

Standard Radio System Plan

**REQUIREMENTS FOR FIXED SERVICE
LINE OF SIGHT RADIO-RELAY SYSTEMS
OPERATING IN THE FREQUENCY BAND
7425 MHz TO 7725 MHz**



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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
7425 MHz TO 7725 MHz**

2.0 INTENT

- 2.1 This Standard Radio System Plan (SRSP) states the requirements for the utilization of the frequency band 7425 MHz - 7725 MHz for line of sight multiple-hop radio-relay systems in the fixed service, these systems being:
 - 2.1.1 Radio systems using analogue modulation with RF channel loading of up to 300 telephone channels or the equivalent; and
 - 2.1.2 Radio systems using digital modulation at bit rates up to 155 Mbit/s including synchronous digital hierarchy (SDH) and plesiochronous digital hierarchy (PDH) bit rates using appropriate modulation method.
- 2.2 Radio-relay systems are intended as bearers for telephony video and data.
- 2.3 The intended use of these radio-relay systems is mainly for Trunk/Main link only. However, the use of these radio-relay system for Mini/Spur links may be considered due to the reasons of economic and technical constraints.
- 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 this 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 Use of improved digital modulation techniques which increase channel loading capacity is encouraged and will be given priority in frequency assignment.
- 3.3 Although a radio system conforms to the requirements of this SRSP, the SKMM may require that modifications be made to the system whenever interference is caused or is liable to be caused to other radio stations or systems as listed in **Appendix A**.
- 3.4 All installations must comply with safety rules as specified in applicable standards.
- 3.5 The equipment used shall be certified under the Communications and Multimedia (Technical Standards) Regulations 2000.

- 3.6 The allocation and allotment of this frequency band and the information in this SRSP are subject to review from time to time to reflect new developments in the communications and multimedia industry.

4.0 CHANNELLING PLAN

- 4.1 The frequency channelling plan is based on the preferred radio frequency channelling arrangement of ITU-R Recommendation **ITU-R F.385-9 (09/07)** that provides a homogeneous pattern of basic radio carrier spacing of 7 MHz, 14 MHz, 28 MHz and 56 MHz. Channel arrangements with carrier spacing of 28 MHz is obtained by channel concatenation.
- 4.2 **Figure 1** shows the examples of the homogeneous arrangement of twenty radio channels of 7 MHz spacing (A) and five channels of 28 MHz spacing (B) with coinciding centre frequencies in the frequency band 7425-7725 MHz. Four additional channels of 28 MHz spacing can be obtained by interleaving between the main channels of (B).
- 4.3 The frequencies (MHz) of the individual channels are expressed by the following relationships respectively:

Let f_o be the frequency of 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)

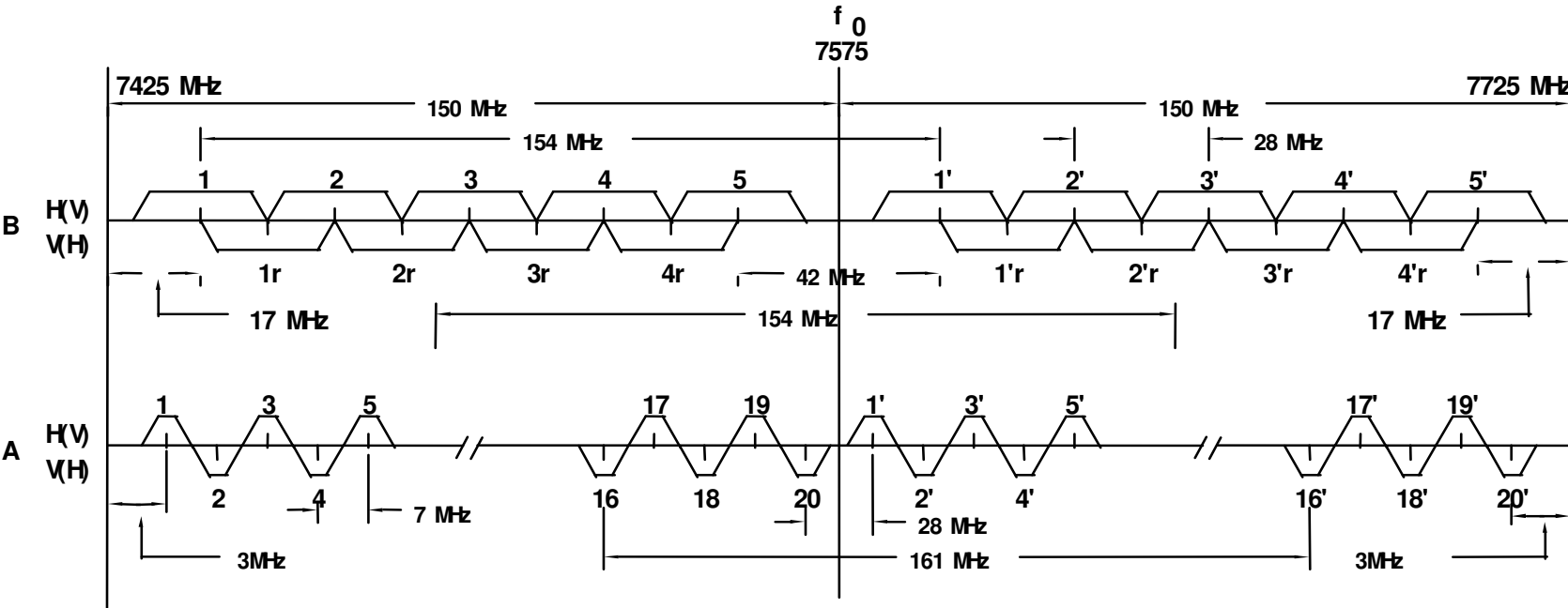
For Tx/Rx separation of 154 MHz and channel spacing of 7 MHz, 14 MHz, 28MHz and 56MHz:

lower half of the band:	$f_n = f_o - 161 + (7 \text{ or } 14 \text{ or } 28 \text{ or } 56) n \text{ MHz}$	For channel bandwidth 7MHz $n = 2, 3, 4, 5 \dots 21$ For channel bandwidth 14MHz $n = 1, 2, 3, 4 \dots 10$
upper half of the band:	$f_n' = f_o - 7 + (7 \text{ or } 14 \text{ or } 28 \text{ or } 56) n \text{ MHz}$	For channel bandwidth 28MHz $n = 1, 2, 3, 4, 5$ For channel bandwidth 56MHz $n = 1, 2$

For Tx/Rx separation of 161 MHz and channel spacing of 7 MHz, 14 MHz, 28 MHz and 56 MHz:

lower half of the band:	$f_n = f_o - 161 + (7 \text{ or } 14 \text{ or } 28 \text{ or } 56) n \text{ MHz}$	For channel bandwidth 7MHz $n = 2, 3, 4, 5 \dots 21$ For channel bandwidth 14MHz $n = 1, 2, 3, 4 \dots 10$
upper half of the band:	$f_n' = f_o + (7 \text{ or } 14 \text{ or } 28 \text{ or } 56) n \text{ MHz}$	For channel bandwidth 28MHz $n = 1, 2, 3, 4, 5$ For channel bandwidth 56MHz $n = 1, 2$

FIGURE 1
RADIO FREQUENCY CHANNEL ARRANGEMENT OF RADIO-RELAY
SYSTEMS OPERATING IN FREQUENCY BAND 7425 - 7725 MHz



NOTE:

1. Centre Frequency $f_0 = 7575$ MHz
2. Separation between adjacent channels = 7 MHz (A) & 28 MHz (B)
3. Separation between corresponding go and return channels = 161 MHz (A), 154 MHz (B)

4.4 The centre frequencies of the three radio-channel arrangements of channel spacing 7 MHz, 14 MHz ,28 MHz and 56MHz are shown in **Table 1**.

Table 1

Channel Carrier Centre Frequencies for Systems with bandwidth equal or greater than 7 MHz and equal or less than 56 MHz for Tx/Rx separation of 161 MHz

Channel No.	Bandwidth = 7MHz		Bandwidth = 14MHz		Bandwidth = 28MHz		Bandwidth = 56MHz	
	Frequency (MHz)		Frequency (MHz)		Frequency (MHz)		Frequency (MHz)	
	Go Channel	Return Channel	Go Channel	Return Channel	Go Channel	Return Channel	Go Channel	Return Channel
1	7428.000	7589.000	7428.000	7589.000	7442.000	7603.000	7470.000	7631.000
2	7435.000	7596.000	7442.000	7603.000	7470.000	7631.000	7526.000	7687.000
3	7442.000	7603.000	7456.000	7617.000	7498.000	7659.000		
4	7449.000	7610.000	7470.000	7631.000	7526.000	7687.000		
5	7456.000	7617.000	7484.000	7645.000	7554.000	7715.000		
6	7463.000	7624.000	7498.000	7659.000				
7	7470.000	7631.000	7512.000	7673.000				
8	7477.000	7638.000	7526.000	7687.000				
9	7484.000	7645.000	7540.000	7701.000				
10	7491.000	7652.000	7554.000	7715.000				
11	7498.000	7659.000						
12	7505.000	7666.000						
13	7512.000	7673.000						
14	7519.000	7680.000						
15	7526.000	7687.000						
16	7533.000	7694.000						
17	7540.000	7701.000						
18	7547.000	7708.000						
19	7554.000	7715.000						
20	7561.000	7722.000						

Table 2

Channel Carrier Centre Frequencies for Systems with bandwidth equal or greater than 7 MHz and equal or less than 56 MHz for Tx/Rx separation of 154 MHz

Channel No.	Bandwidth = 7MHz		Bandwidth = 14MHz		Bandwidth = 28MHz		Bandwidth = 56MHz	
	Frequency (MHz)		Frequency (MHz)		Frequency (MHz)		Frequency (MHz)	
	Go Channel	Return Channel	Go Channel	Return Channel	Go Channel	Return Channel	Go Channel	Return Channel
1	7428.000	7582.000	7428.000	7582.000	7442.000	7596.000	7470.000	7624.000
2	7435.000	7589.000	7442.000	7596.000	7470.000	7624.000	7526.000	7680.000
3	7442.000	7596.000	7456.000	7610.000	7498.000	7652.000		
4	7449.000	7603.000	7470.000	7624.000	7526.000	7680.000		
5	7456.000	7610.000	7484.000	7638.000	7554.000	7708.000		
6	7463.000	7617.000	7498.000	7652.000				

7	7470.000	7624.000	7512.000	7666.000
8	7477.000	7631.000	7526.000	7680.000
9	7484.000	7638.000	7540.000	7694.000
10	7491.000	7645.000	7554.000	7708.000
11	7498.000	7652.000		
12	7505.000	7659.000		
13	7512.000	7666.000		
14	7519.000	7673.000		
15	7526.000	7680.000		
16	7533.000	7687.000		
17	7540.000	7694.000		
18	7547.000	7701.000		
19	7554.000	7708.000		
20	7561.000	7715.000		

5.0 REQUIREMENTS FOR USAGE OF SPECTRUM

- 5.1 This SRSP covers the minimum key characteristics considered necessary in order to make the best use of the available frequencies.
- 5.2 The separation between transmit and receive channels are 161 MHz and 154 MHz for channel bandwidth between 7 MHz – 28 MHz.
- 5.3 154 MHz channel separation is essentially applicable for those systems deployed or purchased prior to the issuance of this SRSP. The usage of 154 MHz 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 161 MHz channel separation for new applications.
- 5.4 Systems with bandwidth less than 7 MHz, the channel arrangement (A) provides for twenty (20) go and twenty (20) return channels for analogue or digital systems having RF channel bandwidth less than or equal to 7 MHz. Different polarisation is recommended for adjacent channels. The go and return channels on a given section should preferably use polarisation as shown in **Table 4**.

Table 4
Channel Polarisation Arrangement for Systems
with Bandwidth less than or equal to 7 MHz

Polarisation	Go Channels (A)	Return Channels (A)
H(V)	1 3 5 7 9 11 13 15 17 19	1' 3' 5' 7' 9' 11' 13' 15' 17' 19'
V(H)	2 4 6 8 10 12 14 16 18 20	2' 4' 6' 8' 10' 12' 14' 16' 18' 20'

- 5.5 A channelling scheme using the radio frequency channels for multi-hop radio-relay systems is shown in **Appendix B**.

- 5.6 Systems with bandwidth greater than 14 MHz and less than 28 MHz, the channel arrangement (B) provides for five main and four interleaved go and return channels for analogue or digital systems having RF channel bandwidth greater than 14 MHz and less than 28 MHz. Different polarisations shall be used for adjacent channels. The main channels and interleaved channels should not be mixed along the same route. The go and return channels on a given section should preferably use polarisation as shown in **Table 5**.
- 5.7 Up to nine (9) go and nine (9) return radio frequency channels for systems having bandwidth of 28 MHz may be obtained by using the main channels and interleaved channels simultaneously. Such use can be considered provided its use can be justified. A fully developed channelling scheme using main radio frequency channels and interleaved channels for multi-hop radio-relay systems are shown in **Appendix C**.

Table 5
Channel Polarisation Arrangement for Systems
with bandwidth greater than 14 MHz and less than 28 MHz

Main Channels						
Polarisation	Go Channels (C)			Return Channels (C)		
H(V)	1	3	5	1'	3'	5'
V(H)	2	4		2'	4'	
Interleaved Channels						
V(H)	1r	3r		1'r	3'r	
H(V)		2r	4r		2'r	4'r

- 5.8 Protection channel may be permitted for multi-channel systems subject to approval by SKMM. However systems using hot-standby are encouraged.
- 5.9 Fixed service line of sight radio-relay systems shall not interfere with earth stations of the Fixed-Satellite service and shall comply with ITU-R recommendations **ITU-R SF.406-8 (04/93)** and **ITU-R SF.765-1 (02/03)** and **Article 21 of the Radio Regulations**.
- 5.10 The shared services within this band are found in the Spectrum Plan and an extract of it is shown in **Appendix A**.

6.0 PRINCIPLES OF ASSIGNMENT

- 6.1 Authorisation to use the line of sight radio-relay spectrum for the radio-relay fixed station is by way of **Apparatus Assignment (AA)**. Priority will be given to the use for a station as trunk or main link.
- 6.2 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 co-ordination among assigned stations and with neighbouring administrations where it applies.
- 6.6 The apparatus assignment shall be 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 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 7 425 MHz to 7 725 MHz 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 FACSMAB (Frequency Assignment and Co-ordination between Singapore, Malaysia and Brunei Darussalam).
 - 8.1.2 Within 60 kilometres of the Malaysian border with Indonesia.
 - 8.1.3 Within 35 kilometres of the Malaysian border with Thailand.

- 8.2 Note that the above coordination distance is continuously being reviewed with our neighbouring countries 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 The technical mitigation guide as mentioned in Section 5 above shall be applied if operator to operator coordination is required.
- 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 D**.

9.0 REVOCATION

- 9.1 MCMC SRSP 515, 18 August 2003 Issue 2 is hereby revoked.

10.0 REFERENCES

- [1] **ITU-R F.385-9 (09/07)** RF Channel Arrangements for Radio-relay Systems in the 7 GHz Band.
- [2] **ITU-R SF.406-8 (04/93)** Maximum Equivalent Isotropically Radiated Power of Radio-relay Transmitters Operating in the Frequency Bands Shared with Fixed Satellite Services.
- [3] **ITU-R SF.765-1 (02/03)** Intersection of Radio-relay Antenna Beams with Orbits used by Space Station of the Fixed Satellite System.
- [4] **Article 21 Radio Regulations** Terrestrial and space services sharing frequency bands above 1GHz.
- [5] **ITU-R SF.355-4 (03/92)** Frequency Sharing between Fixed Satellite Service and Radio-relay Systems in the Same Bands.

Issued by:



Suruhanjaya Komunikasi dan Multimedia Malaysia
Malaysian Communications and Multimedia Commission

15 October 2009

APPENDIX A: SPECTRUM PLAN

7 145 MHz to 7 450 MHz

Frequency Band (MHz)	ITU Allocation			Malaysian Allocation
	Region 1	Region 2	Region 3	
7 300-7 450	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile			FIXED MLA64 MLA65 FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile
	5.461			5.461

5.461 *Additional allocation:* the bands 7 250-7 375 MHz (space-to-Earth) and 7 900-8 025 MHz (Earth-to-space) are also allocated to the mobile-satellite service on a primary basis, subject to agreement obtained under No. 9.21.

MLA64 Standard Radio System Plan: Requirements for Line of sight Radio-Relay Systems Operating in the Fixed Service in the Frequency Band 7111 MHz to 7425 MHz

MLA65 Standard Radio System Plan: Requirements for Line of sight Radio-Relay Systems Operating in the Fixed Service in the Frequency Band 7425 MHz to 7725 MHz

7 450 MHz to 7 850 MHz

Frequency Band (MHz)	ITU Allocation			Malaysian Allocation
	Region 1	Region 2	Region 3	
7 450-7 550	FIXED FIXED-SATELLITE (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.461A			FIXED MLA65 FIXED-SATELLITE (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.461A
7 550-7 750	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile			FIXED MLA65 MLA66 FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile

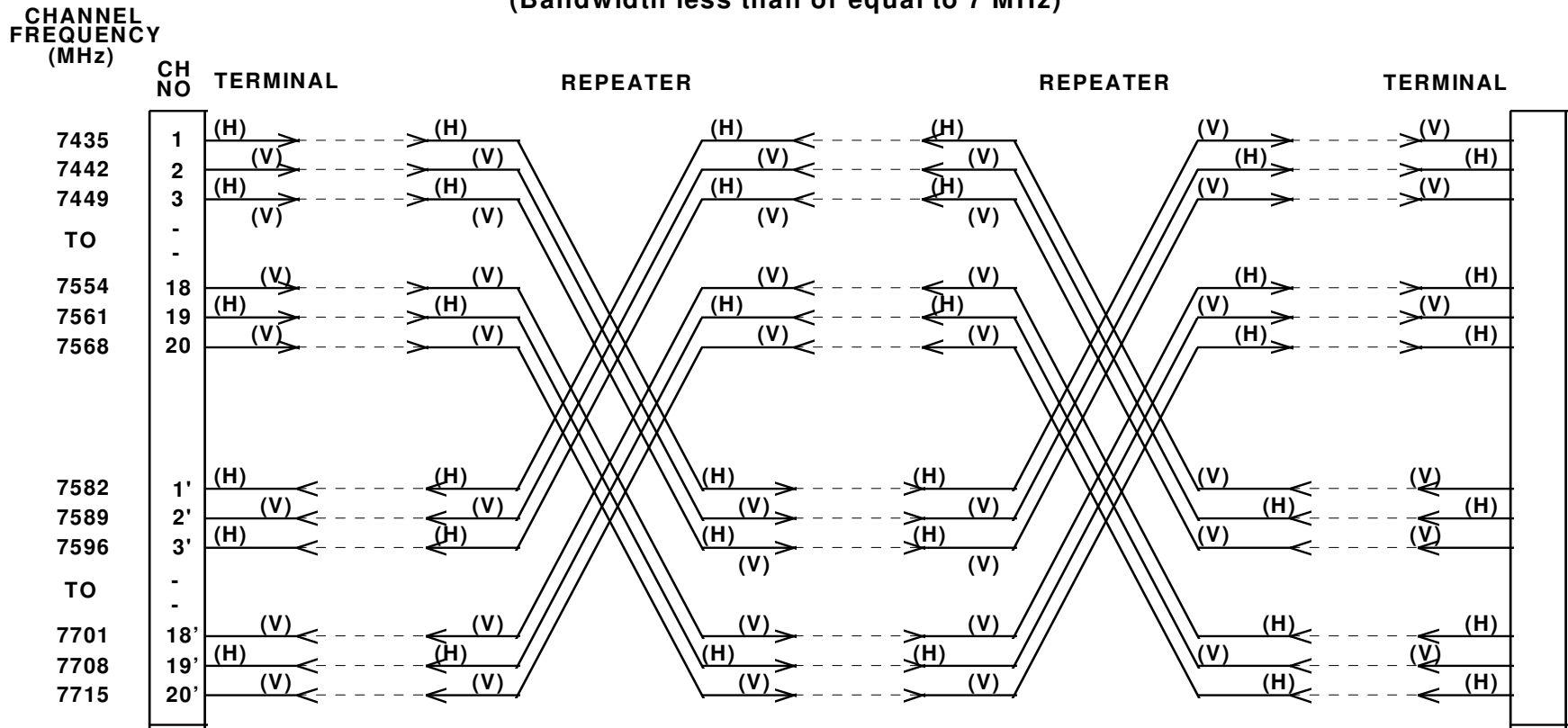
5.461A The use of the band 7 450-7 550 MHz by the meteorological-satellite service (space-to-Earth) is limited to geostationary-satellite systems. Non-geostationary meteorological-satellite systems in this band notified before 30 November 1997 may continue to operate on a primary basis until the end of their lifetime. (WRC-97)

5.461B The use of the band 7 750-7 850 MHz by the meteorological-satellite service (space-to-Earth) is limited to non-geostationary satellite systems. (WRC-97)

MLA65 Standard Radio System Plan: Requirements for Line of sight Radio-Relay Systems Operating in the Fixed Service in the Frequency Band 7425 MHz to 7725 MHz

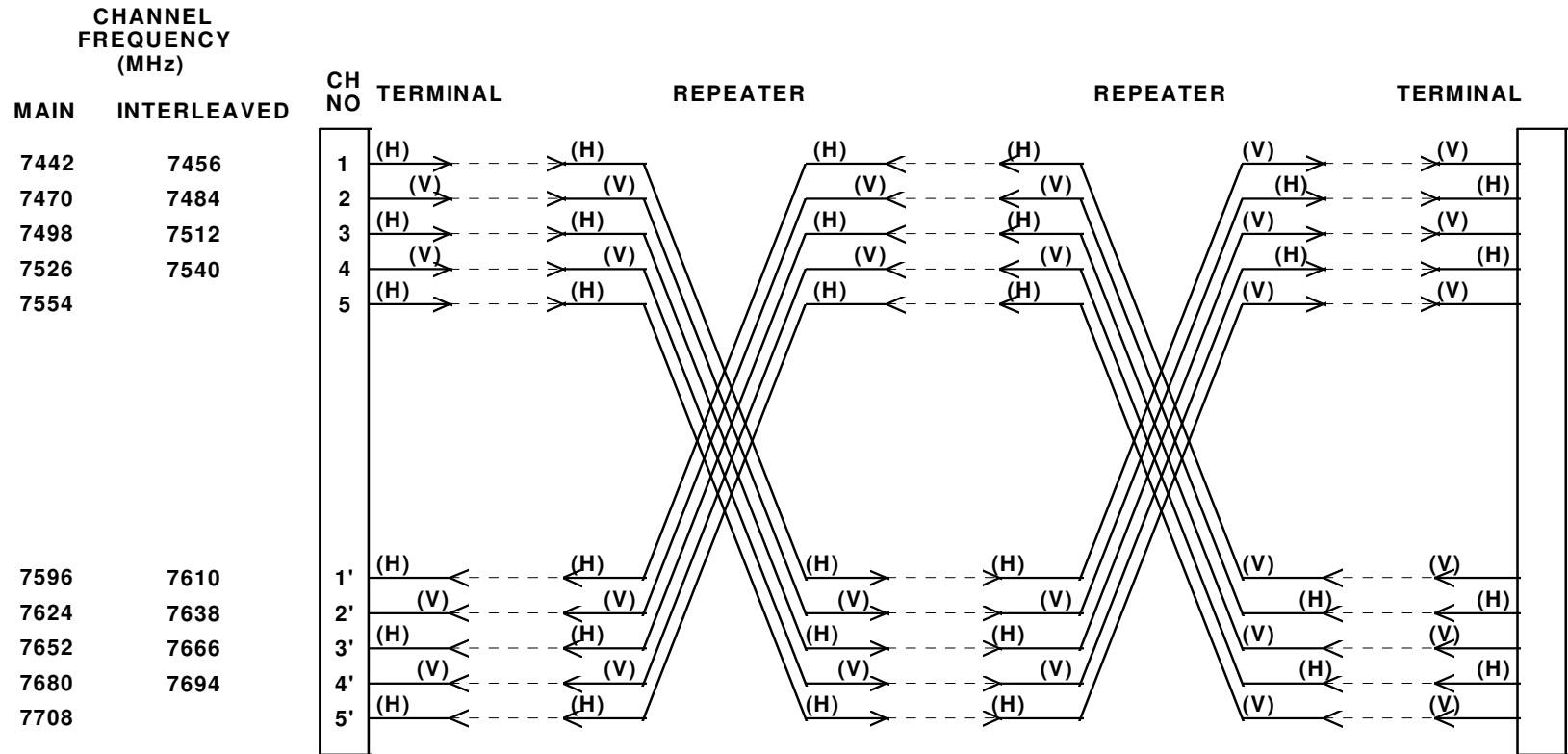
MLA66 Standard Radio System Plan: Requirements for Line of sight Radio-Relay Systems Operating in the Fixed Service in the Frequency Band 7725 MHz to 8275 MHz

APPENDIX B
Radio Channel Arrangement for Multi-hop System
(Bandwidth less than or equal to 7 MHz)



Note:
H - denotes horizontal polarisation
V - denotes vertical polarisation

APPENDIX C
Radio Channel Arrangement for Multi-hop System
(Bandwidth greater than 14 MHz and less than 28 MHz)



Note:
H - denotes horizontal polarisation
V - denotes vertical polarisation

APPENDIX D: INTERFERENCE RESOLUTION PROCESS

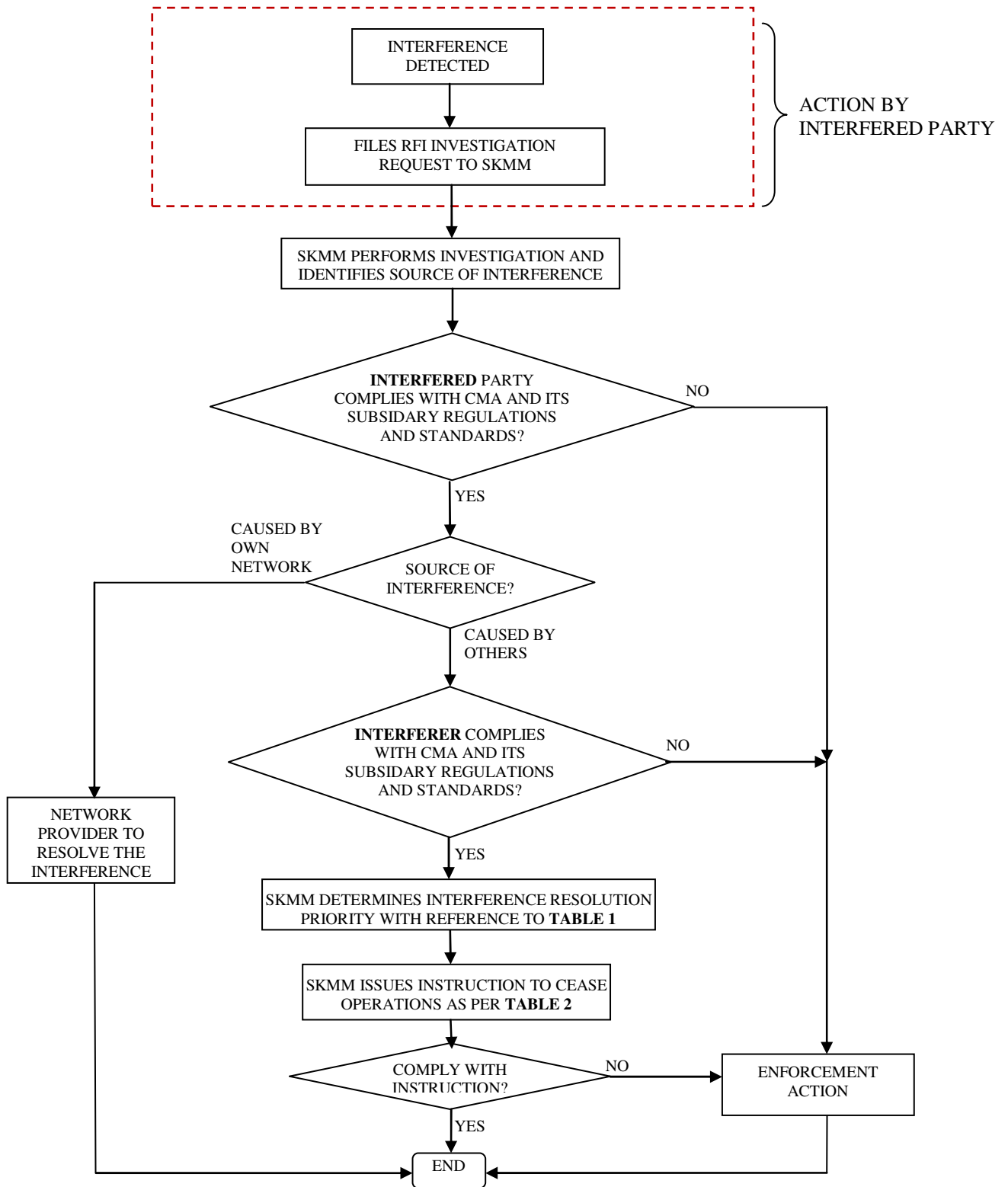


TABLE 1: INTERFERENCE RESOLUTION PRIORITY

	Resolution Type of Priority	Description
1	Service Priority	Primary has priority over secondary services. Among co- primary or co-secondary services, the stated priority is accorded as in the Spectrum Plan
2	Assignment Type Priority	Spectrum Assignment (SA) and Apparatus Assignment (AA) have equal priority but are of higher priority than Class Assignment (CA)
3	Service Type Priority	In the event where service priority and assignment type priority are equal for affected parties, the following list will determine the priority level for the interference case (the earlier in the list is given higher priority): <ul style="list-style-type: none"> i. Safety or Radionavigation service; ii. Based on the Date of Apparatus Assignment - Priority is given to the earliest/first installation

TABLE 2: INTERFERENCE RESOLUTION TIMELINE TO PARTIES

	Types of interference	Description	Resolution Timeline
1	Harmful	Interference which endangers or seriously degrades, obstructs or repeatedly interrupts the functioning of a radionavigation service or one or more safety services operating in accordance with 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.