**Proposal 13:**

* Adopt the following target data rates for eMBB performance evaluation for FR2.

- Indoor: DL: 25Mbps, [100Mbps], UL:5Mbps, [10Mbps]

- Urban: DL: 25Mbps, [100Mbps], UL: 5Mbps, [10Mbps]

- Suburban: DL: 1Mbps, UL: 50kbps, [200kbps]

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| **Companies** | **Comments** |
| Ericsson | We think 400 MHz system bandwidth should be used, since higher bandwidths are a primary advantage of FR2. Therefore, 100 Mbps is more suitable than 25 Mbps. We suggest:- Indoor: DL: 100Mbps, [25Mbps] UL: 10Mbps, [5Mbps]- Urban: DL: 100Mbps, [25Mbps] UL: 10Mbps, [5Mbps] |
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**Proposal 14:**

* For link level simulation, TBS of VoIP for FR2 is the same as FR1.
* For link level simulation, TBS of Msg3 for FR2 is the same as FR1.

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| **Companies** | **Comments** |
| Ericsson | Agree with the proposal. |
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**Proposal 15:**

* The evaluation methodology for FR2 is the same as FR1.
* The link budget template for FR2 is the same as FR1.
* The target performance metric for FR2 is the same as FR1.

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| **Companies** | **Comments** |
| Ericsson | We think it is even more important for FR2 to have proper antenna gain modelling. Can we agree to the following:* + Link budget evaluation methodology and template for FR2 include isotropic loss (a.k.a ‘Hardware link budget’)
	+ With the possible exception of the above, link budget evaluation methodology and template are the same as FR1.

We prefer to further discussed the need for a target metric and how such a metric would be quantified. A target metric is not needed if relative performance is used to identify bottleneck channels. |
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**Proposal 16:**

* For link level simulation, adopt the following table for PUSCH and PDSCH for FR2.

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| **Parameters** | **Values** |
| Scenario and frequency | 28GHz |
| Frame structure for TDD | DDDSU (S: 10D:2G:2U)DDSU (S: 11D:3G:0U) |
| Subcarrier Space | 120kHz |
| BLER | 10% iBLER for eMBB, 2% rBLER for VoIP  |
| UE velocity | Indoor scenario:3km/hUrban scenario: 3km/h for indoor, 30km/h for outdoor. Suburban scenario: 3km/h for indoor, 30km/h, [120km/h] for outdoor. |
| Occupied channel bandwidth for PDSCH | 100MHz, [400MHz] |
| Frequency hopping for PUSCH | Intra-slot, [inter-slot] frequency hopping is enabled |

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| **Companies** | **Comments** |
| Ericsson | We think 30 GHz should be used, as this is in line with prior evaluations.HARQ should be explicitly simulated for PUSCH with [2%] rBLER.3 kmph should be emphasized. Need to check on 120km/h.System bandwidth should be 400 MHz, [100 MHz], as commented above given the greater bandwidth available for FR2.The definition of the scenarios should be clarified; details are in appendix of the [FR2 email discussion document](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_101-e/Inbox/drafts/8.4.1.2%20FR2/R1-20xxxxx%20-%20%5B101-e-NR-Cov-Enh%5D-FR2-v013-IDC-CMCC.docx). ITU InH\_B and UMa\_B can be used as scenarios.Similar to FR1, simulations may or may not use frequency hopping, since it is not always beneficial. Companies can report whether it is used. |
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**Proposal 17:**

* For link level simulation, adopt the following table for PUSCH and PDSCH for FR2.

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| **Parameters** | **Values** |
| BLER | 10% iBLER for eMBB, 2% rBLER for voice. |
| Number of UE antennas | 8 |
| Number of UE TRXUs | 1 or 2 for PUSCH, 2 for PDSCH |
| DMRS configuration | For 3km/h: Type I, one DMRS symbol, no multiplexing with data.For 30km/h, 120km/h: Type I, 2 or 3 DMRS symbol, no multiplexing with data. |
| Waveform | DFT-s-OFDM for PUSCH, CP-OFDM for PDSCH |
| Number of repetitions for PUSCH | For eMBB, no repetition is assumed.For VoIP, the maximum number of repetitions can be 2/4/8. |
| HARQ configuration for PUSCH | For eMBB, no retransmission is assumed.For VoIP, the maximum number of HARQ transmission can be 2/4/8. |

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| **Companies** | **Comments** |
| Ericsson | HARQ should be explicitly simulated for PUSCH with [2%] rBLER.UE antenna configuration should be clarified: how many panels are used; what is the number of panels, etc. We think one good configuration is: 1T2R, [2T2R]; (M,N,P) = (4,2,2); 2 panels in different directionsRepetition and HARQ should be allowed for eMBB. |
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**Proposal 18:**

* For link level simulation, adopt the following table for PUSCH and PDSCH for FR2.

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| **Parameters** | **Values** |
| Number of antenna elements for BS | Indoor scenario: 128Urban scenario: 256Suburban: 256 |
| Number of TxRUs for BS | 2 |
| Channel model for link-level simulation | CDL- A, [CDL-C], TDL-A |
| Delay spread | Indoor scenario: 30nsUrban scenario: 100nsSuburban scenario: 100ns |
| Latency requirements for voice | 50ms/100ms |
| PRBs/TBS/MCS | Reported by companies. |

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| **Companies** | **Comments** |
| Ericsson | BS antenna configurations & gain, including RF losses Follow the modeling of ITU M.2412Indoor:* AAS 128 antenna elements with (M,N,P,Mg,Ng) = (8,8,2,1,1); tilt: 3 deg
* 2T2R for analog beamforming case; other values not precluded
* 23dBi total max gain

Urban:* Antenna near the ceiling, panels in 3 sector configuration. AAS 512 antenna elements in 4 panels with (M,N,P,Mg,Ng) = (8,8,2,2,2); tilt: 12 deg
* 2T2R for analog beamforming case; other values not precluded
* 26dBi total max gain

TDL models should use medium correlationPrefer that voice latency requirements are square bracketed for now, so we can check. |
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**Proposal 19:**

* For link level simulation, adopt the following table for PUCCH for FR2.

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| **Parameters** | **Values** |
| PUCCH format type | Format 1, 2bits UCIFormat 3, 11/22 bits UCI |
| BLER for PUCCH | For PUCCH format 1: DTX to ACK probability: 1%. NACK to ACK probability: 0.1%, ACK missed detection probability: 1%.For PUCCH format 3: Block error probability: 1% |
| Number of PRBs for PUCCH | 1 PRB |
| Number of UE antennas for PUCCH | 1 |
| Number of UE TRXUs for PUCCH | 1 |
| Number of receive antenna elements for BS | Indoor scenario: 128Urban scenario: 256Suburban: 256 |
| Number of receive TxRUs for BS | 2 |
| Number of repetitions for PUCCH | w/ and w/o repetition for PUCCH.The maximum number of repetitions can be 2/4/8. |

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| **Companies** | **Comments** |
| Ericsson | **Format 3 with 4 bits Ack/Nack**:PUCCH Format 3 using 14 symbols, 1 PRB, 4 DMRS and frequency hopping 4 bits payload for ACK/NACKS (three bits for 3DL:1UL TDD asymmetry and another bit for scheduling request)Pr(DTX to ACK) <=1%, Pr(NACK to ACK) <=0.1%, Pr(ACK error) <=1% or 10%**CSI on PUCCH format 3 or PUSCH:**Type I wideband CSI feedback- 8+2=10 bits for 2 port feedback + 3bit CRI1 PRB, no HARQ ACK/NACKs- PUCCH format 3 with 4 DMRS, with frequency hopping, or - PUSCH without multiplexing with data on PUSCH and no frequency hoppingTXRUs should not be specified for the UE; UE should have 1T2R or 2T2RgNB antenna configuration & TXRUs should be the same as PUSCH (as well as other UL & DL channels) |
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**Proposal 20:**

* For link level simulation, adopt the following table for PDCCH for FR2.

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| **Parameters** | **Values** |
| aggregation level | 16 |
| payload | 40 bits |
| CORESET size | 2 symbols |
| CCE-to-REG mapping type | interleaved or non-interleaved mapping |

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| **Companies** | **Comments** |
| Ericsson | CORESET 66 PRBs, 1 symbol, non-interleaved mapping,precoder cycling |
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**Proposal 21:**

* For link level simulation, adopt the following table for PRACH for FR2.

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| **Parameters** | **Values** |
| Format type | Format B4, Format C2 |
| Scheduled PRBs | 12 PRBs |
| Performance metric | 0.1% false alarm, 1% miss-detection |

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| **Companies** | **Comments** |
| Ericsson | 10% or 1% missed detection at 0.1% false alarm probability. Format B4 should be used for maximum coverage. |
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