Ground Station Regulation – a global comparison

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NORTHBASE
68° Northern
Latitude

NORTHBASE

Ground station services for earth-orbit satellites

- Companies, universities, governments, institutions
- Global and domestic

Founded 2019 with 100% Finnish ownership

Location is above the arctic circle, offering good visibility especially to polar orbit satellites

Finland - high-tech and stability, with good regulatory environment and great infrastructure

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NorthBase - 1 Tampere

- UHF/VHF ground station
  - 4x4m Yagi antennas, H/V/R/L
  - UHF/VHF RX / TX

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NorthBase – 2 Muonio

- S/X ground station
  - 3,9m Safran Legion 400 with radome
  - S band RX/TX, X band RX
  - Rack space for customer equipment
  - 1 GB fiber-optic internet connection

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Hosting / Teleport Services

- Perfect location higher than N68°
  - GSaaS services
  - Hosting services
  - Infrastructure and support services provided based upon customer needs

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Finnish High Lapland

Nine municipalities totalling

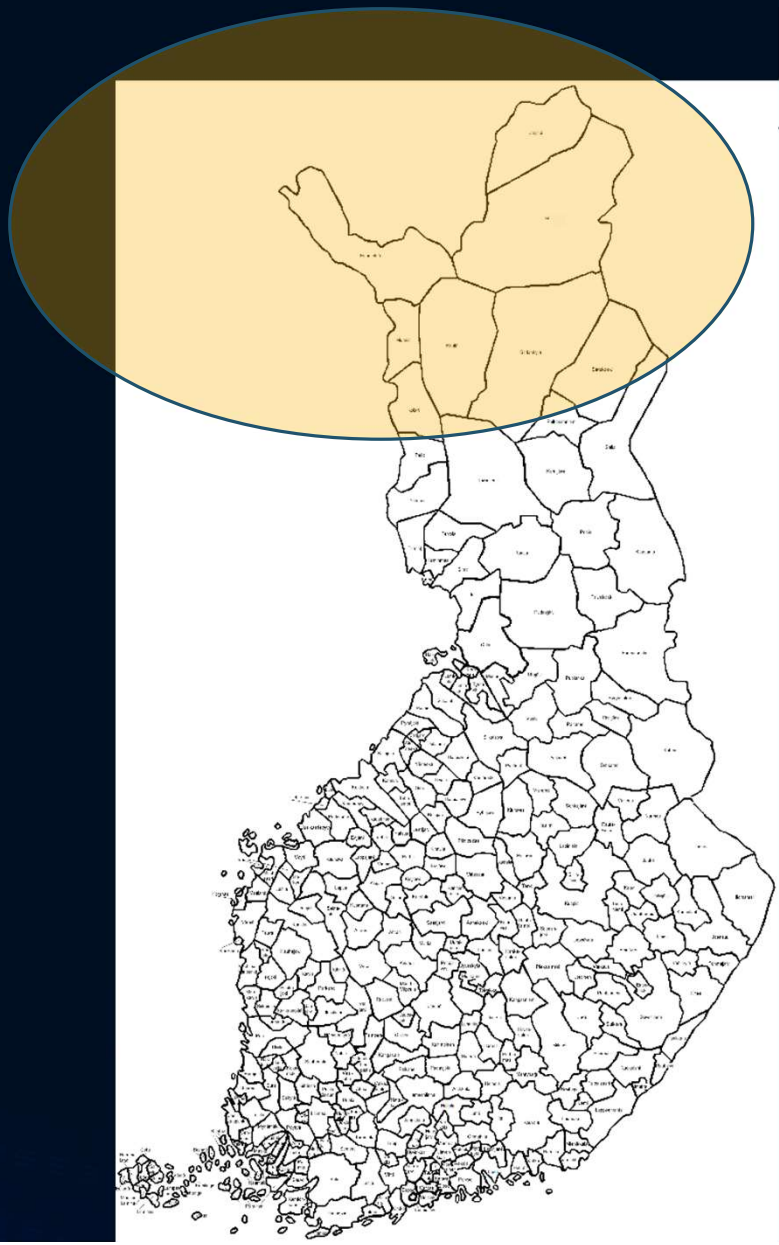
- 64000 km2
- 33000 inhabitants

Comparing with ROK:

- 100000 km2
- 50000000 inhabitants

Population density difference of 1:1000

>>> Lots of room for ground stations



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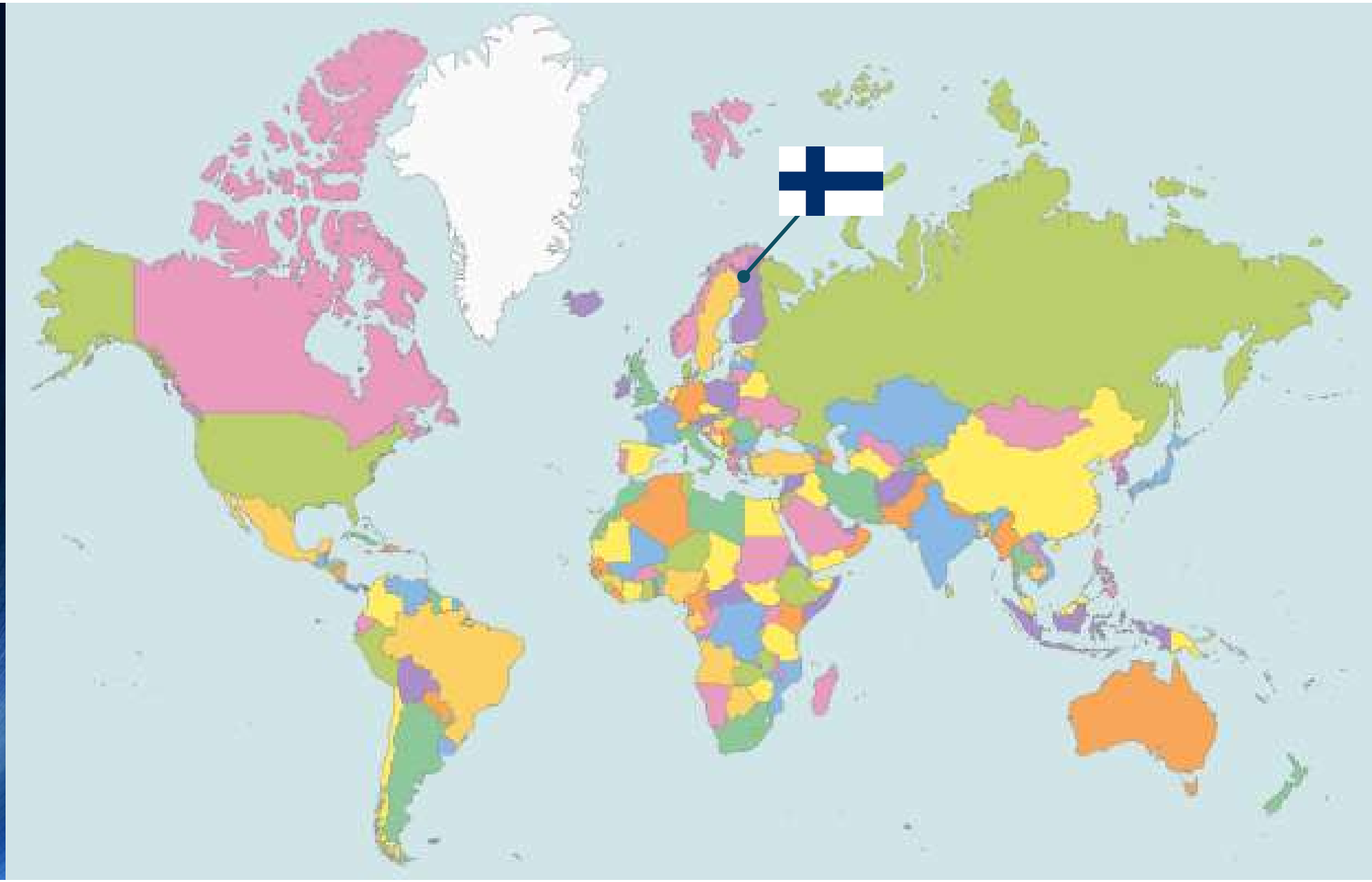
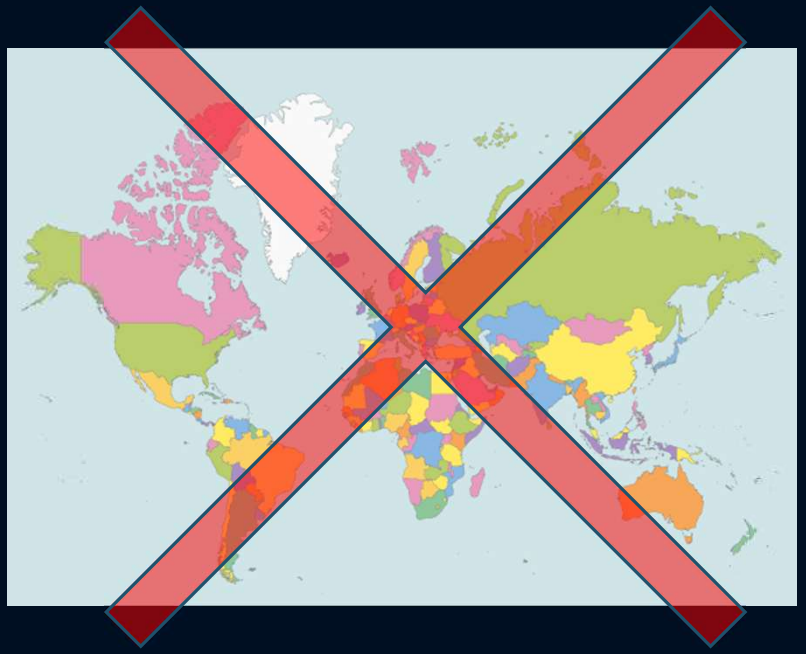
Arctica and Antarctica





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Nature of ground station (GS) regulation

- Satellites are well regulated nationally and internationally
  - Need for international regulation is evident
    - ITU frequency regulation is essential
    - Satellites fly all over the earth and may also drop wherever on the earth
- Need for common GS regulation is not as evident
  - Ground stations are (mainly) stationary and do not affect other countries much
  - GEO satellites have also been stationary and easy to regulate
- As a result, ground station regulation varies greatly between countries
  - Furthermore, regulation in general does not fully reflect the current needs

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Research questions:

1. What types of regulations govern ground station operations globally?
2. Can ground station regulation serve as a competitive advantage for a nation?
3. Is there a necessity for international regulation or for harmonization of national regulations?

Method: Survey plus desk study.

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Survey participant
Desk study country

Findings 1: There are several kinds of regulation

a. *Specific* such as ground station laws, RF licensing
b. *General* such as building permits, export licensing
c. *Hidden* such as geopolitics, national security matters

Regulating cyber security of the GS as well as security of the data seems to be of rising importance.

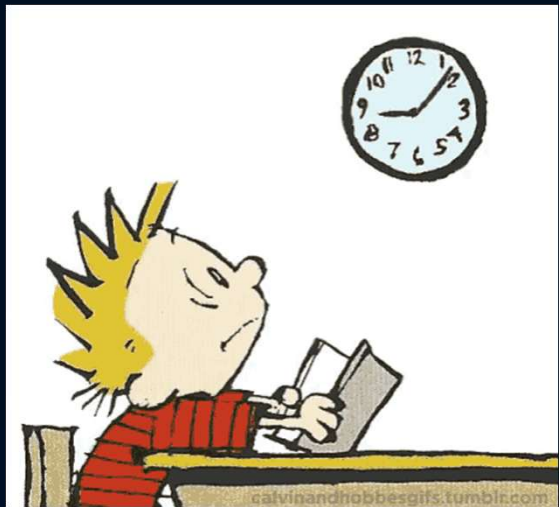
Findings 2: Nature of the regulating body varies greatly

- Examples:

Country	Regulating body
Canada	Global Affairs Canada – International affairs unit under foreign ministry
Finland	Traficom – Licensing body of Ministry of Transport and Communications
France	SGDSN – General Secretariat for Defence and National Security
Germany	BAFA – Federal Office of Economic Affairs and Export Control under Federal Ministry of Economic Affairs and Climate Action (formerly Economic Affairs and Energy)
India	IN-SPACe – Indian National Space Promotion and Authorization Center
USA	FCC, NOAA/DoC – Federal telecommunications authority with weather and ocean research organization under Department of Commerce

Findings 3: Specific GS regulation is rare

- Most countries do not require a GS license
  - Even if they do, in some countries it is acquired by notification method
- GS regulation mostly relies on TX ie. uplink radio permits
  - Receiving ie. downlink is still free from licensing in most countries
- Expected TX permit process times vary from 2 days to 12 months
  - In reality, the announced process times are ofter exceeded.



Findings 4: Foreign operation and operators

- Only few countries forbid GS from foreign entities on their soil
  - Still, these countries allow operating in other countries for their operatives
- Permission may be required to operate outside home country
  - If operated from home country, then applicable home country regulations apply
  - Naturally, operation also has to comply with the target country regulation
- There are no common rules for hosting and co-locating
  - Probably will be more clearly regulated in the future as these practices are essential in LEO operations

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Findings 5: Comparing and harmonizing with other countries

- Harmonization is generally considered welcome
  - Also caveats exist, such as overregulating or not learning from best practises
- Most respondents did not know enough of other countries to compare
  - Supports the claim of GS being a local activity
- Regulation is seen unable to keep up with the pace of LEO satellites
  - LEO satellites and constellations are dynamic and global in nature
  - ITU process is considered too slow and sluggish to work well now and in the future

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More details in paper by

Dr. Tommi Rasila NorthBase Oy
Prof. Arto Ojala University of Vaasa

In "Space Business – Emerging Theory and Practice"

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Yes, if said harmonization results in more flexibility in setting up and licensing GS, and not making it more difficult!

Before harmonization, sharing best practices would be great. Regulators are not familiar with Satellite RF reality, the pace of launches of small satellites, the needs of satellites and the ground segment-as-a-service business model.

It would be great if all would accept the same bands at the same conditions for TT&C.

satellite operators sometimes focus on the satellite and overlook the ground side and some regulations. So I think it is important for GSaaS operators like us to inform them about this.

The ITU and Out Space Committee of UN should lead to set up limitation of LEO satellite constellations, which compete with limited frequencies and orbit resources.

While we would like to see standards between countries in ground station regulation, we fear that a "one size fits all" approach will burden smaller countries with significant red tape.

While achieving global harmonization may present challenges, the potential benefits for the satellite industry and its stakeholders are substantial.

Cyber security compliance must be built into the regulations

It is time to think about a better approach to the ITU frequency coordination process in combination with ground stations.

It's a global market with global customers. Think all would gain to get a more harmonizing regulation, with aligned processes and cost procedures. It could potentially also lead to better overall structure and control.

Still takes one and half year to register basically frequency globally.

Regulations must take a global approach as LEO satellites are not restricted to any one geography

In the case of small satellites (nanosatellites, CubeSats), regulation is lacking behind with the reality.

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