

CubeSat Issues: Where Are We?

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CubeSat Issues: Spectrum

- **Dedicated spectrum is desirable, to provide a home for CubeSat command, control and data relay operations**
 - Simplifies licensing operations
 - Allows use of standard, off-the-shelf components
 - Allows intra “service” coordination
- **Requirements:**
 - Omnidirectional antenna, relatively low data rates point to spectrum in the ~ 300 - 3 000 MHz range
 - Bandwidth to accommodate current and future users – worldwide (~10 MHz?)
- **Service: Under what radio service should CubeSats operate – this is NOT a trivial issue!**



CubeSat Issues: Licensing/Regulatory

- **CubeSat timeline is much shorter than current licensing and approval process:**
 - No money to start licensing prior to award
 - Design, construction, launch ~ 1 year
- **Some info necessary for licensing is not known until near launch time (e.g. orbital parameters)**
- **Requirements:**
 - Fast approval process, preferable no longer than a couple of months
 - Minimum of international (or national) regulatory obligations and data requirements



Solutions?

Spectrum Related Issues to Be Dealt with in ITU-R Study Group 7 (Working Party 7B) through New Question XXX/7:

- What are characteristic data rates, transmission times, bandwidth requirements of individual CubeSats
- How much spectrum is needed? Worldwide estimate.
- Under what service definition should CubeSats operate?
- Preferred frequencies?

Outcome: One or more Recommendations

Should be completed by 2015, in time for the next Radiocommunication Assembly (in practice, by 2014)



Solutions?

Regulatory Issues have been placed (forced) on the Preliminary Agenda of WRC-18/19:

“to consider the appropriate regulatory procedures for notifying satellite networks needed to facilitate the deployment and operation of nano- and picosatellites, in accordance with Resolution COM6/10 (WRC-12)”

resolves to invite WRC-18

- to consider whether modifications to the regulatory procedures for notifying satellite networks are needed to facilitate the deployment and operation of nano- and picosatellites, and to take the appropriate actions,

invites ITU-R

- to examine the procedures for notifying space networks and consider possible modifications to enable the deployment and operation of nano- and picosatellites, taking into account the short development time, short mission time and unique orbital characteristics,

Not clear at present where work is to be performed:

WP 4A (satellites), Special Committee(SC), WP 7B ?



Process

1. Write to the Chair(s) of the relevant group(s), informing them of your interest in participating and the motivation, and ask them to get on the mailing list.
2. Attend meetings, write and submit documents, get to know the other participants.
3. Be patient – Approval of US documents is often difficult. Be aware that there are many interests represented in the group, not all of them favorable to your issue!
4. If at all possible, attend international meetings, particularly if you have an approved US document. No one fights harder to move your paper forward than you!
5. Keep in mind that the ultimate goal is to produce a Recommendation you can live with, and that compromises will be necessary
6. NSF (Andy Clegg and me) are available to help and assist you, call on us! However, we will NOT write the papers.



The Price of Inaction

- **Possibility One:**
 - > **The Issue will be dropped**
 - **The Question may/will be suppressed in 2015, if no action on it**
 - **Drop the issue from the Preliminary Agenda of the WRC. Easy to do!**
- **Possibility Two:**
 - > **Others will write the Recommendation(s)/WRC proposals for you and you may not like the outcome**
 - > **This process has already started in WP 4A**

Do not wait until 2014 to Provide Input!!!!



Information

US WP 7B (space communications) Chair: Ms. Cathy Sham (NASA-Johnson SC)

E-mail: catherine.c.sham@nasa.gov

SG 7 Website: <http://www.ussg7.org>

Username: sg7User

Password: 4webAccess

WP 4A (satellites) Chair: Mr. Joe Hill (FCC)

E-mail: Joseph.Hill@fcc.gov

Special Committee: Mr. Franz Zichy

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National Update: Fed vs Non-Fed Satellites

- **NTIA is clamping down on the definition of Federal and non-Federal satellites**
- **Many upcoming Cubesats will likely not qualify as Federal satellites, meaning we cannot go through the same NTIA process as we did for DICE and CINEMA**
 - > **Non-federal satellites must be licensed through the FCC**
- **NSF will continue to assist, by helping to navigate the FCC process, but we are learning ourselves**



What Constitutes a Government Satellite?

- **Bar set by DICE & CINEMA**
 - > Cubesat is government funded
 - > Launched on government rocket
 - > Launched with a government payload
 - > Ground stations are owned, operated, and/or funded by government



S-band

- **Related to previous slide: Fed government is clamping down on non-Fed use of S-band (2200 – 2290 MHz)**
- **If you don't qualify as a Fed satellite, you should probably plan to avoid this band**



Discussions with FCC

- **Bottom line: FCC recommends that Cubesats file for experimental licenses**
- **With justification and coordination, would allow for a variety of bands (including amateur and maybe even S-band)**
- **There are some preliminary steps that can be completed, even if you aren't certain that you will go the experimental route. Please contact me.**



ITU Notification

- **Snafu with October Cubesat launch – some Cubesats were not notified to ITU, and at the last minute, FCC threatened to hold up launch**
 - > **Did not apply to DICE, since we sought and obtained a waiver through NTIA. Only applied to FCC-licensed and amateur satellites**
- **Recommendation: All Cubesat projects be sure that notification is filed or (for gov satellites) that waivers are in hand, well in advance**
 - > **Contact me for details**



Summary

- **NSF-funded Cubesat projects should contact me well in advance of anticipated launch (>18 months) to sort through the frequency licensing issues (whether you are a gov or non-gov Cubesat)**

