

Draft CEPT Brief on agenda item 1.4

Agenda Item 1.4: to consider frequency-related matters for the future development of IMT-2000 and systems beyond IMT-2000 taking into account the results of ITU-R studies in accordance with Resolution 228 (Rev.WRC-03)

1. Issue

WRC-2003 considered the progress of the ITU-R studies concerning the future development of IMT-2000 and systems beyond IMT-2000, in accordance with Resolution 228. ITU-R was invited to report, in time for WRC-07, on the results of the studies on the spectrum requirements and potential frequency ranges suitable for the future development of IMT-2000 and systems beyond IMT-2000.

2. Preliminary CEPT Position

CEPT supports:

- that additional spectrum is needed, beyond that already identified for IMT-2000;
- the identification of additional spectrum for IMT and the change of identification of existing spectrum from IMT-2000 to IMT, i.e. method 1A
- that the amount of spectrum to be identified should be based on the results of the ITU-R M.2078 for the terrestrial component and ITU-R M.2077 for the satellite component;
- the spectrum requirements based on the higher market setting in ITU-R M.2078 estimated for period from 2015 to 2020 noting difficulty to fulfil this requirement at WRC-07¹;
- that frequency bands should be identified globally to the greatest extent possible in order to facilitate the global roaming and reduction of equipment-cost through economies of scale;
- the identification of the frequency band 3400 - 3800 MHz for IMT;
- to study the digital dividend arising from digital television switchover and an opportunity to add a mobile allocation in the band 470 – 862 MHz;
- WRC07 Resolution referring to studies on the possible future use of the band 470 - 862 MHz for the operation of mobile systems, including IMT and WRC-11 Agenda Item;
- the identification of the MSS bands 1518 - 1525 MHz and 1668 - 1675 MHz for the satellite component of IMT;
- no change to the Radio Regulations to address integrated MSS-and-terrestrial systems;

¹ Further consideration of this text including the possible shift to another section is required

- that the terrestrial component of IMT has high strategic importance;
- the identification of sufficient spectrum out of identified candidate bands below 5 GHz to allow deployment of IMT-Advanced networks requiring mobility;
- that there is no need to modify Footnotes Nos. 5.317A, 5.384A, 5.388 nor Resolutions 212, 223, 224, apart from the consequential action of implementing the method adopted by WRC-07, in line with the decisions of the Radiocommunication Assembly on the Resolution on Naming;
- that when considering identification of frequency bands for IMT, CEPT takes into account the band usage information and the results of ITU-R sharing studies with respect to existing services in those bands;
- no change in the RR regarding the bands 410-430 MHz, 2300 - 2400 MHz, 2700 - 2900 MHz and 4400 - 4990 MHz.

3. Background

The scope of the studies for WRC-07 agenda item was set out in Resolution 228.

There will be two relevant Resolutions considered for adoption at the Radiocommunications Assembly:

- the generic root name concept as given in Draft new Resolution ITU-R M.[IMT.NAME] (Adopted as a Resolution by SG 8, sent to RA for approval). Namely, that:
 - the term “IMT” be the root name that encompasses both IMT-2000 and IMT-Advanced collectively;
 - the term “IMT-2000” encompasses also its enhancements and future developments;
 - the term “IMT-Advanced” be applied to those systems, system components, and related aspects that include new radio interface(s) that support the new capabilities of systems beyond IMT-2000;
- the Draft new Resolution on general principles and objectives for the standardisation and harmonisation of IMT-Advanced.

It is expected that IMT will be continuously developed, and no end-date of this enhancement process is foreseen at this stage. Evolutionary development of IMT, which refers to the enhancements of its technical capabilities, range of available services and breadth of applications, will be progressively introduced during its lifetime.

The ITU view of IMT-Advanced includes advanced services as described in Report ITU-R M.2072 and advanced performance as described in Recommendation ITU-R M.1645 and Report ITU-R M.2074. There may be a need for new wireless access technologies to be developed around the year 2010 and be widely deployed around the year 2015 in some countries. The capabilities of IMT-Advanced (mobile access capabilities and new nomadic/local area wireless access capabilities) are envisaged to handle a wide range of supported data rates according to economic and service demands in multi-user environments with target peak data rates of up to

approximately 100 Mbit/s for high mobility such as mobile access and up to approximately 1 Gbit/s for low mobility such as nomadic/local wireless access. These data rates are targets for research and investigation. Research work targeting towards such new technologies is widely ongoing in Europe and elsewhere.

In conjunction with the IMT, relationships will continue to develop between different radio access and communications systems, for example wireless personal area networks (WPANs), wireless local area networks (WLANs), digital broadcast, including digital mobile broadcast, broadband wireless access (BWA) and fixed wireless access (FWA) and they need to be taken into account when defining the spectrum requirements under this agenda item. The ITU-R spectrum requirements calculation methodology (Recommendation M.1768) takes this into account by being able to handle both market inputs addressing the relevant overall market and technical inputs addressing the involved technologies.

Based on the ITU market and technology predictions the spectrum estimate calculations show that further spectrum will be needed for IMT within the next decade, in addition to the spectrum identified for IMT-2000 at WARC-92 and WRC-2000. The results of these studies are summarised in section 4.2 (ITU studies on spectrum requirements).

Recommendation ITU-R M.1645 further emphasizes the need to provide IMT-2000 services over a wide range of teledensities and geographic coverage areas. This continues to be a priority for the future development of IMT-2000 and systems beyond IMT-2000. Geographical coverage could be increased for the terrestrial component by using lower frequency ranges than those today identified for IMT-2000. Geographical coverage could also be increased by using the satellite component.

In Europe, various studies have been done by the FMS project, the UMTS Forum and the WINNER project and were discussed within CEPT.

The European Commission (through DG INFSO and JRC-IPTS in Seville) has carried out a study of Future Mobile Services. The results of this activity have assisted the preparation of the CEPT response to the ITU Questionnaire on the services and market for the future development of IMT-2000 and systems beyond IMT-2000 (Administrative Circular CACE/326).

UMTS Forum has carried out e.g. a study that addresses the future spectrum requirements using an alternative calculation model. UMTS Forum has also prepared predictions about future markets.

The WINNER project has contributed a significant amount of material on spectrum requirements calculation methodology, radio aspects and actual estimation of future spectrum requirements for IMT-2000 and IMT-Advanced.

The RSPG has developed opinions on WRC-07 and on the digital dividend, which contain high level policy guidance for EU member states relevant to this Agenda Item.

Globally harmonised frequency bands are expected to remain important to facilitate economies of scale and global roaming of terminals on the timeframe 2010 and onwards. Therefore, from the CEPT perspective, the preference is to identify the frequency bands that can be made available globally as far as possible. It has not always been possible in the past to harmonise all bands on global basis. However, a sufficient basic set of bands has to be made available for global roaming purposes. This globally harmonised spectrum may be complemented by further spectrum, harmonised to the extent possible, e.g. regionally in order to meet the estimated spectrum demand.

For CEPT the identification of spectrum in the Radio Regulation for IMT should not be restrictive in order to keep the required flexibility in spectrum management.

4. Spectrum for IMT

4.1 Additional spectrum to fulfil the full range of requirements for IMT-Advanced

Report ITU-R M.2074 shows that the spectrum required for new technologies that can fulfil the full range of requirements of the ITU for IMT-Advanced, including both the “new mobile access” and “new nomadic/local area wireless access”, as they are presented in Recommendation ITU-R M.1645 should be identified below 6 GHz, preferably as low as possible due to a number of technical reasons.

Bands below 6 GHz allow sufficient mobility and there is an acceptable trade-off between cost and wide area coverage. Availability of required RF hardware components is seen feasible in the required timeframe and mobile terminal complexity and power consumption could stay at an acceptable level.

European studies have further shown that due to the Doppler Effect the necessary signalling overhead increases as the carrier frequency increases. To minimise this loss of spectral efficiency the carrier frequency should therefore be made as low as possible.

In particular for mobility objectives and in order to achieve acceptable trade-off between cost and coverage it is clearly preferable to use spectrum below 5 GHz.

Radio interfaces that would be specific for nomadic applications may also be accommodated in the bands above 5 GHz allocated to the MS at WRC-03, if such use is in accordance with RR No. 5.446A and Resolution 229 (WRC-03), and in other bands above 5 GHz. Therefore, an additional identification in the 5 GHz band specifically to IMT in the RR may not be necessary.

Some administrations are considering that the identification of spectrum in the Radio Regulation for the deployment of IMT-Advanced networks implementing the new nomadic capability may not be necessary.

4.1.1 Candidate frequency bands

The advantages and disadvantages of the candidate bands as well as the sharing studies are outlined in full in Report M.2079 and summarised in the CPM report and

therefore are not repeated here. The table below highlights the current use of these bands in CEPT and issues leading to the CEPT position.

Candidate band	Sub band	CEPT usage
2 300-2 400 MHz		Defense systems and radiolocation in some countries.
2 700-2 900 MHz		Most European administrations use this band for the aeronautical radionavigation and radiolocation systems with varying degrees of deployment.
3 400-4 200 MHz	3 400-3 600 MHz	Few receiving earth stations which are requiring protection. The band is allocated to mobile service only on a secondary basis in Region 1, on European Common Allocation (ECA) Table on a primary basis, footnote of ECA, refers mobile allocation to Services Ancillary to Programme making/Services Ancillary to Broadcasting. ECC Decision (07)02 designates this band for Broadband Wireless Access Systems. Radiolocation use in NATO countries in the band 3400 – 3500 MHz. Some countries use this band for fixed service.
	3 600-3 800 MHz	Receiving earth stations, which are requiring protection. ECC Decision (07)02 designates this band for Broadband Wireless Access Systems. Fixed service use.
	3 800-4 200 MHz	Receiving earth stations, which are requiring protection. Fixed service use.
4400 - 4990 MHz	4400 – 4500 MHz	Harmonised NATO band type 1 for fixed, tactical radio relay and mobile systems.
	4500 – 4800 MHz	Harmonised NATO band type 1 for fixed, tactical radio relay and mobile systems. The band is subject to the provisions of Appendix 30B (FSS plan).
	4800 – 4990 MHz	Harmonised NATO band type 1 for fixed, tactical radio relay and mobile systems.

The ECP for the C band has been drafted on the basis of the identification of the band 3.4-3.8 GHz only for IMT.

A draft Resolution on the additional bands for IMT above 3.4 GHz has been drafted to include several provisions addressing the sharing issues in this frequency band and, in particular, the importance of the use and protection of fixed satellite earth stations.

There is still no agreement on whether this Resolution could let the door open for the use of 3.8-4.2 GHz by IMT as an extension band for administrations not being able to accommodate the increase of traffic in the band 3.4-3.8 GHz only. The corresponding

noting was left in square brackets together with the upgrade of mobile service from secondary to primary.

4.1.2 ITU studies on spectrum requirements

Report ITU-R M.2078 presents the spectrum requirements for RAT Group 1 (i.e. pre-IMT, IMT-2000, and its enhancements) and RAT Group 2 (i.e. IMT-Advanced) in 2010, 2015 and 2020. This report uses the spectrum requirements calculation methodology presented in the Recommendation ITU-R M.1768 and defines values for all the input parameters needed for spectrum calculations. The spectrum requirements are presented for two RAT Groups in three time intervals and for two market settings "low" and "high". The two market settings reflect the regional differences in the quantitative market development and RAT deployment status.

The predicted total spectrum bandwidth requirement for both the RATG1 and RATG2 for the year 2020 is calculated in this Report to be 1 280 MHz in areas of low market setting and 1720 MHz in areas of higher market setting (including spectrum already in use, or planned to be used for RATG1). It should be noted that the lower figure (1280 MHz) is higher than the requirements for some countries. In addition there are some countries where the requirement is larger than the higher value (1720 MHz).

As the amount of spectrum currently used or planned to be used for terrestrial IMT-2000 systems in Europe is 585 MHz comprising the 900 MHz, 1800 MHz, the 2 GHz and the 2.6 GHz spectrum bands, the results are equivalent to additional spectrum of 695/1135 MHz .

The calculations were performed assuming one network deployment. In case of several network deployments in a country the total spectrum requirement may be higher in order to account for the packaging of spectrum into carriers. This is also demonstrated in Report ITU-R M.2078.

4.2 Spectrum to improve the coverage for IMT

Resolves 3 of Resolution 228 (rev.WRC03) invites ITU-R to study the regulatory and technical issues on the usage of frequencies below those identified for IMT-2000 in No. 5.317A for the future development of IMT-2000 and systems beyond IMT-2000, notably assessing their advantages and disadvantages. Those studies addressing resolves 3 should take into consideration the needs of developing countries including use of the satellite component of IMT-2000 for suitable coverage of these countries.

Resolution 228 recognizes

- the need, in many developing countries and countries with large areas of low-population density, for the cost-effective implementation of IMT-2000, the future development of IMT-2000 and systems beyond IMT-2000, and that the propagation characteristics of frequency bands below those identified in No. 5.317A result in larger cells;
- that frequencies below those identified for IMT-2000 in No. 5.317A are extensively used by terrestrial services with applications other than IMT-2000 and systems beyond IMT-2000.

In the studies for the spectrum to improve the coverage for IMT, the following items needs to be taken into account:

- proximity to bands already identified for IMT-2000 may lead to reduced complexity of equipment;
- common globally available spectrum facilitates the cost-effective implementation of IMT-2000;
- that some bands may not be appropriate for identification on a global basis for IMT because of the extent of use of these bands by existing services;
- that an extensive use of these frequency bands may only be the case for densely populated areas;
- that in addition to the benefit of low frequency bands for the provision of coverage in low density populated areas, the low frequency bands are also beneficial for extended indoor coverage in urban environment;
- that IMT-2000 systems can be used to meet the requirements of PPDR systems working in lower bands.

Recommendation ITU-R M.1645 stated that geographical coverage could be increased for the terrestrial component of IMT by using lower frequency ranges than those today identified for IMT-2000 or by using the satellite component of IMT-2000, subject to market conditions and certain limitations, such as handset size, power consumption and indoor coverage. The Recommendation also states that IMT services can best be provided at low cost to rural areas and to low income populations by using globally harmonized frequencies to minimize terminal complexity and maximize economies of scale in order to minimize system cost. The selection of bands should take into consideration the different options available (terrestrial/satellite) and should support extended and cost-effective coverage of mobile services in developing countries and countries with large areas of low population density. Bands below the identified spectrum defined in RR No. 5.317A can allow an increase in geographical coverage. Further information can be found in Report ITU-R M.2079.

A study undertaken by ITU-R demonstrated that, when the capital and operational expenses of operating a network are measured, the use of the lower frequency band is a more cost effective solution than the use of the higher bands. However, the study noted that no single solution will be the most cost effective solution in every instance.

4.2.1 Candidate frequency bands

The advantages and disadvantages of the candidate bands as well as the sharing studies are outlined in full in Report M.2079 and summarised in the CPM report and therefore are not repeated here. This section highlights the current use of these bands in CEPT and issues leading to the CEPT position.

4.2.1.1 410-430 MHz

CEPT usage:

In this band there are public safety and emergency networks in some countries. This band presents complex interlacing between PMR, PAMR and civil/governmental usage.

4.2.1.2 450-470 MHz**CEPT usage:**

There are cellular networks in some countries. There are also public safety and emergency networks in some countries. This band presents complex interlacing between PMR, PAMR and civil/governmental usage.

WG FM considered the possible identification of the 450 – 470 MHz band as spectrum for coverage extension for IMT-2000 and Systems Beyond IMT-2000 at WRC-07 (Agenda Item 1.4). During the discussions it was emphasised that all of the relevant ECC documents should be taken into account when considering this issue, i.e. the band 450 - 470 MHz should primarily be used for PMR/PAMR as defined in the ECA table (ERC Report 25) and in the strategic plan for PMR/PAMR (ECC Report 25). In addition to these Reports the Decisions ECC/DEC(02)03 and ECC/DEC(04)06 identify this band for PMR/PAMR.

Some countries in CEPT wish to consider this frequency band as a candidate band for IMT for the following reasons:

- The band is most suitable for cost-effective coverage of low-population density areas;
- The band is fully harmonized for the land mobile service in CEPT;
- Mobile cellular systems in this band are being deployed in some CEPT countries;
- The band is being considered as a candidate band for IMT-2000 in some countries outside CEPT.

4.2.1.3 470-806/862 MHz**CEPT usage:**

Aeronautical radionavigation in some countries (645 – 862 MHz). Primary allocation for mobile service in the upper part of the band in many countries especially for defence usage.

Introduction of digital broadcasting (with better spectrum efficiency) in the band should allow future consideration of other services in spectrum not required for digital television (including mobile broadcast) after the analogue TV switchover. Using the same frequency band as the broadcasting service simplifies the integration of the two services in the terminal using the same antenna.

A Digital broadcasting Plan has been agreed for the frequency bands 174-230 MHz and 470- 862 MHz at the end of the ITU-R Regional Radiocommunication

Conference (RRC-06) in June 2006. More than 50 countries from Region 1 attached the provision to the final Agreement GE-06 that their administrations may use their digital Plan entries for broadcasting or other terrestrial applications with characteristics that may be different from those appearing in the Plan within the envelope of their digital Plan entries under the provisions of the GE06 Agreement and the Radio Regulations, and that their administrations agree that any such use will be afforded protection to the levels defined by the interfering field strengths as arising from their digital Plan entries, taking into account any relevant bilateral agreements.

RRC-06 outcome provides flexibility to European administrations to use the corresponding spectrum to satisfy new requirements, whether for broadcasting or other services, by including in the procedures a provision allowing broadcasting assignments or allotments in the Plans to be used for other applications provided that no more interference is caused and no more protection is claimed compared to the Plan entry.

An envelope implementation concept has been developed in order to implement this approach in a technologically neutral way. This approach will provide a practical way of implementing mobile downlinks services in the future, even without any primary mobile allocation in this band, therefore accommodating the perceived convergence between broadcasting and mobile downlinks but will not provide an easy way to implement mobile uplinks in the band at a future stage.

In the case where CEPT wishes to implement mobile uplink in this frequency, further consideration will be necessary concerning the potential additional mobile allocation in all or portion of this band. The requirement for such mobile uplink, i.e. a decision on whether the digital dividend in Europe will include mobile systems such as IMT-2000, may not be known before WRC-07 and will not be implemented before the switch over.

A certain level of harmonisation would be desirable to facilitate the market development of such applications including a harmonised common channelling arrangement, taking into account compatibility issues, economies of scale and development of pan-European services.

Three options for an ECP have been discussed within CEPT. These options are:

- **B1:** The allocation of the frequency band 470 – 862 MHz for mobile service at WRC-07 together with a WRC-07 Resolution asking for studies on the nature of the digital dividend. If IMT is to be part of this digital dividend, the identification of the relevant sub band for IMT could be done at WRC-11;
- **B2:** No allocation change at WRC-07. The adoption of a WRC-07 Resolution addressing the issue of the digital dividend together with an associated WRC-11 Agenda Item which would enable the allocation of all or part of the band 470 – 862 MHz for mobile service and identification for IMT as one option among other uses of the digital dividend;
- **B3:** A co-primary allocation to Mobile Service in the whole band, and identification of the whole band, or parts thereof, to IMT at WRC-07.

The draft ECP has been drafted based on option B2. The original draft ECP for option B2 was further developed to incorporate some aspects proposed under options B1 and B3.

4.2.2 ITU studies on spectrum requirements

The requirements for spectrum to improve the coverage for IMT are not covered in Report ITU-R M.2078.

5. Spectrum for the satellite component of IMT

ITU has adopted the ITU Report M.2077 on spectrum requirements for the future development of the satellite component of IMT-2000 and systems beyond IMT-2000. Based on the assumption of 2x86 MHz currently available for MSS, including the satellite component of IMT-2000, the results are as shown in Table below. The studies assume the availability of the bands 1518-1525 MHz and 1668-1675 MHz for the MSS.

Table. Estimated new MSS spectrum requirement in the 1-6 GHz band

Estimated required spectrum (MHz)	Lower estimate		Upper estimate	
	2010	2020	2010	2020
Required new allocations in Earth-space direction		19		90
Required new allocations in space-Earth direction excluding distribution		54	3	137
Required new allocations in space-Earth direction including distribution	14	144	33	257

6. Integrated MSS-and-terrestrial systems

There has been interest in recent years for integrated MSS-and-terrestrial systems. This approach allows MSS frequencies to be re-used in a ground based network, improving the coverage of MSS service. In CEPT, provisions for such systems have been developed in the 2 GHz MSS bands. The CEPT provisions include technical constraints and regulatory requirements to ensure that the Complementary Ground Component (CGC) does not cause harmful interference to other services and systems.

It is vital that in authorising integrated satellite-and-terrestrial MSS systems, limitations and constraints are applied to ensure that other current and planned systems in the same and adjacent frequency bands do not suffer harmful interference. To ensure protection of MSS operations from interference, no ITU provisions should be adopted for integrated MSS-and-terrestrial systems in the absence of ITU-R studies. There have been no studies undertaken within ITU-R related to the possible authorisation of integrated satellite-and-terrestrial MSS systems and hence CEPT cannot support additional provisions in the Radio Regulations related to such systems. Furthermore, due to the differing conditions for MSS systems in different countries or regions and in different frequency bands, no generic provisions could ensure appropriate and adequate protection of all MSS systems. This is evidenced for example by the fact that the FCC ATC rules vary for different bands and are different from the rules in Canada and likely from the rules being adopted in Europe for the 2 GHz bands. Therefore, it is more appropriate to study authorisation procedures for integrated MSS-and-terrestrial systems on a country-by-country (or region-by-region) and band-by-band basis. National provisions for integrated MSS-and-terrestrial systems have already been successfully implemented on this basis. In fact, adoption of

ITU provisions for integrated MSS-and-terrestrial systems at this stage could prove to be incompatible with already adopted national rules and would then be counter-productive to the deployment of integrated MSS-and-terrestrial systems.

7. Existing Footnotes and Resolutions

Within the RR, there are three different sets of provisions for the identification of frequency bands for the terrestrial component of IMT-2000:

- Footnote 5.388 and Resolution 212 were developed by WARC-92, and address the bands around 2GHz (the so-called “core bands”).
- Footnote 5.317A and Resolution 224 were developed by WRC-2000, and address bands below 1GHz.
- Footnote 5.384A and Resolution 223 were developed by WRC-2000, and address bands just below 2GHz and the 2500-2690MHz band.

The CEPT position is that these should be systematically updated to reflect the decisions of the Radiocommunication Assembly on the Resolution on “Naming”. Apart from this, no other changes are required to these provisions. Discussions on these issues would probably lead to lengthy debates at WRC-07, which would be a distraction from other, much higher priority, objectives for CEPT.

However, proposals may be made to WRC-07 to modify these provisions. It is important for CEPT to consider in advance how it would react to such proposals. If such a proposal is made, then CEPT should take the following line:

- 1) The numbers of the existing footnotes must remain in their existing locations within the Table of Allocations. These are widely used as references, and any changes would cause considerable confusion and uncertainty.
- 2) The differences in the wording between the three footnotes was a deliberate decision by WRC-2000, and some of the differences are necessary. Any attempt to align the wording would be extremely controversial. Therefore, any such proposals should be opposed, unless they clearly have widespread support.
- 3) The differences in wording between Resolutions 223 and 224 were a deliberate decision by WRC-2000. Most of these differences are necessary, reflecting differences in status between the bands (especially that below 1GHz the mobile allocations are not aligned). Any attempt to align the wording would be controversial, and would probably be found not to be feasible. Therefore, any such proposals should be opposed, unless they clearly have widespread support.
- 4) Several of the provisions of Resolution 212 are no longer relevant, and Resolution 223 contains a number of provisions relating to studies that have now been completed. The two Resolutions address similar frequency ranges. There would be some merit in merging these two Resolutions, provided that this was not too controversial. At the same time, the redundant provisions can be removed or re-worded (for example, by converting a call for studies into a *considering* that they have been completed).

Annex 1 of the brief contains an example of the merging of the two Resolutions. This could be used as the basis for CEPT participation in discussions on this issue, if proposals are made to WRC-07.

8. Methods to satisfy the agenda item

For the terrestrial component of IMT the CPM Report has identified four methods to satisfy the agenda item. CEPT supports the identification of spectrum for IMT, i.e. method 1A, which is described below:

Method 1: On the basis that IMT is the root name for both IMT-2000 and IMT-Advanced and the technologies associated with those terms, IMT could also be used as the application name in the Radio Regulation (RR) footnotes. The additional IMT spectrum could come from spectrum with a primary mobile allocation in Article 5 or a new primary allocation to mobile. A footnote would be used to identify the specific spectrum bands for IMT.

Method 1A: Existing IMT-2000 spectrum could be identified generically for IMT, and any additional spectrum could be identified generically for IMT in the RR.

Method 1B: Existing IMT-2000 footnotes in the RR would not change and any additional spectrum could be identified generically for IMT in the RR.

With regard to the satellite component of IMT-2000 and IMT-Advanced, the bands 1518-1525 MHz and 1668-1675 MHz are the only bands which have been proposed in the ITU. WRC-07 may consider identifying the bands 1 518-1 525 and 1 668 -1 675 MHz as bands which may be used by administrations wishing to implement the satellite component of IMT. This could be accomplished by adding the bands to No. 5.351A and modification to Resolution 225 (Rev.WRC-03).

9. List of relevant documents

ITU-R:

- **Resolution 212 (Rev.WRC-97):** Implementation of International Mobile Telecommunications-2000 (IMT-2000);
- **Resolution 221 (Rev.WRC-03):** Use of high altitude platform stations providing IMT-2000 in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2;
- **Resolution 223 (WRC-2000):** Additional frequency bands identified for IMT-2000;
- **Resolution 224 (WRC-2000):** Frequency bands for the terrestrial component of IMT-2000 below 1 GHz;
- **Resolution 225 (Rev.WRC-03):** Use of additional frequency bands for the satellite component of IMT-2000;
- **Resolution 228 (Rev.WRC-03):** Studies on frequency-related matters for the future development of IMT-2000 and systems beyond IMT-2000 as defined by ITU-R

- **Resolution 802 (WRC-03):** Agenda for the 2007 World Radiocommunication Conference;
- **Resolution 803 (WRC-03):** Preliminary agenda for the 2010 World Radiocommunication Conference;
- **Draft new Resolution ITU-R [IMT.NAME]:** Naming for International Mobile Telecommunications;
- **Recommendation ITU-R M.1645:** Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000;
- **Recommendation ITU-R M.1457:** Detailed specifications of the radio interfaces of International Mobile Telecommunications-2000 (IMT-2000);
- **Recommendation ITU-R M.1768:** Methodology for calculation of spectrum requirement for the future development of IMT-2000 and systems beyond IMT-2000;
- **Report ITU-R M. 2074:** Radio Aspects for the terrestrial component of IMT-2000 and systems beyond IMT-2000;
- **Report ITU-R M.2077:** Traffic forecasts and spectrum requirements for the satellite component of IMT-2000 and systems beyond IMT-2000 for the period 2010 to 2020;
- **Report ITU-R M.2078:** Spectrum requirements for the future development of IMT-2000 and IMT-Advanced
- **Report ITU-R M.2079:** Technical and operational information for identifying spectrum for the terrestrial component of future development of IMT-2000 and IMT-Advanced;
- **Question ITU-R 229-1/8:** Future development of IMT-2000 and systems beyond IMT-2000;
- **Question ITU-R 77-5/8:** Consideration of the needs of developing countries in the development and implementation of mobile radiocommunication technology.

ECC:

- ECC Decision of 15 November 2002 on the designation of frequency band 2500-2690 MHz for UMTS/IMT-2000 (ECC/DEC/(02)06);
- ECC Decision of 18 March 2005 on harmonised utilisation of spectrum for IMT-2000/UMTS systems operating within the band 2500-2690 MHz (ECC/DEC/(05)05);
- ECC Decision of 24 March 2006 on the harmonised utilisation of spectrum for terrestrial IMT-2000/UMTS systems operating within the bands 1900-1980 MHz, 2010-2025 MHz and 2110-2170 MHz (ECC DEC/(06)01);
- ECC Decision of 1 December 2006 on designation of bands 880-915 MHz, 925-960 MHz, 1710-1785 MHz and 1805-1880 MHz for terrestrial IMT-2000/UMTS systems (ECC DEC/(06)13);
- ERC Report 25: The European table of frequency allocations and utilisations covering the frequency range 9 kHz to 275 GHz.

10. Action to be taken in preparation for WRC-2007

- 1 Support the adoption of Draft new Resolutions on Naming and on General principles and objectives for the standardisation and harmonisation of IMT-Advanced at the Radiocommunications Assembly;

- 2 For the WP 8F Kyoto meeting to develop detailed CEPT contributions on sharing studies, including further consideration on the use of mitigation techniques in the bands 3400 - 4200 MHz and 4500 - 4800 MHz;
- 3 Establish a CEPT position on the spectrum requirement for CEPT countries;
- 4 Establish a CEPT position on the candidate bands;
- 5 Further develop the CEPT position on the issues related to the spectrum to improve the coverage for IMT, taking into account the results of studies of frequencies lower than those identified for IMT-2000, including:
 - Possible ways to overcome today's "digital divide"² and improve the availability of universal services;
 - IMT-2000 traffic and spectrum forecast for low user-density scenarios;
 - Whether there is a need for regional identification in the frequency band 450 – 470 MHz;
 - Assess advantages and disadvantages of the use of frequencies below those already identified for IMT-2000 to cover areas of low population density taking into consideration the needs of developing countries and countries with sparsely populated areas including use of the satellite component of IMT 2000 for suitable coverage of these countries.

11. Proposals from outside CEPT

11.1 International organisations

NATO (February 2007)

NATO Military Position

It is important to realize that some of the bands being considered for IMT are extremely important for NATO, in particular the band 4.4-5.0 GHz.

There is a growing military requirement for current and future access to some of the bands for a variety of non standard mobile systems using various power levels, bandwidths, and operational modes, for which sharing would be difficult.

The identification of additional spectrum for IMT-2000 and systems beyond must not impact on NATO operational capabilities.

² World Summit on the Information Society Geneva 2003 – Tunis 2005, Declaration of Principles Building the Information Society: a global Challenge in the new Millennium, Doc. WSIS-03/GENEVA/DOC/4-E

EUMETNET / WMO:

Taking into account the 2700-2900 MHz studies prior to WRC-2000 that concluded on non compatibility between IMT-2000 and radars, WMO and EUMETNET strongly oppose to any IMT identification in the 2700-2900 MHz.

Also, recognising the important and essential use of C-Band satellite facilities for meteorological purposes, relating to safety of life, WMO and EUMETNET opposes a worldwide IMT identification in the 3400-4200 MHz band that would not take into account (e.g. in a Resolution) the essential need of satellite C-Band for data distribution in large areas of the globe.

UMTS Forum:

The UMTS Forum has conducted studies related to preparations for WRC-07. These studies are published in UMTS Forum Report No 37 (Magic Mobile Future), No 38 (Coverage extension bands for UMTS/IMT-2000 in the bands 470-600 MHz and No 40 "Development of spectrum requirement forecasts for IMT-2000 and systems beyond IMT-2000 (IMT-Advanced)".

Doc. ECC PT1(06)23rev1 contains a study on spectrum requirement forecasts for IMT-Advanced based on existing market studies (Forum Report No 37 and the EC FMS Study). The study estimates 1-2 GHz spectrum demand, pending on the market scenario, for high bit rate services.

11.2 Regional organisations

APT (February 2006)

APT Administrations support the studies being conducted by ITU-R Study Groups regarding technical and regulatory aspects of the future development IMT-2000 and IMT-Advanced, which is also called IMT as a whole and on development of the [IMT.ESTIMATE] ensuring estimates of spectrum requirements as accurate as possible corresponding to the market demands of future mobile services.

The APT administrations support to identify new bands for the future development of IMT-2000 and IMT-Advanced based on criteria as contained in Resolution 228 (Rev. WRC-03).

In identifying candidate bands for IMT systems both new capabilities "new mobile access" and "new nomadic/local area wireless access" need to be taken into account as appropriate.

The APT administrations recognize that the evolution of IMT-2000 and IMT-Advanced is foreseen to address the need for data rates higher than those provided by IMT-2000 systems. It is important to have sufficient spectrum to be identified, taking into account user demands.

The early identifications of frequency bands for future development of IMT-2000 and IMT-Advanced is necessary to make progress in the studies and to give administrations enough time to make frequency bands available for development of IMT-2000 and IMT-Advanced and it should preferably be identified by WRC-07.

The dates for the use of bands identified for IMT will depend on the demand for spectrum to support IMT-2000 and IMT-Advanced in each country as well as other conditions as referred to in Resolution **228** (Rev. WRC-03).

Additional spectrum for future development of IMT-2000 and IMT-Advanced should be harmonized globally to the greatest extent possible in order to facilitate global roaming, reduce cost of equipment manufacture and help developing countries to gain benefit from IMT-2000 and IMT-Advanced.

Identification of frequency bands for future development of IMT-2000 and IMT-Advanced should take into account various elements referred to in Resolution **228** (Rev. WRC-03). Cost-effective coverage extension of IMT-2000 services into regional and rural areas is an important aspect of Resolution **228 (Rev.WRC-03)** considerations and, in this respect, some APT administrations support the new identification of bands below 1 GHz that are already allocated to the Mobile Service, in addition to those already identified for IMT-2000 based on the studies referred to in 4) paragraph above. In this regard, particular attention should be given to the recognizing j) of Resolution 228(REV.WRC-03) in the frequency band 470-862 MHz heavily used and under planning by RRC-06, particularly in Region 1.

Some APT administrations also support the new identification of bands between the 1 to 6 GHz in order to support higher data rate (up to 100Mbits/s with very high speed, up to 250 km/h and up to 1 Gbit/s with stationary speed) or high capacity applications. Some other APT administrations do not share this view.

Some APT administrations also support the identification of bands above 6 GHz for the deployment of systems using data rates of 1Gbps such as for nomadic/ local access. Some other APT administrations do not share this view.

Some APT administration is of the view that since the band 4.5-4.8GHz band is part of the down link frequency bands used in Appendix 30B which is world-wide treaty binding agreement this frequency band is currently used or being used in many developing countries for infrastructure telecommunication networks e.g. RASCOM, no identification of this frequency band for IMT-2000 and IMT-Advanced should be made. Some APT administrations are of the view that since the frequency band 3.4 – 4.2 GHz band is heavily used by Fixed Satellite Service on a world-wide basis, no identification of this frequency band for IMT-2000 and IMT-Advanced should be made.

Spectrum already identified for IMT-2000 should be included in the spectrum estimate and may also be used for the future development of IMT-2000 and IMT-Advanced.

Some administrations support extending the identification of bands already designated for use by IMT-2000 systems to also encompass further development of IMT-2000 and IMT-Advanced applications.

APT Administrations are of the view that before the bands 3.4 -4.2 GHz and 4.5 – 4.8 GHz be identified for IMT, sharing studies which have been initiated by the ITU-R should have been completed.

Some APT administrations consider that like terrestrial, Satellite is a possible solution for deployment of IMT systems in conjunction or not with terrestrial systems.

APT administrations are of the view that the bands currently allocated to aeronautical mobile (R) services and aeronautical radio determination services related to safety of life should not be identified for use for IMT applications.

The APT administrations are encouraged to participate and review the study of ITU-R.

CITEL (June 2006)

CITEL Preliminary View(s):

Brazil, Guatemala

Brazil is participating in the studies being conducted in WP 8F, particularly those related to determining the amount of spectrum that may be required for nomadic high data rate applications and high mobility broadband applications to be made available by future development of IMT-2000 and systems beyond IMT-2000, and when this new spectrum will be necessary.

Brazil considers that any new spectrum for the mentioned applications will only be needed after 2015.

Brazil and Guatemala has concerns related to the identification of the bands, or parts of, 470–608 MHz, 614-806 MHz, 3600-4200 MHz and 4400-5000 MHz, for IMT-2000. Sharing studies should be done considering the need to protect the incumbent services. Upon sharing studies results Brazil will analyse this point further.

Canada

Canada supports and is participating in the studies being conducted in WP8F which will determine how much, if any, additional spectrum is required for the future development of IMT-2000 and systems beyond IMT-2000.

United States

The U.S. supports conducting, and is participating, in the studies in WP8F to ensure that the appropriate methodology for estimating spectrum is employed; that anticipated services are reasonable and realistic; and that the estimate of spectrum needs is based on these reasonable methodologies/services. The U.S. also recognizes the special needs of developing areas of the world.

In determining the need for identifying additional spectrum, already identified spectrum and the need to protect existing services must be taken into account.

As studies are conducted in WP8F, the U.S. will determine if it will support the identification of any additional bands for the deployment of these systems. (June 2004).

Uruguay

Uruguay is evaluating the work in process within the WP 8F and expresses its concern with respect to the eventual identification, total or partial, of the bands 470-608 MHz., 614-806 MHz., 3600-4200 MHz. y 4400-5000 MHz for IMT-2000, due to the fact that its considers of great importance the need to protect the services that are currently deployed in this bands.

Preliminary proposals:

1) Brazil: No change in the band 4500-4800 MHz

Reason: The band 4500-4800 MHz is part of the Plan for the fixed-satellite service in accordance with APPENDIX 30B (Rev. WRC- 2000).

2) Canada:

Canada proposes that all references of IMT-2000 in the footnotes of the Radio Regulations (e.g. Footnotes 5.317A, 5.384A, 5.388 and 5.388A) be replaced by IMT and that any new footnotes developed at WRC-07 for Agenda Item 1.4 reference simply IMT.

Reason: Deploying cellular infrastructure is costly and time consuming. Therefore being able to reuse the existing infrastructure to expand the services offered to users is essential. Advances in radio technology are allowing operators to increase their capacity without increasing their spectrum usage. This could allow operators to evolve their existing IMT-2000 systems to systems beyond IMT-2000 by using their existing frequencies. In fact, some operators have found that they can use their PCS and digital cellular bands to offer IMT-2000 systems. As Systems Beyond IMT-2000 are being deployed it is important to allow operators to expand or evolve their existing systems to offer Systems Beyond IMT-2000 services within the bands that they are using for IMT-2000 where ever it is feasible.

Systems that meet the regulatory criteria in a frequency band should not be limited in their evolution and there is no precedence for limiting an allocation in the RR to a specific generation of technology. Given that IMT has been accepted as the root name for both IMT-2000 and IMT-Advanced, it could therefore also be used as the application name in the RR footnotes.

Inter-Americana Proposal (IAP)

1) Brazil, Chile, Guatemala, Uruguay, Argentina, Colombia: No change in the band 3600-4200 MHz

Reason: Tropical climate countries that use 3625-4200 MHz band, due to heavy rain conditions, don't have an alternative frequency band that provides the same quality of service, and, in countries where this band is extensively used, it is not possible to share the band with a service that requires exclusion zones for the protection of the FSS terminals.

Arab Group (April 2006):

The Arab group are not in favour of identifying any new band for IMT2000 and are also objecting to any newly proposed bands (e.g. 450 and 800 MHz) that are used by other services and prefer to use frequency bands that are within the mobile service. The final position will be made after CPM.

RCC (September 2006)

Currently the studies of the potential usage of the new frequency bands for future development of the IMT-2000 systems and systems beyond IMT-2000 on the harmonised basis are carried out. In order to cover the territories of countries with large areas of low-population density, the RCC Administrations support the identification of the frequency band 450-470 MHz for use by the IMT systems. The RCC position on the identification of the 470-862 MHz frequency band for IMT systems will be formulated based on the results of the ITU-R studies and usage of this frequency band by the broadcasting and other services.

The RCC Administrations consider it is expedient to study the necessity of the identification of the additional spectrum for the terrestrial component of the IMT-2000 systems and systems beyond IMT-2000. The final position will be formulated based on the results of the development of the standardization principles of the systems beyond IMT-2000.

The RCC Administrations consider it to be premature for today to identify at WRC-07 the frequency bands 2300-2400 MHz, 2700-2900 MHz, 3400-4200 MHz and 4400-4990 MHz for IMT-2000 systems because of their intensive usage by the other radio services and the complexities in respect of the frequency sharing with them of the IMT systems.

The RCC Administrations consider it to be inexpedient to identify at WRC-07 the additional frequency bands for the IMT-2000 satellite component.

In addition the matter of identification of the new frequency bands for the IMT-2000 satellite component shall be considered taking into account the results of the implementation of already identified frequency bands for the IMT-2000 satellite component.

The RCC Administrations consider that in future it to be possible to use the frequency bands already identified for the IMT-2000 systems for the systems beyond IMT-2000.

Co-ordinator

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RESOLUTION 223 (WRC-2000)

Implementation of International Mobile Telecommunications (IMT) in the frequency range 1-3GHz,

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The World Radiocommunication Conference (Geneva, 2007),

Considering

a) that International Mobile Telecommunications (IMT) is the ITU vision of global mobile access, which started service around the year 2000;

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b) that IMT is an advanced mobile communication applications concept intended to provide telecommunication services on a worldwide scale regardless of location, network or terminal used;

i) That IMT comprises IMT-2000 and IMT-Advanced, and that the naming of IMT, IMT-2000 and IMT-Advanced is addressed in ITU-R Resolution XXX

c) that IMT provides access to a wide range of telecommunication services supported by fixed telecommunication networks (e.g. PSTN/ISDN, Internet Protocol), and to other services which are specific to mobile users;

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d) that the technical characteristics of IMT-2000 are specified in ITU-R and ITU-T Recommendations, including Recommendation ITU-R M.1457, which contains the detailed specifications of the radio interfaces of IMT-2000;

e)

ii) that the framework and overall objectives of IMT-Advanced are described in Recommendation ITU-R M.1645;

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e) that IMT-Advanced is being studied within ITU-R;

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f) that at WARC-92, 230 MHz of spectrum was identified for IMT-2000 in the bands 1 885-2 025 MHz and 2 110-2 200 MHz, including the bands 1 980-2 010 MHz and 2 170-2 200 MHz for the satellite component of IMT;

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g)

iii) that at WRC-2000 the bands 1710-1885 MHz and 2500-2690MHz were identified to meet the requirement of the order of 160 MHz of spectrum, in addition to that already identified for IMT-2000 by WARC-92 and in addition to the spectrum used for first- and second-generation mobile systems in all three ITU Regions, needed in order to meet the projected requirements of IMT-2000 in those areas where the traffic is the highest by 2010; **NOTE: based on Resolution 223 considering i)**

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iv) that the harmonized frequency arrangements for operation of the terrestrial component of IMT-2000 in the spectrum mentioned in this Resolution, aiming to

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[achieve compatibility with existing frequency arrangements used by the first- and second-generation systems, are described in Recommendation ITU-R M.1036;](#)

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v) [that ITU-R has studied the implications of sharing of IMT-2000 with other applications and services in the bands 1 710-1 885 MHz and 2 500-2 690 MHz and the implementation, sharing and frequency arrangements of IMT-2000 in the bands 1 710-1 885 MHz and 2 500-2 690 MHz;](#) ***NOTE: Moved from Invites ITU-R 1***

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vi) [that ITU-R has provided guidance to ensure that IMT-2000 can meet the telecommunication needs of the developing countries and rural areas in the context of the studies referred to above;](#) ***NOTE: Moved from Invites ITU-R 4***

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h) that since WARC-92 there has been a tremendous growth in mobile communications including an increasing demand for wideband multimedia capability, [which has accelerated since WRC-2000;](#)

k) [that the bands identified for IMT, are currently used by either first- or second-generation mobile systems or applications of other radiocommunication services;](#)

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l) that Recommendation ITU-R M.1308 addresses the evolution of existing mobile communication systems to IMT-2000;

m) that harmonized worldwide bands for IMT, are desirable in order to achieve global roaming and the benefits of economies of scale;

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j) that this Conference has identified additional frequency bands in No. 5.384A for IMT-2000 in order to meet the additional spectrum requirement projected by ITU-R;

n) that the bands 1 710-1 885 MHz, [1 885-2 025 MHz](#), [2 110-2 200 MHz](#) and 2 500-2 690 MHz are allocated to a variety of services in accordance with the relevant provisions of the Radio Regulations;

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o) that, for technical reasons, the existing applications in the bands identified for IMT, [in this Resolution](#) require spectrum below 3 GHz;

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p) that technological advancement and market demand will promote innovation and accelerate the delivery of advanced communication applications to consumers;

q) that changes in technology may lead to the further development of communication applications, including IMT,

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emphasizing

a) that flexibility must be afforded to administrations:

– to determine, at a national level, how much spectrum to make available for IMT, from within the identified bands;

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– to develop their own transition plans, if necessary, tailored to meet their specific deployment of existing systems;

- to have the ability for the identified bands to be used by all services having allocations in those bands;
 - to determine the timing of availability and use of the bands identified for IMT, in order to meet particular market demand and other national considerations;
- b) that the particular needs of developing countries must be met;
- c) that Recommendation ITU-R M.819 describes the objectives to be met by IMT-2000 in order to meet the needs of developing countries,

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noting

- a) Resolutions ~~224 (WRC-2000), 225 (WRC-2000)*~~ and [New resolution on above 3GHz] (WRC-07), which also relate to IMT,

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- d) that, due to differing requirements, not all administrations may need all of the bands identified for IMT, or, due to the usage by and investment in existing services, may not be able to implement IMT, in all of those bands;

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- e) that the spectrum for IMT, may not completely satisfy the expected requirements of some administrations;

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c) . that studies regarding the availability of the bands 1 710-1 885 MHz and 2 500-2 690 MHz for IMT-2000 are being conducted in many countries, the results of which could have implications for the use of those bands in those countries;

- f) that currently operating second-generation mobile communication systems may evolve to IMT, in their existing bands;

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- g) that services such as fixed, mobile (second-generation systems), space operations, space research and aeronautical mobile are in operation or planned in the band 1 710-1 885 MHz, or in portions of that band;

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- h) that services such as broadcasting-satellite, broadcasting-satellite (sound), mobile-satellite and fixed (including multipoint distribution/communication systems) are in operation or planned in the band 2 500-2 690 MHz, or in portions of that band;

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- i) that the identification of several bands for IMT, allows administrations to choose the best band or parts of bands for their circumstances;

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- k) that the IMT-2000 radio interfaces as defined in Recommendation ITU-R M.1457 continue to evolve within the framework of ITU-R beyond those initially specified, to provide enhanced services and services beyond those envisaged in the initial implementation;

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- l) that the identification of a band for IMT, does not establish priority in the Radio Regulations and does not preclude the use of the band for any application of the services to which they are allocated;

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* *Note by the Secretariat:* This Resolution was revised by WRC-03.

m) that the provisions of Nos. ~~5.317A, 5.384A, 5.388~~ and [5.New bands] do not prevent administrations from having the choice to implement other technologies in the frequency bands identified for IMT, based on national requirements,

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recognizing

a) that some administrations are planning to use the band 2 300-2 400 MHz for IMT-2000;

b) that for some administrations the only way of implementing IMT, would be spectrum rearming, requiring significant financial investment;

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c) that spectrum for IMT, is identified in Nos. ~~5.317A, 5.384A, 5.388~~ and [5.New bands], but this identification does not preclude the use for IMT, of other bands allocated to the mobile service,

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resolves

1 to invite administrations implementing IMT, or planning to implement IMT, to make available, based on market demand and other national considerations, additional bands or portions of the bands above 1 GHz identified in Nos. ~~5.384A and 5.388~~ for the terrestrial component of IMT,; due consideration should be given to the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT, taking into account the use and planned use of these bands by all services to which these bands are allocated;

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2 to acknowledge that the differences in the texts of Nos. ~~5.384A~~ and ~~5.388~~ do not confer differences in regulatory status,