The International Amateur Radio Union

Since 1925, the Federation of National Amateur Radio Societies
Representing the Interests of Two-Way Amateur Radio Communication

☐ Tick here if this space station is also planned for amateur-satellite service operation.

FREQUENCY COORDINATION REQUEST

Administrative information:

0	**DOCUMENT CONTROL**	
0a	Date submitted	**25 February, 2013**
0b	Document version number (start at zero and increment with each revised request)	**ORS Squared_Feb2013.pdf**
1	**SPACECRAFT (published)**	
1a	Name before launch	ORS Squared
1b	Proposed name after launch	ORS Squared
1c	Country of license.	US
1d	Contact information at your licensing authority.	C/O COSMIAC 2350 Alamo Avenue SE, Suite 100, Albuquerque, New Mexico 87106. 505-934-1861
2	**LICENSEE OF THE SPACE STATION (published)**	
2a	Representative's first (given) name	Craig
2b	Representative's (family) name	Kief
2c	Licensee's name	Craig Kief
2d	Postal address	C/O COSMIAC 2350 Alamo Avenue SE, Suite 100, Albuquerque, New Mexico 87106
2e	Telephone number (including country code)	505-934-1861
2f	Representative e-mail address: our single point of contact who will receive all correspondence	Craig.kief@cosmiac.org
2g	Skype name (if available)	craigkief
2h	List names and e-mail addresses of *additional* people (up to three) who should receive copies of correspondence.	Craig Kief craig.kief@cosmiac.org Brian Zufelt brian.zufelt@cosmiac.org Jim White jim@coloradosatellite.com

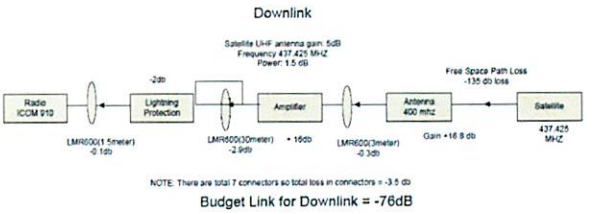
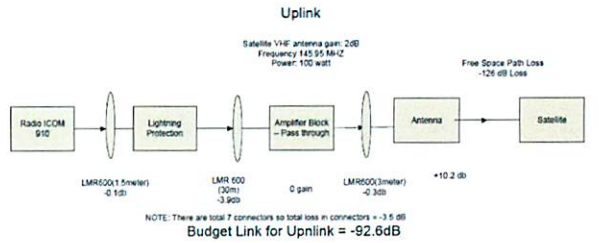
Space station information:

4	**SPACE STATION (published)**	
4a	Mission(s). *Describe in detail what the space station is planned to do. Use as much space as you need.*	This is a 6U CubeSat that is being built to support the Operationally Responsive Spaces mission for obtaining vibrational information from the launch vehicle
4b	Planned launch date.	August 2013

4c	Planned end of mission date.	Total mission duration is less than two years.
4d	Proposed space station **transmitting** frequency[4] plan. *List for each frequency band:* ➔ *frequency band (e.g. 435-438 MHz)* ➔ *output power* ➔ *ITU emission designator*[5,6] ➔ *common description of the emission*[7] ➔ *antenna gain and pattern*[8] ➔ *attitude stabilisation, if used*[9]	437.425 MHz 435-438 MHz 1 Watt F2DB 9600 Baud packet (AFSK) ISIS omni directional antenna (0 dBi) Passive magnetic stabalization
4e	Proposed space station **receiving** frequency[10] plan. *List for each frequency band:* ➔ *frequency band* ➔ *ITU emission designator* ➔ *common description of the emission* ➔ *noise temperature* ➔ *associated antenna gain and pattern*	145.950 MHz 144-148MHz F2DB 9600 Baud packet (AFSK) 500K Isis omni directional antenna (0 dBi)

5	**TELECOMMAND (NOT published)**

[4] Show all frequencies numerically in Hz, kHz, MHz, or GHz. Letter band designations are not used.
[5] ITU emission designators are defined in Appendix I to the radio regulations. Effect of Doppler shift is NOT included when determining bandwidth.
[6] If using a frequency changing transponder, indicate the transmitting bandwidth. Effect of Doppler shift is NOT included when determining bandwidth.
[7] Common emission description means terms like transponder, NBFM, PSK31, 1200 baud packet (AFSK on FM), etc.
[8] Common patterns include omnidirectional, unidirectional (with a pattern).
[9] Unstabilized is a tumbler. Stabilized can be passive magnetic, spinner, three axis, gravity gradient, etc.
[10] Show all frequencies numerically in Hz, kHz, MHz, or GHz. Letter band designations are not used.

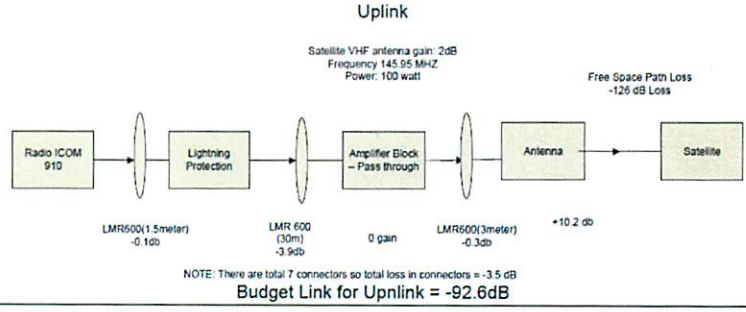
5a	**Telecommand** frequency plan. *List:* ➔ *space station telecommand frequency bands,* ➔ *ITU emission designator(s)* ➔ *common description of the emission* ➔ *link power budget(s)* ➔ *a very general description of any cipher system*[11]	Our desired Space Station downlink frequency is 437.425 MHz. We have multiple control stations beyond the one located at the University of New Mexico. We will utilize a system of obscuring the meaning of the commands and will use a special call sign. F2DB 9600 Baud packet (AFSK) data  Budget Link for Downlink = -76dB  Budget Link for Upnlink = -92.6dB A slight cipher will be utilized to make commanding the receiver satellite more complicated. There is no encryption.
5b	Positive space station transmitter control. *Explain how telecommand stations will turn off the space station transmitter(s) immediately, even in the presence of user traffic and/or space station computer system failure.* ***NOTE:** Transmitter turn off control from the ground is absolutely required.* Software control is useful, but does not substitute for telecommand. *Good engineering practice is to make telecommand independent of all other systems.*	There will be a secondary radio in the non-amateur bands that can be used for positive station control or to shut down the transmitter if necessary.

[11] Any means of preventing unauthorized telecommand of the space station. Recommended, but not required.

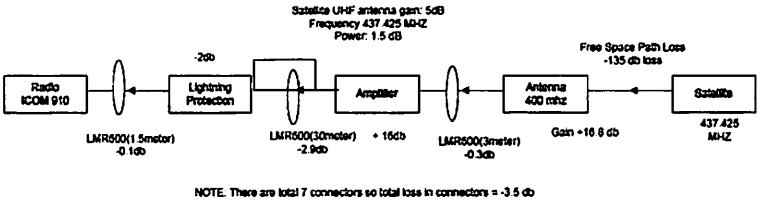
	Be sure to read the paper: *Controlling Space Station Transmitters*.	
5c	Telecommand stations. *List all telecommand stations. Sufficient Earth telecommand stations must be arranged before launch to insure that can be terminated immediately. See RR 22.1 and #3 of the terms and conditions above.*	The primary station will be located at the University of New Mexico in Albuquerque, NM via KE5VSH. We have multiple back up stations including: WD0E (Parker, CO), WMKY (Morehead State University, Morehead, KY), and KD7MFJ (Montana State University, Bozman, MT).

6	**Launch plans (published)**	
6a	Launch agency	ORS
6b	Launch location	Barking Sands, HI
6c	Planned orbit. *Include planned orbit apogee, perigee, inclination, and period. Include plans for orbit changes.*	480-520 km (specific altitude to be determined at a later date) with a polar orbit
6d	List other satellites expected to share the same launch. Update when more information becomes available.	This will be flown on a Super Strypi rocket. The rocket is part of the ORS-4 mission with a launch date of August, 2013

Earth station information:

7	**Typical Earth station — transmitting (published)**	
7a	Describe a typical telecommand station.	The ground station is a normal amateur ground station. There is one yagi antenna for UHF and one for VHF. Both antennas are driven with G-5500 rotators.
7b	Link power budget. *Show complete link budgets for all Earth station transmitting frequency bands.*	

8	**Typical Earth station — receiving (published)**	
8a	Describe a typical Earth station to receive signals from the planned satellite.	The typical AMSAT ground station operating in the 144MHz and 400MHz frequency bands will be acceptable. We are looking at utilizing the COSMIAC ground station in Albuquerque as the main ground station with Jim White in Parker, CO and Morehead State in Morehead, KY can act as back up ground stations.

8b	Link power budget. *Show complete link budgets for all Earth station receiving frequency bands.*	Downlink  Budget Link for Downlink = -76dB

Additional information:

Do not attach large files. Indicate the URL where the information is available.

9	Please, supply any additional information to assist the Satellite Advisor to recommend frequencies for your request(s). We are requesting the same transmit and receive frequencies as we did with a previous satellite so as to make use and interaction as simple as possible.

Signature:

10	Signature of licensee	25 Feb 13 Date submitted for coordination.