



**MCMC SRSP FS 21.20**  
**5 January 2023**

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**Standard Radio System Plan**

**REQUIREMENTS FOR FIXED WIRELESS  
SYSTEMS**

**OPERATING IN THE FREQUENCY BAND OF**

**21.20 GHz to 23.60 GHz**

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## 1. FOREWORD

- 1.1 This Standard Radio System Plan (“**SRSP**”) is prepared by the Malaysian Communications and Multimedia Commission (“**MCMC**”) pursuant to the Communications and Multimedia Act 1998 (“**Act**”) and the Spectrum Plan (“**Spectrum Plan**”) to provide information on the minimum technical and regulatory requirements for the efficient use of the frequency band of **21.20 GHz to 23.60 GHz**.
- 1.2 This SRSP does not attempt to establish any detailed equipment standards.
- 1.3 In the event there are any inconsistencies between this SRSP and the Act or any subsidiary legislations made under the Act, the Act or the subsidiary legislation shall prevail.

## 2. ABBREVIATIONS

<b>AA</b>	Apparatus Assignment
<b>FACSMAB</b>	Frequency Assignment Committee of Singapore , Malaysia and Brunei Darussalam
<b>FS</b>	Fixed Service
<b>FWS</b>	Fixed Wireless System
<b>GHz</b>	Gigahertz
<b>ITU</b>	International Telecommunication Union
<b>ITU-R</b>	ITU Radiocommunication Sector
<b>JCC</b>	Joint Committee on Communications between the Republic of Indonesia and Malaysia
<b>JTC</b>	Joint Technical Committee on Coordination and Assignment of Frequencies along Malaysia – Thailand Common Border
<b>MHz</b>	Megahertz
<b>MCMC</b>	Malaysian Communications and Multimedia Commission
<b>NFP(I)</b>	Network Facilities Provider (Individual)
<b>RF</b>	Radio-frequency
<b>SRSP</b>	Standard Radio System Plan
<b>Trilateral</b>	Trilateral Coordination Meeting between the Republic of Indonesia Malaysia and Singapore

### **3. INTENT**

- 3.1 This SRSP is intended to ensure efficient provision of FWS in Malaysia with minimal service disruption and radio frequency interference among the service providers.
- 3.2 This SRSP provides the minimum requirements for the utilisation of FWS in the frequency band of **21.30 GHz to 23.60 GHz** (“said band”) for digital transmission of FWS in Malaysia.
- 3.3 FWS may be used for high, medium and low capacity fixed service applications including mobile infrastructure on a case-by-case basis.

### **4. GENERAL**

- 4.1 Technical characteristics of the FWS equipment shall conform to all applicable Malaysian standards, international standards, ITU and its radio regulations as agreed and adopted by Malaysia.
- 4.2 Although the system conforms to the requirements of this SRSP, MCMC may require that modifications be made to the system whenever interference is caused or is likely to be caused to other radio stations or systems of services as listed in the Spectrum Plan.
- 4.3 For avoidance of doubt, MCMC shall not be responsible for any costs incurred as a result of the system modifications under subsection 4.2. The cost of modifications under subsection 4.2 shall be fully borne by the assignment holder.
- 4.4 All FWS communications equipment installations must comply with the safety rules and other requirements as specified in the applicable standards.
- 4.5 The FWS communications equipment used shall be certified as required under regulation 14 of the Communications and Multimedia (Technical Standards) Regulations 2000.

4.6 The allocation and assignment of the said band and the information in this SRSP are subject to further review by MCMC from time to time to reflect new developments in the communications and multimedia industry.

## 5. CHANNEL ARRANGEMENT

5.1 The RF channel arrangement is based on the RF channel arrangement in the **ITU-R Recommendation F.637**. Users are encouraged to refer to the latest issue of the recommendation document(s) published at the ITU-R website.

5.2 For this SRSP, the preferred RF channel arrangement is based on homogeneous patterns with channel separation of 3.5 MHz, defined by the following relationship:

$$f_p = f_r + 3.5 + 3.5 p \text{ MHz}$$

where:

$f_p$  be the centre frequency of the band of frequencies occupied (MHz),

$f_r$  be the reference frequency of the homogeneous pattern (MHz),

Note:

i. The reference frequency  $f_r$  is:  $f_r = 21\,196$  MHz

ii.  $p$ :  $1 \leq p \leq 685$

5.3 The homogeneous patterns above may accommodate six (6) two-way (transmit and receive) basic homogeneous arrangements with various channel spacings for different applications, as shown in **Figure 1** of **Appendix A**. The homogeneous arrangements provide for:

- i. 10 channels (1/1' to 10/10') of 112 MHz bandwidth;
- ii. 20 channels (1/1' to 20/20') of 56 MHz bandwidth;
- iii. 40 channels (1/1' to 40/40') of 28 MHz bandwidth;
- iv. 80 channels (1/1' to 80/80') of 14 MHz bandwidth;
- v. 160 channels (1/1' to 160/160') of 7 MHz bandwidth; and

vi. 320 channels (1/1' to 320/320') of 3.5 MHz bandwidth.

5.4 The frequencies of individual channels are expressed by the following relationship:

Let:

$f_r$  be the reference frequency of the homogeneous pattern (MHz),

where

$f_r = 21\,196$  MHz,

$f_n$  be the centre frequency of one RF channel in the lower half of the frequency band (MHz),

$f_{n'}$  be the centre frequency of one RF channel in the upper half of the frequency band (MHz),

5.4.1 For a channel bandwidth of 112 MHz:

lower half of the frequency band:	$f_n = f_r - 28 + 112 n$ MHz	$n = 1, 2, \dots, 10$
Upper half of the frequency band:	$f_{n'} = f_r + 1204 + 112 n$ MHz	

The frequency arrangement is illustrated in **Figure 1(b)** of **Appendix A** and the centre frequencies of the RF channels are listed in **Table 1** of **Appendix A**.

5.4.2 For a channel bandwidth of 56 MHz:

lower half of the frequency band:	$f_n = f_r + 56 n$ MHz	$n = 1, 2, \dots, 20$
upper half of the frequency band:	$f_{n'} = f_r + 1232 + 56 n$ MHz	

The RF channel arrangement is illustrated in **Figure 1(c)** of **Appendix A** and the centre frequencies of the RF channels are listed in **Table 2** of **Appendix A**.

5.4.3 For a channel bandwidth of 28 MHz:

lower half of the frequency band:	$f_n = f_r + 14 + 28 n$ MHz	$n = 1, 2, \dots, 40$
upper half of the frequency band:	$f_{n'} = f_r + 1246 + 28 n$ MHz	

The RF channel arrangement is illustrated in **Figure 1(d)** of **Appendix A** and the centre frequencies of the RF channels are listed in **Table 3** of **Appendix A**.

5.4.4 For a channel bandwidth of 14 MHz:

lower half of the frequency band:	$f_n = f_r + 21 + 14 n$ MHz	$n = 1, 2, \dots, 80$
upper half of the frequency band:	$f_{n'} = f_r + 1253 + 14 n$ MHz	

The RF channel arrangement is illustrated in **Figure 1(e)** of **Appendix A** and the centre frequencies of the RF channels are listed in **Table 4** of **Appendix A**.

5.4.5 For a channel bandwidth of 7 MHz:

lower half of the frequency band:	$f_n = f_r + 24.5 + 7 n$ MHz	$n = 1, 2, \dots, 160$
upper half of the frequency band:	$f_{n'} = f_r + 1256.5 + 7 n$ MHz	

The RF channel arrangement is illustrated in **Figure 1(f)** of **Appendix A** and the centre frequencies of the RF channels are listed in **Table 5** of **Appendix A**.



5.4.6 For a channel bandwidth of 3.5 MHz:

lower half of the frequency band:	$f_n = f_r + 26.25 + 3.5 n$ MHz	$n = 1, 2, \dots,$ 320
upper half of the frequency band:	$f_{n'} = f_r + 1258.25 + 3.5 n$ MHz	

The RF channel arrangement is illustrated in **Figure 1(g)** of **Appendix A** and the centre frequencies of the RF channels are listed in **Table 6** of **Appendix A**.

## 6. REQUIREMENTS FOR USAGE OF SPECTRUM

6.1 This SRSP covers the minimum key characteristics for the use of the said band.

6.2 The use of the said band shall comply with the transmit and receive channel arrangements as shown in **Table 1** to **Table 6** of **Appendix A**.

6.3 The above channel arrangements primarily provide for six (6) basic homogeneous arrangements for FWS with bandwidth of 112 MHz, 56 MHz, 28 MHz, 14 MHz, 7 MHz and 3.5 MHz.

6.4 In a digital radio system, both horizontal and vertical polarisations shall be used, where possible, for each radio frequency channel, as shown in **Figure 1** in **Appendix A**.

6.5 Protection channel may be permitted for multi-channel systems provided that it is duly approved by MCMC with the issuance of AA.

6.6 To maximise the use of frequency, the frequencies assigned to a main route are also assigned for spur routes and vice versa, where possible, without causing interference to each other.

6.7 It should be noted that the FWS in FS shares the frequency bands of 21.20 GHz

to 23.60 GHz and is of the same primary status with multiple other services. As such, it shall comply with **Recommendation ITU-R F.746** and **Recommendation ITU-R SM.1540** of the ITU Radio Regulations.

- 6.8 Special care shall be taken by FWS providers during the network planning stage and installation of their communications equipment to avoid any interference to and from other primary services. The FWS providers shall take full advantage of interference mitigation techniques such as antenna discrimination, antenna tilt, antenna polarization, frequency discrimination, shielding/blocking (introduce diffraction loss), site selection, and/or power control to facilitate the coordination of systems.
- 6.9 In the event that the FWS causes interference to other primary services, and the affected party files a report to MCMC for a resolution, MCMC will decide the necessary modifications and schedule of modifications to resolve the interference. MCMC will be guided by the interference resolution process as shown in **Appendix B**.

## **7. PRINCIPLES OF ASSIGNMENT**

- 7.1 Authorisation to use the said band for FWS station is by way of AA. Priority will be given to the use of a station for trunk or main link.
- 7.2 The eligibilities of applicants for the submission of AA applications are as follows:
- i. NFP(I) licence holder, which owns or provides radiocommunications transmitters and links; or
  - ii. Private network facility (Government and private corporations or companies) for private use only.
- 7.3 For use by private network facility other than offshore, an applicant shall provide proof that existing NFP(I) licence holders are not able to provide FWS station to the said applicant.

7.4 Applicants are required to submit:

7.4.1 AA application for the apparatus on the prescribed AA form in accordance with the Act, relevant subsidiary legislations including the Communications and Multimedia (Spectrum) Regulations 2000 (“**Spectrum Regulations**”) and any relevant instruments issued by MCMC from time to time; and

7.4.2 any other documents and/or information that may be requested by MCMC.

7.5 The assignment shall be subject to all conditions as specified in regulations 9, 10 and 22 of the Spectrum Regulations and any further conditions as may be imposed by MCMC from time to time

7.6 The issuance of AA will be subject to technical analysis by MCMC. If necessary, operator-to-operator coordination at defined geographic boundaries may be required to reduce interference.

7.7 An applicant is also encouraged to coordinate among existing operators of FWS stations in the same frequency band prior to the submission of the AA application.

7.8 The AA shall be assigned based on a first-come, first-serve basis.

## **8. IMPLEMENTATION**

8.1 This SRSP shall be effective on its date of issuance.

8.2 AA application for FWS operating in the said band shall comply with this SRSP, the Act, relevant subsidiary legislations including the Spectrum Regulations and any relevant instruments issued by MCMC from time to time.

## **9. COORDINATION REQUIREMENT**

- 9.1 The use of the said band shall require coordination at the common border area(s) with the neighbouring countries within the coordination zones. The coordination zones are based on agreements reached at border committees, namely FACSMAB, JCC, JTC and Trilateral. Agreement on the use of the said band may differ from one neighbouring country to another, subject to the requirements of the respective country.
- 9.2 In the event there is no agreement on coordination zone, a zone within 50km from the border of the neighbouring countries will be used.
- 9.3 It shall be noted that the coordination zones and other coordination parameters between Malaysia and its neighbouring countries may be reviewed and updated from time to time.
- 9.4 Issuance of AA is also subject to successful coordination with the above neighbouring countries, where applicable.
- 9.5 The technical mitigation guide as mentioned in Section 6 above shall be applied if operator-to-operator coordination is required.
- 9.6 In the event of any interference, MCMC will require the affected users to carry out an operator-to-operator coordination. In the event that the interference remains unresolved after 24 hours by the operators, the affected parties may escalate the matter to MCMC for a resolution. MCMC will decide necessary modifications and schedule of modifications to resolve the interference dispute. MCMC will be guided by the interference resolution process as shown in **Appendix B**.

## **10. REVOCATION**

- 10.1 SKMM SRSP – 528 FS Issue 4 dated 15 October 2009 is hereby revoked.

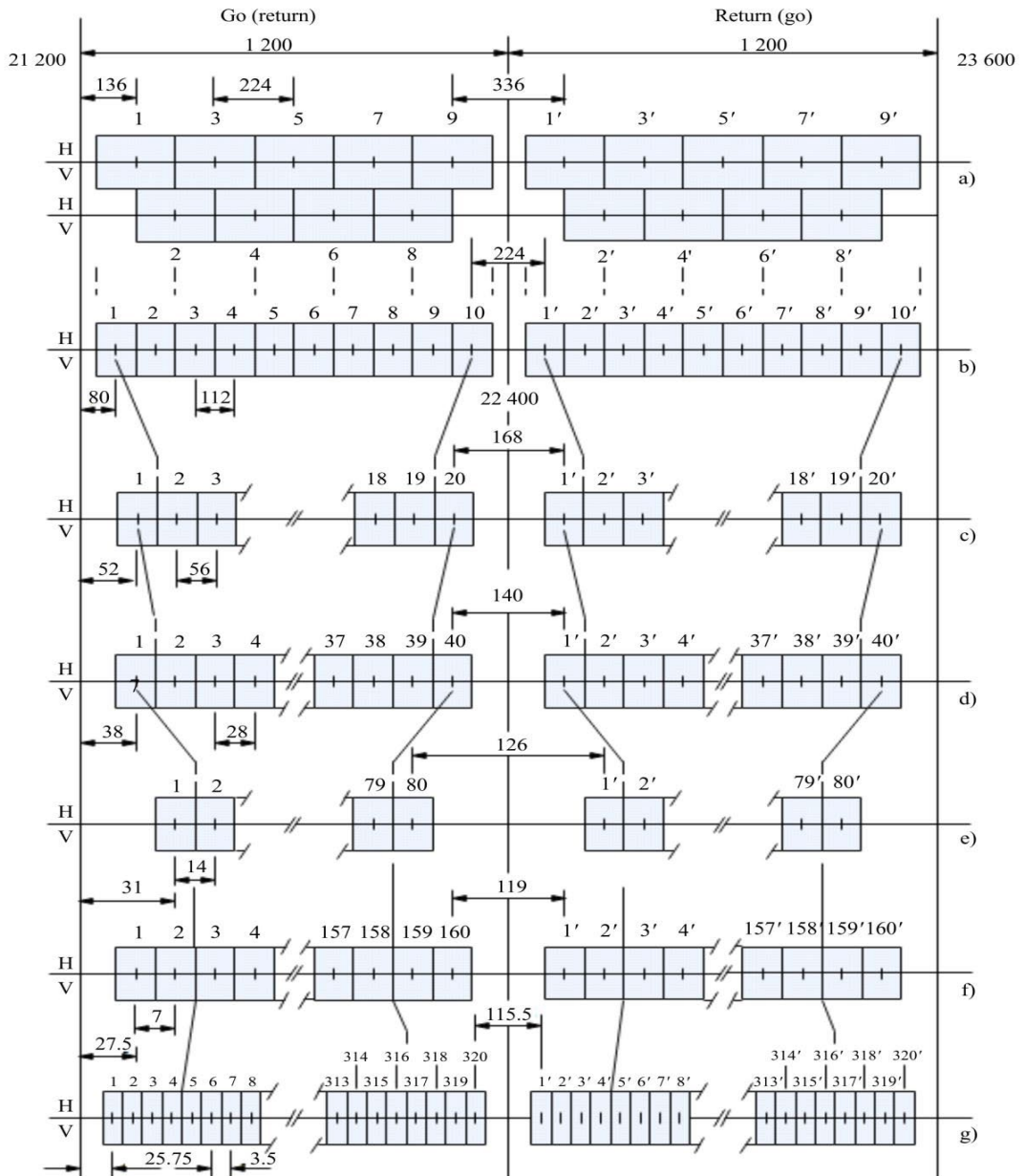
## 11. REFERENCES

- i. **Spectrum Plan**
- ii. **ITU-R F.637** Radio-frequency channel arrangements for fixed wireless systems operating in the 21.2 - 23.6 GHz band.
- iii. **ITU-R SM.1540** Unwanted emissions in the out-of-band domain falling into adjacent allocated bands.
- iv. **ITU-R F.746** Radio-frequency arrangements for fixed service systems.

# APPENDIX A: CHANNEL ARRANGEMENT

**Figure 1**

RF channel arrangements for FWS operating in the 21.20 GHz to 23.60 GHz frequency band (Co-channel arrangement) (All frequencies in MHz)



F.0637-01

**Table 1**  
RF Carrier Centre Frequencies  
(bandwidth = 112 MHz)

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	21280.00	1'	22512.00
2	21392.00	2'	22624.00
3	21504.00	3'	22736.00
4	21616.00	4'	22848.00
5	21728.00	5'	22960.00
6	21840.00	6'	23072.00
7	21952.00	7'	23184.00
8	22064.00	8'	23296.00
9	22176.00	9'	23408.00
10	22288.00	10'	23520.00

**Table 2**  
RF Carrier Centre Frequencies  
(bandwidth = 56 MHz)

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	21252.00	1'	22484.00
2	21308.00	2'	22540.00
3	21364.00	3'	22596.00
4	21420.00	4'	22652.00
5	21476.00	5'	22708.00
6	21532.00	6'	22764.00
7	21588.00	7'	22820.00
8	21644.00	8'	22876.00
9	21700.00	9'	22932.00
10	21756.00	10'	22988.00
11	21812.00	11'	23044.00
12	21868.00	12'	23100.00
13	21924.00	13'	23156.00
14	21980.00	14'	23212.00
15	22036.00	15'	23268.00
16	22092.00	16'	23324.00
17	22148.00	17'	23380.00
18	22204.00	18'	23436.00
19	22260.00	19'	23492.00
20	22316.00	20'	23548.00

**Table 3**  
RF Carrier Centre Frequencies  
(bandwidth = 28 MHz)

Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)
1	21238.00	1'	22470.00	21	21798.00	21'	23030.00
2	21266.00	2'	22498.00	22	21826.00	22'	23058.00
3	21294.00	3'	22526.00	23	21854.00	23'	23086.00
4	21322.00	4'	22554.00	24	21882.00	24'	23114.00
5	21350.00	5'	22582.00	25	21910.00	25'	23142.00
6	21378.00	6'	22610.00	26	21938.00	26'	23170.00
7	21406.00	7'	22638.00	27	21966.00	27'	23198.00
8	21434.00	8'	22666.00	28	21994.00	28'	23226.00
9	21462.00	9'	22694.00	29	22022.00	29'	23254.00
10	21490.00	10'	22722.00	30	22050.00	30'	23282.00
11	21518.00	11'	22750.00	31	22078.00	31'	23310.00
12	21546.00	12'	22778.00	32	22106.00	32'	23338.00
13	21574.00	13'	22806.00	33	22134.00	33'	23366.00
14	21602.00	14'	22834.00	34	22162.00	34'	23394.00
15	21630.00	15'	22862.00	35	22190.00	35'	23422.00
16	21658.00	16'	22890.00	36	22218.00	36'	23450.00
17	21686.00	17'	22918.00	37	22246.00	37'	23478.00
18	21714.00	18'	22946.00	38	22274.00	38'	23506.00
19	21742.00	19'	22974.00	39	22302.00	39'	23534.00
20	21770.00	20'	23002.00	40	22330.00	40'	23562.00



**Table 4**  
RF Carrier Centre Frequencies  
(bandwidth = 14 MHz)

Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)
1	21231.00	1'	22463.00	21	21511.00	21'	22743.00
2	21245.00	2'	22477.00	22	21525.00	22'	22757.00
3	21259.00	3'	22491.00	23	21539.00	23'	22771.00
4	21273.00	4'	22505.00	24	21553.00	24'	22785.00
5	21287.00	5'	22519.00	25	21567.00	25'	22799.00
6	21301.00	6'	22533.00	26	21581.00	26'	22813.00
7	21315.00	7'	22547.00	27	21595.00	27'	22827.00
8	21329.00	8'	22561.00	28	21609.00	28'	22841.00
9	21343.00	9'	22575.00	29	21623.00	29'	22855.00
10	21357.00	10'	22589.00	30	21637.00	30'	22869.00
11	21371.00	11'	22603.00	31	21651.00	31'	22883.00
12	21385.00	12'	22617.00	32	21665.00	32'	22897.00
13	21399.00	13'	22631.00	33	21679.00	33'	22911.00
14	21413.00	14'	22645.00	34	21693.00	34'	22925.00
15	21427.00	15'	22659.00	35	21707.00	35'	22939.00
16	21441.00	16'	22673.00	36	21721.00	36'	22953.00
17	21455.00	17'	22687.00	37	21735.00	37'	22967.00
18	21469.00	18'	22701.00	38	21749.00	38'	22981.00
19	21483.00	19'	22715.00	39	21763.00	39'	22995.00
20	21497.00	20'	22729.00	40	21777.00	40'	23009.00

**Table 4 (continued)**  
 RF Carrier Centre Frequencies  
 (bandwidth = 14 MHz)

Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)
41	21791.00	41'	23023.00	61	22071.00	61'	23303.00
42	21805.00	42'	23037.00	62	22085.00	62'	23317.00
43	21819.00	43'	23051.00	63	22099.00	63'	23331.00
44	21833.00	44'	23065.00	64	22113.00	64'	23345.00
45	21847.00	45'	23079.00	65	22127.00	65'	23359.00
46	21861.00	46'	23093.00	66	22141.00	66'	23373.00
47	21875.00	47'	23107.00	67	22155.00	67'	23387.00
48	21889.00	48'	23121.00	68	22169.00	68'	23401.00
49	21903.00	49'	23135.00	69	22183.00	69'	23415.00
50	21917.00	50'	23149.00	70	22197.00	70'	23429.00
51	21931.00	51'	23163.00	71	22211.00	71'	23443.00
52	21945.00	52'	23177.00	72	22225.00	72'	23457.00
53	21959.00	53'	23191.00	73	22239.00	73'	23471.00
54	21973.00	54'	23205.00	74	22253.00	74'	23485.00
55	21987.00	55'	23219.00	75	22267.00	75'	23499.00
56	22001.00	56'	23233.00	76	22281.00	76'	23513.00
57	22015.00	57'	23247.00	77	22295.00	77'	23527.00
58	22029.00	58'	23261.00	78	22309.00	78'	23541.00
59	22043.00	59'	23275.00	79	22323.00	79'	23555.00
60	22057.00	60'	23289.00	80	22337.00	80'	23569.00

**Table 5**  
RF Carrier Centre Frequencies  
(bandwidth = 7 MHz)

Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)
1	21227.50	1'	22459.50	31	21437.50	31'	22669.50
2	21234.50	2'	22466.50	32	21444.50	32'	22676.50
3	21241.50	3'	22473.50	33	21451.50	33'	22683.50
4	21248.50	4'	22480.50	34	21458.50	34'	22690.50
5	21255.50	5'	22487.50	35	21465.50	35'	22697.50
6	21262.50	6'	22494.50	36	21472.50	36'	22704.50
7	21269.50	7'	22501.50	37	21479.50	37'	22711.50
8	21276.50	8'	22508.50	38	21486.50	38'	22718.50
9	21283.50	9'	22515.50	39	21493.50	39'	22725.50
10	21290.50	10'	22522.50	40	21500.50	40'	22732.50
11	21297.50	11'	22529.50	41	21507.50	41'	22739.50
12	21304.50	12'	22536.50	42	21514.50	42'	22746.50
13	21311.50	13'	22543.50	43	21521.50	43'	22753.50
14	21318.50	14'	22550.50	44	21528.50	44'	22760.50
15	21325.50	15'	22557.50	45	21535.50	45'	22767.50
16	21332.50	16'	22564.50	46	21542.50	46'	22774.50
17	21339.50	17'	22571.50	47	21549.50	47'	22781.50
18	21346.50	18'	22578.50	48	21556.50	48'	22788.50
19	21353.50	19'	22585.50	49	21563.50	49'	22795.50
20	21360.50	20'	22592.50	50	21570.50	50'	22802.50
21	21367.50	21'	22599.50	51	21577.50	51'	22809.50

22	21374.50	22'	22606.50	52	21584.50	52'	22816.50
23	21381.50	23'	22613.50	53	21591.50	53'	22823.50
24	21388.50	24'	22620.50	54	21598.50	54'	22830.50
25	21395.50	25'	22627.50	55	21605.50	55'	22837.50
26	21402.50	26'	22634.50	56	21612.50	56'	22844.50
27	21409.50	27'	22641.50	57	21619.50	57'	22851.50
28	21416.50	28'	22648.50	58	21626.50	58'	22858.50
29	21423.50	29'	22655.50	59	21633.50	59'	22865.50
30	21430.50	30'	22662.50	60	21640.50	60'	22872.50

**Table 5 (continued)**  
RF Carrier Centre Frequencies  
(bandwidth = 7 MHz)

Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)
61	21647.50	61'	22879.50	91	21857.50	91'	23089.50
62	21654.50	62'	22886.50	92	21864.50	92'	23096.50
63	21661.50	63'	22893.50	93	21871.50	93'	23103.50
64	21668.50	64'	22900.50	94	21878.50	94'	23110.50
65	21675.50	65'	22907.50	95	21885.50	95'	23117.50
66	21682.50	66'	22914.50	96	21892.50	96'	23124.50
67	21689.50	67'	22921.50	97	21899.50	97'	23131.50
68	21696.50	68'	22928.50	98	21906.50	98'	23138.50
69	21703.50	69'	22935.50	99	21913.50	99'	23145.50
70	21710.50	70'	22942.50	100	21920.50	100'	23152.50
71	21717.50	71'	22949.50	101	21927.50	101'	23159.50

72	21724.50	72'	22956.50	102	21934.50	102'	23166.50
73	21731.50	73'	22963.50	103	21941.50	103'	23173.50
74	21738.50	74'	22970.50	104	21948.50	104'	23180.50
75	21745.50	75'	22977.50	105	21955.50	105'	23187.50
76	21752.50	76'	22984.50	106	21962.50	106'	23194.50
77	21759.50	77'	22991.50	107	21969.50	107'	23201.50
78	21766.50	78'	22998.50	108	21976.50	108'	23208.50
79	21773.50	79'	23005.50	109	21983.50	109'	23215.50
80	21780.50	80'	23012.50	110	21990.50	110'	23222.50
81	21787.50	81'	23019.50	111	21997.50	111'	23229.50
82	21794.50	82'	23026.50	112	22004.50	112'	23236.50
83	21801.50	83'	23033.50	113	22011.50	113'	23243.50
84	21808.50	84'	23040.50	114	22018.50	114'	23250.50
85	21815.50	85'	23047.50	115	22025.50	115'	23257.50
86	21822.50	86'	23054.50	116	22032.50	116'	23264.50
87	21829.50	87'	23061.50	117	22039.50	117'	23271.50
88	21836.50	88'	23068.50	118	22046.50	118'	23278.50
89	21843.50	89'	23075.50	119	22053.50	119'	23285.50
90	21850.50	90'	23082.50	120	22060.50	120'	23292.50

**Table 5 (continued)**  
**RF Carrier Centre Frequencies**  
 (bandwidth = 7 MHz)

<b>Ch. No.</b>	<b>Freq. (MHz)</b>	<b>Ch. No.</b>	<b>Freq. (MHz)</b>	<b>Ch. No.</b>	<b>Freq. (MHz)</b>	<b>Ch. No.</b>	<b>Freq. (MHz)</b>
121	22067.50	121'	23299.50	141	22207.50	141'	23439.50
122	22074.50	122'	23306.50	142	22214.50	142'	23446.50
123	22081.50	123'	23313.50	143	22221.50	143'	23453.50
124	22088.50	124'	23320.50	144	22228.50	144'	23460.50
125	22095.50	125'	23327.50	145	22235.50	145'	23467.50
126	22102.50	126'	23334.50	146	22242.50	146'	23474.50
127	22109.50	127'	23341.50	147	22249.50	147'	23481.50
128	22116.50	128'	23348.50	148	22256.50	148'	23488.50
129	22123.50	129'	23355.50	149	22263.50	149'	23495.50
130	22130.50	130'	23362.50	150	22270.50	150'	23502.50
131	22137.50	131'	23369.50	151	22277.50	151'	23509.50
132	22144.50	132'	23376.50	152	22284.50	152'	23516.50
133	22151.50	133'	23383.50	153	22291.50	153'	23523.50
134	22158.50	134'	23390.50	154	22298.50	154'	23530.50
135	22165.50	135'	23397.50	155	22305.50	155'	23537.50
136	22172.50	136'	23404.50	156	22312.50	156'	23544.50
137	22179.50	137'	23411.50	157	22319.50	157'	23551.50
138	22186.50	138'	23418.50	158	22326.50	158'	23558.50
139	22193.50	139'	23425.50	159	22333.50	159'	23565.50
140	22200.50	140'	23432.50	160	22340.50	160'	23572.50

**Table 6**  
RF Carrier Centre Frequencies  
(bandwidth = 3.5 MHz)

Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)
1	21225.75	1'	22457.75	31	21330.75	31'	22562.75
2	21229.25	2'	22461.25	32	21334.25	32'	22566.25
3	21232.75	3'	22464.75	33	21337.75	33'	22569.75
4	21236.25	4'	22468.25	34	21341.25	34'	22573.25
5	21239.75	5'	22471.75	35	21344.75	35'	22576.75
6	21243.25	6'	22475.25	36	21348.25	36'	22580.25
7	21246.75	7'	22478.75	37	21351.75	37'	22583.75
8	21250.25	8'	22482.25	38	21355.25	38'	22587.25
9	21253.75	9'	22485.75	39	21358.75	39'	22590.75
10	21257.25	10'	22489.25	40	21362.25	40'	22594.25
11	21260.75	11'	22492.75	41	21365.75	41'	22597.75
12	21264.25	12'	22496.25	42	21369.25	42'	22601.25
13	21267.75	13'	22499.75	43	21372.75	43'	22604.75
14	21271.25	14'	22503.25	44	21376.25	44'	22608.25
15	21274.75	15'	22506.75	45	21379.75	45'	22611.75
16	21278.25	16'	22510.25	46	21383.25	46'	22615.25
17	21281.75	17'	22513.75	47	21386.75	47'	22618.75
18	21285.25	18'	22517.25	48	21390.25	48'	22622.25
19	21288.75	19'	22520.75	49	21393.75	49'	22625.75
20	21292.25	20'	22524.25	50	21397.25	50'	22629.25
21	21295.75	21'	22527.75	51	21400.75	51'	22632.75

22	21299.25	22'	22531.25	52	21404.25	52'	22636.25
23	21302.75	23'	22534.75	53	21407.75	53'	22639.75
24	21306.25	24'	22538.25	54	21411.25	54'	22643.25
25	21309.75	25'	22541.75	55	21414.75	55'	22646.75
26	21313.25	26'	22545.25	56	21418.25	56'	22650.25
27	21316.75	27'	22548.75	57	21421.75	57'	22653.75
28	21320.25	28'	22552.25	58	21425.25	58'	22657.25
29	21323.75	29'	22555.75	59	21428.75	59'	22660.75
30	21327.25	30'	22559.25	60	21432.25	60'	22664.25

**Table 6 (continued)**  
RF Carrier Centre Frequencies  
(bandwidth = 3.5 MHz)

Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)
61	21435.75	61'	22667.75	91	21540.75	91'	22772.75
62	21439.25	62'	22671.25	92	21544.25	92'	22776.25
63	21442.75	63'	22674.75	93	21547.75	93'	22779.75
64	21446.25	64'	22678.25	94	21551.25	94'	22783.25
65	21449.75	65'	22681.75	95	21554.75	95'	22786.75
66	21453.25	66'	22685.25	96	21558.25	96'	22790.25
67	21456.75	67'	22688.75	97	21561.75	97'	22793.75
68	21460.25	68'	22692.25	98	21565.25	98'	22797.25
69	21463.75	69'	22695.75	99	21568.75	99'	22800.75
70	21467.25	70'	22699.25	100	21572.25	100'	22804.25
71	21470.75	71'	22702.75	101	21575.75	101'	22807.75



72	21474.25	72'	22706.25	102	21579.25	102'	22811.25
73	21477.75	73'	22709.75	103	21582.75	103'	22814.75
74	21481.25	74'	22713.25	104	21586.25	104'	22818.25
75	21484.75	75'	22716.75	105	21589.75	105'	22821.75
76	21488.25	76'	22720.25	106	21593.25	106'	22825.25
77	21491.75	77'	22723.75	107	21596.75	107'	22828.75
78	21495.25	78'	22727.25	108	21600.25	108'	22832.25
79	21498.75	79'	22730.75	109	21603.75	109'	22835.75
80	21502.25	80'	22734.25	110	21607.25	110'	22839.25
81	21505.75	81'	22737.75	111	21610.75	111'	22842.75
82	21509.25	82'	22741.25	112	21614.25	112'	22846.25
83	21512.75	83'	22744.75	113	21617.75	113'	22849.75
84	21516.25	84'	22748.25	114	21621.25	114'	22853.25
85	21519.75	85'	22751.75	115	21624.75	115'	22856.75
86	21523.25	86'	22755.25	116	21628.25	116'	22860.25
87	21526.75	87'	22758.75	117	21631.75	117'	22863.75
88	21530.25	88'	22762.25	118	21635.25	118'	22867.25
89	21533.75	89'	22765.75	119	21638.75	119'	22870.75
90	21537.25	90'	22769.25	120	21642.25	120'	22874.25

**Table 6 (continued)**  
 RF Carrier Centre Frequencies  
 (bandwidth = 3.5 MHz)

Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)
121	21645.75	121'	22877.75	151	21750.75	151'	22982.75
122	21649.25	122'	22881.25	152	21754.25	152'	22986.25
123	21652.75	123'	22884.75	153	21757.75	153'	22989.75
124	21656.25	124'	22888.25	154	21761.25	154'	22993.25
125	21659.75	125'	22891.75	155	21764.75	155'	22996.75
126	21663.25	126'	22895.25	156	21768.25	156'	23000.25
127	21666.75	127'	22898.75	157	21771.75	157'	23003.75
128	21670.25	128'	22902.25	158	21775.25	158'	23007.25
129	21673.75	129'	22905.75	159	21778.75	159'	23010.75
130	21677.25	130'	22909.25	160	21782.25	160'	23014.25
131	21680.75	131'	22912.75	161	21785.75	161'	23017.75
132	21684.25	132'	22916.25	162	21789.25	162'	23021.25
133	21687.75	133'	22919.75	163	21792.75	163'	23024.75
134	21691.25	134'	22923.25	164	21796.25	164'	23028.25
135	21694.75	135'	22926.75	165	21799.75	165'	23031.75
136	21698.25	136'	22930.25	166	21803.25	166'	23035.25
137	21701.75	137'	22933.75	167	21806.75	167'	23038.75
138	21705.25	138'	22937.25	168	21810.25	168'	23042.25
139	21708.75	139'	22940.75	169	21813.75	169'	23045.75
140	21712.25	140'	22944.25	170	21817.25	170'	23049.250

141	21715.75	141'	22947.75	171	21820.75	171'	23052.750
142	21719.25	142'	22951.25	172	21824.25	172'	23056.250
143	21722.75	143'	22954.75	173	21827.75	173'	23059.750
144	21726.25	144'	22958.25	174	21831.25	174'	23063.250
145	21729.75	145'	22961.75	175	21834.75	175'	23066.750
146	21733.25	146'	22965.25	176	21838.25	176'	23070.250
147	21736.75	147'	22968.75	177	21841.75	177'	23073.750
148	21740.25	148'	22972.25	178	21845.25	178'	23077.250
149	21743.75	149'	22975.75	179	21848.75	179'	23080.750
150	21747.25	150'	22979.25	180	21852.25	180'	23084.250

**Table 6 (continued)**  
 RF Carrier Centre Frequencies  
 (bandwidth = 3.5 MHz)

Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)
181	21855.75	181'	23087.75	211	21960.75	211'	23192.75
182	21859.25	182'	23091.25	212	21964.25	212'	23196.25
183	21862.75	183'	23094.75	213	21967.75	213'	23199.75
184	21866.25	184'	23098.25	214	21971.25	214'	23203.25
185	21869.75	185'	23101.75	215	21974.75	215'	23206.75
186	21873.25	186'	23105.25	216	21978.25	216'	23210.25
187	21876.75	187'	23108.75	217	21981.75	217'	23213.75
188	21880.25	188'	23112.25	218	21985.25	218'	23217.25
189	21883.75	189'	23115.75	219	21988.75	219'	23220.75
190	21887.25	190'	23119.25	220	21992.25	220'	23224.25
191	21890.75	191'	23122.75	221	21995.75	221'	23227.75
192	21894.25	192'	23126.25	222	21999.25	222'	23231.25
193	21897.75	193'	23129.75	223	22002.75	223'	23234.75
194	21901.25	194'	23133.25	224	22006.25	224'	23238.25
195	21904.75	195'	23136.75	225	22009.75	225'	23241.75
196	21908.25	196'	23140.25	226	22013.25	226'	23245.25
197	21911.75	197'	23143.75	227	22016.75	227'	23248.75
198	21915.25	198'	23147.25	228	22020.25	228'	23252.25
199	21918.75	199'	23150.75	229	22023.75	229'	23255.75
200	21922.25	200'	23154.25	230	22027.25	230'	23259.25
201	21925.75	201'	23157.75	231	22030.75	231'	23262.75

202	21929.25	202'	23161.25	232	22034.25	232'	23266.25
203	21932.75	203'	23164.75	233	22037.75	233'	23269.75
204	21936.25	204'	23168.25	234	22041.25	234'	23273.25
205	21939.75	205'	23171.75	235	22044.75	235'	23276.75
206	21943.25	206'	23175.25	236	22048.25	236'	23280.25
207	21946.75	207'	23178.75	237	22051.75	237'	23283.75
208	21950.25	208'	23182.25	238	22055.25	238'	23287.25
209	21953.75	209'	23185.75	239	22058.75	239'	23290.75
210	21957.25	210'	23189.25	240	22062.25	240'	23294.25

**Table 6 (continued)**  
 RF Carrier Centre Frequencies  
 (bandwidth = 3.5 MHz)

Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)	Ch. No.	Freq. (MHz)
241	22065.75	241'	23297.75	271	22170.75	271'	23402.75
242	22069.25	242'	23301.25	272	22174.25	272'	23406.25
243	22072.75	243'	23304.75	273	22177.75	273'	23409.75
244	22076.25	244'	23308.25	274	22181.25	274'	23413.25
245	22079.75	245'	23311.75	275	22184.75	275'	23416.75
246	22083.25	246'	23315.25	276	22188.25	276'	23420.25
247	22086.75	247'	23318.75	277	22191.75	277'	23423.75
248	22090.25	248'	23322.25	278	22195.25	278'	23427.25
249	22093.75	249'	23325.75	279	22198.75	279'	23430.75
250	22097.25	250'	23329.25	280	22202.25	280'	23434.25
251	22100.75	251'	23332.75	281	22205.75	281'	23437.75
252	22104.25	252'	23336.25	282	22209.25	282'	23441.25
253	22107.75	253'	23339.75	283	22212.75	283'	23444.75
254	22111.25	254'	23343.25	284	22216.25	284'	23448.25
255	22114.75	255'	23346.75	285	22219.75	285'	23451.75
256	22118.25	256'	23350.25	286	22223.25	286'	23455.25
257	22121.75	257'	23353.75	287	22226.75	287'	23458.75
258	22125.25	258'	23357.25	288	22230.25	288'	23462.25
259	22128.75	259'	23360.75	289	22233.75	289'	23465.75
260	22132.25	260'	23364.25	290	22237.25	290'	23469.25
261	22135.75	261'	23367.75	291	22240.75	291'	23472.75

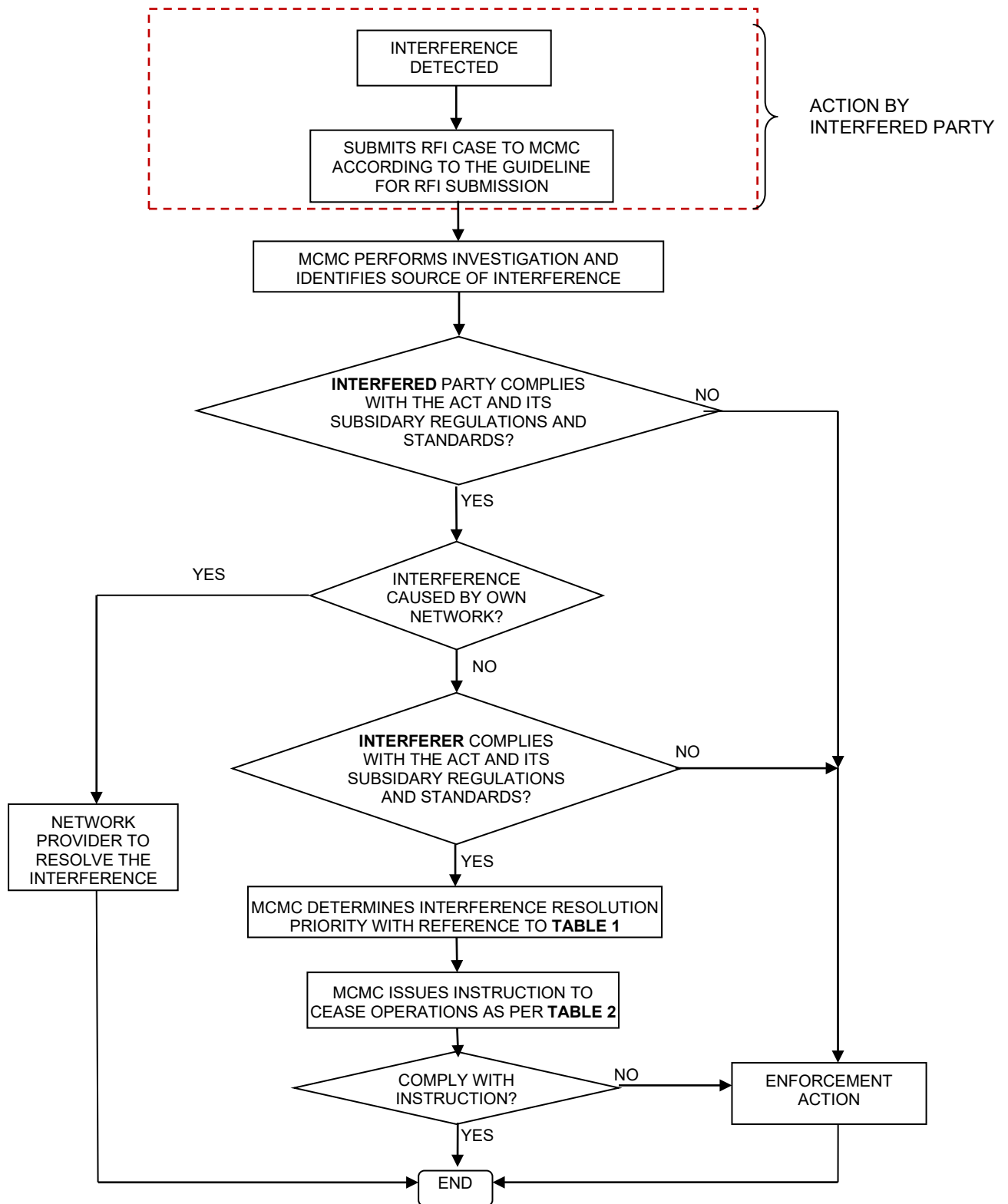
262	22139.25	262'	23371.25	292	22244.25	292'	23476.25
263	22142.75	263'	23374.75	293	22247.75	293'	23479.75
264	22146.25	264'	23378.25	294	22251.25	294'	23483.25
265	22149.75	265'	23381.75	295	22254.75	295'	23486.75
266	22153.25	266'	23385.25	296	22258.25	296'	23490.25
267	22156.75	267'	23388.75	297	22261.75	297'	23493.75
268	22160.25	268'	23392.25	298	22265.25	298'	23497.25
269	22163.75	269'	23395.75	299	22268.75	299'	23500.75
270	22167.25	270'	23399.25	300	22272.25	300'	23504.25

**Table 6 (continued)**  
 RF Carrier Centre Frequencies  
 (bandwidth = 3.5 MHz)

<b>Ch. No.</b>	<b>Freq. (MHz)</b>	<b>Ch. No.</b>	<b>Freq. (MHz)</b>	<b>Ch. No.</b>	<b>Freq. (MHz)</b>	<b>Ch. No.</b>	<b>Freq. (MHz)</b>
301	22275.75	301'	23507.75	311	22310.75	311'	23542.75
302	22279.25	302'	23511.25	312	22314.25	312'	23546.25
303	22282.75	303'	23514.75	313	22317.75	313'	23549.75
304	22286.25	304'	23518.25	314	22321.25	314'	23553.25
305	22289.75	305'	23521.75	315	22324.75	315'	23556.75
306	22293.25	306'	23525.25	316	22328.25	316'	23560.25
307	22296.75	307'	23528.75	317	22331.75	317'	23563.75
308	22300.25	308'	23532.25	318	22335.25	318'	23567.25
309	22303.75	309'	23535.75	319	22338.75	319'	23570.75
310	22307.25	310'	23539.25	320	22342.25	320'	23574.25



## APPENDIX B: INTERFERENCE RESOLUTION PROCESS



**TABLE 1: INTERFERENCE RESOLUTION PRIORITY**

No.	Resolution Type 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 (SA) and Apparatus Assignment (AA) have equal priority but are of higher priority than Class Assignment (CA).
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; and</li> <li>ii. Based on the Date of Apparatus Assignment - Priority is given to the earliest/first installation.</li> </ul>

**TABLE 2: INTERFERENCE RESOLUTION TIMELINE TO PARTIES**

No.	Types of interference	Description	Resolution Timeline
1	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 Spectrum Regulations.	To cease* operation immediately within 24 hours or earlier as specified in the notice issued by MCMC.
2	Major	Electromagnetic interference - (a) rendering any apparatus or service unsuitable for its purpose; or (b) which degrades or obstructs, or repeatedly interrupts, a radiocommunications service operating in accordance with the Spectrum Regulations.	To cease* operation within 3 days or earlier as specified in the notice issued by MCMC if interference cannot be resolved.
3	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.

\*Note:

Resumption of operation of the apparatus is not allowed unless the assignment holder submits an interference resolution or a mitigation plan and has completed the implementation of the mitigation plan to the satisfaction of MCMC to remove/avoid the interference.