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Radio Regulatory Technical Advisory Group (RR-TAG)

Liaison from ITU-R Working Party 5D re: WRC-27 agenda item 1.7

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Abstract

This document contains a liaison received from ITU-R Working Party 5D, entitled “Parameters of terrestrial component of IMT for sharing and compatibility studies in the frequency bands 4 400-4 800 MHz, 7 125-8 400 MHz and 14.8-15.35 GHz”.

Radiocommunication Study Groups

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ITU-R Working Party 5D

LIAISON STATEMENT TO EXTERNAL ORGANIZATIONS[1]

Parameters of terrestrial component of IMT for sharing and compatibility studies in the frequency bands 4 400-4 800 MHz, 7 125-8 400 MHz and 14.8-15.35 GHz

WRC-23 agreed a WRC-27 agenda item 1.7 related to IMT (Administrative Circular CA/270). Working Party (WP) 5D is therefore responsible for preparing the characteristics of terrestrial component of IMT for sharing and compatibility studies in the following frequency bands:

- 4 400-4 800 MHz;
- 7 125-8 400 MHz; and
- 14.8-15.35 GHz.

Working Party 5D has previously developed parameters for sharing and compatibility studies for the terrestrial component of IMT-2020 and IMT-Advanced technologies for bands below 6 GHz, which are contained in Annex 4.4 to Document 5D/716 (June 2021) and in Report ITU-R M.2292, respectively.

CPM27-1 determined that technical and operational characteristics needed for sharing and compatibility studies should generally be available by 31 Dec 2024 (could be extended to 1st July 2025 if necessary). The sharing and compatibility studies may include terrestrial-to-terrestrial, and terrestrial-to-space coexistence scenarios between IMT system and incumbent services, e.g. fixed service, satellite service, science service etc.

In its recent meeting (Feb 2024), WP 5D thus started the task of determining system characteristics and parameters for IMT systems in 4 400-4 800 MHz, 7 125-8 400 MHz and 14.8-15.35 GHz frequency bands, and wish to engage support of external organizations (EOs) in this work.

Support from External Organizations

WP 5D is seeking technical and operational characteristics of terrestrial IMT systems[2] that would operate in frequency bands of 4 400-4 800 MHz, 7 125-8 400 MHz and 14.8-15.35 GHz being considered under WRC-27 AI 1.7, including the evolution of IMT through advances in technology and spectrally efficient techniques:

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1 3GPP RAN, 3GPP RAN 4, ARIB, ATIS, CCSA, ETSI, IEEE, ITRI, TIA, TSDSI, TTA, TTC and WiMAX Forum.

2 Provided characteristics could be those considered for systems to be submitted to IMT-2030 specification process.

i) When providing these parameter values (e.g., IMT-2020 and/or IMT-2030), please also qualify if these values are based on the maximum value, typical value, specific range, or others. In the Attachment, please see example templates (from Annex 4.4 to Doc. 5D/716 (June 2021)) which could be used in your response. EOs should not feel constrained to respond to the format of Tables 1 and 2 in the Attachment of this document, as they are just indicative of examples.

ii) Prior to WRC-23, WP 5D received technical parameters and AAS (Active Antenna System) radiation pattern implementation details with the appropriate models for single-element arrays and the array of sub-arrays implementation of AAS (typically used at IMT base stations). In the case of an array of sub-arrays, the technical parameters were only specified from 1 710 – 4 990 MHz. Taking this into account, for the frequency band 4 400 – 4 800 MHz, WP 5D would welcome any latest information on the AAS radiation pattern implementations and models to be used in sharing and compatibility studies towards WRC-27. For the frequency bands 7 125 – 8 400 MHz and 14.8 – 15.35 GHz, WP 5D welcomes information on the envisaged AAS pattern implementations and models to be used in sharing and compatibility studies towards WRC-27.

iii) Some specific technical parameters and information related to AAS implementations for the abovementioned frequency bands are described below:

a) The particular type of AAS implementation and associated model for IMT base stations, i.e., AAS composed of an array-of-sub-arrays or AAS composed of single-element arrays with its technical justification.

b) If providing specific technical AAS implementation parameters for the array-of-sub-arrays case, WP 5D would welcome:

i) The pre-set sub array tilt is understood as a parameter (a pre-tilt within the elements combined to form a sub array) that is used to focus the main beam below the boresight where a base station is intended to serve its UEs, similarly to the mechanical downtilt. Noticing that the mechanical downtilt of the BS antenna is environment (urban/suburban/rural) dependent, WP5D welcomes further confirmation whether the preset sub-array downtilt varies with the environment or not, what would be the range of values for this parameter and the associated environments and if multiple set of configurable preset sub-array downtilt per BS is foreseen in the future.

ii) Information of advancements in MIMO architectures that could be applicable for future systems.

c) Whether AAS at IMT user equipment is likely or not. If AAS at IMT user equipment is considered as a possibility WP 5D welcomes information relating to the structure of the AAS at the IMT user equipment, associated frequency bands, and the associated parameters of the AAS.

d) IMT base station (inclusive of its AAS-related parameters) and IMT user equipment technical parameters for analyzing adjacent band compatibility of terrestrial IMT systems with other co-primary services in the ITU Radio Regulations.

WP 5D also seeks information about how the AAS performs in adjacent bands i.e. does its performance drops down to that of a single element or still some array features remain. If the latter is true how far in frequency should one assume the continuity of array features even with some degradation?

e) Considering the system-level simulation work typically conducted in WP5D for sharing and compatibility studies using 3D modelling of antenna pattern, WP5D is seeking information on whether for implementation of IMT BS multiuser spatial beamforming techniques, such as zero-forcing (ZF) or minimum mean-square error (MMSE) based schemes, would be necessary to improve the assessment of interference and the accuracy of studies. If considered necessary, guidance on the process of deriving the necessary beamforming weights for the IMT AAS BS to compute its radiation pattern is welcomed.

WP 5D kindly asks initial response on this information by June 2024 meeting of WP 5D, deadline for inputs is 13th June 2024 (1600 UTC).

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Attachment

TABLE 1 EXAMPLE TEMPLATE

IMT-2030 specification related parameters in [xx-xx] MHz

No.	Parameter	Base station (non-AAS)	Base station (AAS)	Mobile station
1	Duplex Method			
2	Channel bandwidth (MHz)			
3	Signal bandwidth (MHz)			
4	Transmitter characteristics			
4.1	Power dynamic range (dB)			
4.2	Spectral mask (dB)			
4.3	ACLR (dB)			
4.4	Spurious emissions /out of band emissions			
4.5	Maximum output power (dBm)			
5	Receiver characteristics			
5.1	Noise figure (dB)			
5.2	Sensitivity (dBm)			
5.3	Blocking response			
5.4	ACS			
5.5	SINR operating range (dB)			

TABLE 2 EXAMPLE TEMPLATE

Beamforming antenna characteristics for IMT-2030 in [xx-xx] MHz

		Rural macro (If it's available)	Suburban macro	Urban macro	Urban small cell (outdoor)/Micro cell	Indoor (small cell)
1	**Base station antenna characteristics**					
1.1	Antenna pattern					
1.2	Element gain (dBi)					
1.3	Horizontal/vertical 3 dB beam width of single element (degree)					
1.4	Horizontal/vertical fronttoback ratio (dB)					
1.5	Antenna polarization					
1.6	Antenna array configuration (Row × Column)					
1.7	Horizontal/Vertical radiating element/sub-					

	array spacing, d_h /d_v					
1.7a	Number of element rows in sub-array, M_{sub}					
1.7b	Vertical radiating element spacing in sub-array, $d_{v,sub}$					
1.7c	Pre-set sub-array down-tilt, $\theta_{subtilt}$ (degrees)					
1.8	Array Ohmic loss (dB)					
1.9	Conducted power (before Ohmic loss) per antenna element/sub-array (dBm)					
1.10	Base station horizontal coverage range (degrees)					
1.11	Base station vertical coverage range (degrees)					
1.12	Mechanical downtilt (degrees)					
1.13	Maximum base station output power/sector (e.i.r.p.) (dBm)					