

**Standard Radio System Plan**

**REQUIREMENTS FOR FIXED SERVICE  
LINE OF SIGHT RADIO-RELAY  
SYSTEMS**

**OPERATING IN THE FREQUENCY  
BAND**

**21.20 GHz TO 23.60 GHz**



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## **1.0 GLOSSARY**

- 1.1 The terms used in this document may be found in the document SRSP Glossary which can be downloaded from SKMM website.  
([http://www.skmm.gov.my/what\\_we\\_do/spectrum/srsp.asp](http://www.skmm.gov.my/what_we_do/spectrum/srsp.asp))

**REQUIREMENTS FOR FIXED SERVICE LINE OF SIGHT RADIO-RELAY  
SYSTEMS OPERATING IN THE FREQUENCY BAND  
21.20 GHz TO 23.60 GHz**

**2.0 INTENT**

- 2.1 This Standard Radio System Plan (SRSP) states the requirements for the utilisation of frequency band 21.2 GHz – 23.6 GHz for Fixed Service line-of sight radio-relay (FSLOSRR) systems.
- 2.2 The intended use of these radio-relay systems is mainly for Mini/Spur link only. However, the use of these radio-relay system for Trunk/Main link may be considered due to the reasons of economic and technical constraints.
- 2.3 Fixed Service line-of sight radio-relay systems are intended as bearers for different applications such as telephony, data, video and television signals.
- 2.4 In general, a SRSP is a document designed to provide information on the minimum requirements in the use of a frequency band as described in Spectrum Plan (see **Appendix A**). It provides information on technical characteristics of radio systems, frequency channelling, coordination initiatives in order to maximise the utilisation, minimise interference and optimise the usage of the band. It is intended to regulate the usage of spectrum and does not attempt to establish any detailed equipment standards.

**3.0 GENERAL**

- 3.1 Technical characteristics of equipment used in Fixed Service line-of sight radio-relay systems shall conform to all applicable Malaysian standards, international standards, International Telecommunications Union (ITU) and its radio regulations as agreed and adopted by Malaysia.
- 3.2 All Fixed Service line-of sight radio-relay installations must comply with safety rules as specified in applicable standards.
- 3.3 The equipment used shall be certified under the Communications and Multimedia (Technical Standards) Regulations 2000.

**4.0 CHANNELLING PLAN**

- 4.1 Fixed Service line-of sight radio-relay systems operating in these bands shall use a duplex frequency plan. The 21.2 GHz to 23.60 GHz band is divided into sub-bands for duplex use. Issuance of assignment shall be made based on the plan in this SRSP.
- 4.2 The frequency channelling plan is based on the preferred radio frequency channelling arrangement of **ITU-R F.637-3 (02/99)**. The homogeneous channel arrangement provides for ten (10) two-way 112 MHz channels (1/1' to 10/10'), twenty (20) two-way 56 MHz channels (1/1' to 20/20'), forty (40) two-way 28 MHz channels (1/1' to 40/40'), eighty (80) two-way 14 MHz channels (1/1' to 80/80'), one hundred and sixty (160) two-way 7 MHz channels (1/1' to 160/160') and three

hundred and twenty (320) two-way 3.5 MHz channels (1/1' to 320/320'), as shown in **Figure 1A to 1F**.

- 4.3 1008 MHz channel separation is essentially applicable for those systems deployed or purchased prior to the issuance of this SRSP. The usage of 1008 MHz channel separation is limited until the end of the system lifespan of the apparatus. The usage include redeployment to different location and/or upgrade the said apparatus for additional capacity with minimal changes of the system. Moving forward, all radio-relay systems shall use 1232 MHz Tx/Rx channel separation for new applications.
- 4.4 The channel arrangements encompass various channel spacing for different applications, provide for five basic homogeneous arrangements for radio-relay systems with channel bandwidth of 112 MHz, 28 MHz, 14 MHz, 7 MHz and 3.5 MHz. The channel carrier centre frequencies of Tables **1, 2, 3, 4** and **5** permit the simultaneous use of systems with different channel arrangements.
- 4.5 The individual channels are derived by the following relationships:

Let  $f_r$  be the frequency near the centre of the band of frequencies occupied (MHz)  
 $f_n$  be the centre frequency of one RF channel in the lower half of the band (MHz)  
 $f_n'$  be the centre frequency of one RF channel in the upper half of the band (MHz)

The centre frequency  $f_o$  is:  $f_o = 22400$  MHz

The reference frequency  $f_r$  is:  $f_r = 21196$  MHz

4.5.1 For a channel bandwidth of 112 MHz:

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

<b>Table 1</b> Channel Carrier Centre Frequencies (bandwidth = 112 MHz)			
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	21280.000	1'	22512.000
2	21392.000	2'	22624.000
3	21504.000	3'	22736.000
4	21616.000	4'	22848.000
5	21728.000	5'	22960.000
6	21840.000	6'	23072.000
7	21952.000	7'	23184.000
8	22064.000	8'	23296.000
9	22176.000	9'	23408.000
10	22288.000	10'	23520.000

4.5.2 For a channel bandwidth of 56 MHz:

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

<b>Table 2</b> Channel Carrier Centre Frequencies (bandwidth = 56 MHz)			
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	21252.000	1'	22484.000
2	21308.000	2'	22540.000
3	21364.000	3'	22596.000
4	21420.000	4'	22652.000
5	21476.000	5'	22708.000
6	21532.000	6'	22764.000
7	21588.000	7'	22820.000
8	21644.000	8'	22876.000
9	21700.000	9'	22932.000
10	21756.000	10'	22988.000
11	21812.000	11'	23044.000
12	21868.000	12'	23100.000
13	21924.000	13'	23156.000
14	21980.000	14'	23212.000
15	22036.000	15'	23268.000
16	22092.000	16'	23324.000
17	22148.000	17'	23380.000
18	22204.000	18'	23436.000
19	22260.000	19'	23492.000
20	22316.000	20'	23548.000

4.5.3 For a channel bandwidth of 28 MHz:

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

<b>Table 3</b> <b>Channel Carrier Centre Frequencies</b> <b>(bandwidth = 28 MHz)</b>			
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	21238.000	1'	22470.000
2	21266.000	2'	22498.000
3	21294.000	3'	22526.000
4	21322.000	4'	22554.000
5	21350.000	5'	22582.000
6	21378.000	6'	22610.000
7	21406.000	7'	22638.000
8	21434.000	8'	22666.000
9	21462.000	9'	22694.000
10	21490.000	10'	22722.000
11	21518.000	11'	22750.000
12	21546.000	12'	22778.000
13	21574.000	13'	22806.000
14	21602.000	14'	22834.000
15	21630.000	15'	22862.000
16	21658.000	16'	22890.000
17	21686.000	17'	22918.000
18	21714.000	18'	22946.000
19	21742.000	19'	22974.000
20	21770.000	20'	23002.000
21	21798.000	21'	23030.000
22	21826.000	22'	23058.000
23	21854.000	23'	23086.000
24	21882.000	24'	23114.000
25	21910.000	25'	23142.000
26	21938.000	26'	23170.000
27	21966.000	27'	23198.000
28	21994.000	28'	23226.000
29	22022.000	29'	23254.000
30	22050.000	30'	23282.000
31	22078.000	31'	23310.000
32	22106.000	32'	23338.000
33	22134.000	33'	23366.000
34	22162.000	34'	23394.000
35	22190.000	35'	23422.000
36	22218.000	36'	23450.000
37	22246.000	37'	23478.000
38	22274.000	38'	23506.000
39	22302.000	39'	23534.000
40	22330.000	40'	23562.000

4.5.4 For a channel bandwidth of 14 MHz:

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

<b>Table 4</b> Channel Carrier Centre Frequencies (bandwidth = 14 MHz)			
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	21231.000	1'	22463.000
2	21245.000	2'	22477.000
3	21259.000	3'	22491.000
4	21273.000	4'	22505.000
5	21287.000	5'	22519.000
6	21301.000	6'	22533.000
7	21315.000	7'	22547.000
8	21329.000	8'	22561.000
9	21343.000	9'	22575.000
10	21357.000	10'	22589.000
11	21371.000	11'	22603.000
12	21385.000	12'	22617.000
13	21399.000	13'	22631.000
14	21413.000	14'	22645.000
15	21427.000	15'	22659.000
16	21441.000	16'	22673.000
17	21455.000	17'	22687.000
18	21469.000	18'	22701.000
19	21483.000	19'	22715.000
20	21497.000	20'	22729.000
21	21511.000	21'	22743.000
22	21525.000	22'	22757.000
23	21539.000	23'	22771.000
24	21553.000	24'	22785.000
25	21567.000	25'	22799.000
26	21581.000	26'	22813.000
27	21595.000	27'	22827.000
28	21609.000	28'	22841.000
29	21623.000	29'	22855.000
30	21637.000	30'	22869.000
31	21651.000	31'	22883.000
32	21665.000	32'	22897.000
33	21679.000	33'	22911.000
34	21693.000	34'	22925.000
35	21707.000	35'	22939.000
36	21721.000	36'	22953.000
37	21735.000	37'	22967.000
38	21749.000	38'	22981.000
39	21763.000	39'	22995.000
40	21777.000	40'	23009.000
41	21791.000	41'	23023.000



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

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
42	21805.000	42'	23037.000
43	21819.000	43'	23051.000
44	21833.000	44'	23065.000
45	21847.000	45'	23079.000
46	21861.000	46'	23093.000
47	21875.000	47'	23107.000
48	21889.000	48'	23121.000
49	21903.000	49'	23135.000
50	21917.000	50'	23149.000
51	21931.000	51'	23163.000
52	21945.000	52'	23177.000
53	21959.000	53'	23191.000
54	21973.000	54'	23205.000
55	21987.000	55'	23219.000
56	22001.000	56'	23233.000
57	22015.000	57'	23247.000
58	22029.000	58'	23261.000
59	22043.000	59'	23275.000
60	22057.000	60'	23289.000
61	22071.000	61'	23303.000
62	22085.000	62'	23317.000
63	22099.000	63'	23331.000
64	22113.000	64'	23345.000
65	22127.000	65'	23359.000
66	22141.000	66'	23373.000
67	22155.000	67'	23387.000
68	22169.000	68'	23401.000
69	22183.000	69'	23415.000
70	22197.000	70'	23429.000
71	22211.000	71'	23443.000
72	22225.000	72'	23457.000
73	22239.000	73'	23471.000
74	22253.000	74'	23485.000
75	22267.000	75'	23499.000
76	22281.000	76'	23513.000
77	22295.000	77'	23527.000
78	22309.000	78'	23541.000
79	22323.000	79'	23555.000
80	22337.000	80'	23569.000

4.5.5 For a channel bandwidth of 7 MHz:

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

<b>Table 5</b> Channel Carrier Centre Frequencies (bandwidth = 7 MHz)							
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	21227.500	1'	22459.500	81	21787.500	81'	23019.500
2	21234.500	2'	22466.500	82	21794.500	82'	23026.500
3	21241.500	3'	22473.500	83	21801.500	83'	23033.500
4	21248.500	4'	22480.500	84	21808.500	84'	23040.500
5	21255.500	5'	22487.500	85	21815.500	85'	23047.500
6	21262.500	6'	22494.500	86	21822.500	86'	23054.500
7	21269.500	7'	22501.500	87	21829.500	87'	23061.500
8	21276.500	8'	22508.500	88	21836.500	88'	23068.500
9	21283.500	9'	22515.500	89	21843.500	89'	23075.500
10	21290.500	10'	22522.500	90	21850.500	90'	23082.500
11	21297.500	11'	22529.500	91	21857.500	91'	23089.500
12	21304.500	12'	22536.500	92	21864.500	92'	23096.500
13	21311.500	13'	22543.500	93	21871.500	93'	23103.500
14	21318.500	14'	22550.500	94	21878.500	94'	23110.500
15	21325.500	15'	22557.500	95	21885.500	95'	23117.500
16	21332.500	16'	22564.500	96	21892.500	96'	23124.500
17	21339.500	17'	22571.500	97	21899.500	97'	23131.500
18	21346.500	18'	22578.500	98	21906.500	98'	23138.500
19	21353.500	19'	22585.500	99	21913.500	99'	23145.500
20	21360.500	20'	22592.500	100	21920.500	100'	23152.500
21	21367.500	21'	22599.500	101	21927.500	101'	23159.500
22	21374.500	22'	22606.500	102	21934.500	102'	23166.500
23	21381.500	23'	22613.500	103	21941.500	103'	23173.500
24	21388.500	24'	22620.500	104	21948.500	104'	23180.500
25	21395.500	25'	22627.500	105	21955.500	105'	23187.500
26	21402.500	26'	22634.500	106	21962.500	106'	23194.500
27	21409.500	27'	22641.500	107	21969.500	107'	23201.500
28	21416.500	28'	22648.500	108	21976.500	108'	23208.500
29	21423.500	29'	22655.500	109	21983.500	109'	23215.500
30	21430.500	30'	22662.500	110	21990.500	110'	23222.500
31	21437.500	31'	22669.500	111	21997.500	111'	23229.500
32	21444.500	32'	22676.500	112	22004.500	112'	23236.500
33	21451.500	33'	22683.500	113	22011.500	113'	23243.500
34	21458.500	34'	22690.500	114	22018.500	114'	23250.500
35	21465.500	35'	22697.500	115	22025.500	115'	23257.500
36	21472.500	36'	22704.500	116	22032.500	116'	23264.500
37	21479.500	37'	22711.500	117	22039.500	117'	23271.500
38	21486.500	38'	22718.500	118	22046.500	118'	23278.500

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

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
39	21493.500	39'	22725.500	119	22053.500	119'	23285.500
40	21500.500	40'	22732.500	120	22060.500	120'	23292.500
41	21507.500	41'	22739.500	121	22067.500	121'	23299.500
42	21514.500	42'	22746.500	122	22074.500	122'	23306.500
43	21521.500	43'	22753.500	123	22081.500	123'	23313.500
44	21528.500	44'	22760.500	124	22088.500	124'	23320.500
45	21535.500	45'	22767.500	125	22095.500	125'	23327.500
46	21542.500	46'	22774.500	126	22102.500	126'	23334.500
47	21549.500	47'	22781.500	127	22109.500	127'	23341.500
48	21556.500	48'	22788.500	128	22116.500	128'	23348.500
49	21563.500	49'	22795.500	129	22123.500	129'	23355.500
50	21570.500	50'	22802.500	130	22130.500	130'	23362.500
51	21577.500	51'	22809.500	131	22137.500	131'	23369.500
52	21584.500	52'	22816.500	132	22144.500	132'	23376.500
53	21591.500	53'	22823.500	133	22151.500	133'	23383.500
54	21598.500	54'	22830.500	134	22158.500	134'	23390.500
55	21605.500	55'	22837.500	135	22165.500	135'	23397.500
56	21612.500	56'	22844.500	136	22172.500	136'	23404.500
57	21619.500	57'	22851.500	137	22179.500	137'	23411.500
58	21626.500	58'	22858.500	138	22186.500	138'	23418.500
59	21633.500	59'	22865.500	139	22193.500	139'	23425.500
60	21640.500	60'	22872.500	140	22200.500	140'	23432.500
61	21647.500	61'	22879.500	141	22207.500	141'	23439.500
62	21654.500	62'	22886.500	142	22214.500	142'	23446.500
63	21661.500	63'	22893.500	143	22221.500	143'	23453.500
64	21668.500	64'	22900.500	144	22228.500	144'	23460.500
65	21675.500	65'	22907.500	145	22235.500	145'	23467.500
66	21682.500	66'	22914.500	146	22242.500	146'	23474.500
67	21689.500	67'	22921.500	147	22249.500	147'	23481.500
68	21696.500	68'	22928.500	148	22256.500	148'	23488.500
69	21703.500	69'	22935.500	149	22263.500	149'	23495.500
70	21710.500	70'	22942.500	150	22270.500	150'	23502.500
71	21717.500	71'	22949.500	151	22277.500	151'	23509.500
72	21724.500	72'	22956.500	152	22284.500	152'	23516.500
73	21731.500	73'	22963.500	153	22291.500	153'	23523.500
74	21738.500	74'	22970.500	154	22298.500	154'	23530.500
75	21745.500	75'	22977.500	155	22305.500	155'	23537.500
76	21752.500	76'	22984.500	156	22312.500	156'	23544.500
77	21759.500	77'	22991.500	157	22319.500	157'	23551.500
78	21766.500	78'	22998.500	158	22326.500	158'	23558.500
79	21773.500	79'	23005.500	159	22333.500	159'	23565.500
80	21780.500	80'	23012.500	160	22340.500	160'	23572.500

4.5.6 For a channel bandwidth of 3.5 MHz:

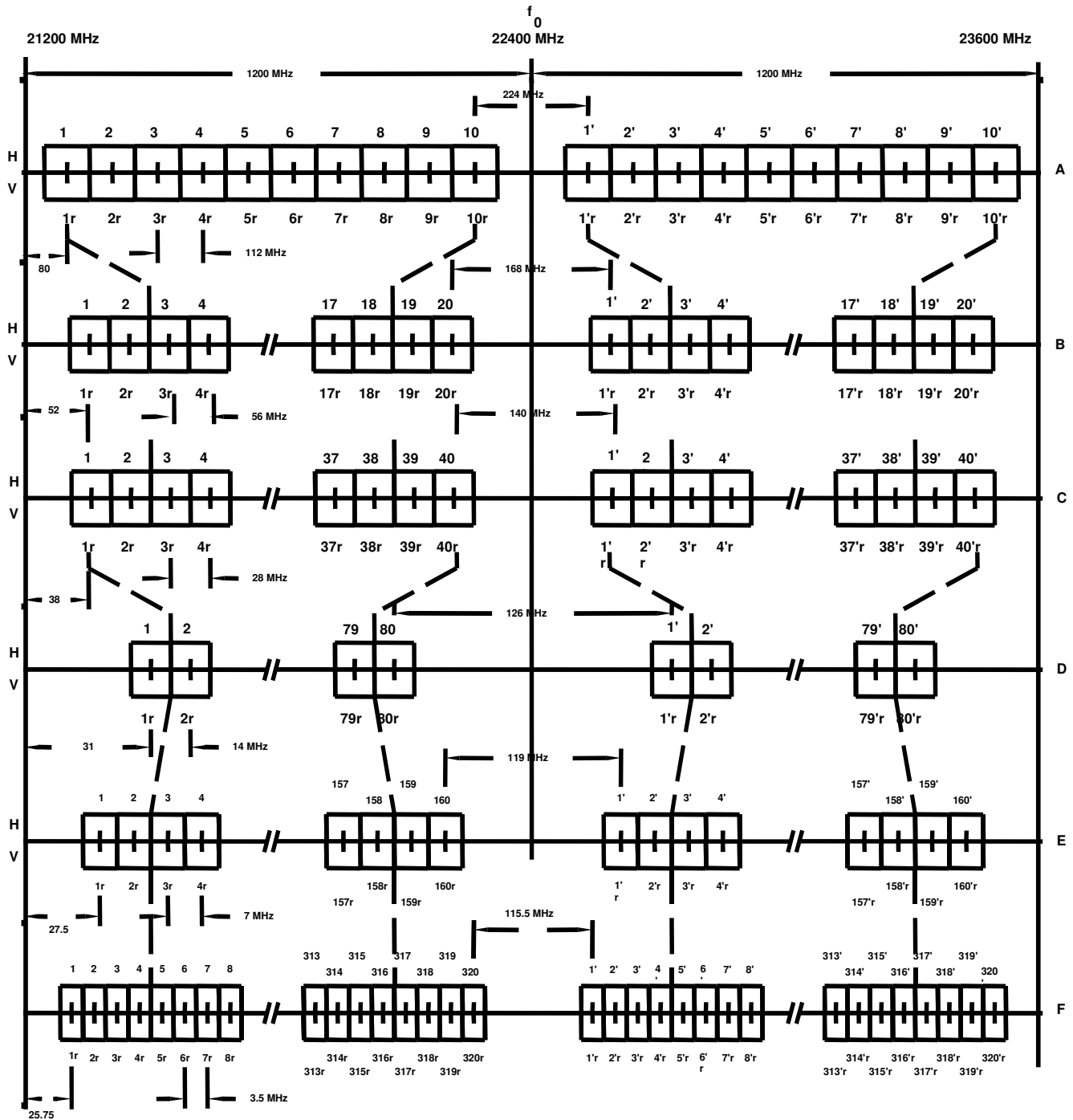
lower half of the band:	$f_n = f_r + 26.25 + 3.5 n$ MHz	$n = 1, 2, \dots, 320$
upper half of the band:	$f_n' = f_r + 1258.25 + 3.5 n$ MHz	

<b>Table 6</b> <b>Channel Carrier Centre Frequencies</b> <b>(bandwidth = 3.5 MHz)</b>							
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	21225.750	1'	22457.750	81	21505.750	81'	22737.750
2	21229.250	2'	22461.250	82	21509.250	82'	22741.250
3	21232.750	3'	22464.750	83	21512.750	83'	22744.750
4	21236.250	4'	22468.250	84	21516.250	84'	22748.250
5	21239.750	5'	22471.750	85	21519.750	85'	22751.750
6	21243.250	6'	22475.250	86	21523.250	86'	22755.250
7	21246.750	7'	22478.750	87	21526.750	87'	22758.750
8	21250.250	8'	22482.250	88	21530.250	88'	22762.250
9	21253.750	9'	22485.750	89	21533.750	89'	22765.750
10	21257.250	10'	22489.250	90	21537.250	90'	22769.250
11	21260.750	11'	22492.750	91	21540.750	91'	22772.750
12	21264.250	12'	22496.250	92	21544.250	92'	22776.250
13	21267.750	13'	22499.750	93	21547.750	93'	22779.750
14	21271.250	14'	22503.250	94	21551.250	94'	22783.250
15	21274.750	15'	22506.750	95	21554.750	95'	22786.750
16	21278.250	16'	22510.250	96	21558.250	96'	22790.250
17	21281.750	17'	22513.750	97	21561.750	97'	22793.750
18	21285.250	18'	22517.250	98	21565.250	98'	22797.250
19	21288.750	19'	22520.750	99	21568.750	99'	22800.750
20	21292.250	20'	22524.250	100	21572.250	100'	22804.250
21	21295.750	21'	22527.750	101	21575.750	101'	22807.750
22	21299.250	22'	22531.250	102	21579.250	102'	22811.250
23	21302.750	23'	22534.750	103	21582.750	103'	22814.750
24	21306.250	24'	22538.250	104	21586.250	104'	22818.250
25	21309.750	25'	22541.750	105	21589.750	105'	22821.750
26	21313.250	26'	22545.250	106	21593.250	106'	22825.250
27	21316.750	27'	22548.750	107	21596.750	107'	22828.750
28	21320.250	28'	22552.250	108	21600.250	108'	22832.250
29	21323.750	29'	22555.750	109	21603.750	109'	22835.750
30	21327.250	30'	22559.250	110	21607.250	110'	22839.250
31	21330.750	31'	22562.750	111	21610.750	111'	22842.750
32	21334.250	32'	22566.250	112	21614.250	112'	22846.250
33	21337.750	33'	22569.750	113	21617.750	113'	22849.750
34	21341.250	34'	22573.250	114	21621.250	114'	22853.250

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
35	21344.750	35'	22576.750	115	21624.750	115'	22856.750
36	21348.250	36'	22580.250	116	21628.250	116'	22860.250
37	21351.750	37'	22583.750	117	21631.750	117'	22863.750
38	21355.250	38'	22587.250	118	21635.250	118'	22867.250
39	21358.750	39'	22590.750	119	21638.750	119'	22870.750
40	21362.250	40'	22594.250	120	21642.250	120'	22874.250
41	21365.750	41'	22597.750	121	21645.750	121'	22877.750
42	21369.250	42'	22601.250	122	21649.250	122'	22881.250
43	21372.750	43'	22604.750	123	21652.750	123'	22884.750
44	21376.250	44'	22608.250	124	21656.250	124'	22888.250
45	21379.750	45'	22611.750	125	21659.750	125'	22891.750
46	21383.250	46'	22615.250	126	21663.250	126'	22895.250
47	21386.750	47'	22618.750	127	21666.750	127'	22898.750
48	21390.250	48'	22622.250	128	21670.250	128'	22902.250
49	21393.750	49'	22625.750	129	21673.750	129'	22905.750
50	21397.250	50'	22629.250	130	21677.250	130'	22909.250
51	21400.750	51'	22632.750	131	21680.750	131'	22912.750
52	21404.250	52'	22636.250	132	21684.250	132'	22916.250
53	21407.750	53'	22639.750	133	21687.750	133'	22919.750
54	21411.250	54'	22643.250	134	21691.250	134'	22923.250
55	21414.750	55'	22646.750	135	21694.750	135'	22926.750
56	21418.250	56'	22650.250	136	21698.250	136'	22930.250
57	21421.750	57'	22653.750	137	21701.750	137'	22933.750
58	21425.250	58'	22657.250	138	21705.250	138'	22937.250
59	21428.750	59'	22660.750	139	21708.750	139'	22940.750
60	21432.250	60'	22664.250	140	21712.250	140'	22944.250
61	21435.750	61'	22667.750	141	21715.750	141'	22947.750
62	21439.250	62'	22671.250	142	21719.250	142'	22951.250
63	21442.750	63'	22674.750	143	21722.750	143'	22954.750
64	21446.250	64'	22678.250	144	21726.250	144'	22958.250
65	21449.750	65'	22681.750	145	21729.750	145'	22961.750
66	21453.250	66'	22685.250	146	21733.250	146'	22965.250
67	21456.750	67'	22688.750	147	21736.750	147'	22968.750
68	21460.250	68'	22692.250	148	21740.250	148'	22972.250
69	21463.750	69'	22695.750	149	21743.750	149'	22975.750
70	21467.250	70'	22699.250	150	21747.250	150'	22979.250
71	21470.750	71'	22702.750	151	21750.750	151'	22982.750
72	21474.250	72'	22706.250	152	21754.250	152'	22986.250
73	21477.750	73'	22709.750	153	21757.750	153'	22989.750
74	21481.250	74'	22713.250	154	21761.250	154'	22993.250
75	21484.750	75'	22716.750	155	21764.750	155'	22996.750
76	21488.250	76'	22720.250	156	21768.250	156'	23000.250
77	21491.750	77'	22723.750	157	21771.750	157'	23003.750
78	21495.250	78'	22727.250	158	21775.250	158'	23007.250

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
79	21498.750	79'	22730.750	159	21778.750	159'	23010.750
80	21502.250	80'	22734.250	160	21782.250	160'	23014.250
161	21785.750	161'	23017.750	241	22065.750	241'	23297.750
162	21789.250	162'	23021.250	242	22069.250	242'	23301.250
163	21792.750	163'	23024.750	243	22072.750	243'	23304.750
164	21796.250	164'	23028.250	244	22076.250	244'	23308.250
165	21799.750	165'	23031.750	245	22079.750	245'	23311.750
166	21803.250	166'	23035.250	246	22083.250	246'	23315.250
167	21806.750	167'	23038.750	247	22086.750	247'	23318.750
168	21810.250	168'	23042.250	248	22090.250	248'	23322.250
169	21813.750	169'	23045.750	249	22093.750	249'	23325.750
170	21817.250	170'	23049.250	250	22097.250	250'	23329.250
171	21820.750	171'	23052.750	251	22100.750	251'	23332.750
172	21824.250	172'	23056.250	252	22104.250	252'	23336.250
173	21827.750	173'	23059.750	253	22107.750	253'	23339.750
174	21831.250	174'	23063.250	254	22111.250	254'	23343.250
175	21834.750	175'	23066.750	255	22114.750	255'	23346.750
176	21838.250	176'	23070.250	256	22118.250	256'	23350.250
177	21841.750	177'	23073.750	257	22121.750	257'	23353.750
178	21845.250	178'	23077.250	258	22125.250	258'	23357.250
179	21848.750	179'	23080.750	259	22128.750	259'	23360.750
180	21852.250	180'	23084.250	260	22132.250	260'	23364.250
181	21855.750	181'	23087.750	261	22135.750	261'	23367.750
182	21859.250	182'	23091.250	262	22139.250	262'	23371.250
183	21862.750	183'	23094.750	263	22142.750	263'	23374.750
184	21866.250	184'	23098.250	264	22146.250	264'	23378.250
185	21869.750	185'	23101.750	265	22149.750	265'	23381.750
186	21873.250	186'	23105.250	266	22153.250	266'	23385.250
187	21876.750	187'	23108.750	267	22156.750	267'	23388.750
188	21880.250	188'	23112.250	268	22160.250	268'	23392.250
189	21883.750	189'	23115.750	269	22163.750	269'	23395.750
190	21887.250	190'	23119.250	270	22167.250	270'	23399.250
191	21890.750	191'	23122.750	271	22170.750	271'	23402.750
192	21894.250	192'	23126.250	272	22174.250	272'	23406.250
193	21897.750	193'	23129.750	273	22177.750	273'	23409.750
194	21901.250	194'	23133.250	274	22181.250	274'	23413.250
195	21904.750	195'	23136.750	275	22184.750	275'	23416.750
196	21908.250	196'	23140.250	276	22188.250	276'	23420.250
197	21911.750	197'	23143.750	277	22191.750	277'	23423.750
198	21915.250	198'	23147.250	278	22195.250	278'	23427.250
199	21918.750	199'	23150.750	279	22198.750	279'	23430.750

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
200	21922.250	200'	23154.250	280	22202.250	280'	23434.250
201	21925.750	201'	23157.750	281	22205.750	281'	23437.750
202	21929.250	202'	23161.250	282	22209.250	282'	23441.250
203	21932.750	203'	23164.750	283	22212.750	283'	23444.750
204	21936.250	204'	23168.250	284	22216.250	284'	23448.250
205	21939.750	205'	23171.750	285	22219.750	285'	23451.750
206	21943.250	206'	23175.250	286	22223.250	286'	23455.250
207	21946.750	207'	23178.750	287	22226.750	287'	23458.750
208	21950.250	208'	23182.250	288	22230.250	288'	23462.250
209	21953.750	209'	23185.750	289	22233.750	289'	23465.750
210	21957.250	210'	23189.250	290	22237.250	290'	23469.250
211	21960.750	211'	23192.750	291	22240.750	291'	23472.750
212	21964.250	212'	23196.250	292	22244.250	292'	23476.250
213	21967.750	213'	23199.750	293	22247.750	293'	23479.750
214	21971.250	214'	23203.250	294	22251.250	294'	23483.250
215	21974.750	215'	23206.750	295	22254.750	295'	23486.750
216	21978.250	216'	23210.250	296	22258.250	296'	23490.250
217	21981.750	217'	23213.750	297	22261.750	297'	23493.750
218	21985.250	218'	23217.250	298	22265.250	298'	23497.250
219	21988.750	219'	23220.750	299	22268.750	299'	23500.750
220	21992.250	220'	23224.250	300	22272.250	300'	23504.250
221	21995.750	221'	23227.750	301	22275.750	301'	23507.750
222	21999.250	222'	23231.250	302	22279.250	302'	23511.250
223	22002.750	223'	23234.750	303	22282.750	303'	23514.750
224	22006.250	224'	23238.250	304	22286.250	304'	23518.250
225	22009.750	225'	23241.750	305	22289.750	305'	23521.750
226	22013.250	226'	23245.250	306	22293.250	306'	23525.250
227	22016.750	227'	23248.750	307	22296.750	307'	23528.750
228	22020.250	228'	23252.250	308	22300.250	308'	23532.250
229	22023.750	229'	23255.750	309	22303.750	309'	23535.750
230	22027.250	230'	23259.250	310	22307.250	310'	23539.250
231	22030.750	231'	23262.750	311	22310.750	311'	23542.750
232	22034.250	232'	23266.250	312	22314.250	312'	23546.250
233	22037.750	233'	23269.750	313	22317.750	313'	23549.750
234	22041.250	234'	23273.250	314	22321.250	314'	23553.250
235	22044.750	235'	23276.750	315	22324.750	315'	23556.750
236	22048.250	236'	23280.250	316	22328.250	316'	23560.250
237	22051.750	237'	23283.750	317	22331.750	317'	23563.750
238	22055.250	238'	23287.250	318	22335.250	318'	23567.250
239	22058.750	239'	23290.750	319	22338.750	319'	23570.750
240	22062.250	240'	23294.250	320	22342.250	320'	23574.250



**Figure 1**  
**Radio frequency channel arrangement of radio-relay systems**  
**operating in the frequency band 21.2 GHz – 23.6 GHz**

Note :

1. Centre Frequency  $f_0 = 22400$  MHz
2. Reference Frequency  $f_r = 21196$  MHz
3. Separation between adjacent channels = A (112 MHz), B (56 MHz), C (28 MHz), D (14 MHz), E (7 MHz) and F (3.5 MHz)
4. Separation between corresponding go and return channels = 1232 MHz



## 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 Only systems using digital technologies that promote spectral efficiency will be issued with an assignment. Capacity enhancing digital techniques are being developed rapidly and such techniques that promote efficient use of spectrum, without reducing quality of service are encouraged.
- 5.3 In some cases, a radio system conforming to the requirements of this SRSP may require modifications if major interference is caused to other radio stations or systems.
- 5.4 Protection channel may be permitted for multi-channel systems subject to approval by the SKMM. However systems using hot-standby are encouraged.
- 5.5 It should be noted that the fixed service shares this band equally on the basis of primary status with other services as shown in **Appendix A**. shall comply with ITU-R recommendations **ITU-R SF.406-8 (04/93)** and **ITU-R SF.765-1 (02/03)** and ITU-R Radio Regulations **Article 21**.
- 5.6 Fixed service line of sight radio relay service providers shall take all steps so as not cause interference to other services. 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.

## 6.0 PRINCIPLES OF ASSIGNMENT

- 6.1 Authorisation to use the line of sight radio-relay spectrum for the FSLOSRR fixed station is by way of **Apparatus Assignment (AA)**.
- 6.2 Eligible persons who may apply for assignments are:
  - 6.2.1 Network Facilities Provider Individual (NFP(I)) licence holder, which provides radiocommunication transmitters and links.
  - 6.2.2 Private network facility (Government and private corporations/companies) for own **offshore** private use only.
  - 6.2.3 Private network facility (Government and private corporations/companies) for own **inland** private use only.
- 6.3 Applicants are required to:
  - 6.3.1 Submit AA application for the apparatus on the prescribed AA forms.

- 6.3.2 For use by **inland** private network facility, applicant have to provide proof that the existing NFP(I)/NSP(I) licence holders are not able to provide line of sight radio-relay service or any other similar service (wireless or wired) to the applicant.
- 6.4 The AA for these bands shall be valid for a period of five (5) years or such lesser period as specified in the AA. AA holders may apply for a new assignment at least sixty (60) days before the expiry date.
- 6.5 Issuance of an AA is also subject to successful coordination among assigned stations and with neighbouring administrations where it applies.
- 6.6 The application for apparatus assignment shall be considered on a first come first served basis.

## **7.0 IMPLEMENTATION**

- 7.1 This SRSP shall be effective on the date of issuance of this document.
- 7.2 No new assignment for fixed service line of sight radio-relay systems operating in the band 21.2 GHz to 23.6 GHz shall be approved unless they comply with this SRSP.
- 7.3 Systems installed or purchased before the effective date of this SRSP are allowed to operate until the end of the system lifespan (maximum 15 years from the year of deployment).

## **8.0 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 50 kilometres of the Malaysian border with Brunei Darussalam.
  - 8.1.2 Within 7.5 kilometres of the Malaysian border with Singapore.
  - 8.1.3 Within 60 kilometres of the Malaysian border with Indonesia.
  - 8.1.4 Within 5 kilometres of the Malaysian border with Thailand.
- 8.2 Note that the above coordination distance is continuously being reviewed with our neighbouring countries and may be updated from time to time.
- 8.3 Technical analysis is carried out by SKMM before an assignment is issued. If necessary, operator to operator coordination at the defined geographic boundaries may be required to reduce interference.
- 8.4 In the event of any interference, SKMM will require 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 SKMM for a resolution. SKMM will decide the necessary modifications

and schedule of modifications to resolve the dispute. SKMM will be guided by the interference resolution process as shown in **Appendix B**.

## **9.0 REVOCATION**

9.1 MCMC SRSP 528 FSLOSRR, 12 July 2006 is hereby revoked.

## **10.0 REFERENCES**

- [1] **ITU-R F.637-3 (02/99)** RF Channel Arrangements for Radio-relay Systems Operating in the 23 GHz band
- [2] **ITU-R SF.406-8 (04/93)** Maximum Isotropically Radiated Power of Radio-relay Transmitters Operating in the Fixed bands Sharing with Fixed Satellite Service.
- [3] **ITU-R SF.765-1 (02/03)** Intersection of radio-relay antenna beams with orbits used by space stations in the fixed-satellite service.
- [4] **Radio Regulations Article 21** Terrestrial and space services sharing frequency bands above 1GHz.

**Issued by:**



**Suruhanjaya Komunikasi dan Multimedia Malaysia**  
Malaysian Communications and Multimedia Commission

**15 October 2009**

## APPENDIX A: SPECTRUM PLAN

21.2 GHz to 22.0 GHz				
Frequency Band (GHz)	ITU Allocation			Malaysian Allocation
	Region 1	Region 2	Region 3	
21.2-21.4	EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive)			EARTH EXPLORATION-SATELLITE (passive) FIXED MLA74 MOBILE SPACE RESEARCH (passive)
21.4-22	FIXED MOBILE BROADCASTING-SATELLITE 5.347A 5.530	FIXED MOBILE	FIXED MOBILE BROADCASTING-SATELLITE 5.347A 5.530 5.531	FIXED MLA74 MOBILE BROADCASTING-SATELLITE 5.347A 5.530

5.347A In the bands:

- 1 452-1 492 MHz,
- 1 525-1 559 MHz,
- 1 613,8-1 626,5 MHz,
- 2 655-2 670 MHz,
- 2 670-2 690 MHz,
- 21.4-22 GHz,

Resolution **739 (WRC-03)** applies. (WRC-03)

5.530 In Regions 1 and 3, the allocation to the broadcasting-satellite service in the band 21.4-22 GHz shall come into effect on 1 April 2007. The use of this band by the broadcasting-satellite service after that date and on an interim basis prior to that date is subject to the provisions of Resolution **525 (WARC-92)\***.

\* *This Resolution was revised by WRC-03.*

5.531 *Additional allocation:* in Japan, the band 21.4-22 GHz is also allocated to the broadcasting service on a primary basis.

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**22.0 GHz to 23.6GHz**

Frequency Band (GHz)	ITU Allocation			Malaysian Allocation
	Region 1	Region 2	Region 3	
<b>22-22.21</b>	FIXED MOBILE except aeronautical mobile 5.149			FIXED MLA74 MOBILE except aeronautical mobile 5.149
<b>22.21-22.5</b>	EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) 5.149 5.532			EARTH EXPLORATION-SATELLITE (passive) FIXED MLA74 MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) <b>5.149 5.532</b>
<b>22.5-22.55</b>	FIXED MOBILE			FIXED MLA74 <b>MOBILE</b>
<b>22.55-23.55</b>	FIXED INTER-SATELLITE 5.338A MOBILE 5.149			FIXED MLA74 INTER-SATELLITE 5.338A MOBILE 5.149
<b>23.55-23.6</b>	FIXED MOBILE			FIXED MLA74 MOBILE

5.149 In making assignments to stations of other services to which the bands:

13 360-13 410 kHz,	4 990-5 000 MHz,	94.1-100 GHz,
25 550-25 670 kHz,	6 650-6 675.2 MHz,	102-109.5 GHz,
37.5-38.25 MHz,	10.6-10.68 GHz,	111.8-114.25 GHz,
73-74.6 MHz in Regions 1 and 3,	14.47-14.5 GHz,	128.33-128.59 GHz,
150.05-153 MHz in Region 1,	22.01-22.21 GHz,	129.23-129.49 GHz,
322-328.6 MHz,	22.21-22.5 GHz,	130-134 GHz,
406.1-410 MHz,	22.81-22.86 GHz,	136-148.5 GHz,
608-614 MHz in Regions 1 and 3,	23.07-23.12 GHz,	151.5-158.5 GHz,
1 330-1 400 MHz,	31.2-31.3 GHz,	168.59-168.93 GHz,
1 610.6-1 613.8 MHz,	31.5-31.8 GHz in Regions 1 and 3,	171.11-171.45 GHz,
1 718.8-1 722.2 MHz,	36.43-36.5 GHz,	172.31-172.65 GHz,
2 655-2 690 MHz,	42.5-43.5 GHz,	173.52-173.85 GHz,
3 260-3 267 MHz,	42.77-42.87 GHz,	195.75-196.15 GHz,
3 332-3 339 MHz,	43.07-43.17 GHz,	209-226 GHz,
3 345.8-3 352.5 MHz,	43.37-43.47 GHz,	241-250 GHz,
4 825-4 835 MHz,	48.94-49.04 GHz,	252-275 GHz
4 825-4 835 MHz,	76-86 GHz,	
4 950-4 990 MHz,	92-94 GHz,	

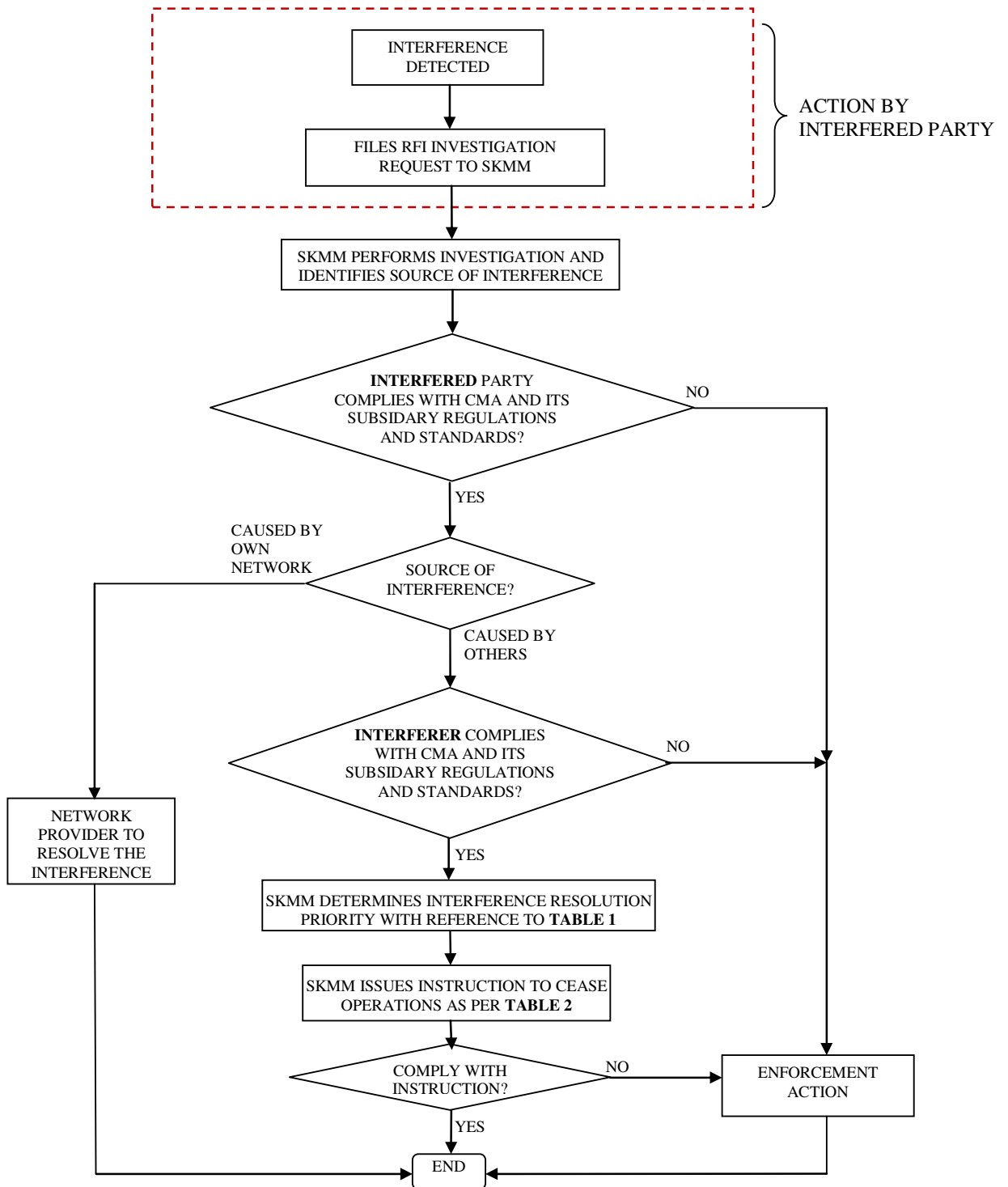
are allocated, administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 4.5 and 4.6 and Article 29). (WRC-2000)

**5.338A** In the bands 1 350-1 400 MHz, 1 427-1 429 MHz, 1 429-1 452 MHz, 22.55-23.55 GHz, 30-31 GHz, 31-31.3 GHz, 49.7-50.2 GHz, 50.4-50.9 GHz and 51.4-52.6 GHz, Resolution **750 (WRC-07)** applies. (WRC-07)

**5.532** The use of the band 22.21-22.5 GHz by the Earth exploration-satellite (passive) and space research (passive) services shall not impose constraints upon the fixed and mobile, except aeronautical mobile, services.

MLA74 Standard Radio System Plan: Requirements for Line of sight Radio-Relay Systems Operating in the Fixed Service in the Frequency Band 21.20 GHz to 23.60 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"> <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 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 CMA (Spectrum) Regulations 2000	To cease* operation immediately within 24 hours or earlier as specified in the notice issued by SKMM
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 SKMM 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 SKMM if interference cannot be resolved

\*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 SKMM to remove/ avoid the interference.