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**APT SURVEY REPORT FOR**

**100 TO 300KHZ BAND NON-BEAM WPT**

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**APT SURVEY REPORT FOR 100 TO 300KHZ BAND NON-BEAM WPT**

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1. **Introduction**

Wireless Power Transmission (WPT) is a technology making it possible to transfer electrical energy from a power source to an electrical load without an interconnection. Wireless power transmission is useful especially when connecting devices with wires is inconvenient or dangerous.

Non-beam WPT typically operates in the near field using non-radiative techniques, in which power is transferred by magnetic fields using inductive coupling between coils of wire, or by electric fields using capacitive coupling between metal electrodes. Several techniques are used for non-beam WPT, such as inductive coupling, resonant inductive coupling, capacitive coupling, resonant capacitive coupling, magneto dynamic coupling. Low power non-beam WPT applications include charging handheld devices like phones and [electric toothbrushes](https://en.wikipedia.org/wiki/Electric_toothbrush), [RFID](https://en.wikipedia.org/wiki/RFID) tags, etc…

Portable and mobile devices form by far the largest volume of WPT devices currently being used.

APT is now drafting a Recommendation on frequency ranges for non-Beam WPT technologies for mobile device. Currently, the Industrial, Scientific, and Medical (ISM) designated band 6 765 kHz – 6 795 kHz (see ITU Radio Regulations No. 5.138) is listed in the draft recommendation circulated for approval. In addition to this ISM band, APT is still investigating non-ISM frequency ranges as there is a demand, for example 100 – 300 kHz frequency range, from the various industries.

Given such circumstances, the APT Wireless Group (AWG) circulated the questionnaires [1] on non-Beam WPT in non-ISM bands to gather information regarding the status of regulations, allowed frequency ranges, suggested WPT power level/reference standard and incumbent systems from the APT countries.

The questionnaires are intended to ask countries if the listed frequency ranges are allowed for non-beam WPT use and also to collect existing system information in order to do further impact studies.

This Survey Report is developed based on the responses to the questionnaires from APT members. It is helpful to understand the regulatory status of WPT in the Asia-Pacific region and can be a guide for further development of APT Recommendation(s)/Report(s).

The questionnaires and the responses can be found in Chapter 2. The responses are summarized in Chapter 3.

1. **Questionnaire**

The questions below are specifically related to the operation of non-beam WPT mobile charging devices operating in the 100-300 kHz frequency range:

**Questions:**

1. What are the existing regulations in your country for frequency band 100 - 300kHz and the applications?

100 – 148.5kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

148.5 – 205kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

205 – 300kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Is there any WPT mobile device operating in 100 - 300kHz deployed in your country?

100 – 148.5kHz, Yes No

148.5 – 205kHz, Yes No

205 – 300kHz, Yes No

1. Does your country regulate Non-Beam WPT mobile device operating in 100 - 300kHz now?

100 – 148.5kHz, Yes No

148.5 – 205kHz, Yes No

205 – 300kHz, Yes No

1. What is the regulation or standard for non-beam WPT in 100 - 300kHz for mobile devices in your country?

100 – 148.5kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

148.5 – 205kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

205 – 300kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Can your country allow mobile devices to use 100 - 300kHz for Non-Beam WPT when they comply with your existing regulation or standard?

100 – 148.5kHz, Yes No

148.5 – 205kHz, Yes No

205 – 300kHz, Yes No

1. Which frequency is not allowed for Non-Beam WPT in frequency range of 100 - 300kHz when it complies with existing regulations?

100 – 148.5kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

148.5 – 205kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

205 – 300kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Can Non-Beam WPT for mobile devices in 100 - 300kHz be approved by meeting the existing regulation?

100 – 148.5kHz, Yes No

148.5 – 205kHz, Yes No

205 – 300kHz, Yes No

1. What is the guideline (emission level and etc) for 100 - 300kHz to meet even there’s no regulation or standard to protect the incumbent system?

100 – 148.5kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

148.5 – 205kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

205 – 300kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Are there any areas of investigation that you think are necessary to the allocation of Non-beam WPT for mobile device operating in 100 - 300kHzin your country?

100 – 148.5kHz

Train Radio

Amateur Radio

Marine Radio

Aviation Radio

Broadcasting system

Others, please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

148.5 - 205kHz

Train Radio

Amateur Radio

Marine Radio

Aviation Radio

Broadcasting system

Others, please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

205 - 300kHz

Train Radio

Amateur Radio

Marine Radio

Aviation Radio

Broadcasting system

Others, please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Who is the contact person to discuss the standard and regulation for WPT frequency plan in your country?
2. Do you think it is necessary to unify the Non- ISM frequency band for Non-beam WPT for mobile device among countries?

Strong agree,

Agree,

Neutral,

Do not agree,

Strong do not agree.

Thanks to the responses from APT Members, the information is consolidated and hyperlinked to the corresponding input documents as provided below:

**Table 2.1 Received Survey responses**

|  |  |  |
| --- | --- | --- |
| No. | Source | Input document |
| 1 | Australia | AWG-23/INP-14 |
| 2 | Bangladesh | AWG-24/INP-08 |
| 3 | China (People’s Republic of) | [AWG-23/INP-99](https://www.apt.int/sites/default/files/2018/04/AWG-23-INP-99_China_9_WIRELESS_POWER_TRANSMISSION_IN_NON-ISM_BAND_0.docx) |
| 4 | Islamic Republic of Iran | [AWG-24/INP-15](https://www.apt.int/sites/default/files/2018/09/AWG-24-INP-15_IRANresponsetoRecirculation_of_WPT_Questionnaire.docx) |
| 5 | Japan | [AWG-24/INP-74](https://www.apt.int/sites/default/files/2018/09/AWG-24-INP-74_Japan9.docx) |
| 6 | Korea (Republic of) | [AWG-24/INP-88](https://www.apt.int/sites/default/files/2018/09/AWG-24-INP-88_KOR_non_beam_WPT_reponse_for_recirculation.docx) |
| 7 | Malaysia | [AWG-23/INP-116](https://www.apt.int/sites/default/files/2018/04/AWG-23-INP-116_Malaysia_WPT_Non-ISM_response.docx) |
| 8 | Myanmar | [AWG-24/INP-23](https://www.apt.int/sites/default/files/2018/09/AWG-24-INP-23_Myanmar_WPT_Response.docx) |
| 9 | New Zealand | [AWG-23/INP-26](https://www.apt.int/sites/default/files/2018/04/AWG-23-INP-26_New_Zealand_WPT_Questionnaire.docx) |
| 10 | Philippines | [AWG-23/INP-118](https://www.apt.int/sites/default/files/2018/04/AWG-23-INP-118_Philippines_WPT_response.docx) |
| 11 | Samoa | [AWG-23/INP-10](https://www.apt.int/sites/default/files/2018/04/AWG-23-INP-10_Samoa_Response_WPT_Non-ISM.docx) |
| 12 | Singapore | [AWG-23/INP-23](https://www.apt.int/sites/default/files/2018/03/AWG-23-INP-23_Singapore_WPT_Questionnaire.docx) |
| 13 | Sri Lanka | [AWG-23/INP-30](https://www.apt.int/sites/default/files/2018/04/AWG-23-INP-30_Sri_Lanka_WPT_Non-ISM_Response_0.docx) |
| 14 | Thailand | [AWG-24/INP-21(Rev.1)](https://www.apt.int/sites/default/files/2018/09/AWG-24-INP-21Rev.1_Thailand_WPT_Questionnaire.docx) |
| 15 | Viet Nam | [AWG-24/INP-102](https://www.apt.int/sites/default/files/2018/09/AWG-24-INP-102_rev1_VTN.Updated_response_to_Questionnaire_on_WPT.docx)(Rev.1) |

1. **Summary of responses**

This section summarizes the responses from Australia, Bangladesh, China (People’s Republic of), Islamic Republic of Iran, Japan, Korea (Republic of), Malaysia, Myanmar, New Zealand, Philippines, Samoa, Singapore, Sri Lanka, Thailand and Viet Nam to the Questionnaire on Non-Beam Wireless Power Transmission in Non-ISM Band.

**3.1 Existing regulations for the 100 – 300kHz frequency range**

This is the response summary for **question#1**.

**Q1:**

What are the existing regulations in your country for frequency band 100 - 300kHz and the applications?

100 – 148.5kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

148.5 – 205kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

205 – 300kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

It is expected that various applications are operating in the 100 – 300kHz frequency range. Also, different standards are present in various countries. The below table is a consolidated input based on the answers to the questionnaire.

**Table 3.1.1 Q1 Response Summary**

|  |  |  |  |
| --- | --- | --- | --- |
| **Existing regulations and applications for the 100 – 300kHz frequency range** | | | |
| Country/Region | 100 – 148.5kHz | 148.5 – 205kHz | 205 – 300kHz |
| Australia | [Radiocommunications Act 1992](https://www.legislation.gov.au/Details/C2017C00356)  [Australian radiofrequency spectrum plan](https://www.acma.gov.au/theacma/australian-radiofrequency-spectrum-plan-spectrum-planning-acma)  [Register of Radiocommunications Licences](https://web.acma.gov.au/rrl/)  [Radiocommunications (Low Interference Potential Devices) Class Licence 2015](https://www.legislation.gov.au/Details/F2016C00432) | [Radiocommunications Act 1992](https://www.legislation.gov.au/Details/C2017C00356)  [Australian radiofrequency spectrum plan](https://www.acma.gov.au/theacma/australian-radiofrequency-spectrum-plan-spectrum-planning-acma)  [Register of Radiocommunications Licences](https://web.acma.gov.au/rrl/)  [Radiocommunications (Low Interference Potential Devices) Class Licence 2015](https://www.legislation.gov.au/Details/F2016C00432) | [Radiocommunications Act 1992](https://www.legislation.gov.au/Details/C2017C00356)  [Australian radiofrequency spectrum plan](https://www.acma.gov.au/theacma/australian-radiofrequency-spectrum-plan-spectrum-planning-acma)  [Register of Radiocommunications Licences](https://web.acma.gov.au/rrl/)  [Radiocommunications (Low Interference Potential Devices) Class Licence 2015](https://www.legislation.gov.au/Details/F2016C00432) |
| Bangladesh | SRD, Maritime applications, Ultra low power active medical implant (Amateur application within 135.7-137.8 kHz) | Ultra low power active medical implant | Aeronautical Radio Beacon, Maritime radio beacon, Ultra low power active medical implant |
| China (People’s Republic of) | 9-190 kHz can be used by all types of short range devices, if they comply with the regulatory document MIIT [2005] 423 | 9-190 kHz can be used by all types of short range devices, if they comply with the regulatory document MIIT [2005] 423 | NA |
| Islamic Republic of Iran | [National spectrum allocations](https://www.cra.ir/FileSystem/View/File.aspx?FileId=ca3e85cf-09a1-471f-be04-c7b495066d7b) according to Region 3.  Short range devices regulation CRA decision No. CRA-DEC 9000-01 | [National spectrum allocations](https://www.cra.ir/FileSystem/View/File.aspx?FileId=ca3e85cf-09a1-471f-be04-c7b495066d7b) according to Region 3.  Short range devices regulation CRA decision No. CRA-DEC 9000-01 | [National spectrum allocations](https://www.cra.ir/FileSystem/View/File.aspx?FileId=ca3e85cf-09a1-471f-be04-c7b495066d7b) according to Region 3.  Short range devices regulation CRA decision No. CRA-DEC 9000-01 |
| Japan | 90-110kHz: RADIONAVIGATION,  110-112kHz: FIXED and MARITIME MOBILE,  112-117.6kHz: RADIONAVIGATION,  117.6-126kHz: FIXED and MARITIME MOBILE,  126-129kHz; RADIONAVIGATION,  129-135.7kHz: FIXED, RADIONAVIGATION and MARITIME MOBILE,  135.7-137.8kHz: FIXED, RADIONAVIGATION, MARITIME MOBILE and amateur (secondary) of e.i.r.p. not more than 1W,  137.8-160kHz: FIXED, RADIONAVIGATION and MARITIME MOBILE | 137.8-160kHz: FIXED, RADIONAVIGATION and MARITIME MOBILE,  160-200kHz:　 Aeronautical RADIONAVIGATION,  200-285kHz: aeronautical RADIONAVIGATION and aeronautical mobile (secondary) | 200-285kHz: aeronautical RADIONAVIGATION and aeronautical mobile (secondary),  285-325kHz: MARITIME RADIONAVIGATION and AERONAUTICAL MOBILE |
| Korea (Republic of) | Allowed for WPT | Allowed for WPT | NA |
| Malaysia | Radionavigation, Maritime Mobile and Fixed Service;  Part of the band is under Class Assignment (unlicensed) | Aeronautical Radionavigation, Maritime Mobile and Fixed Service;  Part of the band is under Class Assignment (unlicensed) | Aeronautical Radionavigation, Maritime Radionavigation and Fixed Service;  Part of the band is under Class Assignment (unlicensed) |
| Myanmar | Technical Specifications for Short Range Devices (SRD) | Technical Specifications for Short Range Devices (SRD) | Technical Specifications for Short Range Devices (SRD) |
| New Zealand | [General User Radio Licence for Short Range Devices](https://www.rsm.govt.nz/about-rsm/spectrum-policy/gazette/gurl/short-range-devices);  [General User Radio Licence for Amateur Radio Operators](https://www.rsm.govt.nz/about-rsm/spectrum-policy/gazette/gurl/amateur-radio-operators) | [General User Radio Licence for Short Range Devices](https://www.rsm.govt.nz/about-rsm/spectrum-policy/gazette/gurl/short-range-devices);  [General User Radio Licence for Amateur Radio Operators](https://www.rsm.govt.nz/about-rsm/spectrum-policy/gazette/gurl/amateur-radio-operators) | ICAO Annex 10 |
| Philippines | [Memorandum](https://www.legislation.gov.au/Details/C2017C00356) Circular No. 03-05-2007 and 02-02-2015;  [Philippines](https://www.acma.gov.au/theacma/australian-radiofrequency-spectrum-plan-spectrum-planning-acma) National Radio Frequency Allocation Table | [Memorandum](https://www.legislation.gov.au/Details/C2017C00356) Circular No. 03-05-2007 and 02-02-2015;  [Philippines](https://www.acma.gov.au/theacma/australian-radiofrequency-spectrum-plan-spectrum-planning-acma) National Radio Frequency Allocation Table | [Memorandum](https://www.legislation.gov.au/Details/C2017C00356) Circular No. 03-05-2007 and 02-02-2015;  [Philippines](https://www.acma.gov.au/theacma/australian-radiofrequency-spectrum-plan-spectrum-planning-acma) National Radio Frequency Allocation Table |
| Samoa | Spectrum Rule Part 5, SRD & Samoa National Frequency Allocation Table 2017 | Spectrum Rule Part 5, SRD & Samoa National Frequency Allocation Table 2017 | Spectrum Rule Part 5, SRD & Samoa National Frequency Allocation Table 2017 |
| Singapore | 100 – 130 kHz: Allocated on a primary basis to radionavigation service  130 – 148.5 kHz: Allocated on a primary basis to maritime mobile service  Allowed for Short Range Devices (SRD). Typical applications include induction loop system / RFID, radio detection, alarm system, medical and biological telemetry. | 148.5 – 160 kHz: Allocated on a primary basis to maritime mobile service  160 – 205 kHz: Allocated on a primary basis to aeronautical radionavigation service  Allowed for SRD. Typical applications include induction loop system / RFID, medical and biological telemetry. | 205 – 285 kHz: Allocated on a primary basis to aeronautical radionavigation service  285 – 300 kHz: Allocated on a primary basis to aeronautical radionavigation service and maritime radionavigation services  Allowed for SRD. Typical applications include induction loop system / RFID, medical and biological telemetry. |
| Sri Lanka | No yet identified | No yet identified | No yet identified |
| Thailand | RNS, Fixed, MMS, Amateur | RNS, ARNS, Fixed, MMS | ARNS, AMS, MNS |
| Viet Nam | Radio Navigation service  Maritime mobile service  Fixed service  Inductive applications (Unlicense applications) | Radio Navigation (aeronautical navigation) service  Fixed service | Radio Navigation (Aeronautical and maritime navigation) service  Aeronautical mobile service |

Detailed answers are available in Annex I.

**3.2 WPT mobile charging device deployment**

WPT mobile charging devices are popular in the market. Wireless Power Consortium (WPC) has been leading the way in wireless charging with an open standard. The Qi technology specifies operation at frequencies in the 87-205 kHz range.

Below is the summary of response from countries on the commercial deployment of WPT mobile charging devices operating in the 100 -300kHz frequency range.

This is the response summary for **question#2**.

**Q2:**

Is there any WPT mobile device operating in 100 - 300kHz deployed in your country?

100 – 148.5kHz, Yes No

148.5 – 205kHz, Yes No

205 – 300kHz, Yes No

**Table 3.2.1 Q2 Response Summary**

|  |  |  |  |
| --- | --- | --- | --- |
| **Commercial WPT mobile charging devices in the 100 – 300kHz frequency range** | | | |
| Country/Region | 100 – 148.5kHz | 148.5 – 205kHz | 205 – 300kHz |
| Australia | Yes | Yes | Yes |
| Bangladesh | No | No | No |
| China (People’s Republic of) | Yes | Yes, part of the band | No |
| Islamic Republic of Iran | Yes | Yes | Yes |
| Japan | Yes | Yes | Yes |
| Korea (Republic of) | Yes | Yes | No |
| Malaysia | Yes | Yes | No |
| Myanmar | Yes | Yes | Yes |
| New Zealand | Yes | Yes | No |
| Philippines | Yes | Yes | Yes |
| Samoa | Yes | Yes | No |
| Singapore | Yes | Yes | Yes |
| Sri Lanka | Yes | Yes | No |
| Thailand | No | No | No |
| Viet Nam | Yes | No | No |

Comments from the administrators are available in Annex II.

**3.3. Regulations for non-beam WPT**

Questions No.3, No.4, No.5, No.6 and No.7 are intended to collect information on regulations and regulatory approval situations in countries for non-beam WPT for mobile device.

This is the response summary for **question#3**.

**Q3:**

Does your country regulate Non-Beam WPT mobile device operating in 100 - 300kHz now?

100 – 148.5kHz, Yes No

148.5 – 205kHz, Yes No

205 – 300kHz, Yes No

**Table 3.3.1 Summary table of question 3**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Country** | **Yes/No**  **100 – 148.5kHz** | **Yes/No**  **148.5 – 205kHz** | **Yes/No**  **205 – 300kHz** | **Remarks** |
| Australia | Yes | Yes | Yes |  |
| Bangladesh | No | No | No |  |
| China (People’s Republic of) | No | No | No | No specific regulation on Non-Beam WPT mobile device operating in 100 – 300 kHz now |
| Islamic Republic of Iran | Yes | Yes | Yes |  |
| Japan | Yes | Yes | Yes |  |
| Korea (Republic of) | Yes | Yes | No |  |
| Malaysia | Yes | Yes | Yes |  |
| Myanmar | No | No | No |  |
| New Zealand | Yes | Yes | No |  |
| Philippines | Yes | Yes | Yes |  |
| Samoa | Yes | Yes |  | The OOTR will consider 205 – 300kHz in the future if the Non Beam WPT system operating in Samoa |
| Singapore | Yes | Yes | Yes |  |
| Sri Lanka | No | No | No |  |
| Thailand | No | No | No |  |
| Viet Nam | Yes | No | No |  |

Comments from the administrators are available in Annex III.

This is the response summary for **question#4**.

**Q4:**

What is the regulation or standard for non-beam WPT in 100 - 300kHz for mobile devices in your country?

100 – 148.5kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

148.5 – 205kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

205 – 300kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Table 3.3.2 Summary table of question 4**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Country** | **Standard/limit**  **100 – 148.5kHz** | **Standard/limit**  **148.5 – 205 kHz** | **Standard/limit**  **205 – 300kHz** | **Remarks** |
| Australia | Radiocommunication licences are not required in Australia for inductive devices that operate in the near field as detailed in [RALI MS 27](https://www.acma.gov.au/-/media/Spectrum-Engineering/Information/pdf/Radiocommunication-Assignment-and-Licensing-Instruction-Determining-the-Applicability-of-Licensing-and-EMC-Regimes-to-Transmitter.pdf?la=en) providing that there is no radiocommunications. | | |  |
| Bangladesh |  |  |  | Not regulated according to Q3 |
| China (People’s Republic of) | No regulation | No regulation | No regulation | No specific regulation on Non-Beam WPT mobile device operating in 100 – 300 kHz now |
| Islamic Republic of Iran | EN300 330 | | |  |
| Japan | <=50W under study, >50W requires individual permission for the installation | | | Refer to Q3 |
| Korea (Republic of) | Technical Regulation under Radio Waves Act | | |  |
| Malaysia | Class Assignment (unlicensed) for Inductive Application Devices | | | Part of the band is under Class Assignment (unlicensed) for Active Medical Implant and Security Devices |
| Myanmar | Technical Specifications for Short Range Devices (SRD) | | |  |
| New Zealand | [Radiocommunications Regulations (Radio Standards) Notice 2016](https://gazette.govt.nz/notice/id/2016-go2007) (specifically  prescribing EN 300 330-1 V1.8.1) | | - | 205 – 300kHz is not permit for WPT |
| Philippines | MC 03-05-2007 and MC 02-02-2015 | | |  |
| Samoa | Spectrum Rule Part 5, SRD & Samoa National Frequency Allocation Table 2017 | Spectrum Rule Part 5, SRD & Samoa National Frequency Allocation Table 2017 | Spectrum Rule Part 5, SRD & Samoa National Frequency Allocation Table 2017 |  |
| Singapore | IMDA Technical Specification for SRD (IMDA TS SRD) | | | EN 300 224-1  EN 300 330-1 |
| Sri Lanka | Not yet identified | Not yet identified | Not yet identified |  |
| Thailand | No regulation | No regulation | No regulation |  |
| Viet Nam | 42dBuA/m @ 10m | NA | NA |  |

Comments from the administrators are available in Annex IV.

This is the response summary for **question#5**.

**Q5:**

Can your country allow mobile devices to use 100 - 300kHz for Non-Beam WPT when they comply with your existing regulation or standard?

100 – 148.5kHz, Yes No

148.5 – 205kHz, Yes No

205 – 300kHz, Yes No

**Table 3.3.3 Summary table of question 5**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Country** | **Yes/No**  **100 – 148.5 kHz** | **Yes/No**  **148.5 – 205 kHz** | **Yes/No**  **205 – 300 kHz** | **Remarks** |
| Australia | Yes | Yes | Yes |  |
| Bangladesh |  |  |  | Not regulated according to Q3 |
| China (People’s Republic of) | Yes | Yes for part of this band | No | 9 – 190 kHz are allowed |
| Islamic Republic of Iran | Yes | Yes | Yes |  |
| Japan | <=50W under study, >50W requires individual permission for the installation | <=50W under study, >50W requires individual permission for the installation | <=50W under study, >50W requires individual permission for the installation | Refer to Q3 |
| Korea (Republic of) | Yes | Yes | No |  |
| Malaysia | Yes | Yes | Yes |  |
| Myanmar | Yes | Yes | Yes |  |
| New Zealand | Yes | Yes | No |  |
| Philippines | Yes | Yes | Yes |  |
| Samoa | Yes | Yes | Yes |  |
| Singapore | Yes | Yes | Yes |  |
| Sri Lanka | Yes | Yes | Yes |  |
| Thailand | Yes | Yes | Yes |  |
| Viet Nam | Yes |  |  |  |

Comments from the administrators are available in Annex V.

This is the response summary for **question#6**.

**Q6:**

Which frequency is not allowed for Non-Beam WPT in frequency range of 100 - 300kHz when it complies with existing regulations?

100 – 148.5kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

148.5 – 205kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

205 – 300kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Table 3.3.4 Summary table of question 6**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Country** | **100 – 148.5 kHz** | **148.5 – 205 kHz** | **205 – 300 kHz** | **Remarks** |
| Australia | Allowed | Allowed | Allowed | The Radiocommunication part of Non-Beam WPT cannot be currently authorised under the LIPD Class Licence if it operates within 285-300 kHz. |
| Bangladesh |  |  |  | Not regulated according to Q3 |
| China (People’s Republic of) | Allowed | Allowed other than 190-205kHz | Not allowed | 9 – 190 kHz are allowed |
| Iran | Allowed | Allowed | Allowed | No restriction |
| Japan | <=50W under study, >50W requires individual permission for the installation | <=50W under study, >50W requires individual permission for the installation | <=50W under study, >50W requires individual permission for the installation | Refer to Q3 |
| Korea (Republic of) | Allowed | Allowed | Not Allowed |  |
| Malaysia | Allowed | Allowed | Allowed |  |
| Myanmar |  |  |  | Allowed according to Q5 |
| New Zealand | Allowed | Allowed | Not Allowed |  |
| Philippines | Allowed | Allowed | Allowed |  |
| Samoa | Allowed | Allowed | Allowed | Reference to Q5 |
| Singapore | Allowed | Allowed | Allowed |  |
| Sri Lanka |  |  |  | Not yet identified |
| Thailand |  |  |  | Not yet identified |
| Viet Nam | Allowed | Not Allowed | Not Allowed |  |

Comments from the administrators are available in Annex VI.

This is the response summary for **question7**.

**Q7:**

Can Non-Beam WPT for mobile devices in 100 - 300kHz be approved by meeting the existing regulation?

100 – 148.5kHz, Yes No

148.5 – 205kHz, Yes No

205 – 300kHz, Yes No

**Table 3.3.5 Summary table of question 7**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Country** | **Yes/No**  **100 – 148.5 kHz** | **Yes/No**  **148.5 – 205 kHz** | **Yes/No**  **205 – 300 kHz** | **Remarks** |
| Australia | Yes | Yes | Yes but only 205-285kHz |  |
| Bangladesh |  |  |  |  |
| China (People’s Republic of) | Yes | Yes for part of the band | No | Radio devices which comply with the regulation document MIIT [2005] 423 are allowed to use 9-190 kHz and approved as short range devices. |
| Islamic Republic of Iran | Yes | Yes | Yes |  |
| Japan | <=50W under study, >50W requires individual permission for the installation | <=50W under study, >50W requires individual permission for the installation | <=50W under study, >50W requires individual permission for the installation | Refer to Q3 about regulation |
| Korea (Republic of) | Yes | Yes | No |  |
| Malaysia | Yes | Yes | Yes |  |
| Myanmar | Yes | Yes | Yes |  |
| New Zealand | Yes | Yes | No |  |
| Philippines | Yes | Yes | Yes |  |
| Samoa | Yes | Yes | Yes |  |
| Singapore | Yes | Yes | Yes |  |
| Sri Lanka | Yes | Yes | Yes |  |
| Thailand | Yes | Yes | Yes |  |
| Viet Nam | Yes |  |  |  |

**3.4 Guideline to protect incumbent radio systems**

This is the response summary for **question#8**.

This section is to figure out what kind of guideline (emission level, etc) is followed to protect the incumbent radio systems.

**Q8:**

What is the guideline (emission level and etc) for 100 - 300kHz to meet even there’s no regulation or standard to protect the incumbent system?

100 – 148.5kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

148.5 – 205kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

205 – 300kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Table 3.4.1 Q8 Response Summary**

|  |  |  |  |
| --- | --- | --- | --- |
| **Guideline to protect incumbent radio systems in 100 – 300kHz frequency range** | | | |
| Country/Region | 100 – 148.5kHz | 148.5 – 205kHz | 205 – 300kHz |
| Australia | CISPR 11 EMC Standard. | CISPR 11 EMC Standard for WPT.  The Radiocommunication part of the Non-Beam WPT operating in the 160-190 kHz has to  comply with FCC Rules Title 47 Part 15 Section 217. | CISPR 11 EMC Standard. |
| Bangladesh |  |  |  |
| China (People’s Republic of) | NA | NA | NA |
| Islamic Republic of Iran | 2400/*f* (kHz)@300m | 2400/*f* (kHz)@300m | 2400/*f* (kHz)@300m |
| Japan | <=50W under study, >50W requires individual permission for the installation | <=50W under study, >50W requires individual permission for the installation | <=50W under study, >50W requires individual permission for the installation |
| Korea (Republic of) | The electric field strength of fundamental frequency of WPT devices should less than or equal to 500uV/m at 3m distance. | The electric field strength of fundamental frequency of WPT devices should less than or equal to 500uV/m at 3m distance. | The electric field strength of fundamental frequency of WPT devices should less than or equal to 500uV/m at 3m distance. |
| Malaysia | Class Assignment No.1 of 2017 | Class Assignment No.1 of 2017 | Class Assignment No.1 of 2017 |
| Myanmar | Technical Specifications for Short Range Devices (SRD) | Technical Specifications for Short Range Devices (SRD) | Technical Specifications for Short Range Devices (SRD) |
| New Zealand | Maximum power must not exceed -20 dBW e.i.r.p. and the magnetic field strength from devices must not exceed 43 dBµA/m at a distance of 10 metres, except in the band 119 – 135 kHz, where the magnetic field strength from devices must not exceed 66 dBµA/m at a distance of 10 metres | Maximum power must not exceed -20 dBW e.i.r.p. and the magnetic field strength from devices must not exceed 43 dBµA/m at a distance of 10 metres, except in the band 119 – 135 kHz, where the magnetic field strength from devices must not exceed 66 dBµA/m at a distance of 10 metres | WPT is not permitted in this band |
| Philippines |  |  |  |
| Samoa | EN300 330 | EN300 330 | EN300 330 |
| Singapore | N.A.  Allowed under IMDA TS SRD | N.A.  Allowed under IMDA TS SRD | N.A.  Allowed under IMDA TS SRD |
| Sri Lanka | Not yet identified | Not yet identified | Not yet identified |
| Thailand | No guideline | No guideline | No guideline |
| Viet Nam | Limit the maximum H field strength (42 dBµA/m@10m) | N.A. | N.A. |

Comments from the administrators are available in Annex VII.

**3.5 Incumbent radio systems to be investigated**

This is the response summary for **question#9**.

Further co-existence studies can be done by referring to the list below in order to address the concern from specific countries.

**Q9:**

Are there any areas of investigation that you think are necessary to the allocation of Non-beam WPT for mobile device operating in 100 - 300kHz in your country?

100 – 148.5kHz

Train Radio

Amateur Radio

Marine Radio

Aviation Radio

Broadcasting system

Others, please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

148.5 - 205kHz

Train Radio

Amateur Radio

Marine Radio

Aviation Radio

Broadcasting system

Others, please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

205 - 300kHz

Train Radio

Amateur Radio

Marine Radio

Aviation Radio

Broadcasting system

Others, please specify \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Table 3.5.1 Q9 Response Summary**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Incumbent system in 100 – 300kHz to be investigated** | | | | | | | |
| Country/Region | Non-ISM (kHz) | Train Radio | Amateur Radio | Aviation Radio | Broadcasting  System | Marine Radio | Others |
| Australia | 100 - 148.5 |  | √ |  |  |  |  |
| 148.5 - 205 |  |  |  |  |  |  |
| 205- 300 |  |  |  |  |  |  |
| Bangladesh | 100 - 148.5 |  | √ |  |  | √ |  |
| 148.5 - 205 |  |  | √ |  | √ |  |
| 205- 300 |  |  | √ |  | √ |  |
| China (People’s republic of) | 100 -148.5 |  | √ | √ |  | √ | Fixed service system，Radio Navigation system，Standard Frequency and Time Signal |
| 148.5 - 205 |  |  | √ |  | √ | Fixed service system |
| 205- 300 |  |  | √ |  | √ |  |
| Islamic Republic of Iran | 100 -148.5 |  |  | √ |  | √ |  |
| 148.5 - 205 |  |  | √ |  | √ |  |
| 205- 300 |  |  | √ |  | √ |  |
| Japan | 100 -148.5 | √ | √ |  |  | √ | System effected by WPT harmonics |
| 148.5 - 205 | √ |  | √ |  |  | System effected by WPT harmonics |
| 205- 300 | √ |  | √ |  | √ | System effected by WPT harmonics |
| Korea (Republic of) | 100 - 148.5 | √ | √ | √ | √ | √ |  |
| 148.5 - 205 | √ | √ | √ | √ | √ |  |
| 205- 300 | √ | √ | √ | √ | √ |  |
| Malaysia | 100 - 148.5 |  |  |  |  | √ | Fixed Service and Radionavigation |
| 148.5 - 205 |  |  |  |  |  | Aeronautical Radionavigation |
| 205- 300 |  |  |  |  |  | Aeronautical Radionavigation and Maritime Radionavigation |
| Myanmar | 100 - 148.5 |  |  |  |  |  |  |
| 148.5 - 205 |  |  | √ |  | √ |  |
| 205- 300 |  |  | √ |  | √ |  |
| New Zealand | 100 - 148.5 |  | √ |  |  |  | Short range devices |
| 148.5 - 205 |  | √ |  |  |  | Short range devices |
| 205- 300 |  |  | √ |  |  | Short range devices |
| Philippines | 100 - 148.5 |  |  |  |  |  |  |
| 148.5 - 205 |  |  |  |  |  |  |
| 205- 300 |  |  |  |  |  |  |
| Samoa | 100 - 148.5 |  |  |  |  | √ | Radionavigation |
| 148.5 - 205 |  |  |  |  | √ |  |
| 205- 300 |  |  |  |  | √ |  |
| Singapore | 100 - 148.5 |  |  |  |  |  |  |
| 148.5 - 205 |  |  |  |  |  |  |
| 205- 300 |  |  |  |  |  |  |
| Sri Lanka | 100 - 148.5 |  |  | √ |  |  |  |
| 148.5 - 205 |  |  | √ |  |  |  |
| 205- 300 |  |  | √ |  |  |  |
| Thailand | 100 - 148.5 |  | √ |  |  |  |  |
| 148.5 - 205 |  |  | √ |  |  |  |
| 205- 300 |  |  | √ |  |  |  |
| Viet Nam | 100 - 148.5 |  |  |  |  |  |  |
| 148.5 - 205 |  |  | √ |  |  |  |
| 205- 300 |  |  | √ |  |  |  |

Comments from the administrators are available in Annex VIII.

**3.6 Country contact for WPT standards, regulation and frequency plan**

This is the response summary for **question#10**.

For questions regarding the standards, regulations and WPT frequency plans within specific countries, please reach out to below contacts.

**Q10:**

Who is the contact person to discuss the standard and regulation for WPT frequency plan in your country?

**Table 3.6.1 Q10 Response Summary**

|  |  |
| --- | --- |
| **Country/Region** | **Contact** |
| Australia | Manager Spectrum Engineering and Space ([freqplan@acma.gov.au](mailto:freqplan@acma.gov.au)) |
| Bangladesh | Director General (Spectrum Division)  Phone: +8801552202732  Email: dgsm@btrc.gov.bd  Bangladesh Telecommunication Regulatory Commission(BTRC)  IEB Bhaban,Ramna,Dhaka-1000 |
| China (People’s Republic of) | Name of the institution: Ministry of Industry and Information Technology (MIIT)  Name of contact person: XU Ying |
| Islamic Republic of Iran | Azim Fard(Ph.D.)  General Director of spectrum planning licensing  Azimfard@cra.ir  +982189661503 |
| Japan | Mr. Sho Yoshimoto, Dupty Director  Electromagnetic Environment Division  Radio Department  Telecommunications Bureau  Ministry of Internal Affairs and Communications  e-mail: gijutsukanri@ml.soumu.go.jp |
| Korea (Republic of) | Kichang yoon([portion@korea.kr](mailto:portion@korea.kr)) |
| Malaysia | Rafeeza Rahim, rafeeza@cmc.gov.my |
| Myanmar | Mr. Soe Thein, Director General, Posts and Telecommunications Department, Ministry of Transport and Communications, Republic of the Union of Myanmar. |
| New Zealand | Peter Gent  Ministry of Business, Innovation and Employment  Po Box 1473  Wellington  New Zealand  [Radio.spectrum@mbie.govt.nz](mailto:Radio.spectrum@mbie.govt.nz)  +64 4 462 4729 |
| Philippines | Roberto P. Toletino (spectrum@ntc.gov.ph)  Chief, Radio Spectrum Planning |
| Samoa | Lefaoali’i Unutoa Auelua – Fonoti  REGULATOR |
| Singapore | Manager (Infocomm & Resource Technology Division)  Email: spectrum\_admin@imda.gov.sg |
| Sri Lanka | Mr. E.N.P.K. Rathnapala  Director / Spectrum Policy & New Technologies  (enpk@trc.gov.lk, +94 11 2683840 Tel/ +94 11 2689675fax) |
| Thailand | Dr. Thirapiroon Thongkamwitoon,  Spectrum Management Bureau, Office of the National Broadcasting and Telecommunications Commission  Email: [thirapiroon.t@nbtc.go.th](mailto:thirapiroon.t@nbtc.go.th) |
| Viet Nam | Mr. Nguyen Anh Tuan, Deputy Director, Radio Frequency policy and planning division, Authority of Radio Frequency Management (Email: [natuan@rfd.gov.vn](mailto:natuan@rfd.gov.vn))  Mr. Nguyen Dinh Tuan, Official, Radio Frequency policy and planning division, Authority of Radio Frequency Management (Email: [tuannd88@rfd.gov.vn](mailto:tuannd88@rfd.gov.vn)) |

**3.7 Comments for harmonization of Non-ISM band for non-beam WPT**

This is the response summary for **question#11**.

This section is to summarize the response from the countries about if it is necessary to unify the Non-ISM frequency band for Non-beam WPT for mobile devices.

**Q11:**

Do you think it is necessary to unify the Non- ISM frequency band for Non-beam WPT for mobile device among countries?

Strong agree,

Agree,

Neutral,

Do not agree,

Strong do not agree.

**Table 3.7.1 Q11 Response Summary**

|  |  |
| --- | --- |
| **Comments to harmonize Non-ISM band for non-beam WPT** | |
| **Country/Region** | **Answer** |
| Australia | Agree |
| Bangladesh | Neutral |
| China (People’s Republic of) |  |
| Islamic Republic of Iran | Agree |
| Japan | Agree |
| Korea (Republic of) | Strong Agree |
| Malaysia | Agree |
| Myanmar | Strong Agree |
| New Zealand | Strong Agree |
| Philippines | Neutral |
| Samoa | Agree |
| Singapore | Neutral |
| Sri Lanka | Strong Agree |
| Thailand | Neutral |
| Viet Nam | Agree |

Comments from the administrators are available in Annex IX.

1. **Conclusion**

This Report presents the survey results on non-beam WPT for mobile device operating in 100 – 300 kHz frequency range from APT countries based on the responses to “QUESTIONNAIRE ON NON-BEAM WIRELESS POWER TRANSMISSION IN NON-ISM BAND” [1].

For summary to Q1, there’re many applications in this frequency range 100 – 300 kHz and different regulations are applied in different countries.

For summary to Q2, commercial WPT mobile devices operating in 100 – 300 kHz are already available in some APT countries according to the feedbacks from 15 countries. For 100 – 148.5 kHz, 13 countries confirmed the deployment in their countries. For 148.5 – 205 kHz, 12 countries confirmed the deployment and for 205 – 300 kHz, 6 countries confirmed the deployment.

For summary to Q3 and Q4, Non-Beam WPT is regulated in some of these countries for 100 – 300 kHz according to the summary in Table 3.3.1 and the regulations are explained in Table 3.3.2. SRD regulations are commonly used to regulate the Non-Beam WPT device.

14 countries replied to Q5, Q6 and Q7. According to the summarized results in Table 3.3.3, Table 3.3.4 and Table 3.3.5,

* 13 countries allow to use 100 – 148.5 kHz for Non-Beam WPT. Japan is still studying for Non-Beam WPT with power rating less than and equal to 50 Watts. These Non-Beam WPT devices can be approved to use by the 13 countries if meeting the existing national regulation.
* 12 countries allow to use 148.5 – 205 kHz for Non-Beam WPT. Vietnam does not allow to use 148.5 – 205 kHz and China currently does not allow to use 190 -205 kHz. Japan is still studying for Non-Beam WPT with power rating less than and equal to 50 Watts. These Non-Beam WPT devices can be approved to use by the 12 countries if meeting the existing national regulation.
* 9 countries allow to use 205 – 300 kHz but 4 countries do not allow to use this frequency range. Japan is still studying for Non-Beam WPT with power rating less than and equal to 50 Watts.

For summary to Q8, different guidelines to protect incumbent radio systems are summarized in Table 3.4.1.

For summary to Q9, table 3.5.1 lists the incumbent radio system to be investigated by the feedbacks from the 15 countries response.

For summary to Q10, APAC countries regulator contacts are consolidated in table 3.6.1 for further discussion.

For summary to Q11, 14 countries responsed to Q11. There’re 4 strong agrees, 6 agrees and 4 neutrals for harmonization of Non-Beam WPT frequency range for mobile device. It’s obviously desirable to harmonize the frequency band for Non-Beam WPT.

Based on the information collected in the survey report, 100 – 148.5 kHz frequency band is ready to be harmonized for Non-Beam WPT. For harmonization of frequency ranges used for 100 – 148.5kHz Non-Beam WPT, study which would minimize the impact to radiocommunication services is desirable. And 148.5 – 190kHz band is considerable for the impact study of the Non-Beam WPT systems to radiocommunication systems.

1. **REFERENCES**

[1] WG-TECH, AWG-22-OUT-12 “QUESTIONNAIRE ON NON-BEAM WIRELESS POWER TRANSMISSION IN NON-ISM BAND” 27 September, 2017

1. **Annexes**

**Annex I:Q1**

**Australia:**

Regulation:

[Radiocommunications Act 1992](https://www.legislation.gov.au/Details/C2017C00356)

[Australian radiofrequency spectrum plan](https://www.acma.gov.au/theacma/australian-radiofrequency-spectrum-plan-spectrum-planning-acma)

[Register of Radiocommunications Licences](https://web.acma.gov.au/rrl/)

100 – 300 kHz used in parts of band for Land Mobile (less than 10 licences)

100 – 300 kHz used in parts of band for Aeronautical (less than 10 licences)

200 – 300 kHz used across band for Aeronautical Radionavigation (40-50 licences)

290 – 300 kHz used in parts of band for Maritime Radionavigation (less than 10 licences)

Australian Amateur Band 2200 metre Band (135.7 – 137.8 MHz)

100 – 148.5kHz, 2x Land Mobile

148.5 – 205kHz, 2x Aeronautical, 2x Aeronautical Radionavigation, 1x Land Mobile

205 – 300kHz, 3x Aeronautical, 41x Aeronautical Radionavigation, 1x Land Mobile

[Radiocommunications (Low Interference Potential Devices) Class Licence 2015](https://www.legislation.gov.au/Details/F2016C00432)

The power transfer through inductive techniques does not require frequency licencing in Australia provided no messaging (signalling on/off) is modulated on the power transfer frequency. The [LIPD Class Licence](https://www.legislation.gov.au/Details/F2016C00432) has item 39 covering the frequency range 160‑190 kHz which enables WPT with signalling to occur on those frequency bands. It would also be possible under more generic items 5, 6 and 7(a) of the [LIPD Class Licence](https://www.legislation.gov.au/Details/F2016C00432) to provide WPT applications.

**Bangladesh:**

100 – 148.5kHz

SRD, Maritime applications, Ultra low power active medical implant (Amateur application within 135.7-137.8 khz)

148.5 – 205kHz,

Ultra low power active medical implant

205 – 300kHz,

Aeronautical Radio Beacon, Maritime radio beacon, Ultra low power active medical implant

**China (People’s Republic of):**

Currently, the band 9-190 kHz can be used by all types of short range devices, if they comply with the regulatory document MIIT [2005] 423 which regulates the following magnetic field-strength limits.

|  |  |
| --- | --- |
| 9kHz-50kHz | 72dBµA/m at 10m (quasi-peak detector) |
| 50kHz-190kHz | 72dBµA/m at 10m (descending 3 dB/octave, quasi-peak detector) |

**Islamic Republic of Iran:**

National spectrum allocations according to Region 3.

Short range devices regulations:

The frequency bands have been used by inductive devices and medical implants in our country according to CRA decision no. CRA-DEC 9000-01. These devices don't require

to receive any frequency license.

Radiocommucincatin services which have been licensed in the bands as primary services.include:

190 to 300 KHz is used by maritime and aeronautical radionavigation (NDB)

**Japan:**

100 – 148.5kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

In Japan, the Frequency Allocation Table stipulates as below

90-110kHz: RADIONAVIGATION,

110-112kHz: FIXED and MARITIME MOBILE,

112-117.6kHz: RADIONAVIGATION,

117.6-126kHz: FIXED and MARITIME MOBILE,

126-129kHz; RADIONAVIGATION,

129-135.7kHz: FIXED, RADIONAVIGATION and MARITIME MOBILE,

135.7-137.8kHz: FIXED, RADIONAVIGATION, MARITIME MOBILE and amateur (secondary) of e.i.r.p. not more than 1W,

137.8-160kHz: FIXED, RADIONAVIGATION and MARITIME MOBILE

148.5 – 205kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

In Japan, the Frequency Allocation Table stipulates as below.

137.8-160kHz: FIXED, RADIONAVIGATION and MARITIME MOBILE,

160-200kHz:　 Aeronautical RADIONAVIGATION,

200-285kHz: aeronautical RADIONAVIGATION and aeronautical mobile (secondary)

205 – 300kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

In Japan, the Frequency Allocation Table stipulates as below.

200-285kHz: aeronautical RADIONAVIGATION and aeronautical mobile (secondary),

285-325kHz: MARITIME RADIONAVIGATION and AERONAUTICAL MOBILE

**Korea (Republic of):**

100 – 148.5kHz, \_\_\_\_\_\_\_\_\_\_\_V\_\_\_\_\_\_\_\_\_\_\_\_\_

148.5 – 205kHz, \_\_\_\_\_\_\_\_\_\_\_V\_\_\_\_\_\_\_\_\_\_\_\_

205– 300kHz, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Malaysia:**

100 – 148.5kHz,

Radionavigation, Maritime Mobile and Fixed Service

Part of the band is under Class Assignment (unlicensed)

148.5 – 205kHz,

Aeronautical Radionavigation, Maritime Mobile and Fixed Service

Part of the band is under Class Assignment (unlicensed)

205 – 300kHz,

Aeronautical Radionavigation, Maritime Radionavigation and Fixed Service

Part of the band is under Class Assignment (unlicensed)

**Myanmar:**

100 – 148.5kHz, Technical Specifications for Short Range Devices (SRD)

148.5 – 205kHz, Technical Specifications for Short Range Devices (SRD)

205 – 300kHz, Technical Specifications for Short Range Devices (SRD)

**New Zealand:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency (kHz)** | **Service** | **Usage** | **Specific regulation** |
| 100 – 148.5 | 100-148.5 kHz  Short Range  Devices  130-148.5 kHz  Amateur usage | Short Range devices, limited to determination, telemetry or telecommand (including WPT)  Amateur operator | [General User Radio Licence for Short Range Devices](https://www.rsm.govt.nz/about-rsm/spectrum-policy/gazette/gurl/short-range-devices)  [General User Radio Licence for Amateur Radio Operators](https://www.rsm.govt.nz/about-rsm/spectrum-policy/gazette/gurl/amateur-radio-operators) |
| 148.5 – 205 | 148.5 – 205 kHz  Short Range  Devices  148.5-190 kHz  Amateur usage | Short Range devices, limited to determination, telemetry or telecommand (including WPT)  Amateur operator | [General User Radio Licence for Short Range Devices](https://www.rsm.govt.nz/about-rsm/spectrum-policy/gazette/gurl/short-range-devices)  [General User Radio Licence for Amateur Radio Operators](https://www.rsm.govt.nz/about-rsm/spectrum-policy/gazette/gurl/amateur-radio-operators) |
| 205 – 300 | Aeronautical Non-Directional  Beacons (NDB) | Radiodetermination and radio beacons | ICAO Annex 10 |

**Philippines:**

[Memorandum](https://www.legislation.gov.au/Details/C2017C00356) Circular No. 03-05-2007 and 02-02-2015

[Philippines](https://www.acma.gov.au/theacma/australian-radiofrequency-spectrum-plan-spectrum-planning-acma) National Radio Frequency Allocation Table

9 – 500 kHz Short Rage Devices (Secondary Basis)

**Samoa:**

Spectrum Rule Part 5, SRD & Samoa National Frequency Allocation Table 2017, ITU-R. RR.5.62

Draft Spectrum Rule Part 5.

1. refer to radio devices or transmitters which provide either unidirectional or

bidirectional communication and have low capability of causing interference to other equipment; and

(b) use integral, dedicated or external antennas and all types of modulation and channel

patterns.

The following table indicated the international standard for Inductive Device application.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| INDUCTIVE APPLICATIONS  Include for example car immobilizers, animal identification, alarm systems, cable detection, waste management, personal identification, wireless voice links, access control, proximity sensors, antitheft systems including RF anti-theft induction systems, data transfer to handheld devices, automatic article identification, wireless control systems and automatic road tolling. | | | | | |
| 23 |  | 9.00 kHz – 148.50 kHz | 72 dBμA/m at 10m | EN 302 291  EN 300 330 |  |
| 24 | Security device | 315.00 kHz – 400.00 kHz | 13.5 dBµA/m at 10 m | EN 302 291  EN 300 330 |  |
| 25 |  | 6765.0 kHz – 6795.0 kHz | 42 dBµA/m at 10 m | EN 302 291  EN 300 330 |  |
| 26 |  | 7400.0 kHz – 8800.0 kHz | 9 dBµA/m at 10 m | EN 302 291  EN 300 330 |  |
| 27 |  | 13.553 MHz – 13.567 MHz | 60 dBµA/m at 10 m | EN 302 291  EN 300 330 |  |
| 28 | Wireless microphone/ Remote Control | 26.957 MHz – 27.283 MHz | 42 dBµA/m at 10 m  ERP 10mW | EN 302 291  EN 300 330 |  |
| 29 | Wireless microphone | 830.00 MHz – 850.00 MHz | E.R.P 10mW | EN 300 220 |  |

**Singapore:**

**100 – 148.5kHz**

100 – 130 kHz: Allocated on a primary basis to radionavigation service

130 – 148.5 kHz: Allocated on a primary basis to maritime mobile service

Allowed for Short Range Devices (SRD). Typical applications include induction loop system / RFID, radio detection, alarm system, medical and biological telemetry.

**148.5 – 205kHz**

148.5 – 160 kHz: Allocated on a primary basis to maritime mobile service

160 – 205 kHz: Allocated on a primary basis to aeronautical radionavigation service

Allowed for SRD. Typical applications include induction loop system / RFID, medical and biological telemetry.

**205 – 300kHz**

205 – 285 kHz: Allocated on a primary basis to aeronautical radionavigation service

285 – 300 kHz: Allocated on a primary basis to aeronautical radionavigation service and maritime radionavigation services

Allowed for SRD. Typical applications include induction loop system / RFID, medical and biological telemetry.

**Sri Lanka:**

Not yet identified.

**Thailand:**

|  |  |  |
| --- | --- | --- |
| Frequency range | Service | Applications |
| 100 – 148.5kHz | RNS, Fixed, MMS, Amateur | Radio Navigation Systems |
| 148.5 – 205kHz | RNS, ARNS, Fixed, MMS | Non Directional Beacon(NDB)/  Locator Middle Marker (LMM) |
| 205 – 300kHz | ARNS, AMS, MNS | Non Directional Beacon(NDB) |

**Viet Nam:**

|  |  |
| --- | --- |
| 100-148.5 | Radio Navigation service  Maritime mobile service  Fixed service  Inductive applications (Unlicense applications) |
| 148.5-200 | Radio Navigation (aeronautical navigation) service  Fixed service |
| 200-300 | Radio Navigation (Aeronautical and maritime navigation) service  Aeronautical mobile service |

**Annex II:Q2**

**Australia:**

It is likely but as there are no requirements to licence these devices the Australian Media and Communications Authority (ACMA) does not keep records.

**China (People’s Republic of)**

WPT mobile devices are operated as short range devices in **9-190 kHz** while they comply with the regulatory document MIIT [2005] 423.

**Philippines:**

It is likely but as there are no requirements to license these devices. One time Registration only.

9 – 500 kHz, Yes No

**Viet Nam:**

Beside WPT mobile device operating in 100-148.5 kHz, there are also WPT mobile devices operating in two frequency channels 326.5 kHz and 340 kHz in Viet Nam.

**Annex III:Q3**

**Japan:**

In Japan, WPT equipment operating 100-300 kHz (the input to the equipment exceeds 50W) requires individual permission(s) for the installation to ensure the equipment meets the technical standard, and does not interfere radio communications.

In the case of emergence of continuous and serious interference to the function of radio facilities caused by WPT equipment, the Minister for Internal Affairs and Communications may order the owners or possessor of such equipment to take necessary measure based on the Radio Law.

Currently, the effect of WPT equipment (the input to the equipment does not exceed 50W) to the radio communications and related regulations are under study.

**Viet Nam:**

Viet Nam also allocated the two frequency channels in 300 kHz range including 326.5 kHz and 340 kHz for non-beam WPT for mobile devices

**Annex IV:Q4**

**Australia:**

Radiocommunication licences are not required in Australia for inductive devices that operate in the near field as detailed in [RALI MS 27](https://www.acma.gov.au/-/media/Spectrum-Engineering/Information/pdf/Radiocommunication-Assignment-and-Licensing-Instruction-Determining-the-Applicability-of-Licensing-and-EMC-Regimes-to-Transmitter.pdf?la=en) providing that there is no radiocommunications. In such a way, the item 39 of the Schedule 1 of the [LIPD Class Licence](file:///\\acact01srvp1\userdata$\skrusevac\Documents\Radiocommunications%20(Low%20Interference%20Potential%20Devices)%20Class%20Licence%202015.htm) authorises the radiocommunications part of WPT systems in the frequency range 160-190 kHz. The operation within the above requested frequency bands is visible under the item 5, 6 and 7 of the Schedule 1 of the LIPD Class Licence.

In addition to the LIPD Class Licence, compliance with the [Radiocommunication Labelling (Electromagnetic Compatibility) Notice 2015](https://www.acma.gov.au/Industry/Suppliers/Regulatory-arrangements/EMC-Electromagnetic-compatibility/emc-labelling-requirements) is required.

**Bangladesh:**

100 – 148.5kHz, Fixed, Maritime Mobile, Radio Navigation

148.5 – 205kHz, Fixed, Aeronautical Radio navigation

205 – 300kHz, Aeronautical Radio navigation, Aeronautical Mobile, Radio beacons

**Islamic Republic of Iran:**

| **Radiation Limits and Technical Conditions of Inductive SRDs** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **No** | **Frequency Bands )kHz)** | **Field Strength/ Radiated Power** | **Spectrum Access Method/Bandwidth Requirement** | **Duty cycle** | **Standard** | **Notes** |
| 1 | 90-119 | 42 dBμA/m at 10m | - | No requirement | EN 300 330 | In case of external antennas only loop coil antennas may be employed |
| 2 | 119-135 | 66 dBμA/m at 10m | - | No requirement | EN 300 330 | In case of external antennas only loop coil antennas may be employed. Field strength level descending 3 dB/oct at 119 kHz |
| 3 | 135-140 | 42 dBμA/m at 10m | - | No requirement | EN 300 330 | In case of external antennas only loop coil antennas may be employed |
| 4 | 140-148.5 | 37.7 dBμA/m at 10m | - | No requirement | EN 300 330 | In case of external antennas only loop coil antennas may be employed |
| 5 | 148.5-5000 | -15 dBμA/m at 10 m | - | No requirement | EN 300 330 | In case of external antennas only loop coil antennas may be employed. The maximum field strength is specified in a bandwidth of 10 kHz.The maximum allowed total field strength is -5 dBμA/m at 10 m for systems operating at bandwidths larger than 10 kHz whilst keeping the density limit (-15 dBμA/m in a bandwidth of 10 kHz) |

**Singapore:**

Technical requirements defined under IMDA Technical Specification for SRD (IMDA TS SRD)

100 – 148.5kHz

|  |  |  |  |
| --- | --- | --- | --- |
| **Authorised Frequency Bands / Frequencies** | **Maximum Field Strength / RF Output power** | **Transmitter Spurious Emissions** | **Test Reference Standards** |
| 100 – 148.5 kHz | ≤ 66 dBμA/m @ 10m | ≥ 32 dB below carrier at 3 m or  EN 300 224-1  EN 300 330-1 | EN 300 224-1  EN 300 330-1 |

148.5 – 205kHz

|  |  |  |  |
| --- | --- | --- | --- |
| **Authorised Frequency Bands / Frequencies** | **Maximum Field Strength / RF Output power** | **Transmitter Spurious Emissions** | **Test Reference Standards** |
| 148.5 – 150 kHz | ≤ 66 dBμA/m @ 10m | ≥ 32 dB below carrier at 3 m or  EN 300 224-1  EN 300 330-1 | EN 300 224-1  EN 300 330-1 |
| 150 – 205 kHz | ≤ 13.5 dBμA/m @ 10m |

205 – 300kHz

|  |  |  |  |
| --- | --- | --- | --- |
| **Authorised Frequency Bands / Frequencies** | **Maximum Field Strength / RF Output power** | **Transmitter Spurious Emissions** | **Test Reference Standards** |
| 205 - 300 kHz | ≤ 13.5 dBμA/m @ 10m | ≥ 32 dB below carrier at 3 m or  EN 300 224-1  EN 300 330-1 | EN 300 224-1  EN 300 330-1 |

**Viet Nam:**

As mentioned in the Q2, Viet Nam also allocated the two frequency channels in 300 kHz range including 326.5 kHz and 340 kHz for non-beam WPT for mobile devices. The limitation on H field strength is below -15 dBµA/m@10m (in a bandwidth of 10 kHz).

**Annex V:Q5**

**China (People’s Republic of):**

Radio devices which comply with the regulation document MIIT [2005] 423 are allowed to use 9-190 kHz as short range devices.

**Annex VI:Q6**

**Australia:**

The Radiocommunication part of Non-Beam WPT cannot be currently authorised under the LIPD Class Licence if it operates within 285-300 kHz.

If they are an inductive device that operates in the near field as detailed in [RALI MS 27](https://www.acma.gov.au/-/media/Spectrum-Engineering/Information/pdf/Radiocommunication-Assignment-and-Licensing-Instruction-Determining-the-Applicability-of-Licensing-and-EMC-Regimes-to-Transmitter.pdf?la=en), then they can operate on any frequency within range specified.

**China (People’s Republic of):**

When comply with the regulation document MIIT [2005] 423, Non-Beam WPT mobile devices are allowed to use 9-190kHz. Currently, other frequency bands in 190-300kHz are not allowed for Non-Beam WPT mobile devices, since there are no specific regulations on Non-Beam WPT mobile device in those bands.

**Thailand:**

No identified frequency. Currently, Thailand has no regulation for Non-Beam WPT.

**Samoa:**

Not yet identified.

**Annex VII:Q8**

**Australia:**

The Radiocommunication part of the Non-Beam WPT operating in the 160-190 kHz has to comply with FCC Rules Title 47 Part 15 Section 217.

In addition, the radiocommunication part of the Non-Beam WPT might be able to operate with the following limits:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 5 | All transmitters | 0.07–0.16 | 3 µW (see Note 1) |  |
| 6 | All transmitters | 0.16–0.19 | 1 µW (see Note 1) |  |
| 7 | All transmitters | (a)    0.19–0.285  (b)   0.325–0.415 | 500 nW (see Note 1) |  |

**Iran:**

|  |  |  |
| --- | --- | --- |
| Frequency Band (MHz) | Electrical Field Strenght Limit (μV/m) | Measurement Distance (m) |
| 0.0083 ̶ 0.480 | 2400/*f* (kHz) | 300 |

**Japan:**

In Japan, WPT equipment operating 100-300 kHz (the input to the equipment exceeds 50W) requires individual permission(s) for the installation to ensure the equipment meets the technical standard, and does not interfere radio communications.

In the case of emergence of continuous and serious interference to the function of radio facilities caused by WPT equipment, the Minister for Internal Affairs and Communications may order the owners or possessor of such equipment to take necessary measure based on the Radio Law.

Currently, the effect of WPT equipment (the input to the equipment does not exceed 50W) to the radio communications and related regulations are under study.

**Thailand:**

No guideline at the moment.

**Annex VIII:Q9**

**Australia:**

It may be necessary to undertake studies to assess the possible impact of WPT systems

operating in the 100 – 148.5 kHz frequency band on the amateur service allocation in the 135.7 –137.8 kHz frequency band. If great care is not taken aggregate noise levels from multiple WPT systems may render the band useless for communications purposes.

The studies need to consider that:

the amateur band is only 2.1 kHz wide so there is little or no opportunity for

stations to move to another frequency to avoid interference

signal levels on this band are very low due transmitter e.i.r.p and receiver

antenna limitations.

**Bangladesh:**

Amateur Radio is in 135.7 – 137.8 kHz.

**Samoa:**

The ITU-R Radio Regulation 2012 frequency 90 – 110 kHz allocated to Radionavigation on PRIMARY basis and Fixed on Secondary basis for all ITU Regions.

Foot Note 5.64

5.64. Only classes A1A or F1B, A2C, A3C, F1C or F3C emissions are authorized for stations of the fixed service in the bands allocated to this service between 90 kHz and 160 kHz (148.5 kHz in Region 1) and for stations of the maritime mobile service in the bands allocated to this service between 110 kHz and 160 kHz (148.5 kHz in Region 1). Exceptionally, class J2B or J7B emissions are also authorized in the bands between 110 kHz and 160 kHz (148.5 kHz in Region 1) for stations of the maritime mobile service.

**Annex IX:Q11**

**Japan:**

It is desirable to harmonize the frequency band, however, impact study in each country is required.

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