**3GPP TSG RAN meeting #104 RP-240xxx**

**Shanghai, China, May 17-20, 2024**

## Status Report to TSG

**Agenda item:** **9.2.1**

|  |  |
| --- | --- |
| **WI / SI Name** | Study on channel modelling enhancements for 7-24GHz for NR |
| included in this status report | Study Item: Yes | Core part: No | Performance part:No | Testing part:No |
| **Acronym** | FS\_NR\_7\_24GHz\_CHmod |
| **Unique ID** | 1020081 |
| **TSG Tdoc of latest approved WI/SI description (if any)** | RP-234018 |
| **Target Completion Date****(indicate if changed)** | Study Item: 06/2025 | Core part:n/a  | Performance part: n/a | Testing part: n/a |
| **Overall Completion level** | Study Item: 25 % | Core part: n/a | Performance Part: n/a | Testing part: n/a |

Note: Overall completion level percentage numbers should use one of the colors below:

* xx%: Normal progress, no RAN plenary action needed
* xx%: Progress behind schedule, may need RAN plenary intervention. If so, SR should clearly define requested action
* xx%: Progress critically behind, RAN plenary shall intervene. SR should define requested action

**Source:**

|  |  |
| --- | --- |
| **Leading WG** | RAN1 |
| **Rapporteur****(Primary)** | **Name** | LEE Daewon |
| **Company** | Intel Corporation |
| **Email** | daewon.lee@intel.com |
| **Rapporteur** | **Name** | ZHANG Nan |
| **Company** | ZTE |
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## 1 Work plan related evaluation

|  |  |
| --- | --- |
| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** | No |

*If you answered No: Then please remove the Excel file from the zip file of this status report.*

*If you answered Yes: Then please fill out the attached Excel template to request a modification of the time budgets for your WI /SI. The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI. The basis are the endorsed time budgets of the last RAN meeting. Please highlight all changes of the values.
 One time unit (TU) corresponds to ~ 2 hours in the meeting.
 If this status report covers a WI with Core and Performance part, then please have one line for each in the attached Excel table.
 Note: If no Excel table is attached, then this means no time budget change.*

**Additional explanations/motivations for the time budget changes in the attached Excel table:**

## 2. Detailed progress in RAN WGs since last TSG meeting (for all involved WGs)

 NOTE: Agreements and Open issues impacted cross-TSG aspects shall be explicitly highlighted

## 2.1 RAN1

#### 2.1.1 Agreements

**Conclusion**

* To provide measurement data, and/or simulation results, and/or available publications with measurement information for frequencies 7 to 24 GHz to validate/update the channel model.
* For frequency continuity of the channel models, Measurement information outside 7 to 24 GHz is also encouraged

**Agreement**

The following provides list of modelling parameters for 7 – 24 GHz frequencies that could be further studied for validation. The parameters listed are starting point for further discussions and does not imply the parameters require validation nor imply parameters require updates for 7 – 24 GHz frequencies.

* Antenna modelling parameters (e.g. radiation power patterns, directional gain values, etc.)
* Pathloss
* LOS probability
* O-to-I penetration loss
* Delay spread (mean, variance)
* AoD spread (mean, variance)
* AoA spread (mean, variance)
* ZoA spread (mean, variance)
* ZoD spread (mean, variance)
* ZoD offset
* Angle distribution characteristics (e.g. exponential, Gaussian, Laplacian distributions)
* Shadow fading
* K factor (mean, variance)
* LSP cross correlations
* Delay scaling parameter
* XPR
* Number of clusters
* Number of rays per cluster
* Cluster delay spread
* Cluster ASD
* Cluster ASA
* Cluster ZSD
* Cluster ZSA
* Per Cluster shadowing
* Correlation distances
* LSP correlation type (e.g. site-specific or all correlated)
* Oxygen absorption
* Correlation distance for spatial consistency
* Blockage region parameters/blocker parameters
* Spatial correlation for blockages
* Material properties for ground reflector model
* Spatial consistency model A/B

**Conclusion**

RAN1 to continue discussion on the need for new modelling parameters/scenarios and modelling procedure. The following modelling parameters/aspects for 7 – 24 GHz frequencies that are currently not available in TR38.901 have been identified by companies in RAN1#116bis. At least the following is for further study, but does not imply parameters/scenarios and modelling procedure are required for 7 – 24 GHz frequencies.

* Intra-cluster K factor
* Random power variability in each polarization
* Addition of SMa deployment scenario

**Conclusion**

* RAN1 to compile measurement/simulation descriptions from companies into a Tdoc to be added as reference to TR38.901.
	+ Rapporteur to update the Tdoc in each meeting based on inputs from companies.
* Rapporteurs to provide a template for the measurement/simulation descriptions capture to RAN1 #117 for initial review and endorsement.

**Agreement**

To check and review the following results and measurement data provided in RAN1 #117 and RAN1#116bis for further discussion in next RAN1 meeting. R1-2405646 contains the list of data sources for the results and measurements provided in RAN1 #117.

* measurements for penetration loss for various materials, including drywall/wood, clear glass, IRR glass, and concrete
* measurements for pathloss for following scenarios: InH\_office LOS, InH-Office NLOS, InF LOS, InF NLOS, UMi LOS, UMi NLOS, UMa LOS, UMa NLOS, [Outdoor courtyard], RMa LOS, RMA NLOS, SMa NLOS
* measurements for polarization for UMa deployment scenario
* measurements for DS for following scenarios: InH-Office LOS, InH-Office NLOS, UMi LOS, UMI NLOS, UMa LOS, UMa NLOS, InF LOS, Inf NLOS.
* Measurements for angular distributions, such as ZOD, ZOA, AOD, AOA for following scenarios: InH, UMi, UMa
* Measurements for number of clusters for following scenarios: InH, UMi
* Simulations for LOS probability for SMa deployment scenario
* Measurement results regarding near-field model for following deployment scenarios: InH-Office LoS, UMa
* Measurement results regarding spatial non-stationarity for following deployment scenarios: UMa, [UE side]
* Simulation results regarding spatial non-stationarity for UMa deployment scenario

**Observation**

* Some companies provided information that sub-urban deployments cannot be represented by existing deployments in TR38.901 (such as UMi, UMa, RMa).

**Conclusion**

The following parameters are used as a starting point for aligning companies understanding of channel model parameters related to suburban use cases.

* BS height: [22.5] m
* Layout: Hexagonal grid, 19 Macro sites, 3 sectors per site, ISD = [1732] m
* Typical building heights: [Up to two floors for residential buildings, up to five floors for commercial buildings]
* UT height: [1.5 or 4.5 m for residential buildings], [1.5/4.5/7.5/10.5/13.5 m for commercial buildings]
* UT distribution: [Uniform horizontally, 70% indoor residential users are on ground floor, 30% are on upper floor]
* FFS: ratio between residential and commercial buildings
* Indoor/Outdoor: [80% indoor and 20% outdoor, FFS on in-car users]
* LOS/NLOS: LOS and NLOS
* Min BS - UT distance(2D): [25] m

**Conclusion**

* To provide information about motivation and reasons why changes to the channel model are essential.

**Agreement**

* Further study whether the following parameters for existing deployment scenarios is necessary to be updated:
	+ Delay spread, pathloss, penetration loss, AoD/AoA/ZoA/Zod spreads, ZoD offset, Angle distribution characteristics (e.g. exponential, Gaussian, Laplacian distributions), XPR, number of clusters, number of rays per cluster, LSP correlations type (e.g. site-specific or all correlated), UE antenna modeling parameters, K factor (mean, variance)
* Study of updates to other parameters are not precluded and subject to further study.

**Agreement**

* Further study whether/how to reflect absolute delay between links, or whether/how correlation type of the delay needs to be changed from site-specific to all-correlated type in the model
	+ Note: site-specific and all-correlated definitions are provided in TR38.901 Section 7.6.3.4.
	+ FFS: impact of ISD on correlation type for the deployment scenario

**Agreement**

* Further study on correcting the scaling of the angles and other alternative to address angle scaling in TR38.901 Section 7.7.5 to enable accurate desired angle spread.

**Agreement**

* Further study of whether/how to model the variability of the co- and cross polar powers, in both diagonal and anti-diagonals of the polarization matrix, in the TR 38.901 model.
	+ FFS: variability is applied for per ray or per cluster or per link
	+ FFS: impact of antenna configurations
	+ For example, variability may be random with an i.i.d. zero-mean Gaussian with some standard deviation, via changes to step 9 and eq (7.5-22) and (7.5-28) in clause 7.5 in TR 38.901.

**Agreement**

* Further study whether/how to model intra-cluster K factor to the TR38.901 models, such as power re-normalization among intra-cluster rays of a cluster so that first intra-cluster ray has K times more average power compared to rest of the intra-cluster rays.
	+ FFS: whether same or different intra-cluster K factor is applied for each clusters
	+ FFS: which applicable deployment scenarios

**Agreement**

* Further study whether/how following UE antenna modelling aspects should be considered in the modelling:
	+ UE antenna placement, e.g. placement along edges of a rectangle reflecting UE form factor,
	+ UE antenna orientation of individual antenna elements, e.g. randomize UE antenna element orientation,
	+ Antenna radiation pattern, e.g. consider more realistic antenna patterns, including a phase component, potential reuse the parabolic pattern,
	+ Antenna imbalance
* Note: this is only used for calibration.

**Agreement**

The antenna array is assumed for the near-field study.

**Agreement**

For the study of near-field channel modelling, at least following aspects should be considered:

* Whether/How to define the near-field region
* The parameters variation for each ray/cluster across different antenna element pairs

**Agreement**

The following scenarios defined in TR38.901 should be considered for the study/modelling of near-field.

* UMa,UMi, Indoor office and Indoor factory
* FFS: RMa and other new scenarios

**Agreement**

For the assumption on the aperture size of antenna array, the following is considered as reference for channel model study.

* up to [TBD] m, or [TBD] lambda for UMi
* up to [TBD] m, or [TBD] lambda for UMa
* up to [TBD] m, or [ TBD] lambda for Indoor office
* up to [TBD] m, or [TBD] lambda for Indoor factory

**Agreement**

For the near-field channel model:

* The impact of the assumption of wavefront is only considered from the perspective of antenna array.
* The near field for each element within the antenna array is not considered in this SI.

Agreement

For near-field channel model, RAN1 strives to design a unified model to explicitly reflect the new properties of near- and existing properties of far-field under the structure of existing stochastic model TR 38.901.

* FFS: whether the same or different implementations, e.g., procedures/equations, are used for near- and far-field channel realization

**Agreement**

The near- or far-field condition should be studied for the direct path and non-direct paths between BS and UE.

* The near-/far-field condition for the direct path may be assessed by using the 3D BS-UE distance.
	+ FFS: The determination of near-/far-field condition for the non-direct paths
* Note: The direct path is referring to the LoS ray in the TR 38.901 in principle.
* Note: The non-direct paths are referring to the cluster/ray(s) without including LoS ray in the TR 38.901.

**Agreement**

For near-field channel, if necessary, to model the following antenna element-wise channel parameters of direct path between TRP and UE,

* Angular domain parameters (i.e., AoA, AoD, ZoA, ZoD), Delay, initial phase, Doppler shift, Amplitude
* FFS: Impacts on the polarization

The following options are considered:

* Option-1: Determined by the locations of both TRP and UE.
* Option-2: Determined by the antenna element locations of both TRP and UE

**Agreement**

The following scenarios defined in TR38.901 should be considered for studying/modelling of spatial non-stationarity

* UMi, UMa, Indoor office and Indoor factory
* FFS: RMa and other new scenarios

**Agreement**

For the modelling of spatial non-stationarity, at least the following options can be studied to identify the impacted ray/cluster and element-pair link:

* Option 1: Introducing per ray/cluster the visible probability, or visibility region for set of antenna element
* Option 2: Introducing the physical blocker to emulate the blockage impact on the link for each element-pair
* Note: The consistency across antenna elements and across clusters should be guaranteed.

**Agreement**

For the assumption on the aperture size of antenna array, the following is considered for near-field and spatial non-stationarity channel model study, e.g., simulation/measurement and calibration:

* Up to 1.5 m for UMa with maximum antenna elements in the array is [5k] for single Polarization.
* Up to 1 m for UMi with maximum antenna elements in the array is [2.22k] for single Polarization.
* Up to [0.71] m for Indoor factory with maximum antenna elements in the array is [1.12k] for single Polarization.
* Up to [0.25 (for rectangular antenna array), 0.5 (for linear antenna array)] m for Indoor office with maximum antenna elements in the array is [138, 24] for single Polarization, respectively.

**Working Assumption**

For the near-field channel modeling, no changes are expected on both value and parameter generation procedure of at least following large-scale parameters in existing TR 38.901:

* Pathloss model, SF, LOS probability
* FFS:DS, ASA, ASD, ZSA, ZSD, K factor

**Agreement**

For near-field channel, if necessary, to model the following antenna element-wise channel parameters of direct path between TRP and UE,

* Phase

with Option-2 “Determined by the antenna element locations of both TRP and UE”.

**Agreement**

For near-field channel, if necessary, to model the following antenna element-wise channel parameters of non-direct path between TRP and UE,

* Angular domain parameters (i.e., AoA, AoD, ZoA, ZoD), Delay, phase, Doppler shift, Amplitude
* FFS: Impacts on the polarization

The following options are considered:

* Option-1: The cluster location-based approach, wherein the cluster location is obtained with following alternatives:
	+ Alt-1: cluster location is derived based on at least the distance between the BS/UE and clusters.
	+ FFS: How to obtain the distance.
	+ FFS: Other parameters.
	+ Alt-2: cluster location is directly dropped and generated.
* Option-2: The parameter-based approach with following detailed alternatives:
	+ Alt-1: Introduce the model of variation rate of parameter over antenna elements.
	+ Alt-2: Modelling the variation by taking the existing spatial consistency procedure of TR 38.901 as baseline.
* Option-3: The curvature-based approach.

**Agreement**

For the modelling of spatial non-stationarity, if necessary, the variation (e.g., reduction) of power for the impacted ray/cluster within the element-pair link should be modelled.

* FFS: The value for power variation
* FFS: Impacts on the phase

**Agreement**

For the modelling of spatial non-stationarity, if necessary, if visible probability (VP) or visibility region (VR) is adopted, at least the following aspects should be considered for definition of VR/VP:

* Granularity of visible probability or visibility region (e.g., per cluster or per ray)
* Determination of visible probability (e.g., distribution) or visibility region (e.g., size, location)

**Agreement**

For the modelling of spatial non-stationarity, if necessary, if physical blocker-based approach is adopted, the following aspects should be considered for definition of blocker:

* Blocker size/type:
	+ FFS: Additional blocker size/type compared to the Table 7.6.4.2-5 in TR 38.901.
	+ FFS: Different blocker sizes/types are considered to emulate the antenna element-wise blockage effect at the BS and UE side
* Blocker location, e.g. distribution of the blocker, relative distance between blocker and BS or UE
* FFS: Number of physical blockers to be considered.

**Agreement**

To align the understanding of the terminology for channel model study, the following figures are considered as the reference:

* For non-direct path:

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* For direct path:

**

**Conclusion**

For near-field channel, no changes are expected on the following parameters for direct path.

* Amplitude, polarization matrix

#### 2.1.2 Remaining Open issues

Validate using measurements the channel model of TR38.901 at least for 7-24 GHz.

Adapt/extend as necessary the channel model of TR38.901 at least for 7-24 GHz, including at least the following aspects for applicable scenarios:

* Near-field propagation (with consideration being given to consistency between near-field and far-field)
* Spatial non-stationarity

## 2.2 RAN2

#### 2.2.1 Agreements

#### 2.2.2 Remaining Open issues

## 2.3 RAN3

#### 2.3.1 Agreements

#### 2.3.2 Remaining Open issues

## 2.4 RAN4

#### 2.4.1 Agreements

#### 2.4.2 Remaining Open issues

## 2.5 RAN5

#### 2.5.1 Agreements

#### 2.5.2 Remaining Open issues

#### 2.5.3 Remaining Open issues with cross-WG dependencies

## 2.6 RAN6

#### 2.6.1 Agreements

#### 2.6.2 Remaining Open issues

## 3. Detailed progress in SA/CT WGs since last TSG meeting (for all involved WGs)

NOTE: This section only needs to be filled in for WI/SIs where there is a corresponding relevant WI/SI in SA/CT.

## 3.1 SAx/CTs

#### 3.1.1 Agreements with cross-TSG impacts

#### 3.1.2 Remaining Open issues with cross-TSG impacts

NOTE: This section should also flag any critical dependencies that need TSG attention.

## 4. References

NOTE: This can be e.g. a list of all related Tdocs in the affected WGs since last TSG, references to LSs, produced TRs/TSs, the work/study item description or status reports of previous TSGs.

1. R1-2402009, “Considerations on the 7-24 GHz channel model validation,” Huawei, HiSilicon, Tongji University
2. R1-2402010, “Considerations on the 7-24 GHz channel model extension,” Huawei, HiSilicon, Tongji University
3. R1-2402090, “On Channel Model Validation of TR38.901 for 7-24GHz,” InterDigital, Inc.
4. R1-2402091, “On Channel Model Extension of TR38.901 for 7-24GHz,” InterDigital, Inc.
5. R1-2402128, “Work Plan for Study on 7-24 GHz Channel Modeling Enhancements,” Intel Corporation, ZTE
6. R1-2402129, “Discussion on channel modeling verification for 7-24 GHz,” Intel Corporation
7. R1-2402130, “Discussion on channel model adaptation/extension,” Intel Corporation
8. R1-2402256, “Views on channel model validation of TR38.901 for 7-24GHz,” vivo
9. R1-2402257, “Views on channel model adaptation/extension of TR38.901 for 7-24GHz,” vivo
10. R1-2402397, “Discussion on channel model validation of TR38.901 for 7-24GHz,” CATT
11. R1-2402398, “Discussion on channel model adaptation/extension of TR38.901 for 7-24GHz,” CATT
12. R1-2402407, “Channel Model Validation of TR 38.901 for 7-24 GHz,” SHARP, NYU WIRLESS
13. R1-2402480, “Discussion on channel model validation of TR38.901 for 7-24GHz,” Samsung
14. R1-2402481, “Discussion on channel model adaptation/extension of TR38.901 for 7-24GHz,” Samsung
15. R1-2402500, “Discussion of FR3 channel model,” Lenovo
16. R1-2402601, “Discussion on Channel model validation of TR38.901 for 7-24GHz,” Nokia
17. R1-2402602, “Discussion on Channel model adaptation/extension of TR38.901 for 7-24GHz,” Nokia
18. R1-2402613, “Discussion on validation of channel model,” Ericsson
19. R1-2402614, “Discussion on adaptation and extension of channel model,” Ericsson
20. R1-2402619, “Skeleton of the CR for TR 38.901,” ZTE, Intel Corporation
21. R1-2402620, “Discussion on the channel model validation,” ZTE
22. R1-2402621, “Discussion on the channel model adaptation and extension,” ZTE
23. R1-2402853, “Channel model validation of TR 38901 for 7-24 GHz,” NVIDIA
24. R1-2402854, “Channel model adaptation of TR 38901 for 7-24 GHz,” NVIDIA
25. R1-2402899, “On Channel Model Validation of TR 38.901 for 7-24 GHz,” Apple
26. R1-2402900, “On Channel Model Adaptation/Extension of TR 38.901 for 7-24 GHz,” Apple
27. R1-2402938, “Discussion on channel modelling enhancements for 7-24GHz for NR,” MediaTek
28. R1-2403066, “Channel model adaptation/extension of TR38.901 for 7-24 GHz,” CEWiT
29. R1-2403086, “Views on Channel Model Adaption/Extension of TR 38.901 for 7-24 GHz,” SHARP
30. R1-2403144, “Discussion on Validation of the Channel Model in 38901,” AT&T
31. R1-2403208, “Channel Model Validation of TR38.901 for 7-24 GHz,” Qualcomm Incorporated
32. R1-2403209, “Channel Model Adaptation/Extension of TR38.901 for 7-24GHz,” Qualcomm Incorporated
33. R1-2403261, “Changes to TR 38 901,” Spark NZ Ltd
34. R1-2403267, “Discussion on channel model validation of TR38.901 for 7-24GHz,” LG Electronics
35. R1-2403268, “Discussion on channel modelling adaptation/extension for 7-24GHz,” LG Electronics
36. R1-2403280, “Discussion on channel model validation of TR38.901 for 7-24GHz,” BUPT, Spark NZ Ltd
37. R1-2403285, “Discussion on modeling near-field propagation and spatial non-stationarity in TR38.901 for 7-24GHz,” BUPT, CMCC
38. R1-2403366, “Channel model adaptation/extension of TR38.901 for 7-24 GHz,” Keysight Technologies UK Ltd
39. R1-2403441, “Summary of issues for Rel-19 7-24 GHz Channel Modeling Validation,” Moderator (Intel Corporation)
40. R1-2403442, “Summary #1 of discussions for Rel-19 7-24 GHz Channel Modeling Validation,” Moderator (Intel Corporation)
41. R1-2403443, “Summary #2 of discussions for Rel-19 7-24 GHz Channel Modeling Validation,” Moderator (Intel Corporation)
42. R1-2403541, “Summary#1 of channel model adaptation and extension,” Moderator (ZTE)
43. R1-2403608, “Summary#2 of channel model adaptation and extension,” Moderator (ZTE)
44. R1-2403609, “Summary#3 of channel model adaptation and extension,” Moderator (ZTE)
45. R1-2403630, “Summary #3 of discussions for Rel-19 7-24 GHz Channel Modeling Validation,” Moderator (Intel Corporation)
46. R1-2403631, “Summary #4 of discussions for Rel-19 7-24 GHz Channel Modeling Validation,” Moderator (Intel Corporation)
47. R1-2403665, “Session notes for 9.8 (Study on channel modelling enhancements for 7-24GHz for NR) ,” Ad-Hoc Chair (CMCC)
48. R1-2403718, “Summary#4 of channel model adaptation and extension,” Moderator (ZTE)
49. R1-2403856, “Discussion on Channel Model Validation of TR38.901 for FR3,” InterDigital, Inc.
50. R1-2403857, “Discussion on Channel Model Extension of TR38.901 for FR3,” InterDigital, Inc.
51. R1-2403878, “Views on Channel model validation of TR38.901 for 7-24GHz,” Sharp, NYU WIRELESS
52. R1-2403907, “Discussion on channel model validation of TR38.901 for 7-24GHz,” LG Electronics
53. R1-2403908, “Discussion on channel modelling adaptation/extension for 7-24GHz,” LG Electronics
54. R1-2403925, “Considerations on the 7-24GHz channel model validation,” Huawei, HiSilicon
55. R1-2403926, “Considerations on the 7-24GHz channel model extension,” Huawei, HiSilicon
56. R1-2403962, “Discussion on channel modeling verification for 7-24 GHz,” Intel Corporation
57. R1-2403963, “Discussion on channel model adaptation/extension,” Intel Corporation
58. R1-2403969, “Template for Data Source Descriptions,” Intel Corporation, ZTE
59. R1-2403991, “Discussion on validation of channel model,” Ericsson
60. R1-2403992, “Discussion on adaptation and extension of channel model,” Ericsson
61. R1-2403996, “Discussion on Channel model validation of TR38.901 for 7-24GHz,” Nokia, Anritsu
62. R1-2403997, “Discussion on Channel model adaptation/extension of TR38.901 for 7-24GHz,” Nokia
63. R1-2404129, “Discussion on channel model validation of TR38.901 for 7 - 24 GHz,” Samsung
64. R1-2404130, “Discussion on channel model adaptation/extension of TR38.901 for 7 - 24 GHz,” Samsung
65. R1-2404191, “Views on channel model validation of TR38.901 for 7-24GHz,” vivo
66. R1-2404192, “Views on channel model adaptation/extension of TR38.901 for 7-24GHz,” vivo
67. R1-2404212, “Discussion on the channel model validation,” ZTE
68. R1-2404213, “Discussion on the channel model adaptation and extension,” ZTE
69. R1-2404304, “Initial Measurement Results for Channel Model Validation,” Apple
70. R1-2404305, “Channel Model Adaptation and Extension of TR38.901 for 7-24 GHz,” Apple
71. R1-2404330, “Discussion on modeling near-field propagation and spatial non-stationarity in TR38.901 for 7-24GHz,” BUPT, CMCC, vivo
72. R1-2404331, “Discussion on channel model validation of TR38.901 for 7-24GHz,” BUPT, Spark NZ Ltd, vivo
73. R1-2404340, “Discussion of FR3 channel model,” Lenovo
74. R1-2404415, “On channel model validation of TR38.901 for 7-24GHz,” CATT
75. R1-2404416, “On channel model adaptation/extension of TR38.901 for 7-24GHz,” CATT
76. R1-2404437, “Discussion on channel modeling for single road bridge (SRB) scenario,” China Telecom, BJTU
77. R1-2404514, “Discussion on channel model validation of TR38.901 for 7-24GHz,” Sony
78. R1-2404521, “Discussion on validation of channel model,” Vodafone, Ericsson
79. R1-2404543, “Channel model validation of TR 38901 for 7-24 GHz,” NVIDIA
80. R1-2404544, “Channel model adaptation of TR 38901 for 7-24 GHz,” NVIDIA
81. R1-2404925, “Discussion on Validation of the Channel Model in 38901,” AT&T
82. R1-2405082, “Discussion on channel modelling enhancements for 7-24GHz for NR,” MediaTek Inc.
83. R1-2405169, “Channel Model Validation of TR38.901 for 7-24 GHz,” Qualcomm Incorporated
84. R1-2405170, “Channel Model Adaptation/Extension of TR38.901 for 7-24GHz,” Qualcomm Incorporated
85. R1-2405250, “Channel model adaptation/extension of TR38.901 for 7-24 GHz,” CEWiT
86. R1-2405339, “Views on Channel model validation of TR38.901 for 7-24GHz,” Sharp, NYU WIRELESS
87. R1-2405360, “Summary of issues for Rel-19 7-24 GHz Channel Modeling Validation,” Moderator (Intel Corporation)
88. R1-2405361, “Summary #1 of discussions for Rel-19 7-24 GHz Channel Modeling Validation,” Moderator (Intel Corporation)
89. R1-2405362, “Summary #2 of discussions for Rel-19 7-24 GHz Channel Modeling Validation,” Moderator (Intel Corporation)
90. R1-2405443, “Summary#1 of channel model adaptation and extension,” Moderator (ZTE)
91. R1-2405444, “Summary#2 of channel model adaptation and extension,” Moderator (ZTE)
92. R1-2405545, “Summary#3 of channel model adaptation and extension,” Moderator (ZTE)
93. R1-2405546, “Summary#4 of channel model adaptation and extension,” Moderator (ZTE)
94. R1-2405588, “Summary #3 of discussions for Rel-19 7-24 GHz Channel Modeling Validation,” Moderator (Intel Corporation)
95. R1-2405589, “Summary #4 of discussions for Rel-19 7-24 GHz Channel Modeling Validation,” Moderator (Intel Corporation)
96. R1-2405646, “Data source descriptions for 7 – 24 GHz SI,” Moderator (Intel Corporation)
97. R1-2405698, “Session notes for 9.8 (Study on channel modelling enhancements for 7-24GHz for NR) ,” Ad-Hoc Chair (CMCC)

 16.02.2024 minor adaptations for RAN #103

 10.11.2023 minor adaptations for RAN #102

 02.08.2023 minor adaptations for RAN #101

 26.04.2023 minor adaptations for RAN #100

 01.02.2023 minor adaptations for RAN #99

 27.10.2022 minor adaptations for RAN #98e

 01.08.2022 minor adaptations for RAN #97e

 21.05.2022 minor adaptations for RAN #96

 10.01.2022 minor adaptations for RAN #95e

 04.10.2021 minor adaptations for RAN #94e

 08.08.2021 minor adaptations for RAN #93e

 17.05.2021 minor adaptations for RAN #92e

 28.01.2021 minor adaptations for RAN #91e

 09.11.2020 minor adaptations for RAN #90e

 31.08.2020 minor adaptations for RAN #89e

 20.04.2020 minor adaptations for RAN #88e

 18.02.2020 minor adaptations for RAN #87e

 14.11.2019 minor adaptations for RAN #86

 18.08.2019 minor adaptations for RAN #85

 12.05.2019 minor adaptations for RAN #84

 27.02.2019 minor adaptations for RAN #83

 21.11.2018 completion levels with colours added (for RAN #82)

v04.81 31.07.2018 simplification of template and addition of cross-TSG aspects (for RAN #81)

v04.80 21.05.2018 minor adaptations for RAN #80

v04.79 26.02.2018 minor adaptations for RAN #79

v04.78 18.11.2017 minor adaptations for RAN #78

v04.77 06.08.2017 minor adaptations for RAN #77

v04.76 15.05.2017 minor adaptations for RAN #76

v04.75 31.01.2017 minor adaptations for RAN #75

v04.74 28.10.2016 minor adaptations for RAN #74

v04.73 01.09.2016 adaptations for RAN #73 (time units in extra Excel table, RAN6 reporting included)

v04.72 26.05.2016 adaptations for RAN #72 (introduction of NR & GERAN TUs)

v04.71 10.02.2016 minor adaptations for RAN #71

v04.70 30.10.2015 minor adaptations for RAN #70

v04.69 12.08.2015 minor adaptations for RAN #69

v04.68 21.05.2015 minor adaptations for RAN #68

v04.67 01.02.2015 minor adaptations for RAN #67

v04.66 16.11.2014 minor adaptations for RAN #66

v04.65 16.08.2014 minor adaptations for RAN #65

v04.64 22.05.2014 minor adaptations for RAN #64

v04.63 24.01.2014 restructuring for RAN #63 to cover Core & Perf. in one doc file

v03.62 11.11.2013 section 1.2.3 adapted for RAN #62

v03 11.08.2013 section 1.2.3 added on time budget

v02 07.05.2010 history added, some spelling corrections

v01 13.11.2009 First version of the template