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**APT REPORT ON**

**THE STATUS OF IMPLEMENTATION OF APT700 BAND PLAN**

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**1. Introduction**

The 9th Meeting of the APT Wireless Group (formerly known as APT Wireless Forum) held in Seoul, Republic of Korea from 13 -16 September 2010 adopted APT Report on Harmonized Frequency Arrangements for the Band 698-806 MHz ([APT Report No.: APT/AWG/REP-14](http://www.apt.int/sites/default/files/APT-AWF-REP-14_APT_Report_Harmonized_Freq_Arrangement.doc)). The arrangement or the band plan was named as APT700. The band plan included the arrangements for both FDD and TDD modes.

Following the development of APT700 at APT Wireless Group (AWG), 3GPP developed the radio interface specifications for both modes of APT700, FDD which is known as Band 28 and TDD which is known as Band 44. APT700 was also included in ITU-R Recommendation M.1036: *Frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications (IMT) in the bands identified for IMT in the Radio Regulations (RR)*.

APT700 has now been widely recognized as a “Digital Dividend” spectrum for LTE services. All over the world there is a trend to adopt APT700 as the preferable band plan for LTE. Potential market size for APT700 covers more than 4 billion people and industry support is quite strong. Although APT700 provides both FDD and TDD arrangements, FDD arrangements have gained global support. So far over 50 countries/territories around the world have either allocated or committed to or recommend APT700 FDD arrangement for deployment. There have been cases of interest for APT700 TDD arrangement as well.

Considering the growing interest for the deployment of LTE services based on APT700, AWG-19 held in Chiang Mai, Thailand from 2 to 5 February 2016, developed the APT Recommendation on *Frequency Arrangements for the Implementation of IMT in the Band 698-806 MHz* which was then subsequently approved by the 40th Session of the Management Committee of the APT (MC-40) held in Nadi, Fiji from 29 November to 2 December 2016. The Recommendation ([No. APT/AWG/REC-08](http://www.apt.int/sites/default/files/Upload-files/AWG/APT-AWG-REC-08_APT_Recommendation_APT700.docx)) recommends APT Members to:

1. adopt the harmonized frequency arrangements given in Annex 1 for the deployment of IMT systems in the band 698 - 806 MHz;
2. take into account the implementation aspects detailed in Annex 2 when implementing the frequency arrangements given in Annex 1;
3. coordinate with neighboring countries to avoid risk of interference between Broadcasting and IMT use in this band;
4. coordinate the use of duplex schemes (FDD and TDD) to minimize interference between neighboring countries; and
5. avoid use of both duplex schemes (FDD and TDD) in the same country.

The 22nd Meeting of the APT Wireless Group (AWG-22) held in Busan, Republic of Korea from 25 to 29 September 2017, instructed the APT Secretariat to develop a report on the status of the implementation of the APT700 Band Plan in Asia-Pacific region. AWG-22 also instructed the APT Secretariat to prepare a related questionnaire to develop such status report. AWG-23 approved the Questionnaire and it was circulated to the Members and Associate Members to gather information regarding the status of implementation of APT700. Further, the 31st Meeting of the AWG held from 22 to 26 May 2023 in Ha Noi, Viet Nam decided to recirculate the questionnaire and update the report. This report has been developed and updated based on the responses from APT Members and Associate Members[[1]](#footnote-1).

**2. SCOPE**

This Report provides information on the status of implementation of the APT700 band plan in Asia-Pacific region based on the survey results.

**3. METHODOLOGY AND STRUCTURE OF THE REPORT**

This report briefly summarizes and analyzes the responses from 20 APT Members and 2 Associate Members in terms of the questions asked. The questions were prepared based on the ‘*recommends*’ part of the APT Recommendation.

The Questionnaire addresses the following key aspects:

* allocation and adoption
* implementation issues
* commercial deployment general feedback.

The responses were analyzed to draw the lessons from the countries which have implemented and deployed systems using APT700 band plan. The report also looked at the issues of some countries which couldn’t implement the band plan up to now. Detailed questionnaire and responses are attached in the annexes.

**4. THE RESPONSES TO QUESTIONNAIRES**

The following APT Members provided their responses to the questionnaire:

1. Australia
2. Bangladesh
3. Bhutan
4. China (People’s Republic of)
5. India
6. Indonesia
7. Islamic Republic of Iran
8. Malaysia
9. Marchall Islands (Republic of)
10. Myanmar
11. Nepal
12. New Zealand
13. Palau
14. Papua New Guinea
15. Republic of Korea
16. Samoa
17. Singapore
18. Sri Lanka
19. Socialist Republic of Viet Nam
20. Thailand
21. Cook Islands
22. Hong Kong, China

**5. SUMMARY AND ANALYSIS OF THE RESPONSES**

1. **Allocation and adoption of APT700**

In Radio Regulation footnote 5.313A Australia, Bangladesh, Brunei Darussalam, Cambodia, China, Korea (Rep. of), Fiji, India, Indonesia, Japan, Kiribati, Lao P.D.R., Malaysia, Myanmar

(Union of), New Zealand, Pakistan, Papua New Guinea, the Philippines, Democratic Rep. of Korea, Solomon Islands, Samoa, Singapore, Thailand, Tonga, Tuvalu, Vanuatu and Viet Nam, have identified the band 698-790 MHz for use by these administrations wishing to implement IMT. In addition to those APT Members, other APT Members such as Afghanistan, Bhutan, Maldives, Nepal and Sri Lanka also identified the band for using IMT.

Australia has allocated frequency band 703-748/758-803 MHz to IMT operators under a spectrum licence. The technical frameworks (conditions) that underpin spectrum licences are ‘technology flexible’, in that they did not prescribe a specific application (such as IMT), rather it contain technical operating envelopes which are optimized for IMT. Operators could choose to deploy any (allocated) service so long as they meet the conditions of those technical frameworks.

Thefrequency band 694-806 MHz has been identified for IMT implementation in Indonesia. It is stated in the [Regulation of The Minister of Communications and Informatics of the Republic of Indonesia No. 10 of 2023 regarding The Use of Radio Frequency Spectrum in the 700 MHz band and 26 GHz band](https://jdih.kominfo.go.id/produk_hukum/unduh/id/885/t/peraturan+menteri+komunikasi+dan+informatika+nomor+10+tahun+2023).

In addition Bangladesh, Bhutan, India, Marshall Islands (Rep. of the), Myanmar, New Zealand, Papua New Guinea, Palau, Republic of Korea, Samoa, Singapore, Sri Lanka, Socialist Republic of Viet Nam, Thailand and Cook Islands have identified the band for IMT services through the amendment of their national frequency plan. Bhutan has identified the band for IMT implementation which can be found in 700 MHz Frequency Band Plan for Bhutan. In India and Malaysia, portion of this frequency band has been identified for the implementation of IMT. The 700 MHz band from 713-748/768-803 MHz was made available for auctions in India in the year 2016. In Myanmar, APT700 band plan has been incorporated in the Spectrum Roadmap 2022-2026. In New Zealand, 700 MHz band has been freed up for IMT use following the completion of re-planning of digital terrestrial television channels to frequencies below 622 MHz. Republic of Korea identified some portion of 698-806 MHz for IMT and PPDR in accordance with the decisions taken WRC-15. In Samoa, the band 698-806MHz has been freed up for IMT. In Sri Lanka, the adoption of the band plan has been included into the Spectrum Roadmap Sri Lanka 2024-2029. Implementation will be done there after 2028. The National Broadcasting and Telecommunications Commission (NBTC) of Thailand have issues Notification on IMT Spectrum Plan in 703-748/758-803 MHz.

People’s Republic of China has not yet identified the band for IMT as it is still occupied by broadcasting services. Identification of this band for IMT still under discussion in China and it is expected that the assignment to mobile operators can be done no later than 2019. If China decides to support the deployment of IMT, China would be planning to use the APT700 band plan with a higher priority to adopt TDD arrangements.

Islamic Republic of Iran has identified the frequency band 790 – 806 MHz for IMT in National Table of Frequency Allocation (NTFA) and with a footnote under the band 610 – 790 MHz, that the 694 – 790 MHz portion is planned to be released from TV broadcasting. Currently both bands are being used by broadcasting services. Further, the Iranian TV broadcaster is insisting to keep this spectrum for their future requirement for broadcasting (UHD, 3D, etc.).

In Hong Kong, China the Communications Authority decided to amend the Hong Kong Table of Frequency Allocations to re-allocate the entire 614 – 806 MHz band to mobile service on a primary basis. The 617 – 652 / 663 – 698 MHz and 703 – 738 / 758 – 793 MHz bands could be used for the provision of public mobile services, including 5G services.

For commercial deployment of IMT in the APT700 band, Australia, Bhutan, India, Indonesia, Marshall Islands (Rep. of the), Myanmar, Papua New Guinea, Palau, New Zealand, Samoa and Thailand have adopted the APT700 arrangement as attached in Annex 1 of the APT Recommendation ([No. APT/AWG/REC-08](http://www.apt.int/sites/default/files/Upload-files/AWG/APT-AWG-REC-08_APT_Recommendation_APT700.docx)) with FDD arrangements and assignments being done by operators. In India the APT700 band plan was adopted in the FDD mode with the spectrum assigned for IMT based applications from 713-748 MHz for the uplink and 768-803 MHz in the downlink.In Indonesia, the adoption is specified in the ‘Regulation of The Minister of Communications and Informatics of the Republic of Indonesia No. 10 of 2023 regarding The Use of Radio Frequency Spectrum in the 700 MHz band and 26 GHz band’. The Republic of Korea adopted upper duplex of the APT700 band plan for an FDD arrangement.

Malaysia has adopted the APT700 band plan by way of 2X40 MHz FDD arrangements. Viet Nam adopted APT700 band plan partially, which is 2x30 MHz FDD with UL 703-733 MHz and DL 758-788 MHz. Nepal and Singapore also have plans to adopt the full APT700 band plan. All of these countries preferred FDD in dual duplexer arrangements. Bangladesh and Myanmar also prefer to adopt APT700 for implementation. However, Bangladesh is delaying the adoption due to the fact that the ecosystem of the APT700 is not yet developed widely in the world and is waiting for the appropriate time. Sri Lanka is considering the level of adoption of APT700 in 2028 at the implementation stage. Currently the band is used for TV broadcasting in Sri Lanka.

In Islamic Republic of Iran the only utilization of the band is limited to 2x10 MHz of spectrum in rural areas for data networks operating on a secondary basis. The future band plan is consistent with that being used in the CEPT region in which the frequency band pair 698-736/753-791 MHz has been adopted as FDD arrangement and frequency band 738-753 MHz has been considered for TDD use. Also, two 3 MHz paired blocks were considered for IoT applications. However, all of bands are adopted as part of the APT Recommendation's Annex 1. The following figure shows how to arrange the plan in the Islamic Republic of Iran.

698

733

736

738

753

788

791

UP

Down

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **35 MHz** | **3 MHz** |  | 15 MHz  TDD | **35 MHz** | **3 MHz** |

55 MHz duplex separation

The Islamic Republic of Iran also mentioned in their response that the APT700 plan conflicts with CEPT band plan XX and they would lose almost 2x15 MHz spectrum and therefore they are reluctant to adopt immediately. On the other hand People’s Republic of China expects to decide no later than 2019 and Thailand to deploy within the year 2021.

Hong Kong, China adopted the APT700 band plan for the 703 – 738 / 758 – 793 MHz band, with FDD mode for provision of public mobile services, including 5G services. The 738 – 748 / 793 – 803 MHz band is reserved for Government applications.

In Cook Islands, the Communication Regulatory Authority will adopt the APT700MHz Plan as attached in Annex 1 of APT Recommendation, the current level of adoption is duplex FDD and spectrum consultation process is in progress at the moment which will include the review of the existing 700MHz band assignment. Consideration of both modes (FDD/TDD) in the context of the Cook Islands market is essential.

1. **Implementation issues of APT700**

Annex 2 of the APT Recommendation on *Frequency Arrangements for the Implementation of IMT in the Band 698-806 MHz* focused on two implementation aspects application to APT700 Plan:

1. Channel bandwidth: use of 5MHz block approach and channel bandwidth multiple of 5MHz
2. Out of band emissions limit: the specification of appropriate UE out of band emission limits to ensure the coexistence of mobile services with adjacent broadcasting services below the 698 MHz spectral boundary is an important aspect of the conventional duplex arrangement in the band 698 - 806 MHz.

Australia, Bhutan, India, Malaysia, Marshall Islands (Rep. of the), New Zealand, Papua New Guinea Samoa, Thailand and Cook Islands has implemented APT700 band based on the above 2 aspects in Annex 2 of the APT Recommendation. In Australia the aspects of out of band emission limit has been incorporated into the technical framework supporting spectrum licenses to be observed in areas where broadcasting services operate on near-adjacent frequencies. Furthermore, in Australia, Telstra’s block had 10 MHz offset from the lower band edge adjacent to the Australian UHF television band and the performance of the UEs complied with the specified emission mask required by the technical framework for the band.

Indonesia takes into account the implementation aspect of APT Recommendation where channel bandwidth is designated as multiple of 5 MHz. The out-of-band emission limit of IMT User Equipment (UE) refers to 3GPP TS 36.101-1 version 16 for 4G and 3GPP TS 38.101-1 version 16 for 5G, with maximum level is -42 dBm within the frequency range of 470-694 MHz.

Myanmar, Nepal, Singapore, and Viet Nam decided to follow the implementation aspects as outline in Annex 2 of the APT Recommendation ([No. APT/AWG/REC-08](http://www.apt.int/sites/default/files/Upload-files/AWG/APT-AWG-REC-08_APT_Recommendation_APT700.docx)). Hong Kong, Chinaalso followed the implementation aspects as outline in Annex 2.

The Republic of Korea also took into account the implementation aspect of APT Recommendation. The channel bandwidth of IMT and PPDR is designated as multiple of 5 MHz (2x20 MHz for IMT, 2x10 MHz for PPDR). But out of band emissions limit for the coexistence of mobile services with adjacent broadcasting services below the 698 MHz is not considered because the lower duplex plan is not adopted in Korea.

On the possible issue of interference between broadcasting and IMT use in the APT700 band Indonesia and Thailand coordinates with Malaysia and Singapore through bilateral and/or trilateral border coordination forums. These forums continuously strive to harmonize the APT700 band plan in the common border areas and promote mutual cooperation to prevent and resolve harmful interference cases.

Similarly India and Myanmar had plans to coordinate among neighboring countries while Australia, Marshall Islands (Rep. of the), New Zealand, Palau, Papua New Guinea and Cook Islands had no issue of interference at this stage. Bhutan did not have formal consultation with the neighboring countries, however, consultation paper was published and open to all while developing the band plan. Samoa has coordinated with American Samoa to avoid any interference both in broadcasting and IMT in the band. Hong Kong, China conducted frequency coordination with People’s Republic China to ensure the deployment of spectrum in the 700 MHz band would not cause harmful interference.

The response was similar when it comes to the coordination of the use of duplex schemes (FDD and TDD) to minimize the interference between neighboring countries. Indonesia has conducted some discussions and will continue to coordinate the use of FDD duplex scheme with Malaysia and Singapore in order to minimize interference potential in the common border areas between the three countries. Samoa has consulted with American Samoa on both duplex scheme to minimize and avoid radio interference. Thailand also coordinated with neighboring countries in this aspect.

To avoid a situation of having both duplex (FDD and TDD) schemes in a country, Australia, Bhutan, India, Indonesia, Malaysia, Marshall Islands (Rep. of the), Papua New Guinea, New Zealand, Samoa, Singapore and Thailand have selected FDD only. Nepal and the Socialist Republic of Viet Nam have also planned to adopt only FDD. However, People’s Republic of China plans to adopt only one duplex scheme but did not indicate their preference of FDD or TDD. Further Islamic Republic of Iran mentioned that they had set a guard band between FDD and TDD spectrum, and this is within the TDD spectrum band (about 5 MHz each side).

1. **Commercial deployment of APT700**

According to a recent report by Global mobile Suppliers Association (GSA), APT 700 (Band 28) is already licensed to mobile operators in many countries in the Asia-Pacific region and in other parts of the world. Among the countries in Asia-Pacific there are Australia, Bhutan, Cook Islands, Fiji, Guyana, Japan, Maldives, Mongolia, New Zealand, Papua New Guinea, Philippines, Samoa, Singapore, Republic of Korea, Thailand, Tokelau and Vanuatu. Among the other countries outside Asia-Pacific are Brazil, Chile, Ecuador, Finland, France, Germany, Iceland, Mexico, Nigeria, Panama, Peru, Saudi Arabia, Suriname and Uruguay. The GSA report further indicates that 44 operators have now launched commercial services using APT700 (Band 28) or at the lower duplexer arrangement of APT700.

Based on the replies from several APT Members and Associate Members, it is found that Australia, Bhutan, India, Malaysia, Marshall Islands (Rep. of the), New Zealand, Palau, Papua New Guinea, Samoa, Thailand, Hong Kong, China and Cook Islands had assigned the band to commercial operators. Following tables show the assignment of APT700 in respective operators in APT Members and Associate Members:

**Australia**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Block (MHz)** | | **Operator** | **IMT Technology** | **Channel bandwidth (MHz)** | **License duration (Years)** |
| **Uplink** | **Downlink** |
| 703-713 | 758-768 | Optus | LTE | 10 | Expiry December 2029 (all) |
| 713-733 | 768-788 | Telstra | LTE | 20 |
| 733-738 | 788-793 | Vodafone Hutchison Australia (VHA) | No deployment to date | 5 |
| 738-748 | 793-803 | TPG | LTE (Trial only) | 10 |

**Bhutan (Kingdom of)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Block (MHz)** | | **Operator** | **IMT Technology** | **Channel bandwidth (MHz)** | **License duration (Years)**  **Uplink** |
| **Uplink** | **Downlink** |
| (703-723) | (758-778) | Operator 1 | IMT  Advanced | 2x4x5MHz | 15 Years |
| (728-748) | (783-803) | Operator 2 | IMT  Advanced | 2x4x5MHz | 15 Years |

**India (Republic of)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Block (MHz)** | | **Operator** | **IMT Technology** | **Channel bandwidth (MHz)** | **License duration (Years)** |
| **Uplink** | **Downlink** |
| 723-733 | 778-788 | Reliance Jio  (assigned) | 5G | 10 | 20 |
| 738-748 | 793-803 | BSNL, PSU  (assigned /reserved) | 5G | 10 | 20 |

**Malaysia**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Block (MHz)** | | **Operator** | **IMT Technology** | **Channel bandwidth (MHz)** | **License**  **duration**  **(Years)** |
| **Uplink**  **(MHz)** | **Downlink**  **(MHz)** |
| 703-743 MHz | 758-798 MHz | Digital Nasional Berhad | 5G/4G | 2 x 40 MHz | Use of frequency is by way of Apparatus Assignment which is renewable annually. |

**Marshall Islands (Republic of the)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Block (MHz)** | | **Operator** | **IMT**  **Technology** | **Channel**  **bandwidth**  **(MHz)** | **License**  **duration**  **(Years)** |
| **Uplink** | **Downlink** |
| 703 - 748 | 758 – 803 | MINTA | LTE | 20 | Indefinite |

**New Zealand**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Block (MHz)** | | **Operator** | **IMT Technology** | **Channel bandwidth (MHz)** | **Licence duration (Years)** |
| **Uplink** | **Downlink** |
| 703 – 723 | 758 – 778 | Spark NZ | FDD-LTE | 2 x 20 | Period: 18 years  Expiration: 2031 (Note 1) |
| 723 – 738 | 778 – 793 | One NZ Ltd | FDD-LTE | 2 x 15 | Period: 18 years  Expiration: 2031 (Note 1) |
| 738 – 748 | 793 – 803 | Two Degrees Mobile Ltd | FDD-LTE | 2 x 10 | Period: 18 years  Expiration: 2031 (Note 1) |

*Note 1: The choice of 18-year instead of the conventional 20-year licence is to ensure the alignment of a common licence expiry date for all IMT frequency bands below 1 GHz.*

**Palau (Republic of)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Block (MHz)** | | **Operator** | **IMT Technology** | **Channel bandwidth (MHz)** | **Licence duration (Years)** |
| **Uplink** | **Downlink** |
| 703 – 723 | 758 – 778 | Palau National Communications Corporation (PNCC) | FDD-LTE | 2 x 10 | Period:  15 years  Expiration:  2038 |
| 723 – 743 | 778 – 798 | Palau Telecoms | FDD-LTE | 2 x 10 | Period: 15years  Expiration: 2038 |

**Papua New Guinea**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Block (MHz)** | | **Operator** | **IMT Technology** | **Channel bandwidth (MHz)** | **License duration (Years)** |
| **Uplink** | **Downlink** |
| 703-718 | 758-773 | DigiVoIP | LTE | 15 x 15 | 10-subject to review |
| 718-733 | 773-788 | Digicel (PNG) Ltd | LTE | 15 x 15 | 10 |
| 733-748 | 788-803 | Telikom PNG | LTE | 15 x 15 | 10 |

**Samoa (Independent State of)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Block (MHz)** | | **Operator** | **IMT**  **Technology** | **Channel**  **bandwidth**  **(MHz)** | **License**  **duration**  **(Years)** |
| **Uplink** | **Downlink** |
| 703 - 718 | 758 - 773 | Digicel (Samoa) Ltd | LTE | 15 | Annually |
| 718 – 733 | 773 – 788 | Vodafone Samoa Ltd | LTE | 15 | Annually |
| 733 – 748 | 788 – 803 | BlueWave | LTE | 15 | Annually |

**Thailand (Kingdom of)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Block (MHz)** | | **Operator** | **IMT**  **Technology** | **Channel**  **bandwidth**  **(MHz)** | **License**  **duration**  **(Years)** |
| **Uplink** | **Downlink** |
| 703 – 723 | 758 – 778 | TRUE | FDD | 2 x 20 | 15 |
| 723 – 738 | 778 – 793 | AIS | FDD | 2 x 15 | 15 |
| 738 – 748 | 793 – 803 | NT | FDD | 2 x 10 | 15 |

**Cook Islands**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Block (MHz)** | | **Operator** | **IMT**  **Technology** | **Channel bandwidth (MHz)** | **License**  **duration**  **(Years)** |
| **Uplink** | **Downlink** |
| 703 - 748 | 758 - 798 | Vodafone CI | 4G LTE | 45MHz | 7 |

**Hong Kong, China**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Block (MHz)** | | **Operator** | **IMT**  **Technology** | **Channel**  **bandwidth (MHz)** | **License**  **duration (Years)** |
| **Uplink** | **Downlink** |
| 758 - 768 | 703 - 713 | Hutchison Telephone Company Limited | FDD-LTE and NR FDD | 10 | 15 |
| 768 - 773 | 713 - 718 | SmarTone Mobile Communications Limited | FDD-LTE and NR FDD | 5 | 15 |
| 773 - 783 | 718 - 728 | Hong Kong Telecommunications (HKT) Limited | FDD-LTE and NR FDD | 10 | 15 |
| 783 - 793 | 728 - 738 | China Mobile Hong Kong Limited | FDD-LTE and NR FDD | 10 | 15 |

In Indonesia (Republic of), Korea (Republic of) and Singapore (Republic of) the assignment to commercial operators is still pending. Indonesia (Republic of) plans to release the band in 2024. Myanmar plans to release the band based on the demand of the industry.

Papua New Guinea assigned on an administrative basis and all were issued under spectrum license which gives right for nationwide deployment. The spectrum price was also calculated in accordance with NICTA’s prescribed fees. But Australia and New Zealand had assigned the spectrum through auction and the details are the following:

In Australia the licences were auctioned in 2013 (703-733/758-788 MHz) and 2017 (733-748/788-803 MHz). Auction prices are contained in the below table:

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency Block (MHz)** | | **Operator** | **Total price ($million)** |
| **Uplink** | **Downlink** |
| *703-713* | *758-768* | *Optus* | *649* |
| *713-733* | *768-788* | *Telstra* | *1302* |
| *733-738* | *788-793* | *Vodafone Hutchison Australia (VHA)* | *286* |
| *738-748* | *793-803* | *TPG* | *1260* |

In Bhutan (Kingdom of), the assignment to the operators were done in late 2015 and it was done administratively. No auction was conducted. The price was very minimal in order to facilitate the operators. In Malaysia, the assignment to the operator was done in 2021 through Direct Award.

In India (Republic of) the assignment of spectrum was carried out through the spectrum auctionsheld during July/August 2022. 10 MHz of spectrum in the 700 MHz band, as tabulated in the above Question 9, was sold to Reliance Jio through spectrum auction at a pan India price of Rs. 39,270 crores. The state-owned PSU (BSNL) shall also make payment as per the market determined price.

In Marshall Islands (Republic of the), the assignment was completed through the administrative/licensing process and no fees at the moment. MINTA is the sole telecom operator in the country operating in a monopoly environment.

In New Zealand spectrum auction was completed in June 2014. Details of the New Zealand “700 MHz auction” can be found in <https://www.rsm.govt.nz/projects-auctions/completed/digital-switchover-and-the-digital-dividend/700-mhz-auction-overview>. The table below shows the final result of the auction (price before New Zealand’s 15% Goods and Services Tax):

|  |  |  |  |
| --- | --- | --- | --- |
| **Operator** | **Frequency lot** | **Frequency range** | **Total price**  **(+GST) in NZD** |
| Spark NZ (formerly Telecom NZ) | Four lots (2 x 20 MHz) | 703-723 MHz  758-778 MHz | $158,100,000 (+GST) |
| One NZ Ltd | Three lots (2 x 15 MHz) | 723-738 MHz  778-793 MHz | $68,000,174 (+GST) |
| Two Degrees Mobile Ltd | Two lots (2 x 10 MHz) | 738-748 MHz  793-803 MHz | $44,000,000 (+GST) |
| TOTAL | Nine lots (2 x 45 MHz) | 703-748 MHz  758-803 MHz | $270,100,174 (+GST) |

In Palau (Republic of), the assignment was completed in 2019 through competitive tenders by the Bureau of Communications. Radio frequency license fees paid as a result of a competitive tender process shall be paid into the Universal Access Revolving Fund, after deduction of any costs reasonably incurred by the Bureau in relation to the tender process. In Samoa, the spectrum has been assigned in equal portion to all three operators.

In India (Republic of), the spectrum band was put for auction in 2016. There were no bidders at that time. India plans to put up the band for next round of auction in 2019.

In the case of Singapore (Republic of),the band was awarded via auction, but is pending assignment.A total of 9 lots (2 x 5 MHz per lot) were available for allocation for a duration of 15 years. Reserve price per lot was SGD 20 million (excluding GST). Winning price was SGD 94 million per lot. The winning bidders, M1 Limited, Singtel Mobile Singapore Pte Ltd and StarHub Mobile Pte Ltd were provisionally awarded with 2 lots, 4 lots and 3 lots respectively**.**

Thailand (Kingdom of) assigns frequency for IMT by auction. The spectrum auction was completed in February 2020. The result of the auction is shown as the table below.

|  |  |  |
| --- | --- | --- |
| **Operator** | **Frequency range (MHz)** | **Total price (THB)** |
| TRUE | 703 – 713 / 758 – 768 | 18,814,898,000 |
| DTAC\* | 713 – 723 / 768 – 778 | 18,814,898,000 |
| AIS | 723 – 738 / 778 – 793 | 35,968,898,000 |
| NT | 738 – 748 / 793 – 803 | 34,306,000,000 |

\* TRUE Corp and DTAC had merged to form a new operator as "True".

As far as future plan of assignment is concerned Bangladesh (People's Republic of) would include APT700 band in the next spectrum auction. In Nepal (Federal Democratic Republic of) the spectrum is planned to be auctioned within 2019. Nepal (Federal Democratic Republic of) feels the ecosystem of the devices and system in APT700 is not mature compared to other IMT bands below 1 GHz. Similarly it is expected that in China the band can be assigned to commercial operators no later than 2019. Viet Nam (Socialist Republic of) would assign by 2020. However, in the case of Indonesia (Republic of) and Myanmar (Republic of the Union of), there is no formal plan yet regarding the time frame for the implementation of APT700. Indonesia (Republic of) is still in the process of stipulating a new Broadcasting Act, together with the Parliament, as this is the main requirement to resolve legal aspects for Analogue Switch-Off (ASO).

Singapore (Republic of)also mentioned that the Singapore and neighbouring countries’ analogue switch off is still pending for APT700 MHz to be fully assigned for IMT in Singapore.

In Hong Kong, China the assignment was completed in 2021 by auction. Details are available on the [website of Office of the Communications Authority](https://www.ofca.gov.hk/en/industry_focus/radio_spectrum/auctions/spectrum_bands_auction/index.html). In Cook Islands existing 700MHz has been assigned before the establishment of the Communication Regulatory Authority (Regulator) of the Cook Islands and market competition adaptation. There is ongoing spectrum consultation by the CRA which would review the current 700MHz assignment. The assignment of spectrum and use in Cook Islands will be finalized after the consultation process.

As far as the customer experiences are concerned Australian operator Telstra shared that no exceptional issues have been experienced. Their good RF system engineering practices and appropriate site selection were employed to mitigate potential EMC issues.

The mobile network operators in New Zealand have deployed IMT (LTE) networks nationwide in the APT700 band plan with coverage assessed in 2017 as exceeding 90 percent of the population.

In Samoa (Independent State of), customers experience feedback is received from both operators and the public. The Samoa administration implement the QoS & QoE policies to address these areas. The mobile network operators in Samoa (Independent State of) have deployed IMT (LTE) networks nationwide in the APT700 band plan with coverage assessed in 2017 as exceeding 85 percent of the population.

1. **Prospects of APT700 and device ecosystem**

In general all APT Members (who provided responses) believes that APT700 could be an international harmonized band plan for LTE as it was recognized by over 44 countries worldwide.

Australia emphasizes the proliferation of deployments in the APT700 band within Region 3 and other regions is well known. Australia identified early that this would be a widely used band and that there would be significant economies of scale to be leveraged by industry in making the band available for IMT use. This precipitated from Australia’s clearance of broadcasting services from the ‘digital dividend’ band (694-820 MHz) as analogue TV broadcasting was shut down and digital TV channels were restacked below 694 MHz. Australia is of the view that APT700 will be a key coverage-layer band in the delivery of mobile services domestically, regionally and internationally for many years to come. The telecom operator in Australia, Telstra has experienced excellent wide-area coverage especially in rural and regional parts of the country by the APT700 band.

Bangladesh (People's Republic of) believes that APT700 is excellent for wide area coverage in regional and rural environments, for in-building coverage, and is an important digital dividend arising from the shift by TV broadcasters to digital transmission. Adoption of the APT700 FDD band plan by many countries has created a major opportunity for near global spectrum harmonization for LTE, ensuring the greatest economies of scale for user devices, capacity for mobile broadband and roaming. Industry and regulators support for the APT700 is strong and it has markets addressing nearly 4 billion people.

Bhutan (Kingdom of) is of the view that regionally harmonized APT700 is the most appropriate band for mobile broadband.

According to China (People's Republic of), APT700 has now been widely recognized as a “Digital Dividend” spectrum for IMT services and the identification of this band for IMT can improve the frequency use efficiency significantly. The APT700 band plan should be taken into account by the APT Member countries and therefore achieve regional and international harmonized band plan. It is expected China will make this band [available](file:///D:\Program%20Files%20(x86)\Dict\7.5.2.0\resultui\dict\?keyword=available)[for](file:///D:\Program%20Files%20(x86)\Dict\7.5.2.0\resultui\dict\?keyword=for) IMT-2020(5G) system

There is considerable demand for the 700 MHz band in India (Republic of). As on date non-commercial / Government users have also demanded for spectrum in this band and have been assigned spectrum in this band for their IMT based safety and security applications.

Indonesia (Republic of) is of the view that APT700 band plan will have a good prospect to be the harmonized band plan for the implementation of mobile broadband (LTE, 5G NR and future mobile technologies), both regionally and globally. Additionally, the 700 MHz frequency band offers advantages such as wide are coverage making it well-suited for deployment in rural or deep indoor areas.

Iran (Islamic Republic of) also believes APT700 plan has now been widely adopted by APT members as well as a large number of countries within the world and these numbers of countries will be grown in the near future. The expectation is that the network equipment vendors as well as user terminal manufacturers would add this plan into their products.

Malaysia in of the view that the APT700 band has potential as a harmonized band plan for LTE, primarily due to its good signal propagation for wide and deep coverage, which is ideal for both urban and rural areas. The adoption of this band across the region can lead to economies of scale, reducing costs for consumers and operators. Moreover, it enhances cross-border compatibility, crucial for international roaming and seamless service in the border areas. However, it is noted that the overall success and harmonisation in this regard depend on multiple factors, considering that each country has its own regulatory policies, existing telecommunications infrastructure, spectrum allocation challenges, and economic considerations to evaluate.

According to Myanmar (Republic of the Union of), APT700 band plan is recognized by 49 countries/territories around the world either allocated or committed to or to recommend APT700 FDD deployment. So it is possible to assign as international harmonized band plan for LTE.

However, Nepal (Federal Democratic Republic of) raised concern on the overlapping portion of APT700 (Band 28) with DD800 (Band 20) and believes that ecosystem of devices and systems in Band 20 is better than Band 28. For countries adopting DD800, some portion of APT700 may be affected.

New Zealand re-iterated that the adoption of APT700 band plan has expanded well beyond countries in the Asia Pacific region. It is noted that a number of countries in the Inter-American Region have already adopted the APT700 band plan, while the pan-European 700 MHz band plan (refer to ECC Decision (15)01) is a sub-set of the APT700 band plan. New Zealand is of the view that the wide adoption of APT700 band plan as the harmonised band plan for LTE will be a good candidate for an anchor layer to support the non-standalone (NSA) operation mode of 5G New Radio (5G NR) networks.

Papua New Guinea, Singapore (Republic of), Thailand (Kingdom of) and Viet Nam (Socialist Republic of) also focused on the regional and global prospects of APT700 and believe that it has the potential to achieve near global harmonization in the future. They believe that it would be more efficient and economical to implement LTE or LTE Advanced technology at this harmonized band plan which would be beneficial for Asia-Pacific. Thailand (Kingdom of) assigns frequency bands for IMT based on technology neutrality. Mobile operators can decide which technology is the most suitable for each frequency band. Currently the band is used for LTE or 5G-NR in Thailand (Kingdom of) based on availability of the mobile handsets in each location.

While answering the country’s future plan to deploy APT700 Bangladesh (People's Republic of) informed that it is delaying the adoption as the ecosystem of APT700 band is not developed well enough. Bangladesh (People's Republic of) still believes that the devices in APT 700 band are significantly less in comparison to number of devices in other IMT bands like- 850/1800/2600/2100 MHz bands. Nepal (Federal Democratic Republic of) also shares the similar concerns expressed by Bangladesh (People's Republic of) on device eco-system.

Indonesia (Republic of) believes that that APT700 is one of the frequency bands that is most supported by LTE-FDD and 5G devices. According to GSA LTE Device Ecosystem Status Update Report in December 2023, APT700 (Band 28) is the 9th rank of LTE-capable device models with 6126 number of devices. Furthermore, based on GSA 5G Device Ecosystem Report in September 2023, APT700/n28 is the 5th rank of supported 5G device which has 1185 devices. Indonesia (Republic of) hopes that the improvement of the LTE and 5G device ecosystem on APT700 can occur, thereby provide economic benefits and build an attractive business model for stakeholder.

Malaysia expressed that the device ecosystem for the APT700 band is expanding. As more manufacturers support this band and a wider variety of devices become available at an affordable price, this will make services more accessible. This growth in device availability and compatibility with emerging technologies will be beneficial for both consumers and other specialized sectors.

Papua New Guinea expressed that the device compatibility and affordability are always important for users. A single mobile device supporting the prime bands including the APT700 band would be the preferred option for many users. China (People's Republic of) also agreed that the device ecosystem of APT700 is important for the effective utilization of this frequency band and suggested that the APT Member countries should take APT700 band plan into account and build the ecosystem together.

Australia mentioned that for Telstra the key issue at the early stages of deployment was to ensure the manufacturers supplied devices with full 3GPP band compliant covering the full Band 28 and not just 28A or 28B. Currently, Telstra is working to ensure that future wearable devices would also support Band 28*.* Similarly, Bhutan (Kingdom of) had difficult time where the operators were not able to obtain the device ecosystem for these frequencies during the early launch of the LTE services in this band sometime in 2015. However, now almost all the devices can support 700MHz IMT services.

Samoa (Independent State of) believes that harmonized band plan like APT700 would provide benefits for all mobile users specially while travelling worldwide with the same device. Improving QoS is an important issue in this regard. Samoa trusts that device ecosystem of APT700 is a must to comply with the Type Approved Technical Standards for manufacturing. Some devices have noted, in terms of type approval process, doesn’t came with technical reports, no label to identify the country of origin, model number, brand name and where these devices were manufactured. This will further enable compatibility of the devices to work in any country within the region.

Subsequently ran (Islamic Republic of), New Zealand, Singapore (Republic of) and Viet Nam (Socialist Republic of) assured that the increased use of the 700 MHz band by APT Members would increase the demand for LTE devices in Asia-Pacific incredibly. Their responses mentioned that there is a strong evidence of rising regional utilization of 700MHz among the vast majority of Latin American and European countries. Therefore, the 700 MHz band is becoming one of the most popular IMT bands in the world. So, this band would bring opportunities for the vendors.

In reply, Myanmar (Republic of the Union of) mentioned that this band plan may lead to Software Define Radio (SDR) devices and hope all mobile devices could include APT700 band in the future.

Hong Kong, China mentioned that the available spectrum in the 703 – 738 / 758 – 793 MHz band has provided the much needed additional spectrum capacity in the sub-1 GHz band to enhance the coverage of IMT services and underpin the Internet-of-things applications. There are over 50 models of 700 MHz user equipment terminals (UETs) certified under the Hong Kong Telecommunications Equipment Evaluation and Certification (HKTEC) Scheme up to December 2023. As certification of UETs under the HKTEC Scheme is on a voluntary basis, there may be more models of such UETs available in the Hong Kong, China market.

**7. Conclusion**

The responses to the questionnaire have provided useful information on the status of implementation of APT700 band in 20 APT Members 2 Associate Members. It could serve as a good reference for other administrations intending to adopt and implement the APT700 in future.

From the responses we could conclude that a number of countries like Australia, Bhutan (Kingdom of), India (Republic of), Malaysia, Marshall Islands (Republic of the), New Zealand, Palau (Republic of), Papua New Guinea, Samoa (Independent State of) and Thailand (Kingdom of) had successfully implemented the APT700 for IMT services. Territories like Hong Kong, China and Cook Islands also assigned the bands to commercial operators. In addition many other countries are planning to implement in near future. However, countries like Indonesia (Republic of), Myanmar (Republic of the Union of) and China (People's Republic of) are waiting for the broadcasting services to clear the band. The situation is similar with Singapore (Republic of) and Viet Nam (Socialist Republic of).

Finally, the apprehension of Bangladesh (People's Republic of) and Nepal (Federal Democratic Republic of) of devices not being available in the APT700 band is also cleared when Australia and New Zealand now do not have this issue on the commercial deployment. Device ecosystem has grown and a handsome number of models of user equipment terminals are not available in the regional markets.

This report would be updated further based on responses from other APT Member countries. It is to be noted that in a number of countries like Maldives (Republic of) and Vanuatu (Republic of), there are commercial networks in already in place. However, those countries have not provided responses to the questionnaire. It is expected that those countries as well as other APT Member countries will submit the responses to the questionnaire that the future AWG meetings.

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**ANNEX 1**

**Responses to the Questionnaires from APT Members and Associate Members**

1. **Australia**



1. **Bangladesh (People's Republic of)**



1. **Bhutan (Kingdom of)**

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1. **China (People’s Republic of)**



1. **India (Republic of) (Updated Response)**



1. **Indonesia (Republic of) (Updated Response)**



1. **Iran (Islamic Republic of)**



1. **Korea (Republic of)**



1. **Malaysia**

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1. **Marshall Islands (Republic of the)**

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1. **Myanmar (Republic of the Union of) (Updated Response)**



1. **Nepal (Federal Democratic Republic of)**



1. **New Zealand**



1. **Palau (Republic of)**

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1. **Papua New Guinea**



1. **Samoa (Independent State of)**

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1. **Singapore (Republic of)**



1. **Sri Lanka (Democratic Socialist Republic of)**

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1. **Thailand (Kingdom of) (Updated Response)**

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1. **Viet Nam (Socialist Republic of) (Updated Response)**

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1. **Cook Islands**

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1. **Hong Kong, China**

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1. Cook Islands, Hong Kong China, Macao China and Niue are the Associate Members of APT. [↑](#footnote-ref-1)