Standard Radio System Plan

REQUIREMENTS FOR DIGITAL TRUNKED RADIO SYSTEMS (DTRS) OPERATING IN THE FREQUENCY BAND OF 380 MHz TO 399.9 MHz

Suruhanjaya Komunikasi dan Multimedia Malaysia
Malaysian Communications and Multimedia Commission
Off Persiaran Multimedia,
63000 Cyberjaya, Selangor Darul Ehsan, Malaysia
Tel: +60 3 8688 8000 Fax: +60 3 8688 1005
Website: http://www.skmm.gov.my

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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 the Commission's website. (http://www.skmm.gov.my/skmmgovmy/files/attachments/SRSPGlossary.pdf)

REQUIREMENTS FOR DIGITAL TRUNKED RADIO SYSTEMS (DTRS) OPERATING IN THE FREQUENCY BAND OF 380 MHz TO 399.9 MHz

2.0 INTENT

2.1 In general, Standard Radio System Plan (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 plans, coordination initiatives in order to maximise the utilisation, minimise radio frequency interference and optimise the usage of the spectrum. It is intended to regulate the usage of spectrum and does not attempt to establish any detailed equipment standards.

2.2 This SRSP states the requirements for the utilisation of the frequency band between 380 MHz to 399.9 MHz ("the said band") for Digital Trunked Radio Systems (DTRS) in Malaysia.

2.3 DTRS are two-way mobile radio systems consisting of mobile terminals, multiple-channel base stations and control stations. Trunking is the pooling of radio channels of a DTRS, whereby users have automatic access to all channels of the system. DTRS may also have roaming capabilities and permits Direct Mode Operation (DMO) between mobile terminals.

2.4 DTRS applications include transmission of voice, data, image, paging, short messaging, facsimile and PSTN interconnection for users such as transport companies, service and maintenance companies, airlines services and Government agencies. Users of these frequencies may be operators of private organisations/ corporation as well as government agencies. The operation of DTRS may be area based or of nation-wide roaming capabilities.

3.0 GENERAL

3.1 The technical characteristics of equipment used in DTRS shall conform to all applicable technical standards which may include the mandatory standards, technical codes, Malaysian standards, international standards, International Telecommunications Union (ITU) recommendations and its Radio Regulations as well as other standards as agreed and adopted by Malaysia.

3.2 The installation of all DTRS shall comply with safety rules as specified in the applicable Malaysian 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 the said 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.

3.5 The following is an overview of some DTRS technologies in the industry:

3.5.1 TETRA

TETRA (Terrestrial Trunked Radio) is a standard developed by the European Telecommunications Standards Institute (ETSI). The purpose of the TETRA standard is to meet the needs of various Professional Mobile Radio (PMR) user organizations. The first version of TETRA standard was published in 1995.

TETRA is based on a 4-slot TDMA (Time Division Multiple Access) with 25 KHz physical radio channel bandwidth. TETRA standard supports trunking mode and IP-based TETRA solutions are available.

TETRA 2 is the enhancement of the TETRA standard which provide improvement on data speed and voice codec. TETRA 2 has introduced TETRA Enhanced Data Service (TEDS) which offers higher data rates utilizing multiple bandwidths and modulation schemes. The TEDS offers 4 different RF channel bandwidths of 25 kHz, 50 kHz, 100 kHz and 150 kHz.

3.5.2 APCO-P25

APCO-P25 (Association of Public-Safety Communications Officials – Project 25) is a common standard for Digital Trunked Radio Systems used by public safety agencies in North America to enable them to communicate with other agencies and mutual aid response teams in emergencies.

APCO-P25 is based on FDMA (Frequency Division Multiple Access) capable of operating in 12.5 kHz and/or 25 kHz physical radio channel bandwidth. This standard allows backward compatibility with analogue systems and supports both trunked and conventional operation models. IP based APCO-P25 solutions are also available.

3.5.3 APCO-P25 Phase 2

The APCO-P25 standard (also known as APCO-P25 Phase 1) is further improved on spectrum efficiency with the development of APCO-P25 Phase 2 using 2-slot TDMA scheme.

3.5.4 NXDN

NXDN is a digital air interface protocol for mobile communication. It was developed jointly by Icom Incorporated and Kenwood Corporation. This standard is based on FDMA (Frequency Division Multiple Access) and defines both trunked and conventional modes of operation.

NXDN is a digital radio communications protocol using 4-Level FSK (4LFSK) modulation capable of fitting into both 12.5 kHz and 6.25 kHz physical radio channel bandwidth (9600 bps and 4800 bps respectively).

3.5.5 DMR

DMR (Digital Mobile Radio) is a standard developed by the European Telecommunications Standards Institute (ETSI) under its Electromagnetic compatibility and Radio spectrum Matters (ERM). The standard (ETSI TS 102 361) is based on a two-slot TDMA protocol. DMR applies TDMA method of spectral efficiency where 12.5 kHz channel will be divided into two equivalent time slots. The DMR design is capable to support trunked radio networks range from 12.5 kHz physical radio channel to wide area systems incorporating multiple physical radio channels extended over many radio sites. It provides a migration path from analogue to digital with its ability to operate in both analogue and digital modes.

4.0 CHANNELLING PLAN

4.1 This SRSP defines the said band providing a total bandwidth of 19.9 MHz for the DTRS.

4.2 The channel arrangements are divided into 4 pairs of frequency blocks (block A/A', block B/B', block C/C' and block D/D') with transmit/receive separation of 10 MHz. The blocks are each allocated with 99 channels, except for block D/D' which has 98 channels, that are arranged into 10 groups as shown in **Appendix B**.

4.3 The said band is channelized into 395 duplex channels (channel No.1 to channel No.395) with channel bandwidth of 25 kHz.

4.4 Channels shall be allotted according to the channel allotment plan in **Appendix C**. Assignment of channels for areas of operation near the borders with Brunei, Singapore, Indonesia and Thailand will be based on the regional frequency blocks allotted. However, all four regional blocks will be available for national use for the rest of the country. Block A/A', B/B', and C/C' will be for civilian use and block D/D' will be reserved for military use.

4.5 The channel allotment plan is designed to minimise inter-modulation and frequency interference problems by assigning co-sited channels that are 250 kHz apart. The frequency blocks A/A', B/B' and C/C' which contain 99 channels and D/D' which has 98 channels, are divided into ten of 10-channel groups viz. A01-A10, B01-B10, C01-C10 and D01-D10 respectively. Each 10-channel group (9 channels for group 10) is sub-divided into two 5-channel sub-groups.

4.6 Channels can be assigned for area or nationwide operation. Co-location assignments will be by sub-groups (or part thereof) of up to a maximum of ten channels within the same group per DTRS base/repeater station. The number of channels/groups assigned will be based on the service requirement of the operator and to be determined by the Commission.

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 frequency band.

5.2 Capacity enhancing techniques are continually being developed. This SRSP allows for the adoption of such techniques for more efficient use of spectrum, without reducing quality of service. Good cell-planning practice and frequency reuse should be adopted to maximise spectrum usage.

5.3 Maximum radiated power:

5.3.1 DTRS base station transmissions shall not exceed +27 dBW Effective Radiated Power (ERP);

5.3.2 On case to case basis, higher ERP may be permitted if acceptable technical justification is provided;

5.3.3 DTRS mobile station transmissions shall not exceed 25 W Effective Isotropic Radiated Power (EIRP). The mobile station shall comply with the technical specification set under "*Technical Specification for Land Mobile Radio Equipment*" and the Class Assignment ('CA'); and

5.3.4 Different ERP for DTRS base station transmission may be applied at the common border areas according to the agreement reached between Malaysia and the neighbouring countries.

5.4 Channel loading of DTRS should be such that the maximum use is made of the available spectrum while providing reasonable Grade of Service (GOS). This SRSP requires the loading of private systems to be such as to provide a GOS of not exceeding 5%.

5.5 The Erlang C model will be used as a guide to assess the channel needs of the applicant. This model is adopted as the reference as it assumes that the systems will queue a certain number of blocked calls. The GOS will be defined by specified delay, in messages lengths, such that the delayed calls will not exceed the specified delay with a probability P(t) of 0.05 (5%). That is, 95% of the calls placed will not be delayed by greater than the specified delay. An Erlang C table is provided in **Appendix D** for reference.

5.6 The GOS is critical for emergency services as well for local government agencies. The corresponding figure for public safety systems (e.g. police, ambulance and fire department) is 2.5%. However, the level of GOS may be changed if deemed necessary by the Commission based on specific service requirements.

5.7 The allocations of spectrum and shared services within the said band are found in the Spectrum Plan shown in **Appendix A**.

6.0 PRINCIPLES OF ASSIGNMENT

6.1 Authorisations to use the said band for the DTRS base station apparatus and the trunked radio access device are as follows:

6.1.1 Apparatus Assignment ('AA') for DTRS base station apparatus; and

6.1.2 Class Assignment ('CA') for trunked radio access device. The applicants are required to comply with any notification of CA issued pursuant to Section 169 of the Communications and Multimedia Act 1998 ('the Act') which confers rights on any person to use any frequency band or bands for the specified devices.

6.2 Eligible persons who may apply for the AA are private network facility (Government and private corporations/companies) for own and private use only.

6.3 Applicants are required to submit AA application for the apparatus on the prescribed AA form.

6.4 The AA for the said band shall be valid for a period of five (5) years or such lesser period as specified in the AA. AA holders may re-apply for a new assignment at least sixty (60) days before expiry date.

6.5 Issuance of an AA is also subject to successful co-ordination among assigned stations and with neighbouring countries where it applies.

6.6 The AA shall be assigned on a first come first served basis. In the event of unavailability of spectrum, applicants will be placed in the queue that will be reviewed periodically.

7.0 IMPLEMENTATION

7.1 This SRSP shall be effective from the date of issuance of this document.

8.0 COORDINATION REQUIREMENT

8.1 Use of these frequency bands shall require coordination with Malaysia's neighbouring countries within the coordination zones:

8.1.1 Within 50 kilometres of Malaysian border with FACSMAB (Frequency Assignment Committee of Singapore, Malaysia and Brunei Darussalam) member countries; and

8.1.2 Within 30 kilometres of the Malaysian border with Thailand.

8.2 The shared use of the said band between Brunei Darussalam, Malaysia, Singapore and Thailand for DTRS at the common border areas has been agreed as shown in **Appendix E** and **Appendix F**.

8.2.1 For Thailand, maximum permissible level of interference are as follows:

8.2.1.1 Signal strength of -85 dBm; measured at 5 km from the border at 1.5m above the ground level; and

8.2.1.2 C/I value of 18 dB.

8.3 In the event of any interference, the Commission will require the affected users to carry out an operator-to-operator coordination. In the event that the interference remained unsolved after 24 hours by the operators, the affected parties may escalate the matter to the Commission for a resolution. The Commission will determine the necessary modifications and schedule of modifications to resolve the interference. The Commission will be guided by the interference resolution process as shown in **Appendix G**.

9.0 REVOCATION

9.1 MCMC SRSP-519M, 18 August 2003 Issue 2 is hereby revoked.

10.0 REFERENCES

[1] SKMM WTS LMR Rev.1.01:2007

[2] UK Radio Interface Requirement 2004, Private Business Mobile Radio (TETRA)

[3] http://www.apcoinyl.org/frequency/project25/. Comprehensive APCO25 Information and Website

[4] ETSI Standard EN 300 394-1 v3.2.1 (2012-10)

[5] Recommendation ITU-R M.1808

Issued by:

Suruhanjaya Komunikasi dan Multimedia Malaysia
Malaysian Communications and Multimedia Commission

APPENDIX A: EXTRACT OF SPECTRUM PLAN

(This Appendix forms an integral part of the SRSP document)

Frequency Band (MHz)	ITU Allocations			Malaysian Allocations
	Region 1	**Region 2**	**Region 3**	
335.4-387	FIXED MOBILE 5.254			FIXED MOBILE MLA34 5.254 MLA3 MLA14 MLA84 MLA93
387-390	FIXED MOBILE Mobile-satellite (space-to-Earth) 5.208A 5.208B 5.254 5.255			FIXED MOBILE MLA34 Mobile-satellite (space-to-Earth) 5.208A 5.208B 5.254 5.255 MLA3 MLA14 MLA84 MLA93
390-399.9	FIXED MOBILE 5.254			FIXED MOBILE MLA34 5.254 MLA3 MLA14 MLA84 MLA93

5.208A In making assignments to space stations in the mobile-satellite service in the bands 137-138 MHz, 387-390 MHz and 400.15-401 MHz, administrations shall take all practicable steps to protect the radio astronomy service in the bands 150.05-153 MHz, 322-328.6 MHz, 406.1-410 MHz and 608-614 MHz from harmful interference from unwanted emissions. The threshold levels of interference detrimental to the radio astronomy service are shown in the relevant ITU-R Recommendation. (WRC-07)

5.208B* In the bands:
137-138 MHz,
387-390 MHz,
400.15-401 MHz,
1 452-1 492 MHz,
1 525-1 610 MHz,
1 613.8-1 626.5 MHz,
2 655-2 690 MHz,
21.4-22 GHz,
Resolution 739 (Rev.WRC-07) applies. (WRC-07)

5.209 The use of the bands 137-138 MHz, 148-150.05 MHz, 399.9-400.05 MHz, 400.15-401 MHz, 454-456 MHz and 459-460 MHz by the mobile-satellite service is limited to non-geostationary-satellite systems. (WRC-97)

5.220 The use of the bands 149.9-150.05 MHz and 399.9-400.05 MHz by the mobile-satellite service is subject to coordination under No. 9.11A. The mobile-satellite service shall not constrain the development and use of the radionavigation-satellite service in the bands 149.9-150.05 MHz and 399.9-400.05 MHz. (WRC-97)

5.222 Emissions of the radionavigation-satellite service in the bands 149.9-150.05 MHz and 399.9-400.05 MHz may also be used by receiving earth stations of the space research service.

5.224A The use of the bands 149.9-150.05 MHz and 399.9-400.05 MHz by the mobile-satellite service (Earth-to-space) is limited to the land mobile-satellite service (Earth-to-space) until 1 January 2015. (WRC-97)

5.224B The allocation of the bands 149.9-150.05 MHz and 399.9-400.05 MHz to the radionavigation-satellite service shall be effective until 1 January 2015. (WRC-97)

5.254 The bands 235-322 MHz and 335.4-399.9 MHz may be used by the mobile-satellite service, subject to agreement obtained under No. 9.21, on condition that stations in this service do not cause harmful interference to those of other services operating or planned to be operated in accordance with the Table of Frequency Allocations except for the additional allocation made in footnote No. 5.256A. (WRC-03)

5.255 The bands 312-315 MHz (Earth-to-space) and 387-390 MHz (space-to-Earth) in the mobile-satellite service may also be used by non-geostationary-satellite systems. Such use is subject to coordination under No. 9.11A.

5.260 Recognizing that the use of the band 399.9-400.05 MHz by the fixed and mobile services may cause harmful interference to the radionavigation satellite service, administrations are urged not to authorize such use in application of No. 4.4.

MLA3 Notification of Issuance of Class Assignment.

MLA14 The following frequency bands are exclusively use by the Government of Malaysia:

30 kHz to 70 kHz;	70 kHz to 90 kHz;
110 kHz to 160 kHz;	1985 kHz to 3000 kHz;
3025 kHz to 3155 kHz;	4700 kHz to 4750 kHz;
5680 kHz to 5730 kHz;	6685 kHz to 6765 kHz;
8965 kHz to 9040 kHz;	11175 kHz to 11275 kHz;
13200 kHz to 13260 kHz;	13360 kHz to 13410 kHz;
14500 kHz to 14900 kHz,	15010 kHz to 15100 kHz;
17970 kHz to 18030 kHz;	23200 kHz to 23350 kHz;
25550 kHz to 25670 kHz;	30.010 MHz to 37.500 MHz;
41.015 MHz to 44.000 MHz;	44.000 MHz to 47.000 MHz;
47.000 MHz to 50.000 MHz;	54.000 MHz to 68.000 MHz;
72.800 MHz to 74.800 MHz;	75.200 MHz to 75.400 MHz;
75.400 MHz to 87.000 MHz;	165.000 MHz to 167.000 MHz
170.000 MHz to 172.000 MHz,	230.000 MHz to 235.000 MHz;
235.000 MHz to 267.000 MHz;	267.000 MHz to 272.000 MHz;
272.000 MHz to 273.000 MHz;	273.000 MHz to 312.000 MHz;
312.000 MHz to 315.000 MHz;	315.000 MHz to 322.000 MHz;
322.000 MHz to 328.600 MHz;	335.400 MHz to 380.000 MHz;
380.000 MHz to 399.900 MHz;	444.000 MHz to 445.000 MHz
449.000 MHz to 450.000 MHz,	457.000 MHz to 458.000 MHz;
458.000 MHz to 459.000 MHz;	467.000 MHz to 468.000 MHz;

468.000 MHz to 469.000 MHz; 798.000 MHz to 806.000 MHz;
960.000 MHz to 1215.000 MHz; 1400.000 MHz to 1427.000 MHz;
2040.000 MHz to 2096.000 MHz 2035.000 MHz to 2036.000 MHz
2232.000 MHz to 2233.000 MHz; 2700.000 MHz to 2900.000 MHz;
2900.000 MHz to 3100.000 MHz; 3100.000 MHz to 3300.000 MHz;
3300.000 MHz to 3400.000 MHz; 4940.000 MHz to 4990.000 MHz;
5460.000 MHz to 5470.000 MHz; 5470.000 MHz to 5650.000 MHz;
8146.000 MHz to 8275.000 MHz; 9500.000 MHz to 9800.000 MHz;
9800.000 MHz to 10000.000 MHz.

MLA34 Standard Radio System Plan 519M: Requirements for Digital Trunk Radio Service (DTRS) Operating in the Frequency Band 380 MHz to 400 MHz.

MLA84 The following bands have been identified for Public Protection and Disaster Relief (PPDR) use in Malaysia:
380 MHz to 400 MHz;
816 MHz to 821 MHz / 861 MHz to 866 MHz;
4940 MHz to 4990 MHz

MLA93 Technical Specification for Land Mobile Radio Equipment (SKMM WTS LMR)

APPENDIX B: CHANNELLING PLAN (25 kHz)

Ch. No	1	11	21	31	41	51	61	71	81	91
Base Rx	380.025	380.275	380.525	380.775	381.025	381.275	381.525	381.775	382.025	382.275
Base Tx	390.025	390.275	390.525	390.775	391.025	391.275	391.525	391.775	392.025	392.275
	DMO	GROUP A01								

Ch. No	2	12	22	32	42	52	62	72	82	92
Base Rx	380.050	380.300	380.550	380.800	381.050	381.300	381.550	381.800	382.050	382.300
Base Tx	390.050	390.300	390.550	390.800	391.050	391.300	391.550	391.800	392.050	392.300
	DMO	GROUP A02								

Ch. No	3	13	23	33	43	53	63	73	83	93
Base Rx	380.075	380.325	380.575	380.825	381.075	381.325	381.575	381.825	382.075	382.325
Base Tx	390.075	390.325	390.575	390.825	391.075	391.325	391.575	391.825	392.075	392.325
	DMO	GROUP A03								

Ch. No	4	14	24	34	44	54	64	74	84	94
Base Rx	380.100	380.350	380.600	380.850	381.100	381.350	381.600	381.850	382.100	382.350
Base Tx	390.100	390.350	390.600	390.850	391.100	391.350	391.600	391.850	392.100	392.350
	DMO	GROUP A04								

Ch. No	5	15	25	35	45	55	65	75	85	95
Base Rx	380.125	380.375	380.625	380.875	381.125	381.375	381.625	381.875	382.125	382.375
Base Tx	390.125	390.375	390.625	390.875	391.125	391.375	391.625	391.875	392.125	392.375
	DMO	GROUP A05								

Ch. No	6	16	26	36	46	56	66	76	86	96
Base Rx	380.150	380.400	380.650	380.900	381.150	381.400	381.650	381.900	382.150	382.400
Base Tx	390.150	390.400	390.650	390.900	391.150	391.400	391.650	391.900	392.150	392.400
	DMO	GROUP A06								

Ch. No	7	17	27	37	47	57	67	77	87	97
Base Rx	380.175	380.425	380.675	380.925	381.175	381.425	381.675	381.925	382.175	382.425
Base Tx	390.175	390.425	390.675	390.925	391.175	391.425	391.675	391.925	392.175	392.425
	DMO	GROUP A07								

Ch. No	8	18	28	38	48	58	68	78	88	98
Base Rx	380.200	380.450	380.700	380.950	381.200	381.450	381.700	381.950	382.200	382.450
Base Tx	390.200	390.450	390.700	390.950	391.200	391.450	391.700	391.950	392.200	392.450
	DMO	GROUP A08								

Ch. No	9	19	29	39	49	59	69	79	89	99
Base Rx	380.225	380.475	380.725	380.975	381.225	381.475	381.725	381.975	382.225	382.475
Base Tx	390.225	390.475	390.725	390.975	391.225	391.475	391.725	391.975	392.225	392.475
	DMO	GROUP A09								

Ch. No	10	20	30	40	50	60	70	80	90	
Base Rx	380.250	380.500	380.750	381.000	381.250	381.500	381.750	382.000	382.250	
Base Tx	390.250	390.500	390.750	391.000	391.250	391.500	391.750	392.000	392.250	
	DMO	GROUP A10								

Ch. No	100	110	120	130	140	150	160	170	180	190
Base Rx	382.500	382.750	383.000	383.250	383.500	383.750	384.000	384.250	384.500	384.750
Base Tx	392.500	392.750	393.000	393.250	393.500	393.750	394.000	394.250	394.500	394.750
	DMO	GROUP B01								

Ch. No	101	111	121	131	141	151	161	171	181	191
Base Rx	382.525	382.775	383.025	383.275	383.525	383.775	384.025	384.275	384.525	384.775
Base Tx	392.525	392.775	393.025	393.275	393.525	393.775	394.025	394.275	394.525	394.775
	DMO	GROUP B02								

Ch. No	102	112	122	132	142	152	162	172	182	192
Base Rx	382.550	382.800	383.050	383.300	383.550	383.800	384.050	384.300	384.550	384.800
Base Tx	392.550	392.800	393.050	393.300	393.550	393.800	394.050	394.300	394.550	394.800
	DMO	GROUP B03								

Ch. No	103	113	123	133	143	153	163	173	183	193
Base Rx	382.575	382.825	383.075	383.325	383.575	383.825	384.075	384.325	384.575	384.825
Base Tx	392.575	392.825	393.075	393.325	393.575	393.825	394.075	394.325	394.575	394.825
	DMO	GROUP B04								

Ch. No	104	114	124	134	144	154	164	174	184	194
Base Rx	382.600	382.850	383.100	383.350	383.600	383.850	384.100	384.350	384.600	384.850
Base Tx	392.600	392.850	393.100	393.350	393.600	393.850	394.100	394.350	394.600	394.850
	DMO	GROUP B05								

Ch. No	105	115	125	135	145	155	165	175	185	195
Base Rx	382.625	382.875	383.125	383.375	383.625	383.875	384.125	384.375	384.625	384.875
Base Tx	392.625	392.875	393.125	393.375	393.625	393.875	394.125	394.375	394.625	394.875
	DMO	GROUP B06								

Ch. No	106	116	126	136	146	156	166	176	186	196
Base Rx	382.650	382.900	383.150	383.400	383.650	383.900	384.150	384.400	384.650	384.900
Base Tx	392.650	392.900	393.150	393.400	393.650	393.900	394.150	394.400	394.650	394.900
	DMO	GROUP B07								

Ch. No	107	117	127	137	147	157	167	177	187	197
Base Rx	382.675	382.925	383.175	383.425	383.675	383.925	384.175	384.425	384.675	384.925
Base Tx	392.675	392.925	393.175	393.425	393.675	393.925	394.175	394.425	394.675	394.925
	DMO	GROUP B08								

Ch. No	108	118	128	138	148	158	168	178	188	198
Base Rx	382.700	382.950	383.200	383.450	383.700	383.950	384.200	384.450	384.700	384.950
Base Tx	392.700	392.950	393.200	393.450	393.700	393.950	394.200	394.450	394.700	394.950
	DMO	GROUP B09								

Ch. No	109	119	129	139	149	159	169	179	189	
Base Rx	382.725	382.975	383.225	383.475	383.725	383.975	384.225	384.475	384.725	
Base Tx	392.725	392.975	393.225	393.475	393.725	393.975	394.225	394.475	394.725	
	DMO	GROUP B10								

Ch. No	199	209	219	229	239	249	259	269	279	289
Base Rx	384.975	385.225	385.475	385.725	385.975	386.225	386.475	386.725	386.975	387.225
Base Tx	394.975	395.225	395.475	395.725	395.975	396.225	396.475	396.725	396.975	397.225
	DMO	GROUP C01								

Ch. No	200	210	220	230	240	250	260	270	280	290
Base Rx	385.000	385.250	385.500	385.750	386.000	386.250	386.500	386.750	387.000	387.250
Base Tx	395.000	395.250	395.500	395.750	396.000	396.250	396.500	396.750	397.000	397.250
	DMO	GROUP C02								

Ch. No	201	211	221	231	241	251	261	271	281	291
Base Rx	385.025	385.275	385.525	385.775	386.025	386.275	386.525	386.775	387.025	387.275
Base Tx	395.025	395.275	395.525	395.775	396.025	396.275	396.525	396.775	397.025	397.275
	DMO	GROUP C03								

Ch. No	202	212	222	232	242	252	262	272	282	292
Base Rx	385.050	385.300	385.550	385.800	386.050	386.300	386.550	386.800	387.050	387.300
Base Tx	395.050	395.300	395.550	395.800	396.050	396.300	396.550	396.800	397.050	397.300
	DMO	GROUP C04								

Ch. No	203	213	223	233	243	253	263	273	283	293
Base Rx	385.075	385.325	385.575	385.825	386.075	386.325	386.575	386.825	387.075	387.325
Base Tx	395.075	395.325	395.575	395.825	396.075	396.325	396.575	396.825	397.075	397.325
	DMO	GROUP C05								

Ch. No	204	214	224	234	244	254	264	274	284	294
Base Rx	385.100	385.350	385.600	385.850	386.100	386.350	386.600	386.850	387.100	387.350
Base Tx	395.100	395.350	395.600	395.850	396.100	396.350	396.600	396.850	397.100	397.350
	DMO	GROUP C06								

Ch. No	205	215	225	235	245	255	265	275	285	295
Base Rx	385.125	385.375	385.625	385.875	386.125	386.375	386.625	386.875	387.125	387.375
Base Tx	395.125	395.375	395.625	395.875	396.125	396.375	396.625	396.875	397.125	397.375
	DMO	GROUP C07								

Ch. No	206	216	226	236	246	256	266	276	286	296
Base Rx	385.150	385.400	385.650	385.900	386.150	386.400	386.650	386.900	387.150	387.400
Base Tx	395.150	395.400	395.650	395.900	396.150	396.400	396.650	396.900	397.150	397.400
	DMO	GROUP C08								

Ch. No	207	217	227	237	247	257	267	277	287	297
Base Rx	385.175	385.425	385.675	385.925	386.175	386.425	386.675	386.925	387.175	387.425
Base Tx	395.175	395.425	395.675	395.925	396.175	396.425	396.675	396.925	397.175	397.425
	DMO	GROUP C09								

Ch. No	208	218	228	238	248	258	268	278	288	
Base Rx	385.200	385.450	385.700	385.950	386.200	386.450	386.700	386.950	387.200	
Base Tx	395.200	395.450	395.700	395.950	396.200	396.450	396.700	396.950	397.200	
	DMO	GROUP C10								

Ch. No	298	308	318	328	338	348	358	368	378	388
Base Rx	387.450	387.700	387.950	388.200	388.450	388.700	388.950	389.200	389.450	389.700
Base Tx	397.450	397.700	397.950	398.200	398.450	398.700	398.950	399.200	399.450	399.700
	DMO	GROUP D01								

Ch. No	299	309	319	329	339	349	359	369	379	389
Base Rx	387.475	387.725	387.975	388.225	388.475	388.725	388.975	389.225	389.475	389.725
Base Tx	397.475	397.725	397.975	398.225	398.475	398.725	398.975	399.225	399.475	399.725
	DMO	GROUP D02								

Ch. No	300	310	320	330	340	350	360	370	380	390
Base Rx	387.500	387.750	388.000	388.250	388.500	388.750	389.000	389.250	389.500	389.750
Base Tx	397.500	397.750	398.000	398.250	398.500	398.750	399.000	399.250	399.500	399.750
	DMO	GROUP D03								

Ch. No	301	311	321	331	341	351	361	371	381	391
Base Rx	387.525	387.775	388.025	388.275	388.525	388.775	389.025	389.275	389.525	389.775
Base Tx	397.525	397.775	398.025	398.275	398.525	398.775	399.025	399.275	399.525	399.775
	DMO	GROUP D04								

Ch. No	302	312	322	332	342	352	362	372	382	392
Base Rx	387.550	387.800	388.050	388.300	388.550	388.800	389.050	389.300	389.550	389.800
Base Tx	397.550	397.800	398.050	398.300	398.550	398.800	399.050	399.300	399.550	399.800
	DMO	GROUP D05								

Ch. No	303	313	323	333	343	353	363	373	383	393
Base Rx	387.575	387.825	388.075	388.325	388.575	388.825	389.075	389.325	389.575	389.825
Base Tx	397.575	397.825	398.075	398.325	398.575	398.825	399.075	399.325	399.575	399.825
	DMO	GROUP D06								

Ch. No	304	314	324	334	344	354	364	374	384	394
Base Rx	387.600	387.850	388.100	388.350	388.600	388.850	389.100	389.350	389.600	389.850
Base Tx	397.600	397.850	398.100	398.350	398.600	398.850	399.100	399.350	399.600	399.850
	DMO	GROUP D07								

Ch. No	305	315	325	335	345	355	365	375	385	395
Base Rx	387.625	387.875	388.125	388.375	388.625	388.875	389.125	389.375	389.625	389.875
Base Tx	397.625	397.875	398.125	398.375	398.625	398.875	399.125	399.375	399.625	399.875
	DMO	GROUP D08								

Ch. No	306	316	326	336	346	356	366	376	386	
Base Rx	387.650	387.900	388.150	388.400	388.650	388.900	389.150	389.400	389.650	
Base Tx	397.650	397.900	398.150	398.400	398.650	398.900	399.150	399.400	399.650	
	DMO	GROUP D09								

Ch. No	307	317	327	337	347	357	367	377	387	
Base Rx	387.675	387.925	388.175	388.425	388.675	388.925	389.175	389.425	389.675	
Base Tx	397.675	397.925	398.175	398.425	398.675	398.925	399.175	399.425	399.675	
	DMO	GROUP D10								

APPENDIX C : CHANNELLING ALLOTMENT PLAN (25 kHz)

BLOCK A						BLOCK B						BLOCK C						BLOCK D					
Group	Channel No.					Group	Channel No.					Group	Channel No.					Group	Channel No.				
A01	1	21	41	61	81	B01	100	120	140	160	180	C01	199	219	239	259	279	D01	298	318	338	358	378
	11	31	51	71	91		110	130	150	170	190		209	229	249	269	289		308	328	348	368	388
A02	2	22	42	62	82	B02	101	121	141	161	181	C02	200	220	240	260	280	D02	299	319	339	359	379
	12	32	52	72	92		111	131	151	171	191		210	230	250	270	290		309	329	349	369	389
A03	3	23	43	63	83	B03	102	122	142	162	182	C03	201	221	241	261	281	D03	300	320	340	360	380
	13	33	53	73	93		112	132	152	172	192		211	231	251	271	291		310	330	350	370	390
A04	4	24	44	64	84	B04	103	123	143	163	183	C04	202	222	242	262	282	D04	301	321	341	361	381
	14	34	54	74	94		113	133	153	173	193		212	232	252	272	292		311	331	351	371	391
A05	5	25	45	65	85	B05	104	124	144	164	184	C05	203	223	243	263	283	D05	302	322	342	362	382
	15	35	55	75	95		114	134	154	174	194		213	233	253	273	293		312	332	352	372	392
A06	6	26	46	66	86	B06	105	125	145	165	185	C06	204	224	244	264	284	D06	303	323	343	363	383
	16	36	56	76	96		115	135	155	175	195		214	234	254	274	294		313	333	353	373	393
A07	7	27	47	67	87	B07	106	126	146	166	186	C07	205	225	245	265	285	D07	304	324	344	364	384
	17	37	57	77	97		116	136	156	176	196		215	235	255	275	295		314	334	354	374	394
A08	8	28	48	68	88	B08	107	127	147	167	187	C08	206	226	246	266	286	D08	305	325	345	365	385
	18	38	58	78	98		117	137	157	177	197		216	236	256	276	296		315	335	355	375	395
A09	9	29	49	69	89	B09	108	128	148	168	188	C09	207	227	247	267	287	D09	306	326	346	366	386
	19	39	59	79	99		118	138	158	178	198		217	237	257	277	297		316	336	356	376	
A10	10	30	50	70	90	B10	109	129	149	169	189	C10	208	228	248	268	288	D10	307	327	347	367	387
	20	40	60	80			119	139	159	179			218	238	258	278			317	337	357	377	

Note: Block B is available for civilian use in the areas bordering Brunei and Singapore
Block A, B, and C are also available for civilian use for the rest of Malaysia
Block D is reserved for Military use throughout Malaysia

APPENDIX D: ERLANG C TABLE

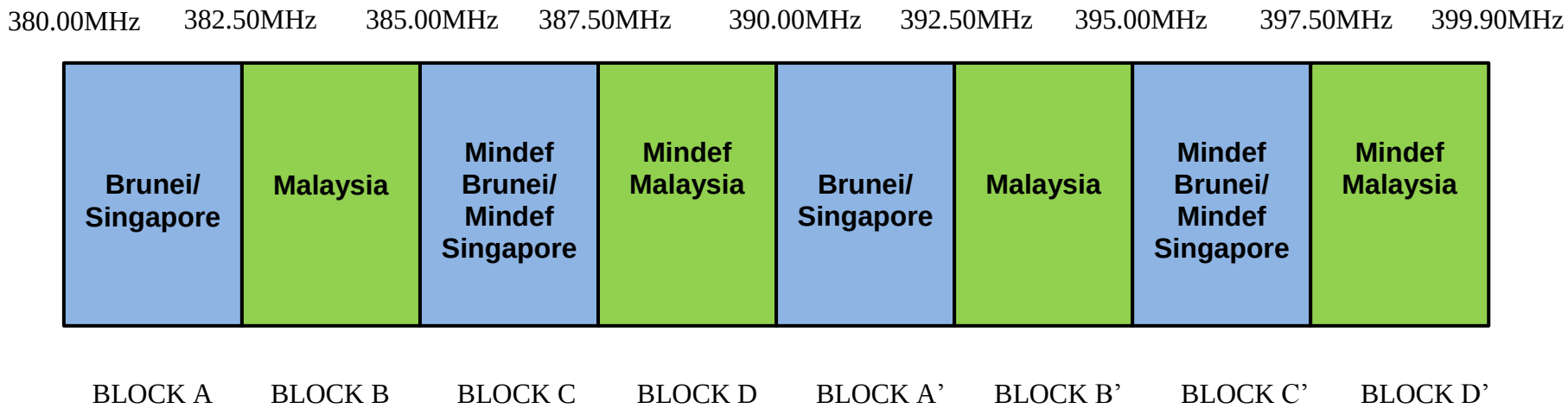
Maximum Offered Load versus B and N
B is in %

N/B	0.01	0.05	0.1	0.5	1	2	5	10	15	20	30	40
1	0.0001	0.0005	0.0010	0.0050	0.0100	0.0200	0.0500	0.1000	0.1500	0.2000	0.3000	0.4000
2	0.0142	0.0319	0.0452	0.1025	0.1465	0.2103	0.3422	0.5000	0.6278	0.7403	0.9390	1.1170
3	0.0860	0.1490	0.1894	0.3339	0.4291	0.5545	0.7876	1.0400	1.2310	1.3930	1.6670	1.9030
4	0.2310	0.3533	0.4257	0.6641	0.8100	0.9939	1.3190	1.6530	1.8990	2.1020	2.4400	2.7250
5	0.4428	0.6289	0.7342	1.0650	1.2590	1.4970	1.9050	2.3130	2.6070	2.8470	3.2410	3.5690
6	0.7110	0.9616	1.0990	1.5190	1.7580	2.0470	2.5320	3.0070	3.3440	3.6170	4.0620	4.4280
7	1.0260	1.3410	1.5100	2.0140	2.2970	2.6330	3.1880	3.7250	4.1030	4.4060	4.8970	5.2980
8	1.3820	1.7580	1.9580	2.5430	2.8660	3.2460	3.8690	4.4630	4.8780	5.2100	5.7440	6.1780
9	1.7710	2.2080	2.4360	3.1000	3.4600	3.8830	4.5690	5.2180	5.6680	6.0270	6.6000	7.0650
10	2.1890	2.6850	2.9420	3.6790	4.0770	4.5400	5.2850	5.9860	6.4690	6.8530	7.4650	7.9590
11	2.6340	3.1860	3.4700	4.2790	4.7120	5.2130	6.0150	6.7650	7.2800	7.6880	8.3360	8.8570
12	3.1000	3.7080	4.0180	4.8960	5.3630	5.9010	6.7580	7.5540	8.0990	8.5300	9.2120	9.7610
13	3.5870	4.2480	4.5840	5.5290	6.0280	6.6020	7.5110	8.3520	8.9260	9.3790	10.09	10.67
14	4.0920	4.8050	5.1660	6.1750	6.7050	7.3130	8.2730	9.1580	9.7600	10.230	10.980	11.580
15	4.6140	5.3770	5.7620	6.8330	7.3940	8.0350	9.0440	9.9700	10.600	11.090	11.870	12.490
16	5.1500	5.9620	6.3710	7.5020	8.0930	8.7660	9.8220	10.790	11.440	11.960	12.770	13.410
17	5.6990	6.5600	6.9910	8.1820	8.8010	9.5050	10.610	11.610	12.290	12.830	13.660	14.330
18	6.2610	7.1690	7.6220	8.8710	9.5180	10.250	11.400	12.440	13.150	13.700	14.560	15.250
19	6.8350	7.7880	8.2630	9.5680	10.240	11.010	12.200	13.280	14.010	14.580	15.470	16.180
20	7.4190	8.4170	8.9140	10.270	10.970	11.770	13.000	14.120	14.870	15.450	16.370	17.100
21	8.0130	9.0550	9.5720	10.990	11.710	12.530	13.810	14.960	15.730	16.340	17.280	18.030
22	8.6160	9.7020	10.240	11.700	12.460	13.300	14.620	15.810	16.600	17.220	18.190	18.960
23	9.2280	10.360	10.910	12.430	13.210	14.080	15.430	16.650	17.470	18.110	19.100	19.890
24	9.8480	11.020	11.590	13.160	13.960	14.860	16.250	17.510	18.350	19.000	20.020	20.820
25	10.480	11.690	12.280	13.900	14.720	15.650	17.080	18.360	19.220	19.890	20.930	21.760
26	11.110	12.360	12.970	14.640	15.490	16.440	17.910	19.220	20.100	20.790	21.850	22.690
27	11.750	13.040	13.670	15.380	16.260	17.230	18.740	20.080	20.980	21.680	22.770	23.630
28	12.400	13.730	14.380	16.140	17.030	18.030	19.570	20.950	21.870	22.580	23.690	24.570
29	13.050	14.420	15.090	16.890	17.810	18.830	20.410	21.820	22.750	23.480	24.610	25.500
30	13.710	15.120	15.800	17.650	18.590	19.640	21.250	22.680	23.640	24.380	25.540	26.440
31	14.380	15.820	16.520	18.420	19.370	20.450	22.090	23.560	24.530	25.290	26.460	27.380
32	15.050	16.530	17.250	19.180	20.160	21.260	22.930	24.430	25.420	26.190	27.390	28.330
33	15.720	17.240	17.970	19.950	20.950	22.070	23.780	25.300	26.320	27.100	28.310	29.270
34	16.400	17.950	18.710	20.730	21.750	22.890	24.630	26.180	27.210	28.010	29.240	30.210
35	17.090	18.670	19.440	21.510	22.550	23.710	25.480	27.060	28.110	28.920	30.170	31.160
36	17.780	19.390	20.180	22.290	23.350	24.530	26.340	27.940	29.000	29.830	31.100	32.100
37	18.470	20.120	20.920	23.070	24.150	25.360	27.190	28.820	29.900	30.740	32.030	33.050
38	19.170	20.850	21.670	23.860	24.960	26.180	28.050	29.710	30.800	31.650	32.970	34.000
39	19.870	21.590	22.420	24.650	25.770	27.010	28.910	30.590	31.710	32.570	33.900	34.940
40	20.580	22.330	23.170	25.440	26.580	27.840	29.770	31.480	32.610	33.480	34.830	35.890
41	21.280	23.070	23.930	26.230	27.390	28.680	30.630	32.370	33.510	34.400	35.770	36.840
42	22.000	23.810	24.690	27.030	28.210	29.510	31.500	33.260	34.420	35.320	36.700	37.790
43	22.710	24.560	25.450	27.830	29.020	30.350	32.360	34.150	35.330	36.230	37.640	38.740

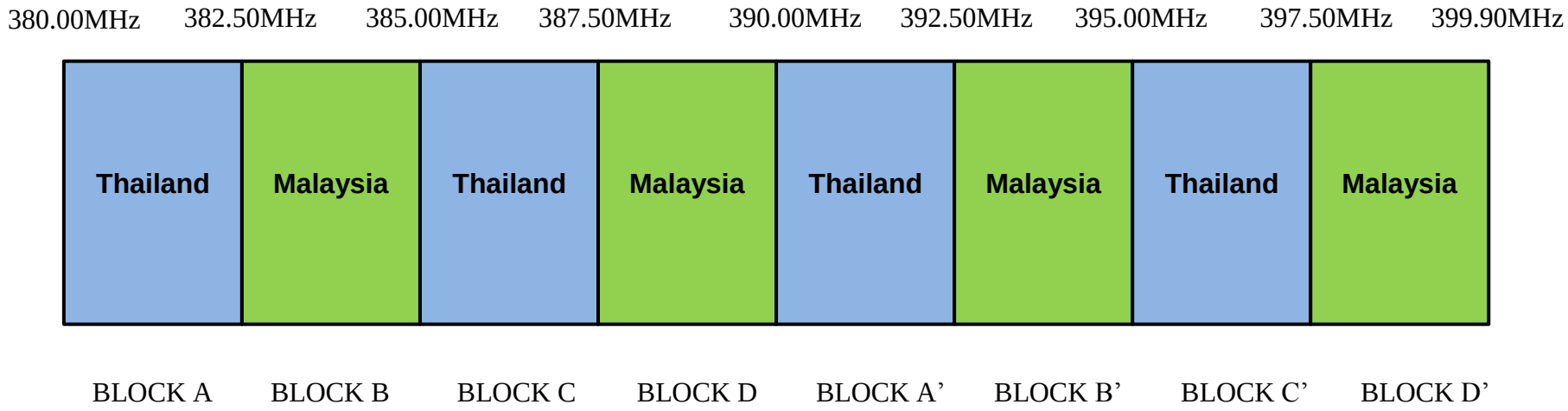
N/B	0.01	0.05	0.1	0.5	1	2	5	10	15	20	30	40
44	23.430	25.310	26.220	28.630	29.840	31.190	33.230	35.040	36.230	37.150	38.580	39.690
45	24.150	26.060	26.980	29.440	30.670	32.030	34.100	35.930	37.140	38.070	39.510	40.640
46	24.880	26.820	27.750	30.240	31.490	32.870	34.970	36.830	38.050	39.000	40.450	41.590
47	25.600	27.570	28.520	31.050	32.320	33.720	35.840	37.720	38.960	39.920	41.390	42.540
48	26.340	28.330	29.300	31.860	33.140	34.560	36.720	38.620	39.870	40.840	42.330	43.500
49	27.070	29.100	30.080	32.680	33.970	35.410	37.590	39.520	40.790	41.760	43.270	44.450
50	27.800	29.860	30.860	33.490	34.800	36.260	38.470	40.420	41.700	4?,69	44.210	45.400
51	28.540	30.630	31.640	34.310	35.640	37.110	39.350	41.320	42.610	43.610	45.150	46.360
52	29.280	31.400	32.420	35.120	36.470	37.970	40.230	42.220	43.530	44.540	46.100	47.310
53	30.030	32.170	33.210	35.940	37.310	38.820	41.100	43.120	44.440	45.470	47.040	48.270
54	30.770	32.950	33.990	36.760	38.150	39.670	41.990	44.020	45.360	46.390	47.980	49.220
55	31.520	33.720	34.780	37.590	38.990	40.530	42.870	44.930	46.280	47.320	48.930	50.180
56	32.270	34.500	35.570	38.410	39.830	41.390	43.750	45.830	47.200	48.250	49.870	51.130
57	33.030	35.280	36.370	39.240	40.670	42.250	44.640	46.740	48.120	49.180	50.820	52.090
58	33.780	36.060	37.160	40.070	41.510	43.110	45.520	47.640	49.040	50.110	51.760	53.050
59	34.540	36.850	37.960	40.900	42.360	43.970	46.410	48.550	49.960	51.040	52.710	54.010
60	35.300	37.630	38.760	41.730	43.200	44.830	47.290	49.460	50.880	51.970	53.650	54.960
61	36.060	38.420	39.560	42.560	44.050	45.700	48.180	50.370	51.800	52.900	54.600	55.920
62	36.820	39.210	40.360	43.390	44.900	46.560	49.070	51.270	52.720	53.830	55.550	56.880
63	37.590	40.000	41.160	44.230	45.750	47.430	49.960	52.180	53.640	54.770	56.490	57.840
64	38.350	40.800	41.970	45.060	46.600	48.300	50.850	53.100	54.570	55.700	57.440	58.800
65	39.120	41.590	42.780	45.900	47.450	49.160	51.740	54.010	55.490	56.630	58.390	59.760
66	39.890	42.390	43.580	46.740	48.300	50.030	52.640	54.920	56.420	57.570	59.340	60.720
67	40.660	43.180	44.390	47.580	49.160	50.900	53.530	55.830	57.340	58.500	60.290	61.680
68	41.440	43.980	45.200	48.420	50.010	51.770	54.420	56.750	58.270	59.440	61.240	62.640
69	42.210	44.780	46.020	49.260	50.870	52.650	55.320	57.660	59.200	60.370	62.190	63.600
70	42.990	45.580	46.830	50.100	51.730	53.520	56.210	58.570	60.120	61.310	63.140	64.560
71	43.770	46.390	47.640	50.950	52.590	54.390	57.110	59.490	61.050	62.250	64.090	65.520
72	44.550	47.190	48.460	51.790	53.450	55.270	58.010	60.410	61.980	63.180	65.040	66.480
73	45.330	48.000	49.280	52.640	54.310	56.140	58.900	61.320	62.910	64.120	65.990	67.440
74	46.110	48.810	50.100	53.490	55.170	57.020	59.800	62.240	63.840	65.060	66.940	68.400
75	46.900	49.610	50.920	54.340	56.030	57.900	60.700	63.160	64.760	66.000	67.890	69.370
76	47.680	50.420	51.740	55.190	56.890	58.780	61.600	64.070	65.690	66.940	68.850	70.330
77	48.470	51.230	52.560	56.040	57.760	59.650	62.500	64.990	66.630	67.880	69.800	71.290
78	49.260	52.050	53.380	56.890	58.620	60.530	63.400	65.910	67.560	68.820	70.750	72.250
79	50.050	52.860	54.210	57.740	59.490	61.410	64.300	66.830	68.490	69.760	71.700	73.220
80	50.840	53.680	55.030	58.600	60.360	62.300	65.210	67.750	69.420	70.700	72.660	74.180
81	51.630	54.490	55.860	59.450	61.220	63.180	66.110	68.670	70.350	71.640	73.610	75.140
82	52.430	55.310	56.690	60.300	62.090	64.060	67.010	69.590	71.280	72.580	74.570	76.110
83	53.220	56.130	57.520	61.160	62.960	64.940	67.920	70.520	72.220	73.520	75.520	77.070
84	54.020	56.950	58.350	62.020	63.830	65.830	68.820	71.440	73.150	74.460	76.470	78.040
85	54.810	57.770	59.180	62.880	64.700	66.710	69.730	72.360	74.080	75.400	77.430	79.000
86	55.610	58.590	60.010	63.730	65.570	67.600	70.630	73.280	75.020	76.350	78.380	79.970
87	56.410	59.410	60.840	64.590	66.450	68.480	71.540	74.210	75.950	77.290	79.340	80.930
88	57.210	60.230	61.670	65.450	67.320	69.370	72.450	75.130	76.890	78.230	80.300	81.900
89	58.020	61.060	62.510	66.320	68.190	70.260	73.350	76.060	77.820	79.180	81.250	82.860
90	58.820	61.880	63.340	67.180	69.070	71.150	74.260	76.980	78.760	80.120	82.210	83.830

N/B	0.01	0.05	0.1	0.5	1	2	5	10	15	20	30	40
91	59.620	62.710	64.180	68.040	69.940	72.040	75.170	77.910	79.690	81.060	83.160	84.790
92	60.430	63.540	65.020	68.900	70.820	72.920	76.080	78.830	80.630	82.010	84.120	85.760
93	61.230	64.360	65.860	69.770	71.700	73.810	76.990	79.760	81.570	82.950	85.080	86.730
94	62.040	65.190	66.700	70.630	72.570	74.710	77.900	80.690	82.500	83.900	86.030	87.690
95	62.850	66.020	67.540	71.500	73.450	75.600	78.810	81.610	83.440	84.840	86.990	88.660
96	63.660	66.850	68.380	72.360	74.330	76.490	79.720	82.540	84.380	85.790	87.950	89.620
97	64.470	67.690	69.220	73.230	75.210	77.380	80.630	83.470	85.320	86.740	88.910	90.590
98	65.280	68.520	70.060	74.100	76.090	78.270	81.540	84.390	86.260	87.680	89.870	91.560
99	66.090	69.350	70.900	74.970	76.970	79.170	82.460	85.320	87.200	88.630	90.820	92.530
100	66.910	70.190	71.750	75.840	77.850	80.060	83.370	86.250	88.130	89.580	91.780	93.490

APPENDIX E: SPECTRUM ALLOCATION FOR DIGITAL TRUNKED RADIO (MALAYSIA /BRUNEI /SINGAPORE)



APPENDIX F: SPECTRUM ALLOCATION FOR DIGITAL TRUNKED RADIO (MALAYSIA /THAILAND)



APPENDIX G: INTERFERENCE RESOLUTION PROCESS

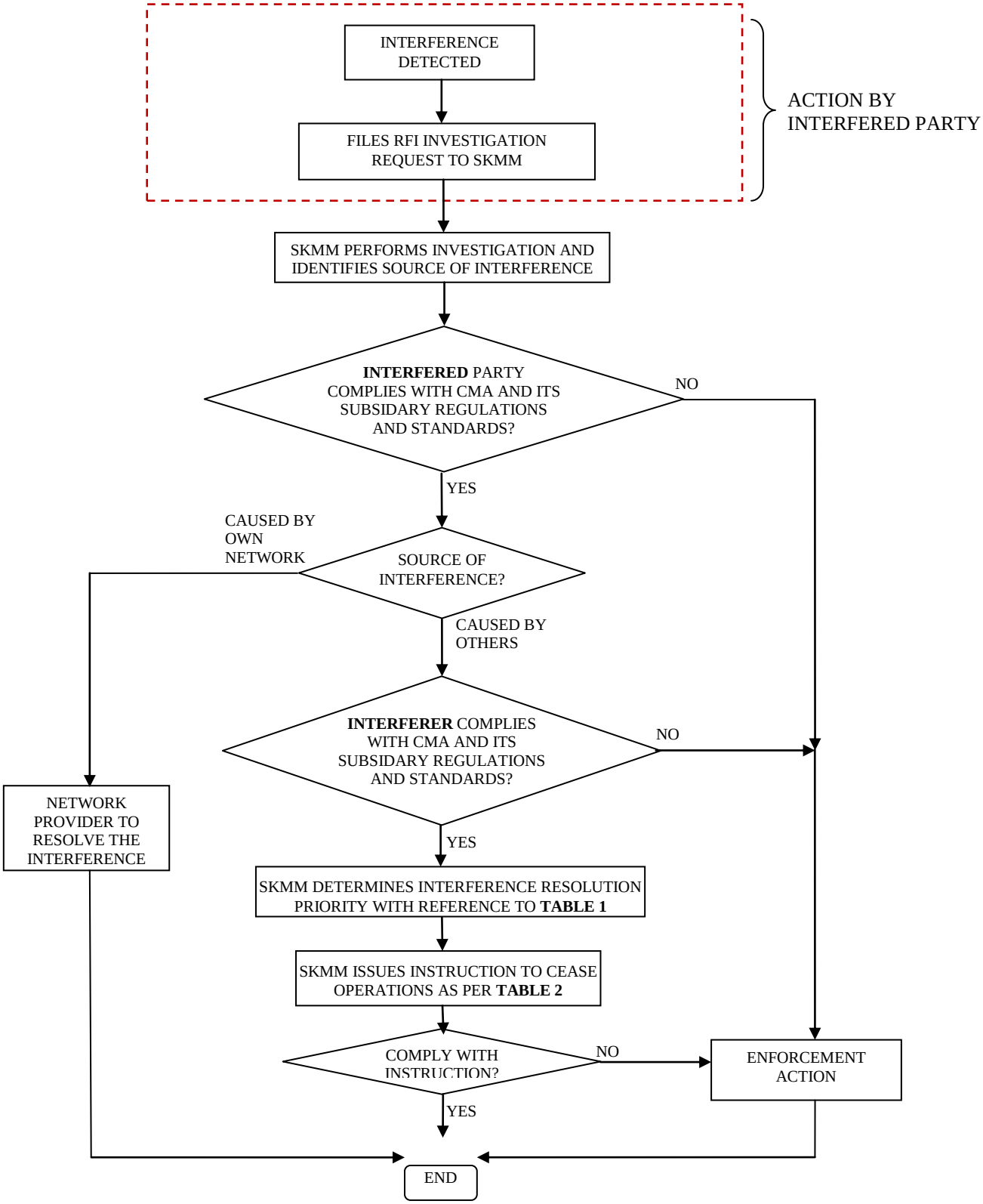


TABLE 1: INTERFERENCE RESOLUTION PRIORITY

	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.