**3GPP TSG-RAN WG4 Meeting # 101-Bis-e R4-210XXXX**

**Electronic Meeting, Jan. 17th – 25th, 2022**

**Agenda item:** 6.9.1, 6.9.3

**Source:** Moderator (Samsung)

**Title:** Email discussion summary for [101-e][124] NR\_HST\_FR2\_enh

**Document for:** Information

# Introduction

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

In RAN Plenary #89-e, the RAN4-led work item of NR support for high speed train (HST) scenario in FR2 has been approved [RP-202118] (which has been further revised to [RP-210800] with editorial revisions and updates on time schedule).

Based on approved WF [R4-2120066], the following agreement and conclusion were made on UE RF core requirement for FR2 HST UE:

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| * + WF1: UE RF requirement framework and Power Class     - For power class, the following agreement is achieved in GTW (Thursday, 4th Nov):       * Proposal 1: Introduce new power class for FR2 HST UE, by numbering as UE power class 6 and specifying UE type as:  |  |  | | --- | --- | | UE Power class | UE type | | 1 | Fixed wireless access (FWA) UE | | 2 | Vehicular UE | | 3 | Handheld UE | | 4 | High power non-handheld UE | | 5 | Fixed wireless access (FWA) UE | | 6 | High Speed Train Roof-Mounted UE |   Agreement: the proposal 1 is agreed.   * + - For UE RF requirement framework, the following agreement is achieved in GTW (Thursday, 4th Nov):   Agreement:   * + - * The unified RF requirements for FR2 HST UE are defined except spherical coverage         + FFS on spherical coverage requirements   Option 1: use the union of the largest spherical coverage of theta and phi to define the unified requirements  Option 2: The unified RF requirement for FR2 HST UE is defined based on one particular scenario requiring the largest spherical coverage.   * + - For UE RF requirement framework, the following agreement is achieved in GTW (Friday, 12th Nov):   Agreement: The assumption that UE has two panels, i.e., back-to-back panels, will be used to derive spherical coverage requirements.   * + - * Further discuss whether one panel based spherical coverage requirement will be specified       * FFS on whether to mandate two panels.   + WF2: Minimum Peak EIRP     - In RAN4#99-e, the following agreement is reached [R4-2107861]:  |  | | --- | | * WF3: Minimum Peak EIRP   + Minimum peak EIRP requirement for FR2 HST UE:     - RAN4 adopt 30.x dBm (similar to PC5) as baseline.     - The baseline could be further discussed if technical issue identified. |  * + - In this meeting, the following confirmation is reached:       * Minimum peak EIRP requirement for FR2 HST UE:         + Keep existing agreement from RAN4#99-e   + WF3: Spherical coverage     - The following agreement is achieved in GTW (Thursday, 11th Nov):   Agreement:   * + - * Directions of antenna panels:         + Boresight directions for forward and backward panels shall be declared by UE vendors.   FFS whether the limitation on boresight directions is needed   * + - * Coordination system to be used for requirement definition:         + Option-1: absolute coordination system:         + Option 2: relative coordination system (relative to the claimed boresight direction)       * Spherical coverage x%-tile point per panel         + Azimuth angle (i.e., phi) range to cover:   Option-1: [-45, +45] degree relative to absolute coordination system  Option-2: [-25, +25] degree relative to UE declared boresight direction  Other options are not precluded   * + - * + Elevation angle (i.e., theta) range to cover:   Option-1: [45, 90] degree relative to absolute coordination system  Option-2: [-10, +10] degree relative to UE declared boresight direction   * + WF4: Beam correspondence for FR2 HST UE     - In this meeting, the following agreement is reached:       * For FR2 HST UE, the beam correspondence support can be summarized in the following table:  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | FR2 Power Class | Rel-15 BC Feature *beamCorrespondenceWithoutUL-BeamSweeping* | Rel-16 SSB based enhanced BC *beamCorrespondenceSSB-based-r16* | Rel-16 CSI-RS based enhanced BC *beamCorrespondenceCSI-RS-based-r16* | Requirement Applicability for  (1) Minimum peak EIRP, spherical coverage requirement (2) BC Tolerance requirement | Side condition | | FR2 HST UE (PC X) | Supported (Mandatory) | Supported (Mandatory) | Not Supported | Meet (1) w/o UL beam sweeping BC Tolerance req. (2) is met implicitly | Side condition for SSB based enh. BC  (CSI-RS not provided) | | Supported | Side condition for CSI-RS based enh. BC  (weak SSB) |  * + WF5: RX Requirement for FR2 HST UE     - In this meeting, the following agreement is reached:       * For FR2 HST UE, RAN4 adopt REFSENS requirement as PC5, that is  |  |  |  |  |  | | --- | --- | --- | --- | --- | | Operating band | REFSENS (dBm) / Channel bandwidth | | | | | 50 MHz | 100 MHz | 200 MHz | 400 MHz | | n257 | -92.6 | -89.6 | -86.6 | -83.6 | | n258 | -92.8 | -89.8 | -86.8 | -83.8 | | N261 | -92.6 | -89.6 | -86.6 | -83.6 | | NOTE 1: The transmitter shall be set to PUMAX as defined in clause 6.2.4 | | | | | |

In this email thread, the following agenda items will be discussed:

* 6.9.1 General
* 6.9.3 UE RF core requirements

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

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

It is suggested to have the following target of 1st and 2nd round email discussion:

* 1st round: Further discussion on the updated TR and UE RF requirements, and get agreement as much as possible.
* 2nd round: Based on results from 1st round, to progress as much as possible for UE RF requirements, as the basis for future discussion.

# Topic #1: General

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

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2201696 | Nokia, Nokia Shanghai Bell, Samsung | TR for FR2 HST |

## Open issues summary

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

N/A. Only 1 TP to TR in this section, companies’ views are collected in below Section 1.3 directly.

## Companies views’ collection for 1st round

### Open issues

N/A. Only 1 TP to TR in this section, companies’ views are collected in below Section 1.3.2 directly.

### CRs/TPs comments collection

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

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| **CR/TP number** | **Comments collection** |
| R4-2201696 (General TP to TR 38.854) | Company A |
| Company B |
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## Summary for 1st round

### Open issues

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

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

### CRs/TPs

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

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

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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)

# Topic #2: UE RF Requirements for FR2 HST

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

## Companies’ contributions summary

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| T-doc number | Company | Proposals / Observations |
| R4-2200327 | Qualcomm, Inc. | Observation 1: To ensure the spherical coverage includes all the possible RRH directions w.r.t. UE based on RRH coverage on track, and become a function of boresight elevation angle w.r.t. ground for a fixed RRH coverage if and are specified w.r.t. boresight direction.  Proposal 1: Use the coordination system w.r.t. the assumed track direction that the panel is facing and the horizontal plane aligns with ground, but allow UE to claim its boresight direction.  Proposal 2: For the agreed FR2 HST demod scenarios, per panel coverage of azimuth angle range = [-45, 45] and polar angle range = [0, 45] includes all the possible RRH directions from UE perspective.  Proposal 3: Set EIRP drop requirement to keep received power at gNB stable.  Proposal 4: EIRP drop requirement for HST is -15dB.  Proposal 5: When RRM requirement set 1 is signaled, allow EIRP drop larger than 15dB. |
| R4-2201764 | Samsung | Draft CR to introduce UE RF requirement for FR2 Power Class 6 |
| R4-2200347 | Nokia, Nokia Shanghai Bell | Proposal 1: It is proposed that the union of the largest spherical coverage of theta and phi to define the unified requirements.  Observation 1: Per panel testing is possibly discussed in RAN5.  Proposal 2: It is proposed to define the UE RF core requirement for the back-to-back antenna panels. |
| R4-2200348 | Nokia, Nokia Shanghai Bell | Observation 1: Absolute coordinate may not be clear enough in the conformance test environment.  Proposal 1: Coordination is based on relative angles from UE declared boresight directions.  Proposal 2: Azimuth angle (i.e., phi) range to cover [-25, +25] degree relative to UE declared boresight direction.  Proposal 3: Elevation angle (i.e., theta) range to cover: [-10, +10] degree relative to UE declared boresight direction. |
| R4-2200836 | ZTE Corporation | Observation 1: scenario B uni-directional deployment has the largest azimuth angle span.  Observation 2: scenario A uni-directional deployment has the largest elevation angle span.  Observation 3: Other values than 10m for Hdiff need to be considered for the elevation angle range.  Observation 4: The azimuth coverage of HST CPE is required to be doubled when RRHs are deployed on both sides of the track.  Proposal 1: To consider option 1 to define the unified spherical coverage requirements.  Proposal 2: To consider absolute coordination system for testing. |
| R4-2201525 | Ericsson | Proposal 1: The orientation of the co-ordinates system to the UE form factor is declared  Proposal 2. The declared co-ordinates system is used for both the declaration of boresight direction(s) and the definition of the range around boresight direction(s) in which coverage is required.  Proposal 3: Do not constrain the minimum or maximum number of declared boresight directions.  Proposal 4: The azimuth range around the boresight is +-40 degrees (based on scenario B)  Proposal 5: The elevation range around the boresight is 0-15 degrees (i.e., horizontal to 15 degrees below horizon). |
| R4-2201763 | Samsung | Proposal-1: The unified RF requirement for FR2 HST UE on spherical coverage is defined based on the scenario in which network signaling is provided to configure UE to follow enhanced RRM requirement Set 2.  Proposal-2: RAN4 follow the baseline assumption that UE has two panels, i.e., back-to-back panels, to derive the spherical coverage requirement, and RAN4 shall not define spherical coverage requirement based on one panel.  Observation-1: The expected spherical coverage region should be defined as a cone shape with the UE vendor claimed boresight direction in the center.  Proposal-3: Relative coordination system can be defined as:   * Azimuth plane:   + Formed by the crossed lines of the panel’s boresight direction and y-axis in absolute coordination system   + The panel’s boresight direction has the theta of 0 degree, in the relative coordination system * Elevation plane:   + Formed by the crossed lines of x-axis and z-axis in absolute coordination system   + The panel’s boresight direction has the phi of 0 degree, in the relative coordination system   Proposal-4: In the new spherical coverage requirement framework for FR2 HST UE:   * Boresight directions for forward and backward panels shall be declared by UE; * The spherical coverage requirement is verified on the areas w.r.t two boresight directions respectively, and each area is defined in the relative coordination system as below:   + The range [theta\_1, theta\_2] relative to the associated boresight direction (theta\_boresight = 0) for elevation;   + The range [phi\_1, phi\_2] relative to the associated boresight direction (phi\_boresight = 0) for azimuth.   Proposal-5: For the area to be verified in FR2 HST spherical coverage requirement framework, it is proposed to use:   * The range [theta\_1 = -10 degree, theta\_2 = +10 degree] relative to the associated boresight direction (theta\_boresight = 0) for elevation; * The range [phi\_1 = -25 degree, phi\_2 = +25 degree] relative to the associated boresight direction (phi\_boresight = 0) for azimuth. * Accordingly, the spherical coverage (by two UE panels) will be |
| R4-2201765 | Samsung | Proposal 1: After RAN4 obtained PC6 EIS spherical coverage requirement, the side conditions for beam correspondence requirement can be derived according by:   * Minimum SSB\_RP = EIS spherical coverage(PC6, n259, 50MHz) - 10\*log10(nrofRBs x 12) – SNR(at Refsens) + SSB Ês/Iot + ΔMBS |

## Open issues summary and 1st round view collection

*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 Spherical Coverage Requirement and Framework

*Sub-topic description*

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

**Issue 2-1-1: Spherical coverage requirement framework – Requirement for one panel**

* [Background] In last RAN4 meeting (RAN4#101-e), it was agreed that the assumption to derive spherical coverage requirement is that UE has two panels, i.e., back-to-back panels, while FFS on whether one panel based spherical coverage requirement will be specified and FFS on whether to mandate two panels.

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| * + - For UE RF requirement framework, the following agreement is achieved in GTW (Friday, 12th Nov):   Agreement: The assumption that UE has two panels, i.e., back-to-back panels, will be used to derive spherical coverage requirements.   * + - * Further discuss whether one panel based spherical coverage requirement will be specified       * FFS on whether to mandate two panels. |

* Proposal on “one-panel based spherical coverage requirement”:
  + Option 1: RAN4 shall not define core requirement for one-panel based spherical coverage requirement.
    - Supported by: Nokia, Samsung
  + Option 2: RAN4 shall define core requirement without constraining the minimum or maximum number of declared boresight directions.
    - Supported by: Ericsson
* Proposal/Observation on conformance tests
  + Observation 1 (Nokia): Per panel testing is possibly discussed in RAN5 (for simplifying the test procedure and optimizing test time).
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

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| **Company** | **Comments** |
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**Issue 2-1-2: Spherical coverage requirement – Coordination system**

* [Moderator] In RAN4#100-e meeting, it is agreed to have a new method to define spherical coverage, i.e., in terms of theta and phi range *w.r.t.* boresight direction, rather than the whole sphere method used in Rel-15. Furthermore, there were two options proposed for the coordination system to be used in RAN4#101-e.

RF core requirement for FR2 HST UE:

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| * + - The following agreement is achieved in GTW (Thursday, 11th Nov):   Agreement:   * + - * Coordination system to be used for requirement definition:         + Option-1: absolute coordination system:         + Option 2: relative coordination system (relative to the claimed boresight direction) |

* Proposals/Observations on two coordination system:
  + Option-1: absolute coordination system (defined for train and rail track)
    - Supported by: ZTE, Qualcomm
    - Observation 1 (Qualcomm): To ensure the spherical coverage includes all the possible RRH directions w.r.t. UE based on RRH coverage on track, φ\_ue and θ become a function of boresight elevation angle w.r.t. ground for a fixed RRH coverage if φ\_ue and θ are specified w.r.t. boresight direction.
    - Proposal 1 (Qualcomm): Use the coordination system w.r.t. the assumed track direction that the panel is facing and the horizontal plane aligns with ground, but allow UE to claim its boresight direction.
  + Option-2: relative coordination system (relative to the claimed boresight direction)
    - Supported by: Nokia, Ericsson, Samsung
    - Observation 1 (Nokia): Absolute coordinate may not be clear enough in the conformance test environment.
    - Proposal 1 (Ericsson): The orientation of the co-ordinates system to the UE form factor is declared
    - Proposal 2 (Ericsson): The declared co-ordinates system is used for both the declaration of boresight direction(s) and the definition of the range around boresight direction(s) in which coverage is required.
    - Observation 2 (Samsung): The expected spherical coverage region should be defined as a cone shape with the UE vendor claimed boresight direction in the center.
    - Proposal 3 (Samsung): Relative coordination system can be defined as:
      * Azimuth plane:
        + Formed by the crossed lines of the panel’s boresight direction and y-axis in absolute coordination system
        + The panel’s boresight direction has the theta of 0 degree, in the relative coordination system
      * Elevation plane:
        + Formed by the crossed lines of x-axis and z-axis in absolute coordination system
        + The panel’s boresight direction has the phi of 0 degree, in the relative coordination system
    - Proposal 4 (Samsung): In the new spherical coverage requirement framework for FR2 HST UE:
      * Boresight directions for forward and backward panels shall be declared by UE;
      * The spherical coverage requirement is verified on the areas w.r.t two boresight directions respectively, and each area is defined in the relative coordination system as below:
        + The range [theta\_1, theta\_2] relative to the associated boresight direction (theta\_boresight = 0) for elevation;
        + The range [phi\_1, phi\_2] relative to the associated boresight direction (phi\_boresight = 0) for azimuth.
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

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| **Company** | **Comments** |
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**Issue 2-1-3: Spherical coverage requirement framework - Coverage region**

* [Background] In last RAN4 meeting (RAN4#101-e), it was agreed to have the unified RF requirements for FR2 HST UE, except the conclusion on spherical coverage is not decided yet, with following two options available:

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| * + - For UE RF requirement framework, the following agreement is achieved in GTW (Thursday, 4th Nov):   Agreement:   * + - * The unified RF requirements for FR2 HST UE are defined except spherical coverage         + FFS on spherical coverage requirements   Option 1: use the union of the largest spherical coverage of theta and phi to define the unified requirements  Option 2: The unified RF requirement for FR2 HST UE is defined based on one particular scenario requiring the largest spherical coverage. |

* Observations on required spherical coverage from Scenario-A and B:
  + Observation 1 (ZTE): scenario B uni-directional deployment has the largest azimuth angle span.
  + Observation 2 (ZTE): scenario A uni-directional deployment has the largest elevation angle span.
* Proposals:
  + Option 1: use the union of the largest spherical coverage of theta and phi to define the unified requirements:
    - Supported by: Nokia, ZTE, Ericsson (based on detailed range proposal in 1525)
  + Option 2: The unified RF requirement for FR2 HST UE is defined based on one particular scenario requiring the largest spherical coverage.
    - Supported by Samsung
    - Proposal-1 (Samsung): The unified RF requirement for FR2 HST UE on spherical coverage is defined based on the scenario in which network signaling is provided to configure UE to follow enhanced RRM requirement Set 2.
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

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| **Company** | **Comments** |
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**Issue 2-1-4: Spherical coverage requirement – Coverage Region and x%-tile**

* [Background] following WFs containing options are provided in last meeting RAN4#101-Bis-e:

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| * + - The following agreement is achieved in GTW (Thursday, 11th Nov):   Agreement:   * + - * Directions of antenna panels:         + Boresight directions for forward and backward panels shall be declared by UE vendors.   FFS whether the limitation on boresight directions is needed   * + - * Spherical coverage x%-tile point per panel         + Azimuth angle (i.e., phi) range to cover:   Option-1: [-45, +45] degree relative to absolute coordination system  Option-2: [-25, +25] degree relative to UE declared boresight direction  Other options are not precluded   * + - * + Elevation angle (i.e., theta) range to cover:   Option-1: [45, 90] degree relative to absolute coordination system  Option-2: [-10, +10] degree relative to UE declared boresight direction |

* [Moderator] Depending on understanding and discussion outcome for the coordination system (Issue 2-1-2) and requirement framework to define the coverage region (Issue 2-1-3), companies are providing detailed proposal on coverage region and x%-tile region for coverage
* Observations on related proposals to define the detailed range:
  + Observation 1 (ZTE): Other values than 10m for Hdiff need to be considered for the elevation angle range.
  + Observation 2 (ZTE): The azimuth coverage of HST CPE is required to be doubled when RRHs are deployed on both sides of the track.
* Proposal on spherical coverage region on azimuth angle (i.e., phi) range:
  + Option-1: [-45, +45] degree relative to absolute coordination system
    - Supported by: ZTE, Qualcomm
  + Option-2: [-25, +25] degree relative to UE declared boresight direction
    - Supported by: Nokia, Samsung
  + Option-3: [-40, +40] degree relative to UE declared boresight direction
    - Supported by: Ericsson
* Proposal on spherical coverage region on elevation angle (i.e., theta) range:
  + Option-1: [45, 90] degree relative to absolute coordination system
    - Changed to [0, 45] degree in Qualcomm’s 0327, by assuming track direction as 0 degree.
    - Supported by Qualcomm
  + Option-2: [-10, +10] degree relative to UE declared boresight direction
    - Supported by: Nokia, Samsung
  + Option-3: [-15, 0] degree (horizontal to 15 degrees below horizon) relative to UE declared boresight direction
    - Supported by: Ericsson
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

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| **Company** | **Comments** |
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**Issue 2-1-5: Spherical coverage requirement - EIRP drop**

* [Moderator] The detailed value of EIRP drop from the peak EIRP value is still FFS.
* Proposals
  + Proposal 1 (Qualcomm): Set EIRP drop requirement to keep received power at gNB stable.
  + Proposal 2 (Qualcomm): EIRP drop requirement for HST is -15dB.
  + Proposal 3 (Qualcomm): When RRM requirement set 1 is signaled, allow EIRP drop larger than 15dB.
* Recommended WF
  + Companies’ views are collected in 1st round discussion.

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| **Company** | **Comments** |
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### Sub-topic 2-2 Beam Correspondence for FR2 HST UE

*Sub-topic description*

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

**Issue 2-2-1: Side Condition for FR2 Power Class 6 UE Beam Correspondence Requirement**

* [Moderator] In RAN4#100-e, it was agreed to FR2 HST UE (roof-mounted UE type) shall mandatorily support Rel-15 BC feature *beamCorrespondenceWithoutUL-BeamSweeping* and Rel-16 BC feature *beamCorrespondenceSSB-based-r16*, and could optionally support Rel-16 BC feature *beamCorrespondenceCSI-RS-based-r16*. Accordingly, in RAN4#101-e, requirement applicability summary were provided, and draftCR [R4-2118223] has been endorsed. The remaining part is side conditions for FR2 power class 6 UE beam correspondence requirement.
* Proposals:
  + Proposal 1 (Samsung): After RAN4 obtained PC6 EIS spherical coverage requirement, the side conditions for beam correspondence requirement can be derived according by:
    - Minimum SSB\_RP = EIS spherical coverage(PC6, n259, 50MHz) - 10\*log10(nrofRBs x 12) – SNR(at Refsens) + SSB Ês/Iot + ΔMBS
* Recommended WF
  + Companies’ views are further collected in 1st round discussion.

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| **Company** | **Comments** |
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## Companies views’ collection for 1st round

### Open issues

[Moderator] View collection under each issues in Section above.

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2201764 (Draft CR to introduce PC6) | Company A |
| Company B |
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## Summary for 1st round

### Open issues

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

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

### CRs/TPs

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

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

## Discussion on 2nd round (if applicable)

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

# Topic #3: Feature List Discussion

## Companies’ contributions summary

In the following contributions which is submitted to Agenda 4 for Rel-17 feature list discussion, there is discussion paper (R4-2200544) relevant to Rel-17 FR2 HST work item, which the moderator captured here draw RF experts’ attention, especially because some of feature list description is related to RF function.

## Open issues summary and 1st round view collection

Proposal (from R4-2200544): Table 6. NR\_HST\_FR2 feature list

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Index | Feature group | Components | Prerequisite feature groups | Need for the gNB to know if the feature is supported | Applicable to the capability signalling exchange between UEs (V2X WI only)”. | Consequence if the feature is not supported by the UE | Type  (the ‘type’ definition from UE features should be based on the granularity of 1) Per UE or 2) Per Band or 3) Per BC or 4) Per FS or 5) Per FSPC) | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Capability interpretation for mixture of FDD/TDD and/or FR1/FR2 | Note | Mandatory/Optional |
| x-1 | Support of FR2 HST operation | 1) Support of FR2 UE PC6  2) Support of enhanced RRM requirements for FR2 HST  3) Support of demodulation processing for FR2 HST | N/A | Yes | No | UE is not able to meet the enhanced requirements in HST FR2 | Per Band | No | Applicable to FR2 only | N/A | FR2 UE power class PC6 signalling is used to indicate support of feature group | Optional with capability signalling |

* Recommended WF
  + Rapporteur expect that the solid proposal on FR2 HST feature can only be reached after technical RRM and Demod discussion in this meeting. But from RF perspective, it is encourage to discussion especially on whether or not sub-feature is needed from RF perspective, and support of FR2 UE PC6 is enough to cover all RF relevant sub-features, if any.
  + Companies’ views are further collected in 1st round discussion.

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| **Company** | **Comments** |
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## Summary for 1st round

## Discussion on 2nd round (if applicable)

# Recommendations for Tdocs

## 1st round

**New tdocs**

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

**Existing tdocs**

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

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

## 2nd round

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

1. Please include the summary of recommendations for all tdocs across all sub-topics.
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   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email address** |
| Samsung | Wang, He (Jackson) | h0809.wang@samsung.com |
|  |  |  |

Note:

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