NTN Lab
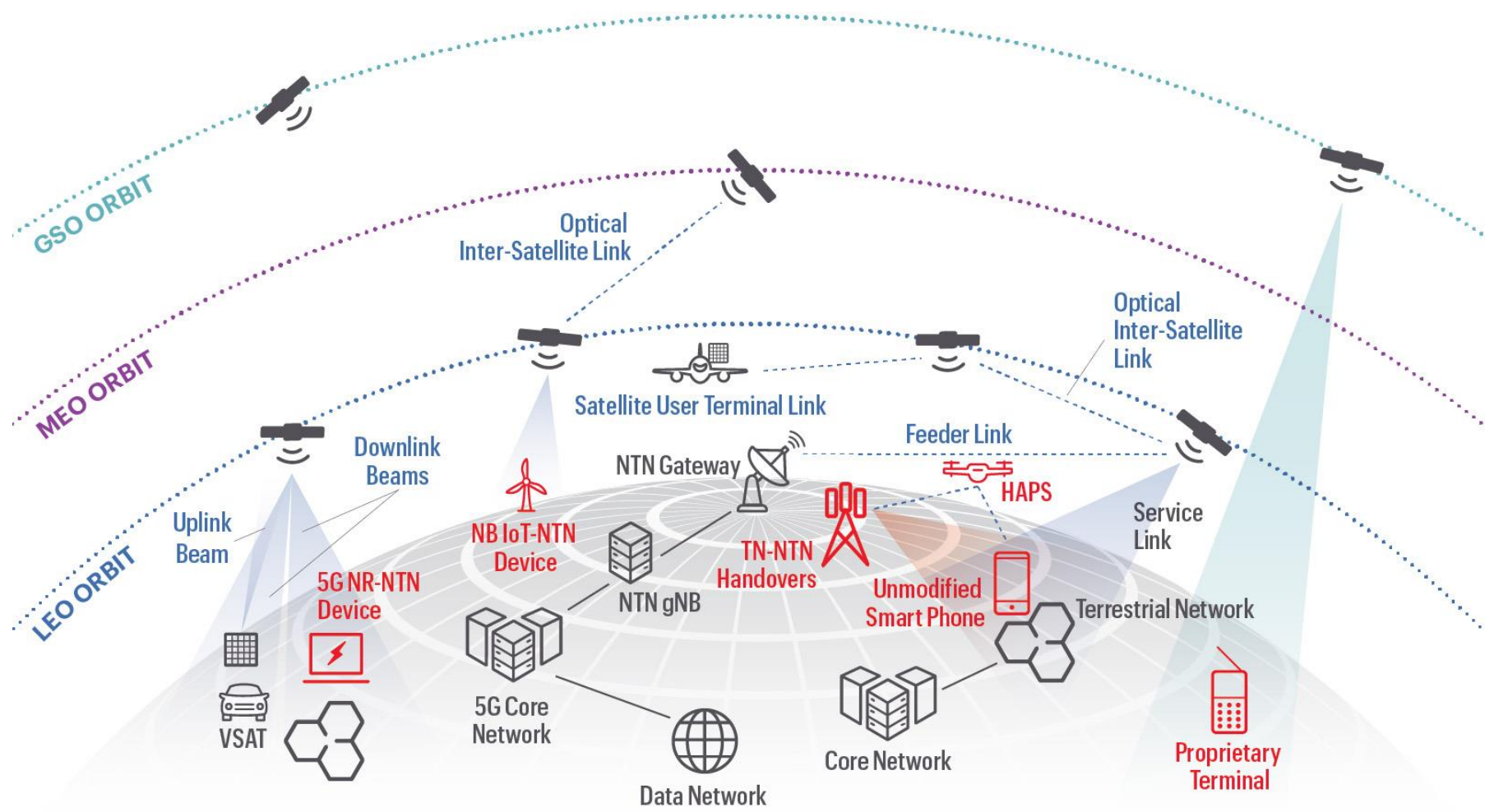
An experimental platform to test and evaluate NTN and TN communications
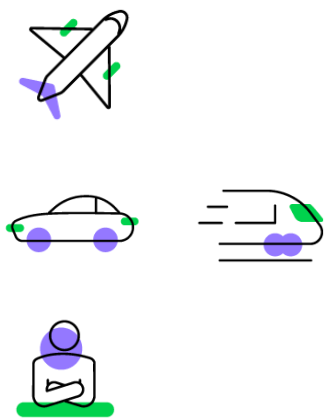
Why?

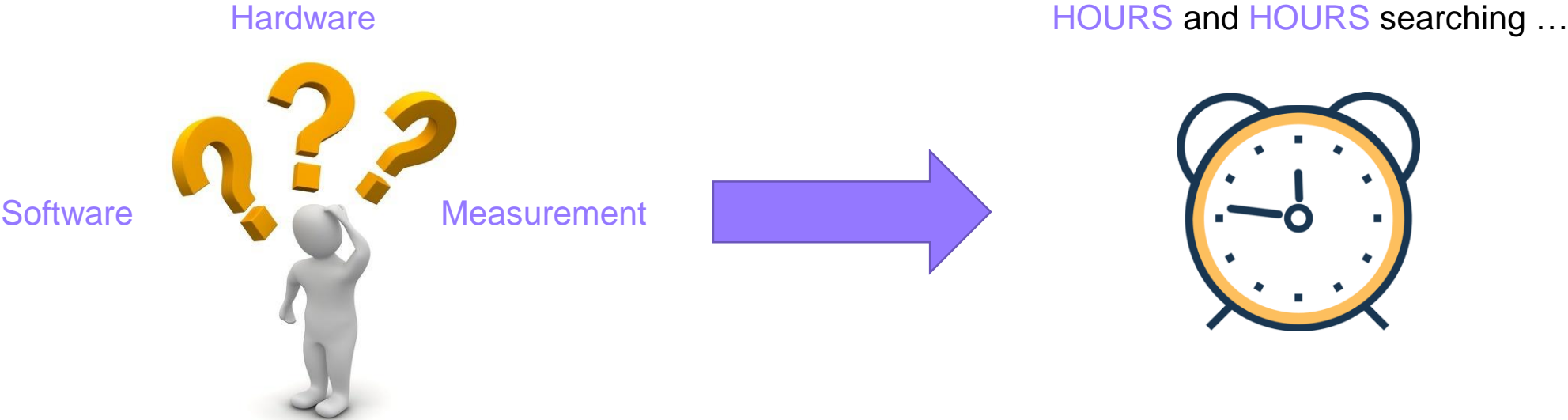Service continuity

Service ubiquity

Where?

Challenges

Lots of research subjects and …

Hardware

Software   Measurement

HOURS and HOURS searching …

Solution

Simulation

Test

NTN LAB
By IRT Saint Exupéry

Emulation

Evaluation

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NTNLab Environement

Emulation

page 7
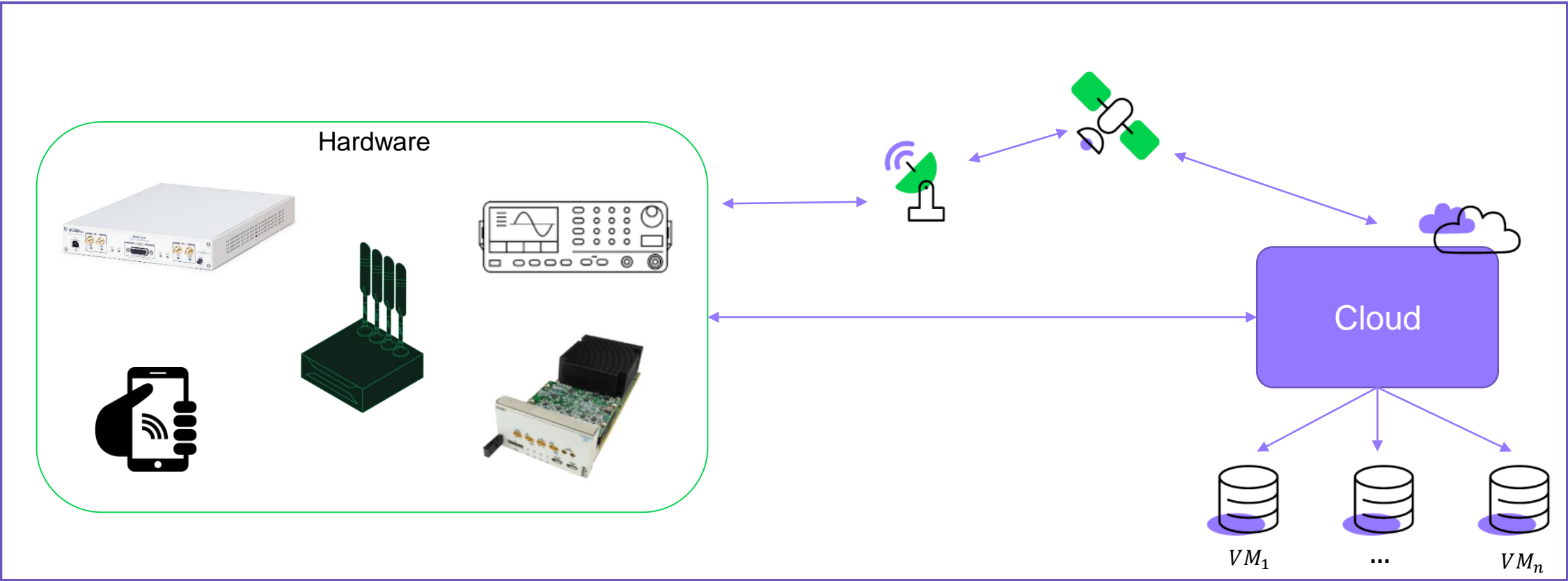
- **MOCN**
- **Satellite backhaul**

OR

Cloud

amarisoft

OPEN AIR INTERFACE

Open5GS

free5GC

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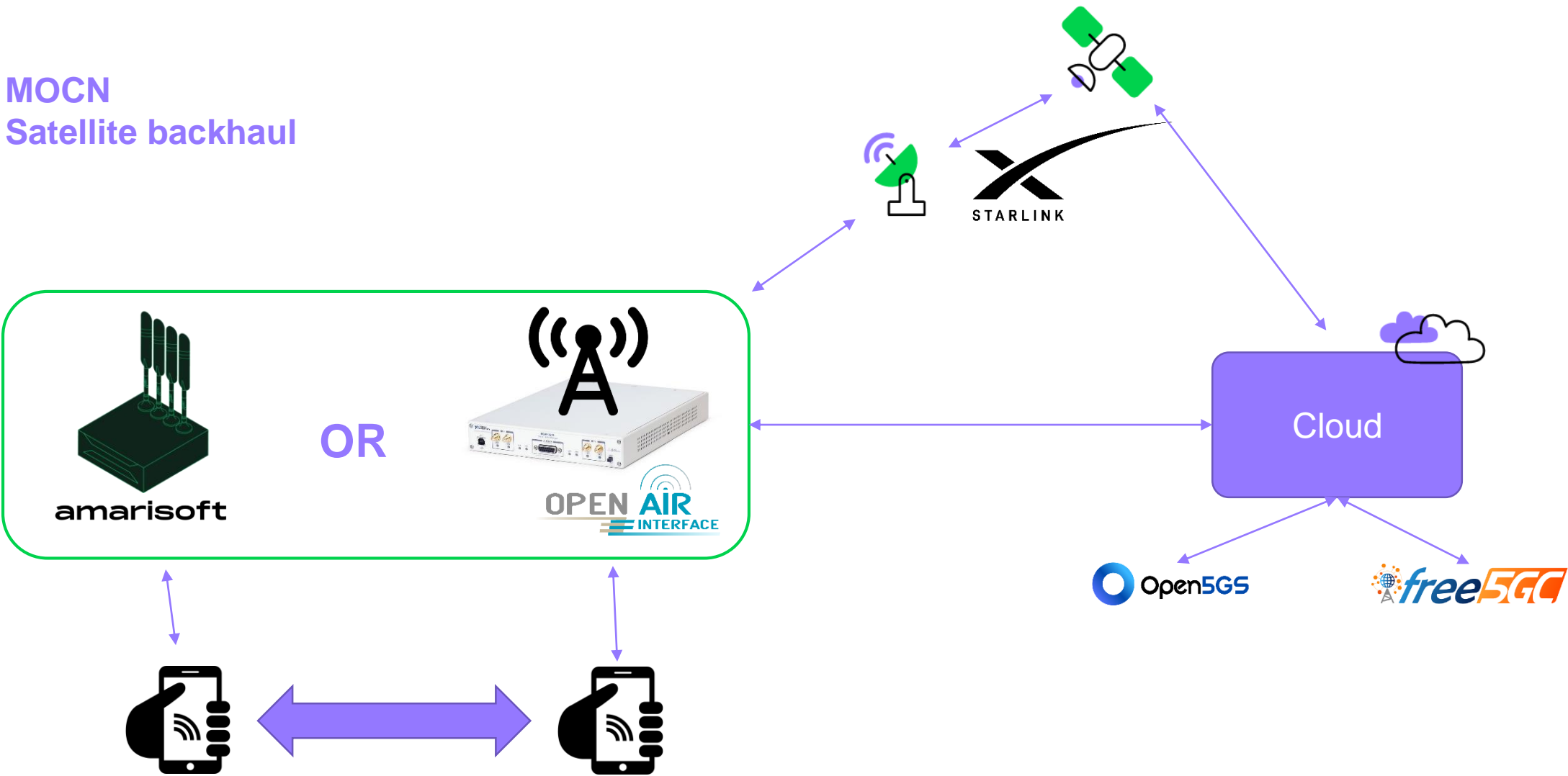
LEO constellation (under investigation)
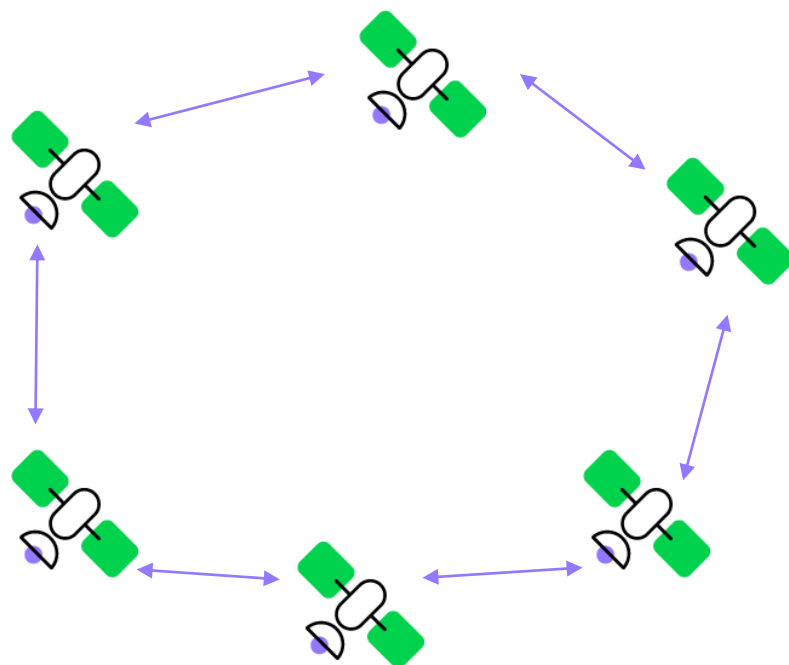
- Stargaze
- OpenSN

VIRTUALIZATION

- Explore RAN disaggregation

- Custom routing schemes, protocols
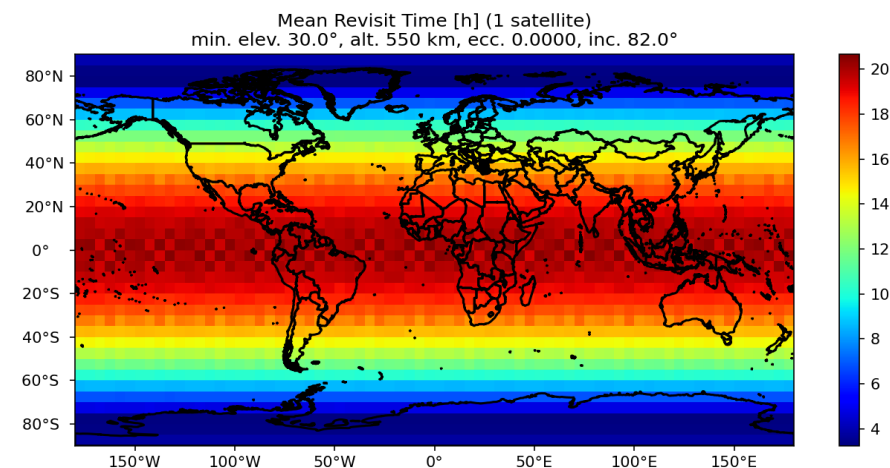
- Build AI / Cybersecurity on top of it

Simulation

Dynamic Link Budget

- **Propagator SGP4**
- **Atmospheric propagation losses**
- **3D antenna**
- **Dynamic visualization**
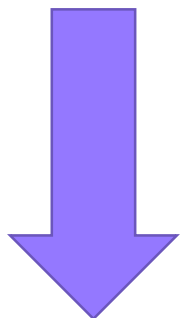
- **SNR of satellites**
- **Footprint on earth**
- **Revisit time**
- **Visibility duration**

Mean Revisit Time [h] (1 satellite)
min. elev. 30.0°, alt. 550 km, ecc. 0.0000, inc. 82.0°
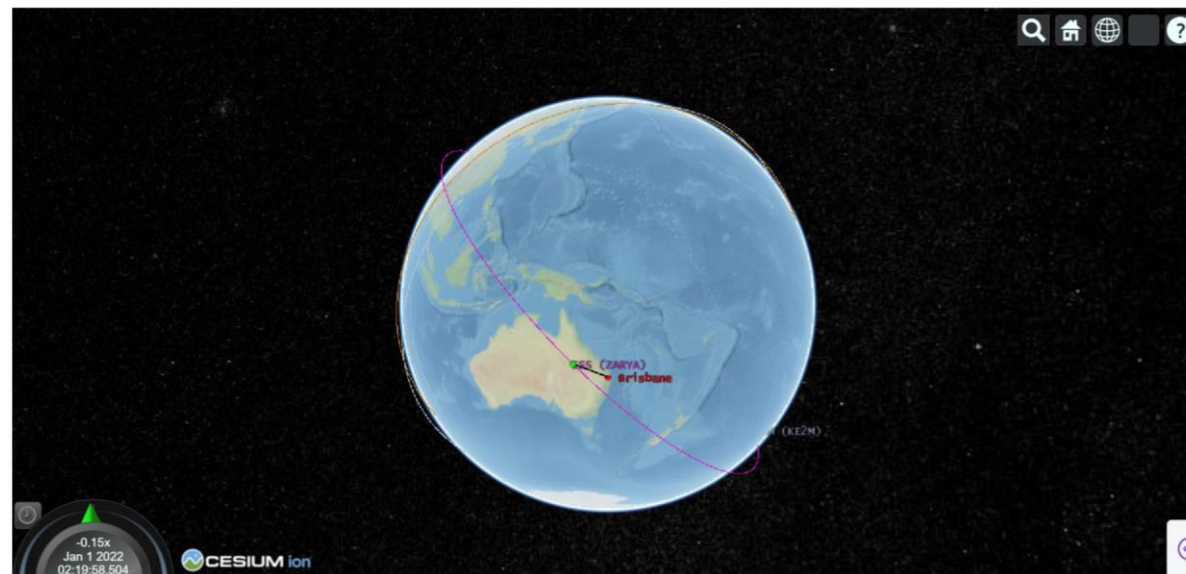
Evaluation

Zero Trust Security(ZTS)

System's breaches & compromised devices

All resources' requests could be malicious

Never trust.
Always verify.

Continuous and aggressive system monitoring, verification

Strong access restrictions and least privilege policies to reduce blast radius

Testbed

Brain

Trust Algorithms

XDR/SIEM (WAZUH manager)

Sec Alerts and Events

Objects/Users trust score

RAN and Core sys and com logs

Sec response

Custom Sec Active response

SAINT EXUPÉRY

Resources consumption and Perf data

Virt Sat

Core Network 1 Free5GC

Core Network 2 Open5GS

UPFs

NWDAF

Communication KPI tool

Internet

Amarisoft gNB/OpenAirInterface

Containers in IRT Datacenter

User Equipment

Wazuh agent

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Test

Active response - blocking malicious gNB/UE

RAN and Core sys and com logs

XDR/SIEM (WAZUH manager)

Sec Alerts and Events

Sec response

Custom Sec Active response

Block gNB

Amarisoft gNB/OpenAirInterface

User Equipment

Core Network 2 Open5GS

UPFs

Communication KPI tool

Containers in IRT Datacenter

Internet

06/10/2025
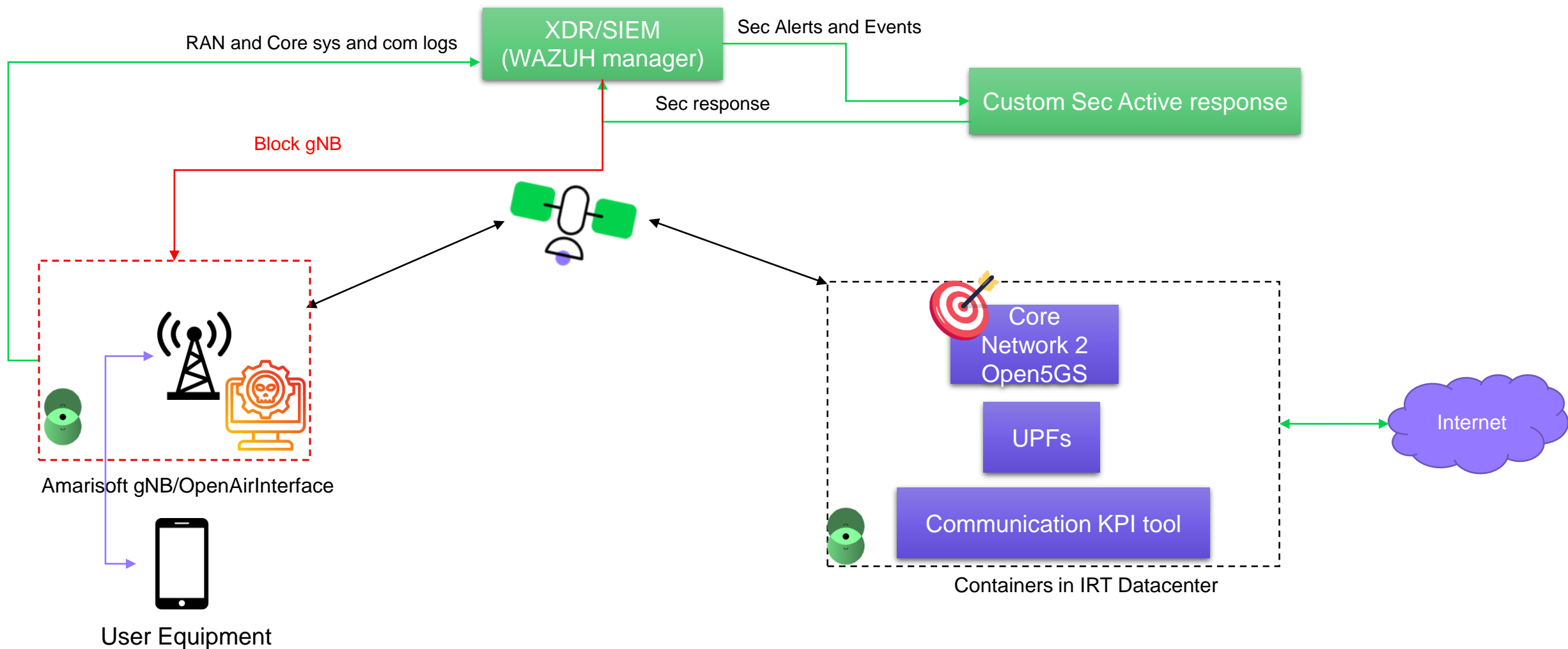
Stress Test

- **MOCN**
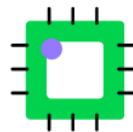- **High number of UEs**
- **Latency, throughput**

OR

x100

Cloud
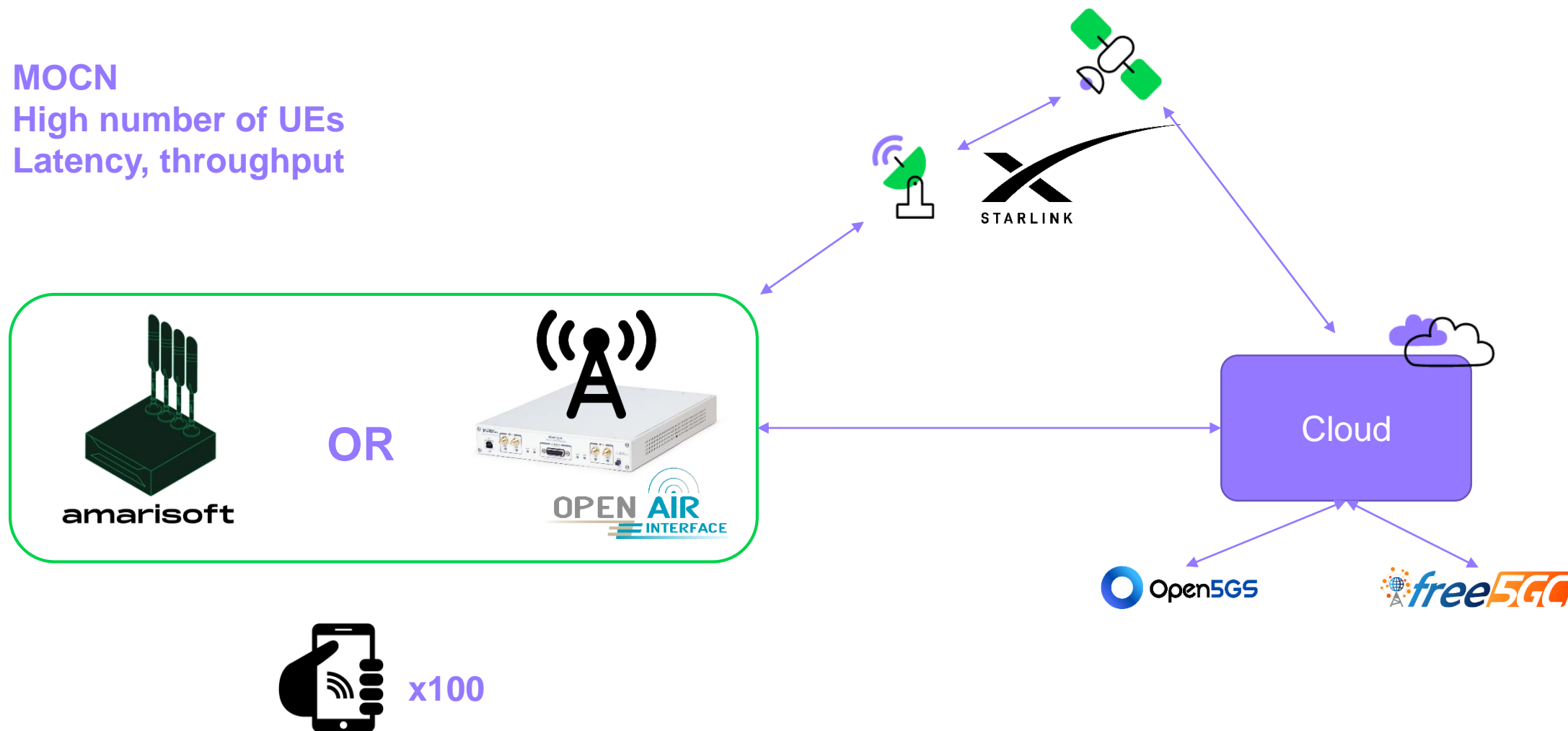
Perspectives

- « Plug & Play »

- RAN disaggregation

- AI native 6G (PHY and network)

- Cybersecurity

Make NTN Lab grow!

How? ➡️ **Projects** ➡️ **State / Industrial fundings**

Involved partners

AIRBUS

THALES

toulouse métropole

AUMOVIO

Projects

- 5GMED
- Airnet
- SuperG
- AutoSat
- Hi5

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Conclusion

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