



MCMC SRSP FS 12.75
21 December 2015

Standard Radio System Plan

**REQUIREMENTS FOR
FIXED WIRELESS SYSTEMS
OPERATING IN THE FREQUENCY BAND
12.75 GHz TO 13.25 GHz**

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**REQUIREMENTS FOR FIXED WIRELESS SYSTEMS
OPERATING IN THE FREQUENCY BAND
12.75 GHz TO 13.25 GHz**

1.0 FOREWORD

- 1.1 This Standard Radio System Plan ('SRSP') is prepared by MCMC pursuant to the Communications and Multimedia Act 1998 ('Act') and the Spectrum Plan to provide information on the minimum technical and regulatory requirements for the efficient use of the allocated frequency band as described in the Spectrum Plan, the extract of which can be found in **Appendix A**.
- 1.2 It is intended to regulate the usage of spectrum and does not attempt to establish any detailed equipment standards.

2.0 INTENT

- 2.1 This SRSP states the requirement for the utilization of the frequency band of **12.75 GHz – 13.25 GHz** for the digital transmission of Fixed Wireless Systems ('FWS') including Synchronous Digital Hierarchy ('SDH') and Plesiochronous Digital Hierarchy ('PDH'), using appropriate digital techniques such as Cross-Polar Interference Cancellers ('XPIC').
- 2.2 The intended use of these FWS is mainly for Trunk/Main link only. However, the use of the FWS for Mini/Spur link may be considered due to the reasons of economic and technical constraints on a case-by-case basis.
- 2.3 When very high capacity links [e.g. twice Synchronous Transfer Mode-1 ('STM-1')] are required, further economy may be achieved using system bandwidths wider than the recommended channel separation, associated to high efficient modulation formats.
- 2.4 Due to the bandwidth of the modulated carrier, it may no longer be practical to use interleaved frequencies.

3.0 GENERAL

- 3.1 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 as listed in **Appendix A**.
- 3.2 All installations must comply with the safety rules as specified in the applicable standards.
- 3.3 The equipment used shall be certified under Part III Regulation 14 of the Communications and Multimedia (Technical Standards) Regulations 2000.
- 3.4 The allocation and allotment of this frequency band and the information in this SRSP are subject to review from time to time to reflect new developments in

the communications and multimedia industry.

4.0 CHANNEL ARRANGEMENT

4.1 The radio frequency ('RF') channel arrangement is based on the preferred RF channel arrangement in the International Telecommunication Union – Radiocommunication ('ITU-R') **Recommendation F.497**. Users are encouraged to refer to the latest issue of the ITU-R document at the website link provided in the References at paragraph 10.0 below..

4.2 For this SRSP, the preferred RF channel arrangement for FWS with a capacity of 34 Mbit/s or higher capacity up to 140 Mbit/s or the synchronous bit-rates, operating in the **13 GHz** band, should be derived as follows:

Let f_r be a reference frequency near the center of the 12750 MHz to 13250 MHz band (MHz),

f_n be the center frequency of a RF channel in the lower half of the band (MHz),

f_n' be the center frequency of one RF channel in the upper half of the band (MHz),

The center frequency f_o is: $f_o = 13000$ MHz

The reference frequency f_r is: $f_r = 12996$ MHz

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

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

lower half of the band: $f_n = f_r - 259 + 28 n$ MHz

upper half of the band: $f_{n'} = f_r + 7 + 28 n$ MHz

where: $n = 1, 2, 3, 4, 5, 6, 7$ or 8 .

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

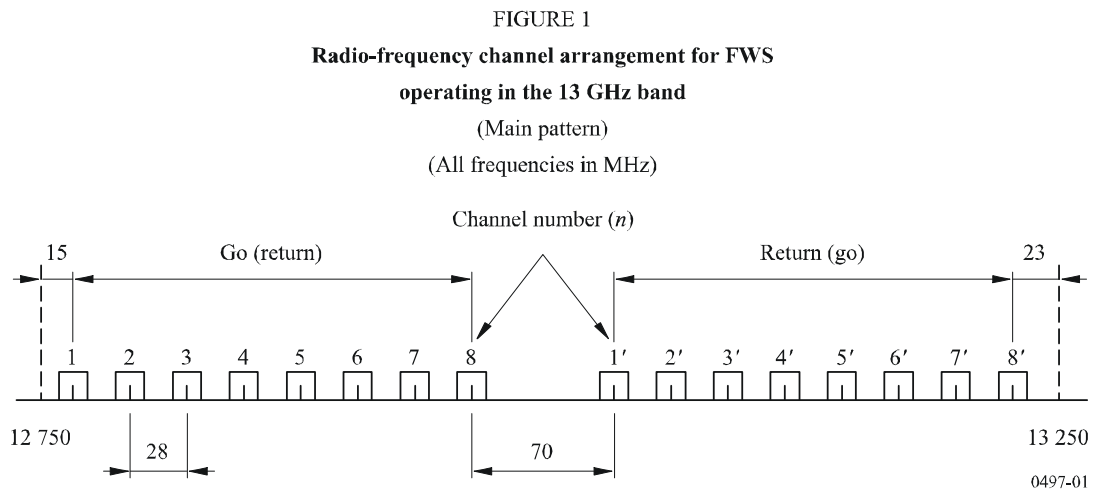


Table 1
Main Channel Carrier Centre Frequencies
 (bandwidth = 28 MHz)

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	12765.00	1'	13031.00
2	12793.00	2'	13059.00
3	12821.00	3'	13087.00
4	12849.00	4'	13115.00
5	12877.00	5'	13143.00
6	12905.00	6'	13171.00
7	12933.00	7'	13199.00
8	12961.00	8'	13227.00

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

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

lower half of the band: $f_m = f_r - 280 + 28n + 14m$ MHz

upper half of the band: $f_{m'} = f_r - 14 + 28n + 14m$ MHz

where: $m = 1$ or 2

$n =$ number of the basic channel arrangement

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

FIGURE 2

Radio-frequency channel arrangement for FWS
for smaller capacity digital system
(14 MHz channel systems)
(All frequencies in MHz)

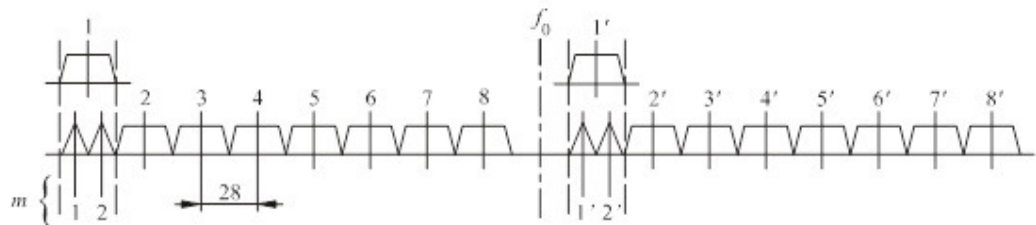


TABLE 2

Center Frequencies for Two (02) sub-channel arrangement
for smaller capacity digital system
(bandwidth = 14 MHz)

Channel No.	Sub-channel	Frequency (MHz)	Channel No.	Sub-channel	Frequency (MHz)
1	1	12758.00	1'	1'	13024.00
	2	12772.00		2'	13038.00
2	1	12786.00	2'	1'	13052.00
	2	12800.00		2'	13066.00
3	1	12814.00	3'	1'	13080.00
	2	12828.00		2'	13094.00
4	1	12842.00	4'	1'	13108.00
	2	12856.00		2'	13122.00
5	1	12870.00	5'	1'	13136.00
	2	12884.00		2'	13150.00
6	1	12898.00	6'	1'	13164.00
	2	12912.00		2'	13178.00
7	1	12926.00	7'	1'	13192.00
	2	12940.00		2'	13206.00
8	1	12954.00	8'	1'	13220.00
	2	12968.00		2'	13234.00

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

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

lower half of the band: $f_m = f_r - 276.5 + 28n + 7m$ MHz

upper half of the band: $f_{m'} = f_r - 10.5 + 28n + 7m$ MHz

where: $m = 1, 2, 3$ or 4

$n =$ number of the basic channel arrangement

The frequency arrangement is illustrated in **Figure 3** and the center frequencies of the main RF channels are listed in **Table 3** below:

FIGURE 3

Radio-frequency channel arrangement for FWS
for smaller capacity digital system
(7 MHz channel systems)
(All frequencies in MHz)

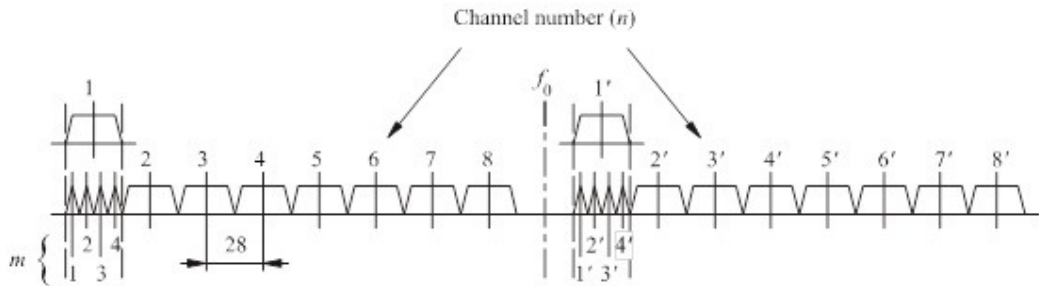


TABLE 3

Center Frequencies for Four (04) sub-channel arrangement
for smaller capacity digital system
(bandwidth = 7 MHz)

Channel No.	Sub-channel	Frequency (MHz)	Channel No.	Sub-channel	Frequency (MHz)
1	1	12754.50	1'	1'	13020.50
	2	12761.50		2'	13027.50
	3	12768.50		3'	13034.50
	4	12775.50		4'	13041.50
2	1	12782.50	2'	1'	13048.50
	2	12789.50		2'	13055.50
	3	12796.50		3'	13062.50
	4	12803.50		4'	13069.50
3	1	12810.50	3'	1'	13076.50
	2	12817.50		2'	13083.50
	3	12824.50		3'	13090.50
	4	12831.50		4'	13097.50
4	1	12838.50	4'	1'	13104.50
	2	12845.50		2'	13111.50
	3	12852.50		3'	13118.50
	4	12859.50		4'	13125.50
5	1	12866.50	5'	1'	13132.50
	2	12873.50		2'	13139.50
	3	12880.50		3'	13146.50
	4	12887.50		4'	13153.50
6	1	12894.50	6'	1'	13160.50
	2	12901.50		2'	13167.50
	3	12908.50		3'	13174.50
	4	12915.50		4'	13181.50
7	1	12922.50	7'	1'	13188.50
	2	12929.50		2'	13195.50
	3	12936.50		3'	13202.50
	4	12943.50		4'	13209.50
8	1	12950.50	8'	1'	13216.50
	2	12957.50		2'	13223.50
	3	12964.50		3'	13230.50
	4	12971.50		4'	13237.50

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

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

lower half of the band: $f_m = f_r - 273 + 28n + 3.5m$ MHz

upper half of the band: $f_{m'} = f_r - 7 + 28n + 3.5m$ MHz

where: $m = 1, 2, 3, 4, 5, 6, 7$ or 8

$n =$ number of the basic channel arrangement

The frequency arrangement is illustrated in **Figure 4** and the center frequencies of the main RF channels are listed in **Table 4** below:

FIGURE 4

Radio-frequency channel arrangement for FWS

for smaller capacity digital system

(3.5 MHz channel systems)

(All frequencies in MHz)

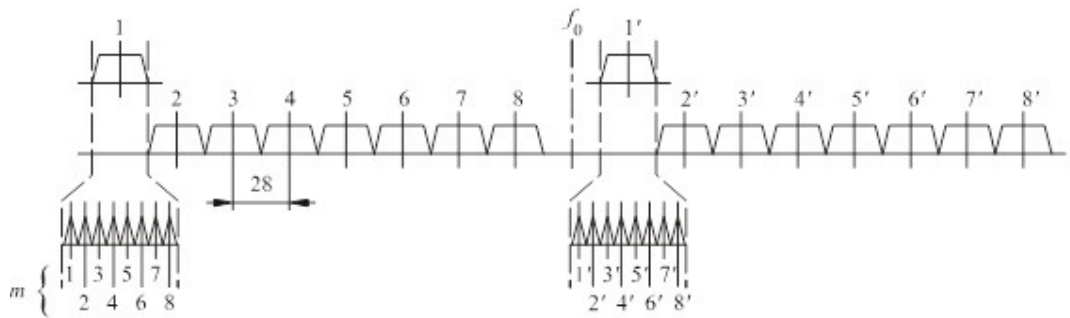


TABLE 4

Center Frequencies for Eight (08) sub-channel arrangement
for smaller capacity digital system
(bandwidth = 3.5 MHz)

Channel No.	Sub-channel	Frequency (MHz)	Channel No.	Sub-channel	Frequency (MHz)
1	1	12754.50	1'	1'	13020.50
	2	12758.00		2'	13024.00
	3	12761.50		3'	13027.50
	4	12765.00		4'	13031.00
	5	12768.50		5'	13034.50
	6	12772.00		6'	13038.00
	7	12775.50		7'	13041.50
	8	12779.00		8'	13045.00
2	1	12782.50	2'	1'	13048.50
	2	12786.00		2'	13052.00
	3	12789.50		3'	13055.50
	4	12793.00		4'	13059.00
	5	12796.50		5'	13062.50
	6	12800.00		6'	13066.00
	7	12803.50		7'	13069.50
	8	12807.00		8'	13073.00
3	1	12810.50	3'	1'	13076.50
	2	12814.00		2'	13080.00
	3	12817.50		3'	13083.50
	4	12821.00		4'	13087.00
	5	12824.50		5'	13090.50
	6	12828.00		6'	13094.00
	7	12831.50		7'	13097.50
	8	12835.00		8'	13101.00
4	1	12838.50	4'	1'	13104.50
	2	12842.00		2'	13108.00
	3	12845.50		3'	13111.50
	4	12849.00		4'	13115.00
	5	12852.50		5'	13118.50
	6	12856.00		6'	13122.00
	7	12859.50		7'	13125.50
	8	12863.00		8'	13129.00

5	1	12866.50	5'	1'	13132.50
	2	12870.00		2'	13136.00
	3	12873.50		3'	13139.50
	4	12877.00		4'	13143.00
	5	12880.50		5'	13146.50
	6	12884.00		6'	13150.00
	7	12887.50		7'	13153.50
	8	12891.00		8'	13157.00
6	1	12894.50	6'	1'	13160.50
	2	12898.00		2'	13164.00
	3	12901.50		3'	13167.50
	4	12905.00		4'	13171.00
	5	12908.50		5'	13174.50
	6	12912.00		6'	13178.00
	7	12915.50		7'	13181.50
	8	12919.00		8'	13185.00
7	1	12922.50	7'	1'	13188.50
	2	12926.00		2'	13192.00
	3	12929.50		3'	13195.50
	4	12933.00		4'	13199.00
	5	12936.50		5'	13202.50
	6	12940.00		6'	13206.00
	7	12943.50		7'	13209.50
	8	12947.00		8'	13213.00
8	1	12950.50	8'	1'	13216.50
	2	12954.00		2'	13220.00
	3	12957.50		3'	13223.50
	4	12961.00		4'	13227.00
	5	12964.50		5'	13230.50
	6	12968.00		6'	13234.00
	7	12971.50		7'	13237.50
	8	12975.00		8'	13241.00

5.0 REQUIREMENTS FOR USAGE OF SPECTRUM

- 5.1 This SRSP covers the minimum key characteristics considered necessary in order to make the best use of the available frequencies.
- 5.2 The channel arrangements above primarily provide for four basic homogeneous arrangements for FWS with bandwidth of **28 MHz**, **14 MHz**, **7 MHz** and **3.5 MHz**.
- 5.3 For international connections, the reference frequency should preferably be **12996 MHz**. Other values may be used by way of agreement between the administrations concerned.
- 5.4 For digital systems, both horizontal and vertical polarization should be used, where possible, for each radio frequency channel.
- 5.5 When very high capacity links are required and network coordination permits, the use of any two adjacent **28 MHz** channels is possible, for a wider bandwidth system, with center frequency lying in the central point of the distance between the two **28 MHz** adjacent channels.
- 5.6 When smaller capacity radio channels are required, the channel arrangements of **Figure 3** and **Figure 4** with channel center frequencies shown respectively in **Tables 3** and **4**, may be used. The use of mixed channel arrangement in the same FWS network can be considered, provided that its use can be justified.
- 5.7 Protection channel may be permitted for multi-channel systems subject to approval by MCMC. However systems using hot-standby are encouraged.
- 5.8 The frequencies assigned to a main route system shall be reused for spur routes and transmission routes (main and spur routes) shall be planned to maximize the frequency usage without any interference.

- 5.9 It should be noted that the FWS in the Fixed Service ('FS') shares this frequency band equally on the basis of primary status with the Fixed-Satellite service ('FSS') and Mobile service ('MS') as shown in **Appendix A**.
- 5.10 Priority is accorded to FSS over other primary services in the frequency band 12.75 GHz to 13.25 GHz at the following locations in **Table 5** below. MCMC may review this priority considering market and technological developments.

TABLE 5

FSS Earth Station Location and Sharing Condition with FS

No	FSS Earth Station Location	GPS	Condition
1	MEASAT Teleport and Broadcast Centre, Cyberjaya, Selangor	2°56'5.00" N 101°39'29.00" E	No FS within a circle of 5 kilometer radius from FSS earth station
2	All Asia Broadcast Centre, Bukit Jalil, Selangor	3°03'5.07" N 101°42'0.53" E	

- 5.11 The FWS shall not interfere with the earth stations of the FSS and shall comply with ITU-R **Recommendations SF.765** and **Article 21** of the ITU Radio Regulation.
- 5.12 Special care must be taken by the FWS and FSS providers during installation of their equipment to avoid any interference to each other, including for installation where the main beam of the FWS is crossing through the FSS priority zone(s) as described in **Table 5** above. They 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.
- 5.13 In the event the FWS causes major interference to the FSS Earth stations and such major interference cannot be mitigated within the resolution timeline as specified in **Appendix B**, the FWS shall immediately cease its operation.

6.0 PRINCIPLES OF ASSIGNMENT

6.1 Authorization to use the FS spectrum for the FWS station is by way of **Apparatus Assignment** ('AA'). Priority will be given to the use for a station as trunk or main link.

6.2 The AA shall be on first-come, first-serve basis.

6.3 Persons who are eligible to apply for an AA include:

6.3.1 Network Facilities Provider Individual ['NFP(I)'] License holder, which owns or provides radiocommunications transmitters and links; or

6.3.2 Private network facility (Government and private corporations or companies) for private use only.

- 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 to the said applicant.

6.4 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.

6.5 Technical analysis is carried out by MCMC before an AA is issued. If necessary, operator-to-operator coordination at the defined geographic boundaries may be required to reduce interference.

6.6 An applicant is also encouraged to coordinate among existing stations prior to the submission of the AA application.

7.0 IMPLEMENTATION

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

- 7.2 No AA for FWS operating in the band 12.75 GHz to 13.25 GHz shall be approved unless its application complies with this SRSP and the requirements set out in the Act and the relevant subsidiary legislations including the Communications and Multimedia (Spectrum) Regulations 2000.
- 7.3 Approval 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 written approval of MCMC.

8.0 INTERNATIONAL BORDER COORDINATION REQUIREMENT

- 8.1 Use of these frequency bands shall require coordination with the neighbouring countries within the following coordination zones:
- 8.1.1 Within 20 kilometers (EIRP less than 46 dBW) of the Malaysian border with Singapore and Brunei Darussalam.
 - 8.1.2 Within 20 kilometers (EIRP less than 46 dBW) of the Malaysian border with Indonesia.
 - 8.1.3 Within 15 kilometers of the Malaysian border with Thailand.
- 8.2 It shall be noted that the above coordination distance is continuously being reviewed with our neighbouring countries and may be updated from time to time.
- 8.3 Issuance of an AA is subject to successful co-ordination among assigned stations and with neighbouring administrations where it applies.
- 8.4 The technical mitigation guide as mentioned in paragraph 5.0 above shall be applied if operator-to-operator coordination is required.
- 8.5 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 remained unresolved after 24 hours by the operators, 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 dispute. MCMC will be guided by the interference resolution process as shown in **Appendix B**.

9.0 REVOCATION

9.1 SKMM SRSP – 525 FS Issue 3 dated 15 October 2009 is hereby revoked.

10.0 REFERENCES

- [1] **ITU-R F.497** Radio-Frequency channel arrangements for fixed wireless systems operating in the 13 GHz (12.75 – 13.25 GHz) band.
 - Link to document: www.itu.int/rec/R-REC-F.497/en
- [2] **ITU-R F.750** Architectures & Functional Aspects of Radio-relay systems for Synchronous Digital Hierarchy (SDH)-based networks.
 - Link to document: www.itu.int/rec/R-REC-F.7/en
- [3] **ITU-R SF.765** Intersection of radio-relay antenna beams with orbits used by space stations in the fixed-satellite service.
 - Link to document: www.itu.int/rec/R-REC-SF.765/en
- [4] **ITU Radio Regulations Article 21** Terrestrial and Space Services Sharing Frequency Bands above 1GHz.

Issued by:



**Malaysian Communications and Multimedia
Commission**

21 December 2015

APPENDIX A: SPECTRUM PLAN

Frequency Band (GHz)	ITU Allocation			Malaysian Allocation
	Region 1	Region 2	Region 3	
12.75-13.25	FIXED FIXED-SATELLITE (Earth-to-space) 5.441 MOBILE Space research (deep space) (space-to-Earth)			FIXED MLA70 FIXED-SATELLITE (Earth-to-space) 5.441 MOBILE Space research (deep space) (space-to-Earth) MLA58

5.441 The use of the bands 4 500-4 800 MHz (space-to-Earth), 6 725-7 025 MHz (Earth-to-space) by the fixed-satellite service shall be in accordance with the provisions of Appendix **30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Appendix **30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by a non-geostationary-satellite system in the fixed-satellite service is subject to application of the provisions of No. **9.12** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete coordination or notification information, as appropriate, for the non-geostationary-satellite systems in the fixed-satellite service and of the complete coordination or notification information, as appropriate, for the geostationary-satellite networks, and No. **5.43A** does not apply. Non-geostationary-satellite systems in the fixed-satellite service in the above bands shall be operated in such a way that any unacceptable interference that may occur during their operation shall be rapidly eliminated. (WRC-2000)

MLA58 Priority given to Fixed Satellite Service (FSS). Existing fixed link should not cause interference into FSS.

MLA70 Standard Radio System Plan 525: Requirements for Fixed Service Line-of-Sight Radio-Relay Systems Operating in the Frequency Band 12.75 GHz to 13.25 GHz.

Note: The text above will be updated with the following text during the next review exercise of the Spectrum Plan document:

MLA70 *Standard Radio System Plan FS 12.75: Requirements for Fixed Wireless Systems Operating in the Frequency Band 12.75 GHz to 13.25 GHz.*

APPENDIX B: INTERFERENCE RESOLUTION PROCESS

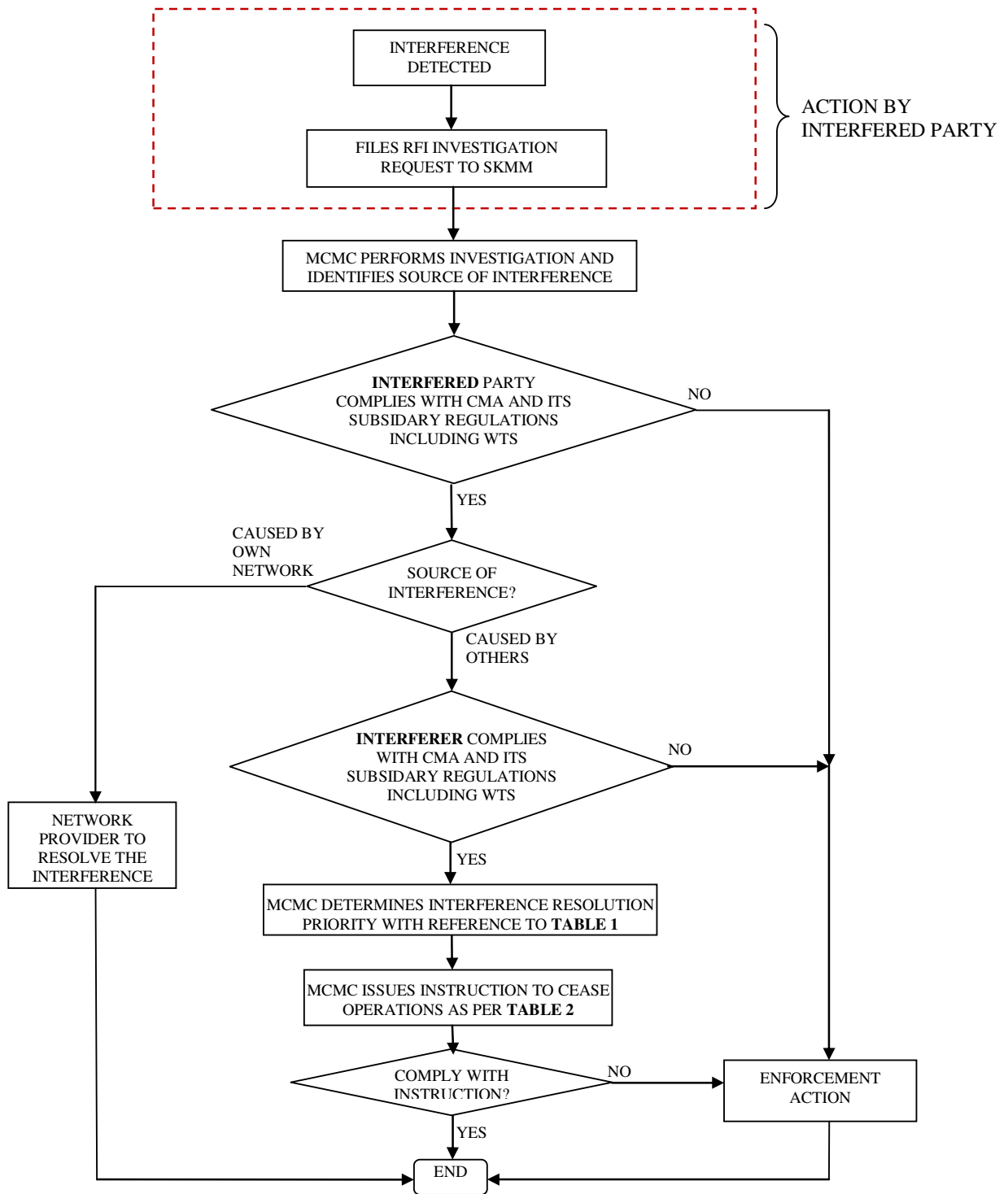


TABLE 1: INTERFERENCE RESOLUTION PRIORITY

	Resolution Type of Priority	Description
1	Service Priority	Primary has priority over secondary services. Among co-primary or co-secondary services, the stated priority is accorded as 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; ii. Based on the Date of Apparatus Assignment - Priority is given to the earliest/first installation

TABLE 2: INTERFERENCE RESOLUTION TIMELINE TO PARTIES

	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 completed the implementation of the mitigation plan to the satisfaction of MCMC to remove/ avoid the interference.