

United States of America

PROPOSAL FOR THE WORK OF THE CONFERENCE

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)**;

Background Information: Resolution **228 (WRC-03)** calls for studies on frequency-related matters for the “future development of IMT-2000” (now referred to as “IMT-2000”) and “systems beyond IMT-2000” (now named “IMT-Advanced”) as defined by ITU-R. Resolves 2 under Resolution **228 (WRC-03)** invites the ITU-R to report, in time for WRC-07, on the results of studies on the spectrum requirements and potential frequency ranges suitable for IMT-2000 and IMT-Advanced, taking into account:

- the evolving user needs, including the growth in demand for IMT-2000 services;
- the evolution of IMT-2000 and pre-IMT-2000 systems through advances in technology;
- the bands currently identified for IMT-2000;
- the time-frame in which spectrum would be needed;
- the period for migration from existing to future systems;
- the extensive use of frequencies below those identified for IMT-2000 in RR No. **5.317A**.

WARC-92 identified the bands 1 885-2 025 MHz / 2 110-2 200 MHz and WRC-2000 identified the bands 806-960 MHz (ITU-R Region 1: 862-960 MHz) / 1 710-1 885 MHz / 2 500-2 690 MHz for use on a worldwide basis by administrations wishing to implement IMT-2000 systems. Resolutions **212 (WARC 92)**, **223 (WRC-2000)** and **224 (WRC-2000)** invite administrations to make available the necessary portion of these identified bands for IMT-2000 development, while recognizing that administrations have the flexibility to use the bands for other applications of services to which the bands are allocated and to implement IMT-2000 in other mobile bands.

As part of the process to identify candidate bands to meet the potential spectrum requirements for IMT-2000 and IMT-Advanced , Resolution **228** calls for technical studies on the compatibility with existing services in the bands of interest. However, at this time such studies have not been completed.

The candidate bands for IMT-2000 and IMT-Advanced systems contained in ITU-R Report M.2079 are between 400 MHz and 5 GHz and in numerical order are:

- 410-430 MHz
- 450-470 MHz
- 470-960 MHz
- 1 710-2 025 MHz and 2 110-2 200 MHz
- 2 300-2 400 MHz

- 2 500–2 690 MHz
- 2 700-2 900 MHz
- 3 400-4 200 MHz
- 4 400-4 990 MHz

Four of the bands (or portions thereof) identified as candidates, 410-430 MHz, 2 700-2 900 MHz, 3 400-4200 MHz, and 4 400- 4990 MHz, are considered in this proposal.

410-430 MHz

The band 410-430 MHz is used extensively by many administrations for fixed and mobile communications systems, long-range surveillance systems, as well as personnel location systems. Ground, shipborne, and airborne radars, which are used for national security, utilize this particular frequency band. Parts of the band are also used for extra vehicular activity (EVA) communications by both the Shuttle and International Space Station on a primary basis for the space research service; and for transmitting hydrological and meteorological data.

2700-2900 MHz

In all three ITU-R Regions, the 2 700-2 900 MHz band is allocated to aeronautical radionavigation. The radionavigation service is designated as a safety service under RR No. **4.10** and harmful interference to it cannot be accepted. By RR No. **5.423**, ground-based meteorological radars are authorized to operate on an equal primary basis. Previous detailed analysis and sharing studies undertaken by various ITU administrations and ongoing within the ITU-R working parties have shown that the utilization of the 2 700-2 900 MHz band by IMT systems is not feasible.

3400-4200 MHz

There are three distinct subbands that need to be considered within the 3400-4200 MHz candidate band:

3400-3650 MHz

The 3 400-3 600 MHz band is allocated to the radiolocation service on a primary basis in ITU-R Regions 2 and 3. The band 3 400-3 600 MHz is allocated to the radiolocation service on a secondary basis in ITU-R Region 1 and the band 3 600-3 700 MHz band is allocated to the radiolocation service on a secondary basis in ITU-R Regions 2 and 3. In this frequency range, administrations have developed and deployed a variety of mobile and transportable high power radar systems that operate on land, on ships, and on aircraft. The shipborne radars are principally used in coastal areas, but can also be used during open ocean transit. The airborne radars are highly mobile and operate in many areas of the world. A number of ongoing sharing studies submitted to the ITU-R have indicated that sharing in the 3 400-3 700 MHz band between the radiolocation service and IMT-Advanced systems operating in the mobile service is not feasible in the same geographic area due to significant levels of interference into both the radar systems and IMT-Advanced devices.

3650-3700 MHz

Several administrations have halted implementation of radiolocation and/or fixed satellite networks in the band 3650-3700 MHz in order to minimize constraints on new terrestrial services

in the band and have adopted provisions to protect these existing systems, while others continue to use radiolocation and/or fixed satellite networks in this band, while yet others may not have existing radiolocation or fixed-satellite networks in the band. In light of this, further consideration of the frequency-related matters for IMT systems may be warranted in the band 3650-3700 MHz, taking into account that its availability for use by IMT will depend on the extent to which FSS receive earth stations are the deployed in this band in any given region.

3700-4200 MHz

Sharing studies have been conducted within the ITU-R regarding sharing of IMT-2000 and IMT-Advanced with FSS receive earth stations. To provide protection of the FSS receive earth stations, some physical separation to the stations of the mobile terrestrial network is required. The magnitude of this separation distance depends on the parameters of the networks and the deployment of the two services, including the elevation angle of the earth station, the position of the IMT-Advanced terminal and/or base station relative to the FSS earth station and the amount of clutter loss. While the studies are still ongoing, the current range of separation distances associated with a single IMT-Advanced macro base station is from 36 to 70 km for the non-site specific studies (flat terrain model) if only long term interference is considered, and from 34-430 km if short term effects are also considered. It should be noted that the 34 kilometer distance for short-term interference does not include the effects of ducting. If ducting effects are taken into account, the separation distance associated with short term interference ranges from 140 – 430 km. For site specific studies, where actual terrain profiles were taken into account, the current range of separation distances for associated with a single IMT-Advanced macro base station is 1 to 110 km if only long term interference is considered and 270 km to 280 km if short term effects are also considered. It is noted that the 270 – 280 km distance corresponds to the results of a single (and only) site specific sharing study by Working Party 8F that considered the effects of short-term interference. It should also be noted that mitigation techniques are also under study that may reduce the separation distances. The minimum separation distances related to the IMT-Advanced micro and/or mobile station will generally be smaller than the ranges listed above.

Although the studies have differences in assumptions and methodologies and need to be continued to find convergence, they all show that ubiquitously deployed IMT-Advanced systems can not share in the same geographical area with FSS, when the FSS is deployed in a ubiquitous manner and/or with no individual licensing of earth stations, since no minimum separation can be guaranteed.

In view of the results of the available sharing studies to date and the above considerations, the band 3700-4200 MHz should be removed from consideration as a candidate band for IMT-Advanced systems.

4400-4990 MHz

The 4 400- 4990 MHz band is allocated on a primary basis to the fixed and mobile (except aeronautical) services. The 4 500-4 800 MHz band is also allocated on a primary basis to the fixed satellite service, subject to Appendix 30B. ITU-R Working Party 8B concluded studies under agenda item 1.5 that show aeronautical telemetry systems for flight test can share with fixed and mobile systems in this band. Use of this band includes many datalinks and a number of unmanned air systems networks. Troposcatter radio terminals are deployed in this band to provide secure digital long-haul radio trunking. Systems in this band include deployable communications systems as well as fixed and mobile radio relay networks.

The 4 400–4990 MHz band is designated by several administrations in Europe and North America as a harmonised band to be used for defense communications and thus is critical to these administrations’ ability to fulfill their peacekeeping obligations. The 4940-4990 MHz band is designated for use in many countries by public protection and disaster relief (PPDR) applications, particularly for broadband. This usage is reflected in Resolution **646 (WRC-03)**, which identifies the 4940-4990 MHz band for PPDR applications in Regions 2 and 3. The term “public protection radiocommunication” refers to radiocommunications used by responsible agencies and organizations dealing with maintenance of law and order, protection of life and property and emergency situations. The term “disaster relief radiocommunication” refers to radiocommunications used by agencies and organizations dealing with a serious disruption of the functioning of society, posing a significant widespread threat to human life, health, property or the environment, whether caused by accident, natural phenomena or human activity, and whether developing suddenly or as a result of complex, long-term processes. It must be noted, however, that Resolution **646** also states specifically in *considering h*): that continuing development of new technologies such as IMT-2000 and systems beyond IMT-2000 and Intelligent Transportation Systems (ITS) may be able to support or supplement advanced public protection and disaster relief applications.

Proposal

ARTICLE 5

USA// 1 NOC

410-460 MHz

Allocation to services		
Region 1	Region 2	Region 3
410-420	FIXED MOBILE except aeronautical mobile SPACE RESEARCH (space-to-space) 5.268	
420-430	FIXED MOBILE except aeronautical mobile Radiolocation 5.269 5.270 5.271	
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Reasons: ITU-R studies have not shown compatibility between IMT systems and the incumbent services in the 410-430 MHz band. Extensive use of this band for national security and public safety purposes preclude the use of this band for commercial wireless purposes.

ARTICLE 5

USA// 2 NOC

2 700-4 800 MHz

Allocation to services		
Region 1	Region 2	Region 3
2 700-2 900	AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation 5.423 5.424	
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Reasons: ITU-R detailed analysis and sharing studies undertaken by various ITU administrations and working parties have shown that the utilization of the 2 700 - 2 900 MHz band by IMT-2000 and IMT-Advanced systems is not feasible.

ARTICLE 5

USA/ / 3 **NOC**

2 700-4 800 MHz

Allocation to services		
Region 1	Region 2	Region 3
.....		
3 400-3 600 FIXED FIXED-SATELLITE (space-to-Earth) Mobile Radiolocation 5.431	3 400-3 500 FIXED FIXED-SATELLITE (space-to-Earth) Amateur Mobile Radiolocation 5.433 5.282 5.432	
	3 500-3 700 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation 5.433 5.435	
	3 700-4 200 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile	
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Reasons: The United States proposes no change to 3400-3650 MHz and 3700-4200 MHz for the following reasons. ITU-R studies have not shown compatibility between IMT systems and the radiolocation service in the 3 400-3 650 MHz band. The results of the ITU-R sharing studies to date have shown that sharing of the 3700 – 4200 MHz frequency band by IMT-Advanced systems and the fixed satellite system is not feasible within the same geographic area. The United States has not determined how to address 3650-3700 MHz under agenda item 1.4, but notes that in the United States, the fixed-satellite service deployments have been halted in order to not constrain terrestrial use of the band while protection of existing earth stations has been ensured. In light of this, further consideration of the frequency-related matters for IMT systems may be warranted in the band 3650-3700 MHz, taking into account that its availability for use by IMT will depend on the extent to which radiolocation and/or FSS receive earth stations are the deployed in this band in a given region.

ARTICLE 5

USA/ / 4 NOC

2 700- 4 800 MHz

Allocation to services		
Region 1	Region 2	Region 3
.....		
4 400-4 500	FIXED MOBILE	
4 500-4 800	FIXED FIXED-SATELLITE (space-to-Earth) 5.441 MOBILE	

4 800-5 570 MHz

Allocation to services		
Region 1	Region 2	Region 3
4 800-4 990	FIXED MOBILE 5.442 Radio astronomy 5.149 5.339 5.443	
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Reasons: Studies have not shown the compatibility of IMT with the radio relay and troposcatter networks operating within the fixed and mobile services in the 4400-4940 MHz band. Further, the 4940-4990 MHz band is used for critical public protection and disaster relief applications. This NOC proposal applies to Agenda Item 1.4 and the identification of spectrum for IMT. The

4 500-4 940 MHz band is being considered for aeronautical mobile telemetry for flight test (air-to-ground) under Agenda Item 1.5.
