

## Anthony Serafini

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**From:** Filipe Manuel Dos Santos Lopes Pereira <fmd43@cornell.edu>  
**Sent:** Tuesday, April 26, 2016 9:41 PM  
**To:** Anthony Serafini  
**Subject:** Re: Cornell STA 128-EX-ST-2016

Dear Tony

Here are the answers :

1 - I think the application mentioned 100 sprites. Can you accomplish the experiment with less? Is there a minimum needed to meet your objective for the test?

The number of Sprites deployed flows directly from the mission objectives. 100 of them are required in order to meet the parameters of the original Kickstarter campaign that funded this project and to demonstrate the combination of communications technology and lifetime/survivability in the space environment.

One of the primary goals of the KickSat-2 mission is to test a novel CDMA communication scheme for very small spacecraft. A major feature of this communication scheme is its ability to simultaneously handle many spacecraft with a single ground station and within a single narrow-band channel. We anticipate it being used in future distributed space missions involving large numbers of small spacecraft. While we could deploy fewer Sprites, we feel that it would offer a far less compelling demonstration of this key technology.

We emphasize that the unique orbital dynamics of these small spacecraft guarantee that they immediately move into a lower orbit than and ahead of the CubeSat that deploys (or separates) them. Then they reenter soon after separation. This fundamental physical behavior ensures the safety of every other spacecraft in the same orbit as the CubeSat. Their roughly week-long lifetime before reentry ensures that they represent no orbital-debris risk on a time scale that relevant to other satellites. Their comparatively high drag promises not only to meet the 25-year reentry requirement by orders of magnitude, but it also provides highly predictable reentry times (accurate within days).

2 - Is there a reason that you need to limit it to daytime passes?

The Sprite spacecraft do not carry batteries. They are powered by solar panels alone and must be illuminated by direct sunlight to operate.

Thank you  
Filipe

On Apr 26, 2016, at 14:08, Anthony Serafini <[Anthony.Serafini@fcc.gov](mailto:Anthony.Serafini@fcc.gov)> wrote:

Felipe

Thanks for the response.  
Follow-on questions from our International Bureau

I think the application mentioned 100 sprites. Can you accomplish the experiment with less? Is there a minimum needed to meet your objective for the test?

You indicated that you were seeking daytime passes. Is there a reason that you need to limit it to daytime passes?

Thanks  
Tony

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**From:** Filipe Manuel Dos Santos Lopes Pereira [<mailto:fmd43@cornell.edu>]  
**Sent:** Friday, April 22, 2016 3:28 PM  
**To:** Anthony Serafini <[Anthony.Serafini@fcc.gov](mailto:Anthony.Serafini@fcc.gov)>  
**Subject:** Re: Cornell STA 128-EX-ST-2016

Dear Tony

Sorry for the delay in getting back to you  
I had to ask Zac about this, since he is the one coordinating these matters with NASA  
Please find his answer below:

"We, along with the NASA orbital debris office have done a thorough analysis of the orbital lifetime of the Sprite spacecraft.  
Our baseline scenario is a deployment at 325 km. altitude. From there, the Sprites are predicted to reenter 2-6 days after deployment.  
The 325 km. altitude was chosen as the lowest possible deployment altitude from which we could be confident in having multiple day time passes over our ground station during which to test the Sprites' communication capabilities."

Kind Regards  
Filipe

On Apr 21, 2016, at 14:53, Anthony Serafini <[Anthony.Serafini@fcc.gov](mailto:Anthony.Serafini@fcc.gov)> wrote:

Hello Filipe

I am trying to follow up on some of my open applications. Thank you for your response attached.

As a follow up, we would like to know consider.

1. What would be the lowest that you could feasibly deploy?
2. What would the mission life be at that lowest altitude?

Regards  
Tony S.  
<172489.PDF>

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