Which test configurations to include for UE transmit timing test cases?

* Proposal 1 (Ericsson): The UE transmit timing tests are defined for the following configuration related to SSB SCS and BW in EN-DC and SA:

**Table 1: Configuration related to SSB SCS and BW in UE transmit timing tests in EN-DC**

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | |

**Table 2: Configuration related to SSB SCS and BW in UE transmit timing tests in SA**

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussion is to agree on test configurations on a general level i.e. issues on Sub-topic 1.1.

Issue 2-6-1 Companies’ comments 1st week:

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

**Issue 2-6-2: LBT (CCA) model for UE transmit timing test cases**

*The listed proposals are discussed in R4-2102649 (Ericsson)*

How to define the details of LBT (CCA) model for UE transmit timing test cases?

* Proposal 1 (Ericsson): UE transmit timing tests are defined for the following LBT configuration/setting in SpCell:
  + - PCCA\_UL=1 and PCCA\_DL < 1 depending on SSB periodicity (e.g. 0.5% for TSSB=20 ms) in all test times
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3.

Issue 2-6-2 Companies’ comments 1st week:

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

**Issue 2-6-3: Test configurations for UE timing advance adjustment accuracy test cases**

*The listed proposals are discussed in R4-2102649 (Ericsson)*

Which test configurations to include for UE timing advance adjustment accuracy test cases?

* Proposal 1 (Ericsson): The timing advance adjustment accuracy tests are defined for the following configuration related to SSB SCS and BW in EN-DC and SA:

**Table 1: Configuration related to SSB SCS and BW in UE timing advance tests in EN-DC**

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | |

**Table 2: Configuration related to SSB SCS and BW in UE advance timing tests in SA**

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussion is to agree on test configurations on a general level i.e. issues on Sub-topic 1.1.

Issue 2-6-3 Companies’ comments 1st week:

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

**Issue 2-6-4: LBT (CCA) model for UE timing advance adjustment accuracy test cases**

*The listed proposals are discussed in R4-2102649 (Ericsson)*

How to define the details for LBT model for UE timing advance adjustment accuracy test cases?

* Proposal 1 (Ericsson): UE timing advance adjustment accuracy tests are defined for the following LBT configuration/setting in SpCell:
  + - PCCA\_UL=1 and PCCA\_DL =1 in all test times
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3.

Issue 2-6-4 Companies’ comments 1st week:

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

### Sub-topic 2-7: Test case details for BWP switching

*Sub-topic description: Proposals related to BWP switching test cases are discussed under this sub-topic:*

*Issue 2-7-1: Test configurations for BWP switching test cases*

*Issue 2-7-2: LBT (CCA) model for BWP switching test cases*

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

**Issue 2-7-1: Test configurations for BWP switching test cases**

*The listed proposals are discussed in R4-2102651 (Ericsson)*

Which test configurations to include for BWP switching delay test cases?

* Proposal 1 (Ericsson): The tests for BWP switching under consistent UL failure are defined for the following configuration related to SSB SCS and BW in EN-DC and SA:

**Table 1: Configuration related to SSB SCS and BW in EN-DC**

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD,  With CCA: NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| Note 1: The UE is only required to be tested in one of the supported test configurations. | |

**Table 2: Configuration related to SSB SCS and BW iin SA**

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussion is to agree on test configurations on a general level i.e. issues on Sub-topic 1.1.

Issue 2-7-1 Companies’ comments 1st week:

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

**Issue 2-7-2: LBT (CCA) model for BWP switching test cases**

*The listed proposals are discussed in R4-2102651 (Ericsson)*

How to define the details of LBT (CCA) model for BWP switching test cases?

* Proposal 1 (Ericsson): The tests on BWP switching under consistent UL failure are defined for the following LBT configuration/setting in SpCell:

**Table 3: LBT settings in UL and DL BWPs in SpCell**

|  |  |  |
| --- | --- | --- |
| Active BWP in SpCell | PCCA\_UL | PCCA\_DL |
| UL active BWP before active BWP switching (UL BWP-1) | 0 | 1 |
| UL active BWP after active BWP switching (UL BWP-2) | 1 | 1 |
| DL active BWP before active BWP switching (DL BWP-1) | 1 | 1 |
| DL active BWP after active BWP switching (DL BWP-2) | 1 | 1 |

* Proposal 2 (Ericsson): Periodic SRS is configured in the SpCell to enable the UE to detect consistent UL LBT failure in the SpCell.
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3.

Issue 2-7-2 Companies’ comments 1st week:

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

### Sub-topic 2-8: Test case details for TCI state switching delay

*Sub-topic description: Proposals related to TCI state switching delay test cases are discussed under this sub-topic:*

*Issue 2-8-1: Test cases to be introduced for TCI state switching*

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

**Issue 2-8-1: Test cases to be introduced for TCI state switching**

*The listed proposals are discussed in R4-2102368 (Ericsson)*

Which test cases to introduce for TCI state switching delay?

* Proposal 1 (Ericsson): In Rel-16 NR-U, test cases for active TCI state switching are introduced for the following cases:
  + EN-DC, NR PSCell under CCA, known TCI state, MAC-based triggering
  + EN-DC, NR PSCell under CCA, known TCI state, RRC-based triggering
  + NR SA, PCell under CCA, known TCI state, MAC-based triggering
  + NR SA, PCell under CCA, known TCI state, RRC-based triggering
  + NR SA, SCell under CCA, known TCI state, MAC-based triggering
  + NR SA, SCell under CCA, known TCI state, RRC-based triggering
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussion is to agree on test configurations on a general level i.e. issues on Sub-topic 1.1.

Issue 2-8-1 Companies’ comments 1st week:

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

### Sub-topic 2-9: Test case details for Interruptions

*Sub-topic description: Proposals related to interruption test cases are discussed under this sub-topic:*

*Issue 2-9-1: Deactivated SCell measurement cycle for interruption test cases*

*Issue 2-9-2: LBT (CCA) model for interruption test cases*

*Issue 2-9-3: Phases of interruption test cases*

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

**Issue 2-9-1: Deactivated SCell measurement cycle for interruption test cases**

*The listed proposals are discussed in R4-2102368 (Ericsson)*

What should be the measurement cycle for deactivated SCell in interruption test cases?

* Proposal 1 (Ericsson): During interruption tests, a deactivated SCell measurement cycle of 160ms is used.
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.

Issue 2-9-1 Companies’ comments 1st week:

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

**Issue 2-9-2: LBT (CCA) model for interruption test cases**

*The listed proposals are discussed in R4-2102368 (Ericsson)*

How to define the details of LBT model for interruption test cases?

* Proposal 1 (Ericsson): LBT model is configured in interruption tests, with a channel access success probability P=[0.75]
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3.

Issue 2-9-2 Companies’ comments 1st week:

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

**Issue 2-9-3: Phases of interruption test cases**

*The listed proposals are discussed in R4-2102368 (Ericsson)*

How to define the different phases of interruption test cases?

* Proposal 1 (Ericsson): The interruption requirements are verified in tests with the following phases
  + - T1 : UE is configured with PCell and PScell if applicable, and measures/reports candidate Scell such that it will be known in T2
    - T2 : Scell is added, interruption requirement verified
    - T3 : Scell is activated, interruption requirement verified
    - T4 : Scell is deactivated, interruption requirement verified
    - T5 : Deactivated Scell measurement interruption requirement is verified
    - T6 : Scell is released, interruption requirement verified
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.

Issue 2-9-3 Companies’ comments 1st week:

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

### Sub-topic 2-10: Test case details for SCell activation/deactivation

*Sub-topic description: Proposals related to SCell activation/deactivation test cases are discussed under this sub-topic:*

*Issue 2-10-1: Measurement cycles for SCell (de)activation test cases*

*Issue 2-10-2: LBT (CCA) model for SCell (de)activation test cases*

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

**Issue 2-10-1: Measurement cycles for SCell (de)activation test cases**

*The listed proposals are discussed in R4-2102368 (Ericsson)*

How to take into account different measurement cycles for SCell (de)activation in the test cases?

* Proposal 1 (Ericsson): Define test cases for SCell (de)activation of known SCell in NR-U for both measurement cycles 160 and 320ms.
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.

Issue 2-10-1 Companies’ comments 1st week:

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

**Issue 2-10-2: LBT (CCA) model for SCell (de)activation test cases**

*The listed proposals are discussed in R4-2102368 (Ericsson)*

How to model LBT (CCA) in SCell (de)activation test cases?

* Proposal 1 (Ericsson): Test cases for SCell (de)activation testing with NR PCC in FR1 with SCC under CCA are modeled with only DL CCA in SCell.
* Proposal 2 (Ericsson): Test cases for SCell (de)activation testing with NR PCC under CCA with SCC under CCA are modeled with DL CCA in SCell and UL CCA in PCell.
* Proposal 3 (Ericsson): Test cases for SCell (de)activation testing with NR PSCC under CCA with SCC under CCA are modeled with DL CCA in SCell and UL CCA in PSCell.
* Proposal 4 (Ericsson): For UL CCA model in SCell (de)activation testing, PCCA\_UL = [0.75] is used for all time intervals.
* Proposal 5 (Ericsson): For DL CCA model in SCell (de)activation testing, PCCA\_DL = [0.75] is used for all time intervals.
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3.

Issue 2-10-2 Companies’ comments 1st week:

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

### Sub-topic 2-11: Test case details for RLM

*Sub-topic description: Proposals related to RLM test cases are discussed under this sub-topic:*

*Issue 2-11-1: Test case sections to be introduced for RLM*

*Issue 2-11-2: SNR combinations for RLM tests*

*Issue 2-11-3: Test configurations for RLM tests*

*Issue 2-11-4: LBT (CCA) model for RLM tests*

*Issue 2-11-5: Testing for UE with different capabilities and under different channel occupancy*

*Issue 2-11-6: Test cases for 4RX UEs*

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

**Issue 2-11-1: Test case sections to be introduced for RLM**

*The listed proposals are discussed in R4-2102529 (Ericsson)*

Which test cases are to be introduced for RLM?

* Proposal 1(Ericsson):
  + The following sections for NR-U RLM are added:
    - For PSCell in Scenario B:
      * A.10.3.1.2 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode
      * A.10.3.1.3 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in non-DRX mode
      * A.10.3.1.4 Radio link monitoring out-of-sync test for PSCell configured with SSB-based RLM RS in DRX mode
      * A.10.3.1.5 Radio link monitoring in-sync test for PSCell configured with SSB-based RLM RS in DRX mode
    - For PCell in Scenario C:
      * A.11.4.1.2 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in non-DRX mode
      * A.11.4.1.3 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in non-DRX mode
      * A.11.4.1.4 Radio link monitoring out-of-sync test for PCell configured with SSB-based RLM RS in DRX mode
      * A.11.4.1.5 Radio link monitoring in-sync test for PCell configured with SSB-based RLM RS in DRX mode
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.

Issue 2-11-1 Companies’ comments 1st week:

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

**Issue 2-11-2: SNR combinations for RLM tests**

*The listed proposals are discussed in R4-2102529 (Ericsson)*

Which SNR combinations are to be tested for each RLM test?

* Proposal 1 (Ericsson): For RLM out-of-sync, Test 1 and Test 2 (with different SNR combinations) are developed for testing both requirements (RLM-RS SSB Es/Iot ≥-7 dB and for RLM-RS SSB Es/Iot <-7 dB).
  + 1a. For RLM out-of-sync, Test 1 SNRs: (1 dB, [-7 dB], [-15 dB]).
  + 1b. For RLM out-of-sync, Test 2 SNRs: (1 dB, [-3 dB], [-7 dB]).
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.

Issue 2-11-2 Companies’ comments 1st week:

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

**Issue 2-11-3: Test configurations for RLM tests**

*The listed proposals are discussed in R4-2102529 (Ericsson)*

Which test configurations are to be included in the RLM tests?

* Proposal 1 (Ericsson): Test configurations for NR PCell (Scenario C) and NR PSCell (Scenario B) in all NR-U RLM test cases:
  + <TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz>
  + Note: in Scenario B, the above configuration is further combined with LTE FDD and LTE TDD, resulting in two configurations in test cases for Scenario B.

EN-DC:

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| 2 | LTE TDD; NR: TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz |
| NOTE: The UE is only required to pass in one of the supported test configurations above. | |

SA:

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | TDD, SSB SCS 30 kHz, data SCS 30 kHz, bandwidth 40 MHz |

* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level, i.e. issues on Sub-topic 1-1.

Issue 2-11-3 Companies’ comments 1st week:

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

**Issue 2-11-4: LBT (CCA) model for RLM tests**

*The listed proposals are discussed in R4-2102529 (Ericsson)*

Details of LBT (CCA) model for RLM tests?

* Proposal 1 (Ericsson): DL CCA model for RLM in-sync:
  + T1: DL PCCA=1.0,
  + T2-T5: DL PCCA=TBD.
* Proposal 2 (Ericsson): UL CCA model for RLM in-sync: UL PCCA=1.0 in T1-T5.
* Proposal 3: (Ericsson): DL CCA model for RLM out-of-sync:
  + T1: DL PCCA=1.0,
  + T2, T3: DL PCCA=TBD.
* Proposal 4 (Ericsson): UL CCA model for RLM out-of-sync: UL PCCA=1.0 in T1-T3.

Recommended WF

* Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3.

Issue 2-11-4 Companies’ comments 1st week:

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

**Issue 2-11-5: Testing for UE with different capabilities and under different channel occupancy**

*The listed proposals are discussed in R4-2102529 (Ericsson)*

How to test RLM for a UE with different capabilities?

* Proposal 1 (Ericsson): Use PCCA=0.75 and PCCA=0.5 in RLM out-of-sync test cases.
* Proposal 2 (Ericsson): Use PCCA=0.6 in RLM in-sync test cases.

Recommended WF

* + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.

Issue 2-11-5 Companies’ comments 1st week:

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

**Issue 2-11-6: Test cases for 4RX UEs**

* Proposal 1 (Ericsson): For NR-U, all relevant test cases (e.g., RLM test cases) have to also cover 4 RX UEs (similar to legacy Rel-16 NR).

Recommended WF

* + Can proposal 1 be agreed?

Issue 2-11-6 Companies’ comments 1st week:

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

### Sub-topic 2-12: Test case details for link recovery

*Sub-topic description: Proposals related to link recovery test cases are discussed under this sub-topic:*

*Issue 2-12-1: Test case sections to be introduced for BFD and link recovery*

*Issue 2-12-2: Tests to be introduced for BFD and link recovery and test details*

*Issue 2-12-3: LBT (CCA) model for BFD and link recovery and test details*

*Issue 2-12-4: Test case sections to be introduced for L1-RSRP reporting*

*Issue 2-12-5: Reporting requirements for L1-RSRP measurement procedure test cases*

*Issue 2-12-6: LBT (CCA) model for L1-RSRP measurement reporting tests*

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

**Issue 2-12-1: Test case sections to be introduced for BFD and link recovery**

*The listed proposals are discussed in R4-2101432 (Ericsson)*

Which test cases are to be included for BFD and link recovery?

* Proposal 1 (Ericsson):
  + Define the following BFD and LR test cases for NR-U:
    - A.10.3.4.1 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in non-DRX mode
    - A.10.3.4.2 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in DRX mode
    - A.11.4.4.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode
    - A.11.4.4.2 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.

Issue 2-12-1 Companies’ comments 1st week:

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

**Issue 2-12-2: Tests to be introduced for BFD and link recovery and test details**

*The listed proposals are discussed in R4-2101432 (Ericsson)*

How to define BFD and link recovery tests for different evaluation period depending on different BFD-RS SSB ES/Iot?

* Proposal 1 (Ericsson): To verify the different evaluation period (for BFD-RS SSB Es/Iot ≥ -7 dB and (BFD-RS SSB Es/Iot < -7 dB) in Table 8.5A.2.2-1, define the test cases with
  + 1) BFD-RS SSB Es/Iot ≥ -7 dB and
  + 2) BFD-RS SSB Es/Iot < -7 dB to verify the different evaluation period.
* Proposal 2 (Ericsson): For the case with BFD-RS SSB Es/Iot < -7 dB, set SSB Es/Iot = -3dB in T2 and set SSB Es/Iot = -12dB in T3/T4/T5, by reusing the test cases defined in Rel-15.
* Proposal 3 (Ericsson): For the case with BFD-RS SSB Es/Iot ≥ -7 dB, set SSB Es/Iot = [-1]dB in T2 and set SSB Es/Iot = [-7]dB in T3/T4/T5.
* Proposal 4 (Ericsson): SNR test points for BFD and LR tests with CCA should be adjusted for UEs capable of 4Rx, i.e., set lower SNR test point than the tests for 2Rx UEs.
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.

Issue 2-12-2 Companies’ comments 1st week:

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

**Issue 2-12-3: LBT (CCA) model for BFD and link recovery and test details**

*The listed proposals are discussed in R4-2101432 (Ericsson)*

How to define LBT (CCA) model details for BFD and link recovery tests?

* Proposal 1 (Ericsson): BFD and LR tests specify the DL/UL CCA success rate given by PCCA\_DL and PCCA\_UL.
* Proposal 2 (Ericsson): BFD and LR tests set different PCCA according to the assumed channel access mode, i.e., LBE and FBE. Set higher DL CCA success rate (e.g. 0.75) for FBE and lower DL CCA success rate (e.g. 0.5) for LBE during the tests.
* Proposal 3 (Ericsson): Assume no UL CCA failure during the BFD and LR tests, that is, PCCA\_UL=1.0.
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3.

Issue 2-12-3 Companies’ comments 1st week:

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

**Issue 2-12-4: Test case sections to be introduced for L1-RSRP reporting**

*The listed proposals are discussed in R4-2101432 (Ericsson)*

Which test cases are to be defined for L1-RSRP measurement procedure?

* Proposal 1 (Ericsson): Define the following L1-RSRP measurement procedure test cases for NR-U:
  + A.9.3.3.1 SSB based L1-RSRP measurement when DRX is not used (SA SCell with NR PCell)
  + A.9.3.3.2 SSB based L1-RSRP measurement when DRX is used (SA SCell with NR PCell)
  + A.10.4.3.1 SSB based L1-RSRP measurement on PSCC when DRX is not used (EN-DC PSCell)
  + A.10.4.3.2 SSB based L1-RSRP measurement on PSCC when DRX is used (EN-DC PSCell)
  + A.10.4.3.3 SSB based L1-RSRP measurement on SCC when DRX is not used (EN-DC SCell with LTE PCell and NR-U PSCell)
  + A.10.4.3.4 SSB based L1-RSRP measurement on SCC when DRX is used (EN-DC SCell with LTE PCell and NR-U PSCell)
  + A.11.5.4.1 SSB based L1-RSRP measurement when DRX is not used (SA PCell)
  + A.11.5.4.2 SSB based L1-RSRP measurement when DRX is used (SA PCell)
  + A.11.5.4.3 SSB based L1-RSRP measurement on SCC when DRX is not used (SA SCell with NR-U PCell)
  + A.11.5.4.4 SSB based L1-RSRP measurement on SCC when DRX is used (SA SCell with NR-U PCell)
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.§

Issue 2-12-4 Companies’ comments 1st week:

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

**Issue 2-12-5: Reporting requirements for L1-RSRP measurement procedure test cases**

*The listed proposals are discussed in R4-2101432 (Ericsson)*

Es/Ioc to be used in L1-RSRP measurement procedure tests with CCA?

* Proposal 1 (Ericsson): For L1-RSRP measurement procedure tests with CCA, reuse the same Es/Ioc as Rel-15 tests.

How to define reporting requirements for L1-RSRP measurement procedure test cases?

* Proposal 2 (Ericsson): For NR-U L1-RSRP measurement procedure tests with DRX and non-DRX cases, RAN4 sets the same T1/T2 and reporting timing requirements as Rel-15 test, that is,
  + T1=5s, T2=1s.
  + TReport=80 slots (Periodic L1-RSRP reporting with PUCCH)
  + The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement.
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.

Issue 2-12-5 Companies’ comments 1st week:

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

**Issue 2-12-6: LBT (CCA) model for L1-RSRP measurement reporting tests**

*The listed proposals are discussed in R4-2101432 (Ericsson)*

How to define the details of LBT (CCA) model for L1-RSRP measurement procedure tests?

* Proposal 1 (Ericsson): L1-RSRP measurement procedure tests specify the DL/UL CCA success rate given by PCCA\_DL and PCCA\_UL.
* Proposal 2 (Ericsson): L1-RSRP measurement procedure tests set PCCA\_DL < 1 (e.g., 0.75). Set the common PCCA\_DL applicable for both FBE and LBE.
* Proposal 3 (Ericsson): RAN4 discuss whether L1-RSRP measurement procedure tests consider UL CCA failure or not during the tests. If not considered, set PCCA\_UL=1.0 in the test cases.
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3. Issue 2-12-6 Companies’ comments 1st week:

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

### Sub-topic 2-13: Test case details for RRM measurements: Intra-frequency, inter-frequency and inter-RAT

*Sub-topic description: Proposals related to RRM measurement test cases are discussed under this sub-topic:*

*Issue 2-13-1: Test case sections to be introduced for intra-frequency measurements*

*Issue 2-13-2: Test configurations for RRM measurements*

*Issue 2-13-3: LBT (CCA) configuration for RRM measurement test cases*

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

**Issue 2-13-1: Test case sections to be introduced for intra-frequency measurements**

*The listed proposals are discussed in R4-2102531 (Ericsson)*

Which test cases are to be defined for intra-frequency measurements?

* Proposal 1 (Ericsson): The following test cases are defined for NR-U intra-frequency RRM measurements for PCC, SCC, and PSCC:
  + SA event triggered reporting test without gaps under non-DRX,
  + SA event triggered reporting test without gaps under DRX,
  + SA event triggered reporting test with per-UE gaps under non-DRX,
  + SA event triggered reporting test with per-UE gaps under DRX.
* Proposal 2 (Ericsson): Each test case is conducted for three A3 measurement quantities: SS-RSRP, SS-RSRQ, SS-SINR.
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.

Issue 2-13-1 Companies’ comments 1st week:

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

**Issue 2-13-2: Test configurations for RRM measurements**

*The listed proposals are discussed in R4-2102531 (Ericsson)*

Which test configurations are to be added for RRM measurements?

* Proposal 1 (Ericsson): Test configurations to be introduced for RRM measurements:

Scenario A:

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Scenario B:

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Scenario C:

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Inter-RAT E-UTRAN-NR-U:

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level, i.e. issues on Sub-topic 1-1.

Issue 2-13-2 Companies’ comments 1st week:

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

**Issue 2-13-3: LBT (CCA) configuration for RRM measurement test cases**

*The listed proposals are discussed in R4-2102531 (Ericsson)*

How to define the details of LBT (CCA) model for RRM measurement test cases?

* Proposal 1 (Ericsson): UL CCA model: PCCA\_UL=1.0 in all time intervals (T1 and T2).
* Proposal 2: (Ericsson): DL CCA model: PCCA\_DL=[0.75] in all time intervals (T1 and T2).
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3.

Issue 2-13-3 Companies’ comments 1st week:

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

### Sub-topic 2-14: Test case details for RSSI and CO measurements

*Sub-topic description: Proposals related to RSSI and CO measurement test cases are discussed under this sub-topic:*

*Issue 2-14-1: Test case sections to be introduced for RSSI and CO measurements*

*Issue 2-14-2: LBT (CCA) model for RSSI and CO measurements*

*Issue 2-14-3: Number of cells for RSSI and CO measurements*

*Issue 2-14-4: Test coverage for RSSI and CO measurements*

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

**Issue 2-14-1: Test configurations to be introduced for RSSI and CO measurements**

*The listed proposals are discussed in R4-2102531 (Ericsson)*

Which test configurations are to be included for RSSI and CO measurements?

* Proposal 1 (Ericsson): In RSSI and CO test cases, the test configurations are the same as for RRM measurement:

Scenario A:

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | Without CCA: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 3 | Without CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode  With CCA: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Scenario B:

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

Scenario C:

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |

Inter-RAT E-UTRAN-NR-U:

|  |  |
| --- | --- |
| Configuration | Description |
| 1 | LTE FDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD; NR: 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| NOTE: The UE is only required to be tested in one of the supported test configurations. | |

* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level, i.e. issues on Sub-topic 1-1.

Issue 2-14-1 Companies’ comments 1st week:

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

**Issue 2-14-2: LBT (CCA) model for RSSI and CO measurements**

*The listed proposals are discussed in R4-2102531 (Ericsson)*

How to define LBT (CCA) model details for RSSI and CO measurement test cases?

* Proposal 1 (Ericsson): UL CCA model: PCCA\_UL=1.0
* Proposal 2 (Ericsson): DL CCA model: PCCA\_DL=1.0
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3.

Issue 2-14-2 Companies’ comments 1st week:

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

**Issue 2-14-3: Number of cells for RSSI and CO measurements**

*The listed proposals are discussed in R4-2102531 (Ericsson)*

How to define the number of cells for RSSI and CO measurement test cases?

* Proposal 1 (Ericsson): Number of cells for RSSI and CO measurements:
  + Scenario A:
    - Intra-frequency RSSI/CO: 2 cells (PCell, SCell)
    - Inter-frequency RSSI/CO: 2 cells (PCell, SCell) and 1 inter-frequency for RSSI/CO
  + Scenario B:
    - Intra-frequency RSSI/CO: 2 cells (E-UTRAN PCell, NR PSCell)
    - Inter-frequency RSSI/CO: 2 cells (E-UTRAN PCell, NR PSCell) and 1 inter-frequency for RSSI/CO
  + Scenario C:
    - Intra-frequency RSSI/CO: 1 cell (PCell)
    - Inter-frequency RSSI/CO: 1 cell (PCell) and 1 inter-frequency for RSSI/CO
  + Standalone Inter-RAT E-UTRAN-NR-U:
    - Inter-RAT RSSI/CO: 1 cell (E-UTRAN PCell) and 1 inter-RAT frequency for RSSI/CO
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.

Issue 2-14-3 Companies’ comments 1st week:

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

**Issue 2-14-4: Test coverage for RSSI and CO measurements**

*The listed proposals are discussed in R4-2102531 (Ericsson)*

How to define the test coverage for intra- and inter-frequency RSSI and CO measurement test cases?

* Proposal 1 (Ericsson): The following test coverage is proposed for *intra-frequency* RSSI and CO:
  + RSSI:
    - Test 1: Non-DRX, SMTC and RMTC are overlapping
    - Test 2: DRX, SMTC and RMTC are not overlapping
  + CO:
    - Test 1: DRX, SMTC and RMTC are overlapping
    - Test 2: Non-DRX, SMTC and RMTC are not overlapping
* Proposal 2 (Ericsson): The following test coverage is proposed for *inter-frequency* RSSI and CO:
  + - RSSI:
      * Non-DRX
    - CO:
      * DRX
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.

Issue 2-14-4 Companies’ comments 1st week:

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

### Sub-topic 2-15: Test case details for SFTD measurements

*Sub-topic description: Proposals related to SFTD measurement test cases are discussed under this sub-topic:*

*Issue 2-15-1: Test configurations for SFTD measurements*

*Issue 2-15-2: Reporting in SFTD measurements*

*Issue 2-15-3: LBT (CCA) model for SFTD measurements*

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

**Issue 2-15-1: Test configurations for SFTD measurements**

*The listed proposals are discussed in R4-2102531 (Ericsson)*

Which test configurations are to be included in SFTD measurement test cases?

* Proposal 1 (Ericsson): The following test configurations are used for inter-RAT SFTD reporting delay test with NR target under CCA

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level, i.e. issues on Sub-topic 1-1.

Issue 2-15-1 Companies’ comments 1st week:

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

**Issue 2-15-2: Reporting in SFTD measurements**

*The listed proposals are discussed in R4-2102531 (Ericsson)*

Which reporting types are inter-RAT reporting delay test cases to be based on?

* Proposal 1 (Ericsson): Inter-RAT reporting delay test cases are based on SFTD reporting only, i.e. no additional SS-RSRP reporting.
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level.

Issue 2-15-2 Companies’ comments 1st week:

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

**Issue 2-15-3: LBT (CCA) model for SFTD measurements**

*The listed proposals are discussed in R4-2102531 (Ericsson)*

How to define the details of LBT (CCA) model for SFTD measurement test cases?

* Proposal 1 (Ericsson): Test case for inter-RAT SFTD reporting delay for SFTD between EUTRA PCell and NR neighbour cell on NR carrier under CCA is modelled with DL CCA on the NR carrier.
* Proposal 2 (Ericsson): For DL CCA model in inter-RAT SFTD reporting delay test, PCCA\_DL = [0.75] is used as initial assumption.
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3. Issue 2-15-3 Companies’ comments 1st week:

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

### Sub-topic 2-16: Test case details for SFTD measurement accuracy

*Sub-topic description: Proposals related to SFTD measurement test cases are discussed under this sub-topic:*

*Issue 2-16-1: Test configurations for inter-RAT SFTD measurement accuracy*

*Issue 2-16-2: LBT (CCA) model for inter-RAT SFTD measurement accuracy*

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

**Issue 2-16-1: Test configurations for inter-RAT SFTD measurement accuracy**

*The listed proposals are discussed in R4-2102371 (Ericsson)*

Which test configurations are to be included in inter-RAT SFTD measurement accuracy test cases?

* Proposal 1 (Ericsson): The following test configurations for NR-U Inter-RAT SFTD accuracy testing are to be supported:

|  |  |
| --- | --- |
| Config | Description |
| 1 | LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| 2 | LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode |
| Note: The UE is only required to be tested in one of the supported test configurations | |

* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on test configurations on a general level, i.e. issues on Sub-topic 1-1.

Issue 2-16-1 Companies’ comments 1st week:

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

**Issue 2-16-2: LBT (CCA) model for inter-RAT SFTD measurement accuracy**

*The listed proposals are discussed in R4-2102371 (Ericsson)*

How to define the details of LBT (CCA) model for inter-RAT SFTD measurement accuracy test cases?

* Proposal 1 (Ericsson): In test cases for NR-U Inter-RAT SFTD measurement accuracy, as initial assumption the NR target cell is modelled with DL CCA PCCA\_DL = [0.75].
* Recommended WF
  + Comments on the proposal to be collected in the comment section, but priority for the first round discussions is to agree on the LBT model on a general level, i.e. issues on Sub-topic 2-1, 2-2 and 2-3.

Issue 2-16-2 Companies’ comments 1st week:

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

### CRs/TPs comments collection

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

|  |  |
| --- | --- |
| **CR/TP number** | **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”* |
| AI 7.1.6.1, General | |
| AI 7.1.6.3.2, RRC IDLE, cell re-selection | |
| [**R4-2102243**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102243.zip)  Ericsson  CR | Introduction of NR-U cell reselection tests |
|  |
| AI 7.1.6.3.3, HO delay and interruptions | |
| [**R4-2101135**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101135.zip)  Nokia  draftCR | Draft TC E-UTRAN - NR-U Handover |
|  |
| [**R4-2101649**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101649.zip)  Huawei, HiSilicon  draftCR | Draft CR of test cases for HO delay and interruption for NR-U |
|  |
| AI 7.1.6.3.4, RRC re-establishment | |
| [**R4-2101136**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101136.zip)  Nokia  draftCR | Draft TC RRC re-establishment with CCA |
|  |
| AI 7.1.6.3.5, RRC connection release with re-direction | |
| [**R4-2101650**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101650.zip)  Huawei, HiSilicon  draftCR | Draft CR of test cases for RRC release with redirection for NR-U |
|  |
| AI 7.1.6.3.6, Timing | |
| [**R4-2100774**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100774.zip)  MediaTek inc.  draftCR | Introduction of test cases for UE transmit timing requirements with CCA |
|  |
| [**R4-2102650**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102650.zip)  Ericsson  draftCR | UE timing tests for NR-U |
|  |
| AI 7.1.6.3.7, BWP switching delay and interruptions | |
| [**R4-2102652**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102652.zip)  Ericsson  draftCR | Test cases on BWP switching with consistent UL LBT failures |
|  |
| AI 7.1.6.3.8, PSCell addition/release | |
| [**R4-2101651**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101651.zip)  Huawei, HiSilicon  draftCR | Draft CR of test cases for PSCell addition and release for NR-U |
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| AI 7.1.6.3.9, Interruptions | |
| [**R4-2102369**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102369.zip)  Ericsson  draftCR | DraftCR Introduction of NR-U SCell interruption and SCell (de)activation tests |
|  |
| AI 7.1.6.3.10, RLM | |
| [**R4-2102530**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102530.zip)  Ericsson  draftCR | RLM test cases |
|  |
| AI 7.1.6.3.11, Beam management | |
| [**R4-2101433**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101433.zip)  Ericsson  draftCR | Draft CR: test cases for beam management in NR-U |
|  |
| AI 7.1.6.3.12, Intra-frequency, inter-frequency and inter-RAT measurement requirements | |
| [**R4-2101137**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101137.zip)  Nokia  draftCR | Draft TC NR-U inter-frequency measurements |
|  |
| [**R4-2101652**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101652.zip)  Huawei, HiSilicon  draftCR | Draft CR of test cases for inter-RAT measurement for NR-U |
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| [**R4-2102532**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102532.zip)  Ericsson  draftCR | NR-U RRM, SFTD, RSSI, and CO measurements test cases |
|  |
| AI 7.1.6.3.13, Accuracy requirements for NR-U intra-frequency, inter-frequency and inter-RAT measurements | |
| [**R4-2101015**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101015.zip)  Apple  draftCR | TCs for RSSI and CO measurement accuracy in NR-U R16 |
|  |
| [**R4-2101653**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101653.zip)  Huawei, HiSilicon  draftCR | Draft CR of test cases for intra-frequency measurement accuracy for NR-U |
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| [**R4-2102372**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102372.zip)  Ericsson  draftCR | DraftCR 38.133 NR-U Inter-RAT SFTD accuracy TC |
|  |
| [**R4-2100775**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100775.zip)  MediaTek inc.  draftCR | Introduction of test cases for Accuracy for NR-U inter-frequency SS-RSRP measurements |
|  |
| [**R4-2100776**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2100776.zip)  MediaTek inc.  draftCR | Introduction of test cases for L1-RSRP measurement accuracy with CCA serving cell |
|  |

## Summary for 1st round

### Open issues

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

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

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

|  |  |
| --- | --- |
| **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)

Please continue discussion in open issues summary, after the 2nd week/round delimiter.  
Please also continue the TP/CR discussions above.

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Topic #3: Spec structure and applicability rules

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

## Companies’ contributions summary

The companies contributions on this topic are combined in papers in the other topics, and can be found in Section 1.1 and 2.1.

## Open issues summary and view’s collection for the 1st round

### Sub-topic 3-1: Differentiation between UEs supporting LBE, FBE or both

**Issue 3-1-1: Applicability rules for UEs supporting both LBE and FBE**

* Option 1 (ZTE): If a UE claims to support both modes then the UE shall pass tests for both modes. De-prioritize the discussion if needed since this shall be seen as a corner case.
* Option 2 (Qualcomm): A UE that signals both FBE and LBE capability need to test only LBE test cases

Companies’ comments 1st week:

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

**Issue 3-1-2: Applicability rules for UEs supporting LBE**

* Option 1 (Qualcomm): Only FBE based test cases apply to a UE that signals FBE only capability.

Companies’ comments 1st week:

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

**Issue 3-1-3: Applicability rules for UEs supporting FBE**

* Option 1 (Qualcomm): Only LBE based test cases apply to a UE that signals LBE only capability.

Companies’ comments 1st week:

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

### Sub-topic 3-2: Specification structure for test cases

*Sub-topic description: Discussion about specification structure based on proposals in discussion papers.*

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

**Issue 3-2-1: Test cases with PCell in FR1 and no SCell under CCA**

*The listed proposals are discussed in R4-2100773 (MediaTek)*

In which section to include test cases with PCell in FR1 and no SCell under CCA?

* Proposal 1 (MediaTek): A.9 is also used for the test cases for when Pcell is in FR1 and no SCell under CCA has been configured, e.g. inter-frequency measurement under CCA.

Recommended WF

* Discuss the proposal in the comment section.

Companies’ comments 1st week:

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

### CRs/TPs comments collection

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

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| [**R4-2102523**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102523.zip)  Ericsson  draftCR | **Draft Big CR: Introduction of Rel-16 NR-U RRM performance requirements** |
| Company A: comments |
|  |
|  |
| [**R4-2102525**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2102525.zip)  Ericsson  draftCR | **NR-U test cases structure** |
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## Summary for 1st round

### Open issues

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

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

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

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
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## Discussion on 2nd round (if applicable)

Please continue discussion in open issues summary, after the 2nd week/round delimiter.  
Please also continue the TP/CR discussions above.

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |