



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



EXERCISE 3

Group ID	96604123				108643494		
Emission	22K0G7W				36M0F8W		
Sidelobe					REC-580		
Wanted E/S long	100.02			interfering E/S long	100.53		
Wanted E/S Lat	21.41			Interfering E/S Lat	13.57		
Topocentric angle					3.79		
Frequency (MHZ)	14340						
	Carrier				Interference		
Pes				Pes		PDes	
Ges				Ges()		Ges() $=29-25\log()$	
FSL	-206.89			FSL	-206.83		
Gs							
ES relative to beampeak	-4.87			ES relative to beampeak	0		
Ts							
BW(z)	22000						
Carrier				Interference			
Noise							
C/N							
C/I basic							
adj factor				Equivalent BW (Hz)			
C/I adj							
C/I req'd				C/N+5.5+3.5log(wanted carrier BW(in MHz))			
Margin							
to add 1.87				Sect B3 ROP Attachment2 para 5		Wanted Carrier is Digital	

EXERCISE 3					
Group ID	96604123			108643494	
Emission	22K0G7W	Slide 10		36M0F8W	Slide 11
Sidelobe				REC-580	
Wanted E/S long	100.02		interfering E/S long	100.53	
Wanted E/S Lat	21.41		Interfering E/S Lat	13.57	
Topocentric angle				3.79	
Frequency (MHZ)	14340				
	Carrier			Interference	
Pes	-15	Slide 5	Pes	27	PDes -39
Ges	57	Slide 5	Ges()	14.53	Ges()=29-25log()
FSL	-206.89		FSL	-206.83	
Gs	38.8	Slide 5			
					Slide 7 8 9
ES relative to beampeak	-4.87	Slide 7 8 9	ES relative to beampeak	0	
Ts	603	Slide 5			
BW(z)	22000				
Carrier	-130.96		Interference	-126.5	
Noise	-157.37				
C/N	26.41				
C/I basic	-4.46				
adj factor	22.58		Equivalent BW (MHz)	3.98	
C/I adj	18.11				3
C/I req'd	26.11		C/N+5.5+3.5log(wanted carrier BW(in MHz))		

EXERCISE 3						
Wanted E/S long	100.02			interfering E/S long		100.53
Wanted E/S Lat	21.41			Interfering E/S Lat		13.57
Topocentric angle						3.79
Frequency (MHZ)	14340					
	Carrier					Interference
Pes	-15			Pes		27
Ges	57			Ges()		14.53
FSL	-206.89			FSL		-206.83
Gs	38.8					
ES relative to beampeak	-4.87			ES relative to beampeak		0
Ts	603					
BW(z)	22000					
Carrier	-130.96			Interference	-126.50	
Noise	-157.37					
C/N	26.41					Solution
C/I basic	-4.46	Slide 16				
		17				
adj factor	22.58	Slide 12		Equivalent BW (MHz)	3.98	Slide 12 13
		13				
C/I adj	18.11					
C/I req'd	26.11			C/N+5.5+3.5log(wanted carrier BW(in MHz))		Slide14
Margin	-8.00					4
to add 1.87	-6.13			Sect B3 ROP Attachment2 para 5		Wanted Carrier is Di

Wanted

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 C5a Noise temperature

C4b Nature of service C6a Polarization type C6b Polarization angle

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

A5/A6 Coordinations/Agreements 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 AR11/C/2196	1 22K0G7W--	-15	-58.4						

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 CL	57	0.25					

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 13A Conformity with RR 13B1 Provision 13B2 Remarks 13B3 Date of Review

13C Remarks

Form



Interfering

INTERSPUTNIK-75E-Q (105500291)

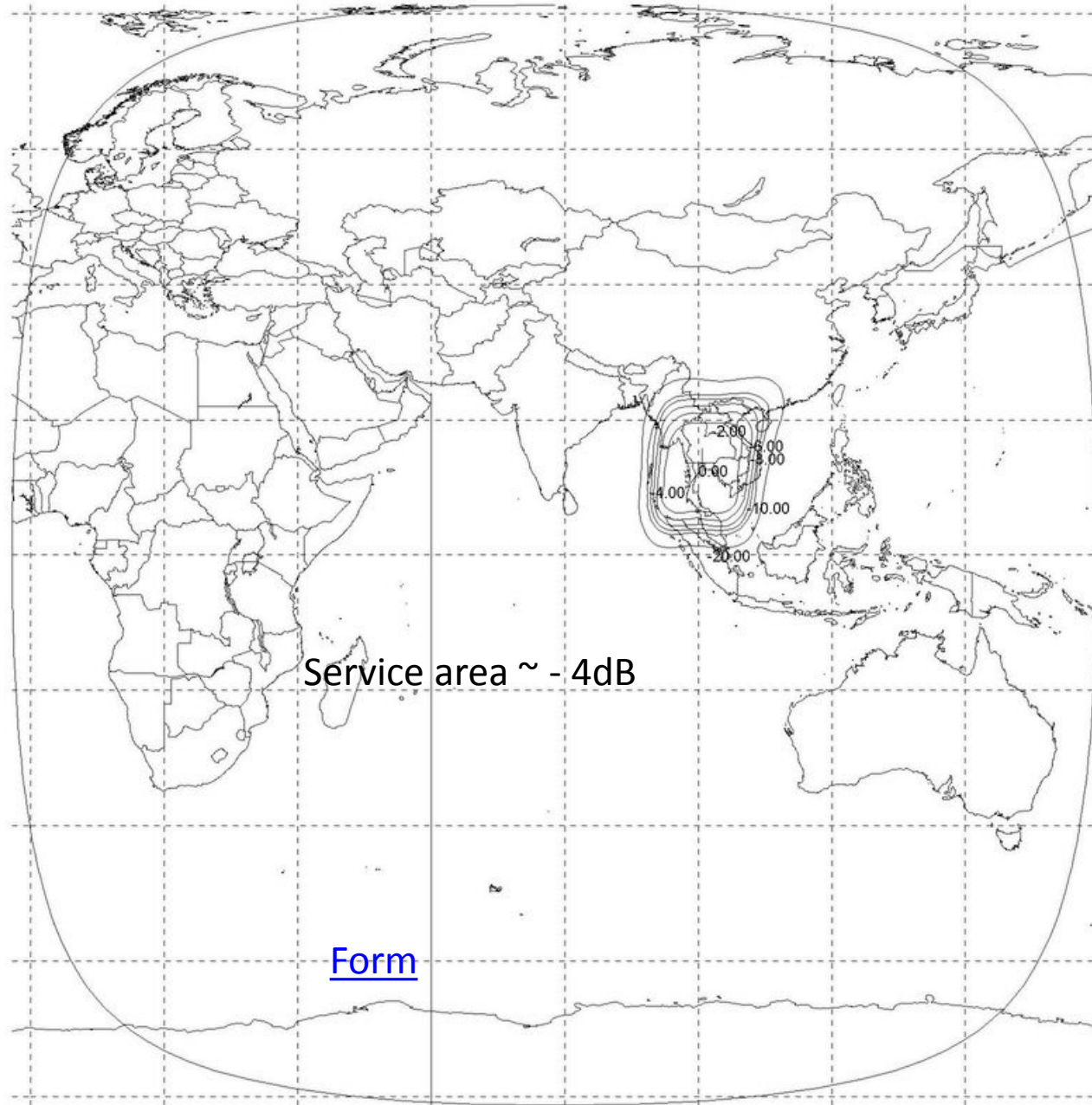
B1a/BR17 Beam designation: DKS		B1b Steerable: <input type="checkbox"/>		B2 Emi-Rcp: R		B3a1 Max. co-polar gain: 37		B3d Pointing accuracy: 0.1								
BR7a/BR7b Group id: 108643494		BR1 Date of receipt: 27.05.2008		C2c RR No. 4.4: <input type="checkbox"/>												
A2a Date of bringing into use: 01.09.2005		A2b Period of valid: 40		A3a Op. agency: 2		A3b Adm. resp: A		BR16 Value of type C8b: <input type="checkbox"/>								
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: <input type="checkbox"/>										
BR14 Special Section: <input type="checkbox"/>																
C4a Class of station: EC		C3a Assigned freq. band: 40000			C5a Noise temperature: 1400											
C4b Nature of service: CP		C6a Polarization type: M			C6b Polarization angle: <input type="checkbox"/>											
C11a1 Service area no.: 1		C11a2 Service area: <input type="checkbox"/>			C11a3 Service area diagram: <input type="checkbox"/>											
A5/A6 Coordinations/Agreements																
11.41		X		IND												
9.7		O		BRU CHN F/EUT G INS LAO MLA RUS SNG THA TUR UAE USA VTN												
N/9.7		O		TON												
C2a1 Assigned frequency																
14.02	GHz	14.1	GHz	14.18	GHz	14.26	GHz	14.34	GHz	14.42	GHz					
14.06	GHz	14.14	GHz	14.22	GHz	14.3	GHz	14.38	GHz	14.46	GHz					
A13		C7a		C8a1/C8b1		C8a2/C8b2		C8c1		C8c2	C8c3	C8c4	C8e1	C8e2		
Ref. to Special Sections		Design. of emission		Max. peak pwr		Max. pwr dens.		Min. peak pwr		Attch.	Min. pwr dens.	Attch.	C/N ratio	Attch.		
API/A/428		36M0F8W--		27		-39		15.5			-50.5		11			
CR/C/144		6M66G7W		16.5		-58.5		5.5			-61.5		8.6			
		45K0G1X--		-1.5		-48		-12.5			-59		9.5			
C10b1		C10b2	C10c1			C10c2	C10d1/C10d2		C10d3	C10d4	C10d7		C10d9	C8g1	C8g2	C8g3
Assoc. earth station id.		Type	Geographical coord.			Ctry	Cls. / Nat.		Max. iso. gain	Bmwidth	Ant. diameter		Ant. dim. (DGSO)	Max. aggr. pwr.	Aggr. bandwidth	Transp. bandwidth = Aggr. bandwidth
TYPICAL-4.5		T					1 TC CP		54.5	0.32						
C10d5a Co-polar antenna pattern																
C10b1		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- N- N-			13B1 Provision: 11.41		13B2 Remarks: <input type="checkbox"/>		13B3 Date of Review: <input type="checkbox"/>						
13C Remarks: E/270508																

Form



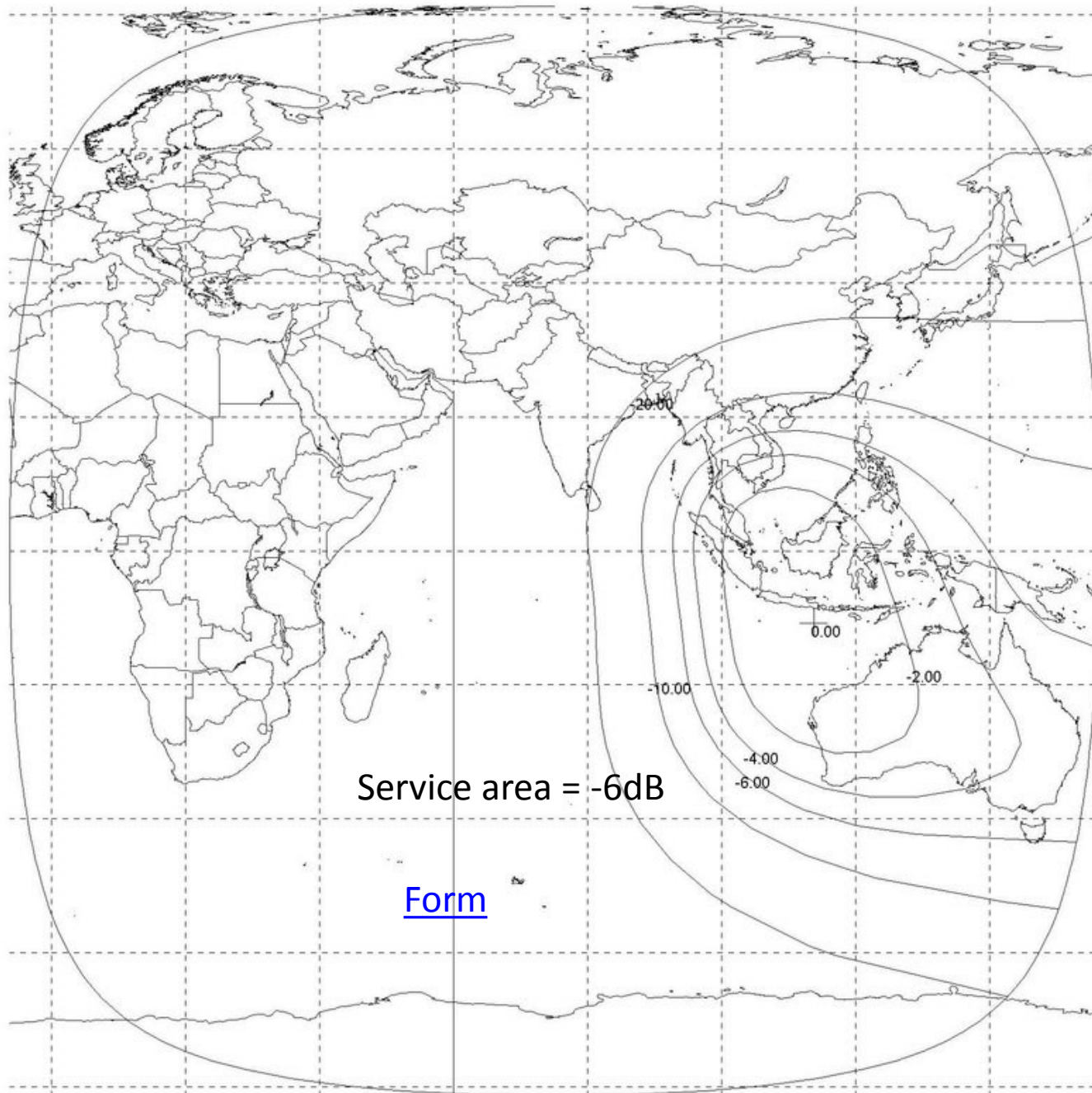


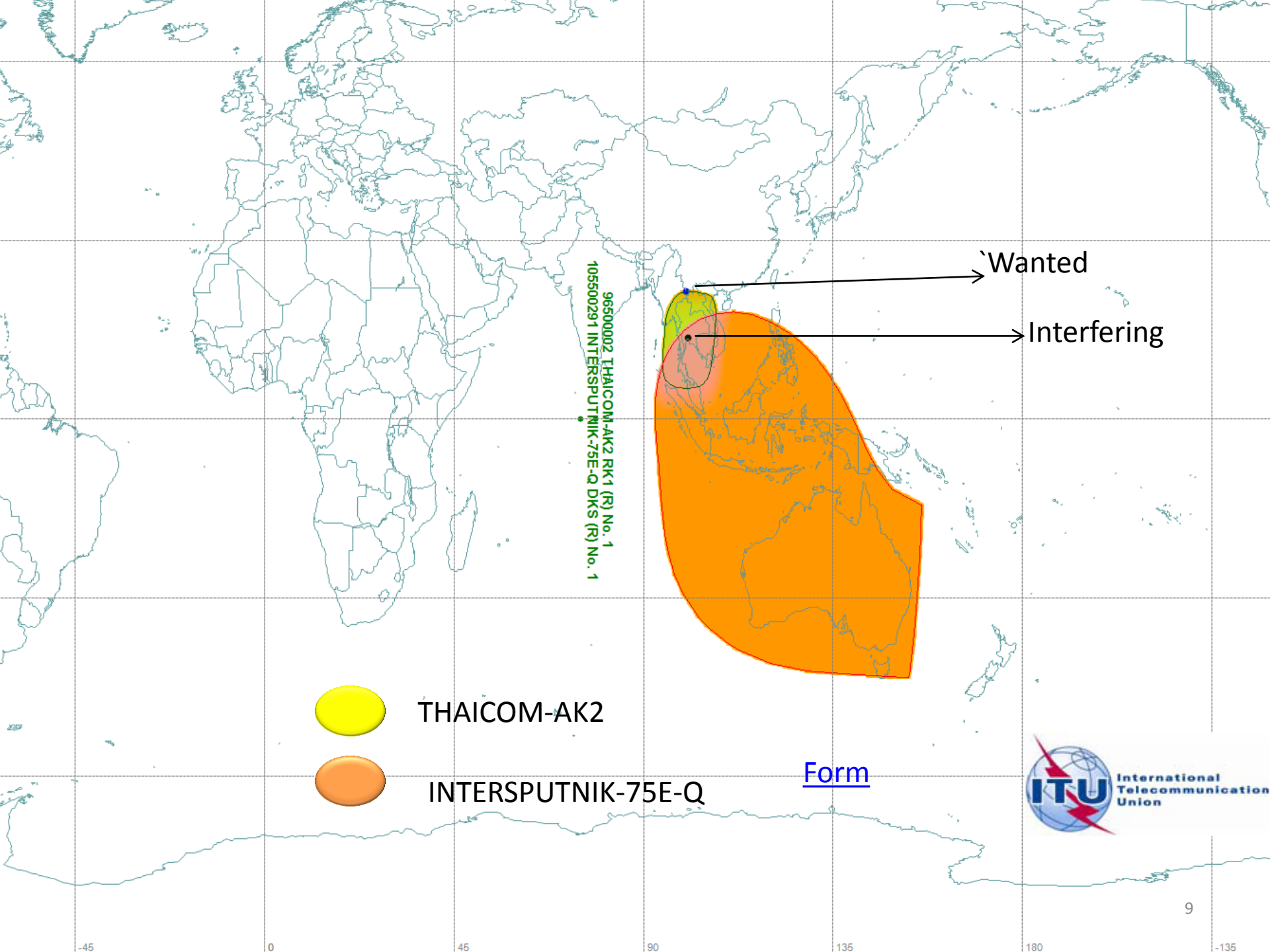
THAICOM-AK2 Receive Beam RK1





INTERSPUTNIK-75E-Q Receive Beam DKS







22K0G7W

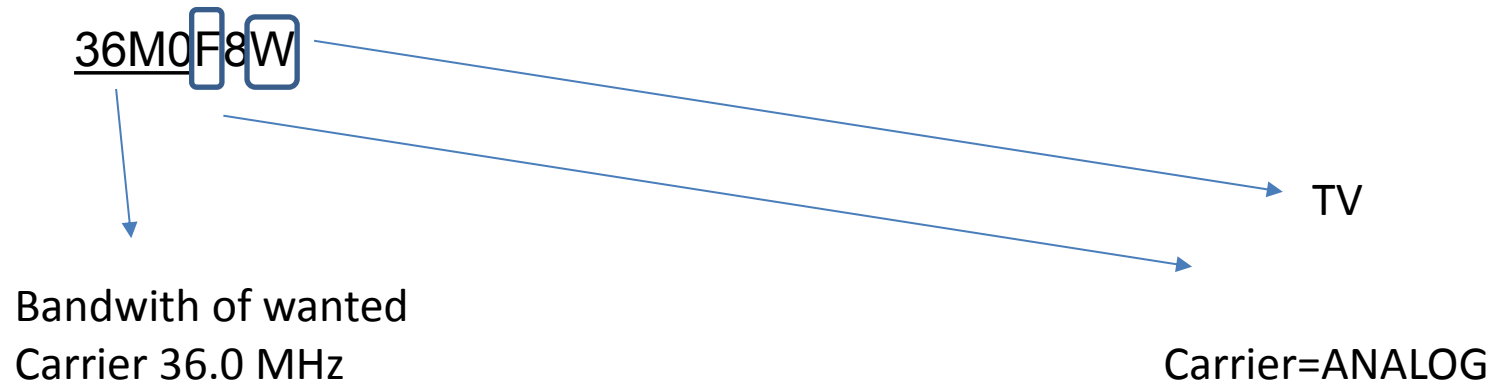


Bandwith of wanted
Carrier 27.0 kHz



Carrier=Digital

Form



Form



Get Adjustment Factor

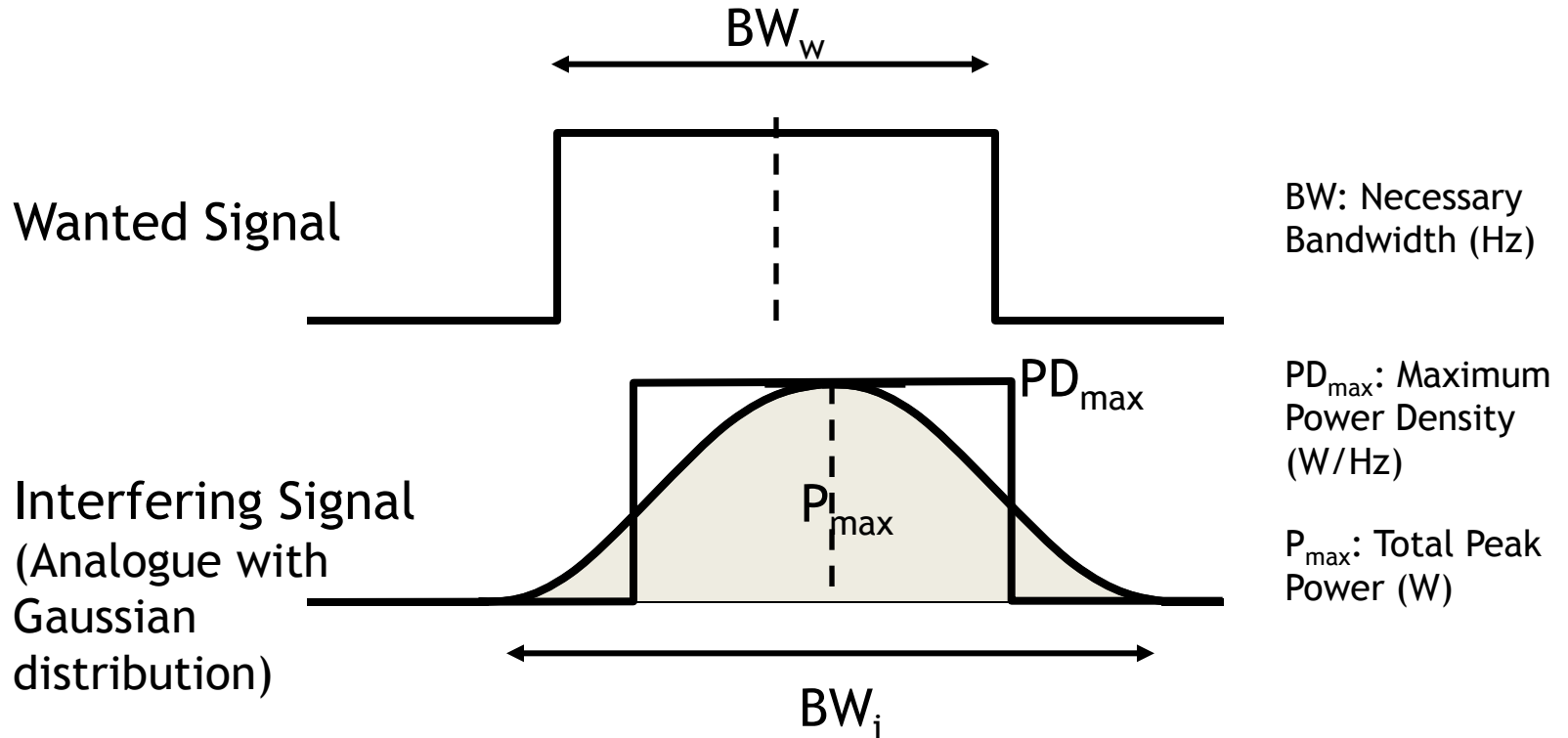
Wanted	Digital	Analogue (Other than TV/FM)	Other	TV/FM
Interfering	Digital			
Digital	METHOD 1: Wanted Bandwidth (BW) to Interfering BW Overlapping Ratio Adjustment			
TV/FM	METHOD 2: Wanted BW to Interfering Equivalent BW Overlapping Ratio Adjustment		METHOD 1: Co-freq.	
Analogue (Other than TV/FM)			METHOD 3: Non co-freq. (Relative Protection Ratio)	
Other			METHOD 2	

Source: Table 1 in Section B3 of Rules of Procedures, ITU-R S.741-2



Finding C/I Get Adjustment Factor

Method 2:



$$BW_{eq}(\text{Hz}) = 10^{((27 - (-39))/10)}$$
$$= 3981072 \text{ Hz}$$



Finding C/I Required

Interfering \ Wanted	TV/FM or Other	Digital	Analogue (Other than TV/FM)
TV/FM	C/N + 14 (dB)		
Digital	If $BW_w \leq BW_{eqi}$ then $C/N + 5.5 + 3.5 \cdot \log(BW_w)$ (dB) $26.41 + 5.5 + 3.5 \cdot \log(0.022) = 26.11$ else if $BW_w > BW_{eqi}$ then $C/N + 12.2$ (dB)	C/N + 12.2 (dB)	
Analogue (Other than TV/FM)	$11.4 + 2 \cdot \log(BW_w)$ (dB)	C/N + 12.2 (dB)	
Other	$11.4 + 2 \cdot \log(BW_w)$ (dB)	C/N + 14 (dB)	

Source: Table 2 in Section B3 of Rules of Procedures, ITU-R S.741-2

BW_w : Necessary bandwidth of wanted carrier (MHz)

BW_{eqi} : Equivalent bandwidth of interfering carrier (MHz)

C/N: Carrier to Noise ratio (dB)

[FORM2](#)

Exercise 3

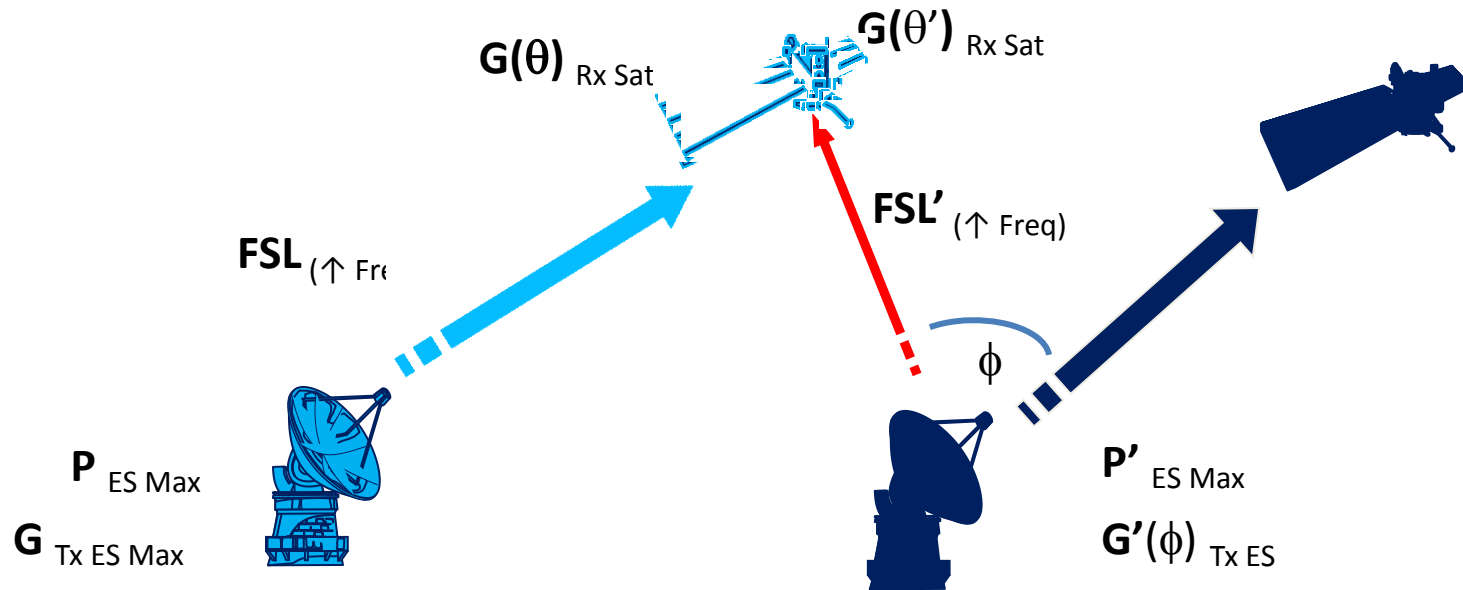
interference from TVFM to Digital (narrow)

Wanted	THAICOM-AK2 (78.5 deg E)	Longitudinal Tolerance	0.1
Interfering	INTERSPUTNIK-75E-Q (75 deg E)	Longitudinal Tolerance	0.1

UPLINK

	Wanted		Interfering	
Beam	RK1		DKS	
Group ID	96604123		108643494	
Emission	22K0G7W		36M0F8W	
Sidelobe			REC-580	
Wanted E/S Long	100.02	Interfering E/S Long	100.53	
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adj factor	22.58	Equivalent BW (MHz)	3.98	
C/I adj	18.11			
C/I required	26.11	C/N+5.5+3.5log(Wanted Carrier BW)		
Margin	-8.00			
to add 1.87	-6.13	Wanted Carrier is Digital		

Calculate C/I basic



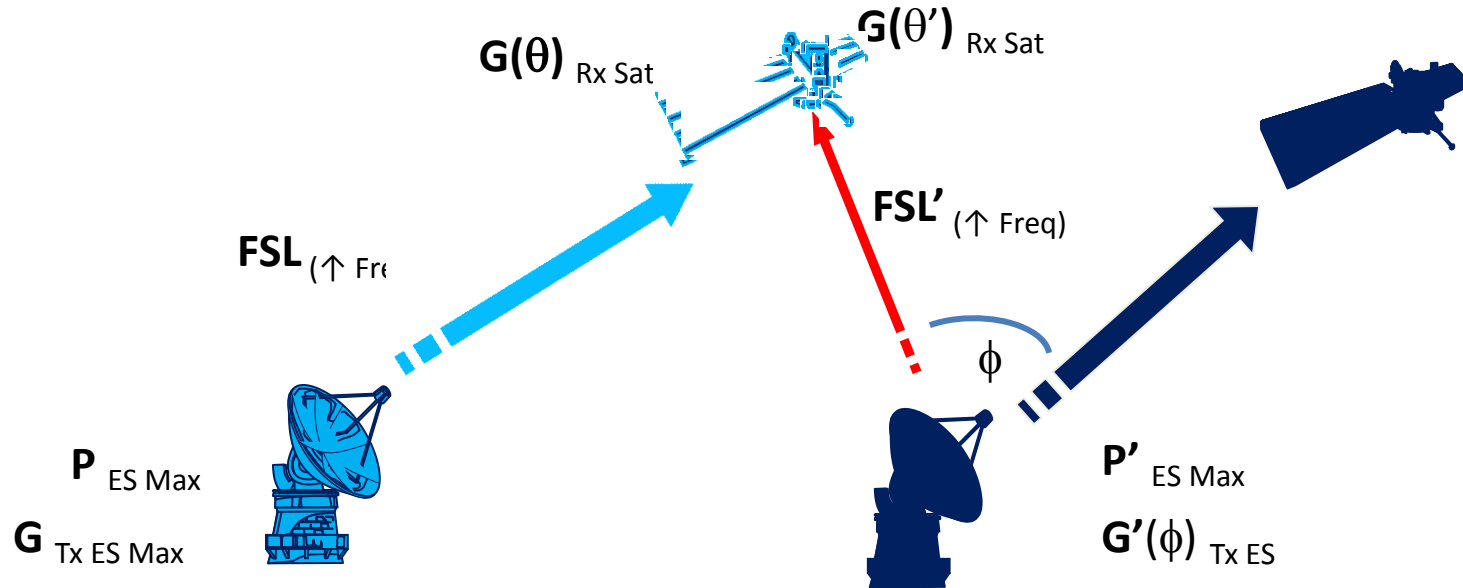
$$C \uparrow = P_{ES \text{ Max}} + G_{Tx \text{ ES Max}} + G(\theta)_{Rx \text{ Sat}} - FSL_{(\uparrow \text{ Freq})} \text{ (dBW)}$$

$$I \uparrow = P'_{ES \text{ Max}} + G'(\phi)_{Tx \text{ ES}} + G(\theta')_{Rx \text{ Sat}} - FSL'_{(\uparrow \text{ Freq})} \text{ (dBW)}$$

$$C/I \uparrow = C \uparrow - I \uparrow \text{ (dB)}$$



Calculate C/I basic



$$C \uparrow = -15 + 57 + (38.8 - 4.87) - 206.89$$

$$I \uparrow = 27 + 14.53 + (38.8 - 0) - 206.83$$

$$C/I \uparrow = -130.96 - (-126.50)$$

$$= -4.46\ dB$$