

ITUEvents

ITU World Radiocommunication Seminar 2018

**3-7 December 2018
Geneva, Switzerland**

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C/I Exercise Materials



EXERCISE 1

- Downlink
- Interference from Digital (wide) to Digital(narrow)
- Wanted
 - THAICOM-AK2 (78.5°E)
 - Group ID : 96604135
 - Emission : 22K0G7W
- Interfering
 - INTERSPUTNIK-75E-Q(75°E)
 - Group ID : 105625699
 - Emission : 32M2G7W

Wanted

THAICOM-AK2 (96500002)

B1a/BR17 Beam designation TK1 **B1b** Steerable **B2** Emi-Rcp E **B3a1** Max. co-polar gain 38.9 **B3d** Pointing accuracy 0.08

BR7a/BR7b Group id 96604135 **BR1** Date of receipt 08.01.1996 **C2c** RR No. 4.4

A2a Date of bringing into use 17.12.1993 **A2b** Period of valid. 35 **A3a** Op. agency 1 **A3b** Adm. resp. A **BR16** Value of type C8b

BR62 Expiry date for bringing into use 06.08.2000 **BR63** Confirmed date of bringing into use 17.12.1993 **BR64** Date of receipt of 1st Res49

BR14 Special Section

C4a Class of station EC **C3a** Assigned freq. band 54000

C4b Nature of service CP **C6a** Polarization type **C6b** Polarization angle

C8d1 Max. tot. peak pwr. **C8d2** Contiguous bandwidth

C11a1 Service area no. 1 **C11a2** Service area **C11a3** Service area diagram 1

A5/A6 Coordinations/Agreements RR1060 0 G TON URS USA USA/IT

C2a1 Assigned frequency

12.5949 GHz 12.6575 GHz 12.7201 GHz

A13 Ref. to Special Sections	C7a Design. of emission		C8a1/C8b1 Max. peak pwr	C8a2/C8b2 Max. pwr dens.	C8c1 Min. peak pwr	C8c2 Attch.	C8c3 Min. pwr dens.	C8c4 Attch.	C8e1 C/N ratio	C8e2 Attch.
	AR11/A/727 AR11/C/2196 AP30/A/127	1	22K0G7W--	-14.9	-58.3					

C10b1 Assoc. earth station id.	C10b2 Type	C10c1 Geographical coord.	C10c2 Ctry	C10d1/C10d2 Cls. / Nat.	C10d3 Max. iso. gain	C10d4 Bmwdth	C10d6 Noise temp.	C10d7 Ant. diameter	C10d9 Ant. dim. (DGSO)
TYPICAL K2 (6/1.2)	T			1 TC CP	41.5	1.45	200		

C10d5a Co-polar antenna pattern

C10b1 Assoc. earth station id.	Co-polar ref. pattern	Coef. A	Coef. B	Coef. C	Coef. D	Phi1	Co-polar rad. diag.
TYPICAL K2 (6/1.2)	A-25*LOG(FI)	29					

Findings **2D** Date of protection 08.01.1996 **13A** Conformity with RR A- A- -- **13B1** Provision **13B2** Remarks **13B3** Date of Review

13C Remarks



INTERSPUTNIK-75E-Q (105500291)

B1a/BR17 Beam designation
 B1b Steerable
 B2 Emi-Rcp
 B3a1 Max. co-polar gain
 B3d Pointing accuracy

BR7a/BR7b Group id.
 BR1 Date of receipt
 C2c RR No. 4.4

A2a Date of bringing into use
A2b Period of valid.
A3a Op. agency
A3b Adm. resp.
BR16 Value of type C8b

BR62 Expiry date for bringing into use
BR63 Confirmed date of bringing into use
BR64 Date of receipt of 1st Res49

BR14 Special Section

C4a Class of station
C3a Assigned freq. band

C4b Nature of service
C6a Polarization type
C6b Polarization angle

C8d1 Max. tot. peak pwr.
C8d2 Contiguous bandwidth

C11a1 Service area no.
C11a2 Service area
C11a3 Service area diagram

A5/A6 Coordinations/Agreements	9.7	<input type="radio"/>	BRU CHN F/EUT G INS LAO RUS SNG THA TUR UAE USA VTN
	AP30#7.1	<input type="radio"/>	
	N/9.7	<input type="radio"/>	
TON			

C2a1 Assigned frequency											
12.525	GHz	12.565	GHz	12.605	GHz	12.645	GHz	12.685	GHz		
12.545	GHz	12.585	GHz	12.625	GHz	12.665	GHz	12.705	GHz		

A13 Ref. to Special Sections	C7a Design. of emission		C8a1/C8b1 Max. peak pwr	C8a2/C8b2 Max. pwr dens.	C8c1 Min. peak pwr	C8c2 Attch.	C8c3 Min. pwr dens.	C8c4 Attch.	C8e1 C/N ratio	C8e2 Attch.
	API/A/428	1	36M0F8W--	5.9	-60.1	0.9		-65.1		16.6
CR/C/144	2	32M2G7W--	14.9	-60.1	7.9		-67.1		23.1	
	3	45K0G1X--	-16.6	-63.1	-23.6		-70.1		20.2	

C10b1 Assoc. earth station id.	C10b2 Type	C10c1 Geographical coord.	C10c2 Ctry	C10d1/C10d2 Cls. / Nat.	C10d3 Max. iso. gain	C10d4 Bmwidth	C10d6 Noise temp.	C10d7 Ant. diameter	C10d9 Ant. dim. (DGSO)
TYPICAL-4, 5	T			1 TC CP	53.3	0.36	200		

C10d5a Co-polar antenna pattern							
C10b1 Assoc. earth station id.	Co-polar ref. pattern	Coef. A	Coef. B	Coef. C	Coef. D	Phi1	Co-polar rad. diag.
TYPICAL-4, 5	REC-580						

Findings **2D** Date of protection
13A Conformity with RR
13B1 Provision
13B2 Remarks
13B3 Date of Review

13C Remarks



Exercise 1

Wanted:

Interfering:

Interference from Digital wide to Digital narrow

THAICOM-AK2 (78.5E)

INTERSPUTNIK-75E-Q (75E)

Longitudinal Tolerance

0.1

Longitudinal Tolerance

0.1

DOWNLINK

	Wanted
Beam	TK1
Group ID	96604135
Emission	22K0G7W
Wanted E/S long	106.86
Wanted E/S Lat	18.85
Topocentric angle	3.73
Wanted E/s sidelobe pattern	A-25log() A=29
Frequency (MHZ)	12585

	Interfering
Beam	002
Group ID	105625699
Emission	32M2G7W

	Wanted
Ps	
Gs	
ES relative to wanted beam peak	
FSL	
Ges	
BW(Hz)	
Tes	

	Interfering
Ps	
Gs	
ES relative to interfering beam peak	
FSL	
Wanted Ges()	
BW(Hz)	

Carrier	
Noise	
C/N	
C/I basic	
adj factor	
C/I adj	
C/I req'd	C/N+12.2
Margin	
to add 1.87	Sect B3 ROP Attachment2 para5

Interference	
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EXERCISE 2

- Downlink
- Interference from Digital (narrow) to Digital(wide)
- Wanted
 - THAICOM-AK2 (78.5°E)
 - Group ID : 96604139
 - Emission : 27M0G1W
- Interfering
 - INTERSPUTNIK-75E-Q(75°E)
 - Group ID : 105625699
 - Emission : 45K0G1X

Wanted

THAICOM-AK2 (96500002)

B1a/BR17 Beam designation TK1 **B1b** Steerable **B2** Emi-Rcp E **B3a1** Max. co-polar gain 38.9 **B3d** Pointing accuracy 0.08

BR7a/BR7b Group id 96604139 **BR1** Date of receipt 08.01.1996 **C2c** RR No. 4.4

A2a Date of bringing into use 17.12.1993 **A2b** Period of valid. 35 **A3a** Op. agency 1 **A3b** Adm. resp. A **BR16** Value of type C8b

BR62 Expiry date for bringing into use 06.08.2000 **BR63** Confirmed date of bringing into use 17.12.1993 **BR64** Date of receipt of 1st Res49

BR14 Special Section

C4a Class of station EC **C3a** Assigned freq. band 54000

C4b Nature of service CP **C6a** Polarization type **C6b** Polarization angle

C8d1 Max. tot. peak pwr. **C8d2** Contiguous bandwidth

C11a1 Service area no. 1 **C11a2** Service area **C11a3** Service area diagram 1

A5/A6 Coordinations/Agreements RR1060 G TON URS USA USA/IT

C2a1 Assigned frequency

12.5949 GHz 12.6575 GHz 12.7201 GHz

A13 Ref. to Special Sections	C7a Design. of emission		C8a1/C8b1 Max. peak pwr	C8a2/C8b2 Max. pwr dens.	C8c1 Min. peak pwr	C8c2 Attch.	C8c3 Min. pwr dens.	C8c4 Attch.	C8e1 C/N ratio	C8e2 Attch.
	AR11/A/727 AR11/C/2196 AP30/A/127	1	27M0G1W--	15.1	-59.2					

C10b1 Assoc. earth station id.	C10b2 Type	C10c1 Geographical coord.	C10c2 Ctry	C10d1/C10d2 Cls. / Nat.	C10d3 Max. iso. gain	C10d4 Bmwidth	C10d6 Noise temp.	C10d7 Ant. diameter	C10d9 Ant. dim. (DGSO)
TYPICAL K3 (6/1)	T			1 TC CP	40	1.85	200		

C10d5a Co-polar antenna pattern						
C10b1 Assoc. earth station id.	Co-polar ref. pattern	Coef. A	Coef. B	Coef. C	Coef. D	Phi1 Co-polar rad. diag.
TYPICAL K3 (6/1)	A-25*LOG(FI)	29				

Findings **2D** Date of protection 08.01.1996 **13A** Conformity with RR A- A- -- **13B1** Provision **13B2** Remarks **13B3** Date of Review

13C Remarks



INTERSPUTNIK-75E-Q (105500291)

B1a/BR17 Beam designation 002 B1b Steerable B2 Emi-Rcp E B3a1 Max. co-polar gain 37 B3d Pointing accuracy 0.1

BR7a/BR7b Group id. 105625699 BR1 Date of receipt 19.08.2005 C2c RR No. 4.4

A2a Date of bringing into use 01.09.2005 A2b Period of valid. 40 A3a Op. agency 2 A3b Adm. resp. A BR16 Value of type C8b

BR62 Expiry date for bringing into use 07.09.2005 BR63 Confirmed date of bringing into use 01.09.2005 BR64 Date of receipt of 1st Res49

BR14 Special Section

C4a Class of station EC C3a Assigned freq. band 36000

C4b Nature of service CP C6a Polarization type M C6b Polarization angle

C8d1 Max. tot. peak pwr. 18 C8d2 Contiguous bandwidth 36000

C11a1 Service area no. 1 C11a2 Service area C11a3 Service area diagram 2

A5/A6 Coordinations/Agreements	9.7	O	BRU	CHN	F/EUT	G	INS	LAO	RUS	SNG	THA	TUR	UAE	USA	VTN
	AP30#7.1	O													
	N/9.7	O													TON

C2a1 Assigned frequency											
12.525	GHz	12.565	GHz	12.605	GHz	12.645	GHz	12.685	GHz		
12.545	GHz	12.585	GHz	12.625	GHz	12.665	GHz	12.705	GHz		

A13 Ref. to Special Sections	C7a Design. of emission		C8a1/C8b1 Max. peak pwr	C8a2/C8b2 Max. pwr dens.	C8c1 Min. peak pwr	C8c2 Attch.	C8c3 Min. pwr dens.	C8c4 Attch.	C8e1 C/N ratio	C8e2 Attch.
	API/A/428	1	36M0F8W--	5.9	-60.1	0.9		-65.1		16.6
CR/C/144	2	32M2G7W--	14.9	-60.1	7.9		-67.1		23.1	
	3	45K0G1X--	-16.6	-63.1	-23.6		-70.1		20.2	

C10b1 Assoc. earth station id.	C10b2 Type	C10c1 Geographical coord.	C10c2 Ctry	C10d1/C10d2 Cls. / Nat.	C10d3 Max. iso. gain	C10d4 Brwidth	C10d6 Noise temp.	C10d7 Ant. diameter	C10d9 Ant. dim. (DGSO)
TYPICAL-4, 5	T			1 TC CP	53.3	0.36	200		

C10d5a Co-polar antenna pattern							
C10b1 Assoc. earth station id.	Co-polar ref. pattern	Coef. A	Coef. B	Coef. C	Coef. D	Phi1	Co-polar rad. diag.
TYPICAL-4, 5	REC-580						

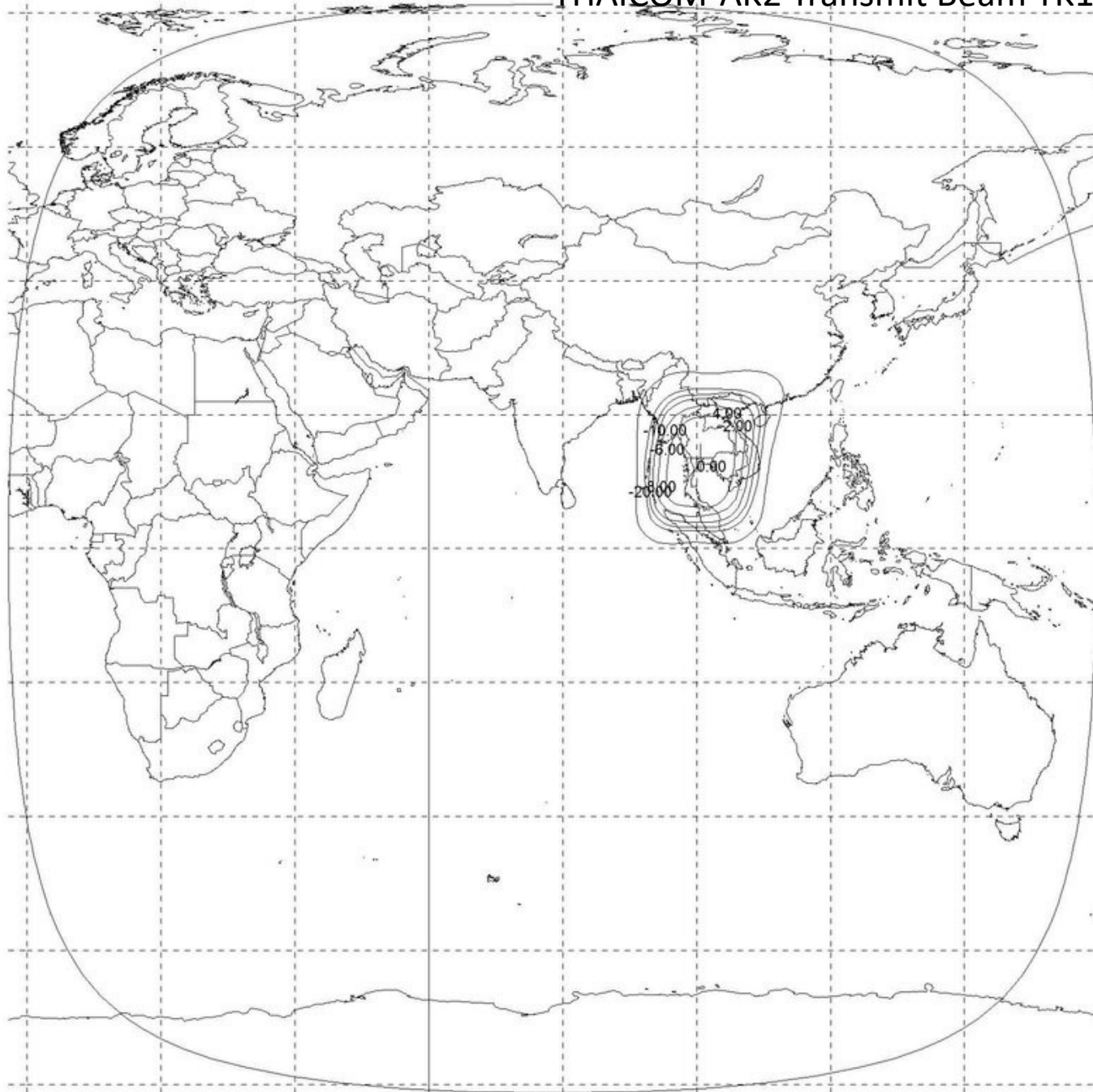
Findings 2D Date of protection 19.08.2005 13A Conformity with RR A- A- -- 13B1 Provision 13B2 Remarks 13B3 Date of Review

13C Remarks



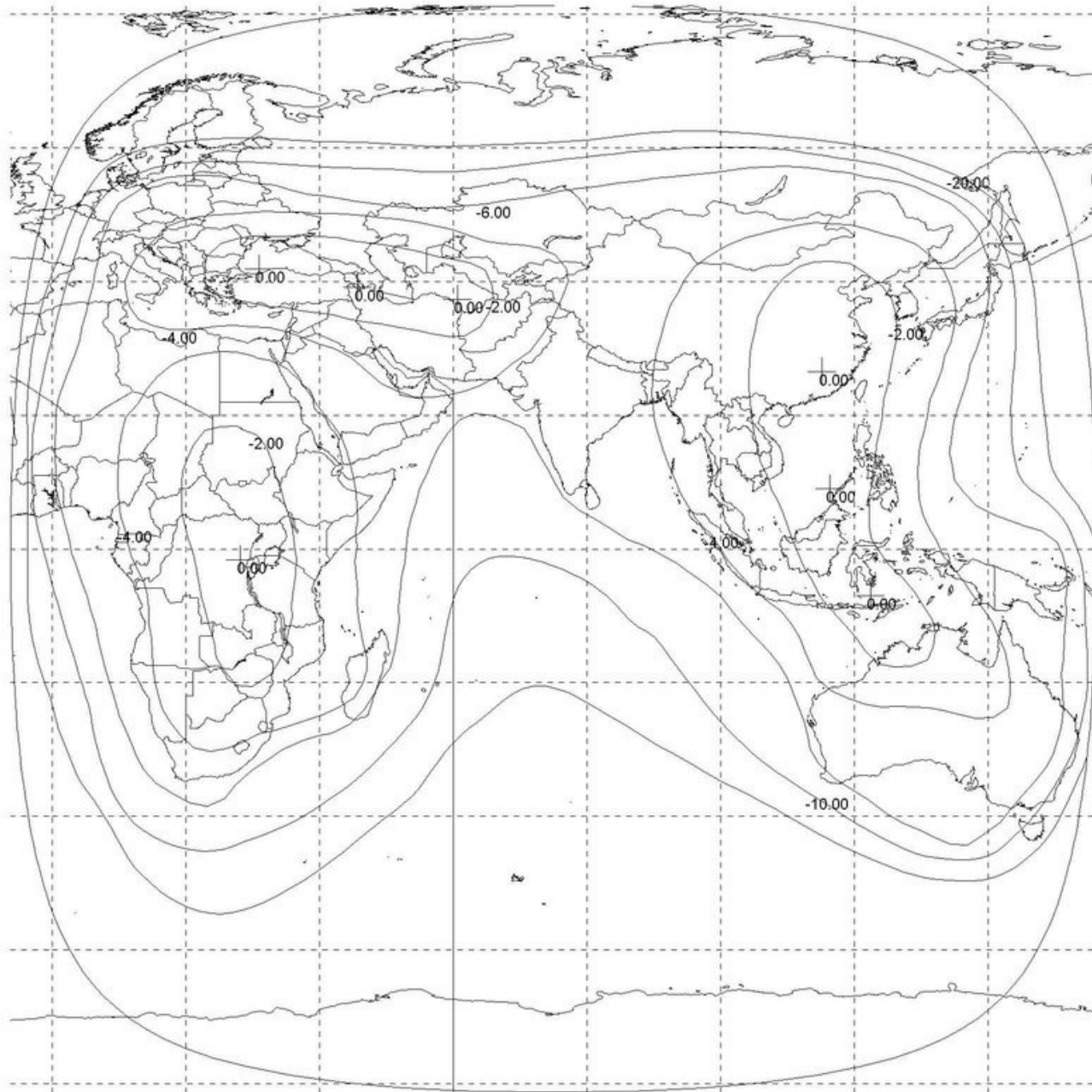


THAIKOM-AK2 Transmit Beam TK1





INTERSPUTNIK-75E-Q Transmit Beam 002





Exercise 2

Wanted:

Interfering:

Interference from Digital narrow to Digital wide

THAICOM-AK2 (78.5E)

INTERSPUTNIK-75E-Q (75E)

Longitudinal Tolerance

0.1

Longitudinal Tolerance

0.1

DOWNLINK

	Wanted
Beam	TK1
Group ID	96604139
Emission	27M0G1W
Wanted E/S long	106.86
Wanted E/S Lat	18.85
Topocentric angle	3.73
Wanted E/s sidelobe pattern	A-25log() A=29
Frequency (MHZ)	12585

	Interfering
Beam	002
Group ID	105625699
Emission	45K0G1X

	Wanted
Ps	
Gs	
ES relative to wanted beam peak	
FSL	
Ges	
BW(Hz)	
Tes	

	Interfering
Ps	
Gs	
ES relative to interfering beam peak	
FSL	
Wanted Ges()	
BW(Hz)	

Carrier	
Noise	
C/N	
C/I basic	
adj factor	
C/I adj	
C/I req'd	C/N+12.2
Margin	
to add 1.87	Sect B3 ROP Attachment2 para5

Interference





EXERCISE 3

- Uplink
- Interference from TVFM to Digital (narrow)
- Wanted
 - THAICOM-AK2 (78.5°E)
 - Group ID : 96604123
 - Emission : 22K0G7W
- Interfering
 - INTERSPUTNIK-75E-Q(75°E)
 - Group ID : 108643494
 - Emission : 36M0F8W

Wanted

B1a/BR17 Beam designation		RR1	B1b Steerable			B2 Emi-Rcp		R	B3a1 Max. co-polar gain		38.8	B3d Pointing accuracy		0.08									
BR7a/BR7b Group id.		96604123	BR1 Date of receipt		08.01.1996	C2c RR No. 4.4																	
A2a Date of bringing into use		17.12.1993	A2b Period of valid.		35	A3a Op. agency		1	A3b Adm. resp.		A	BR16 Value of type C8b											
BR62 Expiry date for bringing into use		06.08.2000	BR63 Confirmed date of bringing into use		17.12.1993	BR64 Date of receipt of 1st Res49																	
BR14 Special Section																							
C4a Class of station		EC	C3a Assigned freq. band		54000	C5a Noise temperature		603															
C4b Nature of service		CP	C6a Polarization type			C6b Polarization angle																	
C11a1 Service area no.		1	C11a2 Service area			C11a3 Service area diagram			1														
A5/A6 Coordinations/Agreements		RR1060	0	G TON URS USA USA/IT																			
C2a1 Assigned frequency																							
14.3429	GHz	14.4055	GHz	14.4681	GHz																		
A13 Ref. to Special Sections		C7a Design. of emission		C8a1/C8b1 Max. peak pwr		C8a2/C8b2 Max. pwr dens.		C8c1 Min. peak pwr		C8c2 Attch.		C8c3 Min. pwr dens.		C8c4 Attch.		C8e1 C/N ratio		C8e2 Attch.					
AR11/A/727		1 22K0G7W--		-15		-58.4																	
AR11/C/2196																							
C10b1 Assoc. earth station id.		C10b2 Type		C10c1 Geographical coord.		C10c2 Ctry		C10d1/C10d2 Cls. / Nat.		C10d3 Max. iso. gain		C10d4 Bmwdth		C10d7 Ant. diameter		C10d9 Ant. dim. (DGSO)		C8g1 Max. aggr. pwr.		C8g2 Aggr. bandwidth		C8g3 Transp. bandwidth = Aggr. bandwidth	
TYPICAL K2 (6/1.2)		T				1 TC CP		57		0.25													
C10b1 Assoc. earth station id.		Co-polar ref. pattern		Coef. A		Coef. B		Coef. C		Coef. D		Phi1		Co-polar rad. diag.									
TYPICAL K2 (6/1.2)		A-25*LOG(FI)		29																			
Findings		2D Date of protection		08.01.1996	13A Conformity with RR		A-	A-	--	13B1 Provision		13B2 Remarks		13B3 Date of Review									
13C Remarks																							



Interfering

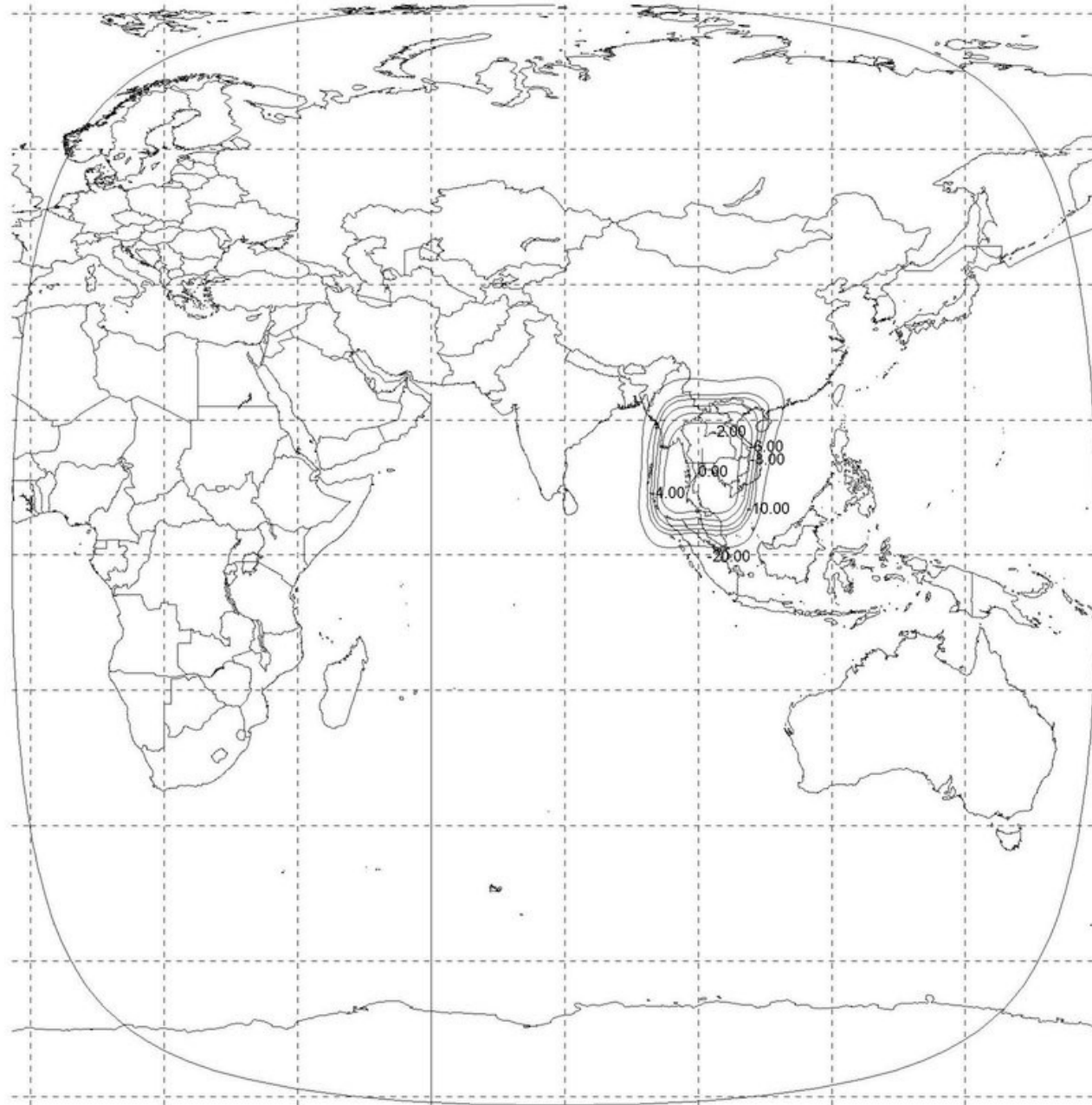
INTERSPUTNIK-75E-Q (105500291)

B1a/BR17 Beam designation <input type="text" value="DKS"/>		B1b Steerable <input type="checkbox"/>		B2 Emi-Rcp <input type="text" value="R"/>		B3a1 Max. co-polar gain <input type="text" value="37"/>		B3d Pointing accuracy <input type="text" value="0.1"/>															
BR7a/BR7b Group id. <input type="text" value="108643494"/>		BR1 Date of receipt <input type="text" value="27.05.2008"/>		C2c RR No. 4.4 <input type="text"/>																			
A2a Date of bringing into use <input type="text" value="01.09.2005"/>		A2b Period of valid. <input type="text" value="40"/>		A3a Op. agency <input type="text" value="2"/>		A3b Adm. resp. <input type="text" value="A"/>		BR16 Value of type C8b <input type="text"/>															
BR62 Expiry date for bringing into use <input type="text" value="07.09.2005"/>		BR63 Confirmed date of bringing into use <input type="text" value="01.09.2005"/>				BR64 Date of receipt of 1st Res49 <input type="text"/>																	
BR14 Special Section <input type="text"/>																							
C4a Class of station <input type="text" value="EC"/>		C3a Assigned freq. band <input type="text" value="40000"/>				C5a Noise temperature <input type="text" value="1400"/>																	
C4b Nature of service <input type="text" value="CP"/>		C6a Polarization type <input type="text" value="M"/>				C6b Polarization angle <input type="text"/>																	
C11a1 Service area no. <input type="text" value="1"/>		C11a2 Service area <input type="text"/>				C11a3 Service area diagram <input type="text" value="8"/>																	
A5/A6 Coordinations/Agreements		<input type="text" value="11.41"/> <input type="text" value="9.7"/> <input type="text" value="N/9.7"/>		<input type="text" value="X"/> <input type="text" value="O"/> <input type="text" value="O"/>		IND BRU CHN F/EUT G INS LAO MLA RUS SNG THA TUR UAE USA VTN TON																	
C2a1 Assigned frequency																							
<input type="text" value="14.02"/> GHz		<input type="text" value="14.1"/> GHz		<input type="text" value="14.18"/> GHz		<input type="text" value="14.26"/> GHz		<input type="text" value="14.34"/> GHz		<input type="text" value="14.42"/> GHz		<input type="text"/>		<input type="text"/>		<input type="text"/>							
<input type="text" value="14.06"/> GHz		<input type="text" value="14.14"/> GHz		<input type="text" value="14.22"/> GHz		<input type="text" value="14.3"/> GHz		<input type="text" value="14.38"/> GHz		<input type="text" value="14.46"/> GHz		<input type="text"/>		<input type="text"/>		<input type="text"/>							
A13 Ref. to Special Sections		C7a Design. of emission		C8a1/C8b1 Max. peak pwr		C8a2/C8b2 Max. pwr dens.		C8c1 Min. peak pwr		C8c2 Attch.		C8c3 Min. pwr dens.		C8c4 Attch.		C8e1 C/N ratio		C8e2 Attch.					
API/A/428		1 36M0F8W--		27		-39		15.5				-50.5				11							
CR/C/144		2 6M60G7W--		16.5		-50.5		5.5				-61.5				8.6							
		3 45K0G1X--		-1.5		-48		-12.5				-59				9.5							
C10b1 Assoc. earth station id.		C10b2 Type		C10c1 Geographical coord.		C10c2 Ctry		C10d1/C10d2 Cls. / Nat.		C10d3 Max. iso. gain		C10d4 Bmwdth		C10d7 Ant. diameter		C10d9 Ant. dim. (DGSO)		C8g1 Max. aggr. pwr.		C8g2 Aggr. bandwidth		C8g3 Transp. bandwidth = Aggr. bandwidth	
TYPICAL-4.5		T						1 TC CP		54.5		0.32											
C10d5a Co-polar antenna pattern																							
C10b1 Assoc. earth station id.		Co-polar ref. pattern		Coef. A		Coef. B		Coef. C		Coef. D		Phi1		Co-polar rad. diag.									
TYPICAL-4.5		REC-580																					
Findings 2D Date of protection <input type="text" value="19.08.2005"/>		13A Conformity with RR <input type="text" value="A-"/> <input type="text" value="N-"/> <input type="text" value="N-"/>		13B1 Provision <input type="text" value="11.41"/>		13B2 Remarks <input type="text"/>		13B3 Date of Review <input type="text"/>															
13C Remarks <input type="text" value="E/270508"/>																							



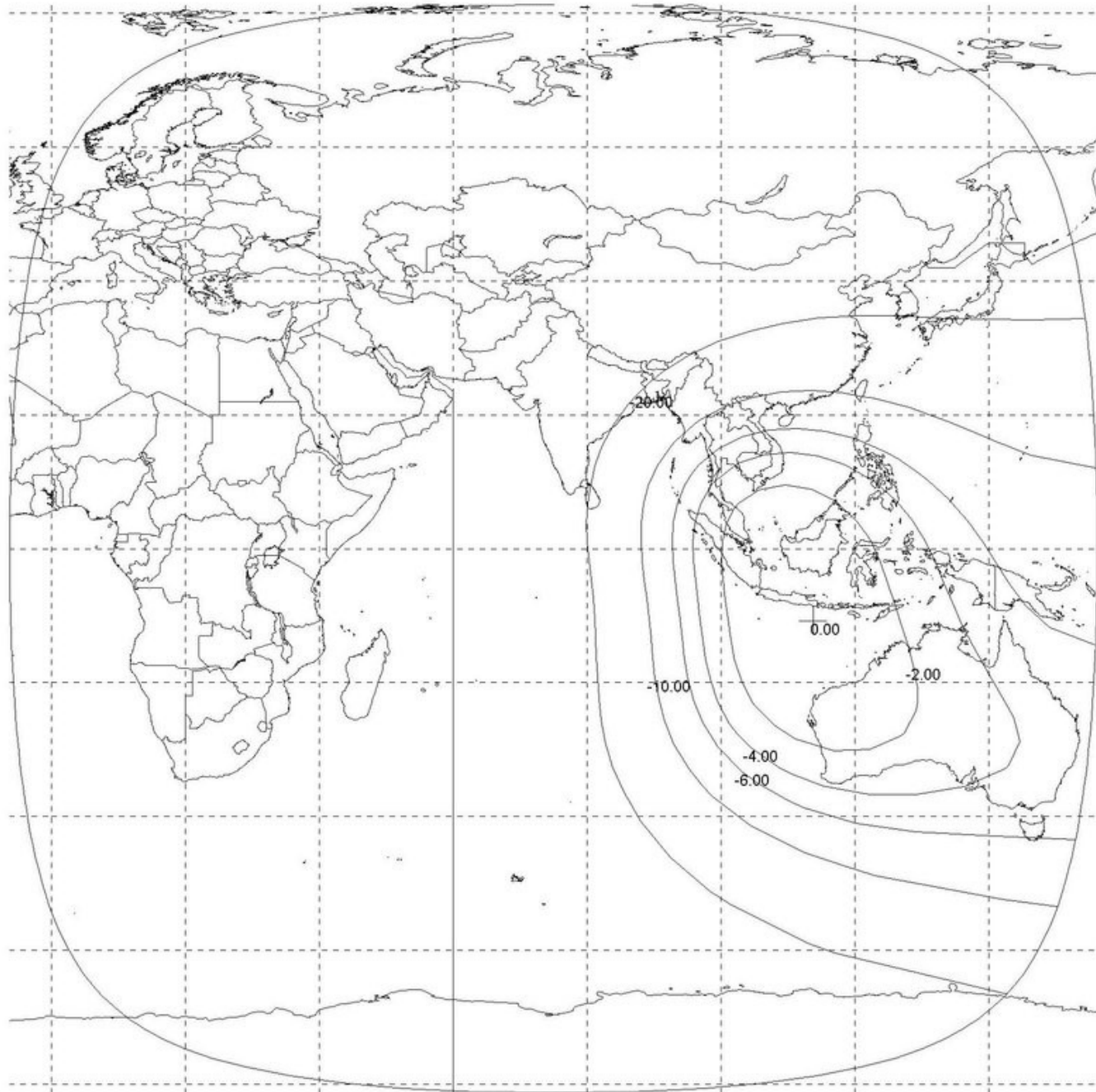


THAICOM-AK2 Receive Beam RK1





INTERSPUTNIK-75E-Q Receive Beam DKS





Exercise 3

Wanted:

Interfering:

Interference from TVFM to digital narrow

THAICOM-AK2 (78.5E)

INTERSPUTNIK-75E-Q (75E)

Longitudinal Tolerance

0.1

Longitudinal Tolerance

0.1

UPLINK

	Wanted
Beam	RK1
Group ID	96604123
Emission	22K0G7W

Wanted E/S long	100.02
Wanted E/S Lat	21.41

Frequency (MHZ)	14340
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Pes	
Ges	
FSL	
Gs	
ES relative to beampeak	
Ts	
BW(Hz)	

Carrier	
Noise	
C/N	
C/I basic	
adj factor	
C/I adj	
C/I req'd	
Margin	
to add 1.87	

$C/N+5.5+3.5\log(\text{wanted carrier BW(in MHz)})$

Sect B3 ROP Attachment2 para 5

	Interfering
Beam	DKS
Group ID	108643494
Emission	36M0F8W
Sidelobe	REC-580
interfering E/S long	100.53
Interfering E/S Lat	13.57
Topocentric angle	3.79

Pes		Pdes	
Ges()		$Ges()=29-25\log()$	
FSL			

ES relative to beampeak	
--------------------------------	--

Interference	
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Equivalent BW (Hz)	
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Wanted Carrier is Digital