**3GPP TSG-RAN WG4 Meeting # 111 R4-2410568**

**Fukuoka, 20th ‒ 24th May, 2024**

**Agenda item:** 10.3.6

**Source:** Moderator (Ericsson)

**Title:** Ad-hoc minutes for [111][127] FS\_NR\_IMT

**Document for:** Information

# Introduction

This document contains minutes and agreements from the second ad-hoc for [111][127]FS\_NR\_IMT.

# Topic #3: 14800-15530 MHz frequency range

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**Issue 3-1: Simulation scenarios**

* Proposals

Maximum set of scenarios:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| No. | Usage scenario | Aggressor | Victim | Direction | Simulation frequency | Deployment Scenario |
| 1 | eMBB | NR, TBD MHz | NR, TBD MHz | DL to DL | 15 GHz | Indoor hotspot |
| 2 | eMBB | NR, TBD MHz | NR, TBD MHz | DL to DL | 15 GHz | Urban macro |
| 3 | eMBB | NR, TBD MHz | NR, TBD MHz | DL to DL | 15 GHz | Dense urban |
| 4 | eMBB | NR, TBD MHz | NR, TBD MHz | UL to UL | 15 GHz | Indoor hotspot |
| 5 | eMBB | NR, TBD MHz | NR, TBD MHz | UL to UL | 15 GHz | Urban macro |
| 6 | eMBB | NR, TBD MHz | NR, TBD MHz | UL to UL | 15 GHz | Dense urban |

* + Option 1: Consider all of the above scenarios (Nokia, Qualcomm, ZTE)
  + Option 2: Consider urban macro and indoor hotspot (Vivo, Ericsson)
    - Prioritize urban macro first (Ericsson)
  + Option 3: Consider urban macro (Huawei)

Moderator suggestion for discussion:

Aim to agree either:

* Option 1: Decide on urban macro and indoor hotspot only. Urban macro is 1st priority for simulations for August
* Option 2: Consider urban macro for the 1st phase of simulations until August. Re-check the need for dense urban in August

**Issue 3-2: Layout**

* Proposals
  + Option 1: Follow 38.803 layout except possibly ISD, indoor/outdoor ratio, grid shift, which will be discussed with other issues
  + Option 2: Follow 38.921 layout except possibly ISD, indoor/outdoor ratio, grid shift, which will be discussed with other issues

Note: Option 1 and option 2 differ only for urban macro ISD and coordinated/uncoordinated deployment so this issue can be solved automatically with agreement on issues 3-1 and 3-5, and option 2 does not contain dense urban.

Moderator suggestion:

* Do not discuss this issue directly. Discuss dense urban, urban macro ISD and co-ordinated/un-co-ordinated separately. Then the rest of the models are the same.

**Issue 3-3: ISD**

* Proposals
  + Urban macro:
    - Option 1: 350m (Vivo)
    - Option 2: 450m (Qualcomm, Huawei)
      * Start with 450m but do not preclude smaller (Ericsson)
  + Indoor:
    - Option 1: 20m (Nokia, Vivo, Ericsson)

Moderator suggestion:

* For indoor, agree 20m
* For outdoor, consider both 350m and 450m until August. Also other ISD not precluded (since ISD will actually depend on assumptions for array size, UE type etc. ).

**Issue 3-4: Percentage indoor users for urban macro**

* Proposals
  + - Option 1: 0% (Ericsson)
    - Option 2: 20% (Nokia, Vivo, Huawei in tables in contributions)

Moderator suggestion: Check if we can downselect

**Issue 3-5: Co-ordinated and un-coordinated for outdoor**

* Proposals
  + - Option 1: Both co-ordinated and un-coordinated (Ericsson)
    - Option 2: Un-coordinated (Qualcomm)
    - Option 3: Only co-ordinated (0% GS) (Nokia, Vivo)

Moderator suggestion: Check if we can downselect

**Issue 3-6: Co-ordinated and un-coordinated for indoor**

* Proposals
  + - Option 1: Only co-ordinated (0% GS) (Nokia, Vivo, Ericsson)

**Issue 3-7: Pathloss model**

* Proposals
  + - Option 1: As 38.803 (follows 38.900)
    - Option 2: As 38.921 (follows 38.901)

Moderator suggestion: Follow Nokia TP

**Issue 3-6: BS antenna array sub-array size**

* Proposals
  + - Option 1: 4 (Nokia, CATT)
    - Option 2: Consider 4 - 6 (Ericsson)
    - Option 3: 16 (Huawei)

Moderator suggestion: Do not decide this now, concentrate on total array size.

**Issue 3-6: BS antenna array size**

* Proposals
  + - Option 1: 1024 (Qualcomm, CATT)
    - Option 2: 1024-2048 (Ericsson)
    - Option 3: 16\*24 (1536 elements) (Nokia)
    - Option 4: 4096 (Huawei)

Moderator suggestion: Check coverage for 350m and 450m with all of these options (1024, 1536, 2048, 4096)

**Issue 3-7: BS antenna array other parameters**

* Proposals

|  |  |  |
| --- | --- | --- |
| Parameter | Macro suburban | Macro urban |
| Element gain (dBi) (Note 2) | 6.4 | 6.4 |
| Horizontal/vertical 3 dB beam width of single element (degree) | 90º for H 65º for V | 90º for H 65º for V |
| Horizontal/vertical fronttoback ratio (dB) | 30 for both H/V | 30 for both H/V |
| Antenna polarization | Linear ±45º | Linear ±45º |
| Horizontal/Vertical radiating sub-array spacing | 0.5 of wavelength for H, TBD of wavelength for V | 0.5 of wavelength for H, TBD of wavelength for V |
| Vertical element separation in sub-array () | 0.7 of wavelength of V | 0.7 of wavelength of V |
| Pre-set sub-array down-tilt (degrees) | 3 | 3 |
| Array Ohmic loss (dB) (Note 2) | 2 | 2 |
| Conducted power (before Ohmic loss) per sub-array (dBm) (Note 3) | 28 | 28 |
| Base station horizontal coverage range (degrees) | +/-60 | +/-60 |
| Base station vertical coverage range (degrees) (Note 1) | 90-100 | 90-100 |
| Mechanical down-tilt (degrees) | 6 | 6 |
| Note 1: The vertical coverage range is given for the elevation angle θ, defined between 0° and 180°.  Note 2: The element gain includes the loss and is per polarization. | | |

Moderator suggestion: Follow the Nokia TP for this part, no online discussion

**Issue 3-8: UE type**

* Proposals
  + - Option 1: FR1 like (Apple, Skyworks, Murata, Mediatek, Vivo)
    - Option 2: FR2 like (CATT, Google, Ericsson)
      * 2x2 antenna (Ericsson)
    - Needs further discussion (Samsung)
    - Consider both options for co-existence simulation (Qualcomm)

Moderator suggestion: Take some discussion on the feasibility of each of the options. Consider both options until August

**Issue 3-9: UE output power**

* Proposals
  + - Option 1: 26dBm (Qualcomm, Mediatek (assuming 2TX))
    - Option 2: 23dBm
    - Option 3: Even 23dBm may be difficult for 2TX, needs more checking (Murata)

Moderator suggestion: Check if we can narrow down. Assume at least 2TX, possibly even 4TX ? If we cannot narrow down, assume 23dBm for initial simulations in the first phase until August, but companies welcome to consider 26dBm if coverage is not enough.

**Issue 3-9: BS output power**

* Proposals
  + - Option 1: 43dBm TRP / 100MHz (Ericsson)

**Issue 3-9: UE number of RX (for FR1 like)**

* Proposals
  + - Option 1: 4 as baseline (Skyworks)
    - 6RX
    - 8RX

Moderator suggestion: Prioritize 4RX for simulations for August, but do not rule out other options.

**Issue 3-10: Bandwidth**

* Proposals
  + - Option 1: 200-400MHz (Nokia)
    - Option 2: 200MHz (Qualcomm, Vivo)
    - Option 3: 100MHz (Ericsson, Apple (possibly also larger))
      * Consider smaller BW for UL with several UEs (e.g. 1-3 UEs) (Ericsson)
    - Option 4: 400MHz (Huawei)

Moderator suggestion:

* Discuss whether there is a need to consider several UEs being scheduled across the bandwidth (for coverage)
* Check if we can agree a bandwidth per scheduled UE

**Issue 3-11: BS noise factor**

* Proposals
  + - Option 1: 11dB (Vivo)
    - Option 2: 8dB (WA), 13dB (MR), 16dB (LA) (Nokia, Ericsson)
    - Option 3: 9 dB for WA (Qualcomm)
    - Option 4: 8dB for WA (38.921) (Huawei, ZTE)

Moderator suggestion: Check if we can agree 8dB, at least as a tentative assumption for August

**Issue 3-11: UE noise factor**

* Proposals
  + - Option 1: 10dB (38.921) (Nokia, ZTE)
    - Option 2: 9-13dB (Qualcomm)
    - Option 3: 8dB (Ericsson)
    - Option 4: 14dB (Apple)

Moderator suggestion: Check what convergence is possible. Otherwise, for an initial simulation assumption for August take 11dB (half way between the extremes of 8dB and 14dB) for 1st phase simulations, but discuss again in August.

**Issue 3-12: UL SNR target**

* Proposals
  + - Option 1: 15dB (Qualcomm)

# Topic #2: 7125 – 8400 GHz frequency range

**Issue 2-18: ACLR**

Previous agreement:

ACLR

* UE
  + Option 1: 26dB, 27dB (study) for PC3
  + Option 2: 30dB (n104) for PC3, 31dB (n104) for PC2
* Proposals
  + Option 1: 26dB, 27dB (previous study and LS response) for PC3 (Apple, Skyworks, Mediatek, vivo, Huawei
  + Option 2: 30dB (n104) for PC3, 31dB (n104) for PC2 (Nokia, CMCC, Qualcomm, Ericsson, ZTE, Samsung)
* Recommended WF

**Issue 2-20: Noise figure**

Previous agreement:

Noise Figure

* UE
  + Option 1: Follow n104 noise figure (12dB)
  + Option 2: Be consistent with information sent previously IMT-2020 28GHz, e.g. 10dB
  + Option 3: Be consistent with Previous LS to ITU-R on 6, 10GHz, NF was 9-13dB
* Proposals
  + Option 1: Follow n104 noise figure (12dB) (CATT, Qualcomm, Ericsson, Huawei, Samsung, (Apple??))
  + Option 2: Be consistent with information sent previously IMT-2020 28GHz, e.g. 10dB
    - Option 2a 9-10dB (Nokia)
    - Option 2b: 9dB (CMCC, ZTE)
  + Option 3: Be consistent with Previous LS to ITU-R on 6, 10GHz, NF was 9-13dB(Skyworks, Vivo))
    - Option 3a: 12-13dB (Apple)
    - Option 3b: 13dB (Mediatek)
* Recommended WF
  + Adopt option 1

**Issue 2-22: Blocking response**

Previous agreement: No previous agreement (FFS)

* Proposals
  + Option 1: As in 38.101-1 (CMCC, Qualcomm, Ericsson, Huawei, Samsung)
  + Option 2: Do not use the existing requirement and discuss further (ZTE)

**Issue 2-23: ACS**

Previous agreement:

Issue 2-12 ACS

* UE:
  + Follow n104 or follow previous studies
* Proposals
  + Option 1: 31dBc (Mediatek)
  + Option 2: 32dBc (Vivo, CMCC, Apple)
  + Option 3: 33dB as in 38.101-1 (Ericsson, Qualcomm, Samsung, ZTE)