

**Standard Radio System Plan**

**REQUIREMENTS FOR FIXED SERVICE  
LINE OF SIGHT RADIO-RELAY SYSTEMS  
OPERATING IN THE FREQUENCY BAND  
7111 MHz TO 7425 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>

<b>TABLE OF CONTENTS</b>	<b>PAGE</b>
<b>1.0 GLOSSARY</b>	<b>3</b>
<b>2.0 INTENT</b>	<b>4</b>
<b>3.0 GENERAL</b>	<b>4</b>
<b>4.0 CHANNELLING PLAN</b>	<b>5</b>
<b>5.0 REQUIREMENTS FOR USAGE OF SPECTRUM</b>	<b>8</b>
<b>6.0 PRINCIPLES OF ASSIGNMENT</b>	<b>9</b>
<b>7.0 IMPLEMENTATION</b>	<b>10</b>
<b>8.0 COORDINATION REQUIREMENT</b>	<b>10</b>
<b>9.0 REVOCATION</b>	<b>11</b>
<b>10.0 REFERENCES</b>	<b>11</b>
 <b>APPENDICES</b>	
 <b>APPENDIX A :SPECTRUM PLAN 7075 MHz TO 7450 MHz</b>	 <b>12</b>
 <b>APPENDIX B :RADIO FREQUENCY CHANNEL ARRANGEMENT FOR MULTI-HOP SYSTEM</b>	 <b>14</b>
 <b>APPENDIX C:INTERFERENCE RESOLUTION PROCESS</b>	 <b>15</b>

## **1.0 GLOSSARY**

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

**REQUIREMENTS FOR FIXED SERVICE LINE OF SIGHT RADIO-RELAY  
SYSTEMS OPERATING IN THE FREQUENCY BAND  
7111 MHz TO 7425 MHz**

**2.0 INTENT**

- 2.1 This Standard Radio System Plan (SRSP) states the requirements for the utilization of the frequency band 7111 MHz - 7425 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, voice 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 plans are based on the preferred radio frequency channelling arrangements of ITU-R Recommendation **ITU-R F.385-9 (09/07)** on a homogeneous pattern of basic radio carrier spacing of 7 MHz. Channel arrangements with carrier spacing of 7 MHz, 14 MHz and 28 MHz are obtained by channel concatenation and 35MHz channel bandwidth for 154MHz channel separation.

4.2 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 168 MHz:

lower half of the band:	$f_n = f_o - 168 + (7 \text{ or } 14 \text{ or } 28) n \text{ MHz}$	For channel bandwidth 7MHz $n = 2, 3, 4, 5 \dots 22$
upper half of the band:	$f_{n'} = f_o + (7 \text{ or } 14 \text{ or } 28) n \text{ MHz}$	For channel bandwidth 14MHz $n = 2, 3, 4, 5 \dots 11$ For channel bandwidth 28MHz $n = 1, 2, 3, 4, 5$

For Tx/Rx separation of 161 MHz:

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

For Tx/Rx separation of 154 MHz:

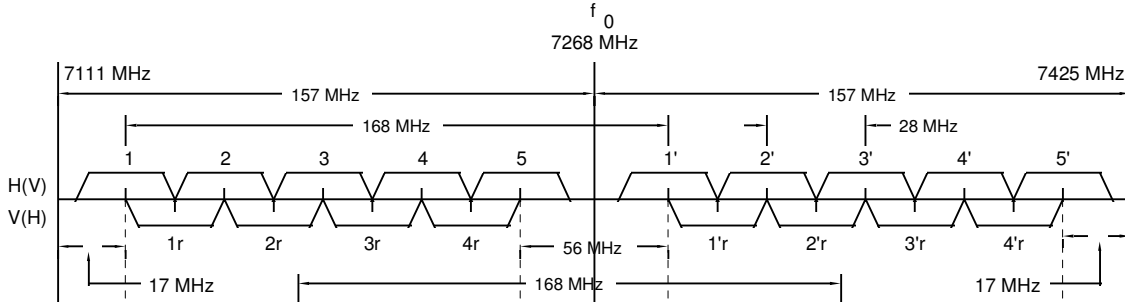
lower half of the band:	$f_n = f_o - 168 + 35 n \text{ MHz}$	$n = 1, 2, 3, 4$
upper half of the band:	$f_{n'} = f_o - 14 + 35 n \text{ MHz}$	

4.3 **Figure 1** shows the example of the arrangement of five (5) channels of 28 MHz bandwidth with coinciding centre frequencies in the frequency band 7111 MHz - 7425 MHz with 168 MHz transmit and receive (Tx/Rx) channel separation. Four (4)

additional channels of 28 MHz bandwidth can be obtained by interleaving between the main channels.

**Figure 1**

Radio frequency channel arrangement of 28 MHz bandwidth for radio-relay systems operating in the frequency band 7111 MHz - 7425 MHz



4.4 The centre frequencies of the radio channel arrangements of separations 168 MHz and 161 MHz are shown in **Table 1** and **Table 2** respectively. Standard frequency plan shall be used for all channel spacing.

**Table 1**

Channel Carrier Centre Frequencies for Systems with bandwidth between 7 MHz – 28 MHz and Tx/Rx separation of 168 MHz.

Channel No.	Bandwidth = 7MHz		Bandwidth = 14MHz		Bandwidth = 28MHz	
	Frequency (MHz)		Frequency (MHz)		Frequency (MHz)	
	Go Channel	Return Channel	Go Channel	Return Channel	Go Channel	Return Channel
1	7114.000	7282.000	7128.000	7296.000	7128.000	7296.000
2	7121.000	7289.000	7142.000	7310.000	7156.000	7324.000
3	7128.000	7296.000	7156.000	7324.000	7184.000	7352.000
4	7135.000	7303.000	7170.000	7338.000	7212.000	7380.000
5	7142.000	7310.000	7184.000	7352.000	7240.000	7408.000
6	7149.000	7317.000	7198.000	7366.000		
7	7156.000	7324.000	7212.000	7380.000		
8	7163.000	7331.000	7226.000	7394.000		
9	7170.000	7338.000	7240.000	7408.000		
10	7177.000	7345.000	7254.000	7422.000		
11	7184.000	7352.000				
12	7191.000	7359.000				
13	7198.000	7366.000				
14	7205.000	7373.000				
15	7212.000	7380.000				
16	7219.000	7387.000				
17	7226.000	7394.000				
18	7233.000	7401.000				
19	7240.000	7408.000				
20	7247.000	7415.000				
21	7254.000	7422.000				

**Table 2**  
Channel Carrier Centre Frequencies for Systems  
with bandwidth between 7 MHz – 28 MHz and Tx/Rx separation of 161 MHz.

Channel No.	Bandwidth = 7MHz		Bandwidth = 14MHz		Bandwidth = 28MHz	
	Frequency (MHz)		Frequency (MHz)		Frequency (MHz)	
	Go Channel	Return Channel	Go Channel	Return Channel	Go Channel	Return Channel
1	7114.000	7275.000	7121.000	7282.000	7135.000	7296.000
2	7121.000	7282.000	7135.000	7296.000	7163.000	7324.000
3	7128.000	7289.000	7149.000	7310.000	7191.000	7352.000
4	7135.000	7296.000	7163.000	7324.000	7219.000	7380.000
5	7142.000	7303.000	7177.000	7338.000	7247.000	7408.000
6	7149.000	7310.000	7191.000	7352.000		
7	7156.000	7317.000	7205.000	7366.000		
8	7163.000	7324.000	7219.000	7380.000		
9	7170.000	7331.000	7233.000	7394.000		
10	7177.000	7338.000	7247.000	7408.000		
11	7184.000	7345.000				
12	7191.000	7352.000				
13	7198.000	7359.000				
14	7205.000	7366.000				
15	7212.000	7373.000				
16	7219.000	7380.000				
17	7226.000	7387.000				
18	7233.000	7394.000				
19	7240.000	7401.000				
20	7247.000	7408.000				
21	7254.000	7415.000				
22	7261.000	7422.000				

4.5 The centre frequencies of the radio-channel arrangements of channel bandwidth 35 MHz are shown in **Table 3**.

**Table 3**  
Channel Carrier Centre Frequencies for Systems  
with bandwidth 35 MHz

Go Channel (C)		Return Channel (C)	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	7135.000	1'	7289.000
2	7170.000	2'	7324.000
3	7205.000	3'	7359.000
4	7240.000	4'	7394.000

## 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 161MHz and 168 MHz for channel bandwidth between 7 MHz – 28 MHz.
- 5.3 161 MHz channel separation is essentially applicable for those systems deployed or purchased prior to the issuance of this SRSP. The usage of 161 MHz channel separation is limited until the end of the system lifespan of the apparatus. The usage include redeployment to different location and/or upgrade the said apparatus for additional capacity with minimal changes of the system. Moving forward, all radio-relay systems shall use 168 MHz channel separation for new applications.
- 5.4 Tx/Rx channel separations of 154 MHz are allowed for 35 MHz channel bandwidth.
- 5.5 Standard channels plan as shown in **Table 1, Table 2 & Table 3**. The range of frequencies of one Tx/Rx channel separation used is strictly to be within the table. For example, with Tx/RX channel separation of 168 MHz, the set of frequencies used for a system is to be within **Table 1** and it ranges from Channel 1 to Channel 21.
- 5.6 Systems with RF channel bandwidth greater than 14 MHz and equal or less than 28 MHz, the channel arrangement in **Figure 1** 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 equal or less than 28 MHz. Different polarisations is recommended 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 4**.
- 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 B**.
- 5.8 Protection channel may be permitted for multi-channel systems subject to approval by SKMM. However systems using hot-standby are encouraged.

**Table 4:** Channel Polarisation Arrangement for Systems with channel bandwidth greater than 14 MHz and equal or 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

- 5.9 The frequencies assigned to a main route system shall be reused for spur routes and the transmission routes (main and spurs routes) shall be planned to maximise the frequency usage without any interference.
- 5.10 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**.
- 5.11 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 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 has 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 7111 MHz to 7 425 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 FACSMA (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 C**.

## 9.0 REVOCATION

9.1 MCMC SRSP 514, 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.

Issued by:



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

**15 October 2009**

## APPENDIX A: SPECTRUM PLAN

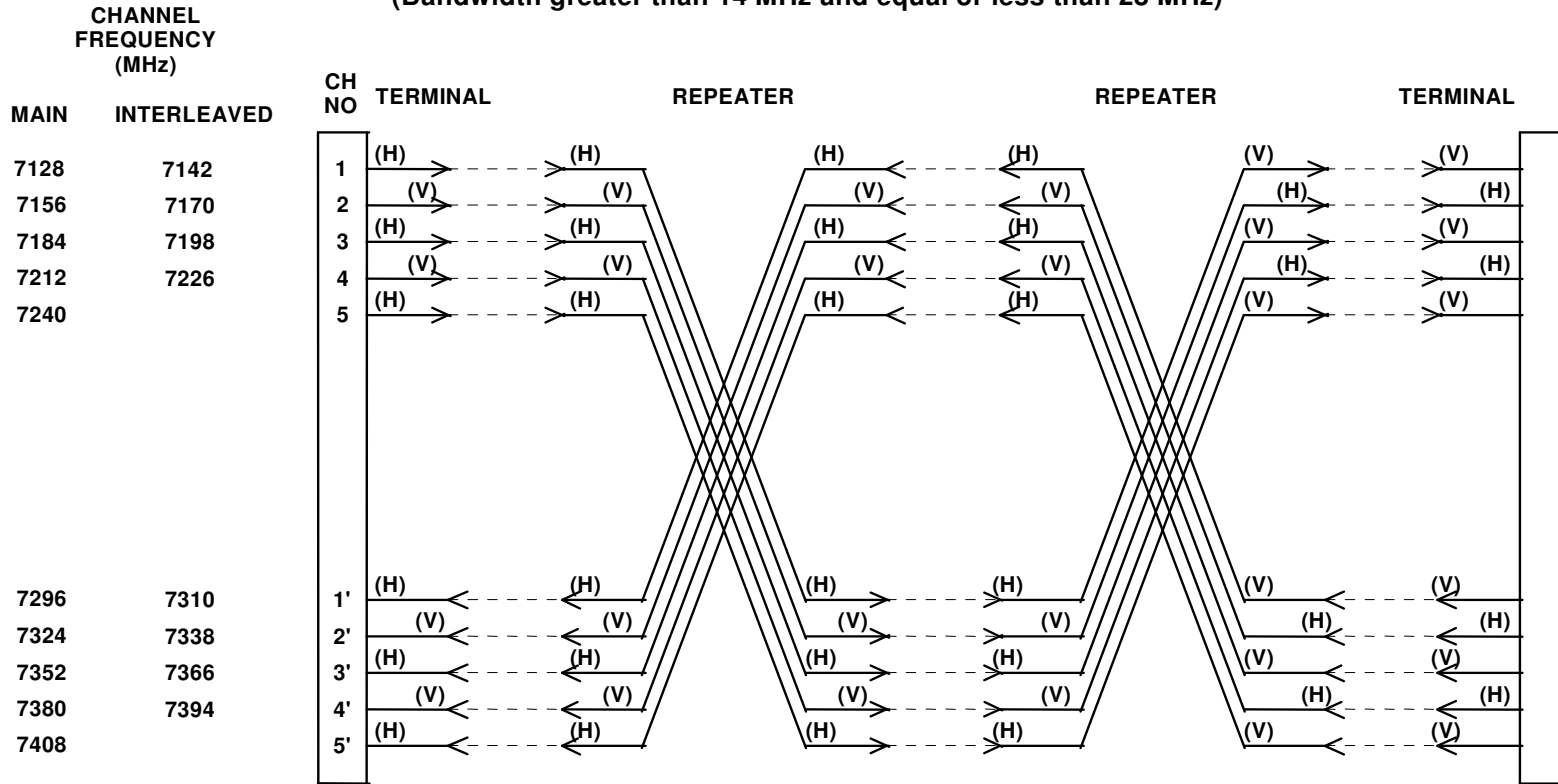
### 7 075 MHz to 7 450 MHz

Frequency Band (MHz)	ITU Allocation			Malaysian Allocation
	Region 1	Region 2	Region 3	
<b>7 075-7 145</b>	FIXED MOBILE 5.458 5.459			FIXED MLA62 MLA64 MOBILE 5.458
<b>7 145-7 235</b>	FIXED MOBILE SPACE RESEARCH (Earth-to-space) 5.460 5.458 5.459			FIXED MLA64 MOBILE SPACE RESEARCH (Earth-to-space) 5.460 5.458
<b>7 235-7 250</b>	FIXED MOBILE 5.458			FIXED MLA64 MOBILE 5.458
<b>7 250-7 300</b>	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE 5.461			FIXED MLA64 FIXED-SATELLITE (space-to-Earth) MOBILE 5.461
<b>7 300-7 450</b>	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.461			FIXED MLA64 MLA65 FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile 5.461

- 5.458** In the band 6 425-7 075 MHz, passive microwave sensor measurements are carried out over the oceans. In the band 7 075-7 250 MHz, passive microwave sensor measurements are carried out. Administrations should bear in mind the needs of the Earth exploration-satellite (passive) and space research (passive) services in their future planning of the bands 6 425-7 025 MHz and 7 075-7 250 MHz.
- 5.459** *Additional allocation:* in the Russian Federation, the frequency bands 7 100-7 155 MHz and 7 190-7 235 MHz are also allocated to the space operation service (Earth-to-space) on a primary basis, subject to agreement obtained under No. 9.21. (WRC-97)
- 5.460** The use of the band 7 145-7 190 MHz by the space research service (Earth-to-space) is restricted to deep space; no emissions to deep space shall be effected in the band 7 190-7 235 MHz. Geostationary satellites in the space research service operating in the band 7 190-7 235 MHz shall not claim protection from existing and future stations of the fixed and mobile services and No. 5.43A does not apply. (WRC-03)
- 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.
- MLA62** Standard Radio System Plan: Requirements for Line of sight Radio-Relay Systems Operating in the Fixed Service in the Upper 6 GHz Band 6430 MHz to 7110 MHz
- 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

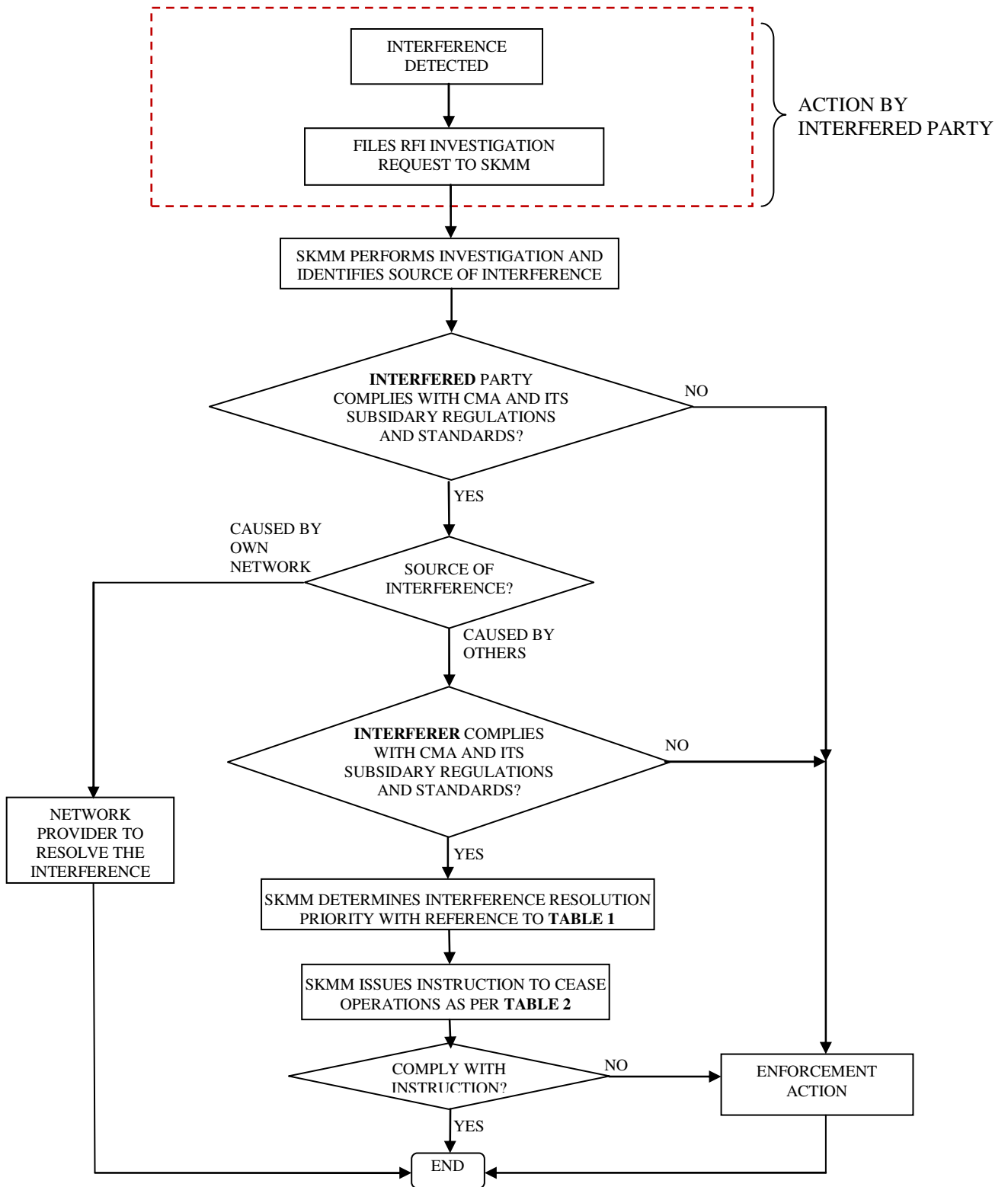
## APPENDIX B

### Radio Frequency Channel Arrangement for Multi-hop System (Bandwidth greater than 14 MHz and equal or less than 28 MHz)



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

## APPENDIX C: INTERFERENCE RESOLUTION PROCESS



**TABLE 1: INTERFERENCE RESOLUTION PRIORITY**

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

**TABLE 2: INTERFERENCE RESOLUTION TIMELINE TO PARTIES**

	Types of interference	Description	Resolution Timeline
1	Harmful	Interference which endangers or seriously degrades, obstructs or repeatedly interrupts the functioning of a radionavigation service or one or more safety services operating in accordance with CMA (Spectrum) Regulations 2000	To cease* operation immediately within 24 hours or earlier as specified in the notice issued by SKMM
2	Major	Electromagnetic interference rendering any apparatus or services unsuitable for their intended purpose.  For this purpose interference to public correspondence service is considered under this category	To cease* operation within 3 days or earlier as specified in notice issued by SKMM if interference cannot be resolved.
3	Minor	Electromagnetic interference which does not affect the overall operation of any radiocommunications transmission.	To cease* operation within 7 days or earlier as specified in the notice issued by SKMM if interference cannot be resolved

\*Note:

Resumption of operation of the apparatus is not allowed unless the assignment holder submit interference resolution or mitigation plan and complete implementation of the mitigation plan to the satisfaction of SKMM to remove/ avoid the interference.