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**APT report on survey the usage and future plan**

**of The Band 4800-4990 MHz IN ASIA PACIFIC REGION**

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1. **Introduction**

During WRC-15 meeting, the band of 4 800-4 990 MHz was identified for the implementation of International Mobile Telecommunications (IMT) in 1 country in Region 2, 3 countries (including Cambodia, Lao P.D.R. and Viet Nam) in Region 3.

To facilitate the study on the band 4 800-4 990 MHz for terrestrial IMT-Advanced/IMT-2020 systems for the Asia Pacific region, AWG-21 developed a questionnaire to collect information on the current usage and future plan of the band 4 800-4 990 MHz among the APT countries.

The questionnaire are made of ten questions which can be found in APT/AWG website ([link](http://www.apt.int/sites/default/files/2017/04/AWG-21-out-24_QUESTIONNAIRE_ON_Bands_3300-3400_MHz_0.docx)). The information on the current usage and future plan of the band 4 800-4 990 MHz in Asia Pacific region was encouraged to share in the questionnaire.

1. **Summary of the respondents**

14 administrations responded to the questionnaire. The detailed response could be found in the following input contributions:

|  |  |
| --- | --- |
| **Country** | **Document** |
| Thailand | AWG-22-INP-09 |
| Australia | AWG-22-INP-20 |
| Japan | AWG-22-INP-23 |
| Indonesia | AWG-22-INP-48 |
| Lao PDR | AWG-22-INP-54 |
| Iran | AWG-22-INP-58 |
| Singapore | AWG-22-INP-67 |
| Korea | AWG-22-INP-76 |
| China | AWG-22-INP-83, further update in AWG-23/INP-93 and AWG-25/INP-56 |
| Viet Nam | AWG-22-INP-100 |
| Papua New Guinea | AWG-23/INP-35 |
| Philippines  | AWG-23/INP-59 |
| Bangladesh | AWG-23/INP-111 |
| Malaysia | AWG-23/INP-114 |

1. **Summary of Questionnaire Responses**

**4.1 Question 1**

What is/are current allocation(s) (e.g. mobile service, fixed service, mobile-satellite service) in the bands 4 800-4 990 MHz in your country?

**Answers**

|  |  |  |
| --- | --- | --- |
| **Countries** | **Frequency Portion** | **Services** |
| **Thailand** | 4800-4990 MHz | Fixed Mobile (Primary) |
| 4800-4990 MHz | Radio Astronomy (Secondary) |
| **Australia** | 4 800-4 990 MHz | Fixed, Mobile, FSS (primary) |
| 4 800-4 990 MHz | Radio astronomy (secondary) |
| **Japan** | 4 800-5 000 MHz | MOBILERadio astronomy |
| **Indonesia** | 4800 – 4990 MHz | FIXED |
| **Lao PDR** | 4 800-4 990 MHz | FIXEDMOBILERadio astronomy  |
| **Iran** | 4800-4990 MHz | FIXED, MOBILE, Radio astronomy |
| **Singapore** | 4800-4990 MHz | Fixed |
| **Korea** | 4 800 – 4 990 MHz | Fixed Services  |
| 4 800 – 4 990 MHz | Mobile Services (including Aeronautical mobile) |
| **China** | 4 800 - 4 990 MHz |  FIXED MOBILE Radio astronomy International footnotes, which are 5.442 and 5.149, are quoted in the national radio frequency allocation in China. WRC-15 revised No. 5.442 in Radio Regulation. Currently, the National Frequency Allocation Table is planned to be revised accordingly.CHN21 The fixed service in the 3 600-4 200 MHz, 4 400-4 990 MHz, 5 925-6 425 MHz and 6 425-7 110 MHz bands are mainly intended for large-capacity microwave relay communication trunk networks. Any new microwave communication system shall not cause harmful interference to operating or already-planned large-capacity microwave relay communication trunk networks. (2001) |
| **Viet Nam** | 4 800-4 990 MHz | FIXEDMOBILERadio Astronomy |
| **Papua New Guinea** | 4 800- 4 990 MHz | Fixed service ITU-R F.1099 |
| 4825-4835 & 4950-4990 MHz | Mobile service (footnote 5.442) |
| **Philippines** | 4400 - 5000 MHz | Fixed RelaysPoint-to-Point Radio Microwave Radio System |
| **Bangladesh** | 4800-4940 MHz | 1. FIXED
2. MOBILE
3. Radio Astronomy
 |
|  | 4940-4990 MHz | 1. FIXED
2. MOBILE
3. Radio Astronomy
 |
| Malaysia | 4800-4990 MHz | FIXED MOBILERadio Astronomy |

**4.2 Question 2**

What application(s) is/are currently licensed/used in the 4 800-4 990 MHz band? Which frequency portion is used for each application?

**Answers**

|  |  |  |
| --- | --- | --- |
| **Countries** | **Frequency Portion** | **Services** |
| **Thailand** | 4400-4700/ 4700-5000 MHz | Microwave Link |
| **Australia** | 4 800-4 990 MHz | Government use: Unmanned Aerial Systems Command and Control, Air-ground-air data links, Tropospheric scatter long-haul links, High capacity line-of-sight links. Commercial fixed links. Commercial aeronautical systems. Commercial land mobile systems. |
| 4 940-4 990 MHz | Public protection and disaster relief applications (PPDR) |
| **Japan** | 4 900-5 000 MHz | Wireless access system (IEEE 802.11j) |
| **Indonesia** | 4800 – 4990 MHz | Point to point (Microwave Link) |
| **Lao PDR** | 4 800-4 990 MHz | None |
| **Iran** | 4800-4990 MHz | Point to Point Microwave Links, Air Ground Air Operations |
| **Singapore** | 4800-4990 MHz | Point-to-point (PtP) links |
| **Korea** | 4 800 – 4 990 MHz | Fixed Wireless Access for long range |
| 4 800 – 4 990 MHz | Mobile communication (including Aeronautical mobile) |
| **China** | 4800 – 4 990 MHz | Microwave communication system |
| 4 800 - 4 990 MHz | Aeronautical mobile systems |
| **Viet Nam** | 4 400- 5000 MHz | Microwave link (P - P) |
| 4 940-4 990 MHz | PPDR |
| **Papua New Guinea** | 4 800 – 4 990 MHz | SDH Microwave links |
| **Philippines** | 4400 - 5000 MHz | Microwave links (Backbone) |
| **Bangladesh** | 4810-4970 MHz | Fixed Links |
| **Malaysia** | 4800-4990 MHz | Fixed station - Point to point / point to multipoint |

**4.3 Question 3**

To what extent are those applications used (e.g. number of stations) in the bands 4 800-4 990 MHz in your country?

**Answers**

|  |  |  |
| --- | --- | --- |
| **Countries** | **Frequency Portion** | **Services** |
| **Thailand** | N/A |
| **Australia** | 4 800-4 990 MHz | Australia-wide government use |
| 4 800-4 990 MHz | 16 spectrum access authorisations for fixed links. |
| 4 800‑4 940 MHz | 2 spectrum access authorisations for commercial aeronautical systems. |
| 4 940-4 990 MHz | Australia-wide PPDR use |
| 4 940‑4990 MHz | Commercial land mobile system. |
| **Japan** | 4 900-5 000 MHz | Wireless access system (IEEE 802.11j)Around 16 000 stations |
| **Indonesia** | 4800 – 4990 MHz | 2009 stations |
| **Lao PDR** | None |
| **Iran** | 4800-4990 MHz | Point to Point Microwave Links: About 200 links |
| 4800-4990 MHz | Air Ground Air Operations: widely used in some channels |
| **Singapore** | 4800-4990 MHz | Islandwide PtP links |
| **Korea** | 4 800 – 4 990 MHz | Fixed Wireless Access for long range |
| 4 800 – 4 990 MHz | Mobile communication (including Aeronautical mobile) |
| **China** | 4 800 – 4 990 MHz | Still under evaluation. |
| **Viet Nam** | 4 400- 5000 MHz | Microwave (9 microwave links) |
| 4 940-4 990 MHz | PPDR (2 stations) |
| **Papua New Guinea** | 4 800 – 4 990 | SDH Microwave links (around 30 sites) |
| **Philippines** | 4400 - 5000 MHz | Microwave links (Backbone) |
| **Bangladesh** | 4810-4970 MHz | Fixed Links |
| **Malaysia** | 4800-4990 MHz | Over 1,000 fixed stations, nationwide |

**4.4 Question 4**

Is there any expiry date for the existing licenses in the bands 4 800-4 990 MHz in your country?

**Answers**

|  |  |  |  |
| --- | --- | --- | --- |
| **Countries** | **Frequency Portion** | **Services/Applications** | **Licenses** |
| **Thailand** | N/A |
| **Australia** | 4 800-4 990 MHz | As above | Tenures/expiry dates vary, however all licences are issued with an expectation of renewal upon expiry |
| 4 940-4 990 MHz | PPDR | PPDR is authorized by class licence, which facilitates shared spectrum access for agencies responsible for PPDR. Class Licence is a legislative instrument with no prescribed expiry date. |
| **Japan** | 4 900-5 000 MHz | Wireless access system (IEEE 802.11j) | No expiry date |
| **Indonesia** | 4800 – 4990 MHz | Point to point (Microwave Link) | 5 years since assignment and can be extended for the next 5 years |
| **Lao PDR** | None |
| **Iran** | 4800-4990 MHz | Point to Point Microwave Links | Extendable |
| 4800-4990 MHz | Air Ground Air Operations | Up to 2019 and extendable |
| **Singapore** | 4800-4990 MHz | Fixed/ PtP links | Usage on an annual renewal basis |
| **Korea** | 4 800 – 4 990 MHz | Fixed Wireless Access for long range | no expiry date |
| 4 800 – 4 990 MHz | Mobile communication (including Aeronautical mobile) | no expiry date |
| **China** | 4800 – 4 990 MHz | Microwave communication system | Various from station to station |
| 4 800 - 4 990 MHz | Aeronautical mobile systems | Not available |
| **Viet Nam** | 4 940-4 990 MHz | PPDR | Expiry date: 25/05/2022 |
| 4 400- 5000 MHz | Microwave link | Expiry date: end of May, 2018. Renewal of the microwave licenses can be up to 2027 |
| **Papua New Guinea** | 4 800 – 4 990 | Fixed service/ SDH Microwave link (around 30 sites) |  |
| **Philippines** | 4400 - 5000 MHz | Fixed Relays/ Backbones | Renewable |
| **Bangladesh** | 4810-4970 MHz | Fixed Links | Not Mentioned. |
| **Malaysia** | 4800-4990 MHz | Fixed service / point to point / point to multipoint | Annually renewable upon expiry on 31 December |

**4.5 Question 5**

How widely are existing services/applications deployed in the bands 4 800-4 990 MHz within your country (in space and time – for example the geographical deployment in urban versus rural areas)?

**Answers**

|  |  |  |  |
| --- | --- | --- | --- |
| **Countries** | **Frequency Portion** | **Services/Applications** | **Current Status** |
| **Thailand** | N/A |
| **Australia** | 4 800-4 990 MHz | Government use | Australia-wide itinerant |
| 4 800-4 990 MHz | Fixed links | 16 spectrum access authorisations. One of which is in high spectrum density area and one in medium density area. The rest are in regional areas.  |
| 4 800‑4 990 MHz | Commercial Aeronautical | Two spectrum authorisations. One in high density and the other in remote density areas. |
| 4 940-4 990 MHz | PPDR | Australia-wide itinerant |
| 4 940‑4 990 MHz | Commercial Land Mobile | Western Australia wide one spectrum access authorization. |
| **Japan** | 4 900-5 000 MHz | Wireless access system (IEEE 802.11j) | All over the country, surrounding sea |
| **Indonesia** | 4800 – 4990 MHz | Point to point (Microwave Link) | urban : 148 stationsrural : 1861 stations |
| **Lao PDR** | 4 800-4 990 MHz | None | None |
| **Iran** | 4800-4990 MHz | Point to Point Microwave Links | About 200 links mostly in rural areas |
| 4800-4990 MHz | Air Ground Air Operations | widely used in some channels mostly in rural areas |
| **Singapore** | 4800-4990 MHz | Fixed/ PtP links | Islandwide deployment |
| **Korea** | 4 800 – 4 990 MHz | Fixed Wireless Access for long range | 24 hours and all territory  |
| 4 800 – 4 990 MHz | Mobile communication (including Aeronautical mobile) | 24 hours and all territory |
| **China** | 4800 – 4 990 MHz | Microwave communication system | Scattered around the country |
| 4 800 - 4 990 MHz | Aeronautical mobile systems | Not specific |
| **Viet Nam** | 4 940-4 990 MHz | PPDR | Deploy to operate in all region |
| 4 400- 5000 MHz | Microwave link | Only in urban areas |
| **Papua New Guinea** | 4 800 – 4 990 | Fixed service/ SDH Microwave link (around 30 sites) | Nationwide terrestrial backbone network |
| **Philippines** | 4400 - 5000 MHz | Fixed Relays/ Backbones | Nationwide |
| **Bangladesh** | 4810-4970 MHz | Fixed Links | Deployed in remote/rural area, especially in riverine area. |
| **Malaysia** | 4800-4990 MHz | Fixed service / point to point and point to multipoint | Nationwide |

**4.6 Question 6**

When there are multiple applications licensed in the 4 800-4 990 MHz band, how do you achieve sharing/compatibility between these applications?

**Answers**

|  |  |
| --- | --- |
| **Countries** | **Answers** |
| **Thailand** | No |
| **Australia** | Commercial services are operated on a “no interference/no protection” basis with respect to government services. Government and PPDR users coordinate spectrum access between themselves. |
| **Indonesia** | There is only one application (Point to Point Communication). The license can only be issued when the proposal passed the Technical Analysis. |
| **Lao PDR** | No |
| **Iran** | By geographical and frequency channels separation. |
| **Singapore** | The users in the band 4800-4990 MHz are expected to coordinate among themselves to ensure minimal interference among the applications. |
| **Korea** | Frequency and distance separation when licensing |
| **China** | Spectrum usage and requirements of different radiocommunication systems deployed within and adjacent to 4800 – 4990MHz frequency bands are taken into consideration to avoid harmful interference. |
| **Viet Nam** | ARFM applied multiple applications licensed in the 4 800-4 990 MHz band from 2013. In sharing condition, The requirement of emission standard should be complied, all the microwave link must use directional antenna, and change frequency if there is claim of interference from PPDR systems.In the National Frequency Allocation Table, a national footnote VTN 18 for 4 800-4 990 MHz band: "The band 4 800 – 4 990 MHz is reserved for IMT system. It also is used for PPDR system in the band 4 940 – 4 990 MHz. The manufacture and import of radio equipment to be used in Vietnam in 4 800-4 990 MHz band must be complied with this regulation and other relevant regulations." |
| **Papua New** **Guinea** | None at present |
| **Philippines** | Thorough study and evaluation. Existing assignment versus the proposed frequency. |
| **Bangladesh** |  |
| **Malaysia** | Technical analysis to study on sharing conditions is conducted prior to issuance of Apparatus Assignment. Apparatus Assignment is subject to operating conditions on sharing of the frequency, where required.  |

**4.7 Question 7**

Do you have planned or potential future applications on this bands 4 800-4 990 MHz?

**Answers**

|  |  |
| --- | --- |
| **Countries** | **Answers** |
| **Thailand** | No. |
| **Australia** | No [The band is being “monitored” for potential new mobile service applications, however there are no firm plans at this stage.] |
| **Japan** | Yes |
| **Indonesia** | No. |
| **Lao PDR** | Yes. |
| **Iran** | No, however, may be considered for IMT, if it get popular. |
| **Singapore** | No plan at the moment. Singapore will continue to monitor the market and technology developments in this band before deciding on the potential future applications. |
| **Korea** | No. |
| **China** | Yes. The band planning for 4 800 – 5 000 MHz as the band for IMT-2020 systems was officially issued in Nov, 2017. The frequency license for 5G trial in the frequency band 4800-4900 MHz has been issued in December 2018. Trial networks have been built up to provide continuous coverage in Hangzhou and Guangzhou. |
| **Viet Nam** | Yes |
| **Papua New** **Guinea** | None  |
| **Philippines** | **No** |
| **Bangladesh** | Not yet |
| **Malaysia** | No |

**4.8 Question 8**

What is/are planned or potential future applications in the bands 4 800-4 990 MHz?

**Answers**

|  |  |  |  |
| --- | --- | --- | --- |
| **Countries** | **Frequency Portion** | **Future Applications** | **Timeline** |
| **Australia** |  | Not applicable. |  |
| **Japan** | 4 800-4 900 | IMT | Under consideration |
| **Lao PDR** | 4 800-4 990 MHz | IMT | N/A |
| **Iran** |  |
| **Singapore** | To be studied  | To be studied | To be studied |
| **China** | 4 800 - 5 000 MHz | IMT-2020 system | Commercialization 2019-2020 |
| **Viet Nam** | 4 800-4 990 MHz | IMT | Under studying |
| **Papua New** **Guinea** | Yet to be determined | Yet to be determined | Yet to be determined |
| **Philippines** |  |  |  |
| **Bangladesh** |  |  |  |
| **Malaysia** | Not applicable | Not applicable | Not applicable |

**4.9 Question 9**

What are the issues / challenges that need to be considered in order to allocate, identify and make available for use the bands of 4 800-4 990MHz for IMT?

**Answers**

|  |  |  |
| --- | --- | --- |
| **Countries** | **Frequency Portion** | **Issues/Challenges** |
| **Thailand** | National Policy. |
| **Australia** | 4 800-4 990 MHz | Ensuring ongoing access (and primacy) for itinerant government services. Given the itinerant nature of government spectrum use, sharing with IMT is a challenge.  |
| 4 940-4 990 MHz | Ensuring ongoing access (and primacy) for itinerant PPDR services. Given the itinerant nature of PPDR use, sharing with IMT is a challenge. |
| **Japan** | 4 800-4 900 MHz | Compatibility with wireless access system in the 4 900-5 000 MHz frequency band |
| **Lao PDR** | N/A |
| **Iran** | 4800-4990 | Sharing between IMT systems and Point to Point Microwave Links |
| 4800-4990 | Sharing between IMT systems and Air Ground Air Operations |
| 4800-4990 | Unavailability of economic equipments |
| **Singapore** | 4800-4990 MHz | Cross-border harmonization, compatibility with adjacent uses and requirements for interference protection |
| **Korea** | 4 800 – 4 990 MHz | Sharing and compatibility with neighboring country |
| **China** | 4 800 – 4 990 MHz | IMT systems shall not cause harmful interference to the radio astronomy services on 4990-5000MHz frequency bands. Compatibility and sharing studies between IMT systems and other systems deployed within and adjacent to 4800 – 5000MHz frequency bands are needed before making decisions on frequency allocation or identification.  |
| **Viet Nam** | 4 800-4 990 MHz | Compatibility with PPDR system |
| **Papua New Guinea** | 4 800 – 4 990 | Coordination with current Fixed service |
| **Philippines** |  |  |
| **Bangladesh** | 4810-4970 MHz | Existing riverine connectivity needs similar alternative suitable band.  |
| **Malaysia** | 4800-4990 MHz | Interference into existing stations |

**4.10 Question 10**

Do you have any expectations or suggestions for your administration about the bands 4 800-4 990 MHz to be studied in the AWG?

**Answers**

|  |  |
| --- | --- |
| **Countries** | **Answers** |
| **Australia** | Australia may contribute a proposal to study shared access between itinerant government and non-government mobile services – ensuring primacy for government services is maintained – at a future AWG |
| **Indonesia** | No |
| **Lao PDR** | None |
| **Iran** | Sharing studies between IMT systems andPoint to Point Microwave Links and also Air Ground Air Operations within 4800-4990 MHz band is proposed to be conducted by AWG |
| **Singapore** | No |
| **Korea** | Before the development of the frequency arrangements for the bands 4 800–4 990 MHz, the relevant sharing and compatibility studies should be taken into account as outlined in Resolution 223 (Rev.WRC-15)]. |
| **China** | *N/A* |
| **Viet Nam** | The harmonization on 4 800-4 990 MHz band for IMT in APT region should be taken into consideration. |
| Papua New Guinea | Co-existence of Fixed and Mobile services |
| **Philippines** |  |
| **Bangladesh** |  |
| **Malaysia** | No |