The WRC series

# L-Band: The 1500 MHz IMT Range

December 2017

# Introduction

The 1500 MHz range of IMT frequencies sits between long-standing 850/900 MHz and higher IMT bands around 1800 MHz and will form a vital part of mobile broadband networks in the near future. The 1427-1518 MHz band was identified for use by IMT systems at WRC-15. It provides an ideal mix of coverage and capacity. In total, 91 MHz of mobile broadband spectrum is available in this band to help mobile operators deploy faster broadband services over wide areas. This will boost the social and economic development of all countries that decide to take advantage of it.

Band plan discussions are ongoing regarding supplemental downlink (SDL), FDD and TDD. These should be considered on a regional basis seeking harmonisation to enable roaming and maximise the benefits of economies of scale.

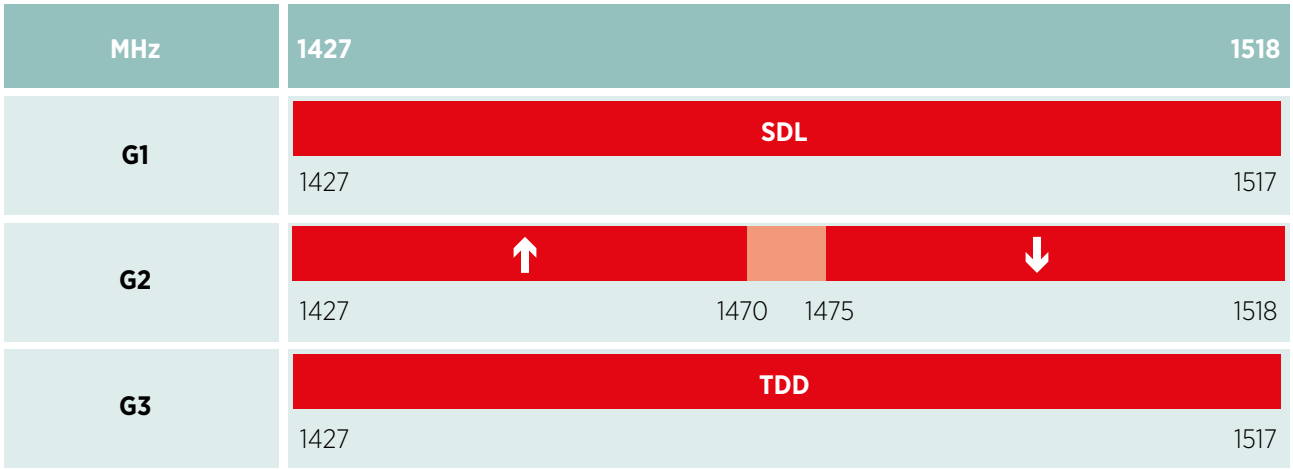
# Frequency arrangement options

Existing and continued regulatory activity can give countries confidence that they are able to fully use the IMT frequency range at 1427-1518 MHz without interference to other services. Some regions have decided which IMT technology will be used for the 1500 MHz range, while others are still deciding, and these require adoption of different frequency arrangements.

There are currently three options available that use the full range, which will be used for the different IMT technologies: supplemental downlink (SDL), frequency division duplex (FDD) or time division duplex (TDD). Harmonised use of these frequency arrangements, or part of them depending on market demand, is vital to the successful roll-out of IMT in the 1500 MHz range.

FIGURE 1

## Frequency arrangement options



# Regional harmonisation

Work on coordinating 1500 MHz usage has been going on for some time and some regions or countries have already made moves to use frequencies in a certain way. Where this has been done, it is of benefit to join the ecosystem created by one particular frequency arrangement.

- **Option G1 will be used for IMT in the 1500 MHz range in the Americas and in Europe.**
- **Japan has already deployed IMT networks using a frequency arrangement which is compatible with Option G2.**
- **Other Regions and countries are considering their options.**

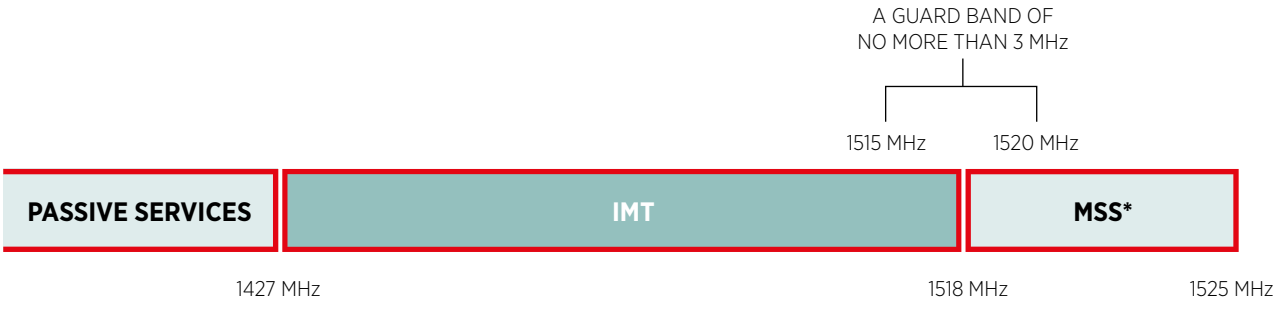
In order to maximise the benefits of IMT in the 1500 MHz range countries and regions should work towards harmonised use of the band.

In the first instance, work regarding harmonisation should focus on the bandplans already adopted, either by other regions or through 3GPP. Extensive work has been carried out in 3GPP on options in line with G1, G2 and G3. This work is not only to create frequency arrangements but also to define some technical aspects such as unwanted emission limits and user equipment parameters to comply with the ITU's and other regional regulations. Information from 3GPP's work can provide clear guidance to administrations in their assessment of the technical characteristics and likely ecosystem of each 1500 MHz frequency arrangement.

Governments and industry have been working to harmonise the use of the 1500 MHz range for IMT for many years. Further harmonisation activity is required in some regions, but the development of the 1500 IMT range as a driver for mobile broadband is already well underway.

FIGURE 2

## The L-band: a good mix of coverage and capacity




*1518-1525 MHz is allocated to satellite, but isn't heavily used in many parts of the world

# Compatibility with MSS

Discussion of interference between IMT and the mobile satellite service (MSS) in the adjacent band has formed a crucial part of the development of the band 1427-1518 MHz band for IMT services. Current studies between IMT SDL and MSS conclude they can coexist with a guard band of 3 MHz. This conclusion is also applicable to the case between FDD and MSS. It is important to assess the realistic use of 1518-1525 MHz to decide where to place the guard band: this is used by certain countries as an extension to the core MSS band at 1525-1559 MHz but is not used in many countries. This gives flexibility to countries when they are making the national decision as to where to place the guard band between IMT and MSS

# Compatibility with passive services

The 1400-1427 MHz band, adjacent to the band identified for IMT, is allocated to the following passive services: Earth exploration satellite service, space research service and radio astronomy. Mobile's ability to exist alongside such services is crucial to the development of broadband and does not need a guard band. In order to ensure protection of passive services, IMT needs to comply with the unwanted emission limits specified in Resolution 750 (Rev.WRC-15). The 3GPP specifications have been developed to comply with these limits.

# Further analysis

While details of protection required from adjacent bands for other services is given in the Radio Regulations, the ITU continues to develop further work. Also, useful technical analysis has been done on a regional level that can be used in other regions. In particular, the ECC's Report 263 addresses adjacent band compatibility between IMT in the band 1492-1518 MHz and MSS in the band 1 518-1 525 MHz. Also, ECC Decision (17)06 establishes conditions of operation in the whole 1427-1518 MHz to ensure continued operation of passive services below 1427 MHz and of MSS above 1518 MHz.

The solution includes limiting the power in the lower 5 MHz channel, 1427-1432 MHz, and in the upper channel 1512-1517 MHz. This power limitation ensures compatibility with services in adjacent bands as well as ensuring the most efficient and widest use of the spectrum identified to IMT by WRC-15.

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