

The APT Frequency Arrangement in the 700 MHz: Reflections on the International Spectrum Management Regime

Mohamed El-Moghazi

Department of Electronic & Electrical Engineering, University of
Strathclyde

Jason Whalley

Newcastle Business School, Northumbria University

James Irvine

Department of Electronic & Electrical Engineering, University of
Strathclyde

Abstract: The conflict over the frequency arrangements and out-of-band emissions (OOBE) of the mobile terminals below 694 MHz, taking into account the allocation of the 694-790 MHz band to the mobile service, has revealed the emerging tendency of countries in Regions 1 and 2 to align themselves with Region 3 to lower the cost of end-user equipment. Moreover, the discussion has highlighted that global harmonisation is at the heart of modern spectrum policy given that the ITU-R decision-making procedures are mostly based upon consensus with the possibility of few countries blocking the discussion. There is also a need to revise the current ITU-R structure of three regions as convergence is emerging between them. The paper's main argument is that in this era of globalisation, it is not beneficial for a country or a group of countries to act separately from the rest of the world even if they could.

Introduction

African and Arab countries made their voice heard during the World Radiocommunication Conference of 2012 (WRC-12)¹ when they called for an immediate allocation of the 694-790 MHz band to mobile service to meet growing demand for broadband. The European countries opposed the proposal, arguing that the band is heavily utilised by broadcasters in their countries. Eventually, the conference approved the allocation, which was effective immediately after WRC-15 (El-Moghazi, Whalley & Irvine 2013).

Following WRC-12, a discussion has emerged with regard to the frequency arrangements in the 700 MHz band, and the limits of the out of band emission (OOBE)² values of mobile devices in the 700 MHz band. During these discussions, it was evident that the influence of the Asia-Pacific Telecommunity (APT) countries (<http://www.aptsec.org/>), which lie in ITU-R Region 3³ within the ITU-R, has been extended to Regions 1 and 2. In particular, it seems that the APT frequency arrangement and OOBE values in the 700 MHz in Region 3 had consequences on the discussions in the other regions. Accordingly, the overarching research question of this paper is formulated as: 'What are the policy implications of the 700 MHz band mobile allocation in Regions 1 and 2 given the APT activities in Region 3?' More specifically, the paper examines the influence of the APT plan for 700 MHz on the other ITU-R regions and the role that was played by geographical isolated countries such as Australia and New Zealand. Additionally, the paper reflects on the decision-making procedures of the ITU-R and the three regions system.

The rest of the paper is organised as follows. The following section explores the literature review on the 700 MHz issue and is followed by a section that outlines the adopted research method. This is then

followed by two sections that examine the frequency arrangements in the 700 MHz and OOB values respectively. After discussing the different policy implications of the 700 MHz issue, the paper ends with a concluding section.

Literature Review

The ITU is the main institution of the international telecommunication regime⁴ ([Cowhey & Aronson 1991](#)). One of the main norms⁵ of the international regime is organising global commons (e.g. spectrum) while the regime's decision-making procedures are based on one vote for every country within the ITU ([Cowhey 1990](#)). The Radiocommunication Sector of the ITU (ITU-R) discusses the wireless industry main issues through World Radiocommunication Conferences (WRC), which aims at reviewing and revising the international Radio Regulations (RR) ([Gregg 2009](#)).

WRC is one of the ITU-R conferences that consider specific radiocommunication matters. Regional organisations usually present common proposals to the WRC on behalf of their member states as proposals must have the support of more than one administration to be considered ([Contant & Warren 2003](#)). There are six main regional organisations in the ITU-R, namely: European Conference of Postal and Telecommunications Administrations (CEPT), the Asia Pacific Telecommunity (APT), the inter-American commission of telecommunications (CITEL), the Arab Spectrum Management Group (ASMG), the African Telecommunications Union (ATU), and the Regional Commonwealth in the field of Communications (RCC).

The WRC-12 witnessed the success of Arab and African countries in acquiring an additional allocation to the mobile service in the 700 MHz band in Region 1 so that growing demand for broadband could be met ([Standeford 2012b, 2012c](#)). The European countries opposed such proposals because the 694-790 MHz band is mainly used for broadcasting service in their territories and a large investment had already been made to fund the transition to digital television ([El Moghazi et al. 2015](#)). Eventually, WRC-12 decided to allocate the 694-790 MHz frequency band in Region 1 to mobile service on a primary basis in addition to the existing primary broadcasting service and to identify the band for IMT ([ITU-R 2012b](#)).

Historically, most of the UHF band (470-862 MHz) was planned for analogue terrestrial broadcasting service in Region 1. In 2006, the Regional Radiocommunication Conference 2006 (RRC-06) planned the digital terrestrial broadcasting service in Region 1 and in the Islamic Republic of Iran to be in the frequency bands 174-230 MHz and 470-862 MHz (ITU, 2006). Shortly after that, the WRC-07 approved an additional allocation in the frequency band 790-862 MHz to mobile service effectively from 17 June 2015 (ITU-R, 2007).

Following WRC-12, the ITU-R studied the channelling arrangements for the mobile service adapted to the frequency band below 790 MHz taking into account the existing arrangements in Region 1 in the frequencies between 790 and 862 MHz, the harmonisation with arrangements across the three regions, and the compatibility with other primary services to which the band is allocated including in adjacent bands. To achieve that, the Joint Task Group 4-5-6-7⁶ (JTG 4-5-6-7) was established ([Stirling 2012](#)).

Methodology

In order to answer the main research question, this paper adopts a qualitative methodology that examines the case study of the APT countries regarding the 700 MHz mobile allocation in the period until WRC-15. More specifically, the paper focuses on two main issues from the APT perspective, namely, OOB values and frequency arrangements in the 700 MHz band. Case studies require conducting a detailed investigation of specific case(s) in order to obtain a closer insight into the context and processes involved in the research subject ([Meyer 2001](#)).

The paper also adopts an inductive approach where the theory is developed based on the observations or the findings of the research (Bryman & Bell, 2007). Inductive research is more suitable when the researcher intends to understand the nature of a problem and is concerned with the context in which events have occurred (Saunders, Lewis & Thornhill 2009). The context in this paper is the discussions related to the 700 MHz issue within the ITU-R.

The paper is based on primary data collected mainly through semi-structured interviews with 42 stakeholders that participated in the 700 MHz debate during and after WRC-12. Questions were asked regarding to the effectiveness of WRC decision making procedures in the light of the 700 MHz issue and the different views of the regional organisations (CEPT, APT, CITELE, ATU, ASMG, CITELE) and leading countries during WRC-12 and afterward with regards to frequency arrangements in the 700 MHz and the technical conditions related to the mobile allocation in the band. The paper also draws on the observations made by the lead author who attended meetings where the 700 MHz issue was discussed. In addition, the paper draws from secondary data from the APT countries' contributions in the various ITU-R working parties (WPs).

The difference between unstructured and semi-structured interview is that the former is similar to a conversation and could contain one question, while the later comprises a list of questions on specific topics (Bryman & Bell 2007). However, structured interviews have a rigid structure that cannot be easily modified (Bryman & Bell, 2007).

Interviews were selected for a variety of reasons (Saunders et al. 2009). Firstly, they enabled the interviewer to build on their responses and thus explore issues as they emerge in greater depth. Secondly, personal contact helps achieve a greater response rate as interviewees may hesitate when providing sensitive data or be reluctant to spend time explaining their answers. For confidentiality reasons, the names of the interviewees are not disclosed.

Frequency Arrangements

The first issue that is related to the 700 MHz mobile allocation is the frequency arrangements or channel planning in the 700 MHz band in Region 1 considering harmonisation with the other regions. Channel planning accommodates a type of channel duplex mode (Frequency Division Duplex (FDD) and Time Division Duplex (TDD))⁷ and the width of the channel (e.g., 20 MHz). The issue of agreeing on one frequency arrangement in the 700 MHz band was quite important, as having different arrangements in the band would negatively influence global harmonisation between the three ITU-R regions.

In Europe, CEPT adopted a plan in the 800 MHz that operates in the bands 791-821 MHz, 832-862 MHz and provides 2x30 MHz for FDD operation. In addition, the US adopted a more complicated plan that comprises a mix of FDD operation in the bands 698-716 MHz, 728-746 MHz, 746-763 MHz, and 776-793 MHz and TDD operation in the band 716-728 MHz (ITU-R, 2012a). The US plan has the disadvantage of being highly fragmented and it offers less spectrum for mobile broadband use (Zehle 2013). In addition, there are interoperability difficulties between the different band blocks in the US plan (Standeford 2012a).

In Asia, initially there were views to partially harmonise with the US plan in the 700 MHz band (APT 2009). Meanwhile, the 700 band was of a critical importance to Region 3 countries because most of the 800 MHz band is used for application other than mobile (APT 2009). Eventually, the APT adopted a plan in the 700 MHz in 2010 that operates in the bands 703-748 MHz and 758-803 MHz and provides 2x45 MHz for FDD operation of broadband systems (APT 2010). Figure 1 (below) shows the APT plan and the guard band between it and the digital terrestrial TV (DTTV) in the UHF band.

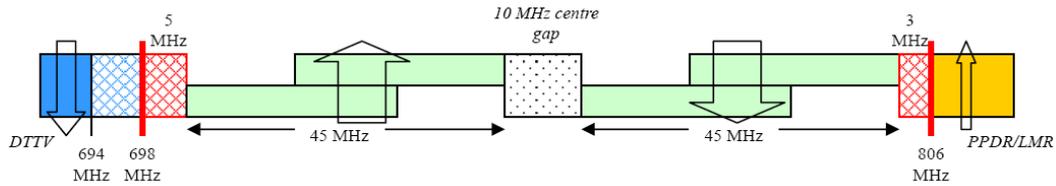


Figure 1 - Harmonised FDD Arrangement in the 698-806 MHz band (APT, 2010)

In Latin American, shortly before the WRC-12, CITEL countries adopted a new recommendation highlighting two options for frequency arrangements in the 700 MHz, mainly the APT FDD and the US plans (CITEL 2011). By 2013, the number of countries in Region 3 who decided to adopt the APT 700 MHz plan was 18 countries. In particular, all of the countries in Region 3 except for Bolivia decided to adopt the US band plan (Bateson 2014; Migwalla 2013).

The APT band plan is different than the other plans because it comprises of a dual-duplexer arrangement with 2x30 MHz for each one (APT 2010). The reason for adopting dual-duplexer is that the maximum bandwidth of a duplexer for a terminal at this frequency range is usually around 30-35 MHz (APT 2009). Therefore, it is difficult to have a user handset that covers the 2x45 MHz of the APT plan with only one duplexer.

The APT plan overlaps with the CEPT plan in the band 791-803 MHz, which means that countries cannot adopt both of the two plans at the same time and a choice between them has to be made. If a country decides to adopt the CEPT plan, it will not be able to utilise the large bandwidth of 45 MHz of the APT plan in the 700 MHz band. On the other hand, fully adopting of the APT plan would impact the harmonisation with CEPT plan as shown in Figure 2 (below).

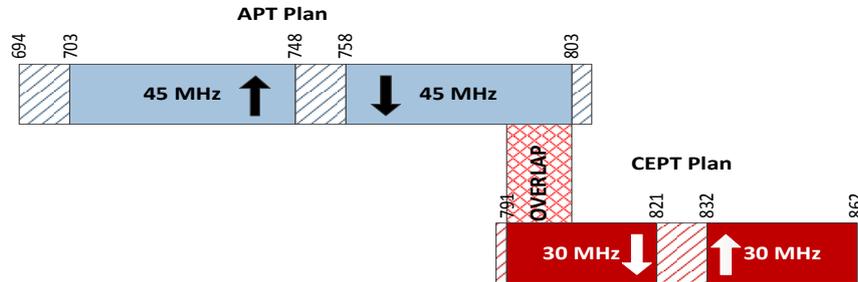


Figure 2 Overlap between the APT Plan in the 700 MHz Band and the CEPT Plan in the 800 MHz Band (Egypt 2012)

Similarly, adopting the CEPT plan in full would contradict with the CDMA or GSM plans in the 850 MHz band that is used by many countries in Africa, and using the CDMA 850 or GSM 850 band plans in their entirety would contradict with the plan of the 900 MHz band that is used for systems such as GSM900. Figure 3 (below) shows the different frequency arrangements in the 700 MHz, 800 MHz, 850 MHz and 900 MHz bands.

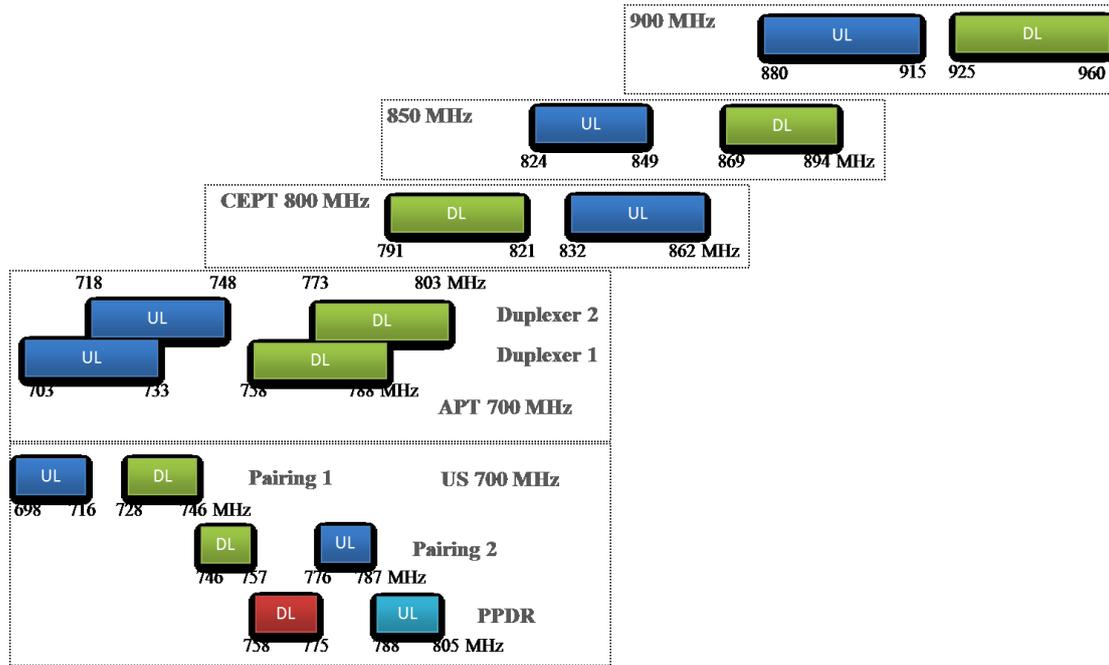


Figure 3 - Frequency Arrangements in the 700 MHz, 800 MHz, 850 MHz, 900 MHz Bands (Rancy, 2012)

Having said that, harmonisation between the CEPT 800 MHz plan and the APT 700 MHz plan is possible by adopting the lower duplexer of the APT plan of the bands, 703-733 MHz and 758-788 MHz as shown in Figure 4. This implies that end user equipment can operate according to the APT plan in the 700 MHz band in the Asian countries while being able to roam in Europe on the 800 MHz band using the CEPT plan.

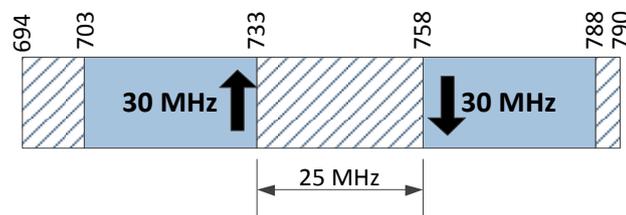


Figure 4 - Using the Lower Duplexer of the APT Plan (Egypt, 2012)

The issue of the preferred frequency arrangements in the 700 MHz in Region 1 was discussed extensively in the WP 5D following WRC-12 where there were 14 different proposed frequency arrangements that were fully or partially harmonised with the APT plan (Migwalla 2013). This indicates that harmonisation with the APT plan was more or less a common target in order to reap the benefits of economies of scale. In particular, at the beginning of the discussions, several African countries wanted to make the maximum use of the 700 MHz band by utilising most of the APT plan (e.g., 2x40 MHz), if not all (2x45 MHz), even if that would be on the cost of losing harmonisation with the CEPT plan in the 800 MHz band (Egypt 2013; Kenya 2014).

Meanwhile, CEPT countries made a proposal indicating their interest in a channelling arrangement for IMT in the 694-790 MHz band which consists of 2x30 MHz at the lower edge of the APT plan in addition to up to 20 MHz (738-758 MHz) for supplemental downlink (United Kingdom 2014). Eventually, it was agreed that channelling arrangements would consist of a common baseline arrangement: 2x30 MHz FDD (uplink: 703-733 MHz, and downlink: 758-788 MHz), which is the lower duplexer of the APT plan in the 700 MHz band

([Working Party 5D 2014](#)). Outside of the ITU, several countries announced that will adopt the lower duplex of the APT plan ([Bateson 2013b](#); [Youell 2014](#)).

Out of Band Emission Values

The second issue that was discussed following WRC-12 is the OOB values of the mobile service terminals in the band below the frequency 694 MHz, which are required for the protection of the broadcasting service. The issue with the OOB values is that a too stringent OOB limit would make it more technically challenging for IMT end user devices to meet them without further design complexity and cost increases. On the contrary, a less stringent OOB limit may imply additional measures to protect the broadcasting service operating below 694 MHz such as filters on the broadcasting receivers ([ITU-R 2014](#)).

One of the first identified OOB value in the 700 MHz band was determined in association with the APT plan in 2011 not to exceed -34 dBm/MHz below the frequency 694 MHz which is equivalent to -25 dBm/ 8MHz ([APT 2011](#)). Such a value was formally provided to the JTG 4-5-6-7 meeting by the APT ([APT 2013](#)). Several African countries and mobile industry entities supported adopting such a value ([ECOWAS Administrations plus Cameroon 2013](#); [GSMA 2013](#); [Nokia Corporation 2013, 2014](#)).

During the discussion, several Arab and African countries made a significant step, which was perhaps the first of its kind, by conducting detailed technical studies themselves to support their arguments. More specifically, five African countries conducted Monte Carlo simulations and provided evidence that for the urban environment, IMT OOB value of -25 dBm/8 MHz represents an appropriate regulatory limit ([Cameroon, Kenya, Lesotho, South Africa & Zimbabwe 2013](#)). Similarly, five Arab countries made another contributions indicating the same result in terms of OOB value ([Bahrain, Egypt, Qatar, Kuwait & Emirates 2013](#)).

Subsequently, perhaps for the first time in the history of the ITU-R, 30 African countries presented common proposals to a study group meeting. These 30 African countries proposed that a OOB limit of -25 dBm/8MHz to be adopted as a suitable value for the protection of broadcasting service ([Angola et al. 2014](#)). On the other hand, some European broadcasters suggested OOB values in the range -47 dBm/8 MHz to -52 dBm/8 MHz (Broadcast Networks Europe, 2014), and Russia made a proposal to establish OOB limits not higher than -52 dBm/8 MHz, or -56 dBm/8 MHz (better), with a guard band not less than 9 MHz ([Russian Federation 2014](#)).

There was also a proposal to draft an ITU-R recommendation on the suitable values of OOB. After extensive discussion, the draft recommendation accommodated that the OOB of an IMT mobile station operating in Region 1 in the frequency band 703-733 MHz with an IMT channel bandwidth greater than 10 MHz should not exceed -25 dBm/8 MHz into the frequency band 470-694 MHz and that OOB of an IMT mobile station operating in Region 1 in the frequency band 703-733 MHz with an IMT channel bandwidth of 10 MHz or less should not exceed -42 dBm/8 MHz into the frequency band 470-694 MHz ([Chairman ITU-R Joint Task Group 4-5-6-7 2014](#)). This means that CEPT countries could achieve the -42 dBm/ 8MHz value by limiting the use of larger channel than 10 MHz to frequencies higher than 713 MHz. In fact, the -42 dBm/8 MHz value was a political compromise within CEPT with the European broadcasters to provide further protection for their systems ([Youell 2015](#)).

It should be noted that the variance in the OOB values is related to different factors. Firstly, countries that require lower values of OOB tend to have extra protection to their services below 694 MHz (e.g., broadcasting). On the other hand, countries which plan to deploy mobile services in the 700 MHz band require higher values of OOB to have less complexity for the mobile terminals operating in the band. Secondly, even for the countries that require lower or higher OOB values, technical assumptions and models of simulations largely affect requirements for OOB values.

While most of the ITU-R countries attending the meetings supported such a recommendation, due to the opposition of a few countries, the recommendation could not be agreed. In particular, there were two views. The first view was that the recommendation was mature and should be adopted and approved. On the other hand, Russia and Iran had the view that the draft recommendation was not mature enough to be agreed. Eventually, the OOB recommendation was approved in the Radio Assembly of 2015 (RA-15) with some changes to indicate that these OOB values would facilitate protection of the broadcasting service in the lower UHF band (470-694 MHz) rather than directly protect it ([ITU-R 2015](#)).

Policy Implications

The 700 MHz mobile allocation issue has raised a lot of issues that need further examination. Firstly, it seems that the APT plan adopted in Region 3 did have an influence on the discussion on the 700 MHz mobile allocation in the other ITU-R regions. More specifically, the interviews with the main stakeholders revealed that although the European countries were initially against the 700 MHz mobile allocation during WRC-12 because the issue is not on the agenda of the conference and that the band is heavily used by other services especially broadcasting ([El Moghazi et al. 2015](#)). However, eventually they agreed to the allocation considering that the Arab and African countries may align themselves solely to the Asian APT band plan. If this occurred, the manufacturing industry in Europe would be the loser.

As further explained by one interviewee from an Arab country, the European countries were not ready at the WRC-12 in terms of having a suitable frequency arrangement. More specifically, APT and the US already had their frequency arrangements developed in the 700 MHz band. Moreover, adopting the APT band plan was perceived as being much more efficient in terms of lowering the cost and achieving roaming. A statement made by an interviewee conveys this current reality “*much of Africa and Middle East has probably more aligned East to West (Regions 2 and 3) rather than North and South*”.

Furthermore, one senior interviewee from the APT region explained that the APT wants to be in line with other regions as much as possible and this is the reason why the APT was keen that other countries from other regions follow their 700 MHz channel arrangements. One other interviewee from APT explained that APT managed to develop a plan and there was interest in gaining momentum behind it. In particular, the Asian manufacturers had a special interest in gaining market share in the Arab and African countries.

Meanwhile, several interviewees indicated that some non-European countries, including the African and Arab ones, which were interested in the 700 MHz band allocation, were also keen to have the European countries agreeing to the allocation. More specifically, although the African and Arab countries intended initially to have an immediate allocation even in their own territories, they also wanted the European countries to join the allocation in order to have a regional allocation for all Region 1 countries.

However, at the WRC-15 the European countries would be prepared and have their frequency arrangements in the 700 MHz band agreed. In fact, this is one of the reasons why the European countries requested to have the allocation activated by the time of WRC-15 and not immediately in WRC-12. In particular, one interviewee from CEPT explained that if the Asian, African and Arab countries were interested in that band, Europe would not miss the chance of having cheap handsets imported from Asia. One other interviewee from CITELE commented on the frequency arrangements proposed by the US and how it was expected that, at least, Canada and Mexico would follow the US to achieve economies of scales. However, Mexico, despite incredible pressure from the US government, decided to adopt the APT plan. One other senior interviewee from the US clarified that the US frequency arrangements originated from politicians rather than engineers. In fact, this highlighted the emerging importance of regionally coordinating spectrum management plans before applying them at the national level even in the case of large countries like the US.

The second issue that is worth examination is the role of geographical isolated countries such as Australia and New Zealand in the APT in leading the discussions in Region 3. Firstly, the APT plan emerged when New Zealand led several Asian countries to harmonise a frequency arrangement in the 700 MHz band. New Zealand was motivated by having its analogue TV services in the VHF bands, which made re-farming the use of part of the UHF band for the mobile service relatively easier ([Newlands 2010a](#)). In particular, the beginning was when the Australian Communications and Media Authority (ACMA) sought views on the best possible plan for the digital dividend in Australia and Telstra and Telecom New Zealand made a joint proposal that was endorsed later on by APT and ACMA (Vanston, 2013). In fact, Australia was motivated by having a harmonised band plan in the 700 MHz with the Asian countries to achieve economies of scales ([Newlands 2010b](#)).

Additionally, Australia was the first to have assignment in the 700 MHz in line with the APT plan ([Bateson, 2013a](#)) and the first to have a live network in the band via Telstra ([Ericsson 2014](#)). Furthermore, not only were the Arab and African proposals regarding OOB values influenced by the APT decision on such values but also by the practical implementation in the APT region. For instance, in a regional African meeting, Egypt made a proposal to continue supporting the OOB value of -25dBm/8MHz as a baseline for Region 1 considering the successful implementation of these values in Australia ([NTRA of Egypt 2014](#)). Similarly, Australia reported to the JTG meetings its practical experience in deploying the APT plan in the 700 MHz band ([Australia 2013](#)).

The third issue that needs close examination is the decision-making procedures of the ITU-R. More specifically, the discussions in the ITU-R are based on consensus, which means that it is possible for a few countries to block the discussion until they have their views included. In practice this is what happened regarding the ITU-R recommendation on OOB. While the recommendation had the support of several African, Arab and European countries, it was not possible to obtain agreement regarding the recommendation during the ITU-R meetings.

In fact, consensus is related to one of the most important concepts in the telecom industry: harmonisation. If consensus is not possible, each group of countries would have their own solutions and economies of scales would not be achieved. However, consensus has the drawback of countries blocking the discussion even on the basis of linking the issue to other issues. What could be concluded on this issue is that countries are not totally independent in their decision-making when it comes to international spectrum management. In particular, while each country is sovereign in their territories regarding spectrum use, countries need the other countries agreement in order to have a regional or global harmonised use of spectrum. Otherwise, in most cases, countries do not have the scale to act alone in the telecom industry, and even if they have the scale, they still need their citizens to be able to roam in other countries

Consensus is also related to the concept of mutual interests, on which the international telecommunication regime is based. [Zacher \(1996\)](#) explains that the creation and durability of international regimes is based on the existence of important mutual interests in cooperation. The concept of mutual interest was quite evident in the issues of OOB where the African and Arab countries intended to reach a win-win situation with the European countries, as having different OOB values for each group of countries will increase the prices of the user terminals and make them more complicated.

Having said that, it could be argued that the ITU-R decision-making procedures do not enable a particular group of countries to impose their views on others, and it encourages the ITU-R countries to reach a compromise. Such a compromise could imply that all participants are equally happy and unhappy. This is the reason why voting has rarely been used in the ITU-R. Meanwhile, the decision-making procedures could be considered as a double-edged sword due to the capabilities of few countries to block the whole discussion. In such a case, these few countries could state their reservations in the final agreed documents or they could largely delay or even stop reaching a common agreement (such as approving an ITU-R

recommendation). However, in practice, this rarely occurs, and countries may adopt different plans nationally than those agreed by the ITU-R while not causing interference to their neighbours. Such an issue may call for revising the WRC decision-making procedures to have more active role of the ITU-R BR to make sure that the discussion is purely technical.

The fourth issue that needs highlighting is the three regions system. In particular, while the 700 MHz mobile allocation discussion in the ITU-R was considered as a Region 1 issue, several entities from Regions 2 and 3 were involved. Firstly, Iran, a Region 3 country, as part of GE-06 plan, which covers Region 1 in addition to Iran, was interested in the discussion. In particular, while most of the region's countries (Arab, African, European) were keen to have the mobile allocation, Iran was more concerned with the protection of their terrestrial broadcasting service in the 700 MHz from the deployment of mobile in neighbouring Region 1 countries. Therefore, it could have been more convenient to have Iran as part of Region 1 instead of having this historical division between Regions 1 and 3 that is geographically unexplained.

In fact, the situation of Iran is complicated as explained by one of the interviewees. On the one hand, Iran is part of Region 3, which has already a mobile allocation in the 700 MHz band. On the other hand, Iran is also against having mobile allocation in the 700 MHz band in Region 1 unless its broadcasting service is fully protected. In other words, although the 700 MHz allocation in Region 1 should be a Region 1 decision, a country from Region 3 is involved in the discussion. One other issue that was raised is related to Russia, which is far away geographically from Africa and is still able to oppose decisions related to service allocation in Africa. As stated by one of the interviewees from Africa *"we are on the other side of the earth, we can't cause interference to the Russians"*.

In general, it is argued that the three regions system does not accurately reflect the geographical situation where countries in Region 1 are quite close to countries in Region 3, and Region 1 accommodates different interests between countries in different stages of development. There is, therefore, a need for the ITU-R to revisit its current three region allocation. One possible way forward would be to divide both Regions 1 and 2 into two, while another would be to create six regions to reflect the six regional spectrum management organisations.

Conclusions

The main adopted band plan in the 700 MHz band is the APT one which provides 2x45 MHz for FDD operation of broadband systems but overlaps with the CEPT plan in the 800 MHz. While the African and Arab countries intended to follow the WRC-12 to fully harmonise with the APT plan, it was eventually agreed to partially harmonise with the APT plan by the adopting the lower duplex of it.

One of the first identified OOB value in the 700 MHz was determined in association with the APT plan in 2011 to be not exceeding -34 dBm/MHz below the frequency 694 MHz. While the Arab and African countries supported the APT value, other countries and broadcasters suggested more stringent values. Eventually, the ITU-R recommendation on the OOB values was agreed due to the support from most of Region 1 countries although it was met with resistance from a few countries.

The 700 MHz mobile allocation issue has shown that there is a tendency of African and Arab countries and the Latin American countries to align with the Asian market in instead of with the European and American ones respectively, largely to lower the cost of the end user equipment. In addition, it is shown how geographical isolated countries such as Australia and New Zealand have influence over the other countries in their region and even on countries located in other ITU regions.

The examination of the decision making procedures in the light of the 700 MHz discussion has revealed that although the countries are sovereign in their territories regarding spectrum

use, they is still a need for the others countries in order to have a regional or global harmonised use of spectrum. Therefore, discussions in the ITU-R are mostly based upon consensus. Moreover, having this conflict of interest during the 700 MHz discussions between countries in different ITU-R regions raised a big question mark regarding the current ITU-R three regions system. In general, this paper has argued that, in this era of globalisation, it is not beneficial for a country or a group of countries to act separately from the rest of the world even if they could.

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Endnotes

¹ Decisions related to international spectrum allocation are taken during ITU-R WRCs.

² Out-of-band emission is emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process.

³The world is divided in terms of radiocommunication service allocation into three regions, where Region 1 comprises Europe, Africa, the Middle East west of the Persian Gulf including Iraq, the former Soviet Union and Mongolia. Region 2 covers the Americas, Greenland and some of the eastern Pacific Islands. Region 3 contains most of non-former-Soviet-Union Asia, east of and including Iran, and most of Oceania ([ITU-R 2008](#)).

⁴[Young \(1982\)](#) defines regimes as social institutions governing the actions of those interested in specifiable activities and international regimes as regimes pertaining to activities of interest to members of the international system.

⁵Regimes can be defined as sets of implicit or explicit principles, norms, rules, and decision-making procedures around which actors' expectations converge in a given area of international relations ([Krasner 1982](#); [Zacher 1996](#)).

⁶ The name of the group indicates the cooperation between four main study groups (SGs) in the ITU-R: SG 4 (satellite services), SG 5 (mobile services), SG 6 (broadcasting services), and SG 7 (science services).

⁷ In FDD, the uplink and the downlink use a different frequency. In TDD, they use the same frequencies.