

Bjornson, Christopher

From: Bjornson, Christopher
Sent: Thursday, December 06, 2018 1:46 PM
To: 'Leann.Nguyen@fcc.gov'
Subject: FCL Tech, 1905-EX-ST-2018

Ms. Nguyen:

You had asked FCL Tech to submit a written consent from Astro Digital for its operations in the 25.5-27.5 GHz Band under the above-referenced STA application. Astro Digital has consented to the proposed operations through the email below. Please let us know if you have any questions.

Sincerely,
Chris

Christopher R. Bjornson
Steptoe & Johnson LLP
1330 Connecticut Avenue, N.W.
Washington, D.C. 20036
Phone: 202.429.3059
e-mail: cbjornson@steptoe.com

From: Jan King [mailto:jan@astrodigital.com]
Sent: Wednesday, November 28, 2018 1:05 AM
To: Bjornson, Christopher
Cc: peter.ruderman@astrodigital.com; Lin, Tony; Chris Biddy; Kyle Leveque; Gordon Hardman; Brian Cooper
Subject: Re: Request for Consent to Use the 25.5-275.5 GHz Band

Christopher,

I am Jan A. King, CTO at Astro Digital. I'm the direct AD staff person who handles most of the spectrum regulatory analysis matters for our firm. I understand we are requested by the FCC to respond to you with regard to coordination of your Ka-band links, being used for a low altitude airborne station demonstration, with our Landmapper satellite system. We understand you will be using a STA, which has been filed by you with the Commission. Our Landmapper system uses the 25.5 to 27.0 GHz band for its high speed remote sensing data downlink. We are authorized to do so under a Part 25 license issued to us by FCC.

I have reviewed the STA as requested by Peter Ruderman (which you forwarded to him and to me) and I am primarily reacting to the air-to-ground link in the frequency band 25.5 - 27.5 GHz. From the Form 442 I understand the following (I think it's always a good idea to check to see if I am interpreting what you are intending, correctly):

The air-to-ground link has a TX power output of $2.51\text{ W} = 4.0\text{ dBW}$.

The emission bandwidth is 2.0 GHz

The TX antenna beamwidth is 6.5 degrees (HPBW), which yields an antenna with a directivity of 28.0 dBW and a gain of 27.0 dBW.

This produces an airborne platform EIRP = $4.0 + 27.0 \text{ dBW} = 31 \text{ dBW} = 1259 \text{ Watts}$.

For this power to be received by a victim station, that station would have to be directing its beam toward the airborne platform and the airborne platform beam would have to be directed toward the victim ground station.

In addition, for the victim to receive the emission from the airborne platform above a 5 degree elevation mask, that victim would have to be within 54 km (slant range) of the airborne platform emitter. This is correct for an airborne platform at 5000 m and under smooth terrain conditions. We assume the LAT/LONG of the airborne platform is nearly stationary and is either tethered or controlled by on-board means.

It is not worth considering cases where the victim ground station has an elevation angle lower than 5 degrees due to the excess path losses at 26.5 GHz caused by meteorological conditions. For the record, the slant range to the horizon (0 deg. elevation angle) at 5000 m altitude is 253 km.

The potential for interference, in this instance, would be from your airborne platform to our Earth station, while receiving a Landmapper satellite.

I'm pleased to inform you that our nearest (and only) Earth station for receiving our satellites at 26.8 GHz, at this time, is located in Norway at Svalbard Island. That station is at 78.23 deg. N and 15.37 deg. E. It is at 479 m mean altitude. So, there could be no line of sight condition between our Earth station and your airborne platform.

So, I see no case for interference between your airborne downlink and our Earth Station, if my interpretation of your system is correct.

Similarly, you have a ground-to-air link in the same frequency band and with the same emission bandwidth. The EIRP value is much higher but, the ground station beamwidth is much smaller (and the gain much higher). I have not analyzed this case but, I don't believe this is necessary. The only potential for interference would be from your ground station to our ground station, which does receive in that frequency band. However, as our station is at Svalbard, there is no possibility for interference from your ground station either, so long as it remains in Southern California. I also see no other issues with this link pair insofar as the Landmapper system is concerned, if my interpretation of your system is correct.

We have no applications in process nor any license with any administration for the 38.0 - 39.5 GHz frequency band. So, that band gives us no concern.

If you would be so kind, while we have your Form 442 submission to the FCC, we would appreciate also receiving a service copy of your response to Question 6 of Form 442 (also sometimes referred to as your *system narrative*). These applications interest us generally and we would like to remain informed regarding activities in the mmW region of the spectrum. If you could pass this to Peter it would be helpful to us for our records.

Good luck with your trials and we would enjoy learning about any publicly available information regarding your results. Let us know if we can be of any further assistance or if we have misinterpreted any of your Form 442 information.

Best Regards,

Jan A. King
Chief Technical Officer

Astro Digital - US
jan@astrodigital.com

On Nov 28, 2018, at 3:25 AM, Bjornson, Christopher <cbjornso@steptoe.com> wrote:

<STA Application Form.pdf>