

NTN Days 2026

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# **CERES, a satellite constellation network emulator**

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**VIVERIS**

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# CONTEXT

**Increasing interest  
for satellite  
constellations**

**New challenges**

Routing  
Congestion  
Handovers

**Integration with  
terrestrial networks**

Protocols need to adapt to  
new constraints

**Hard to test with  
real systems**

**Simulation has  
its limitations**



Artist's impression: IRIS<sup>2</sup> constellation © Thales Alenia Space

# GOALS OF CERES



## Strategic objectives

- **New Protocol & Algorithm Evaluation**

Assess dynamic routing, handover and network performances under orbital constraints

- **Hardware/software evaluation**

Test satellite/ground equipment, complex topologies & real services

- **Target Industrial & R&D Projects**

**5G NTN**

**edge-computing**

**IoT-NTN**



## How? CERES core capabilities

### 1. Real-Time Emulation

Dynamic constellation topology and delay modelling

### 2. Modular Architecture

Custom orbit selection, routing algorithms, and ISLs

### 3. Seamless Interconnection

Hardware and software equipment integration

### 4. Live Telemetry

Real-time latency and throughput analytics

# HOW CERES WORKS

Configure constellation and algorithm

Launch CERES

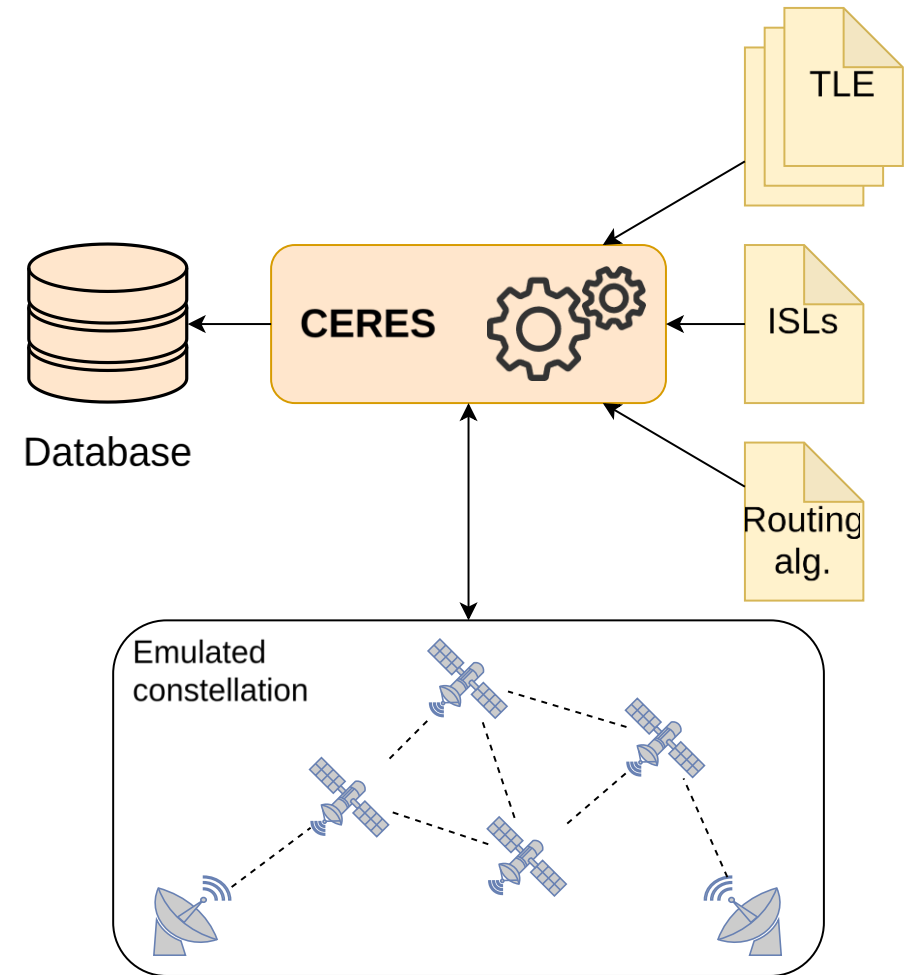
The controller manages all the topology

Update of position and propagation delays (every 10ms)  
Update routes  
Handle handovers  
Gather and export metrics

Run your tests

Retrieve all the metrics

Analyse your results



# METRICS VISUALIZATION



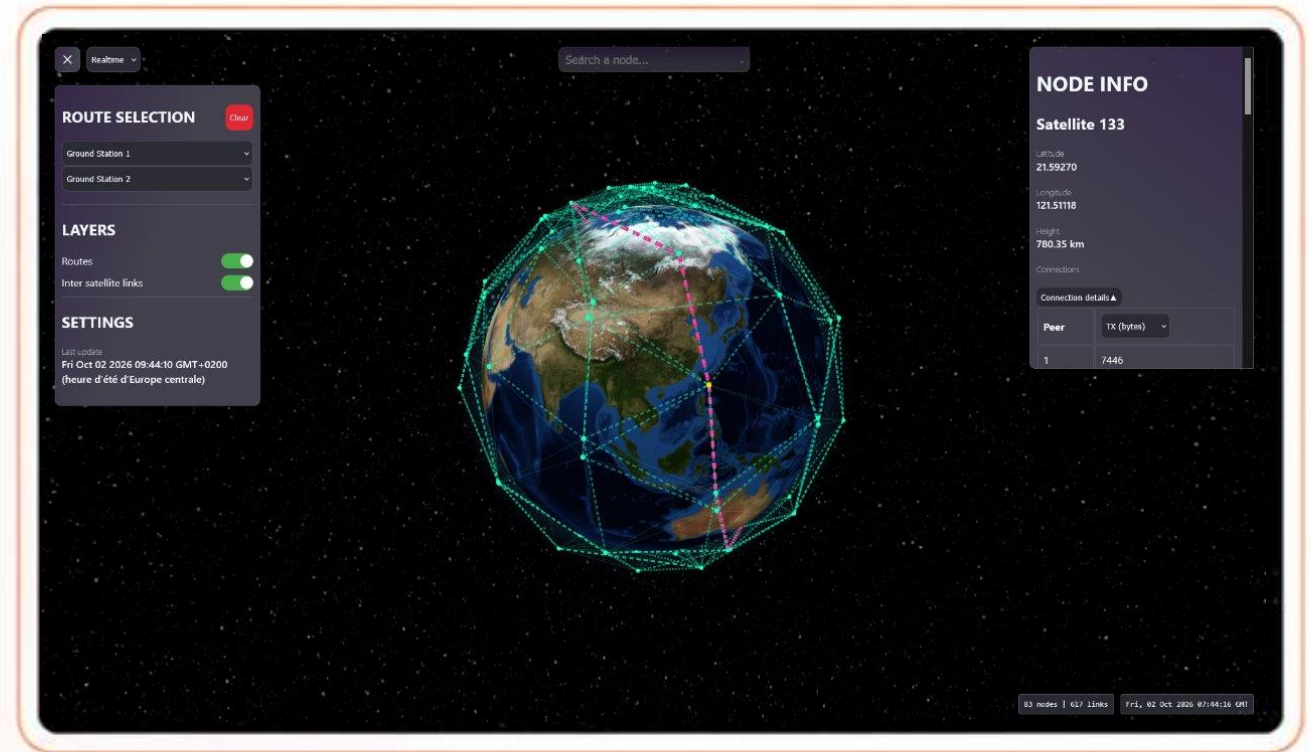
## Numerous metrics sent by CERES to an opensource database

- Positions, routes, latencies, throughputs
- Influx data suite
- Can be sent to other database



## Constellation visualizer for better readability

- Display all metrics from influx database
- Work in real time or in historic mode
- Provide data from satellite to constellation level



# USAGE

## Standalone use to assess impact of algorithms

**Integrate new algorithms in controller**

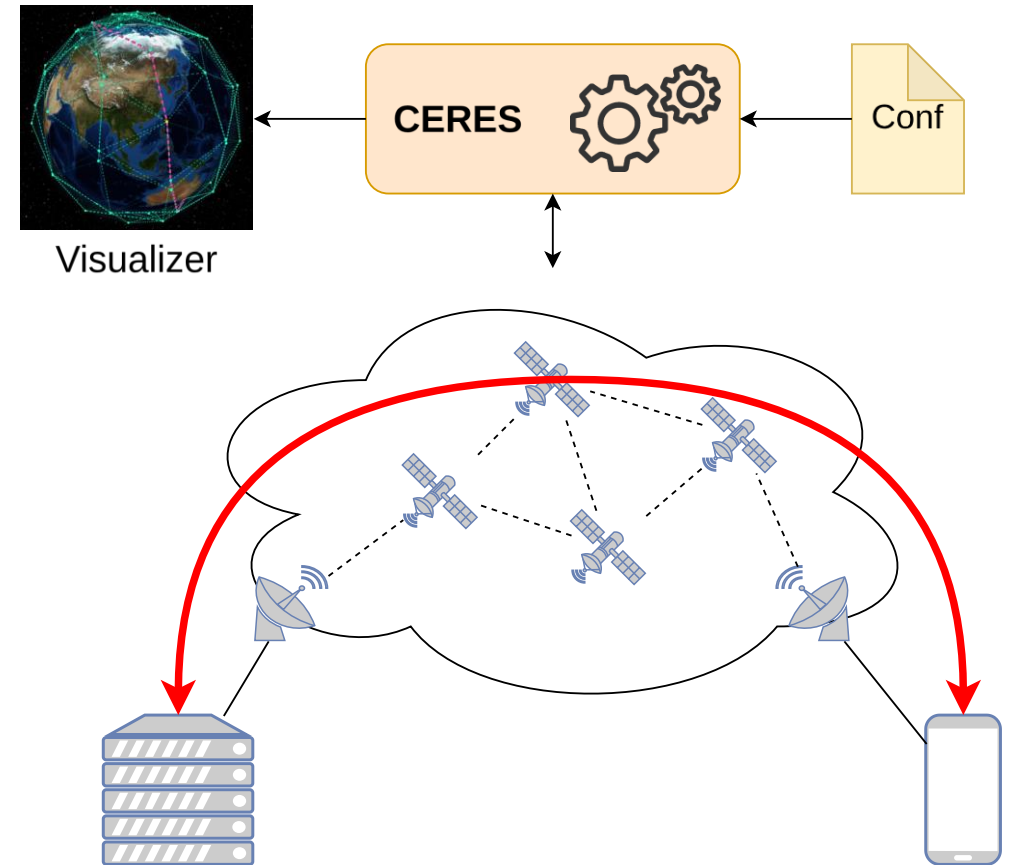
**Export numerous metrics from all nodes and links**

**Evaluate behaviour and performance**

**Compare with already implemented algorithms**

**Any tools can be used**

Traffic generators  
Traffic captures  
Etc.



# USAGE

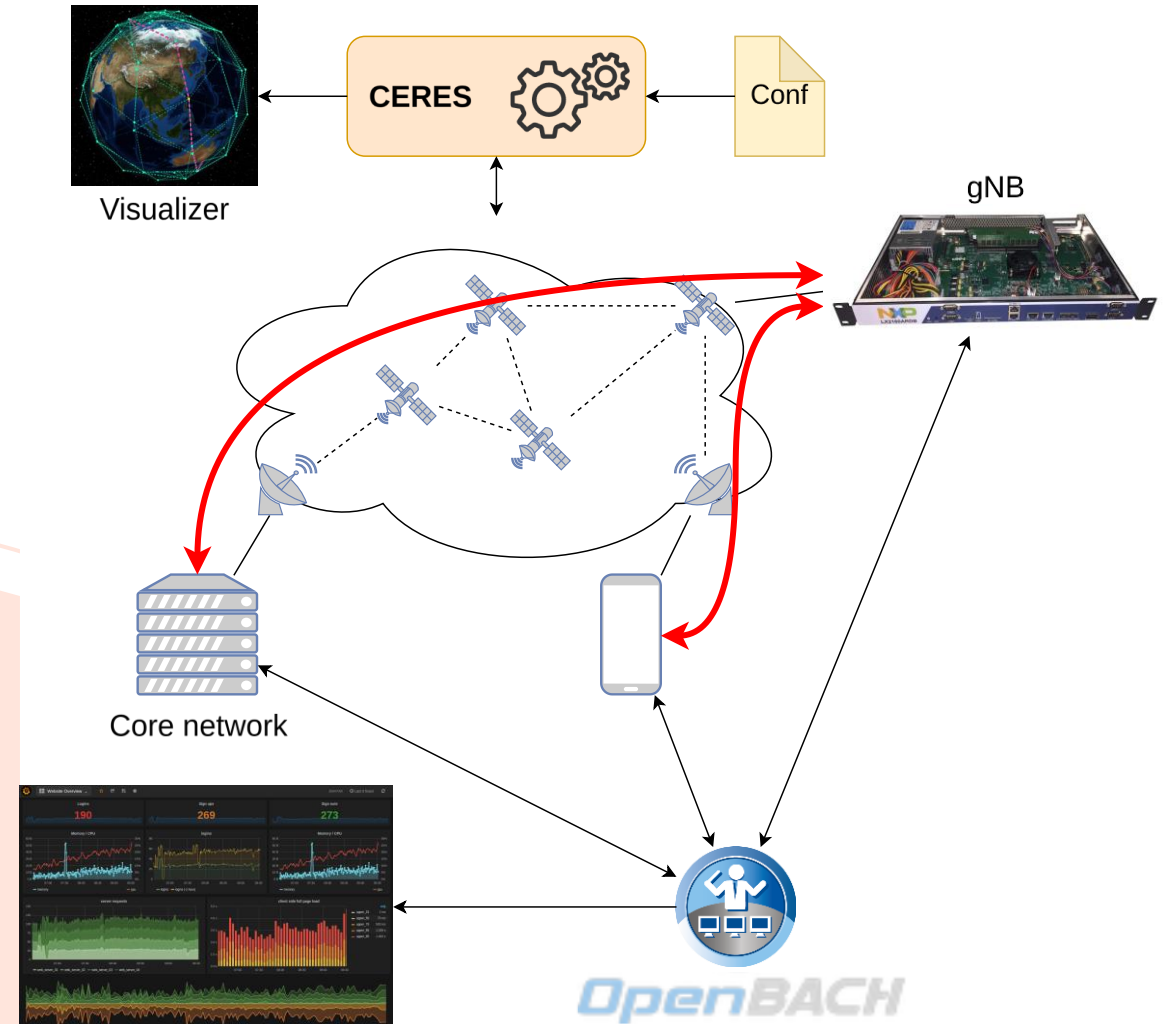
## Integration with other tools and softwares

**Deploy network  
stack over the  
constellation**

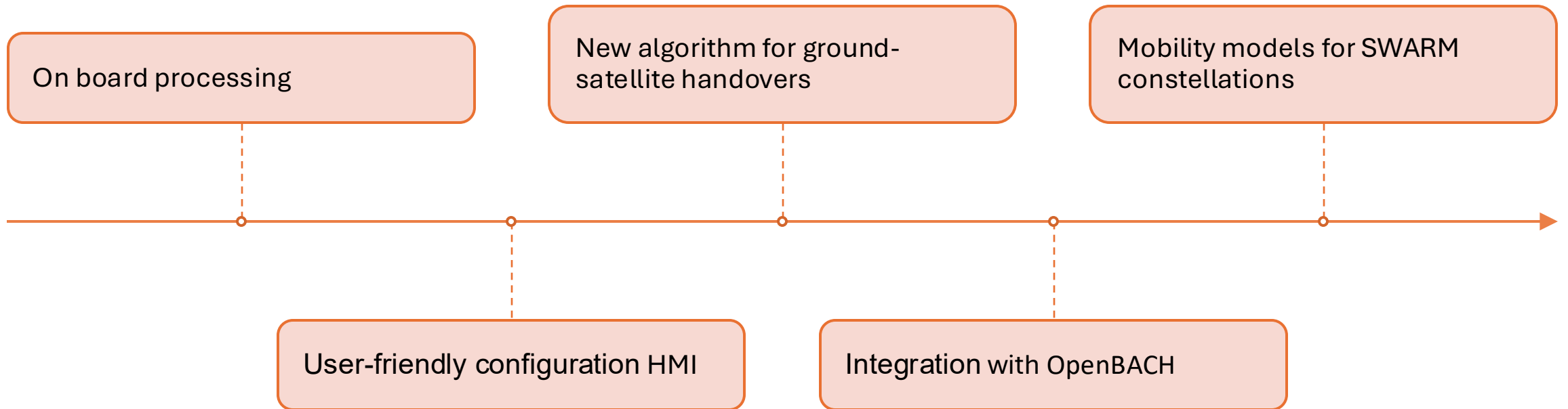
**Export numerous  
metrics from all  
nodes and  
links**

**Evaluate behaviour and performance of  
external devices in NTN context**

Dedicated software  
Specialized hardware  
Protocols



# ROADMAP



**And any evolution required for your future projects !**

**DO YOU HAVE ANY  
QUESTIONS ?**



The image features a minimalist design with a light gray background. Several red lines, both solid and dashed, intersect to form a large, stylized 'V' shape that frames the central text. The text 'VIVERiS' is centered in a bold, red, sans-serif font. Below it, the tagline 'Innover. Simplifier. Partager.' is written in a smaller, red, sans-serif font.

# VIVERiS

Innover. Simplifier. Partager.