



Infostellar

# Frequency and Legal Regulations Surrounding a Ground Station Network

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# Regulations

- Launch provider related
- **Satellite operator or service provider related**
- Ground service provider related

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- Satellite operator or satellite service provider related
  - Satellite operation related
    - **International frequency coordination (via ITU)**
    - IARU coordination for amateur frequency
    - Radio licensing for satellite and ground station (Radio law)
    - Permission/Registration (The law for space activity)
  - Mission related
    - Remote sensing law
    - Communication business act
    - etc.

# Why Do We Need to Care?

## International Frequency Coordination

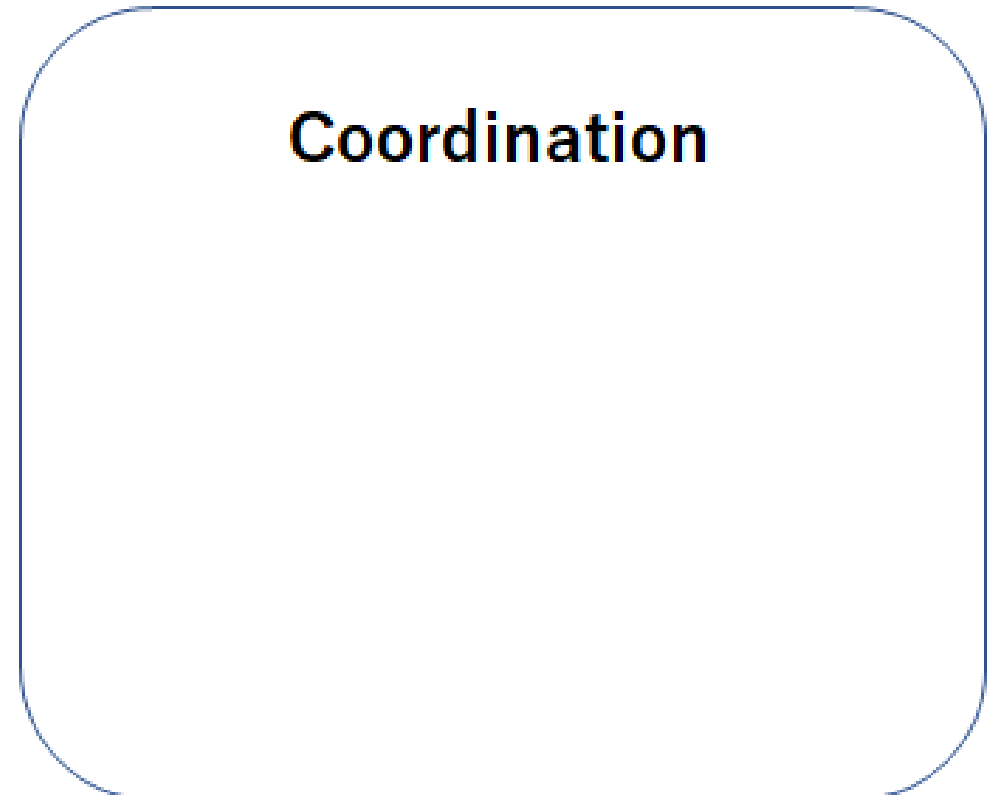
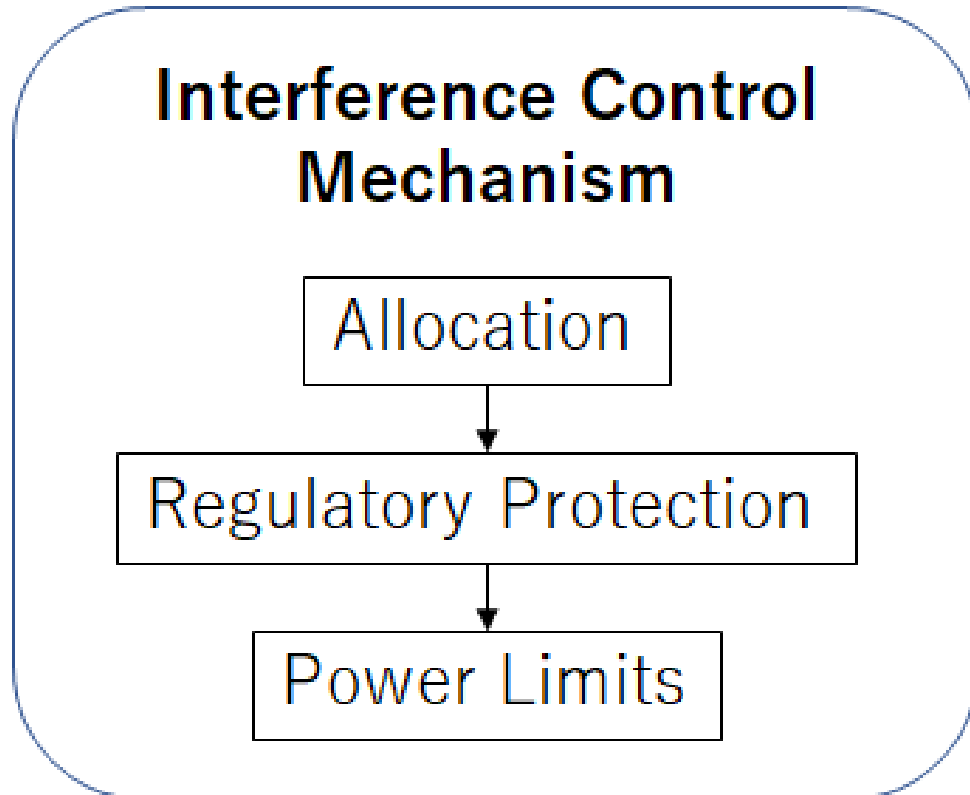
- To avoid harmful interferences

Because number of LEO satellite is increasing so rapidly, pressure to obey the rule is also increased.

- ITU, IARU
- Government: FCC, etc.
- Launch provider
- GEO satellite operators, terrestrial radio operators

**We need to follow the rules, if we want to keep use frequencies**

- Radio frequencies and orbits are limited natural resources.
- Therefore, any radio service operator needs to try to limit the number of frequencies and the spectrum used to the bare minimum to provide their necessary services in a satisfactory manner.
- **Any new assignment, any change of frequency** , or any other basic characteristic of an existing assignment **must avoid causing harmful interference** to other services



# 1) Allocation

- Frequency allocation:

Frequency use definition separated by stations of different **services**

- Each frequency band includes one or more radio service.
- NOT allowed to use a band for undefined services.
- The world has been divided into three regions and each region has different frequency allocation.

# Allocation rules

Region 1	Region 2	Region 3
410-420 FIXED MOBILE except aeronautical mobile SPACE RESEARCH (space-to-space) 5.268		
420-430 FIXED MOBILE except aeronautical mobile Radiolocation 5.269 5.270 5.271		
430-432 AMATEUR RADIOLOCATION 5.271 5.274 5.275 5.276 5.277	430-432 RADIOLOCATION Amateur 5.271 5.276 5.278 5.279	<div data-bbox="1595 648 2186 876" style="border: 1px solid green; border-radius: 15px; padding: 10px; background-color: #e0f2f1;">                     Capital: Primary Service                      Non-capital: Secondary Service                 </div>
432-438 AMATEUR RADIOLOCATION Earth exploration-satellite (active) 5.279A 5.138 5.271 5.276 5.277 5.280 5.281 5.282	432-438 RADIOLOCATION Amateur Earth exploration-satellite (active) 5.279A 5.271 5.276 5.278 5.279 5.281 5.282	
438-440 AMATEUR RADIOLOCATION 5.271 5.274 5.275 5.276 5.277 5.283	438-440 RADIOLOCATION Amateur 5.271 5.276 5.278 5.279	<div data-bbox="1462 1043 1811 1205" style="border: 1px solid green; border-radius: 15px; padding: 10px; background-color: #e0f2f1;">                     Footnote                 </div>
440-450 FIXED MOBILE except aeronautical mobile Radiolocation 5.269 5.270 5.271 5.284 5.285 5.286		



Example)

5.286

The band **449.75-450.25 MHz** may be used for the **space operation service** (Earth-to-space) and the **space research service** (Earth-to-space), subject to agreement obtained under No. 9.21.

- Radio waves transmission and/or reception for specific telecommunication purposes.
- Because **frequency allocation defines the permitted services**, the satellite operator must choose their service carefully and accurately.
- If the wrong service is written in an application, it might be rejected.

IARU most strongly recommends that satellite builders asking for coordination make sure that their mission fits the definitions of the amateur services.

**RR 1.56**        *amateur service: A radiocommunication service for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.*

**RR 1.57**        *amateur-satellite service: A radiocommunication service using space stations on earth satellites for the same purposes as those of the amateur service.*

## 2) Regulatory Protection

Special regulatory protections for specific applications.

Example

- **Geostationary -satellite is given priority over non -geostationary -satellite** . Non-geostationary-satellite shall not cause unacceptable interference to and shall not claim protection from geostationary-satellite networks. (Summarized from RR Volume 1, Article 22, 22.2)
- **Data collection systems (DCS) need to have stable regulatory certainty for long-term continuity for its operation** . The establishment of power limits for earth stations is necessary. (Summarized from RR Volume 3, RESOLUTION 765 and 766 (WRC-15))

### 3) Power Limits

- **Power Flux -Density (PFD)**

to protect terrestrial services from space services.

- **Equivalent Isotropically Radiated Power (EIRP)**

to protect space services from terrestrial services.

- **Aggregate Equivalent Power Flux -Density (EPFD)**

to protect geostationary-satellite services from non-geostationary-satellite services.

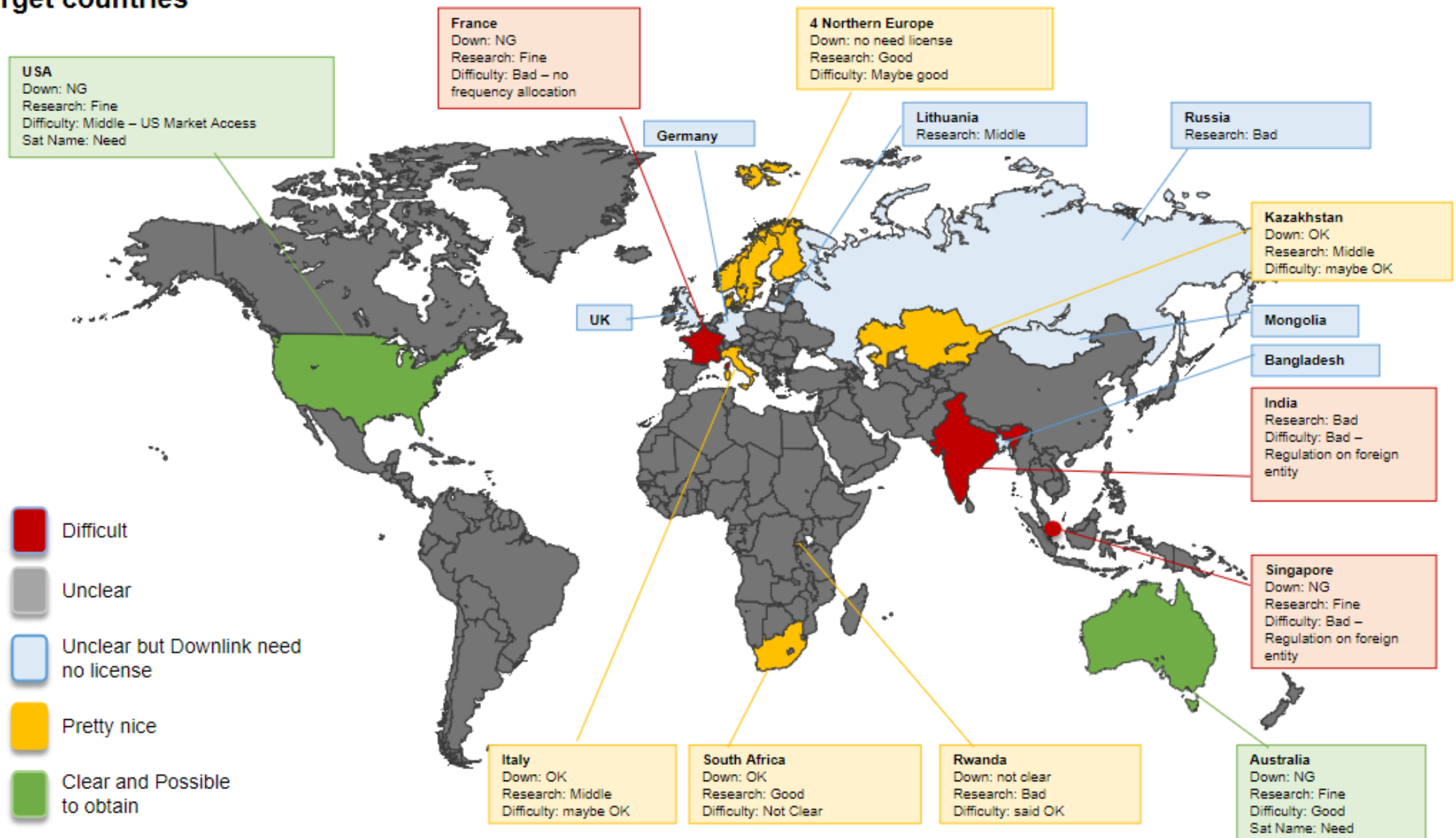
Make proper frequency coordination application, avoid time loss & extra work

- 1 coordination could cover series of satellite
- Proper service?
- Enough understanding of regulatory protection and power limits?

## Summary 2

- Follow the ITU rules
- If CubeSats and the small satellite community continue to use amateur frequencies without a long-term strategy, we may lose other frequency bands can be used
- There is a need to make the community's voice heard in the ITU

# ◆ Severity of testing station target countries





# Thank You

Please feel free to directly reach out  
if you have any questions.

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