# OAIBOX™

## THE WORLD'S LEADING

OPEN-SOURCE 5G/6G TEST NETWORK

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# Allbesmart - Overview

- Telecom engineering SME specialized in open-source 5G/6G founded **2015**, based in Castelo Branco, Portugal
- Associate Member of the **OpenAirInterface Software Alliance** and contributor to the OAI stack (development, testing, debugging and support)
- Creators of **OAIBOX** an Open-source research testbed platforms for **Open RAN** and **AI-RAN**
- OAI code-customization & professional services for advanced 5G/6G use cases
- Member of the **AI-RAN Alliance**

# Meet the “OAIBOX”


- A complete, plug-and-play **E2E 5G/6G network** in a box with 5G Core, RAN and UE, ready to run
- Uses the **OpenAirInterface** open source for CN5G, gNB (CU/DU), near-RT RIC (FlexRIC) and xApps
- Bring **your own radio frontend**, compatible with SDRs (NI/Ettus USRP) or COTS O-RAN O-RUs (Benetel/Liteon)
- **Flexible form factor,** choose a compact, silent desktop unit that shares a lab bench with researchers, or a rack/server build for higher-performance and GPU AI-RAN workloads

# OAI & OAIBOX - synergies

- **OAI is the foundation,** every function comes from the upstream OpenAirInterface stack. OAIBOX makes it easier to deploy and manage
- **A lower barrier to entry** for teams without the time or resources to build from source can still run a full end-to-end OAI network
- **Filling the end-to-end gaps**, with testbed integration, the UE side, and operability so the existing OAI components come together in the lab
- **Support that complements the community:** 700+ product-level questions handled directly by our support team
- **Contributions flow back upstream,** fixes and improvements return to OAI

# OAI & OAIBOX – common issues

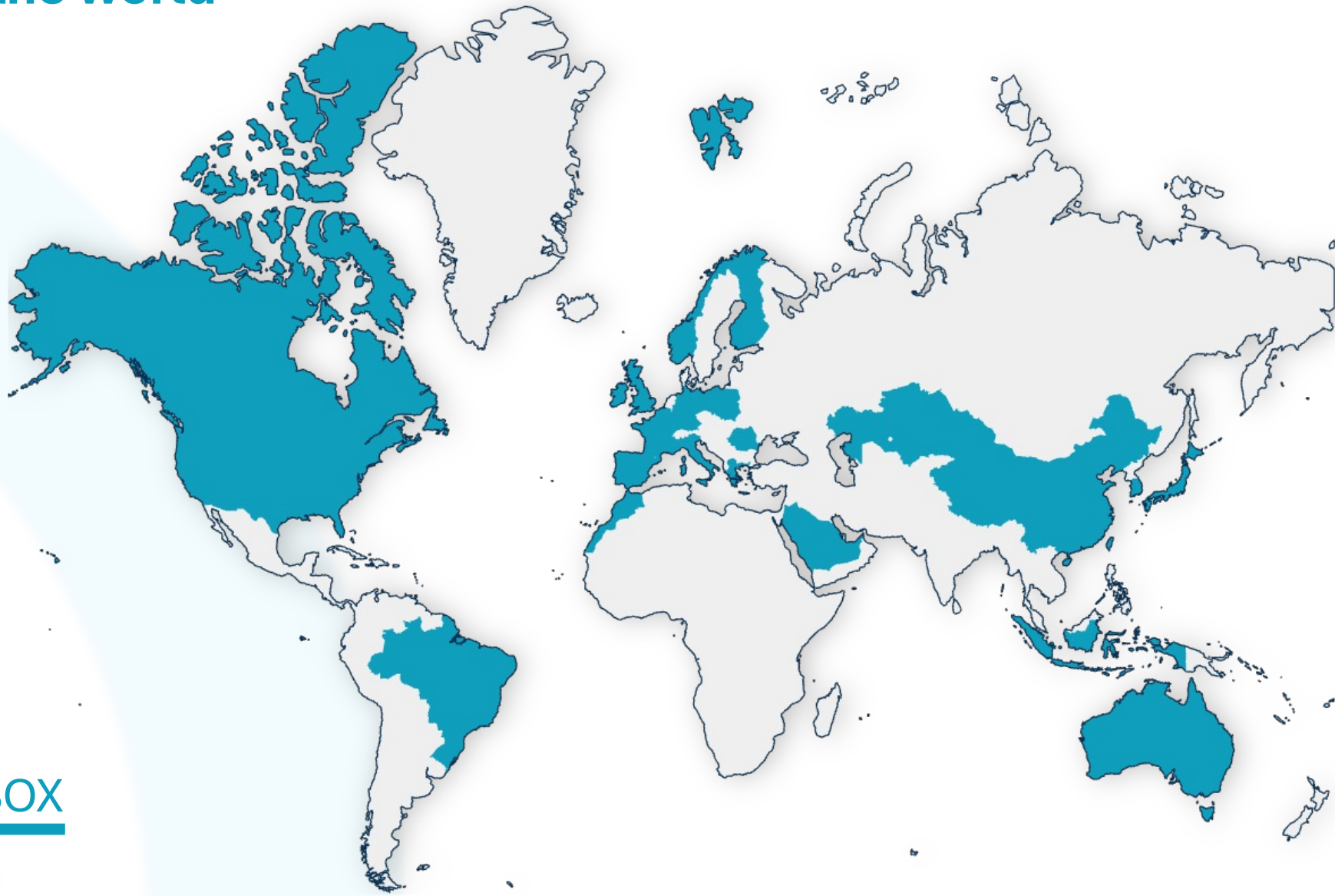
- Customer states: **“Issue when starting gNB”**
  - Customer was using x310 USRP with cables were switched around resulting in RFNOC error on UHD

- Customer states: **“unable to start CU”**
  - Customer moved the testbed and changed the entire network without adjusting the F1 interface IPs

- Customer states: **“UE does not attach to OAIBOX MAX”**
  - Customer was using MIMO 2x2 while the RF cable kit only connected to the second RF chain

- Customer states: **“Quectel COTS UE fails to register with OAI”**
  - After receiving the Quectel already configured and with the SIM card, many customers like to remove the sim card to check it!

# OAI & OAIBOX - around the world



104 Customers

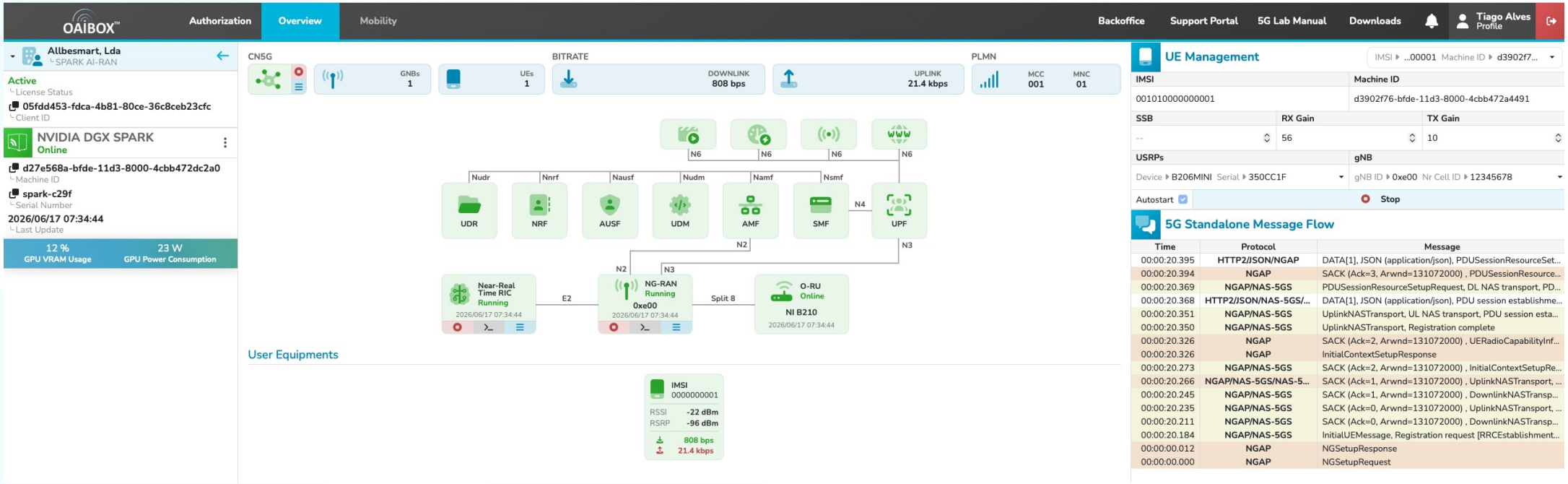
157 Testbeds

204 OAIBOX

# OAIBOX – the product line

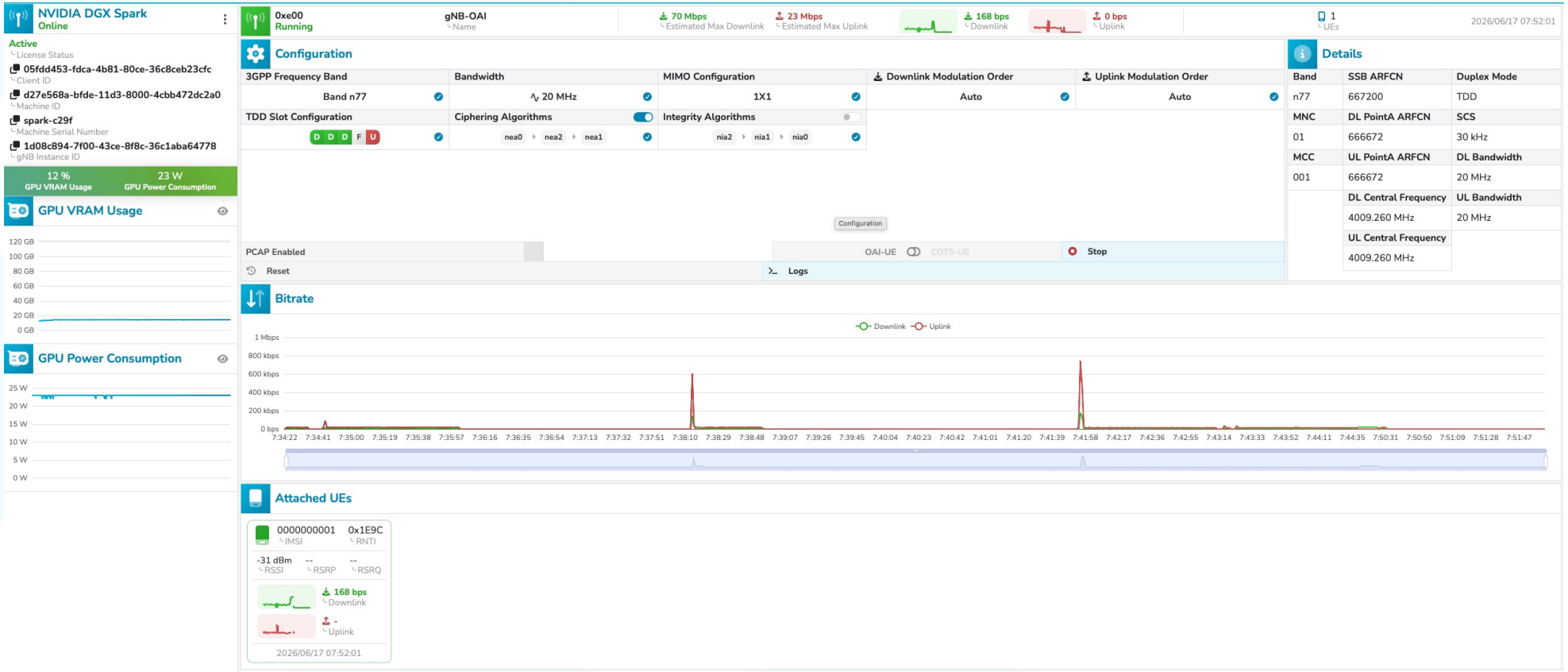
- **5G Lab Kit**, A complete hands-on 5G network on a compact USRP (B206), guided by the **OAIBOX 5G Lab Manual** a ready-to-teach curriculum through the full stack, with exercises
- **MAX**, FR1/FR2/FR3 with any NI/Ettus USRP; our most-deployed unit
- **O-RAN**, FR1/FR2 featuring F1 split as well as split-7.2 fronthaul with COTS O-RUs, for multi-vendor, interoperability
- **AI-RAN**, Leveraging the OAI stack paired with NVIDIA compute adding Sionna digital twin, Aerial, and edge-AI for 6G research

# OAIBOX – the dashboard




- **One pane for the full E2E overview.** CN5G, gNB, Near-RT RIC and the **OAI UE**
- **GPU-aware, running on NVIDIA DGX Spark.** Live GPU telemetry on screen
- **Remote UE control.** Configure and control the **OAI UE** from the Dashboard

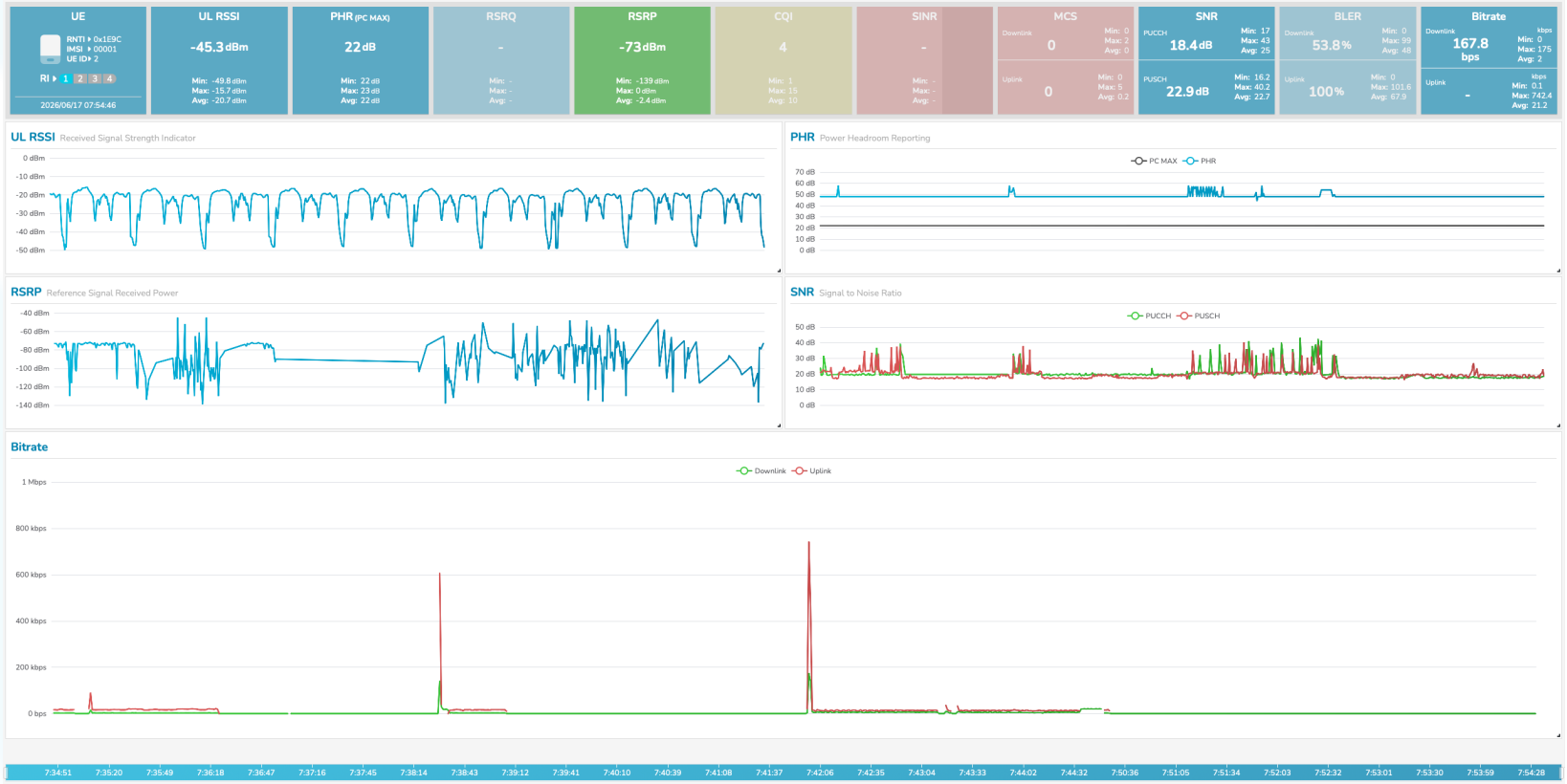
# OAIBOX – the dashboard




- **Configure**
- **Press Start**
- **Repeat!**

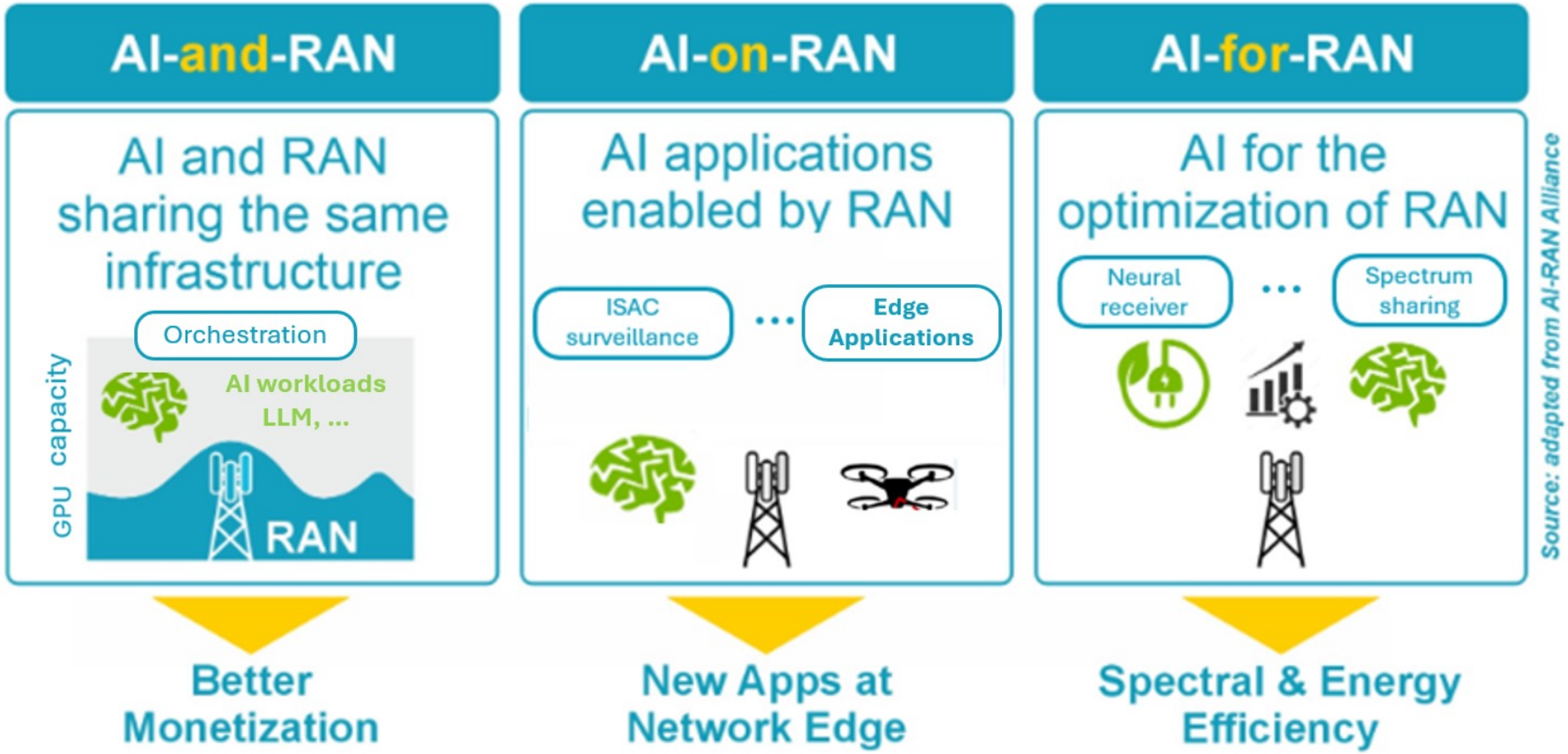
# OAIBOX – the dashboard

- Dedicated view per-UE **Live KPIs and radio metrics**



# OAIBOX AI-RAN – the verticals

The OAIBOX AI-RAN product line empowers 6G researchers to explore and experiment with emerging AI-RAN use cases



# OAIBOX AI-RAN – AI and RAN

*An AI-and-RAN testbed that built upon NVIDIA platforms such as the A100 or GH200*


- **One GPU, two workloads.** A MIG-partitioned GPU to run Aerial (RAN L1) and an AI classifier side by side

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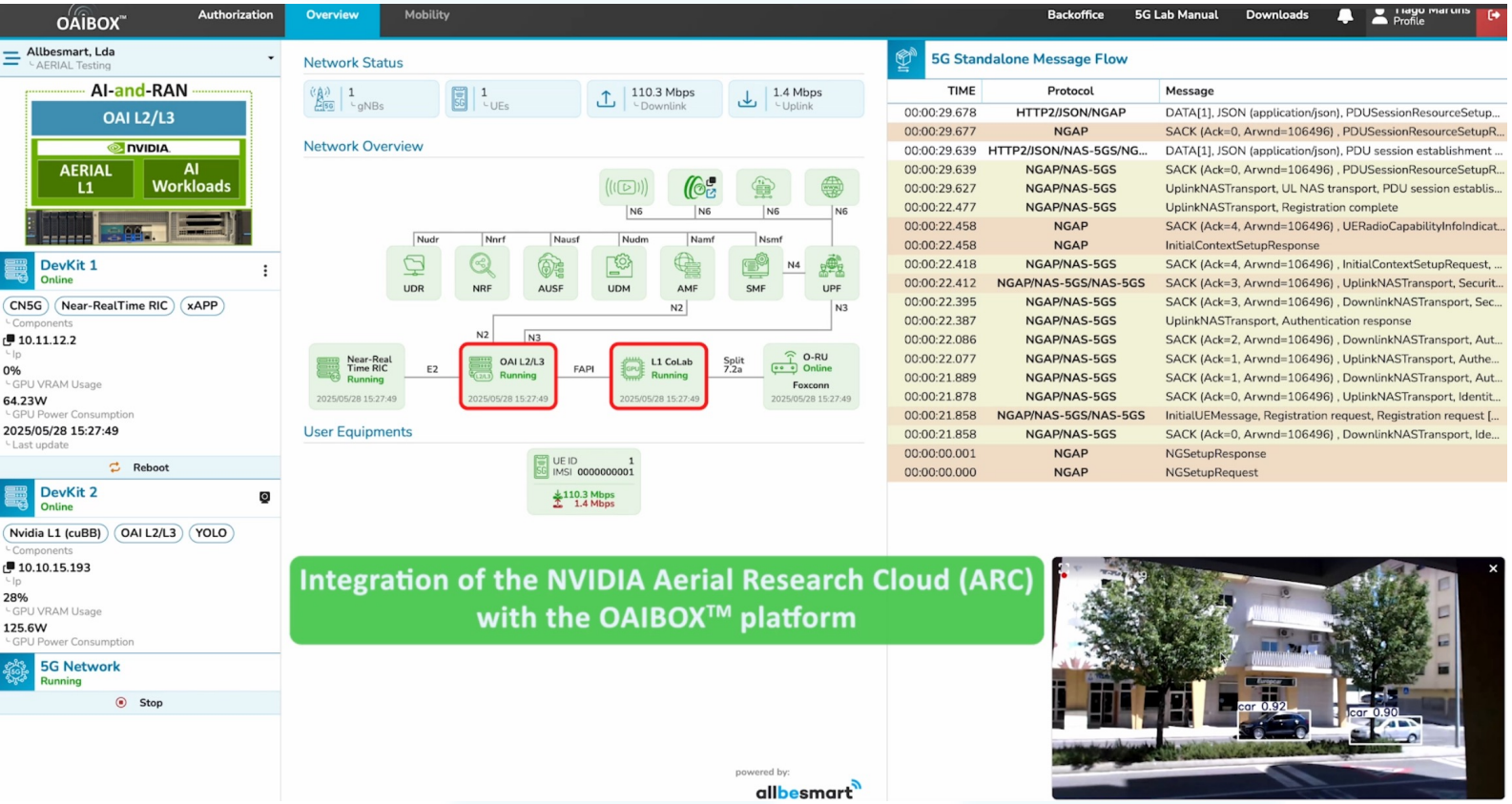



- **One GPU, two workloads.** A MIG-partitioned GPU to run Aerial (RAN L1) and an AI classifier side by side
- **AI-and-RAN**, live YOLO inference on a camera feed in one MIG slice while the 5G L1 runs in the other

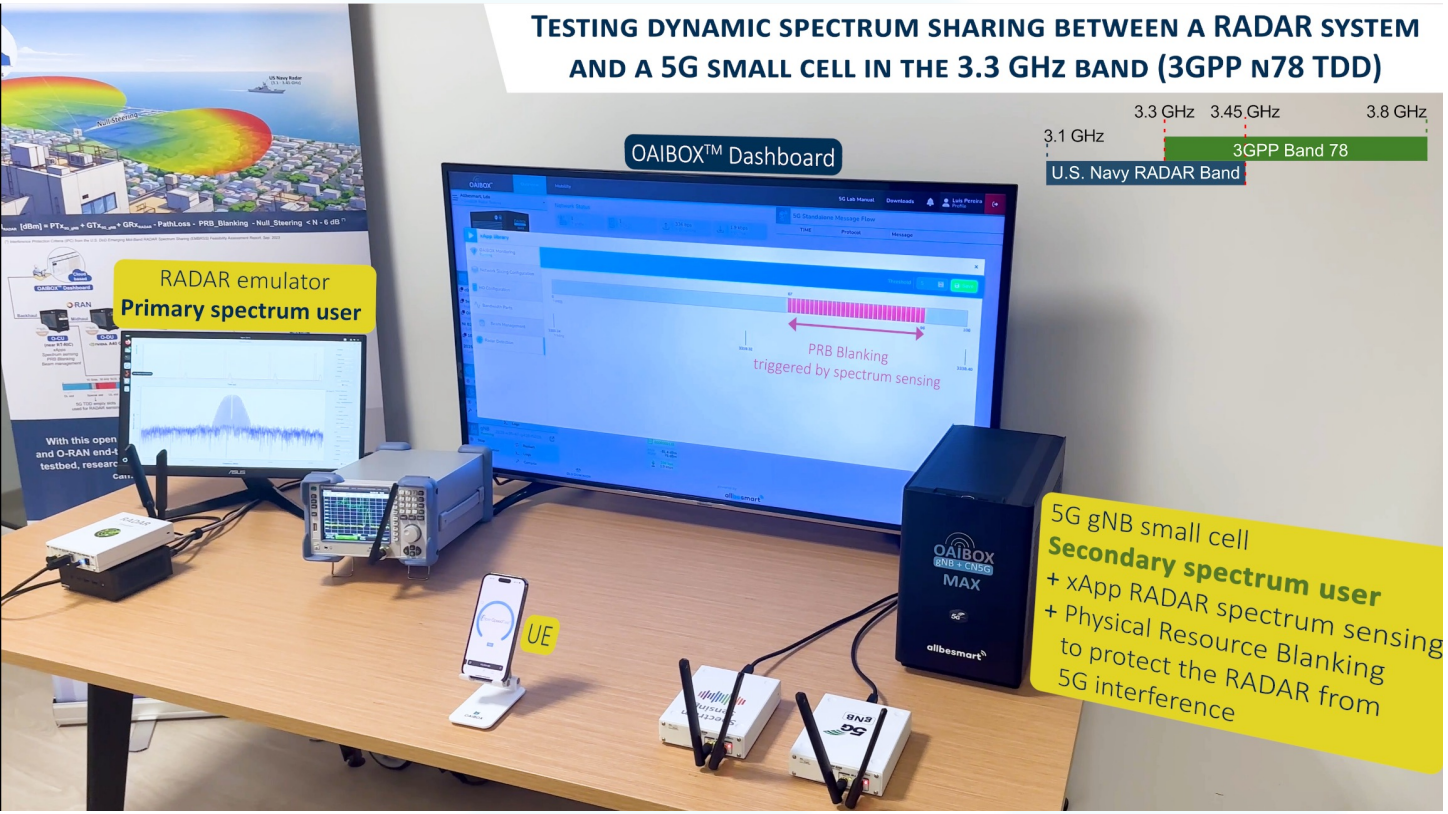
# OAIBOX AI-RAN – AI on RAN

*An AI-on-RAN testbed where the network is the sensor, for ISAC research*


- **The signal is the sensor**. Intrusion detection from standard 5G NR reference signals pulled straight from the live OAI stack
- **ISAC using today's 5G waveforms.** OpenAirInterface's reference signals make real ISAC experimentation possible right now
- **Real-time AI on channel data.** A model classifies channel perturbations to flag an intruder live

# OAIBOX AI-RAN – AI for RAN

*An AI-for-RAN testbed for dynamic spectrum sharing with proactive PRB blanking*




The OAI 5G RAN **shares the band with an incumbent,** occupancy is sensed and PRBs are blanked on both downlink and uplink to minimize interference

**AI makes it predictive,** Incumbent activity is periodic and learnable, so a model forecasts occupancy and blanks PRBs *ahead of time*

**Next up: neural receiver.** A short-term experiment for us, bringing an AI-native receiver onto this testbed

# OAIBOX AI-RAN – Digital Twin

A digital twin inside the OAIBOX Dashboard, ray tracing powered by **NVIDIA Sionna-RT**


- **Ray tracing on the GPU, visualized in the OAIBOX Dashboard.** NVIDIA Sionna RT computes the propagation on the GPU while the OAIBOX dashboard provides the live visualization
- **Bring your own scene and routes.** Customers load their own 3D environments and mobility with open tooling with scenes from Mitsuba and UE routes from SUMO
- **Catch it live at the demo session.** This exact testbed is running in the demos, extended with a second DGX Spark hosting the OAI UE, for a full end-to-end setup

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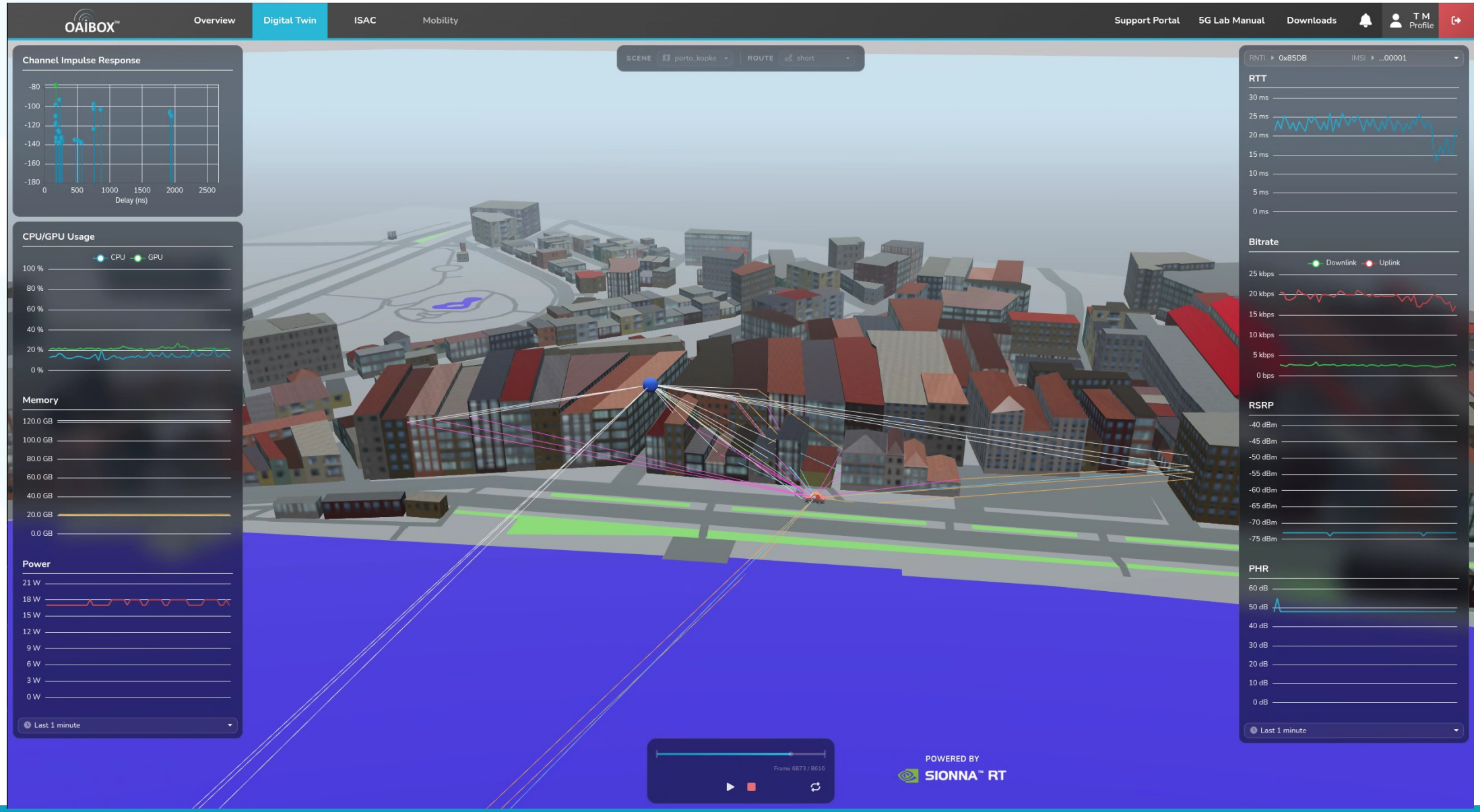

# OAIBOX AI-RAN – Digital Twin for ISAC PoC

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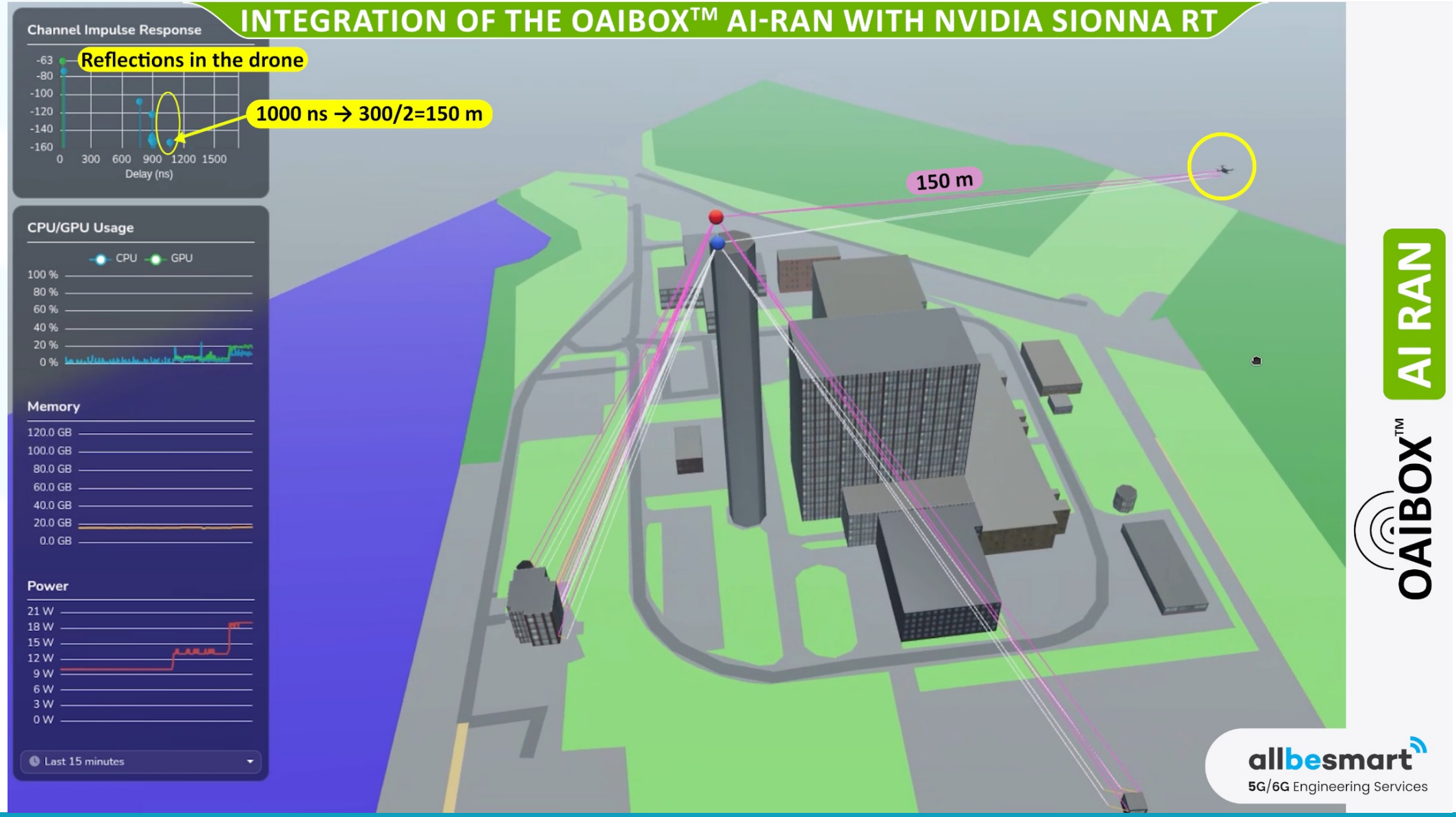

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# Q&A

## Thank you!

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