July 20, 2020

VIA IBFS AND EMAIL

Mr. Jose Albuquerque
Chief, Satellite Division
International Bureau
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, D.C. 20554

RE: Supplement to R2 Space, Inc. XR Satellite Network Application, IBFS File No. SAT-LOA-20200511-00042 (Call Sign S3067)

Dear Mr. Albuquerque:

This letter responds to requests for additional information concerning the above-referenced application made both during a June 3, 2020 conference call among Satellite Division staff and representatives of R2 Space, Inc. ("R2 Space") and in follow-up correspondence from Merissa Velez dated June 9, 2020. The substance of each question posed during these discussions is set forth below followed by R2 Space's response. As a result of the clarifications provided here, R2 Space had made some changes to the information provided in its Technical Annex (Exhibit A) and its Orbital Debris Mitigation Report (Exhibit B), complete revised copies of which are provided as attachments hereto in addition to other technical information that the Satellite Division has requested.

1. With respect to the requirement of the new Small Satellite Rules that there be a zero probability of human casualty from portions of the spacecraft surviving re-entry and reaching the surface of the Earth, provide clarification and demonstration that this requirement will be met.

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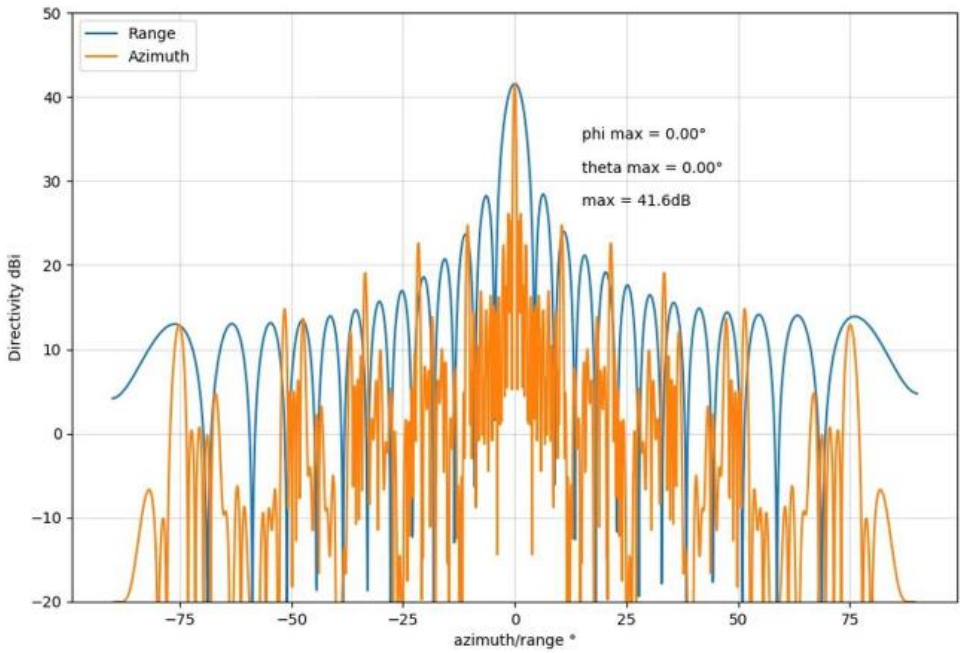
R2 Space utilized NASA's DAS program to calculate the probability of objects surviving reentry and found that no individual components are expected to survive reentry. Below is a list of all XR-1 components along with their respective demise altitudes.

Name	Parent	Qty	Material	Body Type	Thermal Mass	Diameter/Width	Length	Height	Demise Alt	Total DCA	KE
Backplate	1	1	Aluminum	Box	4.83	0.51	0.655	0.04	65.9	0	0
Side Frame	1	2	Aluminum	Flat Plate	2.82	0.63	0.655		69.2	0	0
Top Frame	1	1	Aluminum	Flat Plate	2.9	0.51	0.63		69.5	0	0
Bottom Frame	1	1	Aluminum	Flat Plate	1.03	0.51	0.63		75	0	0
X Frame	1	1	Aluminum	Flat Plate	0.47	0.51	0.655		76.7	0	0
Solar Panel	1	5	Aluminum	Flat Plate	1.74	0.51	0.63		72.9	0	0
Separation ring	1	1	Aluminum	Flat Plate	1.5	0.4	0.4		71.1	0	0
SAR Outer Wing Pane	1	2	Aluminum	Box	6	0.42	0.66	0.02	62.5	0	0
SAR Inner Wing Pane	1	2	Aluminum	Box	6	0.42	0.68	0.02	62.8	0	0
SAR Center Panel	1	1	Aluminum	Box	4.4	0.42	0.52	0.02	63.8	0	0
Thrusters	1	4	Aluminum	Box	1.8	0.1	0.1	0.09	60.2	0	0
RPU	1	1	Aluminum	Box	3.5	0.2	0.2	0.09	58.9	0	0
OBC1	1	1	Aluminum	Box	1.5	0.1	0.16	0.1	67.5	0	0
Watchdog	1	1	Aluminum	Box	0.53	0.14	0.19	0.03	72.6	0	0
PCM Lite	1	1	Aluminum	Box	0.4	0.1	0.21	0.02	73.3	0	0
PCM	1	1	Aluminum	Box	1.2	0.22	0.22	0.03	68.8	0	0
CDR Lite	1	1	Aluminum	Box	0.6	0.17	0.2	0.02	72	0	0
OBC2	1	1	Aluminum	Box	1	0.11	0.15	0.1	70.1	0	0
Contactor	1	1	Fiberglass	Cylinder	0.2	0.05	0.08		72.8	0	0
Coil	20	1	Iron	Cylinder	0.3	0.04	0.04		56.6	0	0
Battery	1	1	Aluminum	Box	3	0.22	0.39	0.13	70.7	0	0
Battery Pack	22	20	Fiberglass	Box	0.09	0.1	0.1	0.05	69.9	0	0
Battery Cell	23	160	Stainless S	Cylinder	0.045	0.018	0.065		64.6	0	0
ADCS	1	1	Aluminum	Box	0.5	0.1	0.1	0.05	69.9	0	0
Reaction Wheel	1	3	Aluminum	Box	0.85	0.12	0.12	0.04	66.5	0	0
MTQ	1	3	Iron	Cylinder	0.6	0.03	0.2		59.5	0	0
Star Tracker	1	2	Aluminum	Box	0.3	0.06	0.1	0.05	72.5	0	0
Upper Shelf	1	1	Aluminum	Flat Plate	0.8	0.47	0.48		75	0	0
Lower Shelf	1	1	Aluminum	Flat Plate	1	0.47	0.48		74.2	0	0

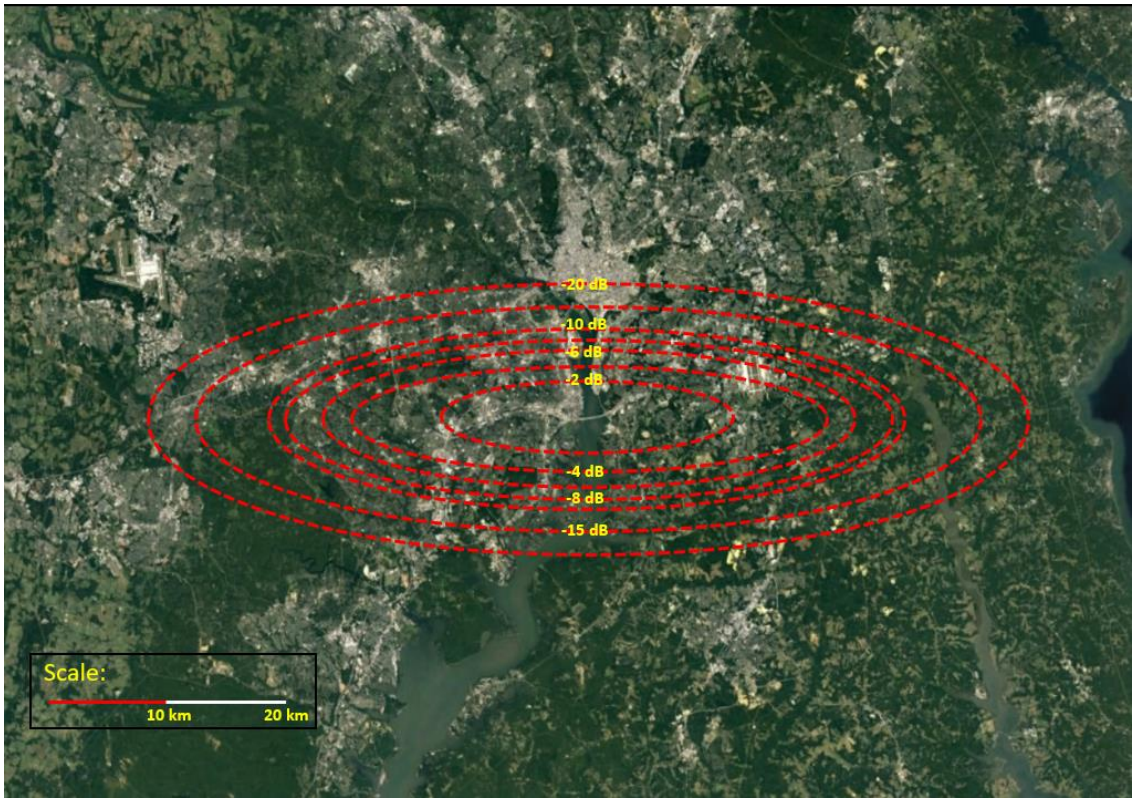
The DAS program outputs demonstrate that the probability of human casualty is 0 as all individual components are expected to break up far above the earth. Accordingly, the XR satellites comply with requirement 4.7-1. *See* Updated Exhibit B at 10-11.

2. Provide antenna gain contours for each transmit and receive antenna beam, as described in Section 25.114(c)(vi)(B) of the FCC's Rules.

SAR antenna beampattern (shown on next page):

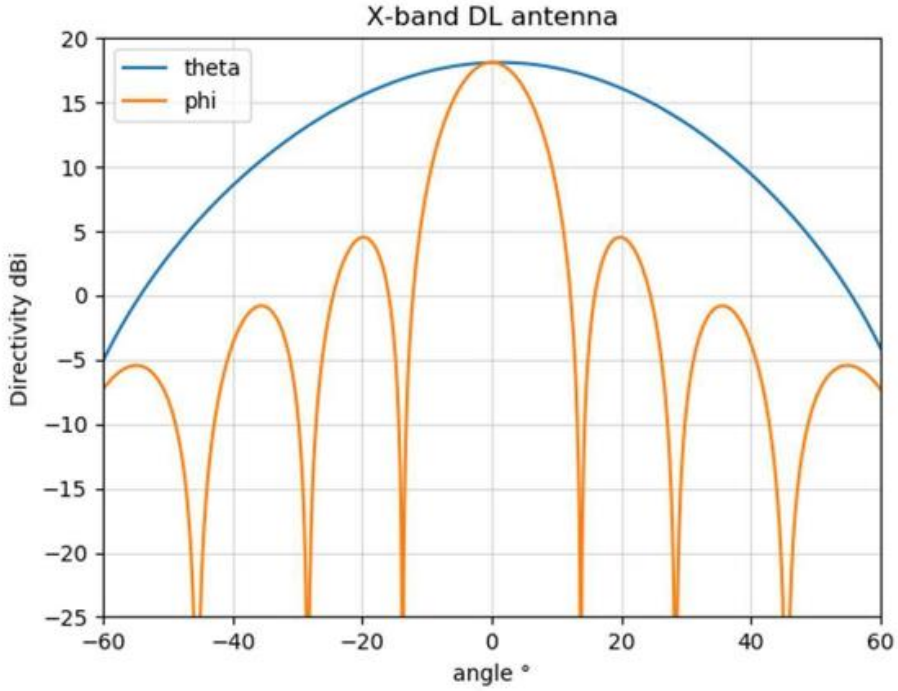


SAR beam contours over the DC/MD/VA region:

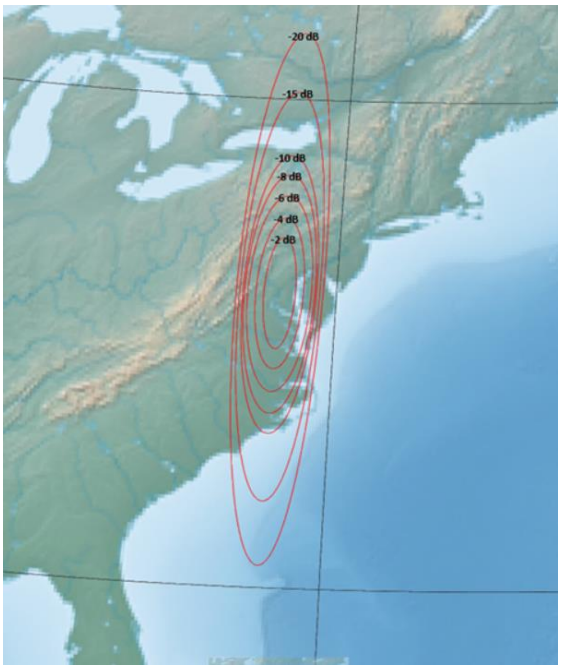


Note: The outermost contour has a diameter of 77 km.

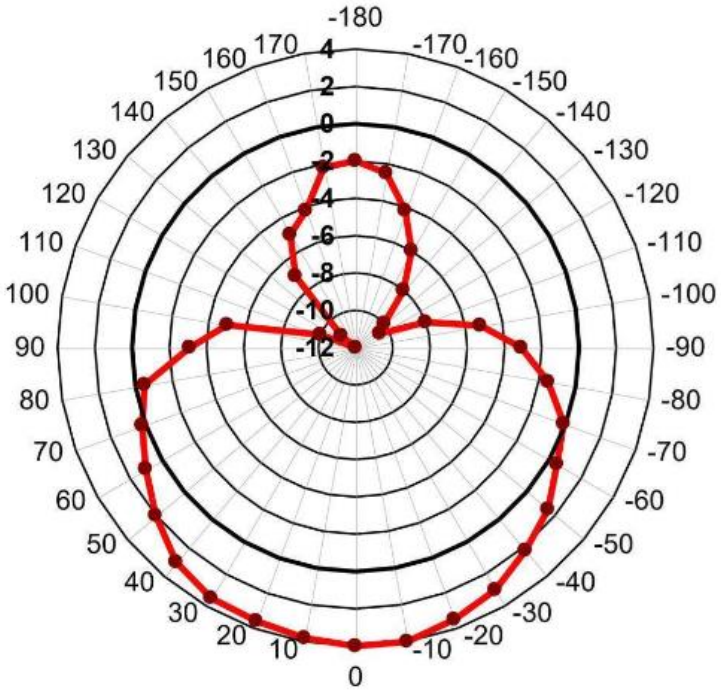
X-band Downlink Antenna beampattern:



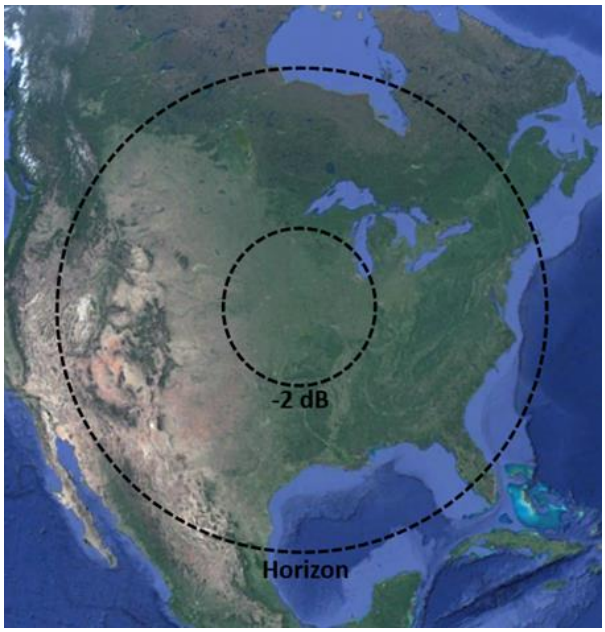
Payload Downlink beam contours:



S-band Antenna beampattern:



The S-band patch antenna beam contour on the ground is illustrated below. At the -4 dB point the contour is over the horizon so only the -2 dB contour and the horizon contours are shown. *See* Updated Exhibit A at 4, 10 & 11.



3. With respect to operations in the 8025-8400 MHz frequency band in the space-to-Earth direction, provide an electromagnetic compatibility analysis in accordance with footnote US258 to the U.S. Table of Frequency Allocations.

ITU-R Recommendation SA-1157 specifies the maximum allowable pfd at the Earth's surface of -255.1 dB(W/(m^2*Hz)) to protect ground receivers in the deep-space research band 8400-8450 MHz. R2 Space does not operate in this band and the XR satellite utilizes an X-Band DSN Filter to ensure that there is not out of band emissions in the SRS band. *See* Updated Exhibit A at 14-15.

4. Concerning use of the 9500-9800 MHz frequency band in the space-to-Earth direction, considering that the band is allocated on a secondary basis for non-Federal operations in the U.S. Table of Allocations, provide any additional information to elaborate on how the planned satellite network will operate on a non-harmful interference basis with respect to the primary allocated services.

The ITU has released a recommendation (ITU-R RS.516) that expressed a favorable view on the compatibility between SAR systems and the radiolocation and meteorological satellite services. This recommendation is backed up by a detailed report (ITU RS.2094) that analyzed the effect of representative SAR transmissions have on the protected services. The representative SAR systems analyzed by the ITU utilized more power and more bandwidth then the planned XR system, giving those systems a higher probability of harmful interference. Given the ITU's favorable outlook on satellites that have a higher probability of harmful interference then the XR system, it can be deduced that the XR system will be compatible with existing primary services.`

If there are any questions in connection with this matter, you may contact me at reuben@r2space.com or (734) 275-0883 or our FCC counsel, David Keir, at dkeir@lermansenter.com or (202) 416-6742.

Respectfully submitted,

DocuSigned by:
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cc (by email): Merissa Velez
Karl Kensinger
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