


From: farsheed.alaae@esimplicity.com 
Subject: RE: STA 0748-EX-ST-2020- The Navy's Space Networks
Date: May 29, 2020 at 2:34 PM



To: Hemple, Steven Steven.Hemple@viasat.com
Cc: NMSC_Satellite_Communications NMSC_Satellite_Communications@navy.mil,
Kibe, Dan M CIV USN NAVMARSPECCN FTM MD (USA) dan.kibe@navy.mil,
Jones, Keith K CIV USN NAVMARSPECCN FTM MD (USA) keith.k.jones@navy.mil,
Palacios, Eric M CIV USN NAVMARSPECCN FTM MD (USA) eric.palacios1@navy.mil, Dhing, Siddharth CTR NMSC
siddharth.dhing.ctr@navy.mil, Alaae, Farshid (Farsheed) CTR (USA) farsheed.alaae.ctr@navy.mil

Steven,

You are welcome. Feel free to contact me and we will deep dive into the C/I methodology as specified in ITU's RoP part B/section B3.

The Navy/NMSC has provided below response to FAB:

Quote

The Department of the Navy concurs with a modified version of the frequency band use with the following restrictions; VIASAT will not use frequency band 2084.9875-2086.3875 MHz as agreed upon in an email between NMSC and Mr. Steven Hemple's (VIASAT) May 29th email (attached).

Unquote

Best Regards,

Farsheed Alaae
eSimplicity Inc/amentum supporting The Navy/NMSC
farsheed.alaae@esimplicity.com
561-945-9598

From: Hemple, Steven <Steven.Hemple@viasat.com>
Sent: Friday, May 29, 2020 8:36 AM
To: farsheed.alaae@esimplicity.com
Cc: 'NMSC_Satellite_Communications' <NMSC_Satellite_Communications@navy.mil>; 'Kibe, Dan M CIV USN NAVMARSPECCN FTM MD (USA)' <dan.kibe@navy.mil>; 'Jones, Keith K CIV USN NAVMARSPECCN FTM MD (USA)' <keith.k.jones@navy.mil>; 'Palacios, Eric M CIV USN NAVMARSPECCN FTM MD (USA)' <eric.palacios1@navy.mil>; 'Dhing, Siddharth CTR NMSC' <siddharth.dhing.ctr@navy.mil>; 'Alaae, Farshid (Farsheed) CTR (USA)' <farsheed.alaae.ctr@navy.mil>
Subject: Re: STA 0748-EX-ST-2020- The Navy's Space Networks

Farsheed,

Thank you for the detailed discussion on this matter. After discussing with our Antenna Systems group, we can satisfy the testing requirements without transmitting in the 2084.9875-2086.3875 MHz. So we are requesting to remove the overlapping band from the STA request. I am uncertain about how to proceed from this point. Do I need to

the STA request. I am uncertain about how to proceed from this point. Do I need to resubmit the application or do you give concurrence with the condition that transmitting in the 2084.9875-2086.3875 MHz band is not allowed?

Additionally, I have some questions/comments on the analysis performed. I will reach out to you separately for a more technical discussion.

Best Regards,

Steve

From: "farsheed.alaae@esimplicity.com" <farsheed.alaae@esimplicity.com>
Date: Thursday, May 28, 2020 at 2:00 PM
To: "Hemple, Steven" <Steven.Hemple@viasat.com>
Cc: 'NMSC_Satellite_Communications' <NMSC_Satellite_Communications@navy.mil>, "Kibe, Dan M CIV USN NAVMARSPECCN FTM MD (USA)" <dan.kibe@navy.mil>, "Jones, Keith K CIV USN NAVMARSPECCN FTM MD (USA)" <keith.k.jones@navy.mil>, "Palacios, Eric M CIV USN NAVMARSPECCN FTM MD (USA)" <eric.palacios1@navy.mil>, "Dhing, Siddharth CTR NMSC" <siddharth.dhing.ctr@navy.mil>, "Alaae, Farshid (Farsheed) CTR (USA)" <farsheed.alaae.ctr@navy.mil>
Subject: STA 0748-EX-ST-2020- The Navy's Space Networks

Good Afternoon Steven,

Thank you for returning my call and taking time to discuss STA 0748-EX-ST-2020. Below, please find our key discussion points and let us know if you have any questions:

1. The Navy's space networks (ITU) do not overlap in frequency with 2051.3-2052.7 MHz; hence below stated concurrence with this proposal:

Frequency Frequency Tolerance(+/-)	Station Class	Emission Designator	Authorized Power
2051.3-2052.7 MHz 0.00000100	FX	1M40G7D	121.6kW (ERP)

Band1: CONCUR because there is no frequency overlap with The Navy's space networks registered in ITU's IFIC 2918 as of 04/14/2020.

2. The ED (1M00G7D) stated on the STA word document is incorrect as it should be 1M40G7D. This is correctly stated in ES coordination analysis (with ES and Terrestrial stations) in the document: '252071.pdf'.

Frequency Frequency Tolerance(+/-)	Station Class	Emission Designator	Authorized Power
2084.9875-2086.3875 MHz 0.00000100	FX	1M00G7D (1M40G7D)	121.6kW (ERP)

Band2: NONCONCUR due to frequency and geographic overlap with unacceptable interference (negative C/I margin) to The Navy's space networks as published in IFIC/SRS 2918 (04/14/2020).

I did not find antenna radiation pattern for ES antenna (ViaSat Model 3440/FCC Reference Pattern) on line including Viasat's public website after exhaustive online search. Instead I chose ITU model in Appendix 7 Annex 3 (Appendix 8 Annex 3 model gives worse C/I margins for The Navy's IRIS-2A) using 40.5 dBi max gain and 3-dB BW of 0.92 degree (i.e. generous to interferer of The Navy). You mentioned this is OK.

3. Worst C/I margins are negative for top Navy victims: -7.4 dB for IRIS-2A and -4.4 dB for IRIS-9B with 2.00 MHz necessary BW (in this case=occupancy BW=allocated BW to make densities same as filed numbers) and group BW=5.000 Hz

Note I modified IRIS-1A in VGSO using applicant's parameters. Interferer's ES Noise Temperature is irrelevant for UL calculation with The Navy's space station as victim. Please disregard interferer's DL parameters as this is for UL calculation.

4. The Navy's CF=2,083.385 MHz so Band=2080.885-2085.885 MHz. The frequency overlap is 2084.9875-2085.8850 MHz.

5. ViaSat is welcome to review and to let us know feedback. Based on The Navy's review and analysis, we suggest to reduce EIRP (or equivalently other parameters that result in the same) and/or reduce/eliminate overlap and/or modify radiation pattern. For concurrence, we require ≥ 0 C/I margin (SEI based on ITU's methodology). We would appreciate if your SATCOM engineering support send us an .mdb files and GIMS (SNS format) so we can more efficiently analyze different strategies for any frequency overlap. Please request to test these in your VGSO 3.0.2.02 to ensure they are importable.

IRIS-2A: $T(C/N)_{obj} = 15 \text{ dB} < T(C/N)_{calc}$ based on $P_{max} = 22.82 \text{ dB}$

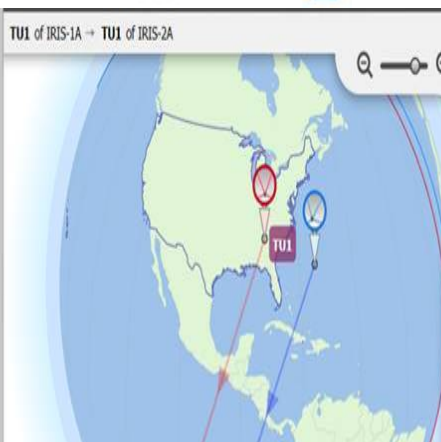
EMISSION INFORMATION

E/R	BEAM DESIGNATION NAME OF EMISSION	TOTAL PEAK POWER	MAXIMUM POWER DENS.	MINIMUM PEAK POWER	MINIMUM POWER DENS.	C/N RATIO
R	TU1 2M00G2D--	40	-23	30	-33	15

UPLINK

Interferer	EIRP	Victim	EIRP	Gain	BW	Ploss	V.L. Cases	Margin	Worst C/I																									
! Beam Pair TU1 → TU1																																		
1M40G7D	S3	2M00G2D	F1	41	-1.93	0.06	SPACE OPERATIO...	-7.4	19.778																									
Freq	Pol	Tx ES	TxPw	Angle	Gmax	Gr1	Gabs	Ploss	Angle	Gmax	Gr1	Gabs																						
I 2.086	CR	SP_OVS 1	55.42	18.06	40.5	-42.92	-2.42	190.26	5.92	-4	-1.36	-5.36																						
V 2.083	CR	SP_OVS 3	30	0.00	41	0.00	41	190.32	6.35	-4	-1.46	-5.46																						
<table border="1" style="width: 100%; border-collapse: collapse; font-size: x-small;"> <thead> <tr> <th>BW Adj</th> <th>Pol Adj</th> <th>App Fac</th> <th>I EIRP</th> <th>C</th> <th>I</th> <th>N</th> <th>C/N</th> <th>C/I</th> <th>C/(N+1)</th> <th>D1/T</th> </tr> </thead> <tbody> <tr> <td>-1.93</td> <td>0.00</td> <td>1</td> <td>S3</td> <td>-124.77</td> <td>-144.55</td> <td>-137.6</td> <td>12.82</td> <td>19.778</td> <td>12.03</td> <td>20.16</td> </tr> </tbody> </table>													BW Adj	Pol Adj	App Fac	I EIRP	C	I	N	C/N	C/I	C/(N+1)	D1/T	-1.93	0.00	1	S3	-124.77	-144.55	-137.6	12.82	19.778	12.03	20.16
BW Adj	Pol Adj	App Fac	I EIRP	C	I	N	C/N	C/I	C/(N+1)	D1/T																								
-1.93	0.00	1	S3	-124.77	-144.55	-137.6	12.82	19.778	12.03	20.16																								

Carrier	2M00G2D	1M40G7D
Assignment, GHz	2.083385	2.085687
Polarisation	CR	CR
Group ID	115627909	118619354
Group B/W MHz	5	1.4
Allocated B/W MHz	2	1.4
Occupied B/W MHz	2	1.4
Tx Power dBW	30	55.42
Pwr Density dBW/Hz	-33.01	-6.04
Tx Gain dB	41	-2.42
ES	SPACE OPERATIO...	SPACE OPERATIO...
Location	N29.8177 W70.9748	N33.9628 W84.0958
Radiation Pattern	App S7, (Annex 3)	App S7, (Annex 3)



The screenshot displays a software interface for antenna and frequency management. At the top, there are tabs for 'IRIS-1A' and 'IRIS-2A'. Below this, a table lists parameters for 'TUI':

Name	Gain Pattern	Peak Gain (dB)	Noise (K)
TUI	From GIMS	40.50	630.00

Below the table, there are sections for 'BEAMS' (listing EUR, HEF, KUR, MBR, TTOR, TUI, UIR, UZR) and a frequency plot showing two groups: 0.259 GHz and 46.5 GHz. A zoomed-in view of the 2.085 - 2.086 GHz band is shown. On the right, a detailed parameter table is visible:

Beamwidth deg	1.5	0.92
Gmax dB	41	40.5
Angle deg	0.00	18.06
Grel dB	0.00	-42.92
EIRP dBW	71	53
Peak Density dBW/Hz	7.99	34.46
Offaxis Density dBW/Hz	7.99	-8.46
Pathloss dB	190.32	190.26
PFD dBW/m2/Hz	-154.5	-170.88
Spreading Loss dB	162.49	162.42
Elevation Angle deg	42.99	46.98
Rx Gain dB	-5.46	-5.36
Beam	TUI	
Radiation Pattern	From GIMS	
Beamwidth deg	266.52	
Gmax dB	-4	
Angle deg	6.35	5.92
Grel dB	-1.46	-1.36
Rx power dBW	-124.77	-142.62

On the far right, an 'ANALYSIS' panel shows settings for 'OFF', 'GRID', 'CONTOURS', 'DETAIL', 'PLOT', 'VICTIM', and 'EARTH STATION'. Below this, an 'Interference Cases' section lists:

- 1 I EIRP set to 53.00 dBW for Beam Pair: TUI → TUI and 1M40G7D into 2M00G2D

INTERFERENCE

I dBW	-144.55
Adjustments dB	-1.93
Bandwidth Adjustment dB	-1.93
Polarisation Loss dB	0.00
Aggregation dB	0.00
Aggregation Factor	1
C dBW	-124.77
C/I dB	19.78
Threshold dB	27.2
Margin dB	-7.42
T K	630
N dBW	-137.6
C/N dB	12.82

IRIS-9B: $T(C/N)_{obj} = 15 \text{ dB} < T(C/N)_{calc}$ based on $P_{max} = 24.68 \text{ dB}$

EMISSION INFORMATION

E/R	BEAM DESIGNATION	TOTAL PEAK POWER	MAXIMUM POWER DENS.	MINIMUM PEAK POWER	MINIMUM POWER DENS.	C/N RATIO
R	TU1 2M00G2D--	40	-23	30	-33	15

The screenshot shows an 'UPLINK' analysis window. It includes a table of interference cases and a map of the Earth showing the location of the antenna.

Interferer	EIRP	Victim	EIRP	Gain	BW	Ploss	V.L. Cases	Margin	Worst C/I
Beam Pair: TU1 → TU1							1/1	-4.4	22.823
1M40G7D 53		2M00G2D 71		-1.91	-1.93	-0.98	SPACE OPERATIO...	-4.4	22.823

Below the table, there is a detailed table of carrier parameters:

Carrier	2M00G2D	1M40G7D
Assignment GHz	2.083385	2.085687
Polarisation	CR	CR
Group ID	118617874	118619354
Group B/W MHz	5	1.4
Allocated B/W MHz	2	1.4
Occupied B/W MHz	2	1.4

On the right, a map shows the Earth with a red dot indicating the location of the antenna. The title of the map is 'TU1 of IRIS-1A → TU1 of IRIS-9B'.

BW Adj	Pol Adj	Agg Fac	I EIRP	C	I	N	C/N	C/I	C/(N+I)	D1/T
-1.93	0.00	1	53	-122.91	-145.74	-137.6	14.68	22.823	14.06	15.35

Name	Gain Pattern	Peak Gain (dBi)	Noise (K)
TU1	From GIMS	40.50	630.00

Tx Power	dBW	
Tx Power	30	63
Pwr Density	-33.01	1.54
Tx Gain	41	-10
ES	SPACE OPERATIO...	SPACE OPERATIO...
Location	N0.1399 W145.3737	N03.9628 W84.0958
Radiation Pattern	App S8, (Annex 3)	App S7, (Annex 3)
Beamwidth	deg	1.5
Gmax	dB	41
Angle	deg	0.00
Grel	dB	0.00
EIRP	dBW	71
Peak Density	dBW/Hz	7.99
Offaxis Density	dBW/Hz	7.99
Pathloss	dB	189.9
PFDF	dBW/m2/Hz	-154.08
Spreading Loss	dB	162.07
Elevation Angle	deg	89.53
Rx Gain	dB	-4.02
Beam		TU1
Radiation Pattern		From GIMS
Beamwidth	deg	266.52
Gmax	dB	-4
Angle	deg	0.071
Grel	dB	-0.016
Rx power	dBW	-122.91

Name	Designation	Min Pwr (dBW)	Max Pwr (dBW)
1	I EIRP set to 53.00 dBW for Beam Pair: TU1 → TU1 and 1M4067D into 2M0062D	-122.91	-143.81

INTERFERENCE	
I	dBW
Adjustments	dB
Bandwidth Adjustment	dB
Polarisation Loss	dB
Aggregation	dB
Aggregation Factor	
C	dBW
C/I	dB
Threshold	dB
Margin	dB
T	K
N	dBW
C/N	dB

Best Regards,

Farsheed Alaaee
 eSimplicity Inc/amentum supporting The Navy/NMSC
farsheed.alaaee@esimplicity.com
 561-945-9598

