

Definition of a future amateur satellite GEO/MEO payload



ESA Satellite Communications Group
February 2024
Frank.Zeppenfeldt@esa.int PD0AP

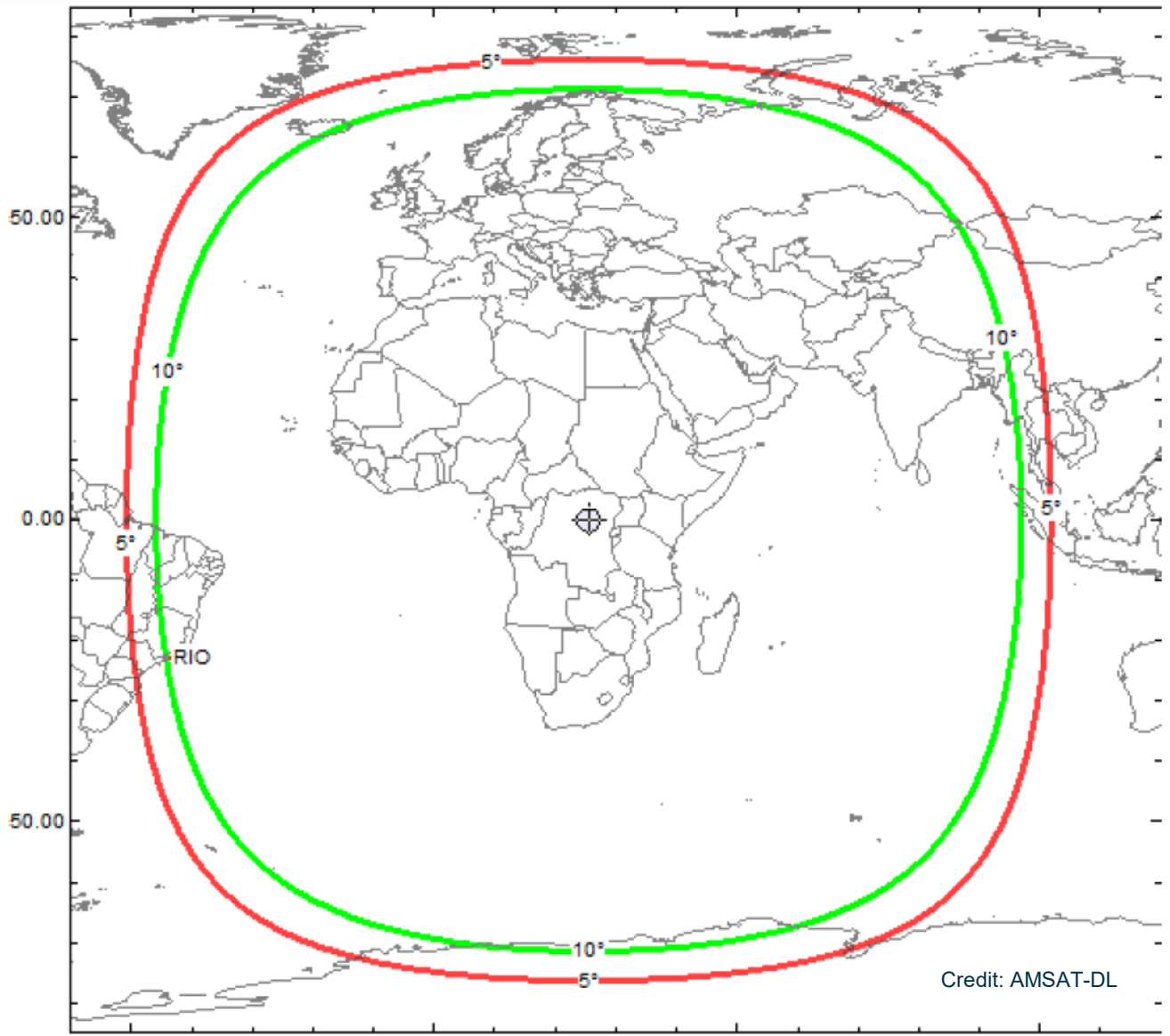
Amateur satellite community always at the forefront of innovation:

- Qualifying the **first CMOS chips** in space.
- Performing the **first Doppler shift analysis** to locate ground-based beacons leading to the COSPAS-SARSAT Search & Rescue system.
- Validating the **first inter-satellite** communication link.
- Demonstrating the **first GPS receiver** in High Elliptical Orbit (HEO).
- Development of packet radio protocols which are still used in many commercial systems.
- The use of CubeSats.
- The design of the **first DVB-S2 Ka-Band** transmitter for small satellites.
- Operation of the **world's largest distributed ground segment**, as a precursor to Ground station-as-a-service offers which are now commercial offered.

QO-100 leading to additional innovation, but with specific GEO-focus (DVB-S2, higher bands, IoT, ranging,...)

Some of us want to see a follow up of QO-100: we would like to support the definition of a future GEO amateur payload.

Geostationary amateur satellite payload QO-100





Letter to ESA Director: "Could ESA support in defining a future amateur satellite GEO payload?"



ESA: "We find this is a good thing. Can we have some budget to support this request?"



All countries working in the Telecommunications programme of ESA

Countries: "OK do it, but please with some focus on European/Canadian amateurs"

Amateur community



Scope of what we will be doing

“The coverage of the payload should be such that **in particular European and Canadian radio amateurs** will benefit, not precluding further **international collaboration** with other radio amateurs.”

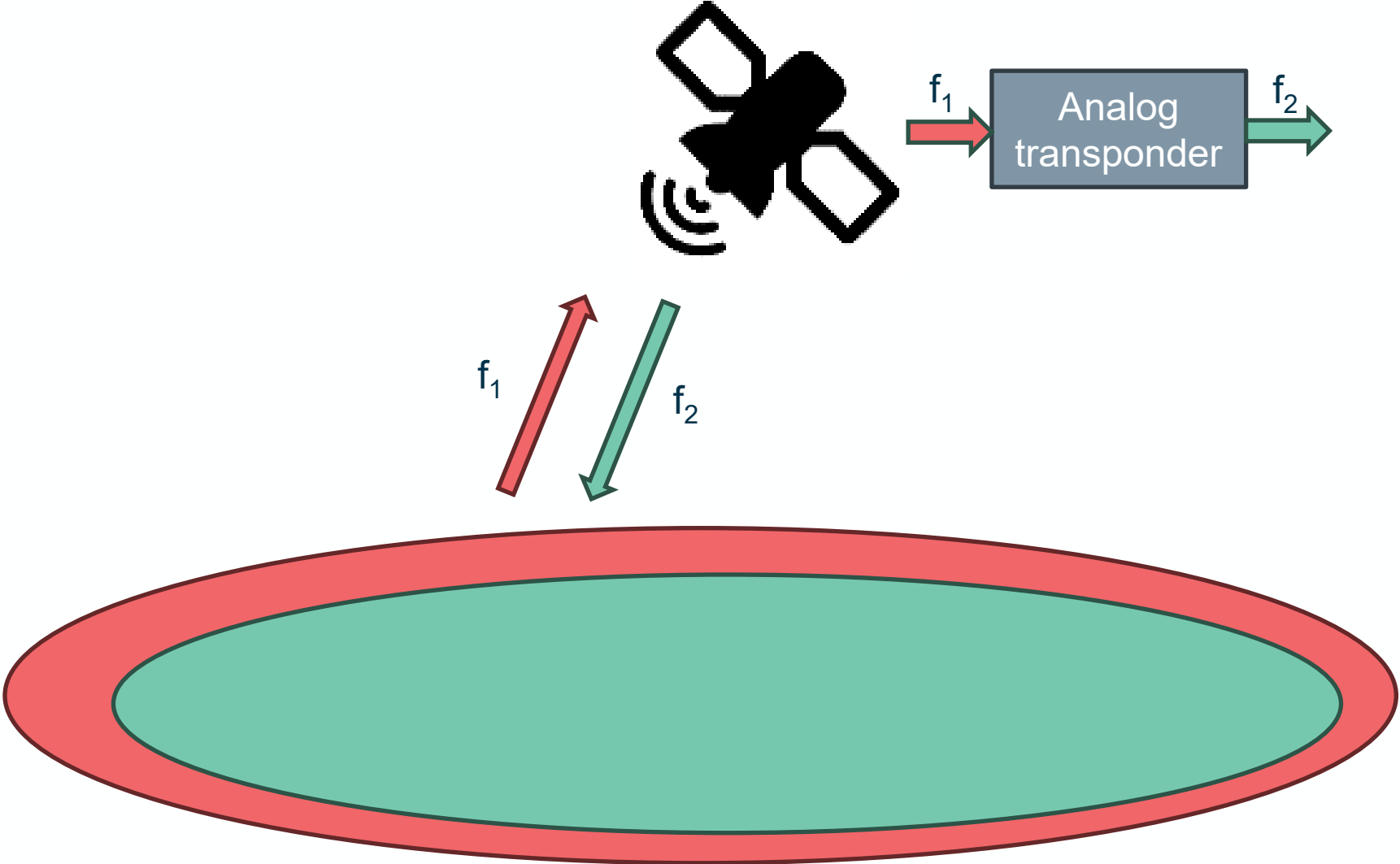
“ESA proposes that this activity will be implemented by a combination of internal, industrial, **and amateur efforts.**”

“The activity shall:

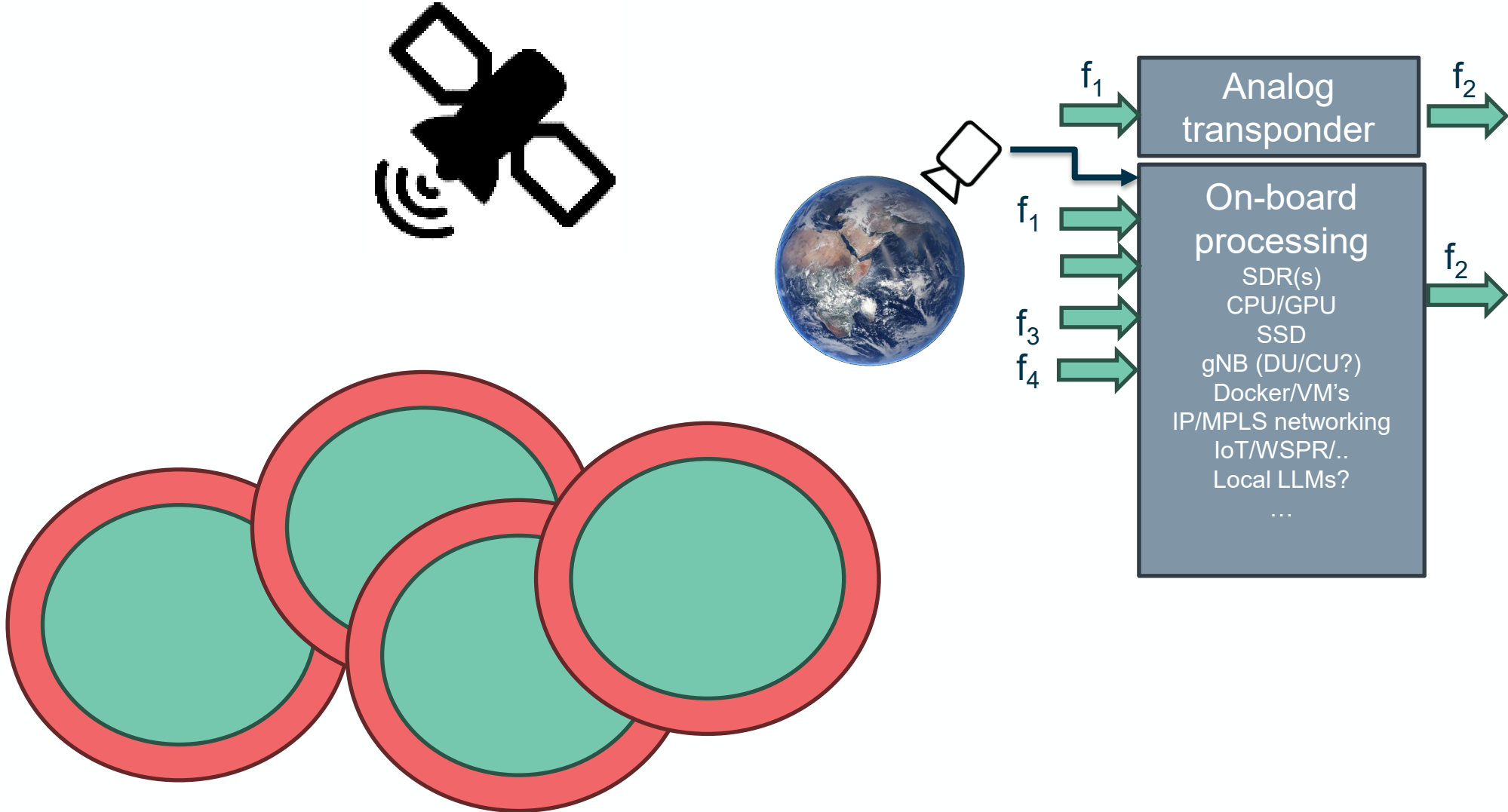
- consolidate requirements from the **amateur** community and **commercial** satellite industry,
- trade-off several payload options,
- address the future user segment,
- develop scenarios on how to finance, procure and operate such a payload,
- and investigate hosting opportunities on geostationary platforms.”



From simple....



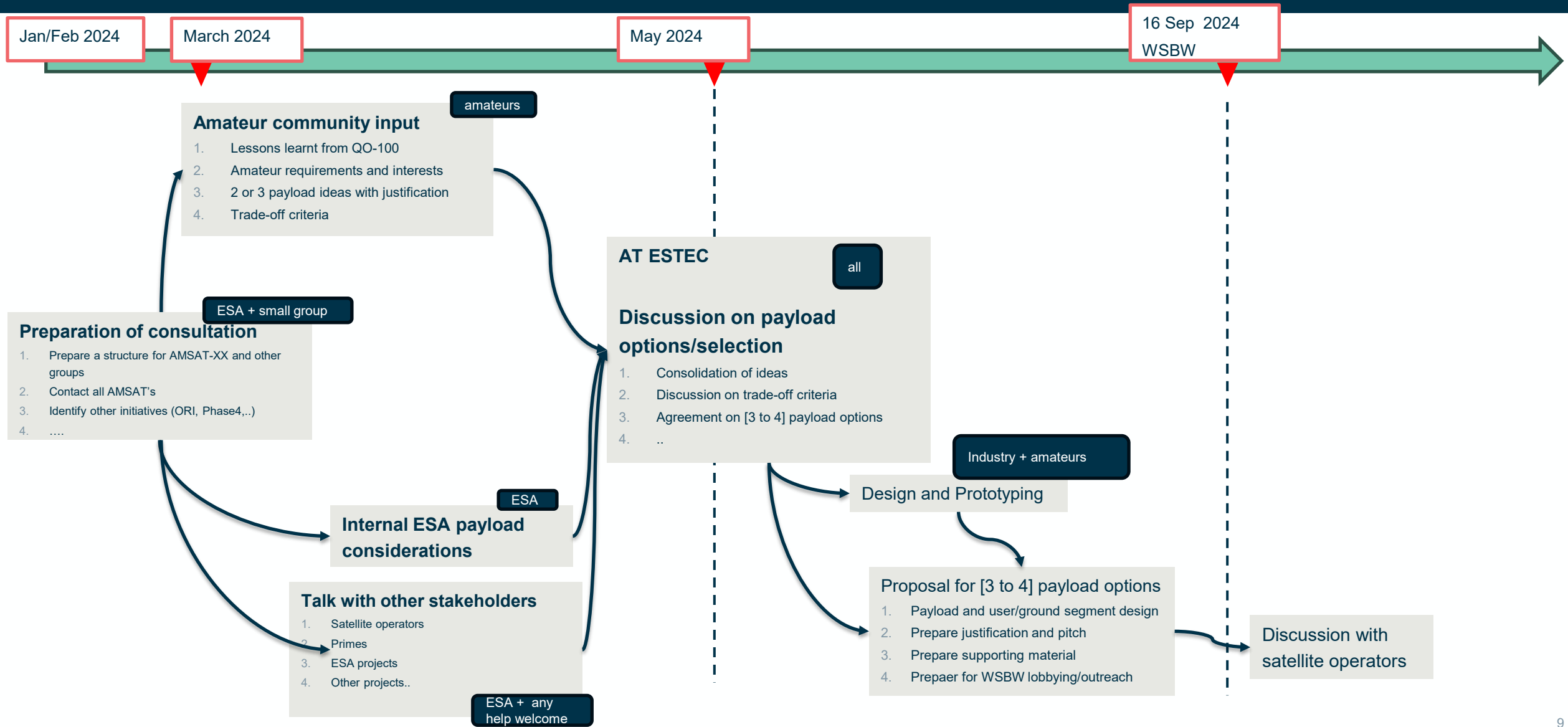
To complex



1. Frequency bands (we go up to 24, 47, 77 GHz?)
2. Analog, digital or both ?
3. Complete on-board SDR/Linux/GPU-box with Docker containers in space?
4. Possible applications – more messaging, IoT, M17, DVB-S2x or 5G-alike?
5. Technical risks (radiation/operator acceptance/...)
6. Allowing inter-satellite links to later LEO's? Moon communications relation? Link with QO-100?
7. Geographical coverage
8. Which degree of centralisation ?
9. Cost and attractiveness of future user terminals?
10. Educational attractiveness?
11. Inclusiveness – or just for a limited group of experts?
12. Hosted or very, very small GEO ?
13. Also MEO ?

First inputs, suggestions and comments already received from amateur community – thank you!

GEO amateur payload – proposed planning



March 2024

Request input from amateur satellite community & other parties, guided by some from the AMSAT community.

May 2024

Have a few detailed payload options for discussion with the community at ESTEC, Netherlands – with technical support

September 2024 World Satellite Business Week (where all satellite operators meet).

Organise discussions with operators

2025

Hopefully propose a few payload options at a next FOSDEM

