



1 **Working Party 8F**

2 **WG SPECTRUM**

3 **PROPOSED TEXTS FOR SECTION 7.2 OF CPM REPORT TO WRC-03**

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5 *NOTE FROM SPEC DG 7 CHAIR - Since both SPEC DG 7 and VIS DG 2 had responsibility for*
6 *CPM text issues for Agenda Item 1.22 at the 6th meeting, further notes in italics indicate which DG*
7 *has the prime responsibility for developing text for each sub-section of the CPM text outline for*
8 *Agenda Item 1.22. However, this does not preclude either DG from commenting on any sub-section,*
9 *as deemed necessary.*

10 *NOTE FROM SPEC DG 7 CHAIR - Since the draft CPM text element for WRC-03 Agenda*
11 *Item 1.22 is to be finalized at the 7th meeting of WP 8F, input contributions to this meeting are*
12 *solicited to complete this text.*

13 **7.2 Agenda Item 1.22 - Consider progress on ITU-R studies concerning future**
14 **development of IMT-2000 and beyond**

15 "to consider progress of ITU-R studies concerning future development of IMT-2000 and systems
16 beyond IMT-2000, in accordance with Resolution 228 (WRC-2000):"

17 Resolution 228, "Studies to consider requirements for the future development of IMT-2000 and
18 systems beyond IMT-2000 as defined by ITU-R".

19 **7.2.1 Introduction**

20 WRC-2000 considered issues related to IMT-2000, resulting in the identification of additional
21 spectrum for the terrestrial component of IMT-2000 in Radio Regulations S5.317A and S5.384A.
22 This spectrum was identified in addition to that identified for the initial IMT-2000 deployment at
23 WARC-92 (in S5.388). WRC-2000 also identified existing global MSS allocations as being
24 available for use by the satellite component of IMT-2000, in accordance with Resolution 225.

25 In Resolution 228 (WRC-2000), the ITU-R was invited to continue studies on overall objectives,
26 applications and technical and operational implementation for the future development of IMT-2000
27 and systems beyond. It was also invited to study spectrum requirements and potential frequency
28 ranges suitable for the future development of IMT-2000 and systems beyond IMT-2000, and in
29 what time-frame such spectrum would be needed.

30 The requirements for the future development of IMT-2000 and systems beyond are to be reviewed
31 by WRC-05/06, taking into consideration the results of ITU-R studies presented to WRC-03.

32 *NOTE FROM DG 7 CHAIR - 7.2 and 7.2.1 are the responsibility of SPEC DG 7.*

1 **7.2.2 Summary of technical and operational studies, including a list of relevant ITU-R**
2 **Recommendations**

3 **7.2.2.1 Introduction**

4 *NOTE FROM DG 7 CHAIR - 7.2.2.1 is the responsibility of VIS DG 2.*

5 **7.2.2.2 Future development of IMT-2000**

6 *NOTE FROM DG 7 CHAIR - 7.2.2.2 is the responsibility of VIS DG 2.*

7 **7.2.2.3 Systems beyond IMT-2000**

8 *NOTE FROM DG 7 CHAIR - 7.2.2.3 is the responsibility of VIS DG 2.*

9 **7.2.2.4 Related Recommendations**

- 10 – Vision and overall objectives of the future development of IMT-2000 and of systems
11 beyond IMT-2000: Recommendation ITU-R M.[IMT.VIS].
- 12 – International Mobile Telecommunications-2000 (IMT-2000): Recommendation
13 ITU-R M.687-2.
- 14 – International Mobile Telecommunications-2000 (IMT-2000) for developing countries:
15 Recommendation ITU-R M.819.
- 16 – Framework for modularity and radio commonality within IMT-2000: Recommendation
17 ITU-R M.1311.
- 18 – Methodology for the calculation of IMT-2000 terrestrial spectrum requirements:
19 Recommendation ITU-R M.1390.
- 20 – Detailed specifications of the radio interfaces of IMT-2000: Recommendation
21 ITU-R M.1457.

22 *NOTE FROM DG 7 CHAIR - 7.2.2.4 is the responsibility of both VIS DG 2 and SPEC DG 7. A*
23 *comment received at the 6th meeting was whether it was necessary/relevant to include Recs. ITU-R*
24 *M.819 and M.1457 in this list.*

25 **7.2.3 Analysis of the results of studies related to the further development of IMT-2000 and**
26 **systems beyond IMT-2000**

27 **7.2.3.1 Preliminary studies of spectrum requirements**

28 Report ITU-R M.2023 "Spectrum Requirements for IMT-2000" projects the required bandwidth for
29 IMT-2000 in the year 2010. WP 8F is now studying the expected growth of required bandwidth for
30 future development of IMT-2000 and Systems Beyond IMT-2000 for the year [2015]. One
31 estimation currently under study was generated using a method similar to the one described in
32 Recommendation ITU-R M.1390 with the assumptions of traffic growth for Future Development of
33 IMT-2000 and Systems Beyond IMT-2000. In this estimation, because very high-speed multimedia
34 services of more than 2 Mbit/s are expected, new service categories have been proposed to take into
35 account in the traffic calculation in addition to those defined in Report ITU-R M.2023. This
36 estimation shows that the required bandwidth in 2015 will be greater than that in 2010. Although
37 WRC-2000 identified an additional spectrum to be used for IMT-2000 based on the estimation of
38 the spectrum requirement of 480 MHz in total in Region 3 555 MHz in total in Region 1, and
39 390 MHz in total in Region 2, additional spectrum for future development to IMT-2000 and
40 systems beyond may be required around [2015] in order to implement the vision, pending outcome
41 of WP 8F studies.

42 *NOTE FROM DG 7 CHAIR - 7.2.3.1 is the responsibility of SPEC DG 7.*

1 **7.2.3.2 Particular requirements of developing countries**

2 *NOTE FROM DG 7 CHAIR - WG DEV is asked to contribute to 7.2.3.2.*

3 **7.2.3.3 Progress towards potential frequency ranges for spectrum**

4 – **Radio propagation**

5 The study results from the ITU-R show that path loss increases proportionally to the carrier
6 frequency to the 2.5 to third power in suburban areas where relatively large cell configuration is
7 adopted while in urban areas the path loss increases proportionally to approximately the square of
8 the carrier frequency. With regard to the dependency of the path loss on the distance between a base
9 station and a mobile terminal, the path loss increases proportionally to the distance to the 3.4-th
10 power in suburban areas, while in urban areas the path loss increases proportionally to
11 approximately the distance to the 3.8-th power.

12 Using the measurement results above, the relative number of required base stations can be
13 calculated to achieve a certain area coverage, which can be covered with a single cell of a certain
14 reference mobile system, e.g. a 3 GHz system. The results show that the relative numbers of
15 required base stations to cover a single cell area of a 3 GHz system, are 1.7 and 2.5 in suburban
16 areas, and 2.4 and 4.5 in urban areas, for 5 GHz and 7 GHz systems, respectively. This suggests that
17 the 7 GHz cellular mobile system roughly requires double the cost of a 5 GHz system. Therefore,
18 the preferred frequency ranges should be as close as possible to the existing bands for mobile
19 communication use, if they have sufficient bandwidth to accommodate broadband traffic.

20 – **Preferred frequency ranges**

21 The frequency bands suitable for the enhanced IMT-2000 and systems beyond IMT-2000 should be
22 considered based on two aspects from the economical and technical viewpoints: a) high mobility
23 support; and b) area coverage.

24 a) **Mobility**

25 Viewed from the user perspective, those systems should support a level of mobility as high as that
26 of the existing cellular phone systems. This suggests that suitable frequency bands should be as
27 close as possible to the existing bands, taking into account the physical nature of the fading radio
28 channels.

29 b) **Area coverage**

30 The usage of a high frequency band results in an extremely small cell. This inhibits the economical
31 deployment of area coverage. This suggests that suitable frequency bands should be as close as
32 possible to the existing bands.

33 Since, according to the system characteristics described in PDNR [IMT.VIS], the enhanced
34 IMT-2000 and systems beyond IMT-2000 aim at establishing service bit rates up to [xx] Mbit/s, and
35 [yy] to [zz] Mbit/s under mobility environments, respectively, it can be concluded that suitable
36 frequency ranges for enhanced IMT-2000 and systems beyond IMT-2000 are those that are not far
37 away from the existing frequency bands for mobile communication use, and that can accommodate
38 such broadband spectrum, such as below [5-6] GHz.

39 *NOTE FROM DG 7 CHAIR - 7.2.3.3 is the responsibility of SPEC DG 7.*

40 **7.2.3.4 Relationship with studies documented under CPM Section 7.1**

41 *NOTE FROM DG 7 CHAIR - 7.2.3.1 is the responsibility of VIS DG 2.*

1 **7.2.4 Methods to satisfy the agenda item and the advantages and disadvantages**

2 WRC-03 may decide to include an agenda item for WRC-05/06 which may consider new spectrum
3 identification and/or allocation, including upgrade of the status of frequency allocations, on a global
4 basis for future development of IMT-2000 and systems beyond IMT-2000, taking into consideration
5 i) the rapidly growing demand of the spectrum for these systems and other systems/services; ii)
6 sufficient time to ensure the availability of the spectrum; and iii) sufficient time for system
7 development. The spectrum may be required to become available by [2010]. Therefore, WRC-03
8 may decide to include this issue as an agenda item for WRC-05/06.

9 WRC may appropriately modify Resolution 228 (WRC-2000) for further studies to consider
10 detailed requirements, and for spectrum identification at WRC-05/06. Alternatively WRC-03 may
11 produce a new “companion” resolution for a WRC-05/6 agenda item.

12 WRC may also invite the ITU-R to conduct and complete in time for WRC-05/06, the appropriate
13 studies leading to technical and operational Recommendations, including spectrum requirements
14 and potential frequency ranges suitable for the future development of IMT-2000 and systems
15 beyond IMT-2000.

16

17 **Advantages**

18 **Disadvantages**

19 *NOTE FROM DG 7 CHAIR - The advantages of disadvantages of methods to satisfy the agenda*
20 *item should speak to the act of WRC-03 making an agenda item for WRC-05/6 on spectrum issues*
21 *for future development to and systems beyond IMT-2000.*

22 *NOTE FROM DG 7 CHAIR - 7.2.4 is the responsibility of SPEC DG 7.*

23 **7.2.5 Regulatory and procedural considerations**

24 [None]

25 *NOTE FROM DG 7 CHAIR - 7.2.5 is the responsibility of SPEC DG 7.*

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