



ASIA-PACIFIC TELECOMMUNITY

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(AWG-28)**

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IAFI-08**

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ITU-APT Foundation of India (IAFI)<sup>1</sup>

**FURTHER UPDATES TO THE WORKING DOCUMENT TOWARDS ADRAFT  
REVISION OF APT REPORT ON FREQUENCY ARRANGEMENTS FOR IMT IN THE  
BAND 470-703 MHZ**

**Background**

At its 27<sup>th</sup> meeting, the AWG developed a working document in AWG-27/TMP-13, based on an input contribution (AWG-27/INP-82). It is noted that AWG - SWG SA&H has not fully reviewed this working document and also decided to carry forward AWG-27/INP-82 to next meeting. AWG-27 invited APT members to contribute to this work item.

**Discussions**

The proposal adds two more options for the frequency arrangements in APT region which will help APT member administrations to use the UHF band more efficiently. These two new options provide an opportunity for APT members that use Band 28 from 703 MHz and therefore would be able to utilize 698-703 MHz. This proposal is fully supported.

**Proposal**

This contribution proposes further updates to the working document contained in AWG/TMP-13 in the attachment. A draft liaison statement to 3GPP is attached for the approval at AWG-28.



Field Code Changed

<sup>1</sup> ITU-APT Foundation of India (IAFI) is a new Affiliate member of APT. Details of IAFI can be seen at [itu-apt.org](http://itu-apt.org)

## WORKING DOCUMENT TOWARDS A DRAFT REVISION OF APT REPORT ON FREQUENCY ARRANGEMENTS FOR IMT IN THE BAND 470-703698 MHz

*[Editor's note: the revisions without any highlight are from AWG-26/INP-08 and 23, and the revisions with cyan highlighted are from AWG-27/INP-82; this document has not been reviewed by AWG-26 and AWG-27.]*

### 1 Introduction

The 470-694 MHz frequency range is allocated to the broadcasting service and mobile service on a co-primary basis in Region 3. The frequency band 470-698 MHz, or parts thereof, was identified by WRC-15 in 7 countries in Region 3 through new footnote No. **5.296A** for use by those administrations as listed wishing to implement terrestrial IMT systems. In addition, there is interest from other significant markets to do the same. Elsewhere, USA, Mexico and several other countries in Region 2 also identified this band for IMT through footnotes **5.295** and **5.308A**. It is noted that resolves 2 of revised Resolution **224 (Rev.WRC-195)** ~~encourages~~ “administrations to take into account results of the existing relevant ITU R studies, when implementing IMT applications/systems resolves to encourage administrations to take into account results of the existing relevant ITU Radiocommunication Sector studies, when implementing IMT applications/systems in the frequency bands 694-862 MHz in Region 1, in the frequency band 470-806 MHz in Region 2, in the frequency band 790-862 MHz in Region 3, in the frequency band 470-698 MHz, or portions thereof, for those administrations mentioned in No. 5.296A, and in the frequency band 698-790 MHz, or portions thereof, for those administrations mentioned in No. 5.313A;

Spectrum below 1 GHz is exceptionally well suited for mobile broadband applications. In particular, the unique propagation characteristics of the bands below 1 GHz allow for wider area coverage, which in turn requires fewer infrastructures and facilitates service delivery to rural or sparsely populated areas. In this regard, the 700MHz ecosystem is growing swiftly: there are over 34 commercial networks deployments.<sup>2</sup> The APT700 band plan coming out from region 3 played a huge role in its success globally. Outside of APAC, some countries in Region 2 have adopted or plan to adopt the APT700 band plan (3GPP Bband28) for LTE system deployments. The lower duplexer of APT700 plan has also been adopted in some countries of ~~for~~ Region 1 since the conclusion of WRC-15.

As the utilisation the 700MHz spectrum increases over time, it is desirable to look at additional spectrum that could be considered as a companion to 3GPP Band 28. ~~Therefore the~~ Therefore the use of parts of the 600MHz band for the mobile broadband service would provide a vital means of delivering high quality, wide area broadband services including in rural areas and deep inside buildings. The timely availability of frequency arrangements is essential for the development of IMT specifications and standards and the early consideration by Administrations in the footnotes referred to above of suitable frequency arrangements.

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<sup>2</sup><https://gsacom.com/paper/gsa-apt700-global-status-regulatory-deployments-devices/>

## 2 Scope

This Report covers aspects related to the harmonized frequency arrangement for the band 470-698 MHz. The objective is to develop possible harmonized frequency arrangements on 470-703-698 MHz in Asia Pacific Region based on the frequency allocation and arrangement in ITU and other Regions, for those countries in the APT region that wish to implement IMT in the existing primary mobile allocation in Region 3. [There are two options of harmonized band plans provided for consideration when implementing IMT in spectrum below the APT700.](#)

## 3 Vocabulary of terms

APT Asia Pacific Telecommunity

IMT International Mobile Telecommunications

WRC World Radiocommunication Conference

3GPP Band 28 UL 703-748 MHz DL 758-803 MHz

3GPP Band 71 UL 663 – 698 MHz DL 617-652 MHz

## 4 References

Final Acts of the World Radiocommunication Conference (WRC-15)

Recommendation ITU-R M.1036-5, “Frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications (IMT) in the bands identified for IMT in the Radio Regulations (RR)”.

APT Report APT/AWG/REP50, “[APT survey report on frequency bands in relation](#) to study on WRC-15 Agenda Item 1.1”.

## 5 Key Considerations for Frequency Arrangements

To maximize the benefits for APT countries, the frequency arrangements for IMT should be harmonized to the maximum practical extent to facilitate interoperability, for economies of scale and to enable seamless roaming by users. As far as practical, these arrangements should also reflect the importance of efficient usage of the spectrum.

In the ITU-R WP5D New Zealand, Mexico and Pacific Islands nations submitted a joint input (Document [WP5D/162](#)), proposing a band plan for the 600 MHz band. The proposed frequency arrangement is based on a reverse FDD configuration, where the frequency range 617-652 MHz is for base-station transmitter and the frequency range 663-698 MHz is for mobile-station transmitter.

The US arrangement for 614-698 MHz after the FCC incentive auction is ~~identical~~ [similar to the band plan proposed in Document WP5D/162, and it includes 7 blocks of 2 x 5 MHz of licensed spectrum in a FDD arrangement, and it does not include channel 37 \(608–614 MHz plus guard bands\).](#)

The interest from many other countries using the same provides for a harmonization and possible healthy ecosystem.

The preference towards reverse FDD configuration is to ensure compatibility with existing frequency arrangements in the band above 698 MHz and the flexibility in implementing measures to protect lower adjacent services in the band below 617 MHz.

The [APT 600MHz band specification Plan for IMT \(option A\)](#) has been included in Release 15 of 3GPP and approved in its RAN#77 meeting. The band is defined as Band 71 and its

frequency band arrangements matches the proposed APT band plan below. The related document 3GPP TR 36.755 is attached in the appendix.

## 6 APT Harmonized Band Plan for IMT

There are two options for a harmonized band plan in the 600 MHz frequency range:

- [Option A : Harmonized with some countries in ITU Region 2 and proposed plans of some APT countries](#)
- [Option B : Harmonised within APT countries and possibly some countries in Region 1](#)

### Option A

The recommended harmonized band plan for implementation of IMT in the band 470-698 MHz is provided in Fig. 1 for this option. It is noted that it has been developed with the consideration of a sharing/coexistence study with the Broadcasting and Radio astronomy services and other applications in the Mobile service.

- Reverse FDD configuration

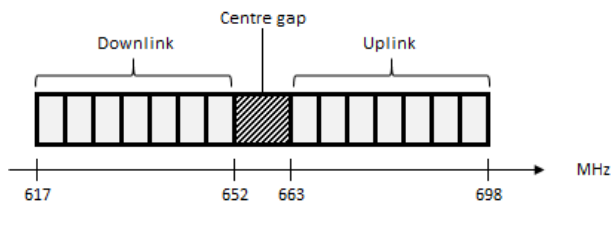


Figure 1: Harmonized band plan for 470-698 MHz band in Option A (Note: The centre gap is also known as duplex gap)

### Option B

There are two options to consider for option B that needs to be considered for APT countries. Option (B) (Options B1 and B2) provides a better utilization of spectrum, in conjunction with the existing APT 700 MHz band plan. In option A the 5 MHz spectrum block in 698- 703 MHz is not fully utilized):

#### Option B1

This option is based on an extension to band n71 and is shown in Fig 2 below:

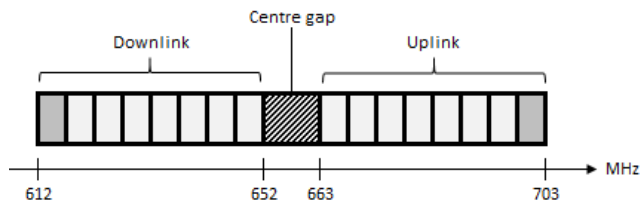


Figure 2: Harmonized band plan for 470-698 MHz band- Option B

In this option the frequency arrangement in Option A is extended upwards and downwards by 5 MHz being a better utilization of spectrum that is achieved with existing APT band that is 703-748 (UL) paired with 758- 803 MHz (DL) (otherwise the spectrum 698- 703 MHz is not fully utilized).

Some countries in Region 3 have RA on a coprimary basis (foot notes: 5.305 and 5.307). and as a consequence, co-existence/sharing with these other services will need to be studied.

#### Duplex Direction

The extended band proposal is a reverse duplex and in the lower part of the FDD band (below the duplex gap) is down link as compared to up link that is the ordinary convention but this is better suited for co-existence with APT 700 MHz band (band 28) at the upper edge of the band but also with possible broadcasting at the lower edge.

#### Channel Bandwidth

The revised proposal will result in 2x 40 MHz of FDD spectrum.

#### Duplex distance

The duplex distance is 51MHz. The frequency plan can support full band or split duplexer as is already the case for 3GPP band 28

#### Carrier Bandwidths supported

The extended bandwidth will support NR carrier bandwidths up to 30 MHz and LTE bandwidths up to 20 MHz

#### Co-existence with existing services

Co-existence with the following services will need study:

- Broadcast television below 612 MHz and size of guard band required. We expect this will be similar to band n71
- Radio Astronomy.

Radio astronomy is a receive only service that uses highly sensitive receivers. We expect IMT services using this band will need geographical separation with RAS receivers, but this will a Administration specific issue.

- Un licenced white space devices and Wireless microphones

Wireless microphones are permitted to operate even with band 71 in part of the duplex gap. This has certain limits proposed in 3GPP TR 36 755. These limits will not change. This proposal is not making any changes to the duplex gap.

### Option B2

This option uses two duplexers as shown in Fig 3 below and the duplex distance is 46 Mhz as is the case with option A. Also the bottom duplexer is the same as that of option A, with an additional upper duplexer that should have as large possible overlap as possible with the lower duplexer in option A but at the same time being able to handle the duplex gap of 6 MHz. The size of this upper duplexer needs to be studied and decided prior to being specified. This upper duplexer is a better utilization of spectrum that is achieved with existing APT 700 MHz band plan (otherwise the spectrum 698–703 MHz is not fully utilized). It can be considered to have variable bandwidths ranging from 35 MHz to 10 MHz respectively. Like option B1, this arrangement B2 is also a reversed duplex arrangement.

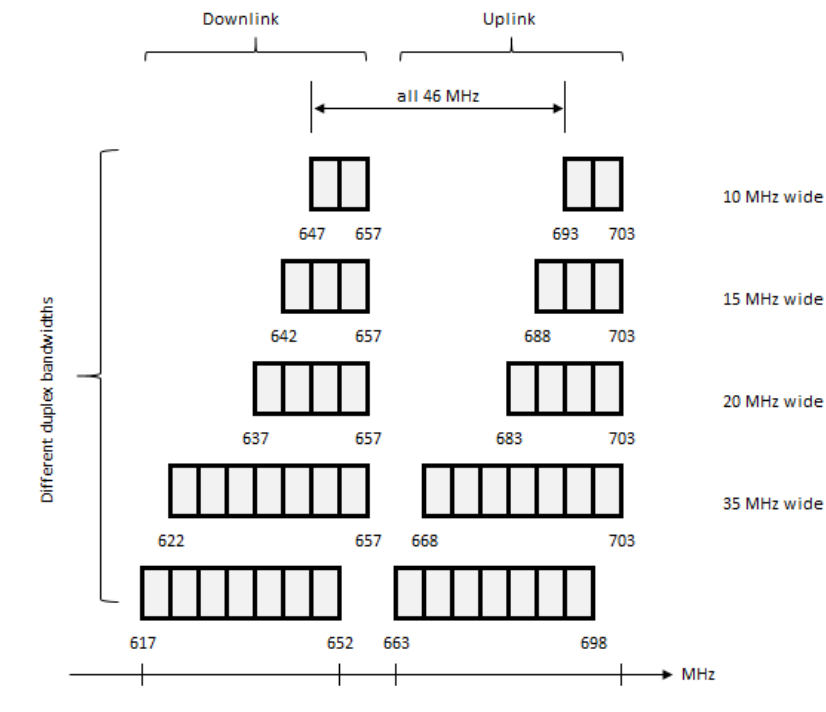


Fig 3: Option B2- two duplexers

This option B2 retains economies of scale advantages by adopting one duplexer being the same as that of option A and the duplex distance same as option A but the duplex gap is now reduced

to 6 MHz. In addition, Option B2 networks can work with option A's user devices, so could facilitate the global circulation of such devices. Further study of this is required to determine if this is feasible.

Also in this option there is no issue with RAS co-existence as is the case with option A.

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APPENDIX

**3GPP SPECIFICATION ON  
600 MHZ BANDFOR LTE**



RP-171631\_TR 36