

## Douglas Young

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**From:** Douglas Young  
**Sent:** Tuesday, August 30, 2016 1:30 PM  
**To:** 'Nicolas Lee'  
**Subject:** Request for Info - File #0238-EX-PL-2016  
**Attachments:** Stanford\_Discovery\_API\_output.rtf  
  
**Importance:** High

The FCC's International Bureau would like you to address the following issues:

### Review of FCC Form 442 and SpaceCap API documents

In the SpaceCap, Sat. Network name is QB50-STANDFORD but in all other documentation (including the ODAR) the satellite is called "**Discovery**". If this is the case, we recommend change the satellite name in the SpaceCap API file to Discovery instead of the QB50-STANDFORD.

In the SpaceCap, Group id 1, **UPLINK**:

Noise Temperature, Box **C5a** has a value of **1771** degrees; we note that this temperature value is very high compare with other UHF earth station operating in the same frequency band. Please double check this value and make any necessary changes to this field; (this is the UHF earth station antenna noise temperature).

Polarization type, Box **C6a**, has a "V" designator but the NTIA space record data form indicates that the uplink antenna polarization is Right Hand Circular. Please validate this information and make any necessary changes.

The Power Density (or Power Spectral Density) boxes **C8a2/C8b2** (Max pwr dens) and box **C8c3** (Min Pwr dens.) values don't match with our calculations; we calculated the power spectral density value using the following equation: Power Spectral Density = Power (in dBW) – 10 \* Log<sub>10</sub> (Emission Bandwidth in Hertz). Applicant please check the power spectral density value and update the SpaceCap file as appropriate.

Please check the C/N ratio value of 30.6, the Space validation is flagging this value as invalid.

We note that on FCC form 442 uplink antenna beamwidth value is 25 degrees; however, in the NTIA space record data form and the SpaceCap file the uplink antenna beamwidth is 30 degrees. Please check this value and update any file as appropriate.

Moreover, on FCC form 442 for the uplink, we calculated the ERP value (max power of 17 dBW + antenna gain of 14.5 dBi = 31.5 dBW EIRP; then converted the 31.5 dBW EIRP value to ERP  $31.5 - 2.15 = 29.35$  dBW and converted to Watts which came to be about 861 Watts. The current ERP value in form 442 is shown as 1426 Watts. Please check my calculation and if agree, update the file as appropriate.

In the SpaceCap, Group id 2, **DOWNLINK**:

Applicant will the spacecraft transmit ONLY when visible from notified services area? If yes, please marked Box **B2bisa.a** with an "X".

Min Elevation Angle, Box **B2bis.b**; what is the minimum antenna elevation angle? (typically it's 10 degrees).

"RR No. 4.4" Box **C2c** is NOT checked with "Y"; the applicant will need to mark this box with "Y";

The Power Density (or Power Spectral Density) boxes **C8a2/C8b2** (Max pwr dens) and box **C8c3** (Min Pwr dens.) values don't match with our calculations; we calculated the power spectral density value using the following equation: Power Spectral Density = Power (in dBW) – 10 \* Log<sub>10</sub> (Emission Bandwidth in Hertz). Applicant please double check the power spectral density value and update the SpaceCap file as appropriate.

We notice that the IARU coordination letter has an emission designator of 6K15F1D but form 442 and SpaceCap file contains emission designator 2K40F1D. We will assume the 2K40F1D is correct but we just wanted to bring this to your attention.

We are also including the SpaceCap API output file and have highlighted in yellow and change the text red the boxes with the issues to help the applicant find the issues.

The items indicated above must be submitted before processing can continue on the above referenced application. Failure to provide the requested information within 30 days of August 30, 2016 may result in application dismissal pursuant to Section 5.67 and forfeiture of the filing fee pursuant to Section 1.1108.

|                               |                  |                             |                          |                              |                       |           |                                |                     |                  |  |
|-------------------------------|------------------|-----------------------------|--------------------------|------------------------------|-----------------------|-----------|--------------------------------|---------------------|------------------|--|
| E_TSUM Requested by: CARLOS.F |                  | Date: 23.08.2016 4:19:53 PM |                          | DB: QB50-STANFORD 0238-EX-P~ |                       | Plan Id.: |                                | Notice type: NONGEO |                  |  |
| A                             | A1a Sat. Network | QB50-STANFORD               | A1f1 Notifying adm. USA  |                              | A1f3 Inter. sat. org. |           | BR1 Date of receipt 29.07.2016 |                     | BR20 BR IFIC no. |  |
| BR6a/BR6b Id. no.             |                  | 1                           | BR3a Provision reference |                              | 9.1/IA                |           | BR2 Adm. serial no.            |                     |                  |  |

Résumé / Summary / Resumen

Article 9, sous-section IA / Article 9, sub-section IA / Artículo 9, sub-sección IA  
第9条第1A分节 / Статья 9, подраздел IA / المادة 9، القسم الفرعي IA

| B1a<br>Beam<br>designation | B2<br>Emi-Rcp | BR8<br>Action<br>code | BR7a<br>Group id. | BR9<br>Action<br>code | BR47<br>Frequency band (MHz) | C4a<br>Class of station |
|----------------------------|---------------|-----------------------|-------------------|-----------------------|------------------------------|-------------------------|
| UPLINK                     | R             |                       | 1                 |                       | 436.63 - 436.64              | EA                      |
| DOWNLINK                   | E             |                       | 2                 |                       | 436.63 - 436.64              | EA                      |

|                                |  |                                 |  |                              |  |                                |  |                     |  |
|--------------------------------|--|---------------------------------|--|------------------------------|--|--------------------------------|--|---------------------|--|
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| A1a Sat. Network QB50-STANFORD |  | A1f1 Notifying adm. USA         |  | A1f3 Inter. sat. org.        |  | BR1 Date of receipt 29.07.2016 |  | BR20 BR IFIC no.    |  |
| BR6a/BR6b Id. no. 1            |  | BR3a Provision reference 9.1/IA |  | BR2 Adm. serial no.          |  | UPLINK                         |  | R                   |  |

A1f2 Submitted on behalf

A4b1 No. of orbital planes

1

A4b2 Ref. body T

A4b3a No. of space stations simult. trans. on Northern Hemisphere

1

A4b3b No. of space stations simult. trans. on Southern Hemisphere

1

| Orbital plane id. no. | A4b4a Inclination angle | A4b4b No. of satellites in this plane | A4b4c Period | A4b4d Apogee | A4b4e Perigee | A4b4f Min. altitude |
|-----------------------|-------------------------|---------------------------------------|--------------|--------------|---------------|---------------------|
| 1                     | 51.6                    | 1                                     | 0-01:32      | 407e0        | 401e0         | 401e0               |

|                                                               |         |                          |  |              |  |                             |  |
|---------------------------------------------------------------|---------|--------------------------|--|--------------|--|-----------------------------|--|
| B1a/BR17 Beam designation UPLINK                              |         | B1b Steerable            |  | B2 Emi-Rcp R |  | B3a1 Max. co-polar gain 2.3 |  |
| B2bis.a Transmit only when visible from notified service area |         | B2bis.b Min. Elev. Angle |  |              |  |                             |  |
| B3c1 Co-polar antenna pattern                                 |         |                          |  |              |  |                             |  |
| Co-polar ref. pattern                                         | Coef. A | Coef. B                  |  |              |  | Co-polar rad. diag.         |  |
|                                                               |         |                          |  |              |  | 1                           |  |

List of orbital planes

1

B4a3a1 Angle alpha

B4a3a2 Angle beta

BR92 Attach. for missing angle alpha/beta

|                                           |  |                                |  |                            |  |
|-------------------------------------------|--|--------------------------------|--|----------------------------|--|
| BR7a/BR7b Group id. 1                     |  | BR1 Date of receipt 29.07.2016 |  | C2c RR No. 4.4 Y           |  |
| BR14 Special Section                      |  |                                |  |                            |  |
| C4a Class of station EA                   |  | C3a Assigned freq. band        |  | C5a Noise temperature 1771 |  |
| C4b Nature of service CV                  |  | C6a Polarization type V        |  | C6b Polarization angle     |  |
| C11a2 Service area XAA                    |  | C11a3 Service area diagram     |  |                            |  |
| A2b Period of valid. 2                    |  | A3a Op. agency 999             |  | A3b Adm. resp. A           |  |
| BR16 Value of type C8b                    |  |                                |  |                            |  |
| BR60 Regulatory deadline(s) 11.44/11.44.1 |  |                                |  |                            |  |

| C1 Frequency Range |                 |  |  |
|--------------------|-----------------|--|--|
| C1a Lower limit    | C1b Upper limit |  |  |
| 436.63 MHz         | 436.64 MHz      |  |  |

| 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. | C8f2 E.i.r.p. on the beam axis |
|-------------------------|-------------------------|--------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|--------------------------------|
| 1 2K40F1DCN             | 17                      | -54.9                    | 17                 |             | -54.9               |             | 30.6           |             |                                |

| C7b Carrier frequency of the emissions (2K40F1DCN) |            |                           |          |            |                         |    |                      |               |  |  |  |
|----------------------------------------------------|------------|---------------------------|----------|------------|-------------------------|----|----------------------|---------------|--|--|--|
| 436.635 MHz                                        |            |                           |          |            |                         |    |                      |               |  |  |  |
| C10b1 Assoc. earth station id.                     | C10b2 Type | C10c1 Geographical coord. |          | C10c2 Ctry | C10d1/C10d2 Cls. / Nat. |    | C10d3 Max. iso. gain | C10d4 Bmwidth |  |  |  |
| STANFORD                                           | S          | 122W10 24                 | 37N25 38 | USA        | 1 TA                    | CV | 14.5                 | 30            |  |  |  |

| 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. |
| STANFORD                        |                       |         |         |         |         |      | 2                   |

13C Remarks

|                                    |  |               |  |              |  |                              |  |
|------------------------------------|--|---------------|--|--------------|--|------------------------------|--|
| B1a/BR17 Beam designation DOWNLINK |  | B1b Steerable |  | B2 Emi-Rcp E |  | B3a1 Max. co-polar gain 2.15 |  |
|------------------------------------|--|---------------|--|--------------|--|------------------------------|--|

|                               |                                |                             |                         |                                 |                       |                     |                                |                     |                  |   |
|-------------------------------|--------------------------------|-----------------------------|-------------------------|---------------------------------|-----------------------|---------------------|--------------------------------|---------------------|------------------|---|
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| A                             | A1a Sat. Network QB50-STANFORD |                             | A1f1 Notifying adm. USA |                                 | A1f3 Inter. sat. org. |                     | BR1 Date of receipt 29.07.2016 |                     | BR20 BR IFIC no. |   |
| BR6a/BR6b Id. no.             |                                | 1                           |                         | BR3a Provision reference 9.1/IA |                       | BR2 Adm. serial no. |                                | DOWNLINK            |                  | E |

B2bis.a Transmit only when visible from notified service area ☐ B2bis.b Min. Elev. Angle ☐

|                               |         |         |  |  |  |                     |
|-------------------------------|---------|---------|--|--|--|---------------------|
| B3c1 Co-polar antenna pattern |         |         |  |  |  |                     |
| Co-polar ref. pattern         | Coef. A | Coef. B |  |  |  | Co-polar rad. diag. |
|                               |         |         |  |  |  | 1                   |

|                        |
|------------------------|
| List of orbital planes |
| 1                      |

B4a3a1 Angle alpha ☐ B4a3a2 Angle beta ☐

BR92 Attach. for missing angle alpha/beta ☐

|                                                 |                          |                                                     |                          |                        |                          |
|-------------------------------------------------|--------------------------|-----------------------------------------------------|--------------------------|------------------------|--------------------------|
| BR7a/BR7b Group id.                             | 2                        | BR1 Date of receipt                                 | 29.07.2016               | C2c RR No. 4.4         | <input type="checkbox"/> |
| BR14 Special Section <input type="checkbox"/>   |                          |                                                     |                          |                        |                          |
| C4a Class of station                            | EA                       | C3a Assigned freq. band                             | <input type="checkbox"/> |                        |                          |
| C4b Nature of service                           | CV                       | C6a Polarization type                               | V                        | C6b Polarization angle | <input type="checkbox"/> |
| C8d1 Max. tot. peak pwr.                        | <input type="checkbox"/> | C8d2 Contiguous bandwidth                           | <input type="checkbox"/> |                        |                          |
| C11a2 Service area                              | XAA                      | C11a3 Service area diagram <input type="checkbox"/> |                          |                        |                          |
| A2b Period of valid.                            | 2                        | A3a Op. agency                                      | 999                      | A3b Adm. resp.         | A                        |
| BR60 Regulatory deadline(s)                     |                          | 11.44/11.44.1 <input type="checkbox"/>              |                          |                        |                          |
| BR16 Value of type C8b <input type="checkbox"/> |                          |                                                     |                          |                        |                          |

|                    |                 |  |
|--------------------|-----------------|--|
| C1 Frequency Range |                 |  |
| C1a Lower limit    | C1b Upper limit |  |
| 436.63 MHz         | 436.64 MHz      |  |

|                         |                         |                          |                    |             |                     |             |                |             |                                |
|-------------------------|-------------------------|--------------------------|--------------------|-------------|---------------------|-------------|----------------|-------------|--------------------------------|
| 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. | C8f1 E.i.r.p. on the beam axis |
| 1 2K40F1DCN             | 6                       | -69.4                    | 6                  |             | -69.4               |             | 16.2           |             | 6                              |

|                                                    |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------|--|--|--|--|--|--|--|--|--|
| C7b Carrier frequency of the emissions (2K40F1DCN) |  |  |  |  |  |  |  |  |  |
| 436.635 MHz                                        |  |  |  |  |  |  |  |  |  |

|                                |            |                           |          |            |                         |                      |               |                   |  |  |
|--------------------------------|------------|---------------------------|----------|------------|-------------------------|----------------------|---------------|-------------------|--|--|
| 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. |  |  |
| STANFORD                       | S          | 122W10 24                 | 37N25 38 | USA        | 1 TA CV                 | 14.5                 | 30            | 481               |  |  |

|                                 |                       |         |         |         |         |      |                     |
|---------------------------------|-----------------------|---------|---------|---------|---------|------|---------------------|
| 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. |
| STANFORD                        |                       |         |         |         |         |      | 2                   |

13C Remarks ☐

BR22 Administration remarks ☐

BR23 Radiocommunication Bureau comments ☐