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**APT REPORT ON**

**FREQUENCY USAGE OF THE BANDS 2 700-2 900 MHZ, 4 200-4 400 MHZ AND 5 350-5 460 MHZ**

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**APT Report on Frequency Usage of the Bands 2 700‑2 900 MHz, 4 200‑4 400 MHz and 5 350-5 460 MHz**

**Table of Contents**

[1. Introduction 2](#_Toc400518751)

[2. Scope 2](#_Toc400518752)

[3. Vocabulary of terms 2](#_Toc400518753)

[4. References 2](#_Toc400518754)

[5. ITU-R Allocations 4](#_Toc400518755)

[5.1 The Band 2 700-2 900 MHz 4](#_Toc400518756)

[5.2 The Band 4 200-4 400 MHz 4](#_Toc400518757)

[5.3 The Band 5 350-5 460 MHz 5](#_Toc400518758)

[6. Consideration of the frequency arrangements in APT 5](#_Toc400518759)

[6.1 The Band 2 700-2 900 MHz 5](#_Toc400518760)

[6.2 The Band 4 200-4 400 MHz 6](#_Toc400518761)

[6.3 The Band 5 350-5 460 MHz 6](#_Toc400518762)

[Attachment 6](#_Toc400518763)

[A.1 Australia 7](#_Toc400518764)

[A.2 Bangladesh 11](#_Toc400518765)

[A.3 P. R. China 12](#_Toc400518766)

[A.4 Iran (Islamic Republic of) 14](#_Toc400518767)

[A.5 Japan 16](#_Toc400518768)

[A.6 Korea 18](#_Toc400518769)

[A.7 New Zealand 19](#_Toc400518770)

[A.8 Singapore 20](#_Toc400518771)

[A.9 Sri Lanka 21](#_Toc400518772)

[A.10 Thailand 22](#_Toc400518773)

[A.11 Vietnam 23](#_Toc400518774)

# Introduction

The aerospace industry is developing the future generation of commercial aircraft to provide airlines and the flying public with more cost-efficient, safe, and reliable aircraft. One important way of accomplishing these aims is to reduce aircraft weight while providing multiple and redundant methods to transmit information on an aircraft. Wireless technologies can be employed to accomplish these goals while also providing environmental benefits and cost savings to manufacturers and operators.

Installed wireless avionics intra-communications (WAIC) systems are one way to derive these benefits. WAIC systems consist of radiocommunications between two or more transmitters and receivers on a single aircraft. Both the transmitter and receiver will be integrated with or installed on the aircraft. In all cases, communication is part of a closed, exclusive network required for aircraft operation. WAIC systems will not provide air-to-ground or air-to-air communications, and will only be used for safety-related applications.

At its meeting in July 2013, the APT Preparatory Group (APG) invited the AWG to study the regional technical requirements relating to work being undertaken by ITU-R Working Party 5B which is examining compatibility between wireless avionics intra-communications (WAIC) systems and existing services, including in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz.

# Scope

This Report outlines current spectrum usage and future plans in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz in Asia Pacific region. It has been developed for APT Members’ information. Initially, the Report allows future meetings of the APG to fully consider the potential regulatory changes necessary to implement WAIC systems and to ensure that appropriate studies are completed prior to regulatory changes being considered at WRC-15. Later on it will assist identify issues where other potential uses of the bands are being considered.

# Vocabulary of terms

WAIC Wireless avionics intra-communications

WRC World Radiocommunication Conference

# References

ITU-R Recommendations and Reports developed to assist in understanding compatibility between EESS (active) and existing uses include:

* Report ITU-R M.[2283](http://www.itu.int/pub/R-REP-M.2283)- "Technical characteristics and spectrum requirements of Wireless Avionics Intra-Communications systems to support their safe operation"
* Preliminary draft new Recommendation ITU-R M.[WAIC]- "Technical characteristics and protection criteria for Wireless Avionics Intra-Communications systems";
* Working document towards a preliminary draft new Recommendation ITU-R M.[WAIC\_Conditions]-"Definition and technical conditions for the use of the aeronautical mobile (R) service to support Wireless Avionics Intra-Communication systems" .
* Preliminary draft new Report ITU-R M.[WAIC\_SHARING\_4 200-4 400MHz]- "Compatibility analysis between wireless avionics intra-communication systems and systems in the existing services in the frequency band 4 200-4 400 MHz";
* Preliminary draft new Report ITU-R M.[WAIC BANDS]- "Consideration of the aeronautical mobile (route), aeronautical mobile and aeronautical radionavigation services allocations to accommodate wireless avionics intra-communications".

# ITU-R Allocations

# The Band 2 700-2 900 MHz

In the Radio Regulations (2012 edition), the frequency band 2 700-2 900 MHz is allocated in three Regions as follows:

Table: ITU-R allocations in 2 700 – 2 900 MHz

|  |
| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 2 700-2 900 AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation 5.423 5.424 |

5.337 The use of the bands 1 300-1 350 MHz, 2 700-2 900 MHz and 9 000-9 200 MHz by the aeronautical radionavigation service is restricted to ground-based radars and to associated airborne transponders which transmit only on frequencies in these bands and only when actuated by radars operating in the same band.

5.423 In the band 2 700-2 900 MHz, ground-based radars used for meteorological purposes are authorized to operate on a basis of equality with stations of the aeronautical radionavigation service.

5.424 *Additional allocation:*in Canada, the band 2 850-2 900 MHz is also allocated to the maritime radionavigation service, on a primary basis, for use by shore-based radars.

# The Band 4 200-4 400 MHz

In the Radio Regulations (2012 edition), the frequency band 4 200-4 400 MHz is allocated in three Regions as follows:

Table: ITU-R allocations in 4 200-4 400 MHz

|  |
| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 4 200-4 400 AERONAUTICAL RADIONAVIGATION 5.438 5.439 5.440 |

5.438 Use of the band 4 200-4 400 MHz by the aeronautical radionavigation service is reserved exclusively for radio altimeters installed on board aircraft and for the associated transponders on the ground. However, passive sensing in the Earth exploration-satellite and space research services may be authorized in this band on a secondary basis (no protection is provided by the radio altimeters).

5.439 *Additional allocation:* in Iran (Islamic Republic of), the band 4 200-4 400 MHz is also allocated to the fixed service on a secondary basis.    (WRC‑12)

5.440 The standard frequency and time signal-satellite service may be authorized to use the frequency 4 202 MHz for space-to-Earth transmissions and the frequency 6 427 MHz for Earth-to-space transmissions. Such transmissions shall be confined within the limits of  2 MHz of these frequencies, subject to agreement obtained under No. **9.21**.

# The Band 5 350-5 460 MHz

In the Radio Regulations (2012 edition), the frequency band 5 350-5 460 MHz is allocated in three Regions as follows:

Table: ITU-R allocations in 5 350-5 460 MHz

|  |
| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 5 350-5 460 EARTH EXPLORATION-SATELLITE (active) 5.448B RADIOLOCATION 5.448D AERONAUTICAL RADIONAVIGATION 5.449 SPACE RESEARCH (active) 5.448C |

5.448B The Earth exploration-satellite service (active) operating in the band 5 350-5 570 MHz and space research service (active) operating in the band 5 460-5 570 MHz shall not cause harmful interference to the aeronautical radionavigation service in the band 5 350-5 460 MHz, the radionavigation service in the band 5 460-5 470 MHz and the maritime radionavigation service in the band 5 470-5 570 MHz.     (WRC-03)

5.448C The space research service (active) operating in the band 5 350-5 460 MHz shall not cause harmful interference to nor claim protection from other services to which this band is allocated.     (WRC-03)

5.448D In the frequency band 5 350-5 470 MHz, stations in the radiolocation service shall not cause harmful interference to, nor claim protection from, radar systems in the aeronautical radionavigation service operating in accordance with No. 5.449.     (WRC-03)

5.449 The use of the band 5 350-5 470 MHz by the aeronautical radionavigation service is limited to airborne radars and associated airborne beacons.

# Consideration of the frequency arrangements in APT

# The Band 2 700-2 900 MHz

The band 2 700-2 900 MHz is mainly used for radio navigation and Radiolocation by primary surveillance radar for aeronautical purposes.

The band is also used for meteorological radar (China, Korea, Iran (Islamic Republic of))

The band is also use for fixed services, These are itinerant fixed links used for TVOB purposes in accordance with Article 4.4 (New Zealand).

It is understood that, following the ITU‑R WP 5B meeting in November 2013, these bands are no longer under consideration as being suitable for WAIC systems as studies show it is incompatible with existing uses. As a result the AWG makes no comment on the suitability of regulatory changes to implement WAIC systems in these bands.

# The Band 4 200-4 400 MHz

The band 4 200-4 400 MHz is mainly used for radio altimeter systems on board aircraft.

The band is also used for Aeronautical Radionavigation (Singapore) and for fixed services on a secondary basis (Iran (Islamic Republic of)).

There are no other uses identified and based on the status of studies to date by the ITU-R, there should be no impediment to making regulatory changes to implement WAIC systems in this band.

# The Band 5 350-5 460 MHz

The band 5 350-5 460 MHz is mainly used for Airborne and ground based weather radar.

The band is also used for space research and experimental purposes (Japan)

The band is also used for Aeronautical Radionavigation (Singapore, Iran (Islamic Republic of))

The band is also used for broadband wireless access services (Bangladesh)

It is understood that, following the ITU‑R WP 5B meeting in November 2013, these bands are no longer under consideration as being suitable for WAIC systems as studies show it is incompatible with existing uses. As a result the AWG makes no comment on the suitability of regulatory changes to implement WAIC systems in this band.

# Attachment

**Current usage and future plans for the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz**

In order to collect information on current usage and future planning, a Survey Questionnaire entitled "APT Frequency Usage of the Bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz in Asia Pacific Region" was made available to all APT Member countries. The questionnaire include the following questions:

**Question 1:** What is/are current allocation(s) (e.g. radiolocation service, aeronautical radionavigation service, fixed service, Earth exploration satellite service, space research (active) service), application(s) and assigned/licensed in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz in your country?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Frequency Bands** | **Service** | **Applications** | **Commercial****Operator** | **License duration** |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |
|   |  |  |  |  |  |

**Question 2**: If there are no services currently used in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz, is there any difficulty with use of the bands and/or obstacles to the use of the bands for WAIC applications?

**Question 3:** Do you have planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? (Yes / No)

If you answered “Yes” to Question 3 above, please answer Question 4.

**Question 4:** What is/are planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz?

|  |  |  |
| --- | --- | --- |
|  | **Planned/Future services and applications**  | **Timeline** |
| 1 |  |  |
| 2 |  |  |
|  |  |  |

**Question 5:** Do you have any issues to be considered relating to the use of the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? If so, what are the issues?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The following summarize information on the current usage and future plan of the band:

# Australia

**Current usage**

**Question 1:** What is/are current allocation(s) (e.g. radiolocation service, aeronautical radionavigation service, fixed service, Earth exploration satellite service, space research (active) service), application(s) and assigned/licensed in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz in your country?

**Answer:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Frequency Band [MHz]** | **Service** | **Applications** | **Commercial****Operator** | **License duration** |
| 1 | **2 700 - 2 900** | AERONAUTICALRADIONAVIGATION 5.337RADIOLOCATION AUS105423 | Radiodetermination transmitters operated in radiofrequency-shielded enclosuresApplications include primary surveillance radar supporting operations with a high safety-of-life requirement, weather watch and wind-finding radars and military radars  | Non-commercial use by government | Radars are apparatus licensed - renewed annuallyRadar operations required until 2025 and beyond |
| 2 | **4 200 - 4 400**  | AERONAUTICALRADIONAVIGATION 5.4385.440 AUS87 | Airborne radio altimeter providing automated landing for flare guidance, and sensor component in ground proximity warning systems | Aviation | Avionics systems are class licensed |
| 3 | **5 350 - 5 460** | EARTH EXPLORATIONSATELLITE (active) 5.448BSPACE RESEARCH (active) 5.448C AERONAUTICALRADIONAVIGATION 5.449RADIOLOCATION 5.448DAUS87 | Airborne weather radar | Aviation | Avionics systems are class licensed |

Note: Primary services are expressed in upper case letters and secondary services are expressed in lower case letters.

Australian footnote:[[1]](#footnote-1)

AUS87 Radio astronomy facilities operated by the CSIRO at the Paul Wild Observatory Narrabri (latitude 30° 18' 46.40" S, longitude 149° 33' 0.44" E), the Parkes Observatory (latitude 32° 59' 54.25" S, longitude 148° 15' 48.65" E) and the Mopra Observatory Coonabarabran (latitude 31° 16' 04.12" S, longitude 149° 05' 58.72" E) and by the University of Tasmania at the Mount Pleasant Observatory Hobart (latitude 42° 48' 12.92" S, longitude 147° 26' 25.86" E) and the Ceduna Observatory (latitude 31° 52' 03.69" S, longitude 133° 48' 35.40" E), and at the Canberra Deep Space Communication Complex (latitude 35° 23' 54.46" S, longitude 148° 58' 39.66" E) conduct passive observations in the frequency bands 1.2-1.8 GHz, 2.2-2.7 GHz, 4.5-6.7 GHz, 8-10 GHz and 16-26 GHz using receivers that are highly sensitive to interference. The Paul Wild and Mopra observatories also operate in the bands 30-50 GHz and 75-115 GHz.

AUS105 This band may be used by stations of the radiolocation service for meteorological and aeronautical surveillance radar, on condition that potential harmful interference is accepted from services operating in adjacent bands in accordance with a spectrum licence.

**Question 2**: If there are no services currently used in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz, is there any difficulty with use of the bands and/or obstacles to the use of the bands for WAIC applications?

**Answer:**

There are currently services using the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz.

**Future plans**

**Question 3:** Do you have planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? (Yes / No)

**Answer:**

Yes.

If you answered “Yes” to Question 3 above, please answer Question 4.

**Question 4:** What is/are planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz?

**Answer:**

|  |  |  |
| --- | --- | --- |
|  | **Planned/Future services and applications**  | **Timeline** |
| 1 | Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan for radio astronomy services and some additional services. The band plan is to establish a radio quiet zone, and provide for the establishment of supplementary radio quite zones, to prevent harmful interference to radio astronomy services. The band plan applies to certain parts of Australia for the frequency range 70 MHz-25.25 GHz. See the Radiocommunications (Mid-West Radio Quiet Zone) Frequency Band Plan 2011 for detail. | Ongoing |
|  |  |  |

**Others**

**Question 5:** Do you have any issues to be considered relating to the use of the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? If so, what are the issues?

**Answer:**

Yes.

ITU-R Working Party 5B is working towards finalising [preliminary draft new Reports](http://www.itu.int/md/dologin_md.asp?lang=en&id=R12-WP5B-C-0167!N21!MSW-E) on compatibility analysis between WAIC systems and systems operating in the 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz frequency bands. These studies indicate that sharing is difficult in the 2 700-2 900 MHz and 5 350-5 460 MHz bands. Working Party 5B has developed draft CPM Report text (Document 5B/475 Annex 7) proposing an AM(R)S allocation to the frequency band 4 200-4 400 MHz as the only ‘Method’ to solve WRC-15 Agenda item 1.17.

ACMA Spectrum Embargo 41 - no new assignments are to be made within the frequency range 230 MHz -25.25 GHz within 100 km radius of latitude 26° 42’ 15” South and longitude 116° 39’ 32” East. This spectrum embargo is ongoing to support the development of the Mid-West Radio Quiet Zone and the Square Kilometre Array.

# Bangladesh

**Current usage**

**Question 1:** What is/are current allocation(s) (e.g. radiolocation service, aeronautical radionavigation service, fixed service, Earth exploration satellite service, space research (active) service), application(s) and assigned/licensed in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz in your country?

**Answer:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Frequency Bands** | **Service** | **Applications** | **Commercial****Operator** | **License duration** |
| 1 | 2700-2900 | No Service |  |  |  |
| 2 | 4200-4400 | Aeronautical |  |  |  |
|   | 5350-5460 | ISP | ISP services | yes | 5 years  |

**Question 2**: If there are no services currently used in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz, is there any difficulty with use of the bands and/or obstacles to the use of the bands for WAIC applications?

**Answer:** The Band 2700-2900 MHz and 4200-4400 MHz has no significant services in Bangladesh. Roadmap will be taken to make good use of those frequency bands.

**Future plans**

**Question 3:** Do you have planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? (Yes / No)

**Answer:** No

If you answered “Yes” to Question 3 above, please answer Question 4.

**Question 4:** What is/are planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz?

**Answer:**

**Others**

**Question 5:** Do you have any issues to be considered relating to the use of the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? If so, what are the issues?

**Answer:** Some issues should be in consideration relating to the use of these bands. In 5350-5460MHz band, ISP’s can merge together to give BWA (fixed) services to the mass people. The other two bands can be used for aeronautical use and for fixed line of sight (LOS) purpose.

# P. R. China

**Current usage**

**Question 1:** What is/are current allocation(s) (e.g. radiolocation service, aeronautical radionavigation service, fixed service, Earth exploration satellite service, space research (active) service),application(s) and assigned/licensed inthe bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz in your country?

**Answer:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Frequency Bands** | **Service** | **Applications** | **Commercial****Operator** | **License duration** |
| 1 | 2 700-2 900 MHz | AERONAUTICAL RADIONAVIGATION | Primary surveillance radars | National air navigation service provider | Long term |
| RADIOLOCATION | Ground-based meteorological radars | National service provider(not commercial) | Long term |
| 2 | 4 200-4 400 MHz | AERONAUTICAL RADIONAVIGATION | Radio altimeters | All airlines | Long term |
|  3 | 5 350-5 460 MHz | AERONAUTICAL RADIONAVIGATION | Ground-based meteorological radars | National service provider(not commercial) | Long term |
| EARTH EXPLORATION-SATELLITE | Weather observation applicationsAltimeters | National service provider(not commercial) | Long term |
| RADIOLOCATION | Ground-based meteorological radars | National service provider(not commercial) | Long term |
| SPACE RESEARCH |  |  |  |

**Question 2**: If there are no services currently used in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz, is there any difficulty with use of the bands and/or obstacles to the use of the bands for WAIC applications?

**Answer:** YES. There are difficulties for WAIC applications using the bands 2 700-2 900 MHz and 5 350-5 460 MHz**.**

**Future plans**

**Question 3:** Do you have planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? (Yes / No)

**Answer:** YES**.**

If you answered “Yes” to Question 3 above, please answer Question4.

**Question 4:** What is/are planned or potential future services and applications inthe bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz?

**Answer:**

|  |  |  |
| --- | --- | --- |
|  | **Planned/Future services and applications**  | **Timeline** |
| 1 | 2 700-2 900 MHzAERONAUTICAL RADIONAVIGATION*Primary surveillance radars* | Long term |
| RADIOLOCATION*Ground-based meteorological radars* |
| 2 | 4 200-4 400 MHzAERONAUTICAL RADIONAVIGATION*Radio altimeters* | Long term |
| AERONAUTICAL MOBILE (R)*WAIC* |
| 3 | 5 350-5 460 MHzAERONAUTICAL RADIONAVIGATION*Ground-based meteorological radars* | Long term |
| EARTH EXPLORATION-SATELLITE*Weather observation applications**Altimeters**SAR* |
| RADIOLOCATION*Ground-based meteorological radars* |
| SPACE RESEARCH |

**Others**

**Question 5:** Do you have any issues to be considered relating to the use of the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? If so, what are the issues?

**Answer:** NO**.**

# Iran (Islamic Republic of)

**Current usage**

**Question 1:** What is/are current allocation(s) (e.g. radiolocation service, aeronautical radionavigation service, fixed service, Earth exploration satellite service, space research (active) service), application(s) and assigned/licensed in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz in your country?

**Answer:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Frequency Bands** | **Service** | **Applications** | **Commercial****Operator** | **License duration** |
| **1** | 2700-2900 | Radiolocation | Weather radar | Metrological Organization | One year（renewal may be allowed.) |
| **2** | 2700-2900 | Aeronautical radionavigation | Primary Surveillance Radar (PSR) | Airports Holding Company | One year（renewal may be allowed.) |
| **3** | 4200-4400 | Fixed | Microwave Point to Point Links | Telecommunication Companies | One year（renewal may be allowed.) |
| **4** | 4200-4400 | Aeronautical radionavigation | Altimeter | Airlines | One year（renewal may be allowed.) |

**Question 2**: If there are no services currently used in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz, is there any difficulty with use of the bands and/or obstacles to the use of the bands for WAIC applications?

**Answer:** Due to the nature of international flight, any decision on the use of above frequency band by WAIC must be harmonized and non-utilization of one/group of administrations would not guarantee interference-free operation frequency bands by other administrations in this case.

**Future plans**

**Question 3:** Do you have planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? (Yes / No)

**Answer:** Yes

If you answered “Yes” to Question 3 above, please answer Question 4.

**Question 4:** What is/are planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz?

**Answer:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Frequency Bands(MHz)** | **Planned/Future services and applications**  | **Timeline** |
| **1** | 2700-2900 | AERONAUTICAL RADIONAVIGATION as RR No. 5.337 | Utilized |
| **2** | 2700-2900 | Radiolocation | Utilized |
| **3** | 4200-4400 | AERONAUTICAL RADIONAVIGATION as RR No. 5.438 | Utilized |
| **4** | 4200-4400 | Fixed as RR No. 439 | Utilized |
| **5** | 5350-5460 | AERONAUTICAL RADIONAVIGATION as RR No. 5.449 | Utilized |
| **6** | 5350-5460 | RADIOLOCATION as RR No. 5.448D | Utilized |
| **7** | 5350-5460 | EARTH EXPLORATION-SATELLITE as RR No. 5.448B | Allocated |
| **8** | 5350-5460 | SPACE RESEARCH as RR No. 5.448C | Allocated |

**Others**

**Question 5:** Do you have any issues to be considered relating to the use of the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? If so, what are the issues?

**Answer:** Due to the nature of international flight, any decision on the use of above frequency band by WAIC must be harmonized and non-utilization of one/group of administrations would not guarantee interference-free operation frequency bands by other administrations in this case. Accordingly, while supporting further study, this administration is in view that utilization of frequency band 2700-2900 MHz to WAIC systems probably endangers safety of flight. In any case, full detailed studies are required on compatibility of WAIC and existing systems in mentioned frequency bands.

# Japan

**Current usage**

**Question 1:** What is/are current allocation(s) (e.g. radiolocation service, aeronautical radionavigation service, fixed service, Earth exploration satellite service, space research (active) service), application(s) and assigned/licensed in the bands 2700-2900 MHz, 4200-4400 MHz and 5350-5460 MHz in your country?

**Answer:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Frequency Bands** | **Service** | **Applications** | **Commercial****Operator** | **License duration** |
| 1 | 2700-2900MHz | AERONAUTICAL RADIONAVIGATION | Airport Surveillance Radar (ASR) | Airport Administrator | 5 years at most（renewal may be allowed.） |
| Radiolocation | Radio system in experiment | Non-commercial use | 5 years at most（renewal may be allowed.） |
| 2 | 4200-4400 MHz | AERONAUTICAL RADIONAVIGATION | Radar Altimeter | Aviation Industry | Infinite |
| Radio system in experiment | Non-commercial use | 5 years at most（renewal may be allowed.） |
| 3 | 5350-5460 MHz | AERONAUTICAL RADIONAVIGATION | N/A | N/A | N/A |
| RADIOLOCATION | Weather Radar | Non-commercial use | 5 years at most（renewal may be allowed.） |
| Radio system in experiment | Non-commercial use | 5 years at most（renewal may be allowed.） |
| SPACE RESEARCH | Space Research | Non-commercial use | 5 years at most（renewal may be allowed.） |
| Radio system in experiment | Non-commercial use | 5 years at most（renewal may be allowed.） |

**Question 2**: If there are no services currently used in the bands 2700-2900 MHz, 4200-4400 MHz and 5350-5460 MHz, is there any difficulty with use of the bands and/or obstacles to the use of the bands for WAIC applications?

**Answer:**

Existing services use these bands as mentioned above.

Sufficient consideration for sharing between the existing services and WAIC is necessary.

**Future plans**

**Question 3:** Do you have planned or potential future services and applications in the bands 2700-2900 MHz, 4200-4400 MHz and 5350-5460 MHz? (Yes / No)

**Answer:**

Yes

If you answered “Yes” to Question 3 above, please answer Question 4.

**Question 4:** What is/are planned or potential future services and applications in the bands 2700-2900 MHz, 4200-4400 MHz and 5350-5460 MHz?

**Answer:**

The existing services, written in Question 1, will be continuously used in these bands.

**Others**

**Question 5:** Do you have any issues to be considered relating to the use of the bands 2700-2900 MHz, 4200-4400 MHz and 5350-5460 MHz? If so, what are the issues?

**Answer:**

Yes

Japan is of the view that the protection of the primary services currently allocated in these bands and the adjacent bands should be ensured for the additional allocation of WAIC.

# Korea

**Current usage**

**Question 1:** What is/are current allocation(s) (e.g. radiolocation service, aeronautical radionavigation service, fixed service, Earth exploration satellite service, space research (active) service), application(s) and assigned/licensed in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz in your country?

**Answer:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Frequency Bands** | **Service** | **Applications** | **Commercial****Operator** | **License duration** |
| 1 | 2700-2900 | AERONAUTICAL RADIONAVIGATION& RADIOLOCATION(Meteorological Radar) | Primary surveillance radars, Meteorological radars |  | 5 year |
| 2 | 4200-4400 | AERONAUTICAL RADIONAVIGATION | Radio altimeters installed on board aircraft | Airline  | 2 year |
|  3 | 5350-5460 | AERONAUTICAL RADIONAVIGATION& RADIOLOCATION | Airborne radars |  | 5 year |

**Question 2**: If there are no services currently used in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz, is there any difficulty with use of the bands and/or obstacles to the use of the bands for WAIC applications?

**Answer: N/A**

**Future plans**

**Question 3:** Do you have planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? (Yes / No)

**Answer: No**

If you answered “Yes” to Question 3 above, please answer Question 4.

**Question 4:** What is/are planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz?

**Answer: N/A**

**Others**

**Question 5:** Do you have any issues to be considered relating to the use of the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? If so, what are the issues?

**Answer:**

The bands 2700-2900 MHz and 5350-5460 MHz are already heavily used for aeronautical navigation service and radiolocation service such as meteorological radars and primary surveillance radars. Therefore, these bands are not considered to be a candidate for WAIC systems.

# New Zealand

**Current usage**

**Question 1:** What is/are current allocation(s) (e.g. radiolocation service, aeronautical radionavigation service, fixed service, Earth exploration satellite service, space research (active) service), application(s) and assigned/licensed in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz in your country?

**Answer:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Frequency Bands** | **Service** | **Applications** | **Commercial****Operator** | **License duration** |
| 1 | 2 700-2 900 MHz | Fixed (Article 4.4) | Itinerant fixed linking for television outside broadcast operations | Broadcast and associated industry | Ongoing – no fixed expiry date |
| 2 | 4 200-4 400 MHz | AERONAUTICAL RADIONAVIGATION | Radio altimeter and associated ground transponders | Aircraft operators | Ongoing – no fixed expiry date |
|  3 | 5 350-5 460 MHz | AERONAUTICAL RADIONAVIGATION | Airborne weather radar | Aircraft operators | Ongoing – no fixed expiry date |

**Question 2**: If there are no services currently used in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz, is there any difficulty with use of the bands and/or obstacles to the use of the bands for WAIC applications?

**Answer:** As the bands 4 200-4 400 MHz and 5 350-5 460 MHz are used for aeronautical purposes, provided that the WAIC applications are compatible with the existing applications, there should be no difficulty with the proposed use.

**Future plans**

**Question 3:** Do you have planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? (Yes / No)

**Answer:** No

If you answered “Yes” to Question 3 above, please answer Question 4.

**Question 4:** What is/are planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz?

**Answer:** Not applicable

**Others**

**Question 5:** Do you have any issues to be considered relating to the use of the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? If so, what are the issues?

**Answer:** As noted above,provided the WAIC applications are compatible with other existing applications, there should be no difficulty with the proposed use.

# Singapore

**Current usage**

**Question 1:** What is/are current allocation(s) (e.g. radiolocation service, aeronautical radionavigation service, fixed service, Earth exploration satellite service, space research (active) service), application(s) and assigned/licensed in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz in your country?

**Answer:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Frequency Bands** | **Service** | **Applications** | **Commercial****Operator** | **License duration** |
| 1 | 2700-2900 MHz | Aeronautical Radionavigation | Radar |  | Long term |
| 2 | 4200-4400 MHz | Aeronautical Radionavigation | Radar |  | Long term |
|  3 | 5350-5460 MHz | Aeronautical Radionavigation | Radar |  | Long term |

**Question 2**: If there are no services currently used in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz, is there any difficulty with use of the bands and/or obstacles to the use of the bands for WAIC applications?

**Answer:** Not Applicable

**Future plans**

**Question 3:** Do you have planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? (Yes / No)

**Answer:** No

If you answered “Yes” to Question 3 above, please answer Question 4.

**Question 4:** What is/are planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz?

**Answer:** Not Applicable

**Others**

**Question 5:** Do you have any issues to be considered relating to the use of the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? If so, what are the issues?

**Answer:** Yes, could affect existing users. The new applications must not cause interference to existing applications.

# Sri Lanka

**Current usage**

**Question 1:** What is/are current allocation(s) (e.g. radiolocation service, aeronautical radionavigation service, fixed service, Earth exploration satellite service, space research (active) service), application(s) and assigned/licensed in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz in your country?

**Answer:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Frequency Bands** | **Service** | **Applications** | **Commercial****Operator** | **License duration** |
| 1 | 2 700-2 900 MHz | None | NA | NA | NA |
| 2 | 4 200-4 400 MHz | None | NA | NA | NA |
|   | 5 350-5 460 MHz | None | NA | NA | NA |

**Question 2**: If there are no services currently used in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz, is there any difficulty with use of the bands and/or obstacles to the use of the bands for WAIC applications?

**Answer:** No difficulties are noticed at the moment

**Future plans**

**Question 3:** Do you have planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? (Yes / No)

**Answer:** No

If you answered “Yes” to Question 3 above, please answer Question 4.

**Question 4:** What is/are planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz?

**Answer:** Not Applicable

**Others**

**Question 5:** Do you have any issues to be considered relating to the use of the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? If so, what are the issues?

**Answer:** No such issues as no deployments are planned

# Thailand

**Current usage**

**Question 1:** What is/are current allocation(s) (e.g. radiolocation service, aeronautical radionavigation service, fixed service, Earth exploration satellite service, space research (active) service), application(s) and assigned/licensed in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz in your country?

**Answer:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Frequency Bands** | **Service** | **Applications** | **Commercial****Operator** | **License duration** |
| 1 | 2 700-2 900 MHz | Aeronautical Radionavigation | Air Traffic ControlRadar | Non- Commercial |  |
| Radiolocation |
| 2 | 4 200-4 400 MHz |  |  |  |  |
| 3 | 5 350-5 460 MHz |  |  |  |  |

**Question 2**: If there are no services currently used in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz, is there any difficulty with use of the bands and/or obstacles to the use of the bands for WAIC applications?

**Answer:** Not applicable.

**Future plans**

**Question 3:** Do you have planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? (Yes / No)

**Answer:** No.

If you answered “Yes” to Question 3 above, please answer Question 4.

**Question 4:** What is/are planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz?

**Answer:** Not applicable.

**Others**

**Question 5:** Do you have any issues to be considered relating to the use of the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? If so, what are the issues?

**Answer:** In Thailand, these bands are mainly used by aeronautical users. This could simplify the mitigation of interference between WAIC and existing aeronautical systems. Nevertheless, interference analysis and mitigation techniques should be studied by ITU-R and/or APT so that APT members will have sufficient and timely information for consideration of regulatory actions regarding WAIC.

# Vietnam

**Current usage**

**Question 1:** What is/are current allocation(s) (e.g. radiolocation service, aeronautical radionavigation service, fixed service, Earth exploration satellite service, space research (active) service),application(s) and assigned/licensed inthe bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz in your country?

**Answer:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Frequency Bands [MHz]** | **Allocation Service** | **Applications** | **Commercial****Operator** | **License duration** |
| 1 | 2 700-2 900 | AERONAUTICAL RADIONAVIGATION 5.337 Radiolocation 5.423 | Aeronautical approach radarWeather radar |  | 10 years |
| 2 | 4 200-4 400 | AERONAUTICAL RADIONAVIGATION 5.438 5.440 |  |  |  |
|  3 | 5 350-5 460 | EARTH EXPLORATION-SATELLITE (active) 5.448B RADIOLOCATION 5.448D AERONAUTICAL RADIONAVIGATION 5.449 SPACE RESEARCH (active) 5.448C |  |  |  |

**Question 2**: If there are no services currently used in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz, is there any difficulty with use of the bands and/or obstacles to the use of the bands for WAIC applications?

**Answer:**

**Future plans**

**Question 3:** Do you have planned or potential future services and applications in the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? (Yes ~~/ No~~)Yes

**Answer:**

If you answered “Yes” to Question 3 above, please answer Question4.

**Question 4:** What is/are planned or potential future servicesand applications inthe bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz?

**Answer:**

|  |  |  |
| --- | --- | --- |
|  | **Planned/Future services and applications**  | **Timeline** |
| 1 | 4200 – 4400 MHz: ARNS systems | 2018 |
| 2 | 5 350-5 460 MHz: ARNS systems | 2018 |

**Others**

**Question 5:** Do you have any issues to be considered relating to the use of the bands 2 700-2 900 MHz, 4 200-4 400 MHz and 5 350-5 460 MHz? If so, what are the issues?

**Answer:**

To insure the protection of allocated services in these bands.

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1. [↑](#footnote-ref-1)