



**Malaysian Communications and Multimedia Commission**

**GUIDELINES ON THE USE OF RADIO SPECTRUM  
FOR UNMANNED AIRCRAFT SYSTEMS**

Notice:

The information contained in these guidelines is intended as a guide only and administrative in nature. For this reason, it 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                |
| CA     | Class Assignment                                   |
| CAAM   | Civil Aviation Authority of Malaysia               |
| CNPC   | Control and Non-Payload Communications             |
| DGTA   | Directorate General Technical Airworthiness        |
| EIRP   | Equivalent Isotropically Radiated Power            |
| EESS   | Earth Exploration Satellite Service                |
| ITU    | International Telecommunication Union              |
| ITU-R  | ITU Radiocommunications Sector                     |
| kHz    | Kilohertz  |
| MCMC   | Malaysian Communications and Multimedia Commission |
| MHz    | Megahertz  |
| mW     | Milliwatt  |
| RFI    | Radio Frequency Interference                       |
| SA     | Spectrum Assignment                                |
| UA     | Unmanned Aircraft                                  |
| UACS   | Unmanned Aircraft Control Station                  |
| UAS    | Unmanned Aircraft Systems                          |
| W      | Watt   |
| WRC    | World Radiocommunications Conference               |

## **2.0 INTENT**

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

### **3.0 BACKGROUND**

3.1 Operation of UAS requires access to radio spectrum. As defined by the ITU, UAS consists of the following radiocommunications sub-systems<sup>1</sup>:

3.1.1 UA:

Powered aircraft that do not carry 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; and

3.1.3 Payload:

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

### **4.0 INTRODUCTION**

4.1 These Guidelines focus on the basic terrestrial UAS radiocommunications links, namely the CNPC and payload communications.

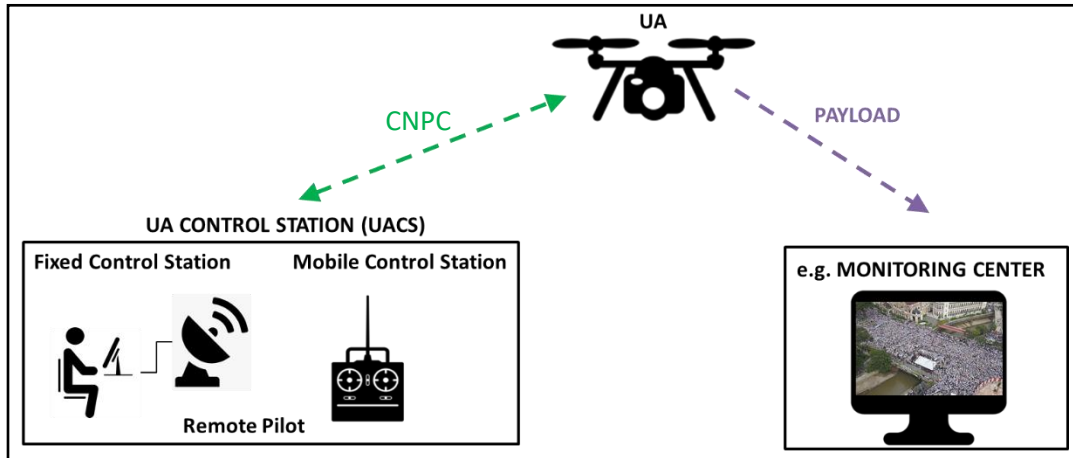
4.2 The functions of CNPC, which are critical to the safe operation of UAS, can be related to different types of information such as telecommand messages, non-payload telemetry data, support for navigation aids, air traffic control voice relay, air traffic services data relay, target track data, airborne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

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

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 **Diagram 1** below depicts the terrestrial communications links of UAS:



**Diagram 1: Terrestrial UAS communications links**

## 5.0 RADIO SPECTRUM FOR UAS OPERATION

### 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 AM(R)S allocation at the WRC 2012 as shown in **Annex 2** of these Guidelines.

5.2 However, notwithstanding subsection 5.1 above, the relevant administration<sup>2</sup> has the right to select the appropriate frequency range within the 5030 MHz to 5091 MHz frequency band in assigning the UAS CNPC links to ensure efficient use of spectrum in its country. Please note that in Malaysia, the information on frequency bands for UAS CNPC is as stated in subsection 6.2 below.

<sup>2</sup> Administration means any governmental department or service responsible for discharging the obligations undertaken in the Constitution of the International Telecommunication Union, in the Convention of the International Telecommunication Union and in the Administrative Regulations; ITU Radio Regulations No. **1.2**

**Most commonly used licence-exempt frequency bands**

5.3 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. In Malaysia, the usage of these frequency bands are assigned under the CA.

**6.0 FREQUENCY ALLOCATION AND THE OPERATION OF UAS BY WAY OF AA AND CA 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 a 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** below :

| <b>Type of Assignment</b> | <b>Frequency Band (MHz)</b> | <b>Type of Radiocommunication (Terrestrial Only)</b>                                       |
|---------------------------|-----------------------------|--|
| AA                        | 5060.5 – 5090.5             | <ul style="list-style-type: none"> <li>• CNPC</li> </ul>                                   |
|                           | 2216 – 2256                 | <ul style="list-style-type: none"> <li>• Payload Communications</li> </ul>                 |
| CA                        | 433 – 435                   | <ul style="list-style-type: none"> <li>• CNPC</li> <li>• Payload Communications</li> </ul> |
|                           | 2400 – 2500                 |  |
|                           | 5725 – 5875                 |  |

**Table 1: Frequency bands allocated for UAS in Malaysia**

## **AA for CNPC Link**

6.3 The channel arrangement for UAS CNPC in 5060.5 MHz to 5090.5 MHz frequency band is shown in **Annex 3** of these Guidelines.

6.4 The use of the 5060.5 MHz to 5090.5 MHz frequency band for other purposes such as for **payload communications shall not be allowed** due to the following reasons:

6.4.1 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; and

6.4.2 Use of the 5060.5 MHz to 5090.5 frequency band for purposes other than CNPC requires 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 Payload Communications Link**

6.5 The channel arrangement for UAS CNPC in the 2216 MHz to 2256 MHz frequency band is shown in **Annex 4** of these Guidelines.

6.6 The use of the 2216 MHz to 2256 MHz frequency band is shared with EESS station(s) and safety service<sup>3</sup> station(s) operated by the Government and both stations are given priority over UAS payload communications link. As such, UAS payload communications link shall at all times, operate on non-interference basis to EESS and safety service stations. MCMC may impose additional conditions to any AA holder(s) for UAS payload communications link as and when MCMC deems fit.

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<sup>3</sup> Safety service means any radiocommunication service used permanently or temporarily for the safeguarding of human life and property; ITU Radio Regulations No. **1.59**



## **General Principles for AA**

6.7 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 2000<sup>4</sup>.

6.8 As guidance for the AA application, **Table 2** below shows each UAS component:

| <b>UAS Component</b>      | <b>Nature of Service</b> | <b>Type of AA Form</b> |
|---------------------------|--------------------------|------------------------|
| Unmanned Aircraft (UA)    | Mobile                   | Mobile Service         |
| UA Control Station (UACS) | Fixed                    | Fixed Service          |

**Table 2: Types of AA application for UAS components**

6.9 Issuance of AA for UAS shall be subject to:

6.9.1 Technical evaluation conducted by MCMC and will be treated on a first-come-first-served basis;

6.9.2 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 areas<sup>5</sup>;

6.9.3 Validity of the certification of the radiocommunications equipment; and

6.9.4 Completion of all necessary assessments from either DGTA and/or CAAM.

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<sup>4</sup> <https://www.mcmc.gov.my/en/legal/acts>

<sup>5</sup> 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.

- 6.10 MCMC may request for additional information and/or documents from the user in evaluating the AA application, or for any other reasons deemed necessary by MCMC in respect of the operations of the UAS.
- 6.11 MCMC may impose additional AA conditions to be adhered to by the user. Any non-compliance with the AA conditions will result in the suspension or cancellation of the AA granted in respect of the UAS.
- 6.12 All relevant procedures pertaining to AA applications including payment for AA fees shall be in order prior to the issuance of the AA certificate.
- 6.13 The required documents for AA application as shown in **Annex 5** of these Guidelines, shall be submitted to:

**Head**  
**Licensing and Assignment Division**  
**Malaysian Communications and Multimedia Commission**  
**Mcmc HQ, Tower 1, Jalan Impact, Cyber 6**  
**63000 Cyberjaya**  
**Selangor**

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

**CA for CNPC and Payload Communications Links**

- 6.16 The use of radio spectrum for UAS by way of CA shall comply with the specific technical parameters stated in **Table 3** below:

| <b>Frequency Bands (MHz)</b> | <b>Maximum EIRP</b> | <b>Type of Radiocommunications</b> |
|------------------------------|---------------------|------------------------------------|
| 433 – 435                    | 100 mW              | • CNPC<br>• Payload Communications |
| 2400 – 2500                  | 500 mW              |                                    |
| 5725 – 5875                  | 1 W                 |                                    |

**Table 3: Technical parameters for UAS under CA**

- 6.17 The use of radio spectrum for UAS under CA:
- 6.17.1 Does not require any application to be made, but the user shall comply with the relevant CA. However, the radiocommunications equipment installed in the UAS shall be certified by MCMC<sup>6</sup> accordingly; and
  - 6.17.2 Shall be on a sharing basis with other services and/or applications and shall be on a non-interference and non-protection basis<sup>7</sup>.
- 6.18 The operation of UAS under CA shall also comply/complete the necessary assessments/conditions required from DGTA and/or CAAM.
- 6.19 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>

## **7.0 CERTIFICATION OF UAS RADIOCOMMUNICATIONS EQUIPMENT IN MALAYSIA**

- 7.1 UAS radiocommunications equipment to be used either under AA or CA shall at all times 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.
- 7.2 UAS radiocommunications 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>

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<sup>6</sup> Refer Section 7 for details

<sup>7</sup> Non-interference and non-protected basis means that no harmful interference may be caused to any radiocommunications service and that no claim may be made for protection of these devices against harmful interference originating from other radiocommunications services and/or applications.

- 7.3 UAS radiocommunications equipment may be certified for a compliance approval (also known as type approval) issued by a registered certifying agency or special approval granted by MCMC or a registered certifying agency.<sup>8</sup>
- 7.4 Further information on the certification requirements of the radiocommunications equipment and the registered certifying agency can be found in the following link:

<https://www.mcmc.gov.my/en/communications-equipment/certification-of-communications-equipment>

## **8.0 SUBMISSION OF UAS APPLICATION IN MALAYSIA**

- 8.1 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 in CAAM's official website (<https://www.caam.gov.my/public/unmanned-aircraft-system-uas>).
- 8.2 Upon submission of the application to CAAM as stated in subsection 8.1 above, CAAM will then liaise with the relevant authorities to conduct assessment based on their respective jurisdictions. For avoidance of doubt, CAAM and MCMC govern different aspects of UAS regulation. The assessment by MCMC shall be subject to the requirements as stipulated in Section 6 and 7 of these Guidelines.
- 8.3 A demonstration of UAS may be required by CAAM to facilitate evaluation of the application. In the event a demonstration is required to be conducted, an AA application for trial purposes shall be submitted to MCMC accordingly.<sup>9</sup>
- 8.4 For further information, please email [drone@caam.gov.my](mailto:drone@caam.gov.my).

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<sup>8</sup> SIRIM QAS International Sdn Bhd is currently the registered certifying agency with MCMC.

<sup>9</sup> Only apply to the frequencies which to be assigned via AA. Please refer **Table 1**.

## **9.0 RADIO FREQUENCY INTERFERENCE**

- 9.1 In the event of interference, the affected person may submit a RFI complaint to MCMC pursuant to section 69 of the Act except for UAS users under CA, as the use of spectrum by any devices under CA is on a non-protection basis.
- 9.2 The RFI interference resolution process can be referred to in **Annex 6** of these Guidelines.
- 9.3 Further information on guidelines for RFI submission can be found in the following link:

<https://www.mcmc.gov.my/en/spectrum/spectrum-interference>

## **10.0 ENQUIRY**

- 10.1 For any enquiries related to these Guidelines, please contact MCMC via email at [spd.fbs@mcmc.gov.my](mailto:spd.fbs@mcmc.gov.my).

## **11.0 REVISION**

- 11.1 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 USE OF UAS IN MALAYSIA

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

| <b>Jurisdiction</b>                                      | <b>Legislation</b>   |
|--|--|
| i. The use of radio spectrum for UAS operations          | i. Communications and Multimedia (Spectrum) Regulations 2000             |
| ii. Certification of UAS radiocommunications 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**

## ANNEX 2: ALLOCATION OF SERVICE FOR THE 5030 MHz TO 5091 MHz FREQUENCY BAND IN THE SPECTRUM PLAN

| Frequency Band (MHz) | ITU Allocation <sup>10</sup>             |          |          | Malaysian Allocation                           |
|----------------------|--|----------|----------|--|
|                      | Region 1                                 | Region 2 | Region 3 |  |
| 5 030-5 091          | AERONAUTICAL MOBILE (R) 5.443C           |          |          | AERONAUTICAL MOBILE (R) 5.443C                 |
|                      | AERONAUTICAL MOBILE-SATELLITE (R) 5.443D |          |          | AERONAUTICAL MOBILE-SATELLITE (R) 5.443D       |
|                      | AERONAUTICAL RADIONAVIGATION 5.444       |          |          | AERONAUTICAL RADIONAVIGATION 5.444 MLA3 MLA102 |

**Table 5: Allocation of service for the 5030 MHz to 5091 MHz frequency band in the Spectrum Plan**

Associated footnotes:

**5.443C** The use of the frequency band 5 030-5 091 MHz by the aeronautical mobile (R) service is limited to internationally standardized aeronautical systems. Unwanted emissions from the aeronautical mobile (R) service in the frequency band 5 030-5 091 MHz shall be limited to protect RNSS system downlinks in the adjacent 5 010-5 030 MHz band. Until such time that an appropriate value is established in a relevant ITU-R Recommendation, the e.i.r.p. density limit of –75 dBW/MHz in the frequency band 5 010-5 030 MHz for any AM(R)S station unwanted emission should be used. (WRC-12)

**5.443D** In the frequency band 5 030-5 091 MHz, the aeronautical mobile-satellite (R) service is subject to coordination under No. **9.11A**. The use of this frequency band by the aeronautical mobile-satellite (R) service is limited to internationally standardized aeronautical systems. (WRC-12)

**5.444** The frequency band 5 030-5 150 MHz is to be used for the operation of the international standard system (microwave landing system) for precision approach and landing. In the frequency band 5 030-5 091 MHz, the requirements of this system shall have priority over other uses of this frequency band. For the use of the frequency band 5 091-5 150 MHz, No. **5.444A** and Resolution **114 (Rev.WRC-15)** apply. (WRC-15)

<sup>10</sup> ITU Radio Regulations: <https://www.itu.int/pub/R-REG-RR/en>

**MLA3** Class Assignment.

**MLA102** Standard Radio System Plan 549: Requirements for Devices using Ultra-Wideband (UWB) Technology Operating in the Frequency Bands from 30 MHz to 960 MHz, 2.17 GHz to 10.6 GHz, 21.65 GHz to 29.5 GHz and 77 GHz to 81GHz.

The Spectrum Plan can be downloaded from the following link:

<https://www.mcmc.gov.my/en/spectrum/spectrum-management>



### ANNEX 3: 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:

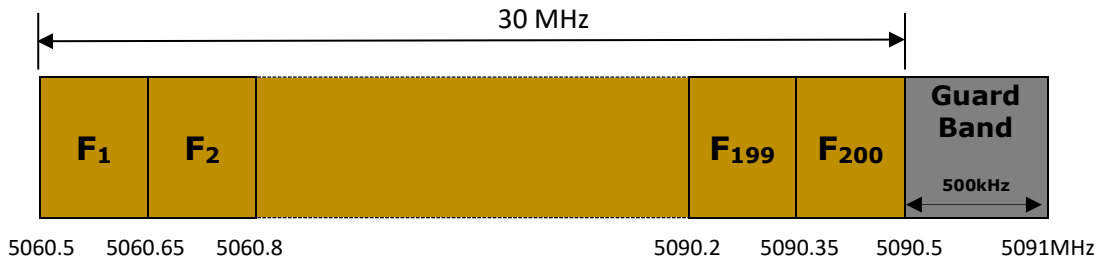
$$F_n = 5060.575 + 0.150 (n - 1) \text{ MHz}$$

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 2** below:



**Diagram 2: Channel arrangement in 5060.5 MHz to 5090.5 MHz frequency band**

- iv. Channelling plan with centre frequency for each sub-block is shown in **Table 6** below.
- 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.

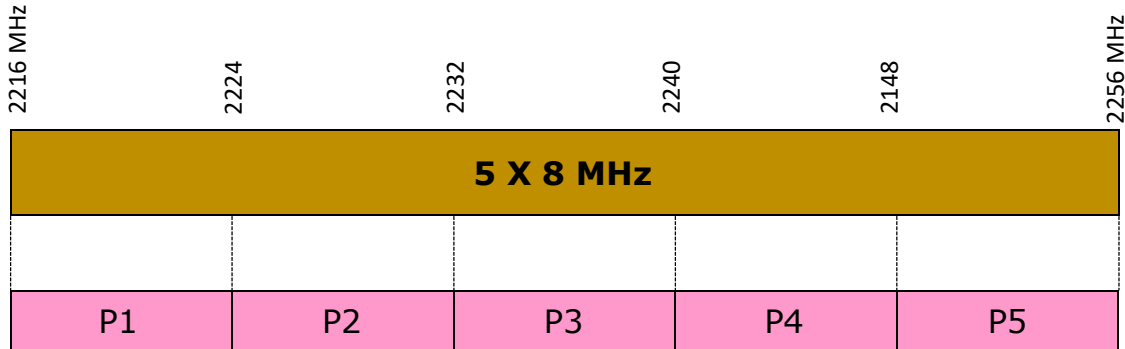
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| Block No.       | Centre Freq. (MHz) | Block No.       | Centre Freq. (MHz) | Block No.        | Centre Freq. (MHz) | Block No.        | Centre Freq. (MHz) | Block No.        | Centre Freq. (MHz) |
|-----------------|--------------------|-----------------|--------------------|------------------|-------------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

**Table 6: Channelling plan with centre frequency for each sub-block**

**ANNEX 4: 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 3** below:



- ii. The centre frequencies of individual channels in the 2216 MHz to 2256 MHz frequency bands are as shown in the **Table 7** 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 7: Centre Frequency for UAS Payload Communications**

**ANNEX 5: REQUIRED DOCUMENTS FOR APPLICATION OF AA**

| <b>No.</b> | <b>Required Documents</b>   |
|------------|---|
| 1          | AA Application Form <sup>11</sup> (per application) – Please refer <b>Table 2</b> 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) <sup>12</sup><br><i>* Not applicable for application from Federal Government</i>     |
| 3          | Application letter with company’s letter head (describe purpose of application)   |
| 4          | For submission made by vendor/operator, authorisation letter issued by applicant on 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 <sup>13</sup>  |
| 9          | The most recent digital Certified True Copy (CTC) of incorporated of company registration under Companies Act 2016<br><i>* Not applicable for application from Federal and State Government</i> |
| 10         | CTC of Certificate of Conformity (CoC) on type approval or special approval issued by SIRIM QAS International Sdn Bhd <sup>14</sup>   |
| 11         | Copy of necessary document(s) from DGTA and/or CAAM <sup>15</sup>   |

<sup>11</sup> The AA application form can be downloaded from MCMC website.

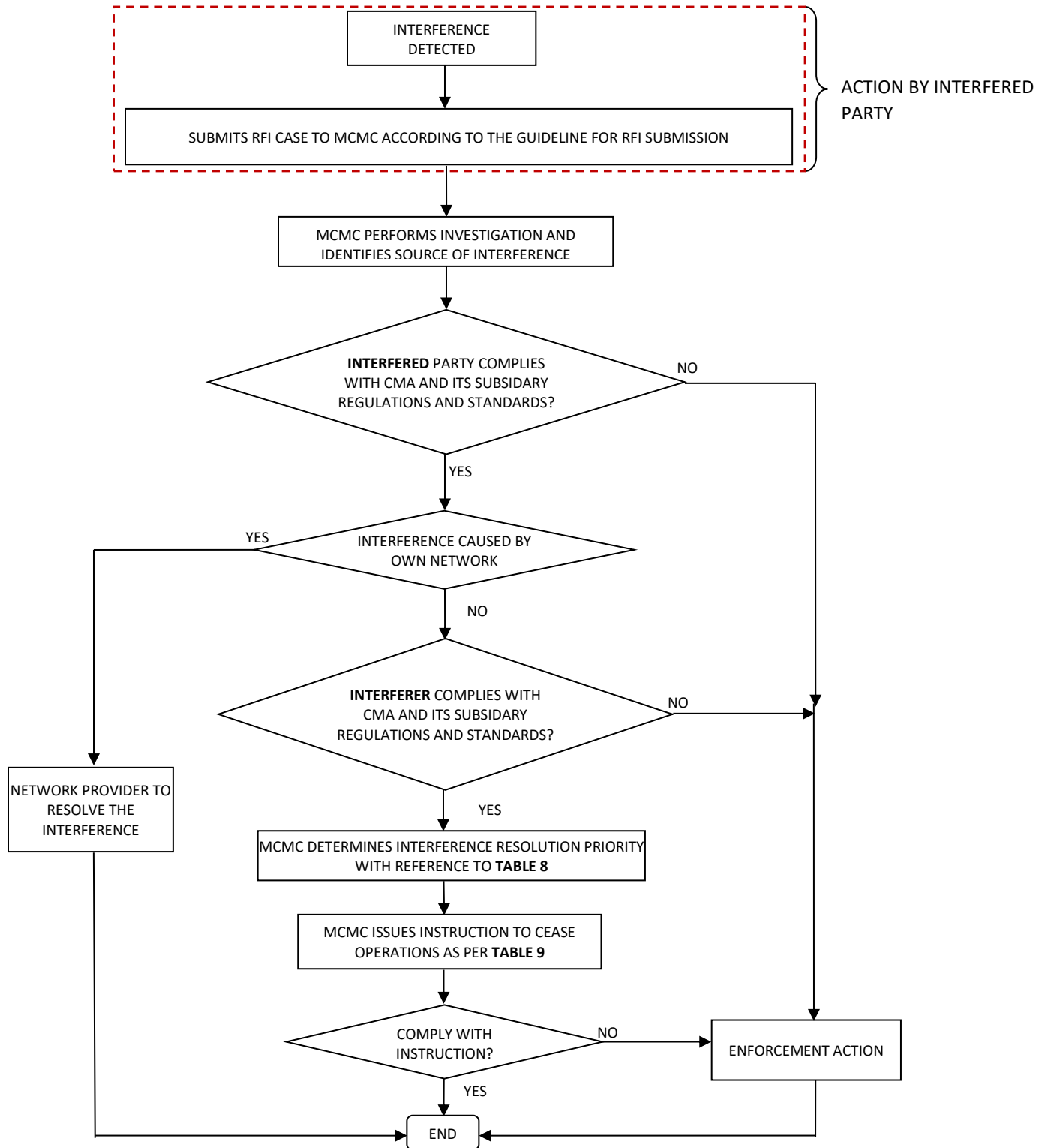
<sup>12</sup> The payment can be made in the form of cheque, money order or postal order payable to **SURUHANJAYA KOMUNIKASI DAN MULTIMEDIA MALAYSIA.**

<sup>13</sup> The person who is authorised to sign the AA form on behalf of the applicant.

<sup>14</sup> 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.

<sup>15</sup> MCMC may request for additional document issued by CAAM or DGTA if necessary.

**ANNEX 6: INTERFERENCE RESOLUTION PROCESS**



**Diagram 4: 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"> <li>i. safety or radionavigation service;</li> <li>ii. based on the date of apparatus assignment - priority is given to the earliest/first installation</li> </ul> |

**Table 8: Interference resolution priority**

| No. | Types of Interference | Description  | Resolution Timeline   |
|-----|-----------------------|--|---|
| 1   | Minor                 | Electromagnetic interference which does not affect the overall operation of any radiocommunications 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.<br><br>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 9: Interference resolution timeline**

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

## **ANNEX 7: REFERENCE**

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