



MCMC SRSP FS 14.40
8 JUNE 2018

Standard Radio System Plan

**REQUIREMENTS FOR
FIXED WIRELESS SYSTEMS
OPERATING IN THE FREQUENCY BAND
14.40 GHz TO 15.35 GHz**

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**REQUIREMENTS FOR FIXED WIRELESS SYSTEMS
OPERATING IN
14.40 GHz TO 15.35 GHz FREQUENCY BAND**

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 **14.40 GHz to 15.35 GHz** frequency band.
- 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

AA	Apparatus Assignment
FS	Fixed Service
FSS	Fixed Satellite Service
FWS	Fixed Wireless System
GHz	Gigahertz
ITU-R	International Telecommunication Union- Radiocommunication
MHz	Megahertz
MCMC	Malaysian Communications and Multimedia Commission
MS	Mobile Service
NFP(I)	Network Facilities Provider (Individual)
RF	Radio Frequency
SRSP	Standard Radio System Plan

3. INTENT

- 3.1 This SRSP states the requirement for utilization of the **14.40 GHz to 15.35 GHz** frequency band for digital transmission of Fixed Wireless Systems (“**FWS**”).
- 3.2 FWS is used mainly for trunk/main link only. However, the use of FWS for mini/spur link may be considered on case-by-case basis.

4. GENERAL

- 4.1 Although a wireless 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.
- 4.2 All equipment installations must comply with the safety rules and other requirements as specified in the applicable standards.
- 4.3 The equipment used shall be certified as required under regulation 14 of the Communications and Multimedia (Technical Standards) Regulations 2000.
- 4.4 The allocation and allotment of the **14.40 GHz to 15.35 GHz** frequency band and the information in this SRSP are subject to review by MCMC from time to time to reflect new developments in the communications and multimedia industry.

5. CHANNEL ARRANGEMENT

- 5.1 The radio frequency (“**RF**”) channel arrangement is based on the RF channel arrangement in the International Telecommunication Union – Radiocommunication (“**ITU-R**”) **Recommendation F.636**. Users are encouraged to refer to the latest issue of the ITU-R document at the website link provided in Section 11 below.

5.2 For this SRSP, the RF channel arrangement for FWS operating in the 15 GHz frequency band should be derived as follows:

Let

f_r be the reference frequency of the 14400MHz to 15350MHz frequency band = 11701MHz,

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),

5.2.1 For a channel separation of **28 MHz**:

Let N be the number of RF channels;

the frequencies (MHz) of individual channels are expressed by the following relationship:

lower half of the frequency band: $f_n = f_r + a + 28 n \text{ MHz}$

upper half of the frequency band: $f_n' = f_r + 3626 - 28 (N-n) \text{ MHz}$

where:

$a = 2688 \text{ MHz}$ for the 14.40 GHz to 15.35 GHz frequency band , and $n = 1, 2, \dots, N$, with $N \leq 16$ for the 14.40 GHz to 15.35 GHz frequency band

The frequency arrangement is illustrated in **Figure 1** and the center frequencies of main RF channels are listed in **Table 1** of **Appendix A**.

5.2.2 For a channel separation of **14 MHz**:

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

lower half of the frequency band: $f_n = f_r + a + 14 n \text{ MHz}$

upper half of the frequency band: $f_n' = f_r + 3640 - 14 (N - n) \text{ MHz}$

where:

$a = 2702 \text{ MHz}$ for the 14.40 GHz to 15.35 GHz frequency band , and

$n = 1, 2, \dots, N$, with $N \leq 32$ for the 14.40 GHz to 15.35 GHz frequency band

The frequency arrangement is illustrated in **Figure 2** and the center frequencies of main RF channels are listed in **Table 2** of **Appendix A**.

5.2.3 For a channel separation of **7 MHz**:

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

$$\text{lower half of the frequency band: } f_m = f_r + a + 28n + 7m \text{ MHz}$$

$$\text{upper half of the frequency band: } f_{m'} = f_r + 3608.5 - 28(N - n) + 7m \text{ MHz}$$

where:

$$m = 1, 2, 3 \text{ or } 4$$

$$a = 2670.5 \text{ MHz for the 14.40 GHz to 15.35 GHz frequency band}$$

$n = 1, 2, \dots, N$, with $N \leq 16$ for the 14.40 GHz to 15.35 GHz frequency band

5.2.4 For a channel separation of **3.5 MHz**:

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

$$\text{lower half of the frequency band: } f_m = f_r + a + 28n + 3.5m \text{ MHz}$$

$$\text{upper half of the frequency band: } f_{m'} = f_r + 3610.25 - 28(N - n) + 3.5m \text{ MHz}$$

where:

$$m = 1, 2, 3, 4, 5, 6, 7 \text{ or } 8$$

$$a = 2672.55 \text{ MHz for the 14.40 GHz to 15.35 GHz frequency band}$$

$n = 1, 2, \dots, N$, with $N \leq 16$ for the 14.40 GHz to 15.35 GHz frequency band

The center frequencies of main RF channels for channel separations of **7 MHz** and **3.5 MHz** are listed in **Tables 3** and **4** of **Appendix A**.

6. REQUIREMENTS FOR USE OF SPECTRUM

- 6.1 This SRSP covers the minimum key characteristics for the use of available frequencies.
- 6.2 Use of transmit and receive channels shall comply with the channel arrangements as shown in **Tables 1 to 4 of Appendix A.**
- 6.3 The above channel arrangements primarily provide for four (4) basic homogeneous arrangements for FWS with bandwidths of 28 MHz, 14 MHz, 7 MHz and 3.5 MHz.
- 6.4 In a digital radio system, both horizontal and vertical polarizations shall be used, where possible, for each radio frequency channel, as shown in **Figure 1 of Appendix A.**
- 6.5 For multi-channel systems, the protection may be permitted with issuance of corresponding apparatus assignment (“**AA**”) by MCMC.
- 6.6 To maximise the use of frequency, the frequencies assigned to a main route are also assigned for spur routes, where possible, without causing interference to each other.
- 6.7 Allocation of FS, FSS and MS are on primary status in the 14.40 GHz to 14.80 GHz frequency band. Sharing conditions for FS and FSS in the 14.40 GHz to 14.80 GHz frequency band are as stipulated in the table below:

No.	Frequency Band	Sharing conditions
1.	14.40 GHz to 14.50 GHz	<ul style="list-style-type: none">• Priority accorded to satellite network filed under the Administration of Malaysia at 91.5° East orbital slot.• FWS stations may operate on non-interference basis.
2.	14.50 GHz to 14.80 GHz	<ul style="list-style-type: none">• Priority accorded to FSS at designated hub stations below:<ul style="list-style-type: none">i. Cyberjaya, Selangor (GPS: Latitude 2°56’5.00”N, Longitude 101°39’29.00” E).

		ii. Bukit Jalil, Selangor (GPS: Latitude 3°03'5.07"N, Longitude 101°42'0.53"E). <ul style="list-style-type: none"> • No FWS is allowed within 3.5 kilometre radius from the above hub stations.
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6.8 MCMC may review this priority, considering the market and technological developments.

6.9 The use of the 14.40 GHz to 14.80 GHz frequency band by FWS of FS and FSS earth station shall comply with the **ITU-R Recommendation SF.765** and **Article 21** of the ITU Radio Regulations ("**Radio Regulations**").

6.10 Special care must be taken by FS and FSS providers during the network planning stage and installation of their equipment to avoid any interference to each other. FS and FSS providers shall take full advantage of interference mitigation techniques such as antenna discrimination, tilt, polarization, frequency discrimination, shielding/blocking (introduce diffraction loss), site selection, and/or power control to facilitate the coordination of systems.

6.11 FWS receiving stations operating in the 14.40 GHz to 14.80 GHz frequency band should avoid directing their antennas towards the geostationary-satellite orbit and FSS earth stations. It is recommended to maintain a minimum separation angle as recommended in **Article 21** of the Radio Regulations.

6.12 In the event of any interference and the affected party files a written report to MCMC for a resolution, MCMC will decide the 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**.

7. PRINCIPLES OF ASSIGNMENT

7.1 Authorization to use spectrum 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 Issuance of AA shall be on first-come, first-serve basis.

- 7.3 Persons who are eligible to apply for an AA include:
- i. Network Facilities Provider Individual (“**NFP(I)**”) license holder, which owns or provides radiocommunications transmitters and links; or
 - ii. Private network facility (Government and private corporations or companies) for private use only.
- 7.4 For use by private network facility other than offshore, an applicant has to provide proof that existing NFP(I) license holders are not able to provide FWS station to the said applicant.
- 7.5 An application for an AA must be done in accordance with the Act and the relevant subsidiary legislations including the Communications and Multimedia (Spectrum) Regulations 2000 (“**Spectrum Regulations**”).
- 7.6 Technical analysis will be carried out by MCMC before an AA is issued. If necessary, operator-to-operator coordination at defined geographic boundaries may be required to mitigate interference.
- 7.7 An applicant is also encouraged to coordinate among existing operators of FWS stations in the same frequency band prior to submission of the AA application.

8. IMPLEMENTATION

- 8.1 This SRSP shall be effective on its date of issuance.
- 8.2 AA application for FWS operating in the 14.40 GHz to 15.35 GHz frequency band shall comply with this SRSP, the Act and relevant subsidiary legislations including the Spectrum Regulations.
- 8.3 AA is required from MCMC prior to the purchase and installation of any FWS equipment. Notwithstanding the above, any system installed or purchased prior to the effective date of this SRSP may be allowed to operate, subject to the issuance of AA by MCMC.

9. COORDINATION REQUIREMENT

- 9.1 The use of the 14.40 GHz to 15.35 GHz frequency band shall require coordination with Malaysia's neighbouring countries within the following coordination zones:
- i. Within 8.5 kilometres of the Malaysian border with Singapore and Brunei Darussalam;
 - ii. Within 8.5 kilometres of the Malaysian border with Indonesia; and
 - iii. Within 15 kilometres of the Malaysian border with Thailand.
- 9.2 The above coordination distance is subject to review with Malaysia's neighbouring countries and may be updated from time to time.
- 9.3 Issuance of AA is also subject to the successful co-ordination with the above neighbouring countries, where applicable.
- 9.4 The technical mitigation guide as mentioned in Section 5 above shall be applied if operator-to-operator coordination is required.
- 9.5 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, the affected parties may escalate the matter to MCMC for a resolution. MCMC will decide the 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 – 526 FS Issue 3 dated 15 October 2009 is hereby revoked.

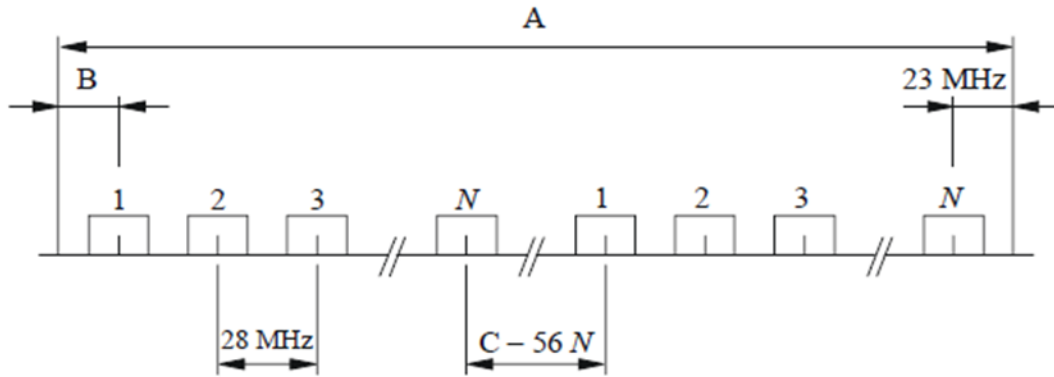
11. REFERENCES

1. **Spectrum Plan**
2. **ITU Radio Regulations Article 21** Terrestrial and Space Services Sharing Frequency Bands above 1 GHz.
3. **ITU-R F.636** Radio-frequency channel arrangements for fixed wireless systems operating in the 14.4–15.35 GHz band.
4. **ITU-R F.750** Architectures & Functional Aspects of Radio-relay systems for Synchronous Digital Hierarchy (SDH)-based networks.
5. **ITU-R SF.765** Intersection of radio-relay antenna beams with orbits used by space stations in the fixed-satellite service.

APPENDIX A: CHANNEL ARRANGEMENT

FIGURE 1

**Radio-frequency channel arrangement for fixed wireless systems
operating in the 15 GHz band: 28 MHz spacing**

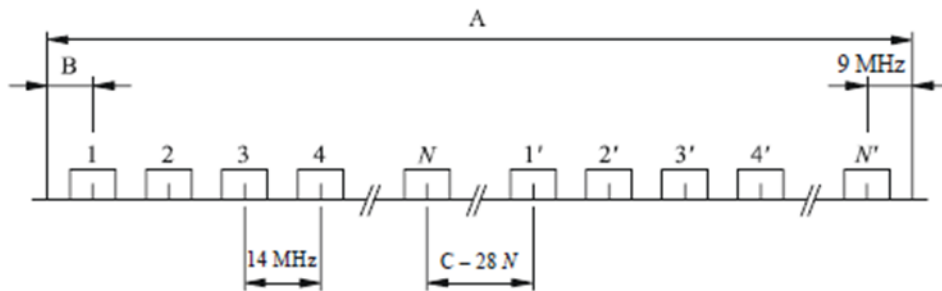


(For the band 14.4-15.35 GHz: A = 950 MHz, B = 17 MHz, C = 966 MHz)

Table 1
Main Channel Carrier Centre Frequencies
(bandwidth = 28 MHz)

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	14417.00	1'	14907.00
2	14445.00	2'	14935.00
3	14473.00	3'	14963.00
4	14501.00	4'	14991.00
5	14529.00	5'	15019.00
6	14557.00	6'	15047.00
7	14585.00	7'	15075.00
8	14613.00	8'	15103.00
9	14641.00	9'	15131.00
10	14669.00	10'	15159.00
11	14697.00	11'	15187.00
12	14725.00	12'	15215.00
13	14753.00	13'	15243.00
14	14781.00	14'	15271.00
15	14809.00	15'	15299.00
16	14837.00	16'	15327.00

FIGURE 2
Radio-frequency channel arrangement for fixed wireless systems
operating in the 15 GHz band: 14 MHz spacing



(For the band 14.4-15.35 GHz: A = 950 MHz, B = 17 MHz, C = 952 MHz)

Table 2
Main Channel Carrier Centre Frequencies
(bandwidth = 14 MHz)

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	14417.00	1'	14907.00
2	14431.00	2'	14921.00
3	14445.00	3'	14935.00
4	14459.00	4'	14949.00
5	14473.00	5'	14963.00
6	14487.00	6'	14977.00
7	14501.00	7'	14991.00
8	14515.00	8'	15005.00
9	14529.00	9'	15019.00
10	14543.00	10'	15033.00
11	14557.00	11'	15047.00
12	14571.00	12'	15061.00
13	14585.00	13'	15075.00
14	14599.00	14'	15089.00
15	14613.00	15'	15103.00
16	14627.00	16'	15117.00
17	14641.00	17'	15131.00
18	14655.00	18'	15145.00
19	14669.00	19'	15159.00

20	14683.00	20'	15173.00
21	14697.00	21'	15187.00
22	14711.00	22'	15201.00
23	14725.00	23'	15215.00
24	14739.00	24'	15229.00
25	14753.00	25'	15243.00
26	14767.00	26'	15257.00
27	14781.00	27'	15271.00
28	14795.00	28'	15285.00
29	14809.00	29'	15299.00
30	14823.00	30'	15313.00
31	14837.00	31'	15327.00
32	14851.00	32'	15341.00

Table 3
Main Channel Carrier Centre Frequencies
(bandwidth = 7 MHz)

Sub-Channel	Main Channels (Go)															
	CH.1	CH.2	CH.3	CH.4	CH.5	CH.6	CH.7	CH.8	CH.9	CH.10	CH.11	CH.12	CH.13	CH.14	CH.15	CH.16
1	14406.5	14434.5	14462.5	14490.5	14518.5	14546.5	14574.5	14602.5	14630.5	14658.5	14686.5	14714.5	14742.5	14770.5	14798.5	14826.5
2	14413.5	14441.5	14469.5	14497.5	14525.5	14553.5	14581.5	14609.5	14637.5	14665.5	14693.5	14721.5	14749.5	14777.5	14805.5	14833.5
3	14420.5	14448.5	14476.5	14504.5	14532.5	14560.5	14588.5	14616.5	14644.5	14672.5	14700.5	14728.5	14756.5	14784.5	14812.5	14840.5
4	14427.5	14455.5	14483.5	14511.5	14539.5	14567.5	14595.5	14623.5	14651.5	14679.5	14707.5	14735.5	14763.5	14791.5	14819.5	14847.5
Sub-Channel	Main Channels (Return)															
	CH.1'	CH.2'	CH.3'	CH.4'	CH.5'	CH.6'	CH.7'	CH.8'	CH.9'	CH.10'	CH.11'	CH.12'	CH.13'	CH.14'	CH.15'	CH.16'
1'	14896.5	14924.5	14952.5	14980.5	15008.5	15036.5	15064.5	15092.5	15120.5	15148.5	15176.5	15204.5	15232.5	15260.5	15288.5	15316.5
2'	14903.5	14931.5	14959.5	14987.5	15015.5	15043.5	15071.5	15099.5	15127.5	15155.5	15183.5	15211.5	15239.5	15267.5	15295.5	15323.5
3'	14910.5	14938.5	14966.5	14994.5	15022.5	15050.5	15078.5	15106.5	15134.5	15162.5	15190.5	15218.5	15246.5	15274.5	15302.5	15330.5
4'	14917.5	14945.5	14973.5	15001.5	15029.5	15057.5	15085.5	15113.5	15141.5	15169.5	15197.5	15225.5	15253.5	15281.5	15309.5	15337.5

Table 4
Main Channel Carrier Centre Frequencies
 (bandwidth = 3.5 MHz)

Sub-Channel	Main Channels (Go)															
	CH.1	CH.2	CH.3	CH.4	CH.5	CH.6	CH.7	CH.8	CH.9	CH.10	CH.11	CH.12	CH.13	CH.14	CH.15	CH.16
1	14404.75	14432.75	14460.75	14488.75	14516.75	14544.75	14572.75	14600.75	14628.75	14656.75	14684.75	14712.75	14740.75	14768.75	14796.75	14824.75
2	14408.25	14436.25	14464.25	14492.25	14520.25	14548.25	14576.25	14604.25	14632.25	14660.25	14688.25	14716.25	14744.25	14772.25	14800.25	14828.25
3	14411.75	14439.75	14467.75	14495.75	14523.75	14551.75	14579.75	14607.75	14635.75	14663.75	14691.75	14719.75	14747.75	14775.75	14803.75	14831.75
4	14415.25	14443.25	14471.25	14499.25	14527.25	14555.25	14583.25	14611.25	14639.25	14667.25	14695.25	14723.25	14751.25	14779.25	14807.25	14835.25
5	14418.75	14446.75	14474.75	14502.75	14530.75	14558.75	14586.75	14614.75	14642.75	14670.75	14698.75	14726.75	14754.75	14782.75	14810.75	14838.75
6	14422.25	14450.25	14478.25	14506.25	14534.25	14562.25	14590.25	14618.25	14646.25	14674.25	14702.25	14730.25	14758.25	14786.25	14814.25	14842.25
7	14425.75	14453.75	14481.75	14509.75	14537.75	14565.75	14593.75	14621.75	14649.75	14677.75	14705.75	14733.75	14761.75	14789.75	14817.75	14845.75
8	14429.25	14457.25	14485.25	14513.25	14541.25	14569.25	14597.25	14625.25	14653.25	14681.25	14709.25	14737.25	14765.25	14793.25	14821.25	14849.25
Sub-Channel	Main Channels (Return)															
	CH.1'	CH.2'	CH.3'	CH.4'	CH.5'	CH.6'	CH.7'	CH.8'	CH.9'	CH.10'	CH.11'	CH.12'	CH.13'	CH.14'	CH.15'	CH.16'
1'	14894.75	14922.75	14950.75	14978.75	15006.75	15034.75	15062.75	15090.75	15118.75	15146.75	15174.75	15202.75	15230.75	15258.75	15286.75	15314.75
2'	14898.25	14926.25	14954.25	14982.25	15010.25	15038.25	15066.25	15094.25	15122.25	15150.25	15178.25	15206.25	15234.25	15262.25	15290.25	15318.25
3'	14901.75	14929.75	14957.75	14985.75	15013.75	15041.75	15069.75	15097.75	15125.75	15153.75	15181.75	15209.75	15237.75	15265.75	15293.75	15321.75
4'	14905.25	14933.25	14961.25	14989.25	15017.25	15045.25	15073.25	15101.25	15129.25	15157.25	15185.25	15213.25	15241.25	15269.25	15297.25	15325.25
5'	14908.75	14936.75	14964.75	14992.75	15020.75	15048.75	15076.75	15104.75	15132.75	15160.75	15188.75	15216.75	15244.75	15272.75	15300.75	15328.75
6'	14912.25	14940.25	14968.25	14996.25	15024.25	15052.25	15080.25	15108.25	15136.25	15164.25	15192.25	15220.25	15248.25	15276.25	15304.25	15332.25
7'	14915.75	14943.75	14971.75	14999.75	15027.75	15055.75	15083.75	15111.75	15139.75	15167.75	15195.75	15223.75	15251.75	15279.75	15307.75	15335.75
8'	14919.25	14947.25	14975.25	15003.25	15031.25	15059.25	15087.25	15115.25	15143.25	15171.25	15199.25	15227.25	15255.25	15283.25	15311.25	15339.25

APPENDIX B: INTERFERENCE RESOLUTION PROCESS

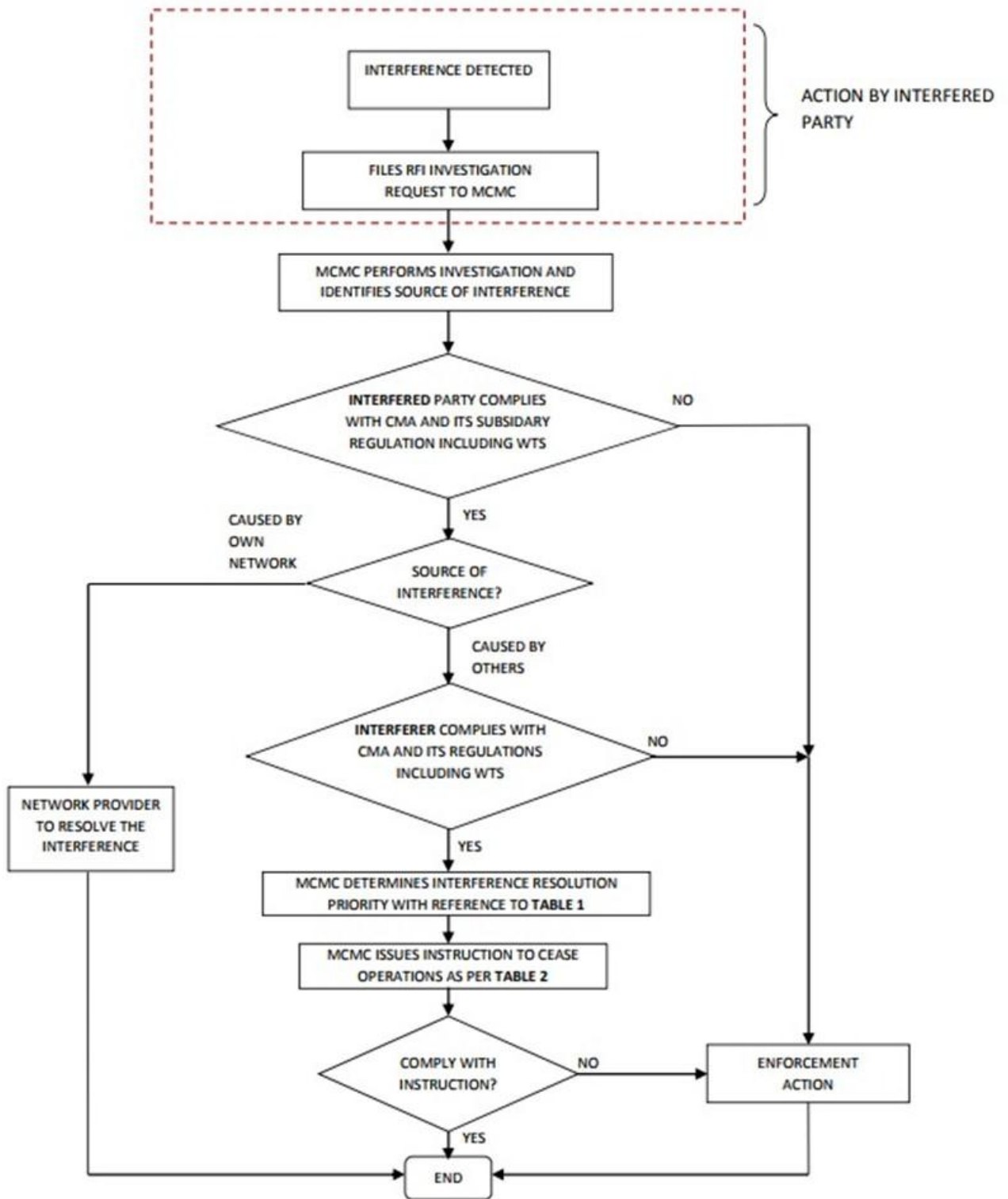


TABLE 1: INTERFERENCE RESOLUTION PRIORITY

	Resolution Type of Priority	Description
1	Service Priority	Primary services has 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"> i. Safety or Radionavigation service. and ii. Based on the Date of Apparatus Assignment - Priority is given to the earliest/first installation.

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 Communications and Multimedia (Spectrum) Regulations 2000.	To cease* operation immediately within 24 hours or earlier as specified in the notice issued by MCMC.
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.	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 interference resolution and/or mitigation plan to the satisfaction of MCMC to remove/avoid the interference.