

# OUFTE-1

The first nanosatellite  
developed at the  
University of Liège  
Belgium



PiNa Workshop Würzburg, 1/10/2009

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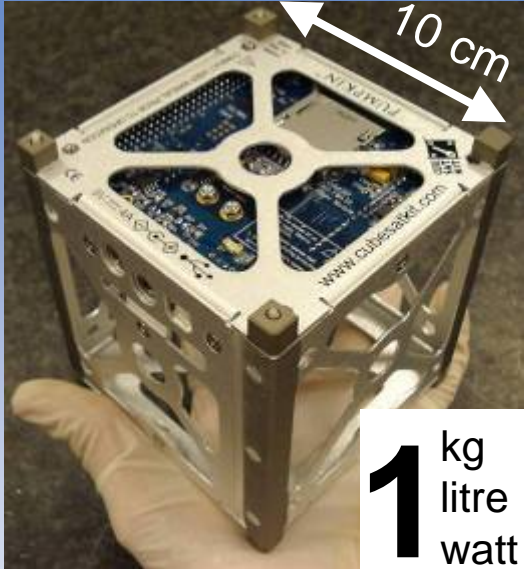
A. OUFTI-1 project

B. Technical overview

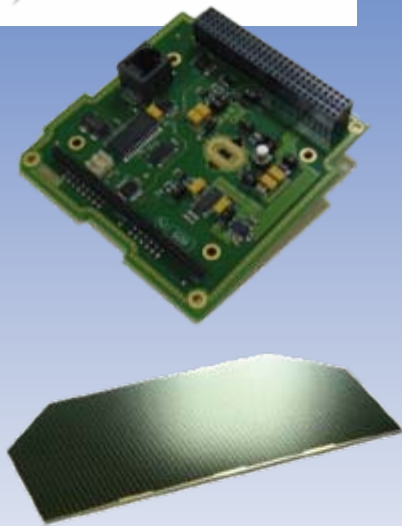
- Space segment
- Ground segment

C. Conclusion

# Main features of OUFTI-1



CubeSat standard



Three payloads



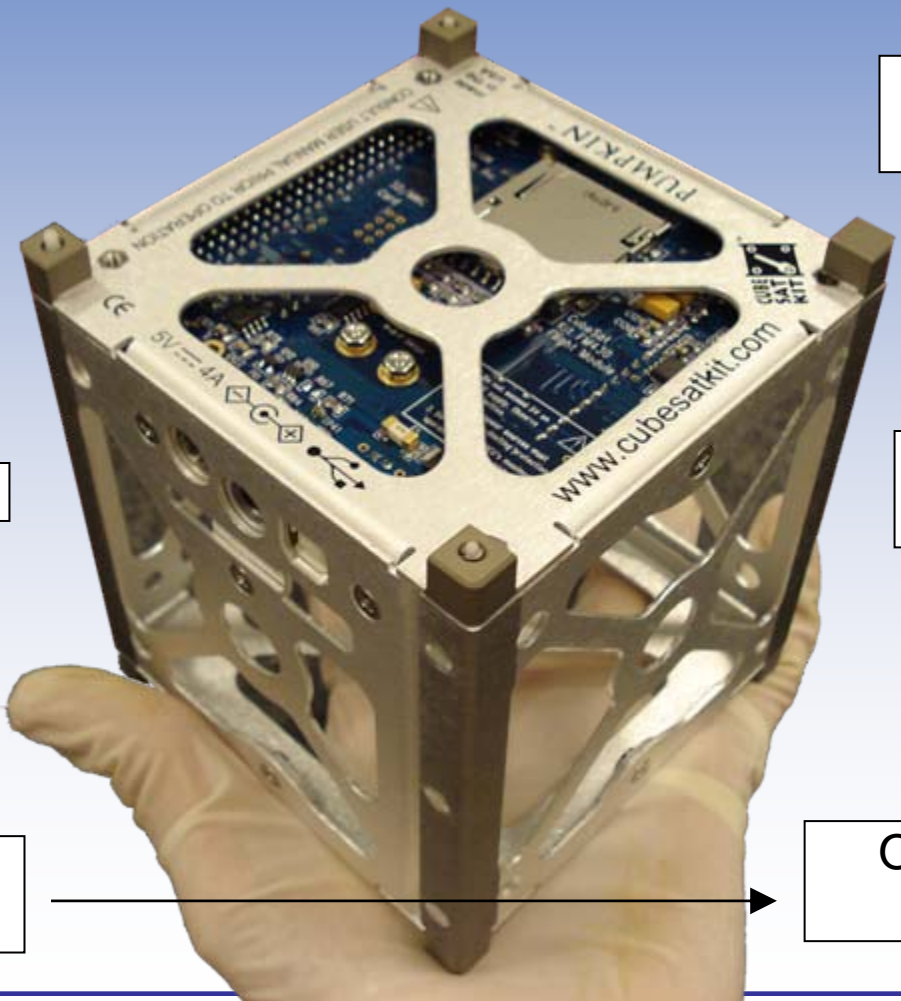
VEGA Maiden Flight



ULg, Helmo-Gramme, HEPL ISIL, UCL

# Mission objectives

## Education with fun



Design of the OUFTI-1 system



Launch of OUFTI-1

1



Satellite alive in space

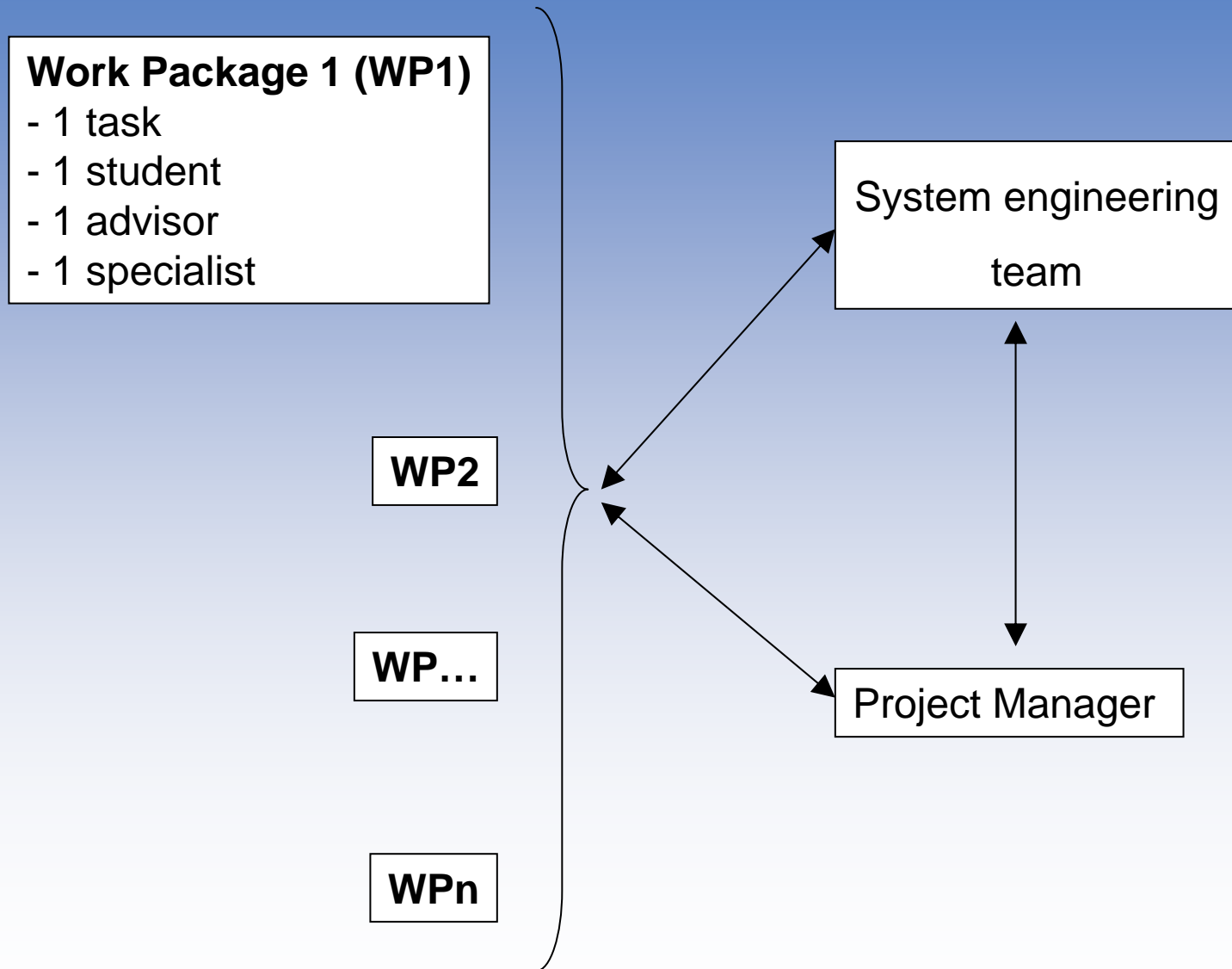
Operating the secondary payloads



Having the D-STAR functional



Operating the satellite



A. OUFTI-1 project

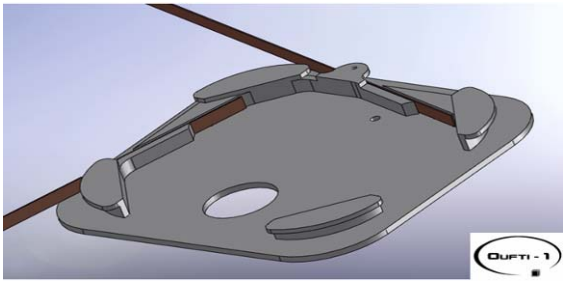
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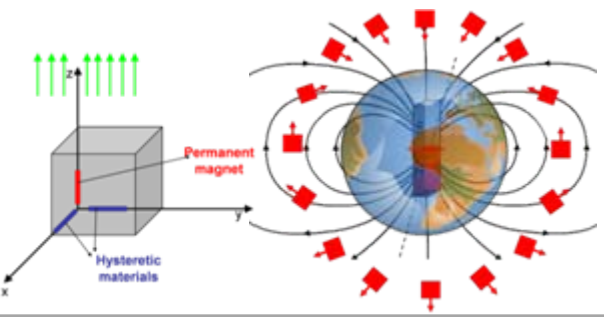
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# Technical overview

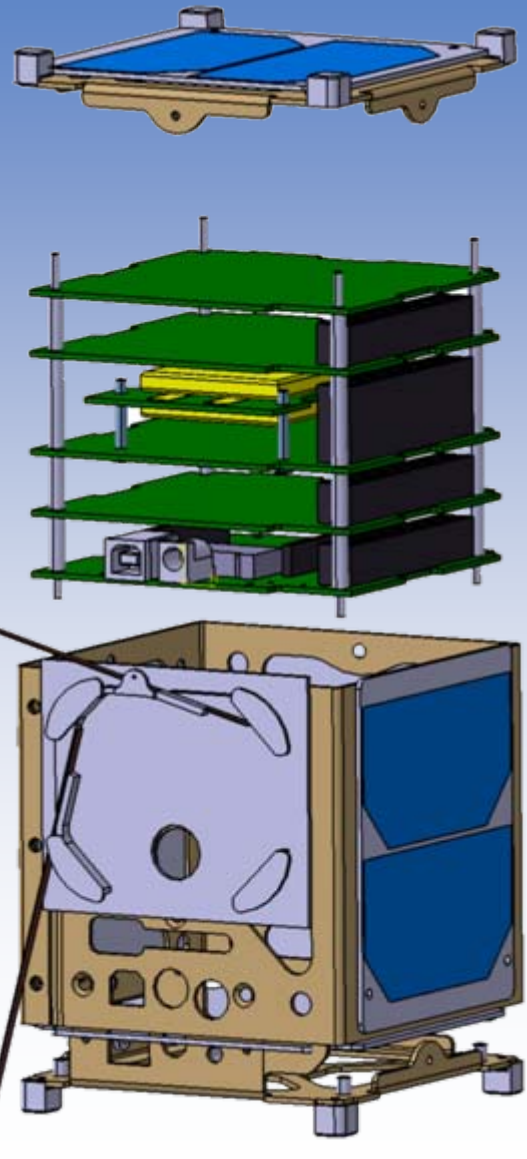
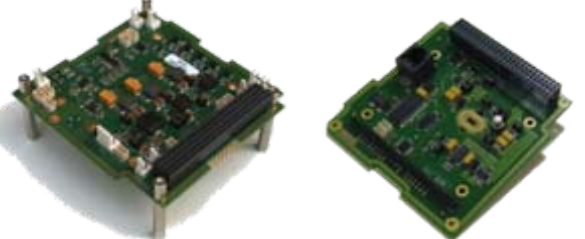
## MECH : Antennas depl.



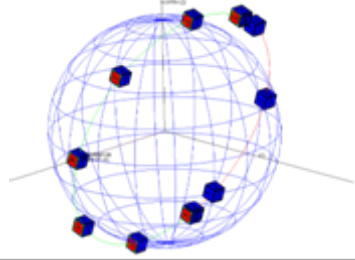
## ADCS : fully passive



## EPS : analog + experimental (digital)



## THER



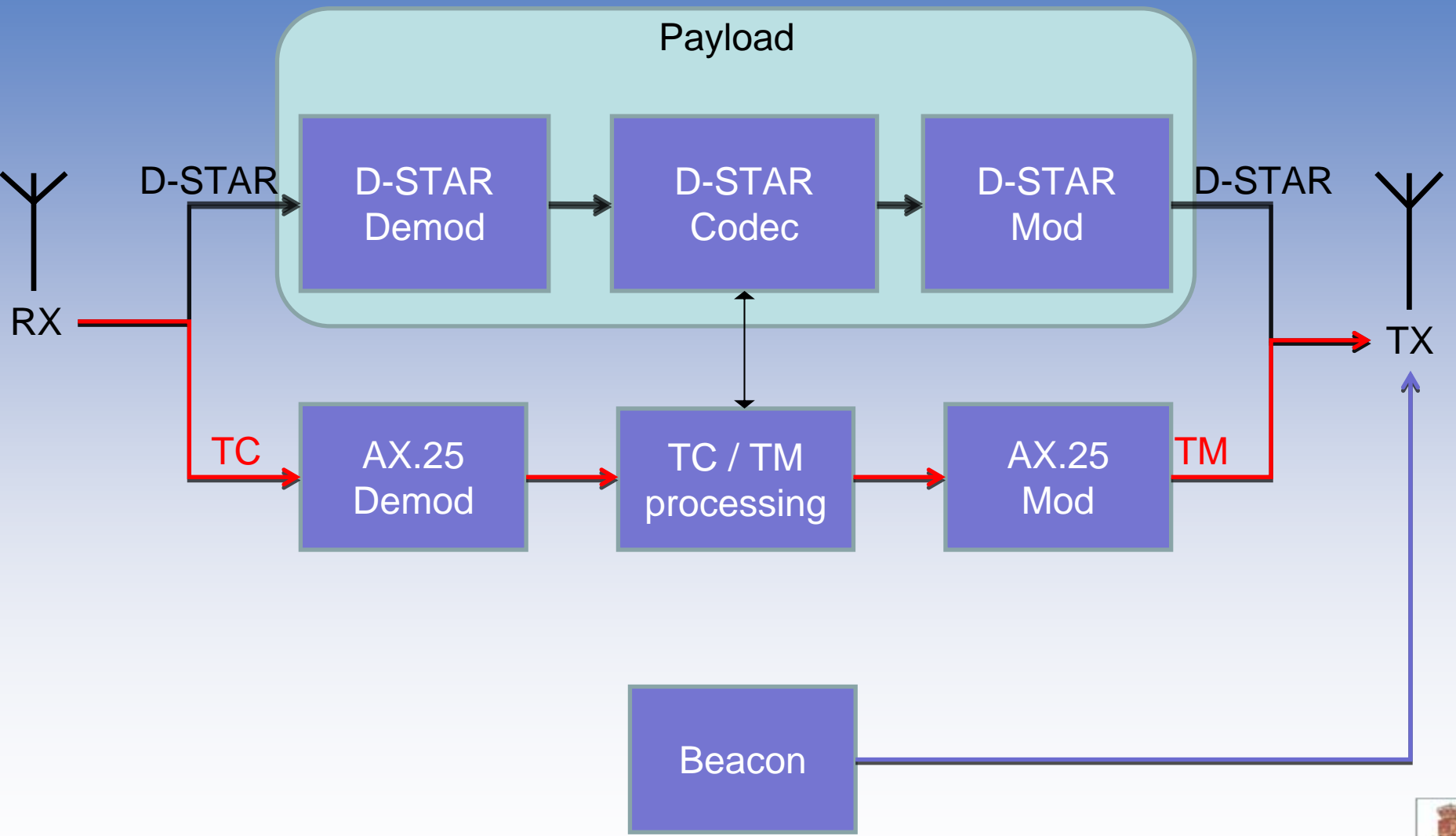
## COM : "3 channels"

- D-STAR
- AX.25
- Beacon

## OBC : kit + "home-made"



# COM system overview





# D-STAR : protocol

- Digital-Smart Technology for Amateur Radio
- Simultaneous data and voice digital transmission
- Data : 1200 bps - Voice : 3600 bps (AMBE encoding)
- GMSK modulation
- Structure of a D-STAR frame

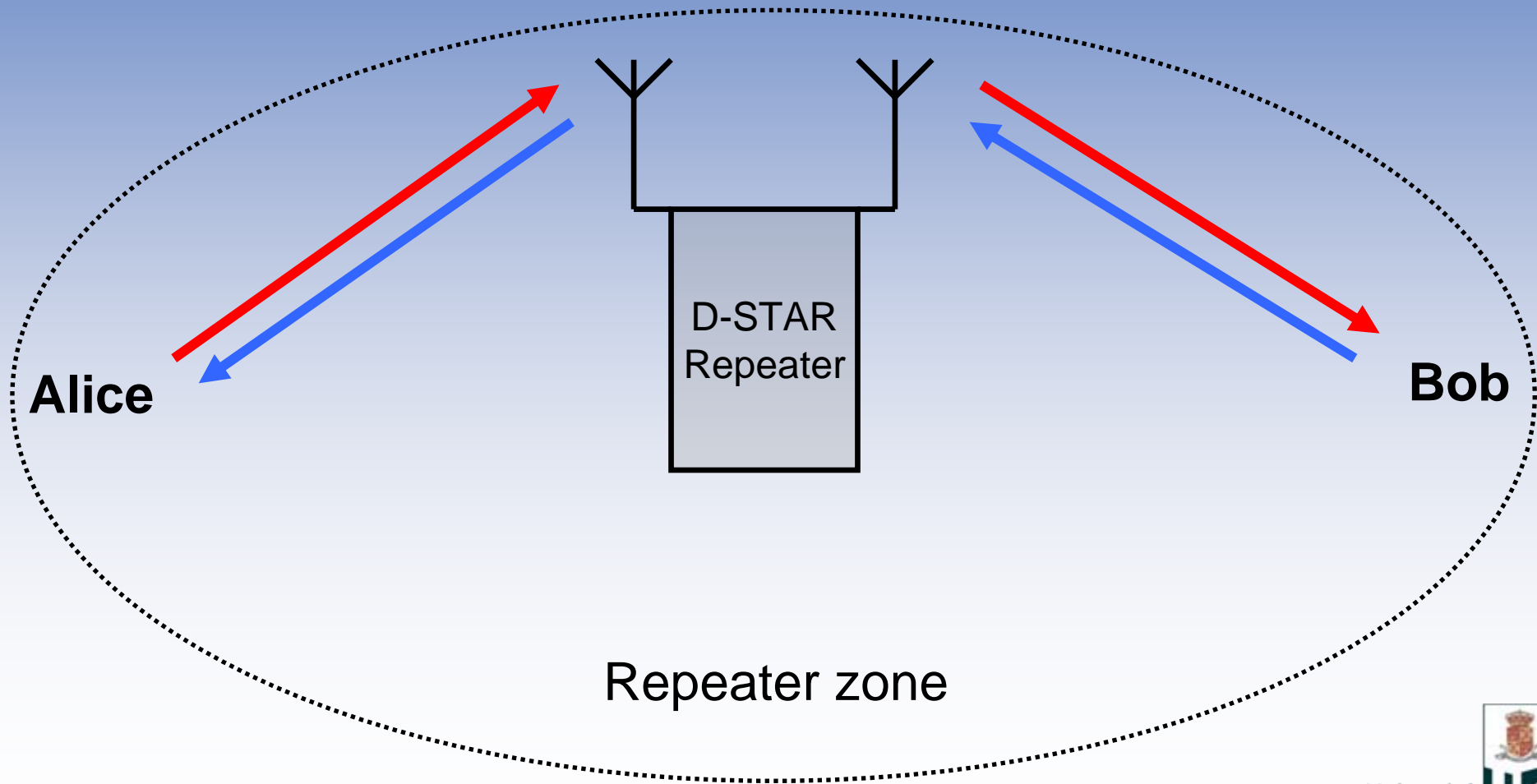
Sync	Pattern	Header	Voice	Data	...	Voice	Data	End of frame
64bits	15bits	660bits	72bits	24bits		72bits	24bits	48bits

**Alice**

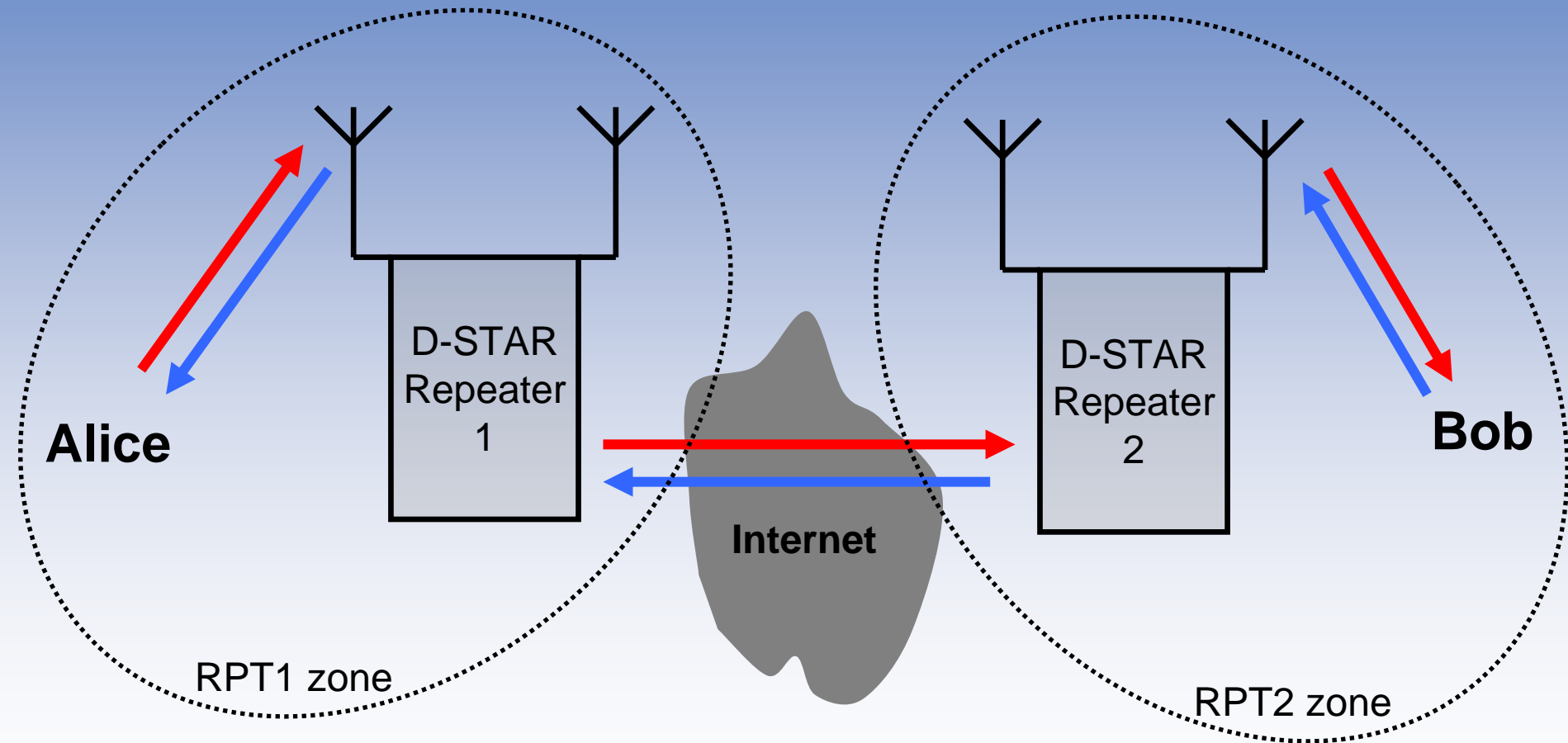


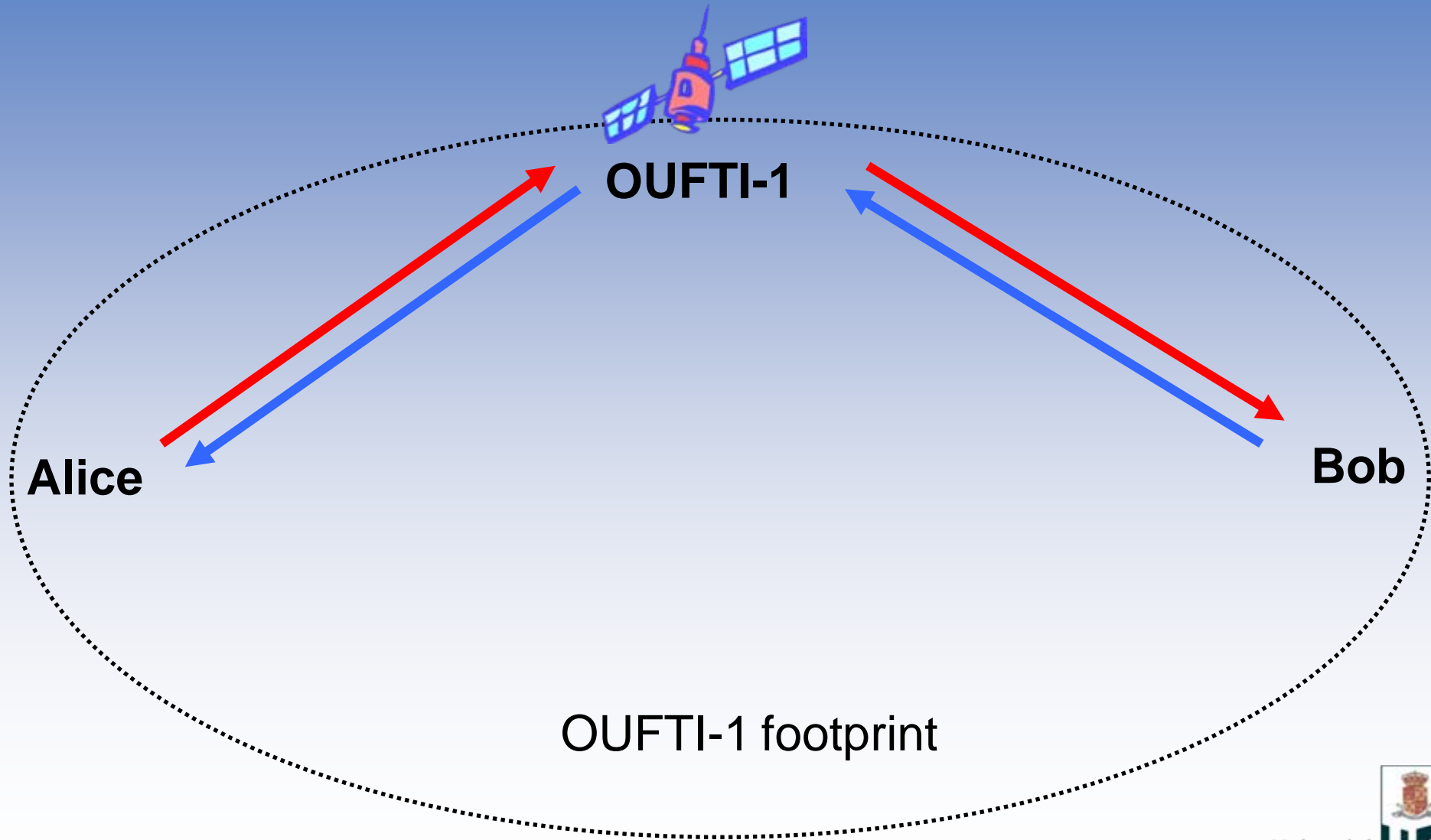
**Bob**

Direct visibility

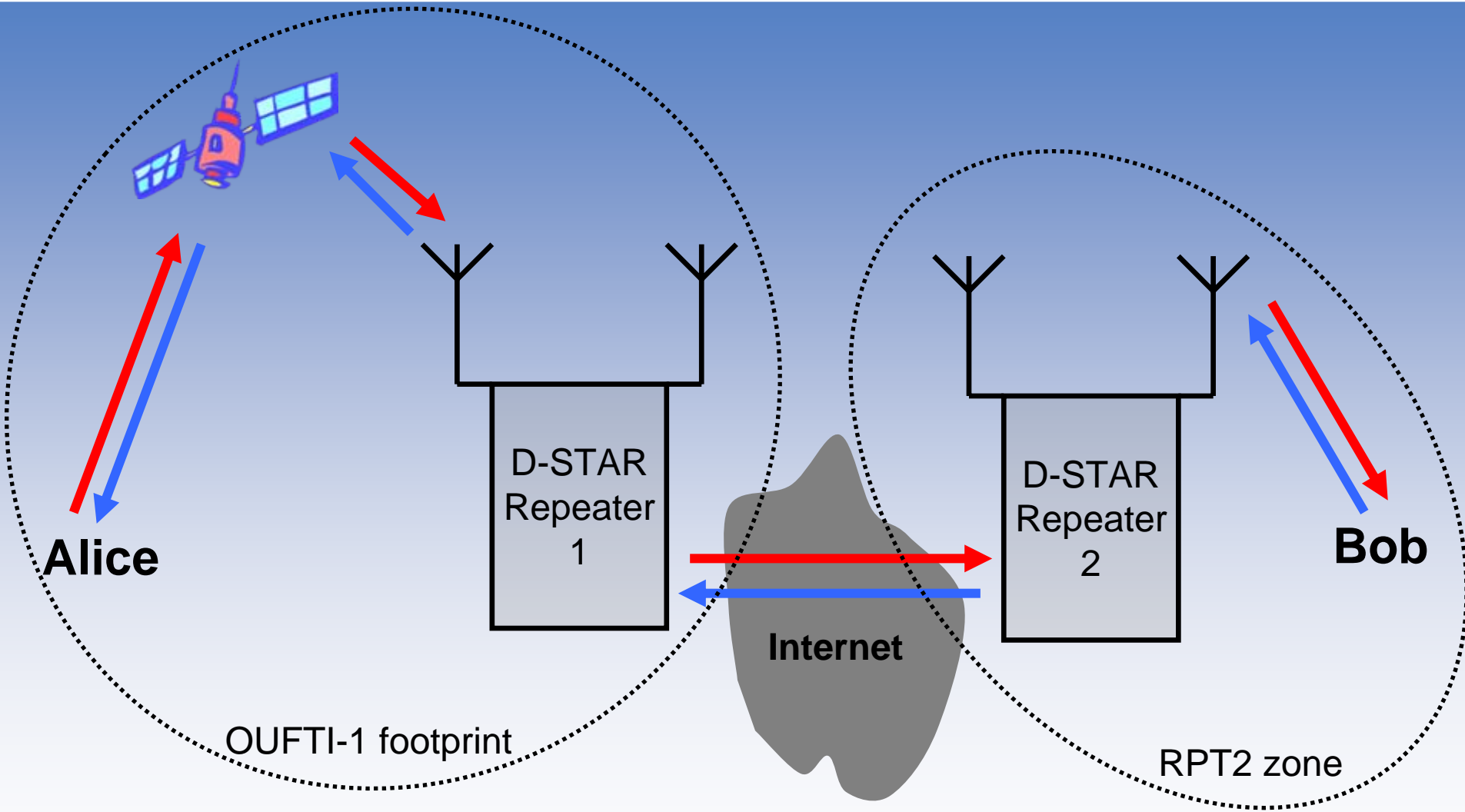


# D-STAR communications (3)

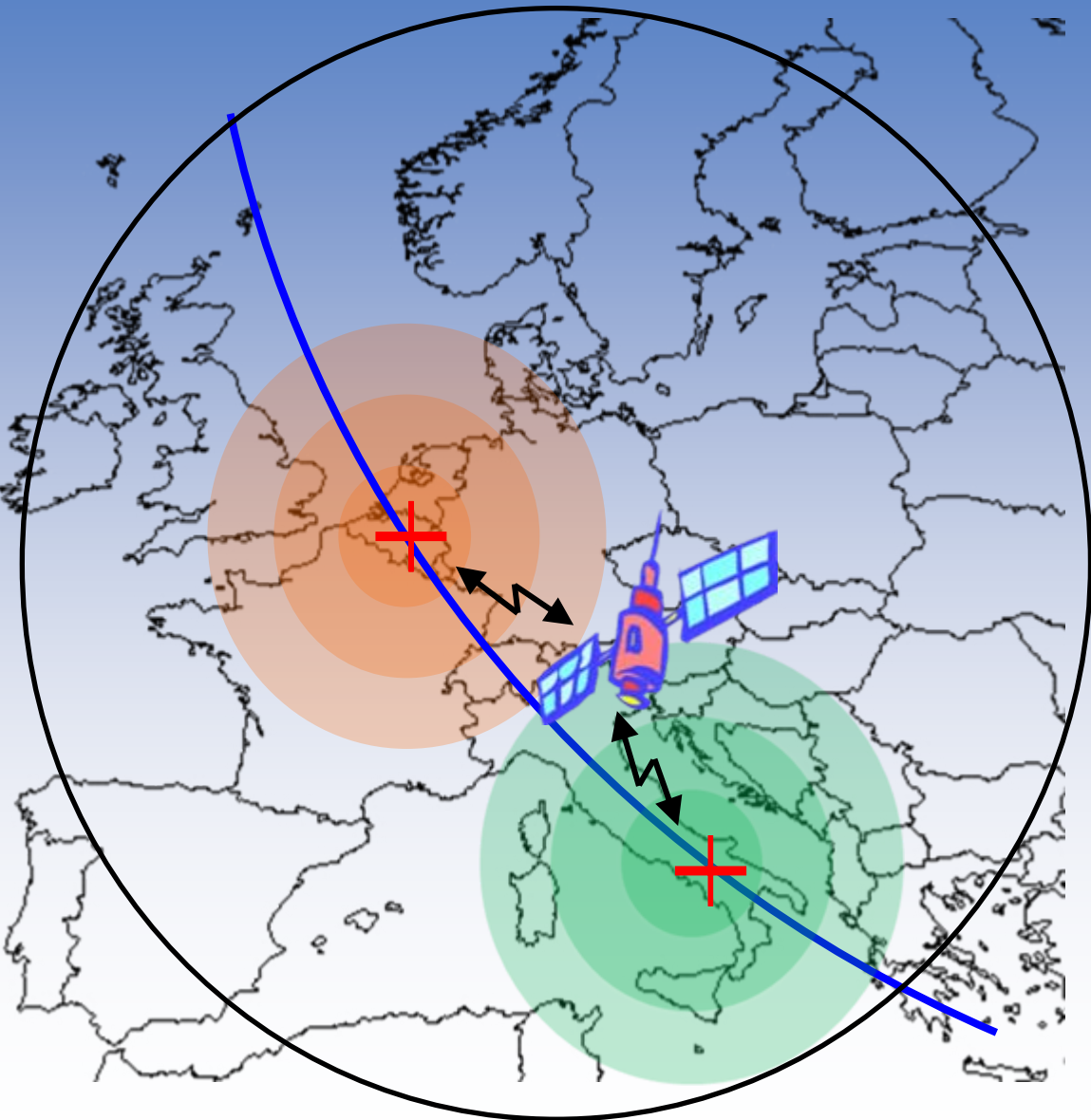




# D-STAR in Space global system

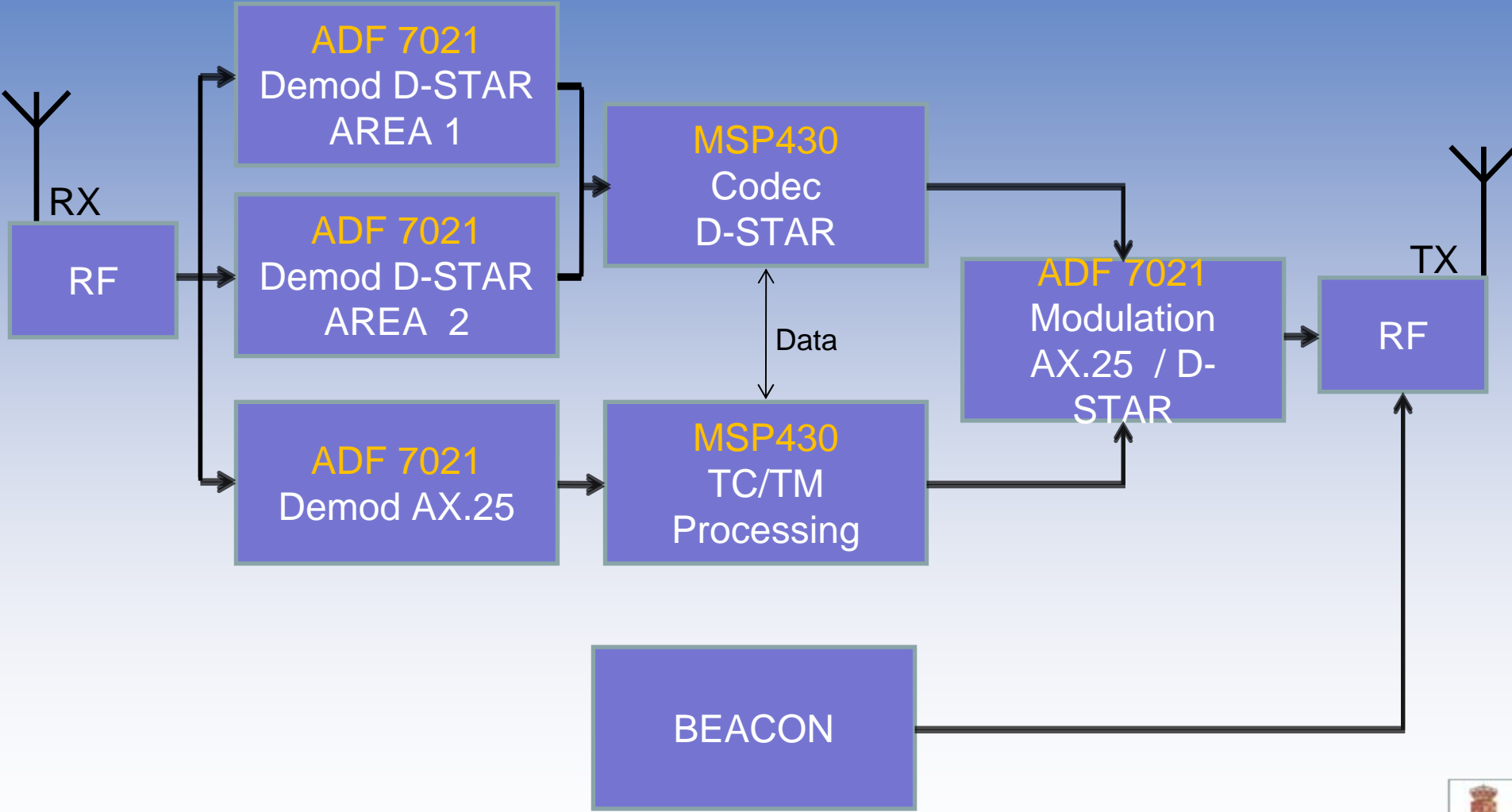


# D-STAR in Space : Doppler



- Satellite booking by Website
- ↓
- Computation of Doppler compensation
- ↓
- Upload of compensation tables
- ↓
- Activation of D-Star payload
- ↓
- Communication between the 2 zones
- ↓
- Shutdown of D-Star payload

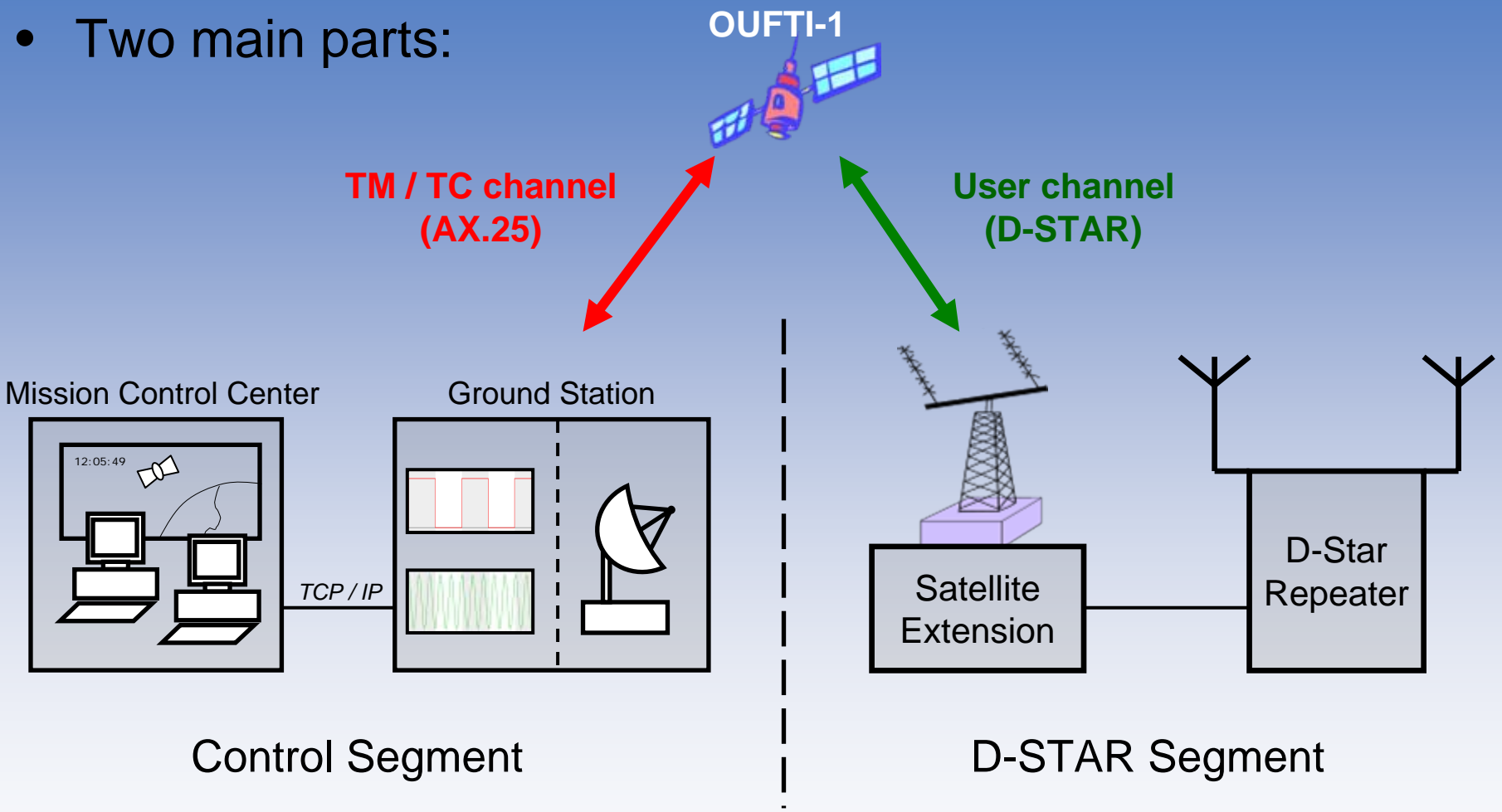
# Our communication solution



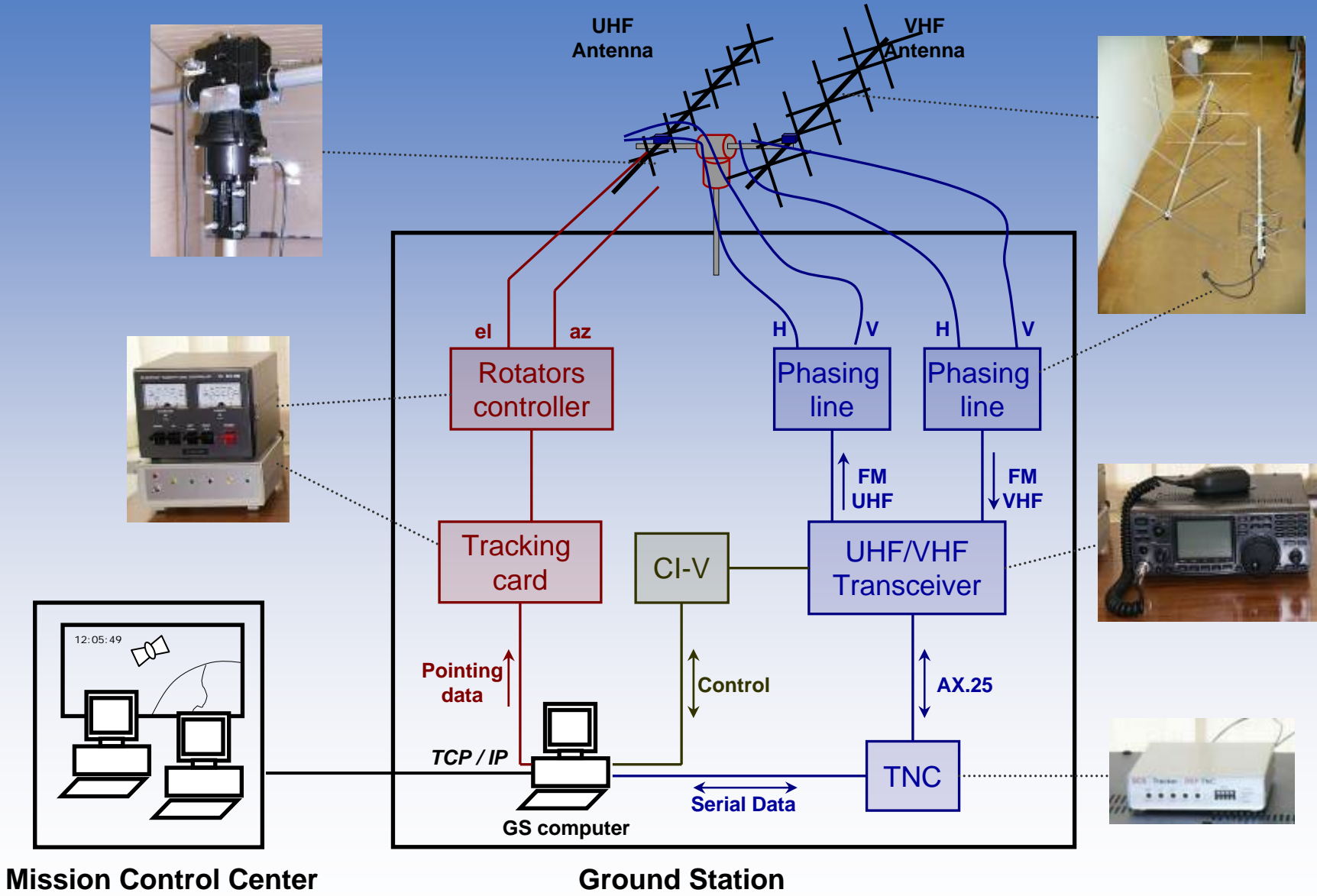


# Ground Segment

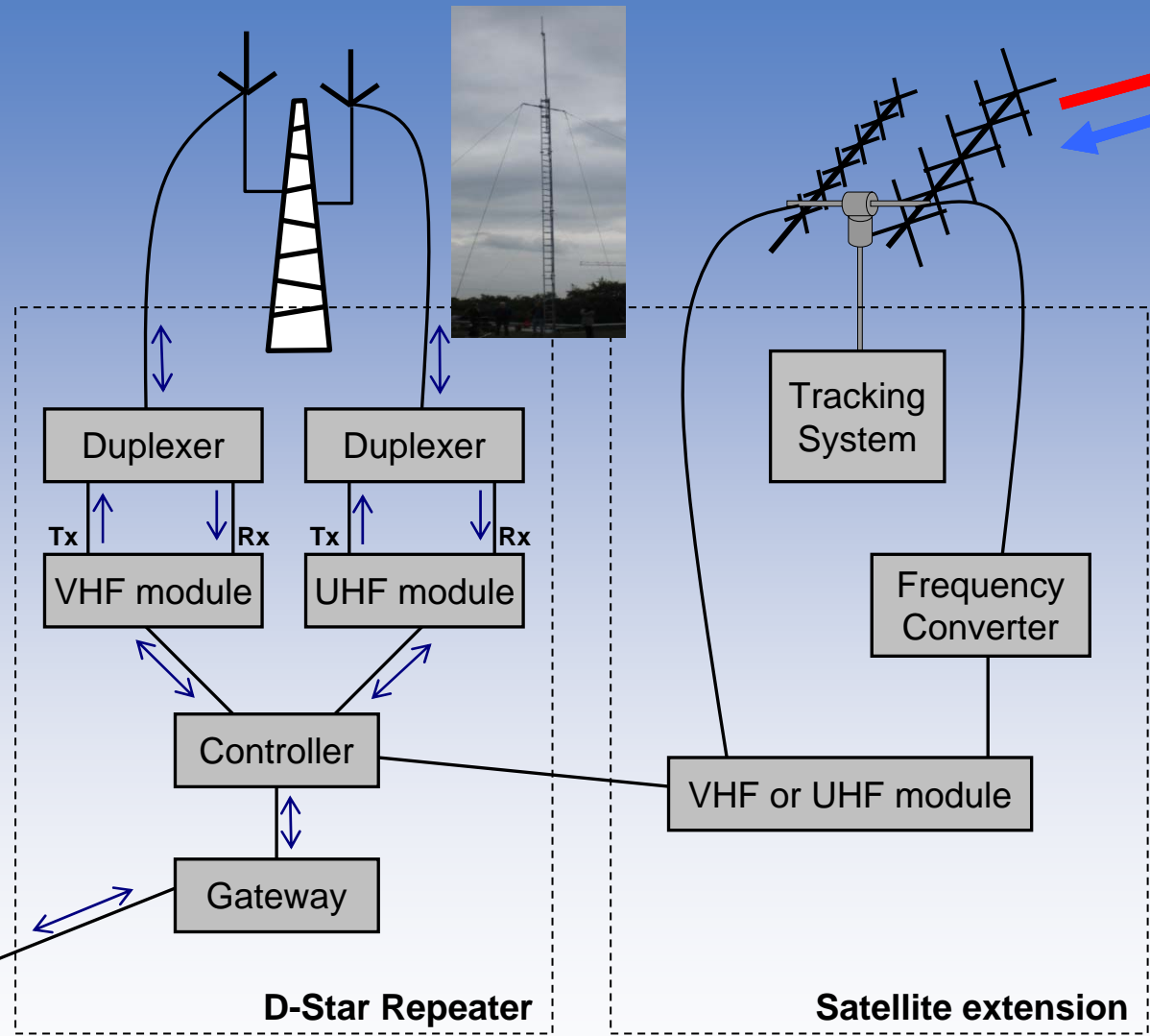
- Two main parts:



# Ground station architecture



# D-STAR segment



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C. Conclusion

- Students project :
  - Already 15 students past year
  - 15 new students this year
- Current state
  - Phase A completed
  - Phase B and C in progress



OUFTI-1 The first nano satellite launch on a beer !



# Thank you for your attention !

