**Rel.17 NR FeMIMO: Phase 2 EVM discussion – Item 2a**

1. Compilation of companies’ views

Based on the companies’ inputs in Phase 1 discussion, an initial proposal on baseline EVM assumptions needed for Rel.17 item 2a beyond Rel.16 EVM is given in section 2.

Companies are encouraged to share their views on the content of section 2 in Table 1 – especially on the blank parts. Based on the inputs gathered in Table 1, the content of section 2 will be refined accordingly to arrive at a final proposal.

Table 1. Inputs from companies on the content of section 2

|  |  |
| --- | --- |
| **Company** | **Input** |
|  |  |
|  |  |
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|  |  |

1. Baseline assumptions for item 2a EVM – *initial proposal*

According to the evaluation scenario (e.g., at FR1 in urban macro / at FR1 in indoor hotspot / at FR2 in indoor hotspot), one of three Tables (Table A.3-1 ~ A.3-3) in appendix (section 3) can be a baseline of EVM for Rel-17 FeMIMO item 2a.

Table 2 to Table 5 include the LLS assumptions which are beyond what we already have in Rel-16 eMIMO EVM.

Table 2. Common assumptions for PDCCH/PUCCH/PUSCH

|  |  |
| --- | --- |
| Parameters | Potential values |
| The number of TRPs | 2 |
| Channel model | TDL for FR1  CDL for FR2 |
| Path-loss modeling | x dB gap between TRPs |
| Blockage | Option 1: Blockage model from Rel-16 (x dB power offset with probability p)  Option 2: Blockage model A in TR38.901 |
| Target BLER | [10^-3, 10^-4, 10^-5] |

Table 3. Detailed assumptions for PDCCH

|  |  |
| --- | --- |
| Parameters | Potential values |
| Baseline schemes | Option 1: Rel-15 PDCCH  Option 2: Spec transparent SFN |
| AL |  |
| Interleaving |  |
| # of RBs/symbols |  |
| Code rates |  |
| DCI payload |  |
| CCE-to-REG mapping |  |
| REG bundling size |  |
| Precoding assumptions |  |
| DMRS configuration |  |
| Number of repetitions |  |
| Repetition schemes | TDM/FDM/SDM |
| Receiver assumption | e.g., soft combining or not |

Table 4. Detailed assumptions for PUCCH

|  |  |
| --- | --- |
| Parameters | Potential values |
| Baseline scheme | Rel-15/-16 PUCCH repetition |
| PUCCH format |  |
| # of RBs/symbols |  |
| Code rates |  |
| Frequency hopping |  |
| Number of repetitions |  |
| Repetition schemes | TDM |
| Receiver assumption |  |

Table 5. Detailed assumptions for PUSCH

|  |  |
| --- | --- |
| Parameters | Potential values |
| Baseline scheme | Rel-15/-16 PUSCH repetition |
| # of RBs/symbols |  |
| DMRS pattern |  |
| # of layers |  |
| Code rates |  |
| Frequency hopping |  |
| UL transmission scheme |  |
| Redundancy Version |  |
| Number of repetitions |  |
| Repetition schemes | TDM |
| Receiver assumption |  |

1. Appendix

Link level simulation assumptions from A.3 in TR38.824

Table A.3-1: Link-level simulation assumptions at 4 GHz for all cases with urban macro

|  |  |
| --- | --- |
| Parameter | Value |
| Carrier frequency for evaluation | 4 GHz |
| Channel model | TDL-C (delay spread: 300ns) as in 38.901 |
| UE speed | 3 km/h for power distribution and Rel-15 enabled use case;  60 km/h for remote driving and ITS; |
| BS antenna configuration | 4 Tx/4 Rx antenna ports and 8 Tx/8 Rx antenna ports  Higher BS antenna configurations for evaluation are not precluded |
| UE antenna configuration | 2 Tx/4 Rx antenna ports  Higher UE antenna configurations for evaluation are not precluded |
| System bandwidth | 40 MHz  Note:  For FDD, 40 MHz for DL and 40 MHz for UL. Note that this is for evaluation purpose because there is no FDD bands identified at 4 GHz currently.  For TDD, 40 MHz for DL/UL. |
| Sub-carrier spacing | 30 kHz  Note: Other values for evaluation are not precluded. |
| Channel estimation | Practical |
| Receiver type | MMSE |
| Q value (i.e. SINR range) | Companies report the 5% Q value |

- Evaluation of 700 MHz and 2 GHz carrier frequency are not precluded.

Table A.3-2: Link-level simulation assumptions at 4 GHz for all cases with indoor hot-spot and factory automation

|  |  |
| --- | --- |
| Parameter | Value |
| Carrier frequency for evaluation | 4 GHz |
| Channel model | TDL-D (delay spread: 30ns) as in 38.901  TDL-C (delay spread: 100ns) as in 38.901  Note: Companies report the modification of the channel model if any |
| UE speed | 3 km/h, 30 km/h |
| BS antenna configuration | 4 Tx/4 Rx antenna ports and 8 Tx/8 Rx antenna ports  Higher BS antenna configurations for evaluation are not precluded |
| UE antenna configuration | 2 Tx/4 Rx antenna ports  Higher UE antenna configurations for evaluation are not precluded |
| System bandwidth | 40 MHz  Note:  For FDD, 40 MHz for DL and 40 MHz for UL. Note that this is for evaluation purpose because there is no FDD bands identified at 4 GHz currently.  For TDD, 40 MHz for DL/UL. |
| Sub-carrier spacing | 30 kHz  Note: Other values for evaluation are not precluded. |
| Channel estimation | Practical |
| Receiver type | MMSE |
| Q value (i.e. SINR range) | Companies report the 5% Q value |

Table A.3-3: Link-level simulation assumptions at 30 GHz for all cases with indoor hot-spot and factory automation

|  |  |
| --- | --- |
| Parameter | Value |
| Carrier frequency for evaluation | 30 GHz |
| Channel model | CDL-A (delay spread: 20 ns) as in 38.901 |
| UE speed | 3 km/h, 30 km/h |
| BS antenna configuration | 2 Tx/2 Rx antenna ports |
| UE antenna configuration | 2 Tx/2 Rx antenna ports |
| System bandwidth | 160 MHz  Note: For TDD, 160 MHz for DL/UL. No FDD bands identified at 30 GHz currently. |
| Sub-carrier spacing | 120 kHz  Note: Other values for evaluation are not precluded. |
| Channel estimation | Practical |
| Receiver type | MMSE |
| Q value (i.e. SINR range) | Companies report the 5% Q value |