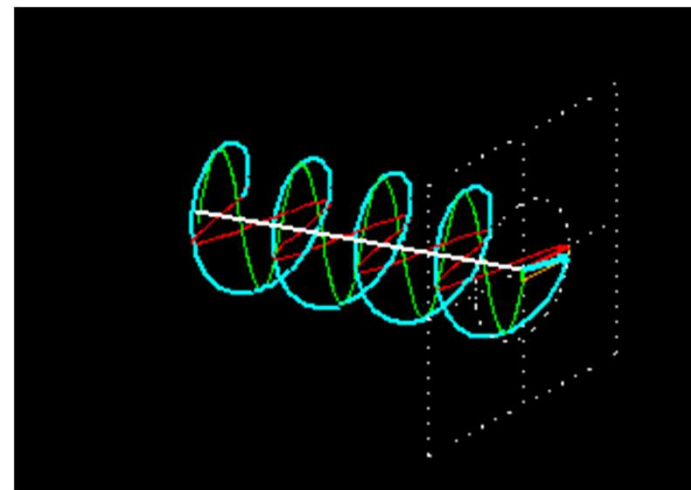
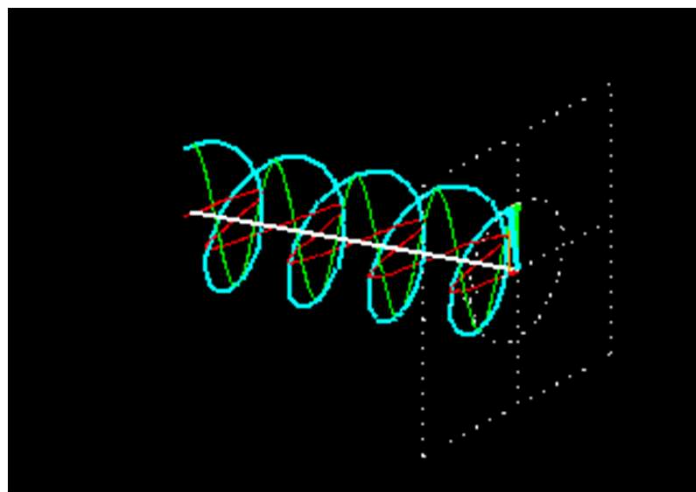
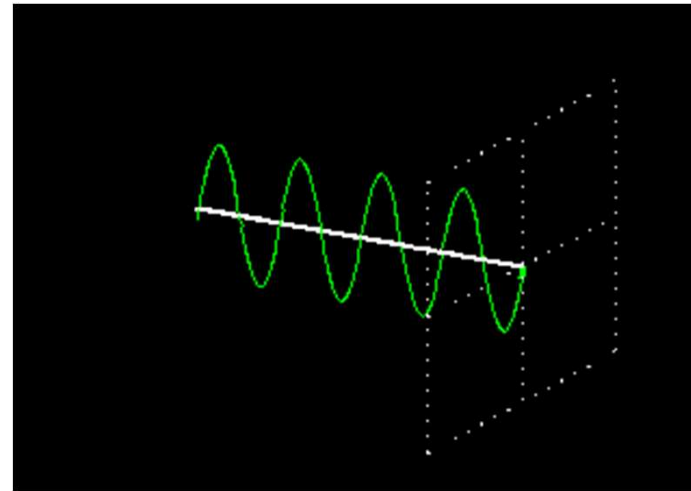
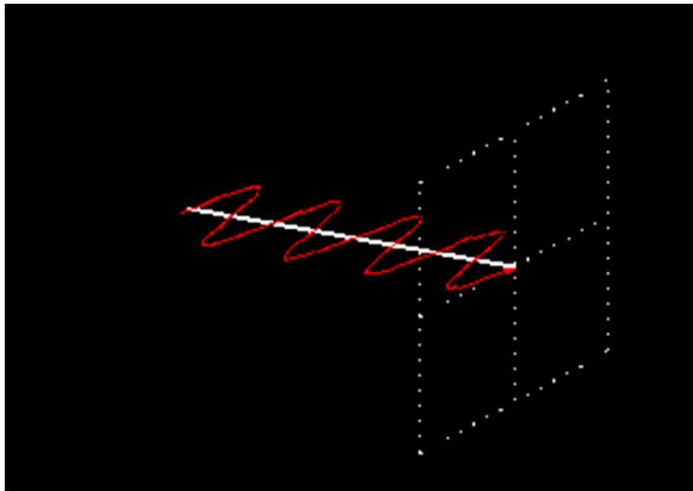


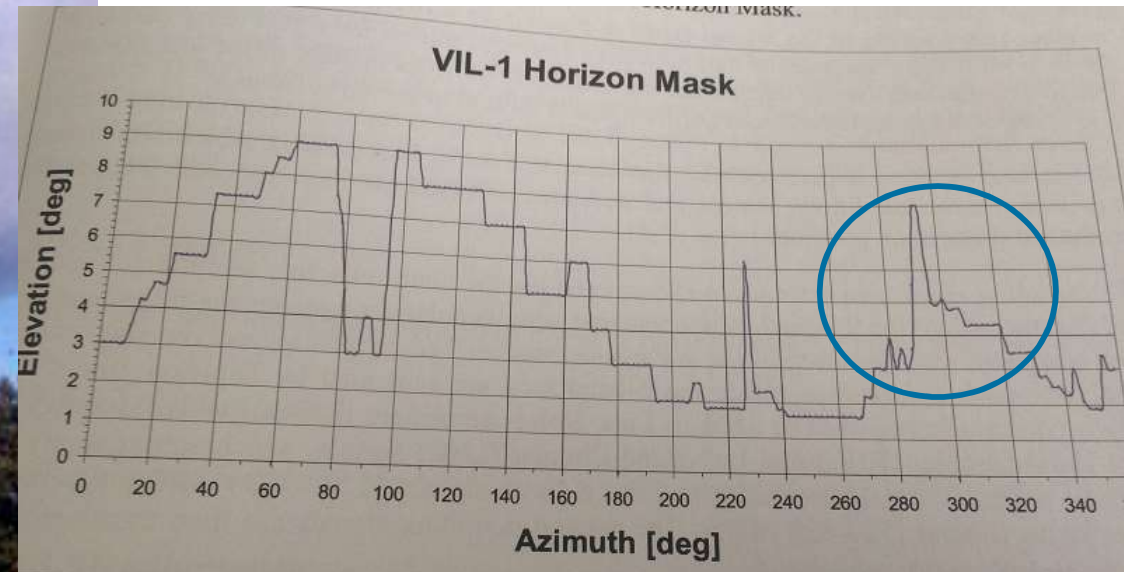
Real Ground Stations

Extra considerations: Polarisation



PROBA-2
RHC only

Extra considerations: Horizon Masks



Extra considerations....



Moving the antenna: pass profiles, tracking signal level, monopulse, program track

Station Timing: GPS, atomic clock etc

RF Testing: Near field problems, test towers, RF compatibility tests, RF suitcase

Cables: electromagnetic shielding, builders digging them up

Wind load

Air conditioning

Electrical grounding

Local RF licenses/laws, building regulations, health and safety rules

And more exotic problems....

https://www.youtube.com/watch?v=_cBTT1TPVW8

Tropical rain



Snow, ice



Lightening protection



Ceberos suffered a few strikes in 2006 causing substantial damage – now improved

Infrastructure problems e.g. communications, power, road, water, security etc...



Strike in Kourou

Mass protests in 2017 prevented launch of Brazilian SGDC and Koreasat-7.

EUTELSAT flew its own 172b sat back to Europe as it cannot get to the launch site

Local restrictions



A strange footprint



Belonging to..



How he got in...



Other visitors...



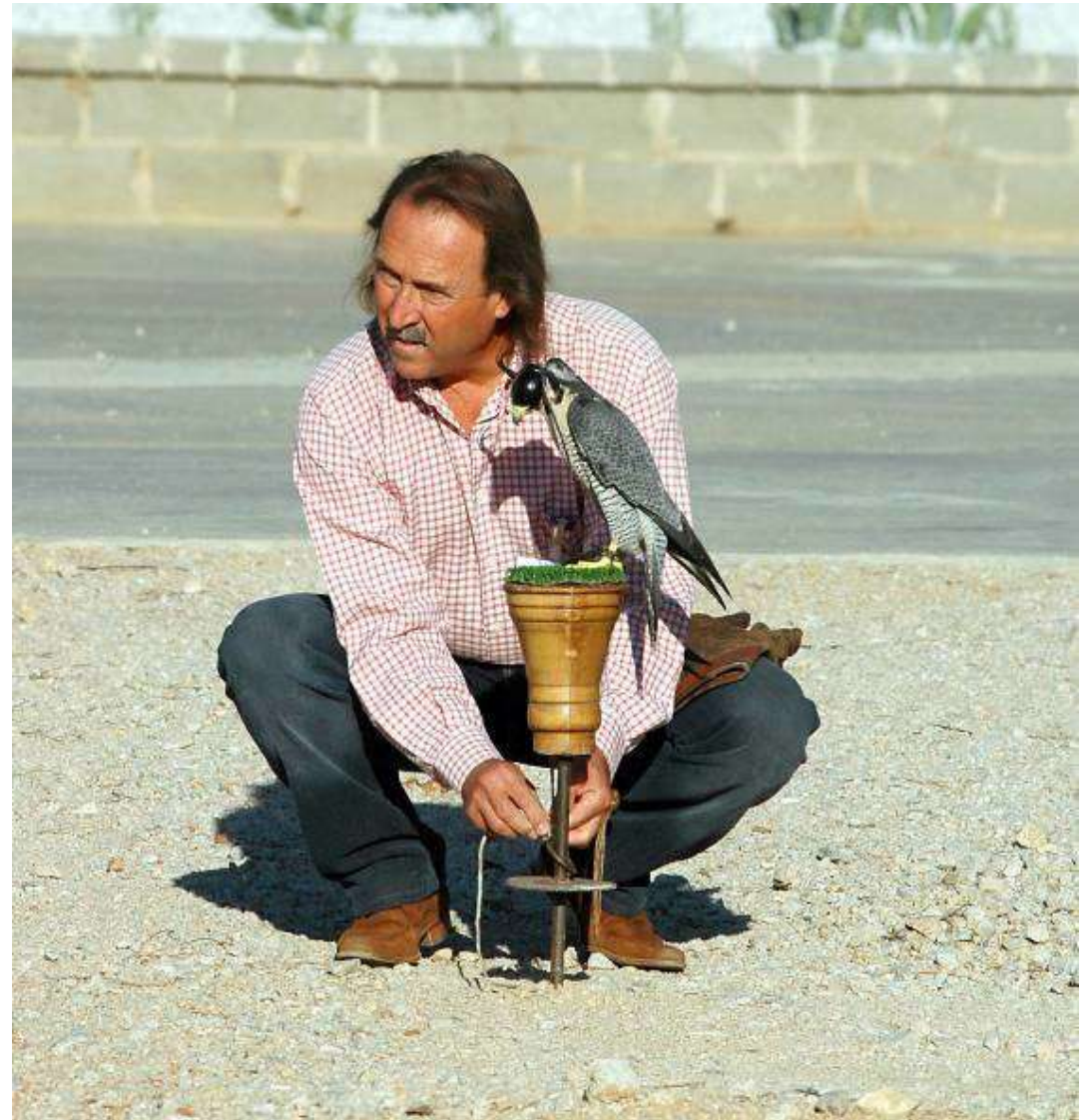
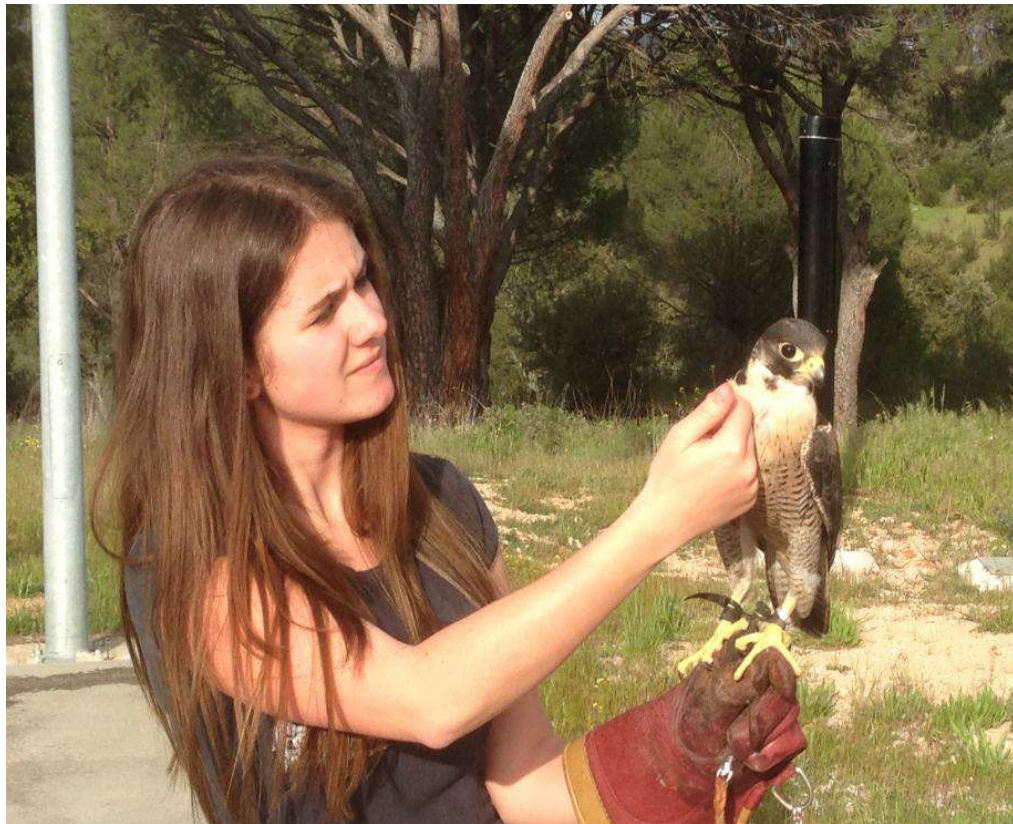
Other visitors...



Other visitors...



Birds



Fire

2013 in
Cebreros



Fire



Remote Control



Politically and legally complex to have ESA stations in non member states



Keep link budgets simple to start with and for checking changes later. “I never received a correct link budget in all my years at ESA” (Rainer Timm)

Use the EIRP expanding wave and “physical area” collection viewpoint to keep your sanity and make trade offs

Be very careful of link budget spread sheets. Very useful and also very dangerous.

Invest in a good LNA and keep it cold and close to the feed

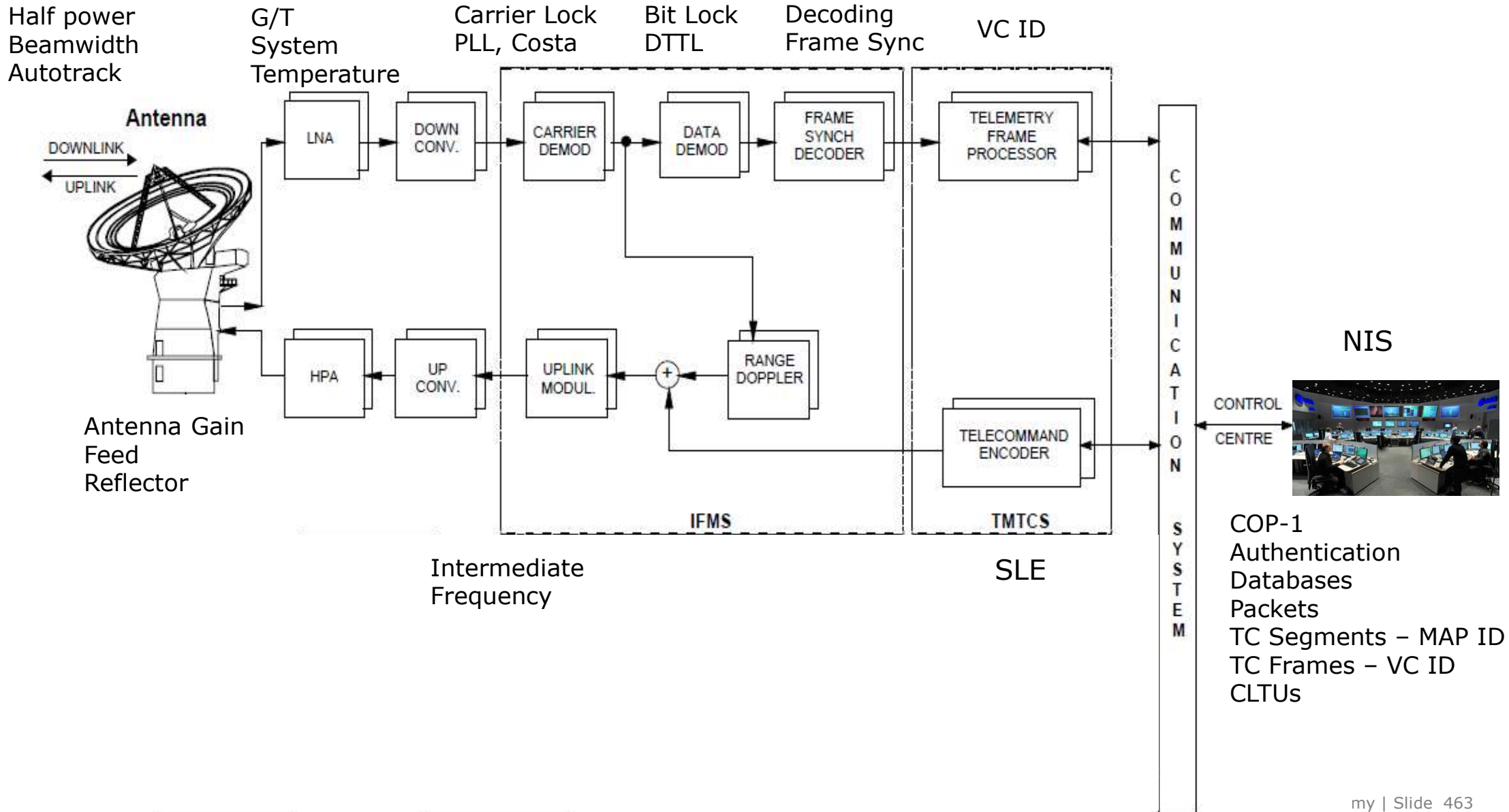
Do not forget the importance of the baseband signal shape – not intuitive

There is much, much more to ground stations than modulation, coding and protocols

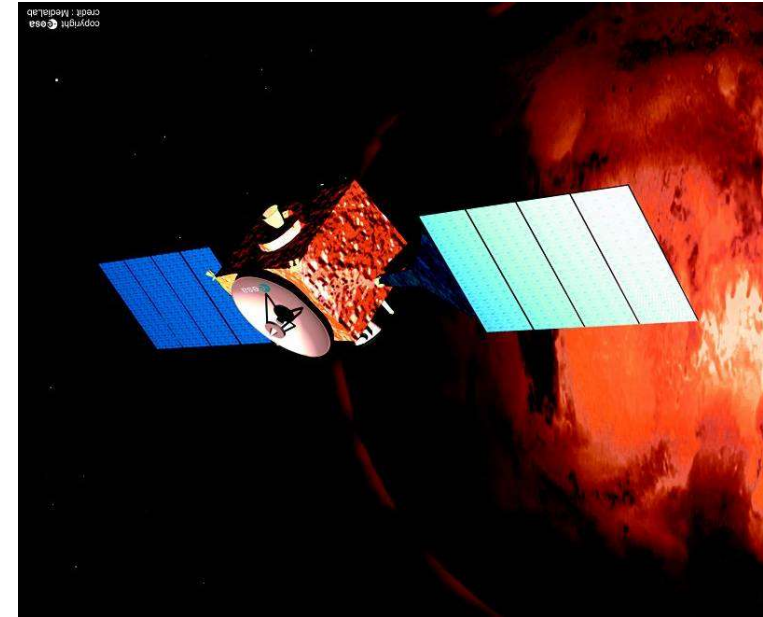
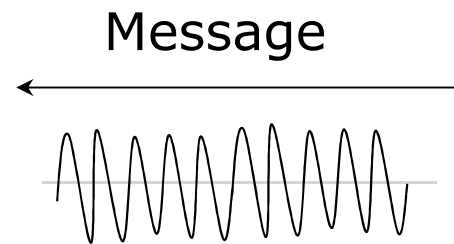
Be aware that the problems of maintaining big dishes scale up to enormous proportions (pointing, wind, power, de-icing, cooling etc)

Nothing beats real testing in the field (Boris Smeds)

Have we missed anything?



Conclusion



You can now design a communications system which is capable of retrieving that message!

Questions

