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| **Radiocommunication Study Groups** |  |
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| **21 November 2011** |
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| Annex 8 to Working Party 5A Chairman’s Report | |
| Working Document towards a PRELIMINARY DRAFT NEW REcommendation ITU-R M.[LMS.fa] | |
| General guidelines for the planning of frequency block arrangements in large contiguous bandwidths for broadband applications in the mobile service | |

**Scope**

This Recommendation provides guidance on the development of frequency arrangements for systems operating in large contiguous bandwidths in the mobile service, with a view to assist administrations on spectrum-related technical issues.

The ITU Radicommunication Assembly,

considering

a) that harmonized spectrum and harmonized frequency arrangements for broadband mobile systems in the mobile service are desirable;

b) that harmonized frequency arrangements in the bands allocated to the mobile service will reduce the overall cost of broadband systems by providing economies of scale and expanded equipment availability, facilitating deployment and enhancing cross-border coordination;

c) that when developing frequency arrangements, possible technological constraints (e.g. cost efficiency, size and complexity of terminals, high speed/low power digital signal processing and the need for compact batteries) need to be taken into account;

d) that guardbands between different systems should be minimized to make more efficient use of the spectrum;

e) that current and future advances in communication technologies (e.g. multimode / multiband terminals, enhanced filter technology, adaptive antennas, advanced signal processing techniques, techniques associated with cognitive radio systems, variable duplex technology and wireless connectivity peripherals, …) may facilitate more efficient use and increase overall utilization of radio spectrum, including the use of larger contiguous bandwidths;

f) the adoption of a harmonized band plan in large contiguous bandwidths for broadband applications in the mobile service, such as those outlined in [Annex 1](#ann1);

g) that some administrations may have different operational needs and spectrum requirements for broadband applications depending on their circumstances,

noting

a) that Recommendation ITU-R F.1399-1 “Vocabulary of terms for wireless access” defines the term “frequency block” as “A contiguous portion of spectrum within a sub-band or frequency band, typically assigned to a single operator”;

b) Recommendation ITU-R M.1036-3 “Frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications-2000 (IMT‑2000) in the bands 806-960 MHz, 1 710-2 025 MHz, 2 110-2 200 MHz and 2 500-2 690 MHz”[[1]](#footnote-1);

c) Recommendation ITU-R M.1808 “Technical and operational characteristics of conventional and trunked land mobile systems operating in the mobile service allocations below 869 MHz to be used in sharing studies”;

d) Recommendation ITU-R M.1823 “Technical and operational characteristics of digital cellular land mobile systems for use in sharing studies”;

e) Draft new Recommendation ITU-R M.[LMS.PPDR.UHF] “Frequency arrangements for public protection and disaster relief radiocommunication systems in UHF bands in accordance with Resolution 646 (WRC-03)”[[2]](#footnote-2),

recommends

that harmonized band plans in large contiguous bandwidths be adopted for broadband applications in the mobile service, wherever possible.

Annex 1

Considerations in the adoption of a harmonized band plan in large contiguous bandwidths for broadband applications in the mobile service

There are certain characteristics that are conducive to efficient and effective use of spectrum for broadband applications. Fundamentally, there should be a harmonized band plan for such applications when large portions of the radiofrequency spectrum are available. That is, instead of first carving the spectrum for different uses and then defining a band plan for each use, a harmonized plan could be adopted first for the large bandand then blocks or sub-bands can be assigned to different uses (commercial operators, public safety agencies, utility companies, etc.). For example, refer to the illustration in Figure 1, which assumes a harmonized large band with paired arrangements that have the same duplex separation, a centre gap that can be used for other purposes, and, if necessary, guardbands at the frequency boundaries in some blocks. Block H can be used as a center gap or for other purposes. The sub-bands could be assigned as follows, for example:   
A-A’ = commercial operator or application #1, B-B’ = commercial operator or application #2, …,   
E-E’ = public safety agency or application #1, F-F’ = public safety agency or application #2,   
G-G’ = Utility company or application #1, etc.

*[Editor’s Note: Add example for unpaired usage]*

FIGURE 1

Harmonized band plan for various uses in a band of sufficiently large bandwidth



This approach would work best for large contiguous amounts of spectrum intended for broadband applications. Even if the entire band cannot be made available at the beginning, it is essential to plan ahead and develop a band plan that can be implemented over time.

This harmonized approach could:

– Enable higher spectrum utilization; reduced interference; economies of scale; enabling the use of the same type of equipment across various mobile applications.

– Enable the technical possibility of specific user groups (e.g., public protection and disaster relief agencies) obtaining additional capacity (traffic overflow) by using commercial services when needed (possibly invoking higher priority traffic), with the same terminal equipment.

– Not all pre-existing users need to evolve to the harmonized band plan at the same time. Provisions should be made for transition over time so the harmonized band plan is implemented following the normal technology life cycle and progression for the individual applications.

– Enable a harmonized plan for a large band technology evolution.

*[Editor’s Note: Contributions are welcome on additional characteristics including limitations/ challenges.]*

Some characteristics of an efficient and effective band plan for broadband applications in the mobile service are as follows:

– large contiguous symmetrical blocks that could support both FDD and TDD;

– efficient transmit and receive spacing, consistent with the available state of the art technology;

– specified and consistent base and mobile transmit direction.

*[Editor’s Note: Add text about the technical considerations such as*

– *guardbands; definitions for internal and external guardbands;*

– *duplex direction (conventional vs. reversed) e.g. that in paired arrangements it is typical to have the base transmit (Base-Tx) in the upper block and add text on reversed duplex based on Recommendation ITU-R M.1036;*

– *unpaired usage;*

– *center gap, duplex distance.]*

In the context of such a harmonized band plan encompassing a large frequency range, one option is that equipment for each specific use would only transmit and receive at specific frequencies (for example, in certain blocks or groups of blocks in Fig. 1 above). This may reduce issues related to receiver overload and intermodulation.

1. *Editor’s Note: There is a draft revision of this Recommendation being developed within ITU-R; the version and title in force should be used at time of publication.* [↑](#footnote-ref-1)
2. *Editor’s Note: This draft new Recommendation will be considered at the November 2011 meeting of ITU-R Study Group 5; once approved, the Recommendation number will be inserted.* [↑](#footnote-ref-2)