



GUIDELINES ON THE USE OF RADIO SPECTRUM FOR UNMANNED AIRCRAFT SYSTEMS

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The information contained in these guidelines is intended as a guide only and administrative in nature. For this reason, these guidelines should not be relied on as legal advice or regarded as a substitute for legal advice in individual cases. Parties should still refer to the legislative provisions contained in the law. The information contained in these guidelines will be updated from time to time either via an addendum or revised guidelines.

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1.0 ABBREVIATIONS

AA	Apparatus Assignment
AM(R)S	Aeronautical Mobile (Route) Service
AMS(R)S	Aeronautical Mobile-Satellite (Route) Service
BLOS	Beyond Line-of-Sight
CA	Class Assignment
CAAM	Civil Aviation Authority of Malaysia
CNPC	Control and Non-Payload Communications
DAA	Detect and Avoid
DGTA	Directorate General Technical Airworthiness
EIRP	Equivalent Isotropically Radiated Power
EESS	Earth Exploration Satellite Service
ITU	International Telecommunication Union
ITU-R	ITU Radiocommunication Sector
kHz	Kilohertz
LOS	Line-of-Sight
MCMC	Malaysian Communications and Multimedia Commission
MIFR	ITU Master International Frequency Register
MHz	Megahertz
MSS	Mobile-Satellite Service
mW	Milliwatt
RFI	Radio Frequency Interference
S&A	Sense and Avoid
SA	Spectrum Assignment
UA	Unmanned Aircraft
UACS	Unmanned Aircraft Control Station
UAS	Unmanned Aircraft Systems
W	Watt

2.0 INTENT

- 2.1 These guidelines (“**Guidelines**”) are prepared by MCMC to guide users on the use of radio spectrum and certification of communications equipment with respect to the operation of UAS in Malaysia.
- 2.2 These Guidelines will serve as a reference for the use of radio frequencies, technical parameters, relevant regulatory procedures, and information related to radio communications for UAS operation.
- 2.3 The radio communications requirements outlined in these Guidelines shall apply to all types, sizes, weights, and functions of the UAS, including the custom-made UAS, which is intended for any operation or purpose.
- 2.4 These Guidelines should be read together with the Communications and Multimedia Act 1998 (“**Act**”), which includes the relevant subsidiary legislations, instruments, codes, and other guidelines that have been issued by MCMC.
- 2.5 The relevant regulations under the Act applicable for the use of UAS within MCMC’s jurisdiction are summarised in **Annex 1** of these Guidelines.
- 2.6 Compliance with these Guidelines does not confer immunity from any legal obligations.
- 2.7 In the event of any inconsistencies between these Guidelines and the Act or any subsidiary legislation made under the Act, the Act or the said subsidiary legislation shall prevail.

3.0 BACKGROUND

3.1 The operation of UAS requires access to the radio spectrum. As defined by the ITU, UAS consists of the following radio communications sub-systems¹:

3.1.1 UA:

Powered aircraft that do not carry a human pilot, use aerodynamic forces to provide vehicle lift and may fly semi-autonomously or autonomously or be piloted remotely. Commonly known as 'drone';

3.1.2 UACS:

Facilities from which a UA is controlled remotely;

3.1.3 Payload:

The weight a UA can carry (e.g. camera); and

3.1.4 DAA:

UA's ability to mitigate from obstacles and also known as S&A.

¹ [Report ITU-R M.2171](#): Characteristics of unmanned aircraft systems and spectrum requirements to support their safe operation in non-segregated airspace

3.2 The radio communications links described in these Guidelines encompass LOS and BLOS connectivity as defined below:

3.2.1 **LOS** is defined as the direct radio line of sight radiocommunication between the UA and UACS using terrestrial communication services; and

3.2.2 **BLOS** is defined as the indirect radiocommunication between the UA and a UACS using satellite communication services.

4.0 INTRODUCTION

4.1 These Guidelines focus on the essential UAS radio communications links, namely the CNPC, payload communications and DAA subsystems.

4.2 The functions of CNPC, which are critical to the safe operation of UAS, can be related to different types of information such as telecommand messages, non-payload telemetry data, support for navigation aids, air traffic control voice relay, air traffic services data relay, target track data, airborne weather radar downlink data, and non-payload video downlink data.

4.3 The functions of payload communications can be related to the application for real-time data streaming (e.g. video link) and are not critical to the safe operation of UAS.

4.4 The function of DAA can be related to the UA's capability to avoid collisions with any obstacles.

5.0 RADIO SPECTRUM FOR UAS OPERATION

The frequency band identified by ITU

- 5.1 ITU has identified the 5030 MHz to 5091 MHz frequency band that could be used for terrestrial UAS CNPC links under the AM(R)S allocation.
- 5.2 For satellite components in the L-band operating under AMS(R)S and MSS allocations, frequency ranges of 1525 MHz to 1559 MHz and 1616 MHz to 1660.5 MHz could accommodate the UAS satellite radio communications link requirement.
- 5.3 The information on the frequency bands can be found in the Spectrum Plan², which can be downloaded from the following link:
<https://www.mcmc.gov.my/en/spectrum/spectrum-management>.

The most commonly used licence-exempt frequency bands

- 5.4 The 433 MHz to 435 MHz, 2400 MHz to 2500 MHz and 5725 MHz to 5875 MHz frequency bands could be used for UAS CNPC and payload communications link together with the 24050 MHz to 24250 MHz frequency band for DAA radar. In Malaysia, the usage of these frequency bands is assigned by way of CA.
- 5.5 Notwithstanding subsections 5.1, 5.2, and 5.4 above, MCMC reserves the right to select the appropriate frequency range in assigning the

² Spectrum Plan is a document developed by MCMC pursuant to section 172 of the Act. It contains information on frequency allocation for various wireless services in Malaysia, international allocation of spectrum as agreed by the ITU for all three ITU regions, procedures for assignment and reassignment of spectrum and general information on spectrum usage in Malaysia.

UAS radio communications links to ensure efficient spectrum use in Malaysia, as stated in subsection 6.2 below.

6.0 FREQUENCY ALLOCATION FOR THE OPERATION OF UAS IN MALAYSIA

6.1 In accordance with section 157 of the Act, no person shall intentionally use any part of the spectrum to provide a network service unless:

6.1.1 the person holds an SA or AA; or

6.1.2 the use of the spectrum is subject to a CA issued by MCMC.

6.2 The use of radio spectrum for UAS in Malaysia is as shown in **Table 1** and **Table 2** below:

6.2.1 Apparatus Assignment

Type of Assignment (Link)	Frequency Band (MHz)	Type of Radiocommunication
AA (Terrestrial)	5060.5 – 5090.5	CNPC
	2216.0 – 2256.0	Payload Communications
AA (Satellite)	1525.0 – 1559.0	CNPC and/or Payload Communications (will be configured by the satellite service provider)
	1616.0 – 1626.5	
	1626.5 – 1660.5	

Table 1: Frequency bands for UAS communications assigned by way of AA in Malaysia

6.2.2 Class Assignment

Type of Assignment (Link)	Frequency Band (MHz)	Type of Radiocommunication	Maximum EIRP
UAS Device Schedule (Terrestrial)	433 – 435	CNPC and/or Payload Communications	100 mW
	2400 – 2500		500 mW
	5725 – 5875		1 W
	24050 – 24250	DAA radar installed on-board UA	100 mW

Table 2: Frequency bands for UAS communications assigned by way of CA in Malaysia

6.3 **Annex 2** and **Annex 3** illustrate examples of UAS terrestrial and satellite communications links, respectively.

6.4 Additionally, there are other frequency band(s) allocated for use by civil aviation that may support the safe operation of UAS. However, the assignment of such frequency band(s) will be treated on a case-by-case basis by MCMC.

7.0 ASSIGNMENT OF FREQUENCIES

AA for Terrestrial CNPC Link

7.1 The channel arrangement for terrestrial UAS CNPC link in 5060.5 MHz to 5090.5 MHz frequency band is shown in **Annex 4** of these Guidelines.

7.2 The use of frequency bands specified for UAS CNPC link for other purposes, such as payload communications, shall not be allowed due to the following reasons:

7.2.1 Ensuring the safe operation of UAS CNPC links:

- CNPC links support safety-critical functions. Interference to, or compromise of the CNPC link will cause potentially catastrophic consequences;

7.2.2 Use of the frequency band for purposes other than CNPC requires a bigger bandwidth to carry data:

- Limitation of frequency channels within this frequency band; and
- Demand for UAS CNPC links is expected to increase in the near future.

AA for Terrestrial Payload Communications Link

- 7.3 The channel arrangement for terrestrial UAS payload communications link in the 2216 MHz to 2256 MHz frequency band is shown in **Annex 5** of these Guidelines.
- 7.4 The use of the 2216 MHz to 2256 MHz frequency band is shared with EESS station(s) and other station(s) operated by the Government. Both stations are given priority over the UAS payload communications link. As such, the UAS payload communications link shall, at all times, operate on a non-interference basis to these stations. MCMC may impose additional conditions to any AA holder(s) for the UAS payload communications link as and when MCMC deems fit.

AA for Satellite Communications Link

- 7.5 The channel arrangement for satellite CNPC and/or payload communications is to be configured through a satellite network system operated by the satellite service provider.
- 7.6 UAS radio communications device communicating with any satellite station shall fulfil the following requirements:
- 7.6.1 Provided by a licensee for the provision of application services in the designated frequency bands listed in **Table 1**;
 - 7.6.2 The associated ITU satellite network filing must have completed coordination with both Malaysian satellite and terrestrial networks;

7.6.3 The frequency assignments under the ITU satellite network filing are recorded in the MIFR; and

7.6.4 The ITU satellite network filing must include Malaysian territory as part of its service area, as recorded in the MIFR.

7.7 For clarity, the satellite frequency bands listed in **Table 1** shall not operate under the Mobile Satellite Access Device Schedule of the CA.

General Principles for AA

7.8 The use of the frequency for UAS CNPC and payload communications classified under AA shall be subject to the relevant legislations and procedures applicable for AA, including the payment of fee(s). The AA fees consist of fixed fees and variable fees as prescribed in the First Schedule of the Communications and Multimedia (Spectrum) Regulations 2000³.

7.9 As guidance for the AA application, **Table 3** below outlines each UAS component:

UAS Component	Type of Assignment	Nature of Service	Type of AA Form
UA	AA (Terrestrial)	Mobile	Mobile Service
UACS		Fixed	Fixed Service
UA	AA (Satellite)	Mobile Satellite	Fixed Service: Earth Station
UACS		Mobile Satellite	Fixed Service: Earth Station

Table 3: Types of AA application for UAS components

³ <https://www.mcmc.gov.my/en/legal/acts>

- 7.10 Issuance of AA for UAS shall be subject to:
- 7.10.1 Technical evaluation conducted by MCMC and will be treated on a first-come-first-served basis;
 - 7.10.2 Border coordination procedures and agreements reached with the neighbouring countries for the use of radio spectrum by UAS within the coordination zone along the international border areas⁴;
 - 7.10.3 Compliance with all requirements and conditions set forth by MCMC;
 - 7.10.4 Validity of the certification of the radio communications equipment; and
 - 7.10.5 Completion of all necessary assessments/conditions from DGTA and/or CAAM.
- 7.11 MCMC may request additional information and/or documents from the user to evaluate the AA application or for any other reasons deemed necessary by MCMC with respect to the operations of the UAS.
- 7.12 MCMC may impose additional AA conditions for the user to adhere to. Any non-compliance with the AA conditions will result in the suspension or cancellation of the AA granted with respect to the UAS.

⁴ i. Frequency Assignment Committee of Singapore, Malaysia and Brunei Darussalam (FACSMAB)
ii. Joint Technical Committee on Coordination and Assignment of Frequencies along Malaysia – Thailand Common Border (JTC)
iii. Joint Committee on Communications between the Republic of Indonesia and Malaysia (JCC)
iv. Trilateral Coordination Meeting between the Republic of Indonesia, Malaysia and Singapore.

- 7.13 All relevant procedures pertaining to AA applications, including payment for AA fees, shall be in order prior to the issuance of the AA certificate.
- 7.14 The required documents for AA application, as shown in **Annex 6** of these Guidelines, shall be submitted to:

Head

Spectrum Planning and Assignment Division

Malaysian Communications and Multimedia Commission

MCMC HQ, Tower 1, Jalan Impact, Cyber 6

63000 Cyberjaya

Selangor

- 7.15 For any enquiries pertaining to AA, please email aa.application@mcmc.gov.my.
- 7.16 Information on the AA application can be found in the following link: <https://www.mcmc.gov.my/en/spectrum/assignment-of-spectrum/apparatus-assignment>

CA for UAS Radio Communications Links

- 7.17 The use of radio spectrum for UAS under CA:
- 7.17.1 Shall use the CA frequencies specified in **Table 2** above;
 - 7.17.2 Shall comply with the specific technical parameters as stipulated in the respective CA Schedule;

- 7.17.3 Shall be on a sharing basis with other services and/or applications and shall be on a non-interference and non-protection basis⁵;
- 7.17.4 Does not require any frequency application to be made. However, the radio communications equipment installed in the UAS shall be certified by MCMC⁶ accordingly; and
- 7.17.5 Shall complete all necessary assessments/conditions required from DGTA and/or CAAM.
- 7.18 Details on the operational conditions and restrictions of UAS under CA are stipulated in the latest CA, which can be downloaded from the following link: <https://www.mcmc.gov.my/en/spectrum/assignment-of-spectrum/class-assignment>.
- 7.19 For any enquiries pertaining to CA, please email class.assignment@mcmc.gov.my.

⁵ Non-interference and non-protected basis means that no harmful interference may be caused to any radiocommunication service and that no claim may be made for the protection of these devices against harmful interference originating from other radiocommunication services and/or applications.

⁶ Refer Section 8 of this document for details.

8.0 CERTIFICATION OF UAS RADIO COMMUNICATIONS EQUIPMENT IN MALAYSIA

- 8.1 UAS radio communications equipment to be used either under AA or CA shall be certified by MCMC or its registered certifying agency and bear a valid MCMC certification label in accordance with the Communications and Multimedia (Technical Standards) Regulations 2000.
- 8.2 UAS radio communications equipment shall comply with the relevant registered technical codes under the Act. The list of technical codes is published in the following link:
<https://www.mcmc.gov.my/en/legal/registers/cma-registers>
- 8.3 UAS radio communications equipment may be certified under the provision of compliance approval (also known as type approval) issued by a registered certifying agency or special approval granted by MCMC or a registered certifying agency⁷.
- 8.4 Further information on the certification requirements of the radio communications equipment can be found in the following link:
<https://www.mcmc.gov.my/en/communications-equipment/certification-of-communications-equipment>

⁷ SIRIM QAS International Sdn Bhd is the registered certifying agency with MCMC.

9.0 AUTHORISATION OF UAS ACTIVITIES IN MALAYSIA

- 9.1 UAS application shall be submitted to CAAM. The process flow of the application for UAS and other approvals from the relevant authorities will be determined by CAAM. Information on the UAS application category and its requirements are available on CAAM’s official website (<https://www.caam.gov.my/public/unmanned-aircraft-system-uas>).
- 9.2 Upon submission of the application to CAAM, as stated in subsection 9.1 above, CAAM will then liaise with the relevant authorities to conduct an assessment based on their respective jurisdictions. For the avoidance of doubt, CAAM and MCMC govern different aspects of UAS regulation. The assessment by MCMC shall be subject to the requirements stipulated in Sections 6, 7 and 8 of these Guidelines.
- 9.3 A demonstration of UAS may be required by CAAM to facilitate the evaluation of the application. In the event that a demonstration of UAS using the designated frequency bands as stated in **Table 1** above is required, an AA application for demonstration purposes shall be submitted to MCMC accordingly.⁸
- 9.4 For further information, please email drone@caam.gov.my.

⁸ Only apply to the frequencies which to be assigned via AA. Please refer **Table 1**.

10.0 RADIO FREQUENCY INTERFERENCE

- 10.1 In the event of interference, the affected person may submit an RFI complaint to MCMC pursuant to section 69 of the Act, except for the use of frequency band for devices, which is assigned by way of CA.
- 10.2 The RFI resolution process can be referred to in **Annex 7** of these Guidelines.
- 10.3 Further information on guidelines for RFI submission can be found in the following link:
<https://www.mcmc.gov.my/en/spectrum/spectrum-interference>

11.0 ENQUIRY

- 11.1 For any enquiries related to these Guidelines, please contact MCMC via email at spd.fbs@mcmc.gov.my.

12.0 REVISION

- 12.1 These Guidelines may be revised or varied from time to time as and when MCMC deems fit and may also be revoked accordingly.

ANNEX 1: REGULATIONS APPLICABLE FOR THE USE OF UAS IN MALAYSIA

The relevant regulations under the Act that are applicable for the use of UAS are shown in **Table 4** below:

Jurisdiction	Legislation
i. The use of radio spectrum for UAS operations	i. Communications and Multimedia (Spectrum) Regulations 2000
ii. Certification of UAS radio communications equipment	ii. Communications and Multimedia (Technical Standards) Regulations 2000
iii. Provision of communications facilities and services	iii. Communications and Multimedia (Licensing) Regulations 2000

Table 4: Regulations applicable for the use of UAS in Malaysia

Note: The diagram in Annexes 2 and 3 illustrates the fundamental model of communications. The actual model may vary depending on the specific requirements of the UAS.

ANNEX 2: EXAMPLE OF UAS TERRESTRIAL COMMUNICATION LINKS (LOS)

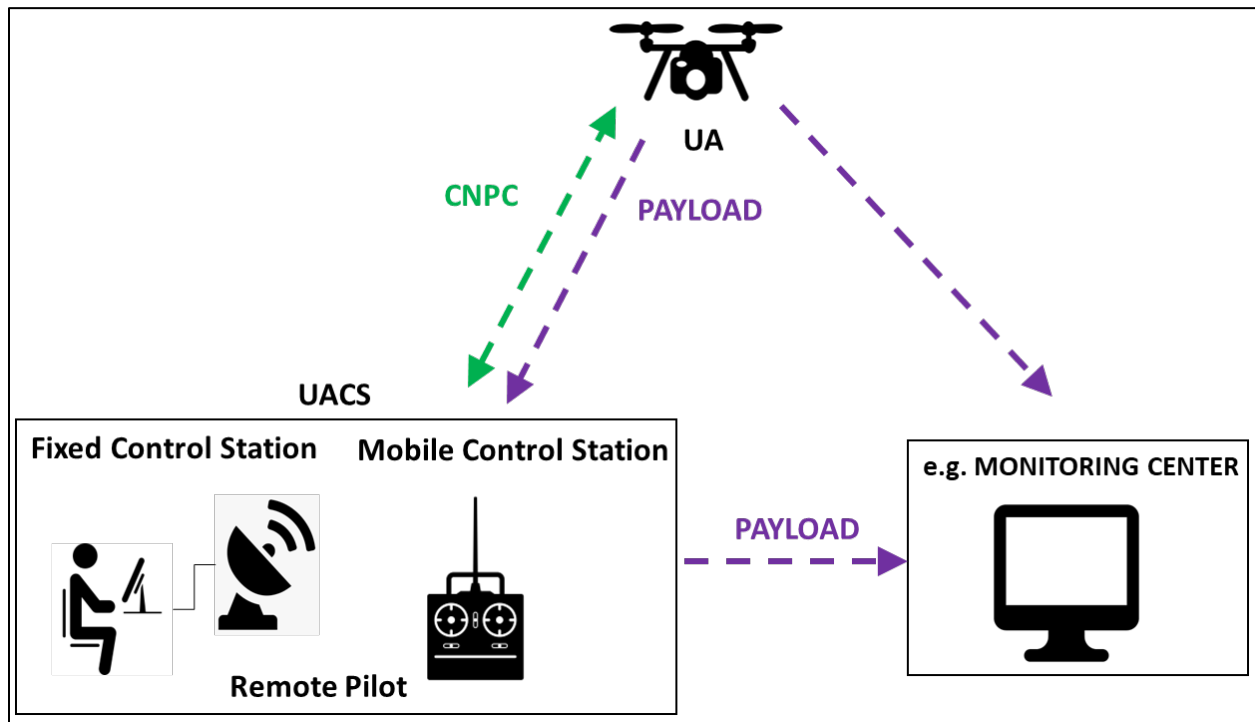


Diagram 1: Terrestrial UAS communications links

**ANNEX 3: EXAMPLE OF UAS SATELLITE COMMUNICATION LINKS
(BLOS)**

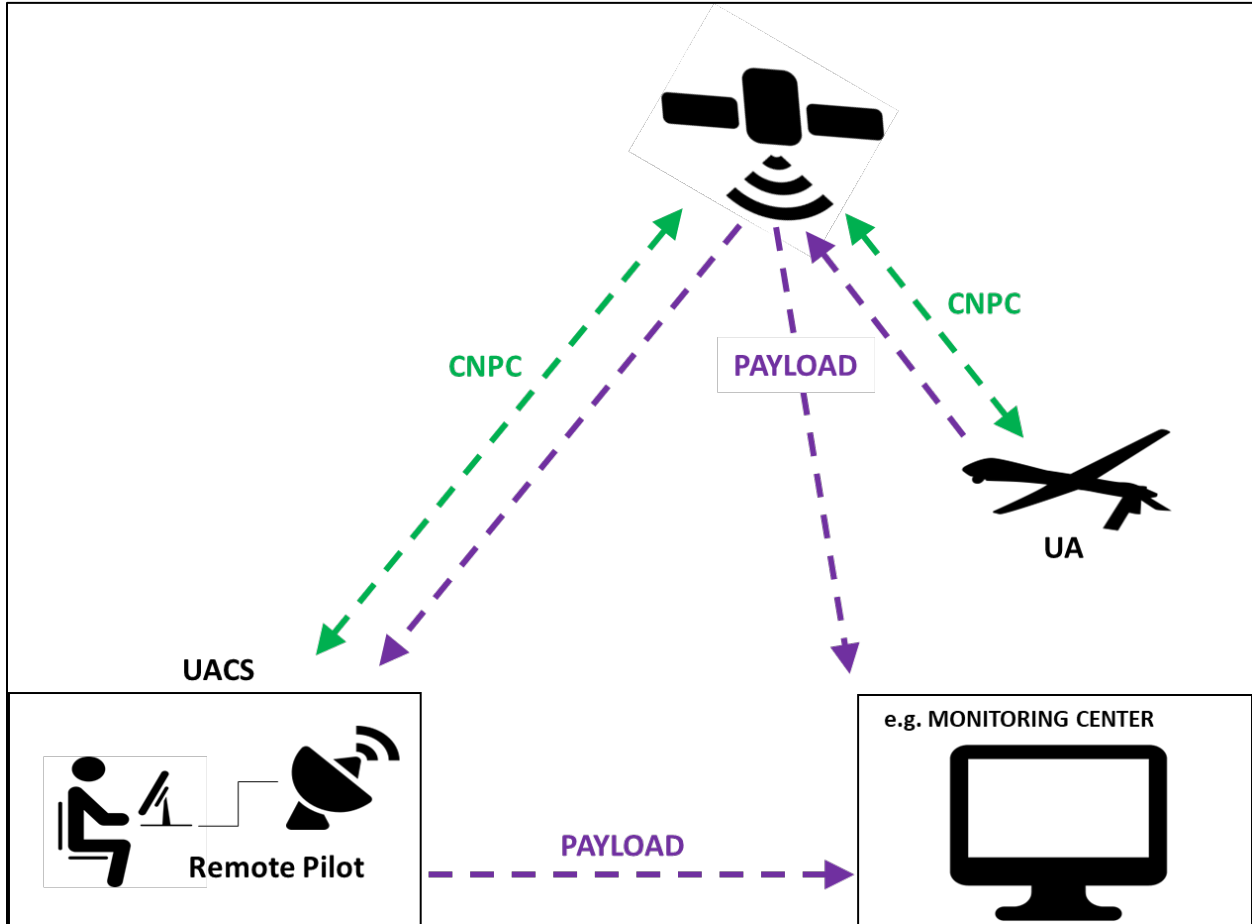


Diagram 2: Satellite UAS communications links

ANNEX 4: CHANNEL ARRANGEMENT FOR UAS CNPC IN THE 5060.5 MHz TO 5090.5 MHz FREQUENCY BAND

- i. The 5060.5 MHz to 5090.5 MHz frequency band provides a total of 30 MHz bandwidth available for UAS CNPC.
- ii. The centre frequencies of individual channels with 150 kHz separation in the 5060.5 MHz to 5090.5 MHz frequency band are derived as follows:

$$F_n = 5060.575 + 0.150 (n - 1) \text{ MHz}$$

Where:

F_n : centre frequency of the n -th slot

$n = 1$ to 200

- iii. The frequency band is divided into 200 sub-blocks with 150 kHz channel bandwidth, as depicted in **Diagram 3** below:

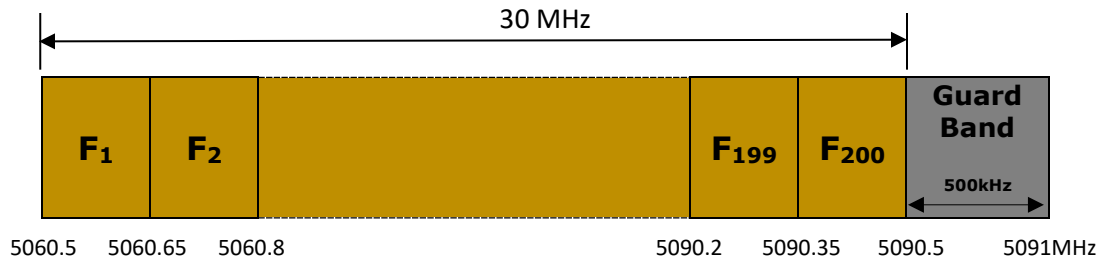


Diagram 3: Channel arrangement in 5060.5 MHz to 5090.5 MHz frequency band

- iv. The channelling plan with centre frequency for each sub-block is shown in **Table 5**.
- v. The user may apply to use a single sub-block of 150 kHz or multiple contiguous sub-blocks of 150 kHz for each assignment.

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Block No.	Centre Freq. (MHz)	Block No.	Centre Freq. (MHz)	Block No.	Centre Freq. (MHz)	Block No.	Centre Freq. (MHz)	Block No.	Centre Freq. (MHz)
F ₁	5060.575	F ₄₁	5066.575	F ₈₁	5072.575	F ₁₂₁	5078.575	F ₁₆₁	5084.575
F ₂	5060.725	F ₄₂	5066.725	F ₈₂	5072.725	F ₁₂₂	5078.725	F ₁₆₂	5084.725
F ₃	5060.875	F ₄₃	5066.875	F ₈₃	5072.875	F ₁₂₃	5078.875	F ₁₆₃	5084.875
F ₄	5061.025	F ₄₄	5067.025	F ₈₄	5073.025	F ₁₂₄	5079.025	F ₁₆₄	5085.025
F ₅	5061.175	F ₄₅	5067.175	F ₈₅	5073.175	F ₁₂₅	5079.175	F ₁₆₅	5085.175
F ₆	5061.325	F ₄₆	5067.325	F ₈₆	5073.325	F ₁₂₆	5079.325	F ₁₆₆	5085.325
F ₇	5061.475	F ₄₇	5067.475	F ₈₇	5073.475	F ₁₂₇	5079.475	F ₁₆₇	5085.475
F ₈	5061.625	F ₄₈	5067.625	F ₈₈	5073.625	F ₁₂₈	5079.625	F ₁₆₈	5085.625
F ₉	5061.775	F ₄₉	5067.775	F ₈₉	5073.775	F ₁₂₉	5079.775	F ₁₆₉	5085.775
F ₁₀	5061.925	F ₅₀	5067.925	F ₉₀	5073.925	F ₁₃₀	5079.925	F ₁₇₀	5085.925
F ₁₁	5062.075	F ₅₁	5068.075	F ₉₁	5074.075	F ₁₃₁	5080.075	F ₁₇₁	5086.075
F ₁₂	5062.225	F ₅₂	5068.225	F ₉₂	5074.225	F ₁₃₂	5080.225	F ₁₇₂	5086.225
F ₁₃	5062.375	F ₅₃	5068.375	F ₉₃	5074.375	F ₁₃₃	5080.375	F ₁₇₃	5086.375
F ₁₄	5062.525	F ₅₄	5068.525	F ₉₄	5074.525	F ₁₃₄	5080.525	F ₁₇₄	5086.525
F ₁₅	5062.675	F ₅₅	5068.675	F ₉₅	5074.675	F ₁₃₅	5080.675	F ₁₇₅	5086.675
F ₁₆	5062.825	F ₅₆	5068.825	F ₉₆	5074.825	F ₁₃₆	5080.825	F ₁₇₆	5086.825
F ₁₇	5062.975	F ₅₇	5068.975	F ₉₇	5074.975	F ₁₃₇	5080.975	F ₁₇₇	5086.975
F ₁₈	5063.125	F ₅₈	5069.125	F ₉₈	5075.125	F ₁₃₈	5081.125	F ₁₇₈	5087.125
F ₁₉	5063.275	F ₅₉	5069.275	F ₉₉	5075.275	F ₁₃₉	5081.275	F ₁₇₉	5087.275
F ₂₀	5063.425	F ₆₀	5069.425	F ₁₀₀	5075.425	F ₁₄₀	5081.425	F ₁₈₀	5087.425
F ₂₁	5063.575	F ₆₁	5069.575	F ₁₀₁	5075.575	F ₁₄₁	5081.575	F ₁₈₁	5087.575
F ₂₂	5063.725	F ₆₂	5069.725	F ₁₀₂	5075.725	F ₁₄₂	5081.725	F ₁₈₂	5087.725
F ₂₃	5063.875	F ₆₃	5069.875	F ₁₀₃	5075.875	F ₁₄₃	5081.875	F ₁₈₃	5087.875
F ₂₄	5064.025	F ₆₄	5070.025	F ₁₀₄	5076.025	F ₁₄₄	5082.025	F ₁₈₄	5088.025
F ₂₅	5064.175	F ₆₅	5070.175	F ₁₀₅	5076.175	F ₁₄₅	5082.175	F ₁₈₅	5088.175
F ₂₆	5064.325	F ₆₆	5070.325	F ₁₀₆	5076.325	F ₁₄₆	5082.325	F ₁₈₆	5088.325
F ₂₇	5064.475	F ₆₇	5070.475	F ₁₀₇	5076.475	F ₁₄₇	5082.475	F ₁₈₇	5088.475
F ₂₈	5064.625	F ₆₈	5070.625	F ₁₀₈	5076.625	F ₁₄₈	5082.625	F ₁₈₈	5088.625
F ₂₉	5064.775	F ₆₉	5070.775	F ₁₀₉	5076.775	F ₁₄₉	5082.775	F ₁₈₉	5088.775
F ₃₀	5064.925	F ₇₀	5070.925	F ₁₁₀	5076.925	F ₁₅₀	5082.925	F ₁₉₀	5088.925
F ₃₁	5065.075	F ₇₁	5071.075	F ₁₁₁	5077.075	F ₁₅₁	5083.075	F ₁₉₁	5089.075
F ₃₂	5065.225	F ₇₂	5071.225	F ₁₁₂	5077.225	F ₁₅₂	5083.225	F ₁₉₂	5089.225
F ₃₃	5065.375	F ₇₃	5071.375	F ₁₁₃	5077.375	F ₁₅₃	5083.375	F ₁₉₃	5089.375
F ₃₄	5065.525	F ₇₄	5071.525	F ₁₁₄	5077.525	F ₁₅₄	5083.525	F ₁₉₄	5089.525
F ₃₅	5065.675	F ₇₅	5071.675	F ₁₁₅	5077.675	F ₁₅₅	5083.675	F ₁₉₅	5089.675
F ₃₆	5065.825	F ₇₆	5071.825	F ₁₁₆	5077.825	F ₁₅₆	5083.825	F ₁₉₆	5089.825
F ₃₇	5065.975	F ₇₇	5071.975	F ₁₁₇	5077.975	F ₁₅₇	5083.975	F ₁₉₇	5089.975
F ₃₈	5066.125	F ₇₈	5072.125	F ₁₁₈	5078.125	F ₁₅₈	5084.125	F ₁₉₈	5090.125
F ₃₉	5066.275	F ₇₉	5072.275	F ₁₁₉	5078.275	F ₁₅₉	5084.275	F ₁₉₉	5090.275
F ₄₀	5066.425	F ₈₀	5072.425	F ₁₂₀	5078.425	F ₁₆₀	5084.425	F ₂₀₀	5090.425

Table 5: Channelling plan with centre frequency for each sub-block

ANNEX 5: CHANNEL ARRANGEMENT FOR UAS PAYLOAD COMMUNICATIONS IN THE 2216 MHz TO 2256 MHz FREQUENCY BAND

- i. The 2216 MHz to 2256 MHz frequency band provides a total of 40 MHz bandwidth available for UAS payload communications as depicted in **Diagram 4** below:

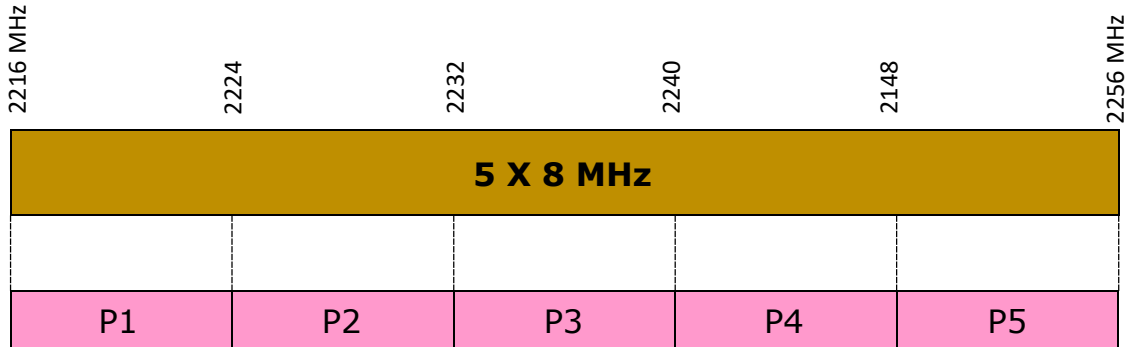


Diagram 4: Channel arrangement in 2216 MHz to 2256 MHz frequency band

- ii. The centre frequencies of individual channels in the 2216 MHz to 2256 MHz frequency bands are as shown in **Table 6** below:

Block No.	Frequency Range (MHz)	Centre Frequency (MHz)
P1	2216 – 2224	2220
P2	2224 – 2232	2228
P3	2232 – 2240	2236
P4	2240 – 2248	2244
P5	2248 – 2256	2252

Table 6: Centre Frequency for UAS Payload Communications

ANNEX 6: REQUIRED DOCUMENTS FOR APPLICATION OF AA

No.	Required Documents
1	AA Application Form ⁹ (per application) – Please refer to Table 3 for type of AA application form for UAS components
2	AA Application Fee as prescribed in the Second Schedule of the Spectrum Regulations (RM60 per application) ¹⁰ <i>* Not applicable for application from the Federal Government</i>
3	Application letter with company’s letterhead (describe the purpose of application)
4	For submission made by vendor/operator, an authorisation letter issued by the applicant on the appointment of the vendor/operator to submit AA on behalf of the applicant
5	Plotting of operation area in map and radius of operation
6	Equipment and antenna specifications
7	Technical specifications of UAS
8	Copy of identification card or passport of applicant ¹¹
9	The most recent digital Certified True Copy (CTC) of incorporation of company registration under the Companies Act 2016 <i>* Not applicable for applications from Federal and State Governments</i>
10	CTC of Certificate of Conformity (CoC) on type approval or special approval issued by SIRIM QAS International Sdn Bhd ¹²
11	Copy of necessary document(s) from DGTA and/or CAAM ¹³

⁹ The AA application form can be downloaded from MCMC website.

¹⁰ The payment can be made in the form of cheque, money order or postal order payable to **SURUHANJAYA KOMUNIKASI DAN MULTIMEDIA MALAYSIA**.

¹¹ The person who is authorised to sign the AA form on behalf of the applicant.

¹² In the event that CoC for type approval or special approval is not available, please provide copy of acknowledgement receipt of the submission of the application for CoC to SIRIM QAS International Sdn Bhd.

¹³ MCMC may request for additional document issued by CAAM or DGTA if necessary.

ANNEX 7: INTERFERENCE RESOLUTION PROCESS

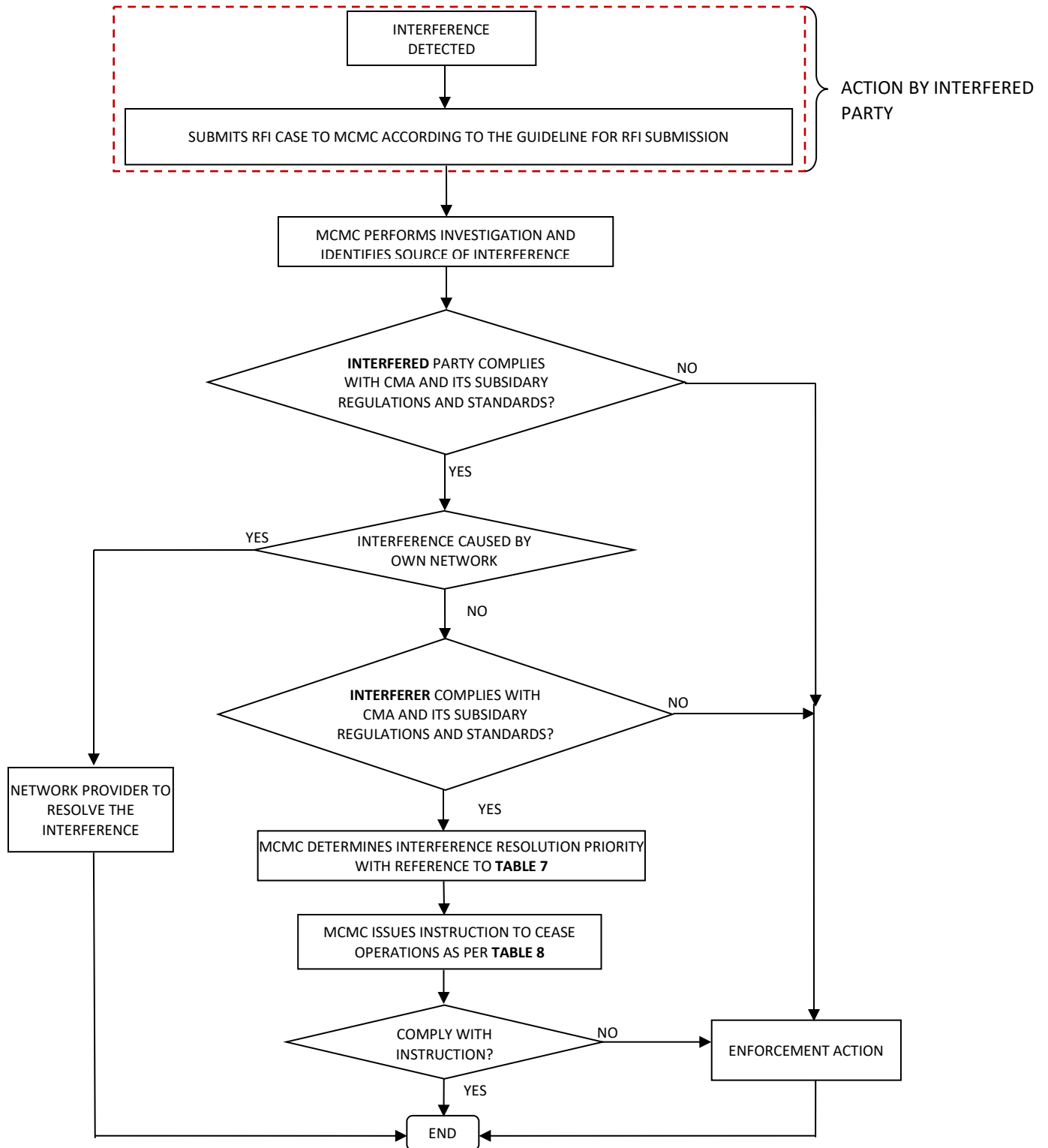


Diagram 5: RFI resolution process

No.	Types of Priority	Description
1	Service Priority	Primary services have priority over secondary services. Among co-primary or co-secondary services, the stated priority is accorded as provided in the Spectrum Plan.
2	Assignment Type Priority	Spectrum assignment and apparatus assignment have equal priority but are of higher priority than class assignment.
3	Service Type Priority	In the event where service priority and assignment type priority are equal for affected parties, the following list will determine the priority level for the interference case (the earlier in the list is given higher priority): <ul style="list-style-type: none"> i. safety or radionavigation service; ii. based on the date of apparatus assignment - priority is given to the earliest/first installation.

Table 7: Interference resolution priority

No.	Types of Interference	Description	Resolution Timeline
1	Minor	Electromagnetic interference which does not affect the overall operation of any radiocommunication transmission	To cease* operation within 7 days or earlier as specified in the notice issued by MCMC if interference cannot be resolved
2	Major	Electromagnetic interference rendering any apparatus or services unsuitable for their intended purpose. For this purpose, interference to public correspondence service is considered under this category	To cease* operation within 3 days or earlier as specified in notice issued by MCMC if interference cannot be resolved.
3	Harmful	Interference which endangers or seriously degrades, obstructs or repeatedly interrupts the functioning of a radionavigation service or one or more safety services operating in accordance with the Act	To cease* operation immediately within 24 hours or earlier as specified in the notice issued by MCMC

Table 8: Interference resolution timeline

Note (*): Resumption of operation of the apparatus is not allowed unless the assignment holder submits an interference resolution or mitigation plan and completes the implementation of the mitigation plan to the satisfaction of MCMC to remove/avoid the interference.

ANNEX 8: REFERENCE

1. **ITU Radio Regulations** (<https://www.itu.int/pub/R-REG-RR>).
2. **Report ITU-R M.2171** Characteristics of unmanned aircraft systems and spectrum requirements to support their safe operation in non-segregated airspace (<https://www.itu.int/pub/R-REP-M.2171>).
3. **MCMC Spectrum Management**
(<https://www.mcmc.gov.my/en/spectrum/spectrum-management>).
4. **MCMC MTSFB TC T020:2023** Aeronautical Radiocommunications Equipment - Specifications
(https://www.mcmc.gov.my/skmmgovmy/media/General/registers/MC-MTSFB-TC-T020_2023-Aeronautical-Radiocommunications-Equipment-Specifications.pdf).
5. **ETSI EN 301 473** Aircraft Earth Stations (AES) operating below 3 GHz under the Aeronautical Mobile Satellite Service (AMSS)/Mobile Satellite Service (MSS) and/or the Aeronautical Mobile Satellite on Route Service (AMS(R)S)/Mobile Satellite Service (MSS).