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TECHNOLOGY ASPECTS

India (Republic of)

PROPOSED MODIFICATIONS TO THE WORKING DOCUMENT TOWARDS PRELIMINARY DRAFT NEW REPORT ITU-R M.[IMT2020.EVAL] FOR THE EMBB-RURAL LMLC CONFIGURATION

1 Introduction

Working Party 5D is in the process of defining and finalising the performance requirements, evaluation criteria and methodology for the assessment of IMT-2020. At the 25th Working Party 5D (WP 5D) meeting held in Geneva, a Low Mobility Large Cell Rural Configuration (LMLC Rural) that addresses the needs of a vast majority of Indian population was discussed.

Following agreements were also arrived at in the meeting #25 with regard to LMLC as provided in working document toward preliminary draft new Report ITU-R M.[IMT-2020.EVAL] (Document 5D/374 Att. 5.11):

- LMLC configuration is only for RU-eMBB
- Receive proposals on the test configuration and the corresponding average spectrum efficiency.

It was also mentioned in the Meeting Report of Sub-Working Group Evaluation (Document 5D/TEMP/230) that the configuration parameters for Rural-eMBB will be provided to reflect LMLC in the meeting #26 to be held in Geneva, 14-22 Feb 2017. This contribution provides the detailed configuration for the Low Mobility Large Cell Rural (LMLC) Scenario.

2 Discussion

The 25th meeting of WP 5D held during Oct. 2016 continued work on the creation of draft new ITU-R M.[IMT-2020.EVAL], resulting in the following five test environments:

- 1) Indoor Hotspot-eMBB
- 2) Dense Urban-eMBB
- 3) Rural-eMBB
- 4) Urban Macro-URLLC
- 5) Urban Macro-mMTC

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The meeting agreed in the merging of High Speed-eMBB into the Rural-eMBB as additional configurations. It also created a new configuration called low mobility large cell (LMLC) under Rural-eMBB. The upcoming meeting of WP 5D (meeting #26 to be held during Feb. 2017) will deliberate on parameters for these additional configurations. Towards this purpose, we are proposing the parameters to reflect a low mobility large cell configuration.

3 Proposal

India proposes values to the LMLC configuration under Rural-eMBB test environment, as given in the annex of this contribution. These values are attached to the working document taken from the Chairman's Report (Doc. 5D/374) – in the Annex. This section provides the detailed test configuration for the Low Mobility Large Cell Rural (LMLC) Scenario proposed to be considered in the section 8.4 Evaluation configurations of the working document toward preliminary draft new Report ITU-R M.[IMT-2020.EVAL] (Document 5D/374 Att. 5.11).

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ANNEX

8.4 Evaluation configurations

[Editor's note: This section is to provide detailed description of evaluation configurations and parameters, e.g., network / antenna topology, antenna configuration, antenna layout, antenna height, Base station /Mobile station antenna numbers, etc.; some evaluation configuration parameters are dependent on test environments, and some could be common for a group of test environments.]

[Editor's note: Detailed evaluation parameters need to be discussed based on input contribution in 26th meeting. Set of common configuration parameters for all the KPIs in a separate common table as in M.2135 needs to be considered.]

[Editor's note: Detailed Text proposals and compiled tables based on input contributions which were not discussed during Meeting #25 are included in Annex 8 and will be carried forward to Meeting #26.]

[TABLE 8-X.

Evaluation configuration parameters

Evaluation parameter	[Indoor hotspot]	[Dense urban]	[Urban Macro]	[Rural Macro]	[Rural eMBB - LMLC Configuration]
Layout					<u>Single layer rural</u>
Inter-BS distance					<u>8 000 m</u>
Base station (BS) antenna height					<u>35 m</u>
Number of BS antenna elements					<u>Up to 64 Tx /Rx antenna elements</u>
Total BS transmit power					<u>43 dBm for 10 MHz bandwidth or 43 dBm for 20 MHz bandwidth</u> <u>EIRP should not exceed [78] dBm</u>

Evaluation parameter	[Indoor hotspot]	[Dense urban]	[Urban Macro]	[Rural Macro]	[Rural eMBB - LMLC Configuration]
UE power class					23 dBm; EIRP Should not exceed [43] dBm
UE antenna system					Up to 4 Tx /Rx antenna elements
Minimum distance between UE and serving cell					35 m
Carrier frequency for evaluation					700 MHz
Outdoor to indoor building penetration loss					13 dB
Outdoor to in-car penetration loss					7 dB
Aggregated system BW (DL+UL)					20 MHz (10 + 10 for FDD)
BS antenna model					2D model (as in 3GPP) / follow the modelling of ITU e-MBB rural
UE antenna model					Omni directional (as in 3GPP) / follow the modelling of ITU e-MBB rural
BS noise figure					5 dB
Device deployment					[Indoor (pedestrian): 40% Outdoor (pedestrian): 40% In-car: 20%]
User density					10 users per macro TRP for full buffer Randomly and

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Evaluation parameter	[Indoor hotspot]	[Dense urban]	[Urban Macro]	[Rural Macro]	[Rural eMBB - LMLC Configuration]
					<u>uniformly dropped within the cell</u>
Traffic model					<u>Full buffer</u>

]

[Editor's note: The configuration parameters of Rural-eMBB would be checked further based on future input.]

TABLE 8-X1

Baseline evaluation configuration parameters

Evaluation Parameters	Indoor hotspot-eMBB	Dense Urban-eMBB	Rural-eMBB	[Rural eMBB - LMLC Configuration]	Urban Macro-mMTC	Urban Macro-URLLC
Base station (BS) antenna height	3m	25 m for macro cells and 10 m for micro cells	35m	<u>35 m</u>	25m	25 m
Total BS transmit power <i>[Editor's Note: these values will be appropriate for end to end simulations.]</i>	4GHz: 24 dBm for 20 MHz; 21 dBm for 10 MHz 30 GHz: 23dBm for [80] MHz bandwidth; 20 dBm for [40] MHz bandwidth 70 GHz: 21 dBm for [80] MHz bandwidth 18 dBm for [40] MHz bandwidth EIRP should not exceed [58] dBm	Macro 4GHz: 44 dBm for 20 MHz bandwidth 41 dBm for 10 MHz bandwidth Macro 30 GHz: [40 dBm] for [80] MHz bandwidth [37 dBm] for [40] MHz bandwidth Macro EIRP should not exceed [73] dBm	49 dBm for 20 MHz; 46 dBm for 10 MHz	<u>43 dBm for 10 MHz bandwidth or 43 dBm for 20 MHz bandwidth EIRP should not exceed [78] dBm</u>	49 dBm for 20 MHz bandwidth 46 dBm for 10 MHz bandwidth	[44 dBm for 20 MHz bandwidth 41 dBm for 10 MHz bandwidth]

Evaluation Parameters	Indoor hotspot-eMBB	Dense Urban-eMBB	Rural-eMBB	[Rural eMBB - LMLC Configuration]	Urban Macro-mMTC	Urban Macro-URLLC
		Micro 4GHz: 33 dBm for 20MHz bandwidth 30 dBm for 10MHz bandwidth Micro 30GHz: 33 dBm for [80] MHz system bandwidth 30 dBm for [40] MHz system bandwidth EIRP should not exceed [68] dBm				
UE power class <i>[Editor's Note: these values will be appropriate for end to end simulations.]</i>	4 GHz: 23 dBm 30 GHz: 23 dBm EIRP should not exceed 43 dBm 70 GHz: 21 dBm, EIRP should not exceed 43 dBm	1- 4 GHz: 23 dBm 2- 30 GHz: 23 dBm, EIRP should not exceed 43 dBm	23dBm	<u>23dBm; EIRP Should not exceed [43] dBm</u>	23 dBm	23 dBm
Minimum distance between UE and serving cell	<i>[Editor's Note: Wait till channel model discussion is done]</i>	<i>[Editor's Note: Wait till channel model discussion is done]</i>	<i>[Editor's Note: Wait till channel model discussion is done]</i>	<u>35 m</u>	<i>[Editor's Note: Wait till channel model discussion is done]</i>	<i>[Editor's Note: Wait till channel model discussion is done]</i>
Carrier frequency for evaluation	4 GHz, 30 GHz, 70 GHz; <i>[Editor's Note: to discuss the following NOTE1 in Meeting #26][NOTE1: Technical requirement will be evaluated]</i>	1- For spectral efficiency evaluation: 2- 1 layer (Macro) with 4 GHz, [30GHz] <i>[Editor's Note: Further]</i>	[700MHz, 4GHz]	<u>700 MHz</u>	700 MHz	4 GHz

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Evaluation Parameters	Indoor hotspot-eMBB	Dense Urban-eMBB	Rural-eMBB	[Rural eMBB - LMLC Configuration]	Urban Macro-mMTC	Urban Macro-URLLC
	under either of the three options. If technical performance requirement is met under either option, the requirement is fulfilled.]	<i>consider 30GHz in meeting #26)</i> 2. For user experienced data rate: 1. 1 or 2 layers (Macro + Micro). 2. 4GHz & 30GHz available in Macro & Micro layers				
Outdoor to indoor building penetration loss	N.A.	[Editor's Note: Wait till channel model discussion is done]	[Editor's Note: Wait till channel model discussion is done]	13 dB	[Editor's Note: Wait till channel model discussion is done]	[Editor's Note: Wait till channel model discussion is done]
Outdoor to in-car penetration loss	N.A.	[Editor's Note: Wait till channel model discussion is done]	[Editor's Note: Wait till channel model discussion is done]	7 dB	[Editor's Note: Wait till channel model discussion is done]	[Editor's Note: Wait till channel model discussion is done]

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TABLE 8-X2

Evaluation configuration parameters for analytical assessment of peak data rate, peak spectrum efficiency

Evaluation parameters	Values
Number of BS antenna elements	4 GHz/ 30 GHz: Up to 256 Tx /Rx 70 GHz: Up to [1 024] Tx/Rx
Number of UE antenna elements	4 GHz: Up to [8,32] Tx /Rx , 30 GHz: Up to [32] Tx /Rx , 70 GHz: Up to [64] Tx /Rx

TABLE 8-X3

**Additional parameters for system simulation
(for 5th percentile user spectral efficiency, average spectral efficiency and [connection density])**

Parameters/ Countries	Indoor hotspot- eMBB	Dense Urban- eMBB	Rural-eMBB	[Rural eMBB - LMLC Configuration]	Urban Macro- mMTC	Urban Macro- URLLC
[Layout] <i>[Editor's Note: to be carried forward to Meeting #26]</i>				Single layer rural		
Inter-BS distance	20 m			<u>8 000 m</u>		
Number of BS antenna elements ¹	4 GHz: Up to 256 Tx/Rx 30 GHz: Up to 256 Tx/Rx 70 GHz: Up to [1024, 256] Tx/Rx			<u>Up to 64 Tx /Rx antenna elements</u>		
Number of UE antenna elements	4 GHz: Up to 8 Tx/Rx 30 GHz: Up to 32 Tx/Rx 70 GHz: Up to [32,64]Tx Rx			<u>Up to 4 Tx /Rx antenna elements</u>		
Channel model	<i>[Editor's Note: Wait till channel model discussion is done]</i>			<u>3GPP/ITU Channel models</u>		
Device deployment	Randomly and uniformly distributed over area 100% indoor			<u>Indoor (pedestrian): 40%</u> <u>Outdoor (pedestrian): 40%</u> <u>In-car:20%</u>		
User mobility model	Fixed and identical speed v of all UTs, randomly and uniformly distributed direction			<u>Fixed and identical speed v of all UTs of the same mobility class, randomly and uniformly distributed direction.</u>		

Parameters/ Countries	Indoor hotspot- eMBB	Dense Urban- eMBB	Rural-eMBB	[Rural eMBB - LMLC Configuration]	Urban Macro- mMTC	Urban Macro- URLLC
UE speeds of interest	3 km/h			<u>Indoor: 3 km/h</u> <u>In-car: 30 km/h</u>		
Inter-site interference modeling	Explicitly modelled			<u>Explicitly modelled</u>		
BS noise figure	4 GHz: 5 dB 30 GHz/70 GHz: [7, 8]dB			<u>5 dB</u>		
UE noise figure	4 GHz: [9]dB 30 GHz/70 GHz: [10, 13]dB			<u>7/9 dB</u>		
BS antenna element gain				<u>8 dBi</u>		
UE antenna element gain				<u>0 dBi</u>		
Thermal noise level				<u>-174 dBm/Hz</u>		
Traffic model ²				<u>Full buffer</u>		
Simulation bandwidth	-			<u>-20 MHz (10 + 10 for FDD)</u>	-	-
User density				<u>10 users per macro TRP for full buffer Randomly and uniformly dropped within the cell</u>		