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Spectrum Management and Telecommunications

Standard Radio System Plan

Technical Requirements for Fixed Line-of-Sight Radio Systems Operating in the Bands 17.8-18.3 GHz and 19.3-19.7 GHz

Aussi disponible en français – PNRH-317,8

Canada

Preface

Issue 2 of SRSP-317.8 has been released to incorporate refinements to the minimum antenna characteristics and the emission limits. This SRSP replaces SRSP-317.8, Issue 1.

Issued under the authority of
the Minister of Industry

_____
R.W. McCaughern
Director General
Spectrum Engineering Branch

Contents

1. Intent

1.1 This Standard Radio System Plan (SRSP) states the minimum technical requirements for the efficient use of the bands 17.8-18.3 GHz and 19.3-19.7 GHz by low, medium and high-capacity (LC, MC and HC) point-to-point digital radio systems in the fixed service using digital modulation.

1.2 This SRSP is intended to be employed in the design and specification of radio systems and equipment and in the evaluation of technical applications for new radio facilities or modification to radio systems submitted in accordance with the current issue of Radio Standards Procedure 113, *Application Procedures for Planned Radio Stations Above 960 MHz in the Fixed Service* (RSP-113).

1.3 This SRSP specifies equipment characteristics relating to efficient spectrum usage only and is not to be regarded as a comprehensive specification for equipment design and/or selection.

2. General

2.1 This SRSP replaces SRSP 317.8, Issue 1.[1] Existing radio systems operating as standard prior to the issuance of this SRSP may continue to operate as standard.[2] Channel centre frequencies of these systems are shown in Appendix 1. Coordination with these systems is required. Extension and/or expansion of these systems will be permitted.

2.2 New stand-alone radio routes must conform to the requirements of this Standard.

2.3 Revision of this SRSP will be made as required.

2.4 Radio systems conforming to these technical requirements will be given priority in licensing over non-standard radio systems operating in these bands.

2.5 The arrangements for non-standard systems are outlined in Spectrum Utilization Policy Gen, *General Information Related to Spectrum Utilization and Radio Systems Policies* (SP-Gen).

2.6 The Geographical Differences Policy (GDP) guideline applies in these frequency bands. More information on the GDP can be found in SP 1-20 GHz.[3]

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[1] SRSP-317.8 (Issue 1) replaced SRSP-317.7 (Issue 1), SRSP-318.5 (Issue 2) and SRSP-318.8 (Provisional, Issue 1).

[2] A moratorium is placed on the licensing of new fixed service systems in the bands 17.7-17.8 GHz and 18.3-19.3 GHz. Modifications to existing fixed service systems which do not increase the interference environment to fixed-satellite service (FSS) or which can be coordinated with FSS systems will be authorized on a case-by-case basis. As of October 2014, the operation of fixed service systems in the band 18.58-19.3 GHz will be on a no-interference basis with respect to Earth stations in the fixed-satellite service. See SP 3-30 GHz, October 2004.

[3] *Revisions to Microwave Spectrum Utilization Policies in the Range of 1-20 GHz* (SP 1-20 GHz), January 1995, contains new spectrum utilization principles including the Geographical Differences Policy guideline. This information will be incorporated into a revision of SP-Gen.

2.7 Although a radio system conforms to the requirements of this SRSP, modifications may be required to the system whenever harmful interference[4] is caused.

2.8 When potential conflicts between radio systems cannot be resolved by the parties concerned, the Department should be advised. After consultation with these parties, Industry Canada will determine the necessary modifications and schedule of modifications to resolve the conflicts.

2.9 The Department may require the licensees and/or applicants to use receiver selectivity characteristics that provide rejection of harmful interference.

2.10 Frequency Division Duplex radio systems operating in this band shall use a two-frequency plan. Where reasonable economic or technical justification is provided (e.g. where siting prevents adequate antenna discrimination), extra frequencies may be used to resolve the problem, subject to the provisions of Section 2.6. Time Division Duplex radio systems should give preference to the use of the unpaired channels.

2.11 In this band, use of the fixed service has priority over use of the fixed-satellite service.

3. Related Documents

The current issues of the following documents are applicable and available on the Spectrum Management and Telecommunications website at: http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/home.

SP 3-30 GHz	*Revisions to Spectrum Utilization Policies in the 3-30 GHz Frequency Range and Further Consultation*
SP 1-20 GHz	*Revisions to Microwave Spectrum Utilization Policies in the Range of 1-20 GHz*
SP-Gen	*General Information Related to Spectrum Utilization and Radio Systems Policies*
RSP-113	*Application Procedures for Planned Radio Stations Above 960 MHz in the Fixed Service*
TRC-43	*Notes Regarding Designation of Emission (Including Necessary Bandwidth and Classification), Class of Station and Nature of Service*

[4] For the purposes of this SRSP, "Harmful Interference" means interference that endangers the functioning of a radionavigation service or other safety services or seriously degrades, obstructs, or repeatedly interrupts a radiocommunication service operating in accordance with regulations and technical requirements laid down by Industry Canada under the Radiocommunication Act.

CPC-2-0-03 *Environmental Process, Radiofrequency Fields and Land-Use Consultation*

Canadian Table of Frequency Allocations 9 kHz to 275 GHz

CPC – Client Procedures Circular
RSP – Radio Standards Procedure
SP – Spectrum Utilization Policy
TRC – Telecommunications Regulation Circular

4. Radio Frequency Channel Arrangements Description

4.1 Radio Frequency Channel Arrangement

The channel plans defined in this standard allow for systems with seven different RF channel bandwidths. See Figure 1 and Appendix 2.

The allowed RF channel bandwidths are:

- greater than 40 MHz and less than or equal to 50 MHz
- greater than 30 MHz and less than or equal to 40 MHz
- greater than 20 MHz and less than or equal to 30 MHz
- greater than 10 MHz and less than or equal to 20 MHz
- greater than 5 MHz and less than or equal to 10 MHz
- greater than 2.5 MHz and less than or equal to 5 MHz
- equal to 2.5 MHz.

The Transmit/Receive (T/R) spacing between paired channels is either 1.16 GHz or 1.56 GHz. In addition, some channels are unpaired.

Figure 1: Channel plan for the bands 17.8 – 18.3 GHz and 19.3 - 19.7 GHz

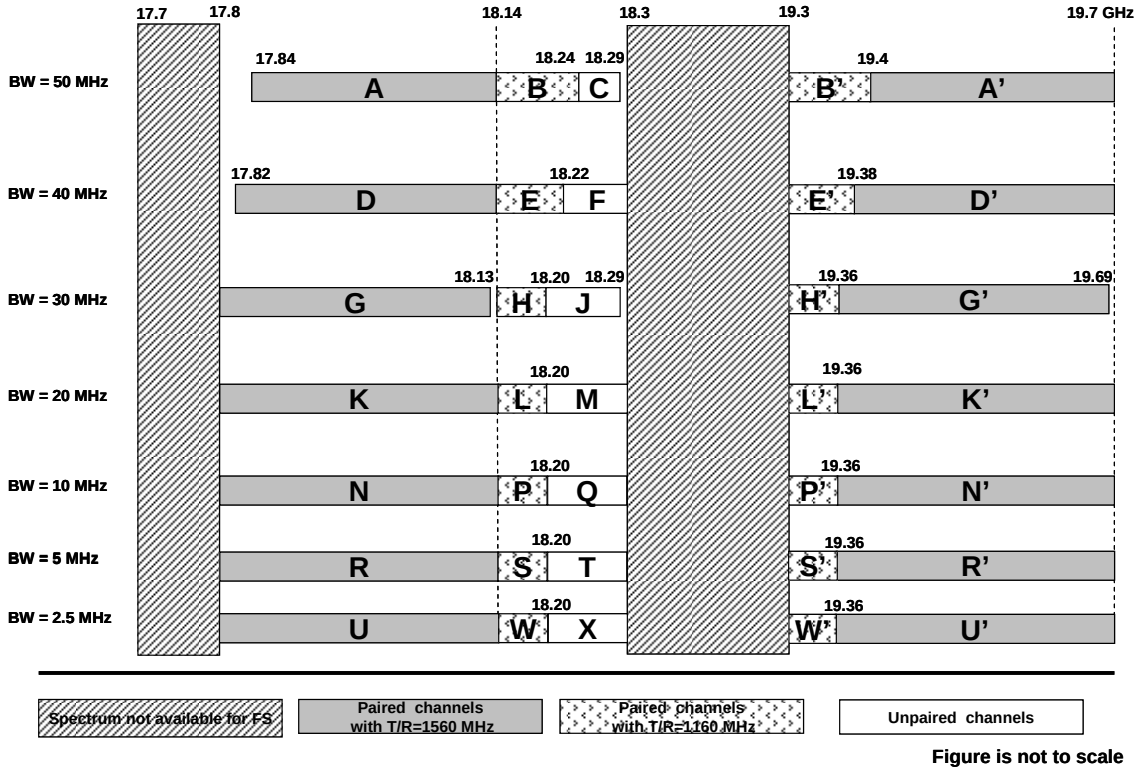

Figure is not to scale

4.2 Radio Frequency Channel Centre Frequencies

4.2.1 The centre frequencies of the 8 paired channels and 1 unpaired channel which allow RF channel bandwidths of greater than 40 MHz and less than or equal to 50 MHz are expressed by the following relationships:

Paired channels with T/R spacing = 1560 MHz:

Lower half of the band	A_n	= 17815 + 50n MHz	for n = 1 to 6
Upper half of the band	A'_n	= 19375 + 50n MHz	for n = 1 to 6

Paired channels with T/R spacing = 1160 MHz:

Lower half of the band	B_n	= 18115 + 50n MHz	for n = 1 to 2
Upper half of the band	B'_n	= 19275 + 50n MHz	for n = 1 to 2

Unpaired channel:

C_1 = 18265 MHz

4.2.2 The centre frequencies of the 10 paired channels and 2 unpaired channels which allow RF channel bandwidths of greater than 30 MHz and less than or equal to 40 MHz are expressed by the following relationships:

Paired channels with T/R spacing = 1560 MHz:

Lower half of the band	D_n	= 17800 + 40n MHz	for n = 1 to 8
Upper half of the band	D'_n	= 19360 + 40n MHz	for n = 1 to 8

Paired channels with T/R spacing = 1160 MHz:

Lower half of the band	E_n	= 18120 + 40n MHz	for n = 1 to 2
Upper half of the band	E'_n	= 19280 + 40n MHz	for n = 1 to 2

Unpaired channels:

	F_n	= 18200 + 40n	for n = 1 to 2

4.2.3 The centre frequencies of the 13 paired channels and 3 unpaired channels which allow RF channel bandwidths of greater than 20 MHz and less than or equal to 30 MHz are expressed by the following relationships:

Paired channels with T/R spacing = 1560 MHz:

Lower half of the band	G_n	= 17785 + 30n MHz	for n = 1 to 11
Upper half of the band	G'_n	= 19345 + 30n MHz	for n = 1 to 11

Paired channels with T/R spacing = 1160 MHz:

Lower half of the band	H_n	= 18125 + 30n MHz	for n = 1 to 2
Upper half of the band	H'_n	= 19285 + 30n MHz	for n = 1 to 2

Unpaired channel:

	J_n	= 18185+ 30n MHz	for n = 1 to 3

4.2.4 The centre frequencies of the 20 paired channels and 5 unpaired channels which allow RF channel bandwidths of greater than 10 MHz and less than or equal to 20 MHz are expressed by the following relationships:

Paired channels with T/R spacing = 1560 MHz:

Lower half of the band	K_n	= 17790 + 20n MHz	for n = 1 to 17
Upper half of the band	K'_n	= 19350 + 20n MHz	for n = 1 to 17

Paired channels with T/R spacing = 1160 MHz:

Lower half of the band	L_n	= 18130 + 20n MHz	for n = 1 to 3
Upper half of the band	L'_n	= 19290 + 20n MHz	for n = 1 to 3

Unpaired channel:

	M_n	= 18190 + 20n MHz	for n = 1 to 5

4.2.5 The centre frequencies of the 40 paired channels and 10 unpaired channels which allow RF channel bandwidths of greater than 5 MHz and less than or equal to 10 MHz are expressed by the following relationships:

Paired channels with T/R spacing = 1560 MHz:

Lower half of the band	N_n	= 17795 + 10n MHz	for n = 1 to 34
Upper half of the band	N'_n	= 19355 + 10n MHz	for n = 1 to 34

Paired channels with T/R spacing = 1160 MHz:

Lower half of the band	P_n	= 18135 + 10n MHz	for n = 1 to 6
Upper half of the band	P'_n	= 19295 + 10n MHz	for n = 1 to 6

Unpaired channels:

	Q_n	= 18195 + 10n MHz	for n = 1 to 10

4.2.6 The centre frequencies of the 80 paired channels and 20 unpaired channels which allow RF channel bandwidths of greater than 2.5 MHz and less than or equal to 5 MHz are expressed by the following relationships:

Paired channels with T/R spacing = 1560 MHz:

Lower half of the band	R_n	= 17797.5 + 5n MHz	for n = 1 to 68
Upper half of the band	R'_n	= 19357.5 + 5n MHz	for n = 1 to 68

Paired channels with T/R spacing = 1160 MHz:

Lower half of the band	S_n	= 18137.5 + 5n MHz	for n = 1 to 12
Upper half of the band	S'_n	= 19297.5 + 5n MHz	for n = 1 to 12

Unpaired channels:

	T_n	= 18197.5 + 5n MHz	for n = 1 to 20

4.2.7 The centre frequencies of the 160 paired channels and 40 unpaired channels which allow RF channel bandwidths of 2.5 MHz are expressed by the following relationships:

Paired channels with T/R spacing = 1560 MHz:

Lower half of the band	U_n	= 17798.75 + 2.5n MHz	for n = 1 to 136
Upper half of the band	U'_n	= 19358.75 + 2.5n MHz	for n = 1 to 136

Paired channels with T/R spacing = 1160 MHz:

Lower half of the band	W_n	= 18138.75 + 2.5n MHz	for n = 1 to 24
Upper half of the band	W'_n	= 19298.75 + 2.5n MHz	for n = 1 to 24

Unpaired channels:

	X_n	= 18198.75 + 2.5n MHz	for n = 1 to 40

4.3 Branching or Spur Route Channels

The frequencies assigned to a main route system should be reused on the branching or spur routes where possible. The siting of repeater stations should be planned with this requirement in view in order that sufficient antenna discrimination is obtained at the branch-off angle.

4.4 Closed Loops

Systems must be designed so that any closed loop will comprise an even number of hops.

4.5 Assignment of Frequencies

New systems using any of the 50, 40, 30, 20, and 10 MHz channel plans should use the lowest available frequency pair that can be successfully coordinated. New systems using 5 and 2.5 MHz channel plans should use the highest available frequency pair that can be successfully coordinated.

4.6 Spectral Efficiency

Digital systems submitted for licensing must have a spectral efficiency capability of at least 1.0 bits/sec/hertz of RF channel bandwidth on a single polarization.

4.7 Protection Channels

One protection channel will normally be permitted for systems designed and planned with more than one working channel. Single channel systems requiring protection must employ hot standby protection.

5. Transmitter Characteristics

5.1 The transmitter power delivered to the antenna input shall not exceed the following limits for each RF channel bandwidth.

Table 1

RF Channel Bandwidth (MHz)	Power Limit (watts)
50	5
40	5
30	5
20	5
10	5
5	1
2.5	1

5.2 The transmitted frequency shall be maintained within 0.003% of the assigned frequency.

5.3 The transmitter emissions in any 1 MHz band, the centre frequency of which is removed from the assigned frequency by more than 50% up to and including 250% of the authorized

bandwidth, shall be as specified by the following equation but in no event less than 11 dB; however, attenuation greater than 56 dB or to an absolute power of less than -13dBm/MHz is not required:

$A = 11 + 0.4 (P - 50) + 10 \log_{10} B$ (dB)

A = Attenuation (in dB) below the mean output power level

P = Separation between the assigned carrier and any emission outside the authorized bandwidth divided by the authorized bandwidth expressed as a percent.

B = Authorized bandwidth in MHz

The transmitter emissions in any 1 MHz band, the centre frequency of which is removed from the assigned frequency by more than 250% of the authorized bandwidth shall be attenuated by $43+ 10 \log_{10}$ (mean output power in watts) dB or 80 dB, whichever is the lesser attenuation.

6. Antenna Characteristics[5]

6.1 The co-polarized radiation pattern envelope in the horizontal plane of the antenna must remain within Envelope A defined in Table 2 and shown in Figure 2, for both vertical and horizontal polarizations.

6.2 In uncongested areas, the co-polarized radiation pattern envelope in the horizontal plane of the antenna must remain within Envelope B defined in Table 2 and shown in Figure 2 for both vertical and horizontal polarizations.

[5] It should be noted that the bands 17.8-18.3 GHz and 19.3-19.7 GHz are also allocated internationally to the fixed-satellite service which must conform to the power flux-density limits given in ITU Radio Regulations Article 21, these limits being:

-115 dB(W/m^2) / MHz for $\delta = 0^o$-5^o
-115 + 0.5(δ-5) dB(W/m^2) / MHz for $\delta = 5^o$-25^o
-105 dB(W/m^2) / MHz for $\delta = 25^o$-90^o
where δ represents the angle of arrival above the horizontal plane.

Table 2: Antenna Standards

Envelope	Minimum Radiation Suppression to Angle in Degrees from Centreline of Main Beam (dB)								
	0º to 1.1º	1.1º to 5º	5º to 10º	10º to 15º	15º to 20º	20º to 30º	30º to 100º	100º to 140º	140º to 180º
A	0	3	25	29	33	36	42	55	55
B	0	3	20	24	28	32	35	36	36

7. Maximum Equivalent Isotropically Radiated Power

7.1 The maximum equivalent isotropically radiated power (e.i.r.p.) from the antenna must not in any case exceed +55 dBW per RF channel.

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_____
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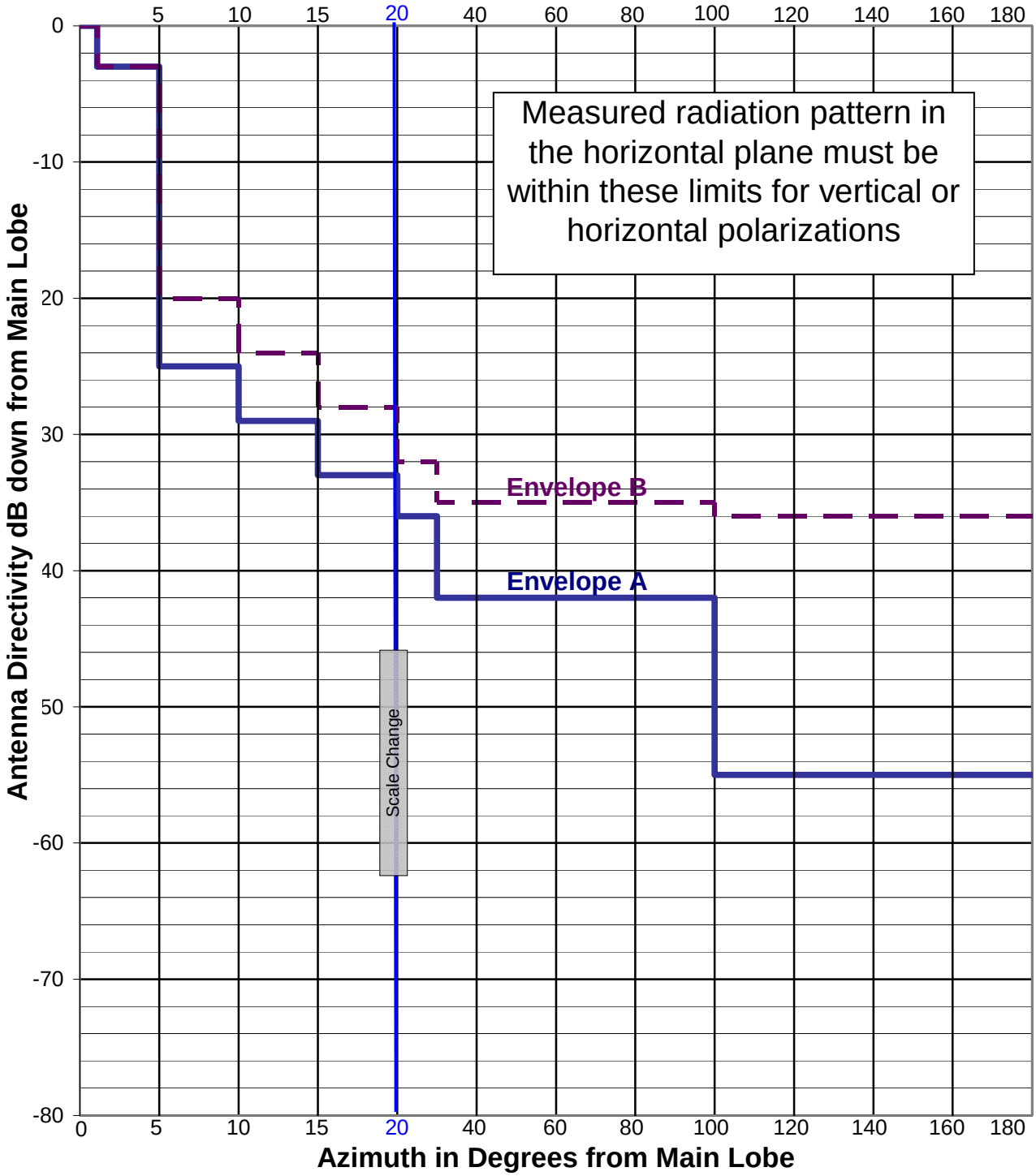
Spectrum Engineering Branch

Figure 1: Minimum Antenna Characteristics
Frequency Bands 17.8-18.3 GHz and 19.3-19.7 GHz



Appendix 1 - Centre Frequencies of Existing Radio Systems

(Coordination with these systems is necessary as per Section 2.1)

1. The bands 17.7-18.14 GHz and 19.26-19.7 GHz

1.1 The centre frequencies in MHz of the 5 paired channels which allow RF channel bandwidths of greater than 40 MHz and less than or equal to 80 MHz are expressed by the following relationships:

Lower half of the band	A_n	= 18140 - 80n	for n = 1 to 5
Upper half of the band	A'_n	= 19700 - 80n	for n = 1 to 5

where n is the channel number and A_n and A'_n are the centre frequencies of the paired channels.

1.2 The centre frequencies in MHz of the 11 paired channels which allow RF channel bandwidths of greater than 20 MHz and less than or equal to 40 MHz are expressed by the following relationships:

Lower half of the band	B_n	= 18160 - 40n	for n = 1 to 11
Upper half of the band	B'_n	= 19720 - 40n	for n = 1 to 11

where n is the channel number and B_n and B'_n are the centre frequencies of the paired channels.

1.3 The centre frequencies in MHz of the 22 paired channels which allow RF channel bandwidths of greater than 10 MHz and less than or equal to 20 MHz are expressed by the following relationships:

Lower half of the band	C_n	= 18150 - 20n	for n = 1 to 22
Upper half of the band	C'_n	= 19710 - 20n	for n = 1 to 22

where n is the channel number and C_n and C'_n are the centre frequencies of the paired channels.

1.4 The centre frequencies in MHz of the 44 paired channels which allow RF channel bandwidths of 10 MHz are expressed by the following relationships:

Lower half of the band	D_n	= 18145 - 10n	for n = 1 to 44
Upper half of the band	D'_n	= 19705 - 10n	for n = 1 to 44

where n is the channel number and D_n and D'_n are the centre frequencies of the paired channels.

2. The bands 18.58-18.82 and 18.92-19.16 GHz

2.1 The centre frequencies in MHz of the 48 paired channels which allow RF channel bandwidths of 5 MHz and less are expressed by the following relationships:

Lower half of the band	A_n	= 18577.5 + 5n	for n = 1 to 48
Upper half of the band	A'_n	= 18917.5 + 5n	for n = 1 to 48

where n is the channel number and A_n and A'_n are the centre frequencies of the paired channels.

2.2 The centre frequencies in MHz of the 24 paired channels which allow RF channel bandwidths of greater than 5 MHz and less than or equal to 10 MHz are expressed by the following relationships:

Lower half of the band $B_n = 18575 + 10n$ for n = 1 to 24
Upper half of the band $B'_n = 18915 + 10n$ for n = 1 to 24
where n is the channel number and B_n and B'_n are the centre frequencies of the paired channels.

2.3 The centre frequencies in MHz of the 12 paired channels which allow RF channel bandwidths of greater than 10 MHz and less than or equal to 20 MHz are expressed by the following relationships:

Lower half of the band $C_n = 18570 + 20n$ for n = 1 to 12
Upper half of the band $C'_n = 18910 + 20n$ for n = 1 to 12
where n is the channel number and C_n and C'_n are the centre frequencies of the paired channels.

3. The bands 18.82-18.92 GHz and 19.16-19.26 GHz

3.1 Channel identification and carrier frequencies of 10 MHz bandwidth RF channels:

Channel No.	Lower (GHz)	Channel No.	Upper (GHz)
1	18.825	1'	19.165
2	18.835	2'	19.175
3	18.845	3'	19.185
4	18.855	4'	19.195
5	18.865	5'	19.205
6	18.875	6'	19.215
7	18.885	7'	19.225
8	18.895	8'	19.235
9	18.905	9'	19.245
10	18.915	10'	19.255

Appendix 2

Table 1: Channel Identification and Carrier Frequencies for Paired Radio Systems with T/R Spacing of 1560 MHz Operating in the Bands 17.8-18.3 GHz and 19.3-19.7 GHz

Go (Return) channels								Go (Return) channels							
Frequency (MHz)	Channel bandwidth (MHz)							Frequency (MHz)	Channel bandwidth (MHz)						
	50	40	30	20	10	5	2.5		50	40	30	20	10	5	2.5
17801.25							U1	19361.25							U1'
17802.50						R1		19362.50						R1'	
17803.75							U2	19363.75							U2'
17805.00					N1			19365.00					N1'		
17806.25							U3	19366.25							U3'
17807.50						R2		19367.50						R2'	
17808.75							U4	19368.75							U4'
17810.00				K1				19370.00				K1'			
17811.25							U5	19371.25							U5'
17812.50						R3		19372.50						R3'	
17813.75							U6	19373.75							U6'
17815.00			G1		N2			19375.00			G1'		N2'		
17816.25							U7	19376.25							U7'
17817.50						R4		19377.50						R4'	
17818.75							U8	19378.75							U8'
17820.00								19380.00							
17821.25							U9	19381.25							U9'
17822.50						R5		19382.50						R5'	
17823.75							U10	19383.75							U10'
17825.00					N3			19385.00					N3'		
17826.25							U11	19386.25							U11'
17827.50						R6		19387.50						R6'	
17828.75							U12	19388.75							U12'
17830.00				K2				19390.00				K2'			
17831.25							U13	19391.25							U13'
17832.50						R7		19392.50						R7'	
17833.75							U14	19393.75							U14'
17835.00					N4			19395.00					N4'		
17836.25							U15	19396.25							U15'
17837.50						R8		19397.50						R8'	
17838.75							U16	19398.75							U16'
17840.00		D1						19400.00		D1'					
17841.25							U17	19401.25							U17'
17842.50						R9		19402.50						R9'	
17843.75							U18	19403.75							U18'
17845.00			G2		N5			19405.00			G2'		N5'		
17846.25							U19	19406.25							U19'
17847.50						R10		19407.50						R10'	
17848.75							U20	19408.75							U20'
17850.00				K3				19410.00				K3'			
17851.25							U21	19411.25							U21'
17852.50						R11		19412.50						R11'	
17853.75							U22	19413.75							U22'
17855.00					N6			19415.00					N6'		
17856.25							U23	19416.25							U23'
17857.50						R12		19417.50						R12'	
17858.75							U24	19418.75							U24'

Go (Return) channels								Go (Return) channels							
Frequency (MHz)	Channel bandwidth (MHz)							Frequency (MHz)	Channel bandwidth (MHz)						
	50	40	30	20	10	5	2.5		50	40	30	20	10	5	2.5
17860.00								19420.00							
17861.25							U25	19421.25							U25'
17862.50						R13		19422.50						R13'	
17863.75							U26	19423.75							U26'
17865.00	A1				N7			19425.00	A1'				N7'		
17866.25							U27	19426.25							U27'
17867.50						R14		19427.50						R14'	
17868.75							U28	19428.75							U28'
17870.00				K4				19430.00				K4'			
17871.25							U29	19431.25							U29'
17872.50						R15		19432.50						R15'	
17873.75							U30	19433.75							U30'
17875.00			G3		N8			19435.00			G3'		N8'		
17876.25							U31	19436.25							U31'
17877.50						R16		19437.50						R16'	
17878.75							U32	19438.75							U32'
17880.00		D2						19440.00		D2'					
17881.25							U33	19441.25							U33'
17882.50						R17		19442.50						R17'	
17883.75							U34	19443.75							U34'
17885.00					N9			19445.00					N9'		
17886.25							U35	19446.25							U35'
17887.50						R18		19447.50						R18'	
17888.75							U36	19448.75							U36'
17890.00				K5				19450.00				K5'			
17891.25							U37	19451.25							U37'
17892.50						R19		19452.50						R19'	
17893.75							U38	19453.75							U38'
17895.00					N10			19455.00					N10'		
17896.25							U39	19456.25							U39'
17897.50						R20		19457.50						R20'	
17898.75							U40	19458.75							U40'
17900.00								19460.00							
17901.25							U41	19461.25							U41'
17902.50						R21		19462.50						R21'	
17903.75							U42	19463.75							U42'
17905.00			G4		N11			19465.00			G4'		N11'		
17906.25							U43	19466.25							U43'
17907.50						R22		19467.50						R22'	
17908.75							U44	19468.75							U44'
17910.00				K6				19470.00				K6'			
17911.25							U45	19471.25							U45'
17912.50						R23		19472.50						R23'	
17913.75							U46	19473.75							U46'
17915.00	A2				N12			19475.00					N12'		
17916.25							U47	19476.25							U47'
17917.50						R24		19477.50						R24'	
17918.75							U48	19478.75							U48'
17920.00		D3						19480.00		D3'					
17921.25							U49	19481.25							U49'
17922.50						R25		19482.50						R25'	
17923.75							U50	19483.75							U50'
17925.00					N13			19485.00					N13'		

Go (Return) channels								Go (Return) channels							
Frequency (MHz)	Channel bandwidth (MHz)							Frequency (MHz)	Channel bandwidth (MHz)						
	50	40	30	20	10	5	2.5		50	40	30	20	10	5	2.5
17926.25							U51	19486.25							U51'
17927.50						R26		19487.50						R26'	
17928.75							U52	19488.75							U52'
17930.00				K7				19490.00				K7'			
17931.25							U53	19491.25							U53'
17932.50						R27		19492.50						R27'	
17933.75							U54	19493.75							U54'
17935.00			G5		N14			19495.00			G5'		N14'		
17936.25							U55	19496.25							U55'
17937.50						R28		19497.50						R28'	
17938.75							U56	19498.75							U56'
17940.00								19500.00							
17941.25							U57	19501.25							U57'
17942.50						R29		19502.50						R29'	
17943.75							U58	19503.75							U58'
17945.00					N15			19505.00					N15'		
17946.25							U59	19506.25							U59'
17947.50						R30		19507.50						R30'	
17948.75							U60	19508.75							U60'
17950.00				K8				19510.00				K8'			
17951.25							U61	19511.25							U61'
17952.50						R31		19512.50						R31'	
17953.75							U62	19513.75							U62'
17955.00					N16			19515.00					N16'		
17956.25							U63	19516.25							U63'
17957.50						R32		19517.50						R32'	
17958.75							U64	19518.75							U64'
17960.00		D4						19520.00		D4'					
17961.25							U65	19521.25							U65'
17962.50						R33		19522.50						R33'	
17963.75							U66	19523.75							U66'
17965.00	A3		G6		N17			19525.00	A3'		G6'		N17'		
17966.25							U67	19526.25							U67'
17967.50						R34		19527.50						R34'	
17968.75							U68	19528.75							U68'
17970.00				K9				19530.00				K9'			
17971.25							U69	19531.25							U69'
17972.50						R35		19532.50						R35'	
17973.75							U70	19533.75							U70'
17975.00					N18			19535.00					N18'		
17976.25							U71	19536.25							U71'
17977.50						R36		19537.50						R36'	
17978.75							U72	19538.75							U72'
17980.00								19540.00							
17981.25							U73	19541.25							U73'
17982.50						R37		19542.50						R37'	
17983.75							U74	19543.75							U74'
17985.00					N19			19545.00					N19'		
17986.25							U75	19546.25							U75'
17987.50						R38		19547.50						R38'	
17988.75							U76	19548.75							U76'
17990.00				K10				19550.00				K10'			
17991.25							U77	19551.25							U77'

Go (Return) channels								Go (Return) channels							
Frequency (MHz)	Channel bandwidth (MHz)							Frequency (MHz)	Channel bandwidth (MHz)						
	50	40	30	20	10	5	2.5		50	40	30	20	10	5	2.5
17992.50						R39		19552.50						R39'	
17993.75							U78	19553.75							U78'
17995.00			G7		N20			19555.00			G7'		N20'		
17996.25							U79	19556.25							U79'
17997.50						R40		19557.50						R40'	
17998.75							U80	19558.75							U80'
18000.00		D5						19560.00		D5'					
18001.25							U81	19561.25							U81'
18002.50						R41		19562.50						R41'	
18003.75							U82	19563.75							U82'
18005.00					N21			19565.00					N21'		
18006.25							U83	19566.25							U83'
18007.50						R42		19567.50						R42'	
18008.75							U84	19568.75							U84'
18010.00				K11				19570.00				K11'			
18011.25							U85	19571.25							U85'
18012.50						R43		19572.50						R43'	
18013.75							U86	19573.75							U86'
18015.00	A4				N22			19575.00	A4'				N22'		
18016.25							U87	19576.25							U87'
18017.50						R44		19577.50						R44'	
18018.75							U88	19578.75							U88'
18020.00								19580.00							
18021.25							U89	19581.25							U89'
18022.50						R45		19582.50						R45'	
18023.75							U90	19583.75							U90'
18025.00			G8		N23			19585.00			G8'		N23'		
18026.25							U91	19586.25							U91'
18027.50						R46		19587.50						R46'	
18028.75							U92	19588.75							U92'
18030.00				K12				19590.00				K12'			
18031.25							U93	19591.25							U93'
18032.50						R47		19592.50						R47'	
18033.75							U94	19593.75							U94'
18035.00					N24			19595.00					N24'		
18036.25							U95	19596.25							U95'
18037.50						R48		19597.50						R48'	
18038.75							U96	19598.75							U96'
18040.00		D6						19600.00		D6'					
18041.25							U97	19601.25							U97'
18042.50						R49		19602.50						R49'	
18043.75							U98	19603.75							U98'
18045.00					N25			19605.00					N25'		
18046.25							U99	19606.25							U99'
18047.50						R50		19607.50						R50'	
18048.75							U100	19608.75							U100'
18050.00				K13				19610.00				K13'			
18051.25							U101	19611.25							U101'
18052.50						R51		19612.50						R51'	
18053.75							U102	19613.75							U102'
18055.00			G9		N26			19615.00			G9'		N26'		
18056.25							U103	19616.25							U103'
18057.50						R52		19617.50						R52'	

Go (Return) channels								Go (Return) channels							
Frequency (MHz)	Channel bandwidth (MHz)							Frequency (MHz)	Channel bandwidth (MHz)						
	50	40	30	20	10	5	2.5		50	40	30	20	10	5	2.5
18058.75							U014	19618.75							U104'
18060.00								19620.00							
18061.25							U105	19621.25							U105'
18062.50						R53		19622.50						R53'	
18063.75							U106	19623.75							U106'
18065.00	A5				N27			19625.00	A5'				N27'		
18066.25							U107	19626.25							U107'
18067.50						R54		19627.50						R54'	
18068.75							U108	19628.75							U108'
18070.00				K14				19630.00				K14'			
18071.25							U109	19631.25							U109'
18072.50						R55		19632.50						R55'	
18073.75							U110	19633.75							U110'
18075.00					N28			19635.00					N28'		
18076.25							U111	19636.25							U111'
18077.50						R56		19637.50						R56'	
18078.75							U112	19638.75							U112'
18080.00		D7						19640.00		D7'					
18081.25							U113	19641.25							U113'
18082.50						R57		19642.50						R57'	
18083.75							U114	19643.75							U114'
18085.00			G10		N29			19645.00			G10'		N29'		
18086.25							U115	19646.25							U115'
18087.50						R58		19647.50						R58'	
18088.75							U116	19648.75							U116'
18090.00				K15				19650.00				K15'			
18091.25							U117	19651.25							U117'
18092.50						R59		19652.50						R59'	
18093.75							U118	19653.75							U118'
18095.00					N30			19655.00					N30'		
18096.25							U119	19656.25							U119'
18097.50						R60		19657.50						R60'	
18098.75							U120	19658.75							U120'
18100.00								19660.00							
18101.25							U121	19661.25							U121'
18102.50						R61		19662.50						R61'	
18103.75							U122	19663.75							U122'
18105.00					N31			19665.00					N31'		
18106.25							U123	19666.25							U123'
18107.50						R62		19667.50						R62'	
18108.75							U124	19668.75							U124'
18110.00				K16				19670.00				K16'			
18111.25							U125	19671.25							U125'
18112.50						R63		19672.50						R63'	
18113.75							U126	19673.75							U126'
18115.00	A6		G11		N32			19675.00	A6'		G11'		N32'		
18116.25							U127	19676.25							U127'
18117.50						R64		19677.50						R64'	
18118.75							U128	19678.75							U128'
18120.00		D8						19680.00		D8'					
18121.25							U129	19681.25							U129'
18122.50						R65		19682.50						R65'	
18123.75							U130	19683.75							U130'

Go (Return) channels								Go (Return) channels							
Frequency (MHz)	Channel bandwidth (MHz)							Frequency (MHz)	Channel bandwidth (MHz)						
	50	40	30	20	10	5	2.5		50	40	30	20	10	5	2.5
18125.00					N33			19685.00					N33'		
18126.25							U131	19686.25							U131'
18127.50						R66		19687.50						R66'	
18128.75							U132	19688.75							U132'
18130.00				K17				19690.00				K17'			
18131.25							U133	19691.25							U133'
18132.50						R67		19692.50						R67'	
18133.75							U134	19693.75							U134'
18135.00					N34			19695.00					N34'		
18136.25							U135	19696.25							U135'
18137.50						R68		19697.50						R68'	
18138.75							U136	19698.75							U136'

Table 2: Channel Identification and Carrier Frequencies for Paired Radio Systems with T/R Spacing of 1160 MHz Operating in the Bands 17.8-18.3 GHz and 19.3-19.7 GHz

Go (Return) channels								Go (Return) channels							
Frequency (MHz)	Channel bandwidth (MHz)							Frequency (MHz)	Channel bandwidth (MHz)						
	50	40	30	20	10	5	2.5		50	40	30	20	10	5	2.5
18141.25							W1	19301.25							W1'
18142.50						S1		19302.50						S1'	
18143.75							W2	19303.75							W2'
18145.00					P1			19305.00					P1'		
18146.25							W3	19306.25							W3'
18147.50						S2		19307.50						S2'	
18148.75							W4	19308.75							W4'
18150.00				L1				19310.00				L1'			
18151.25							W5	19311.25							W5'
18152.50						S3		19312.50						S3'	
18153.75							W6	19313.75							W6'
18155.00			H1		P2			19315.00			H1'		P2'		
18156.25							W7	19316.25							W7'
18157.50						S4		19317.50						S4'	
18158.75							W8	19318.75							W8'
18160.00		E1						19320.00		E1'					
18161.25							W9	19321.25							W9'
18162.50						S5		19322.50						S5'	
18163.75							W10	19323.75							W10'
18165.00	B1				P3			19325.00	B1'				P3'		
18166.25							W11	19326.25							W11'
18167.50						S6		19327.50						S6'	
18168.75							W12	19328.75							W12'
18170.00				L2				19330.00				L2'			
18171.25							W13	19331.25							W13'
18172.50						S7		19332.50						S7'	
18173.75							W14	19333.75							W14'
18175.00					P4			19335.00					P4'		
18176.25							W15	19336.25							W15'
18177.50						S8		19337.50						S8'	
18178.75							W16	19338.75							W16'
18180.00								19340.00							
18181.25							W17	19341.25							W17'
18182.50						S9		19342.50						S9'	
18183.75							W18	19343.75							W18'
18185.00			H2		P5			19345.00			H2'		P5'		
18186.25							W19	19346.25							W19'
18187.50						S10		19347.50						S10'	
18188.75							W20	19348.75							W20'
18190.00				L3				19350.00				L3'			
18191.25							W21	19351.25							W21'
18192.50						S11		19352.50						S11'	
18193.75							W22	19353.75							W22'
18195.00					P6			19355.00					P6'		
18196.25							W23	19356.25							W23'
18197.50						S12		19357.50						S12'	
18198.75							W24	19358.75							W24'
18200.00		E2						19360.00		E2'					
18201.25								19361.25							

Go (Return) channels								Go (Return) channels							
Frequency (MHz)	Channel bandwidth (MHz)							Frequency (MHz)	Channel bandwidth (MHz)						
	50	40	30	20	10	5	2.5		50	40	30	20	10	5	2.5
18202.50								19362.50							
18203.75								19363.75							
18205.00								19365.00							
18206.25								19366.25							
18207.50								19367.50							
18208.75								19368.75							
18210.00								19370.00							
18211.25								19371.25							
18212.50								19372.50							
18213.75								19373.75							
18215.00	B2							19375.00	B2'						

Table 3: Channel Identification and Carrier Frequencies for Unpaired Radio Systems Operating in the Bands 17.8-18.3 GHz and 19.3-19.7 GHz

Frequency (MHz)	Channel bandwidth (MHz)						
	50	40	30	20	10	5	2.5
18201.25							X1
18202.50						T1	
18203.75							X2
18205.00					Q1		
18206.25							X3
18207.50						T2	
18208.75							X4
18210.00				M1			
18211.25							X5
18212.50						T3	
18213.75							X6
18215.00			J1		Q2		
18216.25							X7
18217.50						T4	
18218.75							X8
18220.00							
18221.25							X9
18222.50						T5	
18223.75							X10
18225.00					Q3		
18226.25							X11
18227.50						T6	
18228.75							X12
18230.00				M2			
18231.25							X13
18232.50						T7	
18233.75							X14
18235.00					Q4		
18236.25							X15
18237.50						T8	
18238.75							X16
18240.00		F1					
18241.25							X17
18242.50						T9	
18243.75							X18
18245.00			J2		Q5		
18246.25							X19
18247.50						T10	
18248.75							X20
18250.00				M3			
18251.25							X21
18252.50						T11	
18253.75							X22
18255.00					Q6		
18256.25							X23
18257.50						T12	
18258.75							X24
18260.00							
18261.25							X25
18262.50						T13	

Frequency (MHz)	Channel bandwidth (MHz)						
	50	40	30	20	10	5	2.5
18263.75							X26
18265.00	C1				Q7		
18266.25							X27
18267.50						T14	
18268.75							X28
18270.00				M4			
18271.25							X29
18272.50						T15	
18273.75							X30
18275.00			J3		Q8		
18276.25							X31
18277.50						T16	
18278.75							X32
18280.00		F2					
18281.25							X33
18282.50						T17	
18283.75							X34
18285.00					Q9		
18286.25							X35
18287.50						T18	
18288.75							X36
18290.00				M5			
18291.25							X37
18292.50						T19	
18293.75							X38
18295.00					Q10		
18296.25							X39
18297.50						T20	
18298.75							X40