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**APT REPORT ON**

**the usage OF the FREQUENCY band 13.75-14 Ghz
in THE ASIA-PACIFIC REGION**

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in THE ASIA-PACIFIC REGION**

Contents

[1 Introduction 3](#_Toc414627209)

[2 Scope 3](#_Toc414627210)

[3 Vocabulary of terms 4](#_Toc414627211)

[4 ITU Radio Regulations Allocations 4](#_Toc414627212)

[5 Questionnaire used for the survey report 6](#_Toc414627213)

[6 The current national frequency allocations of APT Members in the frequency band 13.75-14 GHz 7](#_Toc414627214)

[6.1 Australia 7](#_Toc414627215)

[6.2 Bhutan 7](#_Toc414627216)

[6.3 China (People’s Republic of) 7](#_Toc414627217)

[6.4 Indonesia 7](#_Toc414627218)

[6.5 Iran (Islamic Republic of) 8](#_Toc414627219)

[6.6 Japan 9](#_Toc414627220)

[6.7 Korea (Republic of) 9](#_Toc414627221)

[6.8 New Zealand 9](#_Toc414627222)

[6.9 Singapore 9](#_Toc414627223)

[6.10 Socialist Republic of Viet Nam 9](#_Toc414627224)

[6.11 Thailand 10](#_Toc414627225)

[7 The current/planned applications and responsible contact points (optional) of APT Members in the frequency band 13.75-14 GHz 10](#_Toc414627226)

[7.1 Australia 10](#_Toc414627227)

[7.2 Bhutan 11](#_Toc414627228)

[7.3 China (People’s Republic of) 11](#_Toc414627229)

[7.4 Indonesia 11](#_Toc414627230)

[7.5 Iran (Islamic Republic of) 11](#_Toc414627231)

[7.6 Japan 12](#_Toc414627232)

[7.7 Korea (Republic of) 12](#_Toc414627233)

[7.8 New Zealand 13](#_Toc414627234)

[7.9 Singapore 13](#_Toc414627235)

[7.10 Socialist Republic of Viet Nam 13](#_Toc414627236)

[7.11 Thailand 14](#_Toc414627237)

[8 Summary 14](#_Toc414627238)

# Introduction

In the AWG-16 meeting, there was an input AWG-16/INP 86 proposing to conduct a survey on the usage of the frequency band 13.75-14 GHz in the Asia-Pacific region, in order to assist APT Members in using the mentioned frequency band efficiently. The reasons for the proposal in AWG-16/ INP 86 are explained below.

Due to the fast development of fixed-satellite service (FSS) applications in the Ku band, the amount of spectrum in the frequency band 14-14.5 GHz could not satisfy the increasing communications requirements. Noting the frequency band 13.75-14 GHz has also been allocated to FSS on a primary basis in all International Telecommunication Union (ITU) regions since 1996, more and more administrations and satellite operators are deploying or planning to deploy FSS in this frequency band. However in the mentioned frequency band, such FSS applications have to meet the severe limitations as specified in the Radio Regulations.

In addition to FSS, the frequency band 13.75-14 GHz was also allocated to the radiolocation service on a co-primary basis. Furthermore, radionavigation, fixed and/or mobile services were also additionally allocated on a primary basis in some countries, as indicated in the footnotes Nos. **5.499**, **5.500** and **5.501**.

In order to protect the operation of the radiolocation service in this band, the footnote No.**5.502** (WRC-03) indicates that the minimum antenna diameter of the earth station in a geostationary FSS network is 1.2 m. The power-flux density (pfd) level produced by these FSS earth stations, with antenna diameter smaller than 4.5 m, shall not exceed -115 dB (W/m2·10 MHz) for more than 1% of the time at 3 m above the ground at the border, and/or at 36 m above sea level at its low-water mark, of those countries where the administrations provide or are planning to provide radiolocation service, unless prior agreement has been obtained. In addition, for the protection of the application of space research service, the footnote No. **5.503** (WRC-03) places additional constraints on the operation of FSS earth stations in the 10 MHz band from 13.77-13.78 GHz.

Because of the above mentioned severe operational restrictions, implementation difficulties are faced not only in countries with small or narrow geographical areas, but also by other administrations and satellite operators who want to operate FSS systems in the frequency band 13.75-14 GHz. There is less flexibility in designing VSAT networks in this frequency band, and the consultation process may also be difficult due to lack of application information in the Asia-Pacific countries.

In order to protect the normal operation of the radiolocation service and/or other co-primary services based on the Radio Regulations, as well as to rationalize the arrangement of the applications for those APT members who are using and/or planning to provide FSS in the frequency band13.75-14 GHz, it is necessary to consult the information on the application status of services in this frequency band.

# Scope

The purpose of this survey is to collect information on the usage of the frequency band 13.75-14 GHz in the Asia Pacific region. Based on the results of the survey, an AWG/APT Report on the usage of the frequency band 13.75-14 GHz in the Asia Pacific region will be developed. This Report could help those administrations who are using or planning to provide FSS in the frequency band 13.75-14 GHz, to better understand the application situation and the due protection requirement of other co-primary services in an efficient manner. In addition, this Report could also assist administrations who operate other services to better understand the FSS implementation situation in different APT Member countries. This survey is not related to the modification of the footnotes Nos.**5.502** and **5.503**.

# Vocabulary of terms

ITU :International Telecommunication Union

FSS :Fixed-satellite service

Pfd :Power-flux density

VSAT :Very small aperture terminal

# ITU Radio Regulations Allocations

In the Radio Regulations (2012 edition), the frequency band 13.75-14 GHz is allocated in three Regions as follows:

Table: ITU Radio Regulations allocations in the 13.75-14 GHz Frequency Band

|  |
| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| **13.75-14**  FIXED-SATELLITE (Earth-to-space) 5.484A RADIOLOCATION Earth exploration-satellite Standard frequency and time signal-satellite (Earth-to-space) Space research 5.499 5.500 5.501 5.502 5.503 |
|  |

**5.484A** The use of the bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 13.75-14.5 GHz (Earth-to-space), 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), 29.5-30 GHz (Earth-to-space) by a non-geostationary-satellite system in the fixed-satellite service is subject to application of the provisions of No. **9.12** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete coordination or notification information, as appropriate, for the non-geostationary-satellite systems in the fixed-satellite service and of the complete coordination or notification information, as appropriate, for the geostationary-satellite networks, and No. **5.43A** does not apply. Non-geostationary-satellite systems in the fixed-satellite service in the above bands shall be operated in such a way that any unacceptable interference that may occur during their operation shall be rapidly eliminated. (WRC-2000)

**5.499** *Additional allocation:* in Bangladesh and India, the band 13.25-14 GHz is also allocated to the fixed service on a primary basis. In Pakistan, the band 13.25-13.75 GHz is allocated to the fixed service on a primary basis. (WRC-12)

**5.500** *Additional allocation:* in Algeria, Angola, Saudi Arabia, Bahrain, Brunei Darussalam, Cameroon, Egypt, the United Arab Emirates, Gabon, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Jordan, Kuwait, Lebanon, Madagascar, Malaysia, Mali, Morocco, Mauritania, Niger, Nigeria, Oman, Qatar, the Syrian Arab Republic, Singapore, Sudan, South Sudan, Chad and Tunisia, the band 13.4-14 GHz is also allocated to the fixed and mobile services on a primary basis. In Pakistan, the band 13.4-13.75 GHz is also allocated to the fixed and mobile services on a primary basis. (WRC-12)

**5.501** *Additional allocation:* in Azerbaijan, Hungary, Japan, Kyrgyzstan, Romania and Turkmenistan, the band 13.4-14 GHz is also allocated to the radionavigation service on a primary basis. (WRC-12)

**5.502** In the band 13.75-14 GHz, an earth station of a geostationary fixed-satellite service network shall have a minimum antenna diameter of 1.2 m and an earth station of a non-geostationary fixed-satellite service system shall have a minimum antenna diameter of 4.5 m. In addition, the e.i.r.p., averaged over one second, radiated by a station in the radiolocation or radionavigation services shall not exceed 59 dBW for elevation angles above 2° and 65 dBW at lower angles. Before an administration brings into use an earth station in a geostationary-satellite network in the fixed-satellite service in this band with an antenna diameter smaller than 4.5 m, it shall ensure that the power flux-density produced by this earth station does not exceed:

– –115 dB(W/(m2 · 10 MHz)) for more than 1% of the time produced at 36 m above sea level at the low water mark, as officially recognized by the coastal State;

– –115 dB(W/(m2 · 10 MHz)) for more than 1% of the time produced 3 m above ground at theborder of the territory of an administration deploying or planning to deploy land mobile radars in this band, unless prior agreement has been obtained.

For earth stations within the fixed-satellite service having an antenna diameter greater than or equal to 4.5 m, the e.i.r.p. of any emission should be at least 68 dBW and should not exceed 85 dBW. (WRC-03)

**5.503** In the band 13.75-14 GHz, geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 shall operate on an equal basis with stations in the fixed-satellite service; after that date, new geostationary space stations in the space research service will operate on a secondary basis. Until those geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 cease to operate in this band:

– in the band 13.77-13.78 GHz, the e.i.r.p. density of emissions from any earth station in the fixed-satellite service operating with a space station in geostationary-satellite orbit shall not exceed:

i) 4.7*D* 28 dB(W/40 kHz), where *D* is the fixed-satellite service earth station antenna diameter (m) for antenna diameters equal to or greater than 1.2 m and less than 4.5 m;

ii) 49.2 20 log(*D*/4.5) dB(W/40 kHz), where *D* is the fixed-satellite service earth station antenna diameter (m) for antenna diameters equal to or greater than 4.5 m and less than 31.9 m;

iii) 66.2 dB(W/40 kHz) for any fixed-satellite service earth station for antenna diameters (m) equal to or greater than 31.9 m;

iv) 56.2 dB(W/4 kHz) for narrow-band (less than 40 kHz of necessary bandwidth) fixed-satellite service earth station emissions from any fixed-satellite service earth station having an antenna diameter of 4.5 m or greater;

*–* the e.i.r.p. density of emissions from any earth station in the fixed-satellite service operating with a space station in non-geostationary-satellite orbit shall not exceed 51 dBW in the 6 MHz band from 13.772 to 13.778 GHz.

Automatic power control may be used to increase the e.i.r.p. density in these frequency ranges to compensate for rain attenuation, to the extent that the power flux-density at the fixed-satellite service space station does not exceed the value resulting from use by an earth station of an e.i.r.p. meeting the above limits in clear-sky conditions. (WRC-03)

# Questionnaire used for the survey report

The questionnaire contained two questions to collect information on the national frequency allocations within the frequency band of 13.75-14 GHz, including current/planned spectrum usage, as well as protection requirements for the existing/planned services.

**Question 1:** What are the national frequency allocations within the 13.75-14 GHz band in your country? What is the regulation especially the specific on the service operations in your country (e.g. internal country footnote, specific regulation, guideline for application)?

|  |  |  |  |
| --- | --- | --- | --- |
|  | Allocations  | Range of the Frequency band  | Specific Regulation |
| 1 |  |  |  |
| 2 |  |  |  |

**Question 2:** What are current applications, including the applications plans based on the frequency allocation (e.g. fixed-satellite, radiolocation, space research, radionavigation, fixed and mobile services) as well as contact point (contact information of administrations and/or operator) if possible in the 13.75-14 GHz band in your country?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Service | Range of the frequency band  | Current applications or plans | Protection requirement  | Contact point (optional) |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |

# The current national frequency allocations of APT Members in the frequency band 13.75-14 GHz

## Australia

|  |  |  |  |
| --- | --- | --- | --- |
|  | Allocations  | Range of the Frequency band  | Specific Regulation |
| 1 | Fixed Satellite Service (earth-to-space) | 13.75-14.8 GHz | Not for ubiquitous use |
| 2 | Radiolocation | 13.4-14 GHz | Government use only |

*Note: There are also Australian secondary allocations to the Earth exploration-satellite service, standard frequency and time signal-satellite service (Earth-to-space) and the space research service.*

## Bhutan

|  |  |  |  |
| --- | --- | --- | --- |
|  | Allocations  | Range of the Frequency band  | Specific Regulation |
| 1 | Primary (Fixed Satellite and Radio location)  | 13.75-14 GHz | N/A |
| 2 | Secondary (Earth exploration satellite, Standard frequency and time signal satellite and Space research |  |  |

##

## China (People’s Republic of)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Allocations  | Range of the Frequency band  | Specific Regulation |
| 1 | FIXED-SATELLITE(Earth- to - space) | 13.75-14 GHz | RR 5.502 5.503 |
| 2 | RADIOLOCATION | 13.75-14 GHz |  |
| 3 | Earth exploration-satellite | 13.75-14 GHz |  |
| 4 | Standard frequency and time signal-satellite(Earth-to-space) | 13.75-14 GHz |  |
| 5 | Space research | 13.75-14 GHz |  |

## Indonesia

|  |  |  |  |
| --- | --- | --- | --- |
|  | Allocations  | Range of the Frequency band  | Specific Regulation |
| 1 | FIXED and MOBILE | 13.75-14 GHz | Radio Regulation 2012 footnote 5.500 |
| 2 | FIXED-SATELLITE (Earth-to-space)RADIOLOCATIONEarth exploration-satelliteStandard frequency and time signal-satellite (Earth-to-space)Space research | 13.75-14 GHz | Radio Regulation 2012 |
| 3 | FIXED-SATELLITE | Downlink[MHz] | Uplink[MHz] | Internal country footnote: Ministrial Decree No.25/2014 regarding TASFRI footnote INS34 |
| 10 990–11 662 | 13 790–13 862  |
| 11 150–11 222  | 13 950–14 022 |
| 11 490–11 562  | 14 290–14 362 |
| 11 650–11 700 | 14 450–14 522 |

**Note:**

**5.500** *Additional allocation:* in Algeria, Angola, Saudi Arabia, Bahrain, Brunei Darussalam, Cameroon, Egypt, the United Arab Emirates, Gabon, **Indonesia**, Iran (Islamic Republic of), Iraq, Israel, Jordan, Kuwait, Lebanon, Madagascar, Malaysia, Mali, Morocco, Mauritania, Niger, Nigeria, Oman, Qatar, the Syrian Arab Republic, Singapore, Sudan, South Sudan, Chad and Tunisia, the band 13.4-14 GHz **is also allocated to the fixed and mobile services on a primary basis**. In Pakistan, the band 13.4-13.75 GHz is also allocated to the fixed and mobile services on a primary basis. (WRC-12)

## Iran (Islamic Republic of)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Allocations  | Range of the Frequency band  | Specific Regulation |
| 1 | FIXED-SATELLITE (Earth-to-space) | 13.75-14 GHz | As provided by RR No.5.484A and No.5.502  |
| 2 | RADIOLOCATION | 13.75-14 GHz | Short range low power radiodetermination applications under technical standard EN 300 440 |
| 3 | FIXED | 13.75-14 GHz | As provided by RR No.5.500 |
| 4 | MOBILE | 13.75-14 GHz | As provided by RR No.5.500 |
| 5 | Earth exploration-satellite | 13.75-14 GHz | - |
| 6 | Standard frequency and time signal-satellite (Uplink) | 13.75-14 GHz | - |
| 7 | Space research | 13.75-14 GHz | - |

## Japan

|  |  |  |  |
| --- | --- | --- | --- |
|  | Allocations | Range of the Frequency band | Specific Regulation |
| 1 | FIXED-SATELLITE(Earth-to-space) | 13.75-14 GHz | No specific Regulations (in conformity with RR FN Nos. **5.502** and **5.503**) |
| 2 | RADIOLOCATION | 13.75-14 GHz |
| 3 | RADIONAVIGATION | 13.75-14 GHz(According to RR No. **5.501**) |
| 4 | Earth explanation-satellite | 13.75-14 GHz |
| 5 | Standard frequency and time signal-satellite(Earth-to-space) | 13.75-14 GHz |
| 6 | Space research | 13.75-14 GHz |

##

## Korea (Republic of)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Allocations | Range of the Frequency band | Specific Regulation |
| 1 | FIXED SATELLITE (Earth-to-space) | 13.75 – 14 GHz | K151B |
| 2 | RADIOLOCATION | 13.75 – 14 GHz |  |
| 3 | Standard frequency and time signal satellite (Earth-to-space) | 13.75 – 14 GHz |  |
| 4 | Space research | 13.75 – 14 GHz |  |

* **K151B** *The bands 11.7-12.0 GHz, 12.2-12.75 GHz, 13.75-14.5 GHz, 14.5-14.8 GHz, 19.8-21.2 GHz, and 29.6-31.0 GHz are used for satellite services.*

##

## New Zealand

|  |  |  |  |
| --- | --- | --- | --- |
|  | Allocations  | Range of the Frequency band  | Specific Regulation |
| 1 | RADIOLOCATION | 13.75-14 GHz | N/A |

## Singapore

|  |  |  |  |
| --- | --- | --- | --- |
|  | Allocations  | Range of the Frequency band  | Specific Regulation |
| 1 | Fixed-Satellite Service\* | 13.75 – 14.0 GHz |  |

\* In Singapore, the band 13.4-14 GHz is also allocated to the fixed and mobile services on a primary basis.

##

## Socialist Republic of Viet Nam

|  |  |  |  |
| --- | --- | --- | --- |
|  | Allocations  | Range of the Frequency band  | Specific Regulation |
| 1 | FIXED-SATELLITE (Earth-to-space) | 13.75-14 GHz | 5.484A VTN16 5.502 5.503 |
| 2 | RADIOLOCATIONEarth exploration-satelliteStandard frequency and time signal-satellite (Earth-to-space)Space research | 13.75-14 GHz | VTN16 5.502 5.503 |

VTN16:

“The below frequency bands are preferential to use for systems operating in FSS:

3400-3700 MHz (space-to-Earth)

6425-6725 MHz (Earth-to-space)

10700-11700 MHz (space-to-Earth)

12750-13250 MHz (Earth-to-space)

13750- 14000 MHz (Earth -to- space)

14250-14500 MHz (Earth -to- space)

The systems operating in FSS in the above downlink frequency bands (space-to-Earth) shall have receiving filters complying with the standards of the out of band signal.

Systems operating in other services in these frequency bands shall not cause harmful interference to, nor claim protection from the systems operating in FSS.

##

## Thailand

|  |  |  |  |
| --- | --- | --- | --- |
|  | Allocations  | Range of the Frequency band  | Specific Regulation |
| 1 | FIXED-SATELLITE (Earth-to-space) 5.484ARADIOLOCATIONEarth exploration-satelliteStandard frequency and time signal-satellite (Earth-to-space)Space research5.502 5.503 | 13.75-14 GHz | T-JTC2\* (Parameters for frequency coordination along Thailand and Malaysia border)\*Joint Technical Committee on Coordination and Assignment of Frequencies along Thailand-Malaysia Common Border |

# The current/planned applications and responsible contact points (optional) of APT Members in the frequency band 13.75-14 GHz

##

## Australia

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Service | Range of the frequency band  | Current applications or plans | Protection requirement  | Contact point (optional) |
| 1 | Fixed Satellite Service (earth-to-space) | 13.75-14.8 GHz | Fixed Satellite Service | Protection of links achieved through international coordination |  |
| 2 | Radiolocation | 13.4-14 GHz | Government use only |  |  |

##

## Bhutan

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Service | Range of the frequency band  | Current applications or plans | Protection requirement  | Contact point (optional) |
| 1 | N/A | N/A | N/A | N/A | N/A |

##

## China (People’s Republic of)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Service | Range of the frequency band  | Current applications or plans | Protection requirement  | Contact point (optional) |
| 1 | Fixed-satellite | 13.75-14GHz | Fixed-satellite service |  |  |
| 2 | Radiolocation | 13.75-14GHz | Radiolocation | ITU-R M.1644 |  |

##

## Indonesia

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Service | Range of the frequency band  | Current applications or plans | Protection requirement  | Contact point (optional) |
| 1 | FSS | 13.75–14 GHz | fixed-satellite in current application and plan | - | - |
| 2 | FIXED and MOBILE | 13.75–14 GHz | not in used  | - | - |

##

## Iran (Islamic Republic of)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Service | Range of the frequency band  | Current applications or plans | Protection requirement  | Contact point (optional) |
| 1 | FIXED-SATELLITE | 13.75-14 GHz | VSAT (Terminals and hubs) | - | - |
| 2 | FIXED | 13.75-14 GHz | Low density point to point links | - | - |
| 3 | SRD (Short Range Device) | 13.4-14 GHz | Radiodetermination: radar, detection, movement and alert applications | Max. Power: 25mW e.i.r.p | - |

##

## Japan

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Service | Range of the frequency band  | Current applications or plans | Protection requirement | Contact point (optional) |
| 1 | FIXED-SATELLITE(Earth-to-space) | 13.75-14 GHz | Currently, mainly used by the feeder link for DTH service and/or TCR. But, any type of satellite applications can be used in the future. | N/A(Sharing with other service is depending on case-by-case internal consultation.) |  |
| 2 | RADIOLOCATION | 13.75-14 GHz | N/A | N/A |  |
| 3 | RADIONAVIGATION | 13.75-14 GHz | Vessel Traffic Service (VTS) radar | N/A(Sharing with other service is depending on case-by-case internal consultation.) |  |
| 4 | Earth explanation-satellite | 13.75-14 GHz | Radio system in experiment | N/A(Protected on secondary basis and experimental station basis)  |  |
| 5 | Standard frequency and time signal-satellite(Earth-to-space) | 13.75-14 GHz | N/A | N/A |  |
| 6 | Space research | 13.75-14 GHz | N/A | N/A |  |

## Korea (Republic of)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Service | Range of the frequency band  | Current applications or plans | Protection requirement  | Contact point (optional) |
| 1 | FSS | 13.75-14 GHz | Satellite communication | - |  |

##

## New Zealand

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Service | Range of the frequency band  | Current applications or plans | Protection requirement  | Contact point (optional) |
| 1 | RADIOLOCATION | 13.75-14 GHz | Current application - radars | Protection criteria in accordance with Recommendations [ITU-R M.1644](http://www.itu.int/rec/R-REC-M.1644/en) and [ITU-R M.1461](http://www.itu.int/rec/R-REC-M.1461/en) |  |

## Singapore

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Service | Range of the frequency band  | Current applications or plans | Protection requirement  | Contact point (optional) |
| 1 | Fixed-Satellite | 13.75 – 14.0 GHz | Satellite Uplink |  |  |

##  Socialist Republic of Viet Nam

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Service | Range of the frequency band  | Current applications or plans | Protection requirement  | Contact point (optional) |
| 1 | FIXED-SATELLITE (Earth-to-space) | 13.75-14 GHz | VSAT, DTH | 5.484A VTN16 5.502 5.503 | VNPT InternationalHead Office: No. 97 Str. Nguyen Chi Thanh - Ha Noi – VietnamTel: +84 4 38410034 Fax: +84 4 38357393 |
| 2 | RADIOLOCATIONEarth exploration-satelliteStandard frequency and time signal-satellite (Earth-to-space)Space research |  |  |  |  |

VTN16:

“The below frequency bands are preferential to use for systems operating in FSS:

3400-3700 MHz (space-to-Earth)

6425-6725 MHz (Earth-to-space)

10700-11700 MHz (space-to-Earth)

12750-13250 MHz (Earth-to-space)

13750- 14000 MHz (Earth - to- space)

14250-14500 MHz (Earth -to- space)

The systems operating in FSS in the above downlink frequency bands (space-to-Earth) shall have receiving filters complying with the standards of the out of band signal.

Systems operating in other services in these frequency bands shall not cause harmful interference to, nor claim protection from the systems operating in FSS.

##  Thailand

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Service | Range of the frequency band  | Current applications or plans | Protection requirement  | Contact point (optional) |
| 1 | FIXED-SATELLITE | 13.75-14 GHz | Fixed-Satellite |  |  |

# Summary

This survey report includes information on the allocations and current/planned application situation of APT Members in the frequency band 13.75-14 GHz. Such information could help APT Members to better understand the actual usage and avoid the potential harmful interference between different co-primary services and thus improve the efficient usage of the frequency band 13.75-14 GHz.

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