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| **Radiocommunication Study Groups** |  |
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| Source: Revision 2 to Document 5D/TEMP/28 |  |
| **24 July 2012** |
| **English only** |
| Working Party 5D |
| LIAISON STATEMENT TO 3GPP and IEEE parameters for LTE-Advanced and WirelessMAN‑Advanced for use in sharing studies |

# 1 Summary

This liaison statement requests information on parameters for LTE-Advanced and WirelessMAN‑Advanced for use in sharing studies with other radiocommunication services in ITU‑R.

The ITU World Radiocommunication Conference 2012 (WRC-12), which met in January/February 2012, agreed two agenda items relating to spectrum for IMT[[1]](#footnote-1) for consideration at WRC-15[[2]](#footnote-2):

– Agenda item 1.1 considers additional allocations to the mobile service and identification of additional frequency bands for IMT;

– Agenda item 1.2 examines the use of the frequency band 694-790 MHz in ITU-R Region 1.

Working Party 5D (WP 5D) has been requested to provide parameters for use in sharing studies for these two Agenda items. ITU-R has developed sharing parameters for IMT-2000 technologies, which are contained in Report ITU-R M.2039-2. Furthermore, parameters specifically for the 790‑862 MHz band were developed for the purposes of supporting the sharing studies undertaken by JTG 5-6, which were completed in 2010. WP 5D has started the task of updating these parameters for IMT-Advanced, and requests the support of 3GPP and IEEE in this work.

# 2 Introduction

ITU World Radio Conference 2012 (WRC-12) agreed Agenda items 1.1 (AI 1.1) and 1.2 (AI 1.2) as work topics for consideration and decisions at the World Radio Conference 2015 (WRC-15) (planned for Oct/Nov 2015).

In the work structure for AI 1.1 and AI 1.2, certain studies on “sharing & compatibility” were designated to be addressed by a special purpose new entity, a Joint Task Group (JTG 4-5-6-7), created by the first Conference Preparatory Meeting (CPM 15-1) which took place immediately after WRC-12.

Working Party 5D (WP 5D) as the lead group for IMT in ITU-R also has responsibility for certain work on AI 1.1 and AI 1.2.

# 3 Information needed to support sharing studies under AIs 1.1 and 1.2

The work of WP 5D includes supporting the JTG 4-5-6-7’s designated studies by providing to the JTG 4-5-6-7 information on IMT technologies (both IMT-2000 and IMT-Advanced) which includes parameters and criteria that would be utilized in sharing studies carried out in JTG 4-5-6-7.

Deadlines were established for WP 5D to provide the relevant parameters to JTG 4-5-6-7:

– For Agenda item 1.1, by 31 July 2013.

– For Agenda item 1.2 before 31 December 2012.

It was noted in WP 5D in its first meeting in the new ITU-R Study Period that:

– For the IMT-2000 technologies, existing Report ITU-R M.2039-2 (published 2010) *“Characteristics of terrestrial IMT-2000 systems for frequency sharing and interference analyses”* addresses these types of parameters, and 3GPP and IEEE contributed to the development/updating of this Report.

– For the IMT-Advanced technologies, these are not addressed in Report ITU-R M.2039, as the final approval of the IMT-Advanced technologies defined in Recommendation ITU-R M.2012 occurred in ITU-R in January 2012.

Consequently, while Report ITU-R M.2039 addresses the relevant parameters for IMT-2000, these will need to be developed by WP 5D for IMT-Advanced, working in conjunction with the external organizations – 3GPP and IEEE. WP 5D has started work on these sharing, compatibility and protection criteria for IMT-Advanced systems for WRC-15 studies.

# 4 Request to 3GPP and IEEE

Working Party 5D will need to develop parameters for the studies for both AIs 1.1 and 1.2. However, due to the deadlines established by the JTG 4-5-6-7 for receipt of information, WP 5D will undertake this work in two Parts:

**Part 1:** WP 5D is seeking the information relevant to the bands below 1 GHz (and for AI 1.2 particularly the band range of around 694 to 790 MHz)

i) Attachment 1 contains the generic set of parameters for IMT in the band 790‑862 MHz that were used for sharing studies called for under AI 1.17 of WRC-12[[3]](#footnote-3). Please provide comments to Working Party 5D on the suitability of these parameters for the IMT-Advanced technologies in Recommendation ITU‑R M.2012.

 For deployment dependent parameters in the table in Attachment 1, WP 5D would appreciate any appropriate background information to support the parameters. In particular:

 • For power control (row 15 in Attachment 1) it would be beneficial for WP 5D to receive information on how to incorporate the power control mechanism in sharing studies.

 • For density of users and density of user equipment (rows 16 and 17 in Attachment 1), WP 5D would be grateful for information on the number of transmitters (in user equipment) that are transmitting at the same instant in conjunction with scheduler and traffic models.

ii) Please comment on whether these parameters would also be appropriate for adjacent frequency ranges.

iii) WP 5D kindly asks for the Part 1 information in time for its October 2012 meeting (deadline for document submissions is 26 September 2012 at 16:00 hours UTC), in order to meet the deadline for WP 5D to provide this information to JTG 4-5-6-7 before 31 December 2012.

**Part 2 :** WP 5D is seeking the information relevant to “suitable frequency ranges” being considered under AI 1.1. The “suitable frequency ranges” proposed in contributions to WP 5D to date extend from 470 MHz to above 6 GHz, including the bands listed in Table 1 of Report ITU-R M.2039-2 or frequency ranges adjacent to them.

i) Utilizing the enclosed template in Attachment 2, please provide to Working Party 5D the information on IMT-Advanced system parameters corresponding to the respective technologies in Recommendation ITU-R M.2012 in support of sharing and compatibility studies in the “suitable frequency ranges”.

ii) WP 5D kindly asks for Part 2 information in time for its July 2013 meeting, or earlier if possible (deadline for document submissions is 3 July 2013 at 16:00 hours UTC), in order to meet the deadline for WP 5D to provide this information to JTG 4-5-6-7 by 31 July 2013.

iii)This deadline is the final opportunity to provide responses to the liaison for all relevant frequency ranges, including any updates to the preliminary response received for Part 1.

# 5 Administrative information

The planned dates of the relevant WP 5D meetings are:

| ITU-RGroup | No. | Start(planned) | Stop(planned) |  | Deadline for Inputs | Requested from3GPP and IEEE |
| --- | --- | --- | --- | --- | --- | --- |
| WP 5D | 13 | 16 July 12 | 20 July 12 |  |  |  |
| **WP 5D** | **14** | **3 Oct. 12** | **11 Oct. 12** |  | **26 September 2012 @ 16:00 hours UTC** | **Part 1 Information** |
| WP 5D | 15 | 30 Jan 13 | 6 Feb 13 |  | 23 January 2013 @ 16:00 hours UTC |  |
| **WP 5D** | **16** | **10 Jul. 13** | **17 Jul. 13** |  | **3 July 2013 @ 16:00 hours UTC** | **Part 1 Information (updated if needed)****&****Part 2 Information** |

# 6 Reference documents

1) Report ITU-R [M.2039-2](http://www.itu.int/pub/R-REP-M.2039-2-2010) – Characteristics of terrestrial IMT-2000 systems for frequency sharing & interference analyses

2) [Annex 2](http://www.itu.int/md/dologin_md.asp?lang=en&id=R07-JTG5.6-C-0180!N02!MSW-E) of the Chairman’s Report of the fifth and final meeting of JTG 5-6, Document 5‑6/180;List of IMT systems characteristics for use in sharing studies in the band 790-862 MHz

[Editor’s Note: Request to Counsellor to embed file for reference 2]

Contact person for reply liaisons to WP 5D and technical enquiries:

**Contact:** Sergio BUONOMO **E-mail:** sergio.buonomo@itu.int
 Counsellor, Study Group 5

Attachment 1

Generic set of parameters for IMT in the band 790-862 MHz to be used for sharing studies called for under WRC-12 AI 1.17

| No | Parameter | Base station | Mobile station |
| --- | --- | --- | --- |
| 1. | Class of emission |  |  |
| 2. | Modulation parameters | QPSK16-QAM64-QAM | QPSK16-QAM64-QAM |
| 3. | Duplex mode | FDD/TDD |
| 4. | Spectral mask of signals, including | -[[4]](#footnote-4) | -[[5]](#footnote-5) |
| 4.1 | −3 dB radiation bandwidth | - | - |
| 4.2 | −30 dB radiation bandwidth | - | - |
| 4.3 | −60 dB radiation bandwidth | - | - |
| 5. | Maximum spectral power density, dB(mW/Hz) | −23 | −42.5 |
| 6. | Signal bandwidth (MHz) | -[[6]](#footnote-6) |
| 7. | Transmitter e.i.r.p. (dBm) |  |  |
|  | Maximum Transmitter e.i.r.p. (dBm) | 55[[7]](#footnote-7), [[8]](#footnote-8) | 21 to 23[[9]](#footnote-9) |
|  | Average Transmitter e.i.r.p. (dBm) | Deployment dependant | 2 (rural)−9 (urban) |
| 8. | Typical height of the transmitting antenna (m) | 20 to 30 | 1.5 |
| 9. | Transmitting antenna type (sectorized/omnidirectional) | 3 sectors | omni |
| 10. | Transmitting antenna gain, dBi | 15 | 0 |
| 11. | Feeder loss (dB) | 3 | 0 |
| 12. | Antenna pattern model | ITU-R F.1336-2[[10]](#footnote-10) | omni |
| 12.1 | – aperture in the horizontal plane at 3 dB (in deg.) | 65 | NA |

| No | Parameter | Base station | Mobile station |
| --- | --- | --- | --- |
| 12.2 | – aperture in the vertical plane at 3 dB (in deg.) | 15[[11]](#footnote-11) | NA |
| 12.3 | – antenna downtilt | 3° | NA |
| 13. | Relative level of side lobes | –20 dB | NA |
| 14. | Channel bandwidth (MHz)[[12]](#footnote-12) | 51.25 | 51.25 |
| 15. | Power control range (dB) | 20 | 60 |
| 16. | density of the active users[[13]](#footnote-13),[[14]](#footnote-14) (number per km2) | Rural: 1[[15]](#footnote-15) active user operating at the same time (average number of simultaneously active users)Suburban : 13Urban/In-building : 18 |
| 17. | density of user equipments (number per km2) simultaneously operating in a 5 MHz bandwidth13,[[16]](#footnote-16) | Rural = 0.17 (Freq reuse=1)Rural = 0.17 (Freq reuse=3)Suburban = 2.16 (Freq reuse=1)Urban = 3 (Freq reuse=1) |

|  |  |  |  |
| --- | --- | --- | --- |
| No | Parameter | Base station | Mobile station |
| 18. | Polarization discrimination (dB) | 3[[17]](#footnote-17) | 0 |
| 19. | Capacity criteria, including capacity per cell | Capacity in a cellular system can be measured in terms of voice users per cell, data throughput per cell, etc. The actual capacity is dependent on the assumptions made about system configuration, loading, quality, and fairness, among other things. |
| 20. | Frequency reuse factor | 1 or 3[[18]](#footnote-18) |
| 21. | Receiver thermal noise (dBm/channel) | −102[[19]](#footnote-19) | −9819 |
| 22. | Reference sensitivity | -[[20]](#footnote-20) | -[[21]](#footnote-21) |
| 23. | Receiver blocking response | -[[22]](#footnote-22) | -[[23]](#footnote-23) |
| 24. | Coverage radius | Rural: 8 km Suburban : 2 kmUrban: 0.5 km |

ATTACHMENT 2

Draft template for parameters for IMT-Advanced

Characteristics of IMT-Advanced systems in the [frequency/ies]
[frequency band/frequency range] for use in sharing studies[[24]](#footnote-24)

NOTE 1 – A separate table should be completed for each relevant frequency band and/or portion of the ‘suitable frequency ranges’ for which the parameters differ.

NOTE 2 – If additional parameters are likely to be relevant for sharing studies, please add rows to the table as appropriate.

NOTE 3 – For different frequency bands and/or ranges different types of base station characteristics may apply[[25]](#footnote-25). If this is likely to be relevant for sharing studies, additional rows or columns may be added to the table.

NOTE 4 – For deployment dependent parameters in the table, please provide information on the definition of the parameter and the underlying assumptions.

|  |  |  “LTE-Advanced”[[26]](#footnote-26) | “WirelessMAN-Advanced”[[27]](#footnote-27) |
| --- | --- | --- | --- |
|  | Duplex mode | FDD | TDD | FDD | TDD |
| No. | Parameter | Base station | Mobile station | Base station | Mobile station | Base station | Mobile station | Base station | Mobile station |
| 1 | **Channel bandwidth (MHz)** |  |  |  |  |  |  |  |  |
|  |
| 2 | **Signal bandwidth (MHZ)** |  |  |  |  |  |  |  |  |
|  |
| 3 | **Transmitter characteristics** |  |  |  |  |  |  |  |  |
| 3.1 | Maximum e.i.r.p (dBm) |  |  |  |  |  |  |  |  |
| 3.2 | Averagee.i.r.p (dBm) |  |  |  |  |  |  |  |  |
| 3.3 | Power dynamic Range (dB) |  |  |  |  |  |  |  |  |
| 3.4 | Spectral mask |  |  |  |  |  |  |  |  |
| 3.5 | ACLR |  |  |  |  |  |  |  |  |
| 3.6 | Maximum spectral power |  |  |  |  |  |  |  |  |
|  |
| 4 | **Receiver characteristics** |  |  |  |  |  |  |  |  |
| 4.1 | Thermal noise |  |  |  |  |  |  |  |  |
| 4.2 | Sensitivity |  |  |  |  |  |  |  |  |
| 4.3 | Blocking response |  |  |  |  |  |  |  |  |
| 4.4 | ACS |  |  |  |  |  |  |  |  |
|  |
| 5 | **Antenna characteristics** |  |  |  |  |  |  |  |  |
| 5.1 | Gain (dBi) |  |  |  |  |  |  |  |  |
| 5.2 | Height (m) |  |  |  |  |  |  |  |  |
| 5.3 | Type |  |  |  |  |  |  |  |  |
| 5.4 | Pattern |  |  |  |  |  |  |  |  |
| 5.4.1 | Width in horizontal plane (°) |  |  |  |  |  |  |  |  |
| 5.4.2 | Width in vertical plane (°)  |  |  |  |  |  |  |  |  |
| 5.4.3 | Downtilt (°) |  |  |  |  |  |  |  |  |
| 5.4.4 | Relative side-lobe level (dB) |  |  |  |  |  |  |  |  |
| 5.5 | Type of Polarization  |  |  |  |  |  |  |  |  |
| 5.6 | Feeder loss (dB) |  |  |  |  |  |  |  |  |
|  |
| 6 | **Operational factors** |  |  |  |  |  |  |  |  |
| 6.1 | Frequency reuse factor |  |  |  |  |  |  |  |  |
| 6.2 | Equipment density (number.km²) |  |  |  |  |  |  |  |
| 6.3 | Equipment density (number/km²) operating co-frequency  |  |  |  |  |  |  |  |  |
| 6.4 | Capacity criteria |  |  |  |  |  |  |  |
| 6.5 | Coverage radius (km) |  |  |  |  |  |  |  |  |

ATTACHMENT 3

Information on WRC-15 Agenda items 1.1 and 1.2

 (Extracted from Annex 8 to Circular Letter CA/201, “Results of the first session of the Conference Preparatory Meeting for WRC‑15 (CPM15‑1)”)

| Topic | Responsible group | Action to be taken by the group | Concerned group[[28]](#footnote-28)(1) |
| --- | --- | --- | --- |
| **1.1** to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution **233 [COM6/8] (WRC‑12)**; |
| Resolution **233 [COM6/8] (WRC‑12)**Studies on frequency-related matters on International Mobile Telecommunications and other terrestrial mobile broadband applications | **JTG 4-5-6-7[[29]](#footnote-29)(2)** | resolves to invite ITU‑R1 to study additional spectrum requirements, taking into account:– technical and operational characteristics of IMT systems, including the evolution of IMT through advances in technology and spectrally-efficient techniques, and their deployment;– the bands currently identified for IMT, the technical conditions of their use, and the possibility of optimizing the use of these bands with a view to increasing spectrum efficiency;– the evolving needs, including user demand for IMT and other terrestrial mobile broadband applications;– the needs of developing countries;– the time-frame in which spectrum would be needed;2 to study potential candidate frequency bands, taking into account the results of the studies under *resolves to invite ITU‑R* 1, protection of existing services and the need for harmonization, further resolves1 that the studies referred to in *resolves to invite ITU‑R* 2 include sharing and compatibility studies with services already having allocations in the potential candidate bands and in adjacent bands, as appropriate, taking into account the current and planned use of these bands by the existing services, as well as the applicable studies already performed in ITU‑R;2 to invite WRC‑15 to consider the results of the above studies and take appropriate actions,  | **WP 4AWP 4BWP 4CWP 5AWP 5BWP 5CWP 5DWP 6AWP 7BWP 7CWP 7D**(WP 1AWP 3KWP 3M)**(2)** |

| Topic | Responsible group | Action to be taken by the group | Concerned group |
| --- | --- | --- | --- |
| **1.2** to examine the results of ITU‑R studies, in accordance with Resolution **232 [COM5/10] (WRC‑12)**, on the use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service in Region 1 and take the appropriate measures; |
| Resolution **232 [COM5/10] (WRC‑12)**Use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service in Region 1 and related studies | **JTG 4-5-6-7**(2) | resolves1 to allocate the frequency band 694-790 MHz in Region 1 to the mobile, except aeronautical mobile, service on a co-primary basis with other services to which this band is allocated on a primary basis and to identify it for IMT;2 that the allocation in resolves 1 is effective immediately after WRC‑15;3 that use of the allocation in resolves 1 is subject to agreement obtained under No. 9.21 with respect to the aeronautical radionavigation service in countries listed in No. 5.312;4 that the lower edge of the allocation is subject to refinement at WRC‑15, taking into account the ITU-R studies referred to in invites ITU-R below and the needs of countries in Region 1, in particular developing countries;5 that WRC‑15 will specify the technical and regulatory conditions applicable to the mobile service allocation referred to in resolves 1, taking into account the ITU-R studies referred to in invites ITU-R below,invites ITU-R1 to study the spectrum requirement for the mobile service and for the broadcasting service in this frequency band, in order to determine as early as possible the options for the lower edge referred to in *resolves* 4;2 to study the channelling arrangements for the mobile service, adapted to the frequency band below 790 MHz, taking into account:– the existing arrangements in Region 1 in the bands between 790 and 862 MHz and defined in the last version of Recommendation ITU-R M.1036, in order to ensure coexistence with the networks operated in the new allocation and the operational networks in the band 790‑862 MHz,– the desire for harmonization with arrangements across all Regions,– the compatibility with other primary services to which the band is allocated, including in adjacent bands;3 to study coexistence between the different channelling arrangements which have been implemented in Region 1 above 790 MHz, as well as the possibility of further harmonization;4 to study the compatibility between the mobile service and other services currently allocated in the frequency band 694-790 MHz and develop ITU-R Recommendations or Reports;5 to study solutions for accommodating applications ancillary to broadcasting requirements;6 to report, in time for WRC‑15, the results of these studies, | **WP 4AWP 5AWP 5BWP 5DWP 6A**(WP 3KWP 3M)(2) |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. IMT includes both IMT-2000 and IMT-Advanced. This liaison addresses the IMT-Advanced portion. Additional correspondence from WP 5D will address IMT-2000 with regard to Report ITU‑R M.2039-2. [↑](#footnote-ref-1)
2. The full text of these agenda items is contained in Attachment 3 to this liaison statement. [↑](#footnote-ref-2)
3. This table is taken from Attachment 2 of Annex 2 of Chairman’s Report of the fifth and final meeting of JTG 5-6, Document [5-6/180](http://www.itu.int/md/R07-JTG5.6-C-0180/en);List of IMT systems characteristics for use in sharing studies in the band 790-862 MHz . See section 6 of this liaison statement (reference 2). [↑](#footnote-ref-3)
4. See 3GPP Document: TS 36 104 v 8.5.0, see section 6.6.3 and TS 36 141 v 8.5.0, see section 6.5.2.1. [↑](#footnote-ref-4)
5. See 3GPP Document: TS 36 101 v 8.4.0, see Table 6.6.2.1.1-1 (General E-UTRA spectrum emission mask) and TS 36 521-1 v 8.0.0, see section 6.6. [↑](#footnote-ref-5)
6. Depending on the technology, this parameter can take the following values: 3.84 MHz, 4.5 MHz or 4.6 MHz in a block of 5 MHz; 1.2288 MHz in a block of 1.25 MHz. [↑](#footnote-ref-6)
7. See Annex 2 of reference 2. [↑](#footnote-ref-7)
8. In particular remote rural areas such as some parts of Russia, the e.i.r.p. value may be higher. [↑](#footnote-ref-8)
9. See Annex 1 of reference 2. [↑](#footnote-ref-9)
10. Although this ITU-R Recommendation applies to frequency bands above 1 GHz, it is considered that sectorial antennas operating in the 800 MHz band that employ technology comparable to that used in bands on the order of 1 GHz to 3 GHz should exhibit similar off-axis performance. [↑](#footnote-ref-10)
11. This value is derived from Recommendation ITU-R F.1336-2 (recommends 3.3) using an antenna gain of 15 dBi and an horizontal aperture of 65°. [↑](#footnote-ref-11)
12. This value refers to the block size. [↑](#footnote-ref-12)
13. See Annex 4 of reference 2. [↑](#footnote-ref-13)
14. These values are expressed in users/km² and should be divided by the number of channels available, as appropriate, when studying the compatibility involving IMT in the band 790-862 MHz, to reflect the distribution of users amongst the available channels. [↑](#footnote-ref-14)
15. In particular rural environments such as northern Scandinavia or deserts, the user density may be lower than this. For example, the total population density is 22.6 inhabitants/ km2 for Sweden and 16 for Finland. For areas intended for 800 MHz coverage the estimated population density is estimated to be
0.1-0.5 inhabitants/km2. [↑](#footnote-ref-15)
16. It should be noted that for TDD systems the density of user equipments (numbers per km2) simultaneously operating in a 5 MHz bandwidth would effectively be further reduced.

	1. the number of 5 MHz blocks is slightly larger for TDD (up to 65 MHz in total) than for FDD
	(60 MHz in total);
	2. should JTG 5-6 wish to perform a detailed analysis involving TDD, it should be noted that the TDD base station and mobile station in a given 5 MHz bandwidth will only transmit part of the time (time-division duplex), which will reduce the amount of interference from the base station compared to FDD but at the same time add interference from the mobile station which is not the case for FDD. As detailed in Annex 4, these calculations of user density only consider carrying traffic in the
790-862 MHz, 900 MHz, 1.8 GHz, 2.1 GHz and 2.6 GHz bands. If, in addition to these bands, other frequency bands that were identified for IMT were considered, the user density figures for suburban and urban areas may in reality be lower than the values given in row 17, independent of the duplex method. [↑](#footnote-ref-16)
17. Typically base stations today use cross-polarized antennas (two sets of dipoles slanted at ±45° against the horizontal plane), usually transmitting on one of the two polarisation paths (either +45° or –45° for a given frequency) whilst receiving on both paths (to achieve polarisation diversity). Such signals provide an isolation of 3 dB against both horizontally and vertically polarised signals (e.g. DVB-T signals) due to cross-polarisation discrimination. [↑](#footnote-ref-17)
18. For systems based on OFDM, in the rural deployment, frequency reuse factor 3 is mostly planned (although 1 is not excluded), and at urban and suburban environments, frequency reuse factor 1 or 3 can be used.

 Frequency reuse factor 3 can be implemented by both traffic channels and control channels. And frequency reuse factor 1 can be implemented by traffic channels. In order to avoid inter-cell interference, all of the sub-carriers can be only used in the cell centre with lower power, and parts of the sub-carriers can be used at the cell edge. [↑](#footnote-ref-18)
19. For a 5 MHz channel. [↑](#footnote-ref-19)
20. See 3GPP Document TS 36.104, section 7.2. [↑](#footnote-ref-20)
21. See 3GPP Document TS 36.101, section 7.3. [↑](#footnote-ref-21)
22. See 3GPP Document TS 36.104, section 7.6. [↑](#footnote-ref-22)
23. See 3GPP Document TS 36.101, section 7.6.3. [↑](#footnote-ref-23)
24. A table should be appropriately created for specific band or frequency ranges (e.g. “below 1 GHz”). Rows may be added for other appropriate characteristics. Report ITU-R M.2039-2 may be consulted for examples/guidance. [↑](#footnote-ref-24)
25. For reference, see information on macro, micro, pico and femto base stations in Report ITU-R M.2039. [↑](#footnote-ref-25)
26. Developed by 3GPP as LTE Release 10 and Beyond (*LTE-Advanced*). [↑](#footnote-ref-26)
27. Developed by IEEE as the WirelessMAN-Advanced specification incorporated in IEEE Std 802.16 beginning with approval of IEEE Std 802.16m. [↑](#footnote-ref-27)
28. (1) A concerned ITU-R group may be either a contributing group on a specific item (indicated in bold), or an interested group (indicated between round brackets) that will follow the work on a specific issue and act as appropriate. [↑](#footnote-ref-28)
29. (2) See the CPM15-1 Decision on the establishment and Terms of Reference of Joint Task Group 4-5-6-7 (Annex 10 to this Administrative Circular). [↑](#footnote-ref-29)