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Standard Radio System Plan

REQUIREMENTS FOR FIXED SERVICE LINE OF SIGHT RADIO-RELAY SYSTEMS

OPERATING IN THE FREQUENCY BAND

17.70 GHz TO 19.70 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)

REQUIREMENTS FOR FIXED SERVICE LINE OF SIGHT RADIO-RELAY SYSTEMS OPERATING IN THE FREQUENCY BAND 17.70 GHz TO 19.70 GHz

2.0 INTENT

2.1 This Standard Radio System Plan (SRSP) states the requirements for the utilisation of frequency band 17.7 GHz - 19.7 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 the 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.

3.4 The allocation and allotment of these frequency bands 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 CHANNELLING PLAN

4.1 Fixed Service line-of sight radio-relay systems operating in these bands shall use a duplex frequency plan. The 17.70 GHz to 19.70 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 arrangements of **ITU-R 595-9 (02/06).** The homogeneous channel arrangement provides basically for four (4) two-way 220 MHz channels (1/1' to 4/4'), eight (8) two-way 110 MHz channels (1/1' to 8/8') and thirty-five (35) two-way 27.5 MHz channels (1/1' to 35/35') as shown in **Figure 1 (a)**, **1(b)** and **1(c)** respectively. Multi-state modulation radio links channels could use seventeen (17) two-way 55 MHz channels (1/1' to 17/17') as shown in **Figure 1(d)**.

4.3 The individual channels are derived by the following relationships:
Let f_o be the centre frequency 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 = 18700 MHz

4.3.1 For systems with a channels bandwidth of 220 MHz:

lower half of the band:	$f_n = f_o - 1110 + 220\,n$ MHz	n = 1, 2, 3 or 4
upper half of the band:	$f_{n'} = f_o + 10 + 220\,n$ MHz	

Table 1
Channel Carrier Centre Frequencies for systems with
bandwidth 220 MHz

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	17810.000	1'	18930.000
2	18030.000	2'	19150.000
3	18250.000	3'	19370.000
4	18470.000	4'	19590.000

4.3.2 For systems with a channel bandwidth of 110 MHz:

lower half of the band:	$f_n = f_o - 1000 + 110\,n$ MHz	n = 1, 2, … , 8
upper half of the band:	$f_{n'} = f_o + 10 + 110\,n$ MHz	

Table 2 Channel Carrier Centre Frequencies for systems with bandwidth 110 MHz			
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz
1	17810.000	1’	18820.000
2	17920.000	2’	18930.000
3	18030.000	3’	19040.000
4	18140.000	4’	19150.000
5	18250.000	5’	19260.000
6	18360.000	6’	19370.000
7	18470.000	7’	19480.000
8	18580.000	8’	19590.000

4.3.3 For systems with a capacity of the order of 140 Mbit/s or STM-1 with multi-state modulation formats:

lower half of the band:	$f_n = f_o$ - 1000 + 55 n MHz	n = 1, 2, .. . , 17
upper half of the band:	$f_{n'} = f_o$ + 10 + 55 n MHz	

Table 3 Channel Carrier Centre Frequencies for systems with bandwidth 55 MHz			
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz
1	17755.000	1'	18765.000
2	17810.000	2'	18820.000
3	17865.000	3'	18875.000
4	17920.000	4'	18930.000
5	17975.000	5'	18985.000
6	18030.000	6'	19040.000
7	18085.000	7'	19095.000
8	18140.000	8'	19150.000
9	18195.000	9'	19205.000
10	18250.000	10'	19260.000
11	18305.000	11'	19315.000
12	18360.000	12'	19370.000
13	18415.000	13'	19425.000
14	18470.000	14'	19480.000
15	18525.000	15'	19535.000
16	18580.000	16'	19590.000
17	18635.000	17'	19645.000

4.3.4 For system with a channel bandwidth of 40 MHz:

Lower half of the band:	$f_n = f_o - 1020 + 40\,n$ MHz	$n = 1, 2, \ldots, 35$
Upper half of the band:	$f_{n'} = f_o + 20 + 40\,n$ MHz	

Table 4
Channel Carrier Centre Frequencies for systems with bandwidth 40 MHz

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	17720.000	1'	18720.000
2	17760.000	2'	18760.000
3	17800.000	3'	18800.000
4	17840.000	4'	18840.000
5	17880.000	5'	18880.000
6	17920.000	6'	18920.000
7	17960.000	7'	18960.000
8	18000.000	8'	19000.000
9	18040.000	9'	19040.000
10	18080.000	10'	19080.000
11	18120.000	11'	19120.000
12	18160.000	12'	19160.000
13	18200.000	13'	19200.000
14	18240.000	14'	19240.000
15	18280.000	15'	19280.000
16	18320.000	16'	19320.000
17	18360.000	17'	19360.000
18	18400.000	18'	19400.000
19	18440.000	19'	19440.000
20	18480.000	20'	19480.000
21	18520.000	21'	19520.000
22	18560.000	22'	19560.000
23	18600.000	23'	19600.000
24	18640.000	24'	19640.000
25	18680.000	25'	19680.000

4.3.5 For systems with a capacity of the order of 34 Mbit/s:

lower half of the band:	$f_n = f_o - 1000 + 27.5\,n$ MHz	$n = 1, 2, \ldots, 35$
upper half of the band:	$f_{n'} = f_o + 10 + 27.5\,n$ MHz	

Table 5
Channel Carrier Centre Frequencies for 34 Mbit/s systems with bandwidth 27.5 MHz

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	17727.500	1'	18737.500				
2	17755.000	2'	18765.000	19	18222.500	19'	19232.500
3	17782.500	3'	18792.500	20	18250.000	20'	19260.000
4	17810.000	4'	18820.000	21	18277.500	21'	19287.500
5	17837.500	5'	18847.500	22	18305.000	22'	19315.000
6	17865.000	6'	18875.000	23	18332.500	23'	19342.500
7	17892.500	7'	18902.500	24	18360.000	24'	19370.000
8	17920.000	8'	18930.000	25	18387.500	25'	19397.500
9	17947.500	9'	18957.500	26	18415.000	26'	19425.000
10	17975.000	10'	18985.000	27	18442.500	27'	19452.500
11	18002.500	11'	19012.500	28	18470.000	28'	19480.000
12	18030.000	12'	19040.000	29	18497.500	29'	19507.500
13	18057.500	13'	19067.500	30	18525.000	30'	19535.000
14	18085.000	14'	19095.000	31	18552.500	31'	19562.500
15	18112.500	15'	19122.500	32	18580.000	32'	19590.000
16	18140.000	16'	19150.000	33	18607.500	33'	19617.500
17	18167.500	17'	19177.500	34	18635.000	34'	19645.000
18	18195.000	18'	19205.000	35	18662.500	35'	19672.500

4.3.6 For systems with a channel bandwidth of 20 MHz:

lower half of the band:	$f_n = f_o - 1000 + 20\,n$ MHz	$n = 1, 2, \ldots, 17$
upper half of the band:	$f_{n'} = f_o + 10 + 20\,n$ MHz	

Table 6
Channel Carrier Centre Frequencies for systems with bandwidth 20 MHz

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)		Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	17710.000	1'	18710.000		26	18210.000	26'	19210.000
2	17730.000	2'	18730.000		27	18230.000	27'	19230.000
3	17750.000	3'	18750.000		28	18250.000	28'	19250.000
4	17770.000	4'	18770.000		29	18270.000	29'	19270.000
5	17790.000	5'	18790.000		30	18290.000	30'	19290.000
6	17810.000	6'	18810.000		31	18310.000	31'	19310.000
7	17830.000	7'	18830.000		32	18330.000	32'	19330.000
8	17850.000	8'	18850.000		33	18350.000	33'	19350.000
9	17870.000	9'	18870.000		34	18370.000	34'	19370.000
10	17890.000	10'	18890.000		35	18390.000	35'	19390.000
11	17910.000	11'	18910.000		36	18410.000	36'	19410.000
12	17930.000	12'	18930.000		37	18430.000	37'	19430.000
13	17950.000	13'	18950.000		38	18450.000	38'	19450.000
14	17970.000	14'	18970.000		39	18470.000	39'	19470.000
15	17990.000	15'	18990.000		40	18490.000	40'	19490.000
16	18010.000	16'	19010.000		41	18510.000	41'	19510.000
17	18030.000	17'	19030.000		42	18530.000	42'	19530.000
18	18050.000	18'	19050.000		43	18550.000	43'	19550.000
19	18070.000	19'	19070.000		44	18570.000	44'	19570.000
20	18090.000	20'	19090.000		45	18590.000	45'	19590.000
21	18110.000	21'	19110.000		46	18610.000	46'	19610.000
22	18130.000	22'	19130.000		47	18630.000	47'	19630.000
23	18150.000	23'	19150.000		48	18650.000	48'	19650.000
24	18170.000	24'	19170.000		49	18670.000	49'	19670.000
25	18190.000	25'	19190.000		50	18690.000	50'	19690.000

4.3.7 For systems with a channel bandwidth of 14 MHz:

lower half of the band:	$f_n = f_o - 1000 + 14n$ MHz	$n = 1, 2, \ldots, 70$
upper half of the band:	$f_{n'} = f_o + 10 + 14n$ MHz	

Table 7
Channel Carrier Centre Frequencies for systems with bandwidth 14 MHz

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)		Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	17714.000	1'	18724.000		36	18204.000	36'	19214.000
2	17728.000	2'	18738.000		37	18218.000	37'	19228.000
3	17742.000	3'	18752.000		38	18232.000	38'	19242.000
4	17756.000	4'	18766.000		39	18246.000	39'	19256.000
5	17770.000	5'	18780.000		40	18260.000	40'	19270.000
6	17784.000	6'	18794.000		41	18274.000	41'	19284.000
7	17798.000	7'	18808.000		42	18288.000	42'	19298.000
8	17812.000	8'	18822.000		43	18302.000	43'	19312.000
9	17826.000	9'	18836.000		44	18316.000	44'	19326.000
10	17840.000	10'	18850.000		45	18330.000	45'	19340.000
11	17854.000	11'	18864.000		46	18344.000	46'	19354.000
12	17868.000	12'	18878.000		47	18358.000	47'	19368.000
13	17882.000	13'	18892.000		48	18372.000	48'	19382.000

14	17896.000	14'	18906.000
15	17910.000	15'	18920.000
16	17924.000	16'	18934.000
17	17938.000	17'	18948.000
18	17952.000	18'	18962.000
19	17966.000	19'	18976.000
20	17980.000	20'	18990.000
21	17994.000	21'	19004.000
22	18008.000	22'	19018.000
23	18022.000	23'	19032.000
24	18036.000	24'	19046.000
25	18050.000	25'	19060.000
26	18064.000	26'	19074.000
27	18078.000	27'	19088.000
28	18092.000	28'	19102.000
29	18106.000	29'	19116.000
30	18120.000	30'	19130.000
31	18134.000	31'	19144.000
32	18148.000	32'	19158.000
33	18162.000	33'	19172.000
34	18176.000	34'	19186.000
35	18190.000	35'	19200.000

49	18386.000	49'	19396.000
50	18400.000	50'	19410.000
51	18414.000	51'	19424.000
52	18428.000	52'	19438.000
53	18442.000	53'	19452.000
54	18456.000	54'	19466.000
55	18470.000	55'	19480.000
56	18484.000	56'	19494.000
57	18498.000	57'	19508.000
58	18512.000	58'	19522.000
59	18526.000	59'	19536.000
60	18540.000	60'	19550.000
61	18554.000	61'	19564.000
62	18568.000	62'	19578.000
63	18582.000	63'	19592.000
64	18596.000	64'	19606.000
65	18610.000	65'	19620.000
66	18624.000	66'	19634.000
67	18638.000	67'	19648.000
68	18652.000	68'	19662.000
69	18666.000	69'	19676.000
70	18680.000	70'	19690.000

4.3.8 For systems with a channel bandwidth of 10 MHz:

lower half of the band:	$f_n = f_o - 1005 + 10n$ MHz	$n = 1, 2, \ldots, 17$
upper half of the band:	$f_{n'} = f_o + 5 + 10n$ MHz	

Table 8
Channel Carrier Centre Frequencies for systems with bandwidth 10 MHz

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	17705.000	1'	18710.000
2	17715.000	2'	18730.000
3	17725.000	3'	18750.000
4	17735.000	4'	18770.000
5	17745.000	5'	18790.000
6	17755.000	6'	18810.000
7	17765.000	7'	18830.000
8	17775.000	8'	18850.000
9	17785.000	9'	18870.000
10	17795.000	10'	18890.000
11	17805.000	11'	18910.000
12	17815.000	12'	18930.000
13	17825.000	13'	18950.000
14	17835.000	14'	18970.000
15	17845.000	15'	18990.000
16	17855.000	16'	19010.000
17	17865.000	17'	19030.000
18	17875.000	18'	19050.000
19	17885.000	19'	19070.000
20	17895.000	20'	19090.000

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
51	18205.000	51’	19210.000
52	18215.000	52’	19230.000
53	18225.000	53’	19250.000
54	18235.000	54’	19270.000
55	18245.000	55’	19290.000
56	18255.000	56’	19310.000
57	18265.000	57’	19330.000
58	18275.000	58’	19350.000
59	18285.000	59’	19370.000
60	18295.000	60’	19390.000
61	18305.000	61’	19410.000
62	18315.000	62’	19430.000
63	18325.000	63’	19450.000
64	18335.000	64’	19470.000
65	18345.000	65’	19490.000
66	18355.000	66’	19510.000
67	18365.000	67’	19530.000
68	18375.000	68’	19550.000
69	18385.000	69’	19570.000
70	18395.000	70’	19590.000

21	17905.000	21'	19110.000
22	17915.000	22'	19130.000
23	17925.000	23'	19150.000
24	17935.000	24'	19170.000
25	17945.000	25'	19190.000
26	17955.000	26'	19210.000
27	17965.000	27'	19230.000
28	17975.000	28'	19250.000
29	17985.000	29'	19270.000
30	17995.000	30'	19290.000
31	18005.000	31'	19310.000
32	18015.000	32'	19330.000
33	18025.000	33'	19350.000
34	18035.000	34'	19370.000
35	18045.000	35'	19390.000
36	18055.000	36'	19410.000
37	18065.000	37'	19430.000
38	18075.000	38'	19450.000
39	18085.000	39'	19470.000
40	18095.000	40'	19490.000
41	18105.000	41'	19510.000
42	18115.000	42'	19530.000
43	18125.000	43'	19550.000
44	18135.000	44'	19570.000
45	18145.000	45'	19590.000
46	18155.000	46'	19610.000
4	18165.000	47'	19630.000
48	18175.000	48'	19650.000
49	18185.000	49'	19670.000
50	18195.000	50'	19690.000

71	18405.000	71’	19610.000
72	18415.000	72’	19630.000
73	18425.000	73’	19650.000
74	18435.000	74’	19670.000
75	18445.000	75’	19690.000
76	18455.000	76’	19210.000
77	18465.000	77’	19230.000
78	18475.000	78’	19250.000
79	18485.000	79’	19270.000
80	18495.000	80’	19290.000
81	18505.000	81’	19310.000
82	18515.000	82’	19330.000
83	18525.000	83’	19350.000
84	18535.000	84’	19370.000
85	18545.000	85’	19390.000
86	18555.000	86’	19410.000
87	18565.000	87’	19430.000
88	18575.000	88’	19450.000
89	18585.000	89’	19470.000
90	18595.000	90’	19490.000
91	18605.000	91’	19510.000
92	18615.000	92’	19530.000
93	18625.000	93’	19550.000
94	18635.000	94’	19570.000
95	18645.000	95’	19590.000
96	18655.000	96’	19610.000
97	18665.000	97’	19630.000
98	18675.000	98’	19650.000
99	18685.000	99’	19670.000
100	18695.000	100’	19690.000

4.3.9 For systems with a channel bandwidth of 7.5 MHz:

lower half of the band:	$f_n = f_o - 997.5 + 7.5\,n$ MHz	$n = 1, 2, \ldots, 131$
upper half of the band:	$f_{n'} = f_o + 12.5 + 7.5\,n$ MHz	

Table 9
Channel Carrier Centre Frequencies for systems with bandwidth 7.5 MHz

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	17710.000	1'	18720.000
2	17717.500	2'	18727.500
3	17725.000	3'	18735.000
4	17732.500	4'	18742.500
5	17740.000	5'	18750.000
6	17747.500	6'	18757.500
7	17755.000	7'	18765.000
8	17762.500	8'	18772.500
9	17770.000	9'	18780.000
10	17777.500	10'	18787.500
11	17785.000	11'	18795.000

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
66	18197.500	66'	19207.500
67	18205.000	67'	19215.000
68	18212.500	68'	19222.500
69	18220.000	69'	19230.000
70	18227.500	70'	19237.500
71	18235.000	71'	19245.000
72	18242.500	72'	19252.500
73	18250.000	73'	19260.000
74	18257.5000	74'	19267.500
75	18265.000	75'	19275.000
76	18272.500	76'	19282.500

12	17792.500	12'	18802.500
13	17800.000	13'	18810.000
14	17807.500	14'	18817.500
15	17815.000	15'	18825.000
16	17822.500	16'	18832.500
17	17830.000	17'	18840.000
18	17837.500	18'	18847.500
19	17845.000	19'	18855.000
20	17852.500	20'	18862.500
21	17860.000	21'	18870.000
22	17867.500	22'	18877.500
23	17875.000	23'	18885.000
24	17882.500	24'	18892.500
25	17890.000	25'	18900.000
26	17897.500	26'	18907.500
27	17905.0000	27'	18915.000
28	17912.500	28'	18922.500
29	17920.000	29'	18930.000
30	17927.500	30'	18937.500
31	17935.000	31'	18945.000
32	17942.500	32'	18952.500
33	17950.000	33'	18960.000
34	17957.500	34'	18967.500
35	17965.000	35'	18975.000
36	17972.500	36'	18982.500
37	17980.000	37'	18990.000
38	17987.500	38'	18997.500
39	17995.000	39'	19005.000
40	18002.500	40'	19012.500
41	18010.000	41'	19020.000
42	18017.500	42'	19027.500
43	18025.000	43'	19035.000
44	18032.500	44'	19042.500
45	18040.000	45'	19050.000
46	18047.500	46'	19057.500
47	18055.000	47'	19065.000
48	18062.500	48'	19072.500
49	18070.000	49'	19080.000
50	18077.500	50'	19087.500
51	18085.000	51'	19095.000
52	18092.500	52'	19102.500
53	18100.000	53'	19110.000
54	18107.500	54'	19117.500
55	18115.000	55'	19125.000
56	18122.500	56'	19132.500
57	18130.000	57'	19140.000
58	18137.500	58'	19147.500
59	18145.000	59'	19155.000
60	18152.500	60'	19162.500
61	18160.000	61'	19170.000
62	18167.500	62'	19177.500
63	18175.000	63'	19185.000
64	18182.500	64'	19192.500
65	18190.000	65'	19200.000

77	18280.000	77'	19290.000
78	18287.500	78'	19297.500
79	18295.000	79'	19305.000
80	18302.500	80'	19312.500
81	18310.000	81'	19320.000
82	18317.500	82'	19327.500
83	18325.000	83'	19335.000
84	18332.500	84'	19342.500
85	18340.000	85'	19350.000
86	18347.500	86'	19357.500
87	18355.000	87'	19365.000
88	18362.500	88'	19372.500
89	18370.000	89'	19380.000
90	18377.500	90'	19387.500
91	18385.000	91'	19395.000
92	18392.500	92'	19402.500
93	18400.000	93'	19410.000
94	18407.500	94'	19417.500
95	18415.000	95'	19425.000
96	18422.500	96'	19432.500
97	18430.000	97'	19440.000
98	18437.500	98'	19447.500
99	18445.000	99'	19455.000
100	18452.500	100'	19462.500
101	18460.000	101'	19470.000
102	18467.500	102'	19477.500
103	18475.000	103'	19485.000
104	18482.500	104'	19492.500
105	18490.000	105'	19500.000
106	18497.500	106'	19507.500
107	18505.000	107'	19515.000
108	18512.500	108'	19522.500
109	18520.000	109'	19530.000
110	18527.500	110'	19537.500
111	18535.000	111'	19545.000
112	18542.500	112'	19552.500
113	18550.000	113'	19560.000
114	18557.500	114'	19567.500
115	18565.000	115'	19575.000
116	18572.500	116'	19582.500
117	18580.000	117'	19590.000
118	18587.500	118'	19597.500
119	18595.000	119'	19605.000
120	18602.500	120'	19612.500
121	18610.000	121'	19620.000
122	18617.500	122'	19627.500
123	18625.000	123'	19635.000
124	18632.500	124'	19642.500
125	18640.000	125'	19650.000
126	18647.500	126'	19657.500
127	18655.000	127'	19665.000
128	18662.500	128'	19672.500
129	18670.000	129'	19680.000
130	18677.500	130'	19687.500

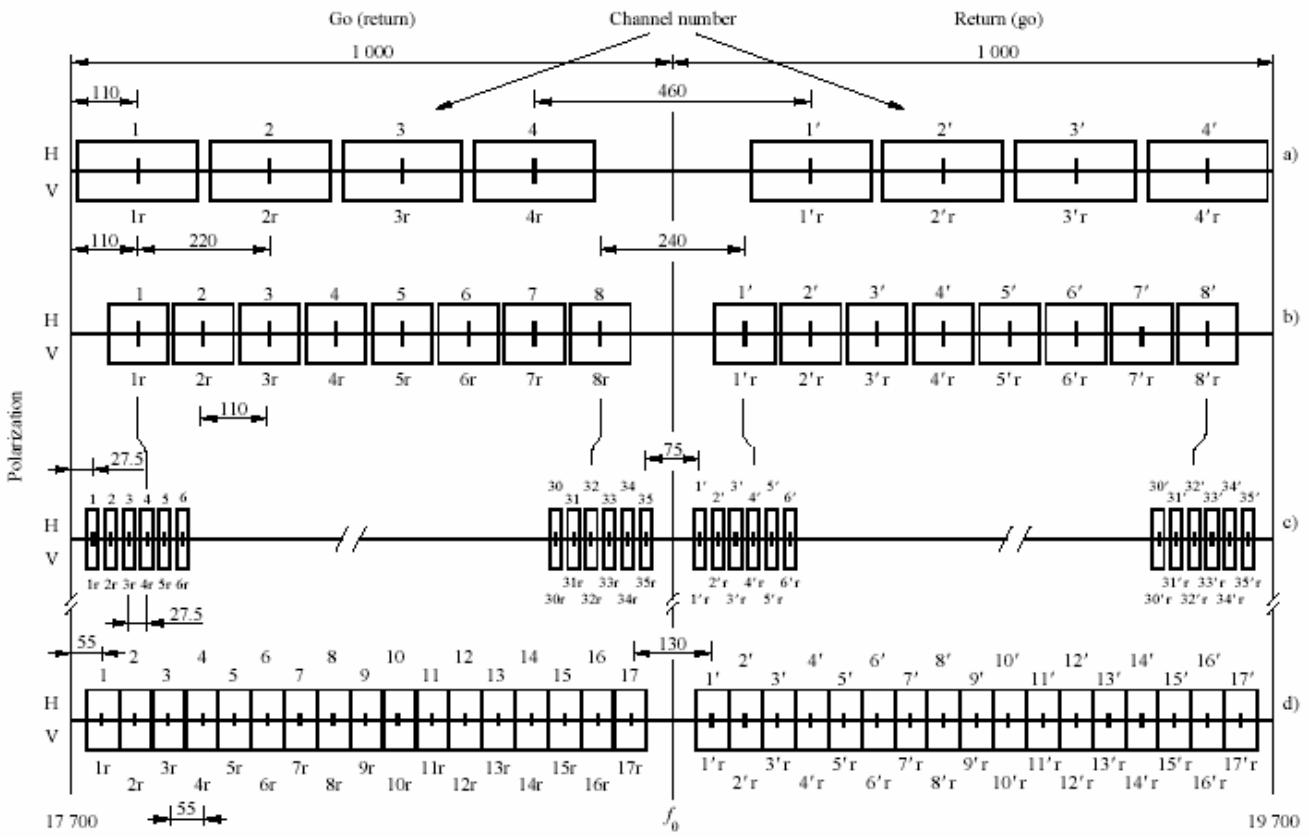

Figure 1
Radio frequency channel arrangement of radio-relay systems operating in the frequency band 17.7 GHz - 19.7 GHz

Note:

1. Centre Frequency f_0 = 18700 MHz
2. Separation between adjacent channels = (220 MHz), B (110 MHz), C (27.5 MHz) and D (55 MHz)

4.4 The lower guard band, upper guard band, channels 1 and 8' can be subdivided and utilised for other small capacity radio systems such as point-to-multipoint systems when the need arises.

4.5 The centre frequencies of the RF channels for radio systems operating in the frequency band 17.7 GHz – 19.7 GHz with bandwidth of 220 MHz and 110 MHz, 27.5 MHz and 55 MHz as shown in **Figures 1(a)**, **1(b)**, **1(c)** and **1(d).**

4.6 Interleaved arrangement

For systems with a capacity of the order of 280 Mbit/s:

lower half of the band:	$f_n = f_o - 1000 + 110\,n$ MHz	$n = 1, 2, \ldots, 7$
upper half of the band:	$f_{n'} = f_o + 120 + 110\,n$ MHz	

The frequency arrangement is illustrated in **Figure 2(a).**

For systems with a capacity of the order of 140 Mbit/s:

lower half of the band:	$f_n = f_r - 945 + 55\,n$ MHz	$n = 1, 2, \ldots, 15$
upper half of the band:	$f_{n'} = f_r + 65 + 55\,n$ MHz	

The frequency arrangement is illustrated in **Figure 2(b).**

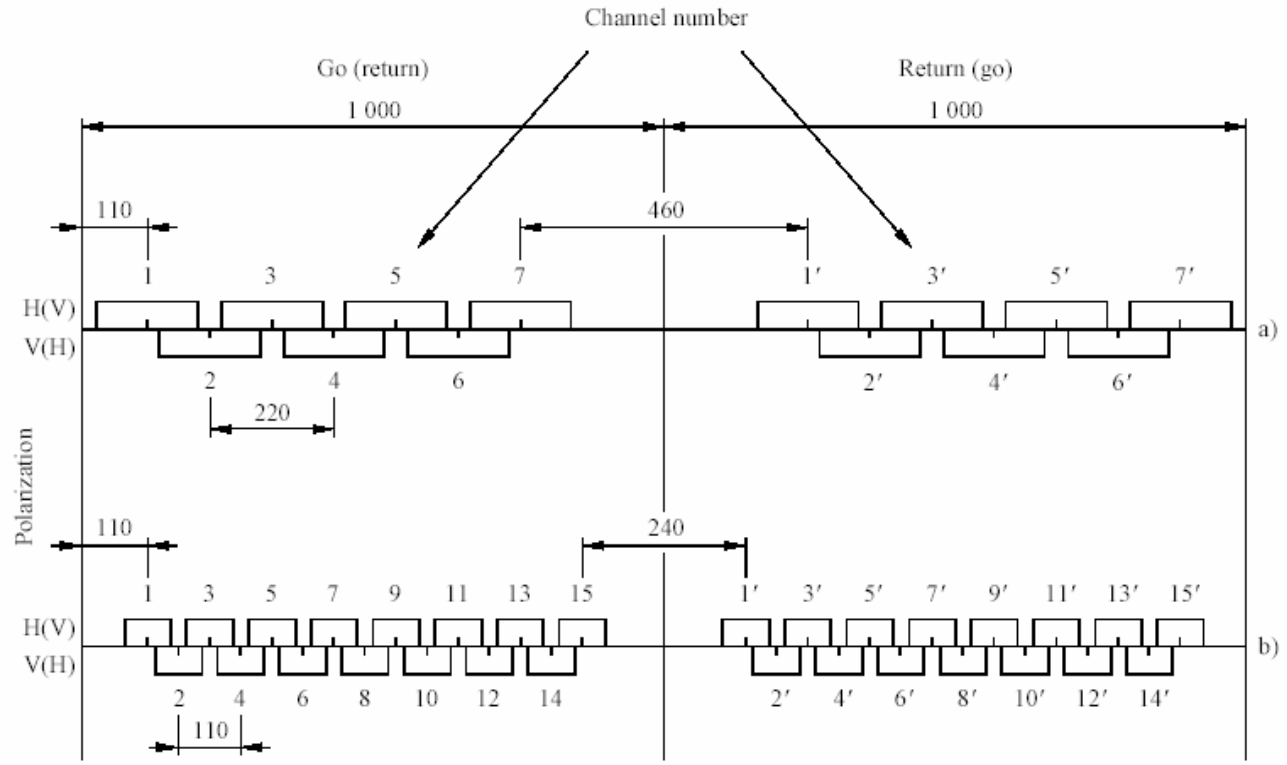

Figure 2
Radio frequency channel arrangement of radio-relay systems operating in the frequency band 17.7 GHz - 19.7 GHz (Interleaved Arrangement)

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 the Fixed-Satellite service (FSS) as well as other services as shown in **Appendix A**.

5.6 Fixed service line of sight radio relay systems shall not interfere with earth stations of the FSS and 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**.

5.7 Fixed service line of sight radio relay systems are required shall be shut down immediately when there is a major interference to FSS earth stations which cannot be mitigated. Implementation of mitigation techniques to avoid interference shall be borne by the radio relay service providers.

5.8 Fixed service line of sight radio relay service providers shall take all steps so as not cause interference to FSS. 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 Fixed Service line-of sight radio-relay 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 radio communication 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 17.7 GHz to 19.7 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.

8.4 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.

8.5 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 527 FSLOSRR, 12 July 2006 is hereby revoked.

10.0 REFERENCES

[1] **ITU-R Recommendation F.595-9 (02/06)** RF Channel Arrangement for Radio Relay Systems operating in the 18 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

17.7 GHz to 18.4 GHz

Frequency Band (GHz)	ITU Allocation			Malaysian Allocation
	Region 1	Region 2	Region 3	
17.7-18.1	**17.7-18.1** FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE	**17.7-17.8** FIXED FIXED-SATELLITE (space-to-Earth) 5.517 (Earth-to-space) 5.516 BROADCASTING-SATELLITE Mobile 5.515 **17.8-18.1** FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE	**17.7-18.1** FIXED FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE	**17.7-18.1** FIXED MLA73 FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.516 MOBILE
18.1-18.4	FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B (Earth-to-space) 5.520 MOBILE 5.519 5.521			FIXED MLA73 FIXED-SATELLITE (space-to-Earth) 5.484A (Earth-to-space) 5.520 MOBILE 5.519

5.484A The use of the bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 13.75-14.5 GHz (Earth-to-space), 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), 29.5-30 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)

5.515 In the band 17.3-17.8 GHz, sharing between the fixed-satellite service (Earth-to-space) and the broadcasting-satellite service shall also be in accordance with the provisions of § 1 of Annex 4 of Appendix **30A**.

5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. The use of the band

17.3-17.8 GHz in Region 2 by systems in the fixed-satellite service (Earth-to-space) is limited to geostationary satellites. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1 and 3 and 17.8-18.1 GHz (Earth-to-space) in Region 2 by non-geostationary-satellite systems 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)

5.516B The following bands are identified for use by high-density applications in the fixed-satellite service:

17.3-17.7 GHz	(space-to-Earth) in Region 1,
18.3-19.3 GHz	(space-to-Earth) in Region 2,
19.7-20.2 GHz	(space-to-Earth) in all Regions,
39.5-40 GHz	(space-to-Earth) in Region 1,
40-40.5 GHz	(space-to-Earth) in all Regions,
40.5-42 GHz	(space-to-Earth) in Region 2,
47.5-47.9 GHz	(space-to-Earth) in Region 1,
48.2-48.54 GHz	(space-to-Earth) in Region 1,
49.44-50.2 GHz	(space-to-Earth) in Region 1,
and	
27.5-27.82 GHz	(Earth-to-space) in Region 1,
28.35-28.45 GHz	(Earth-to-space) in Region 2,
28.45-28.94 GHz	(Earth-to-space) in all Regions,
28.94-29.1 GHz	(Earth-to-space) in Region 2 and 3,
29.25-29.46 GHz	(Earth-to-space) in Region 2,
29.46-30 GHz	(Earth-to-space) in all Regions,
48.2-50.2 GHz	(Earth-to-space) in Region 2.

This identification does not preclude the use of these bands by other fixed-satellite service applications or by other services to which these bands are allocated on a co-primary basis and does not establish priority in these Radio Regulations among users of the bands. Administrations should take this into account when considering regulatory provisions in relation to these bands. See Resolution **143 (WRC-03)**. (WRC-03)

5.517 In Region 2, use of the fixed-satellite (space-to-Earth) service in the band 17.7-17.8 GHz shall not cause harmful interference to nor claim protection from assignments in the broadcasting-satellite service operating in conformity with the Radio Regulations. (WRC-07)

5.519 *Additional allocation:* the bands 18.0-18.3 GHz in Region 2 and 18.1-18.4 GHz in Regions 1 and 3 are also allocated to the meteorological-satellite service (space-to-Earth) on a primary basis. Their use is limited to geostationary satellites. (WRC-07)

5.520 The use of the band 18.1-18.4 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links of geostationary-satellite systems in the broadcasting-satellite service. (WRC-2000)

5.521 *Alternative allocation:* in Germany, Denmark, the United Arab Emirates and Greece, the band 18.1-18.4 GHz is allocated to the fixed, fixed-satellite (space-to-Earth) and mobile services on a primary basis (see No. **5.33**). The provisions of No. **5.519** also apply. (WRC-03)

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18.4 GHz to 18.8 GHz

Frequency Band (GHz)	ITU Allocation			Malaysian Allocation
	Region 1	Region 2	Region 3	
18.4-18.6	FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B MOBILE			FIXED MLA73 FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B **MOBILE**
18.6-18.8	EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile Space research (passive) 5.522A 5.522C	EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.522B MOBILE except aeronautical mobile **SPACE RESEARCH (passive)** **5.522A**	EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile Space research (passive) 5.522A	EARTH EXPLORATION-SATELLITE (passive) FIXED MLA73 FIXED-SATELLITE (space-to-Earth) 5.522B MOBILE except aeronautical mobile Space research (passive) **5.522A**

5.522 (SUP - WRC-2000)

5.522A The emissions of the fixed service and the fixed-satellite service in the band 18.6-18.8 GHz are limited to the values given in Nos. 21.5A and 21.16.2, respectively. (WRC-2000)

5.522B The use of the band 18.6-18.8 GHz by the fixed-satellite service is limited to geostationary systems and systems with an orbit of apogee greater than 20 000 km. (WRC-2000)

5.522C In the band 18.6-18.8 GHz, in Algeria, Saudi Arabia, Bahrain, Egypt, the United Arab Emirates, the Libyan Arab Jamahiriya, Jordan, Lebanon, Morocco, Oman, Qatar, the Syrian Arab Republic, Tunisia and Yemen, fixed-service systems in operation at the date of entry into force of the Final Acts of WRC-2000 are not subject to the limits of No. **21.5A**. (WRC-2000)

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18.8 GHz to 19.7 GHz

Frequency Band (GHz)	ITU Allocation			Malaysian Allocation
	Region 1	Region 2	Region 3	
18.8-19.3	FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.523A MOBILE			FIXED MLA73 FIXED-SATELLITE (space-to-Earth) 5.516B 5.523A **MOBILE**
19.3-19.7	FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.523B 5.523C 5.523D 5.523E MOBILE			FIXED MLA73 FIXED-SATELLITE (space-to-Earth) (Earth-to space) 5.523B 5.523C 5.523D 5.523E **MOBILE**

5.523A The use of the bands 18.8-19.3 GHz (space-to-Earth) and 28.6-29.1 GHz (Earth-to-space) by geostationary and non-geostationary fixed-satellite service networks is subject to the application of the provisions of No. **9.11A** and No. **22.2** does not apply. Administrations having geostationary-satellite networks under coordination prior to 18 November 1995 shall cooperate to the maximum extent possible to coordinate pursuant to No. **9.11A** with non-geostationary-satellite networks for which notification information has been received by the Bureau prior to that date, with a view to reaching results acceptable to all the parties concerned. Non-geostationary-satellite networks shall not cause unacceptable interference to geostationary fixed-satellite service networks for which complete Appendix **4** notification information is considered as having been received by the Bureau prior to 18 November 1995. (WRC-97)

5.523B The use of the band 19.3-19.6 GHz (Earth-to-space) by the fixed-satellite service is limited to feeder links for non-geostationary-satellite systems in the mobile-satellite service. Such use is subject to the application of the provisions of No. **9.11A**, and No. **22.2** does not apply.

5.523C No. **22.2** shall continue to apply in the bands 19.3-19.6 GHz and 29.1-29.4 GHz, between feeder links of non-geostationary mobile-satellite service networks and those fixed-satellite service networks for which complete Appendix **4** coordination information, or notification information, is considered as having been received by the Bureau prior to 18 November 1995. (WRC-97)

5.523D The use of the band 19.3-19.7 GHz (space-to-Earth) by geostationary fixed-satellite service systems and by feeder links for non-geostationary-satellite systems in the mobile-satellite service is subject to the application of the provisions of No. **9.11A**, but not subject to the provisions of No. **22.2**. The use of this band for other non-geostationary fixed-satellite service systems, or for the cases indicated in Nos. **5.523C** and **5.523E**, is not subject to the provisions of No. **9.11A** and shall continue to be subject to Articles **9** (except No. **9.11A**) and **11** procedures, and to the provisions of No. **22.2**. (WRC-97)

5.523E No. **22.2** shall continue to apply in the bands 19.6-19.7 GHz and 29.4-29.5 GHz, between feeder links of non-geostationary mobile-satellite service networks and those fixed-satellite service networks for which complete Appendix **4** coordination information, or notification information, is considered as having been received by the Bureau by 21 November 1997. (WRC-97)

MLA73 Standard Radio System Plan: Requirements for Line of sight Radio-Relay Systems Operating in the Fixed Service in the Frequency Band 17.70 GHz to 19.70 GHz

APPENDIX B: INTERFERENCE RESOLUTION PROCESS

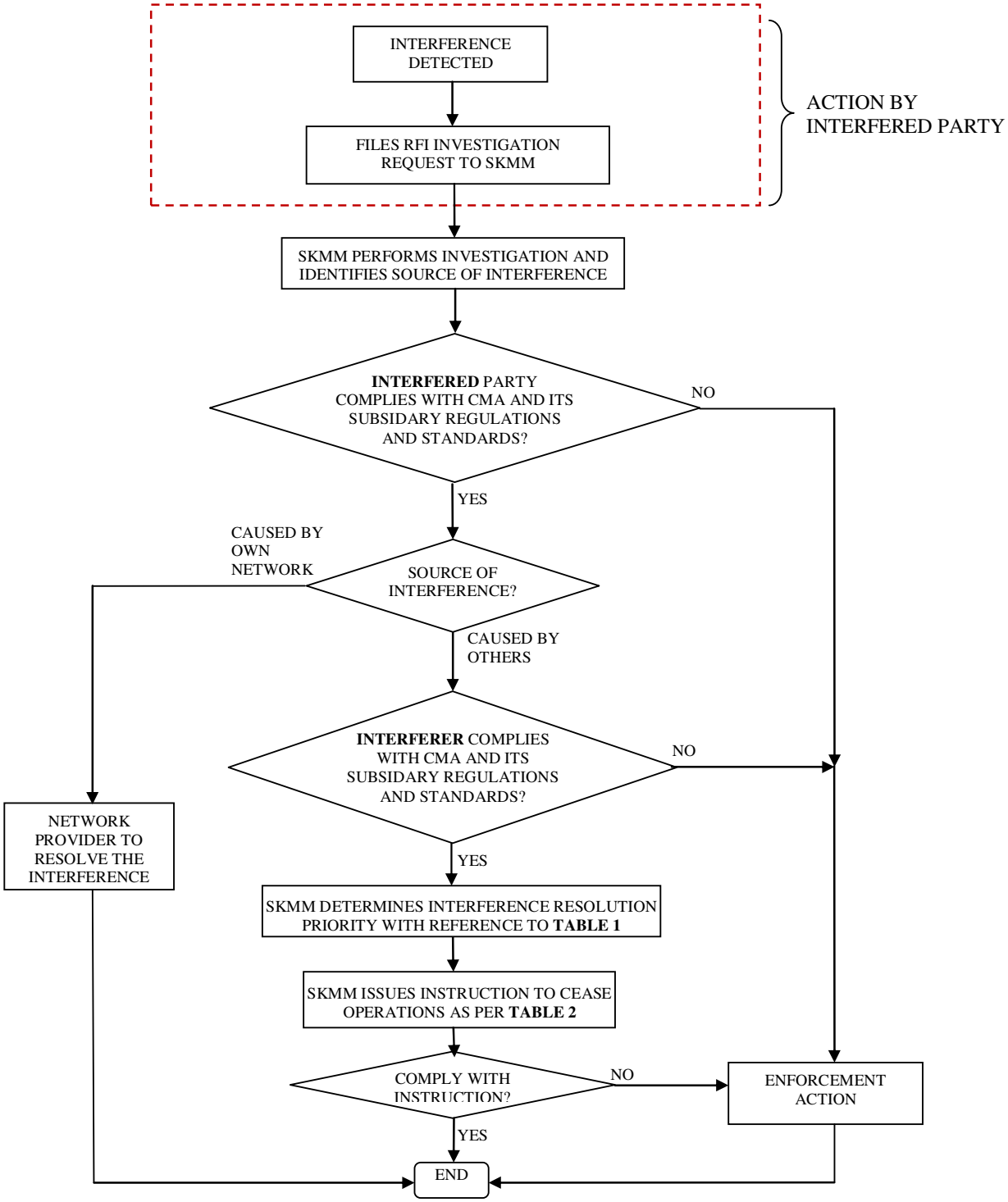

TABLE 1: INTERFERENCE RESOLUTION PRIORITY

	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): 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 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.