



6G-VERSUS

Energy-Aware Arctic Remote Site with AI-Enhanced Control

6G-VERSUS showcases the profound sustainable, economic, and societal impact of 6G technology.

Finnish Pilot: Innovates with a self-sustainable 5G base station, focuses on developing an energy grid free remote base station site for arctic weather conditions and paving the way for energy-autonomous communication networks.

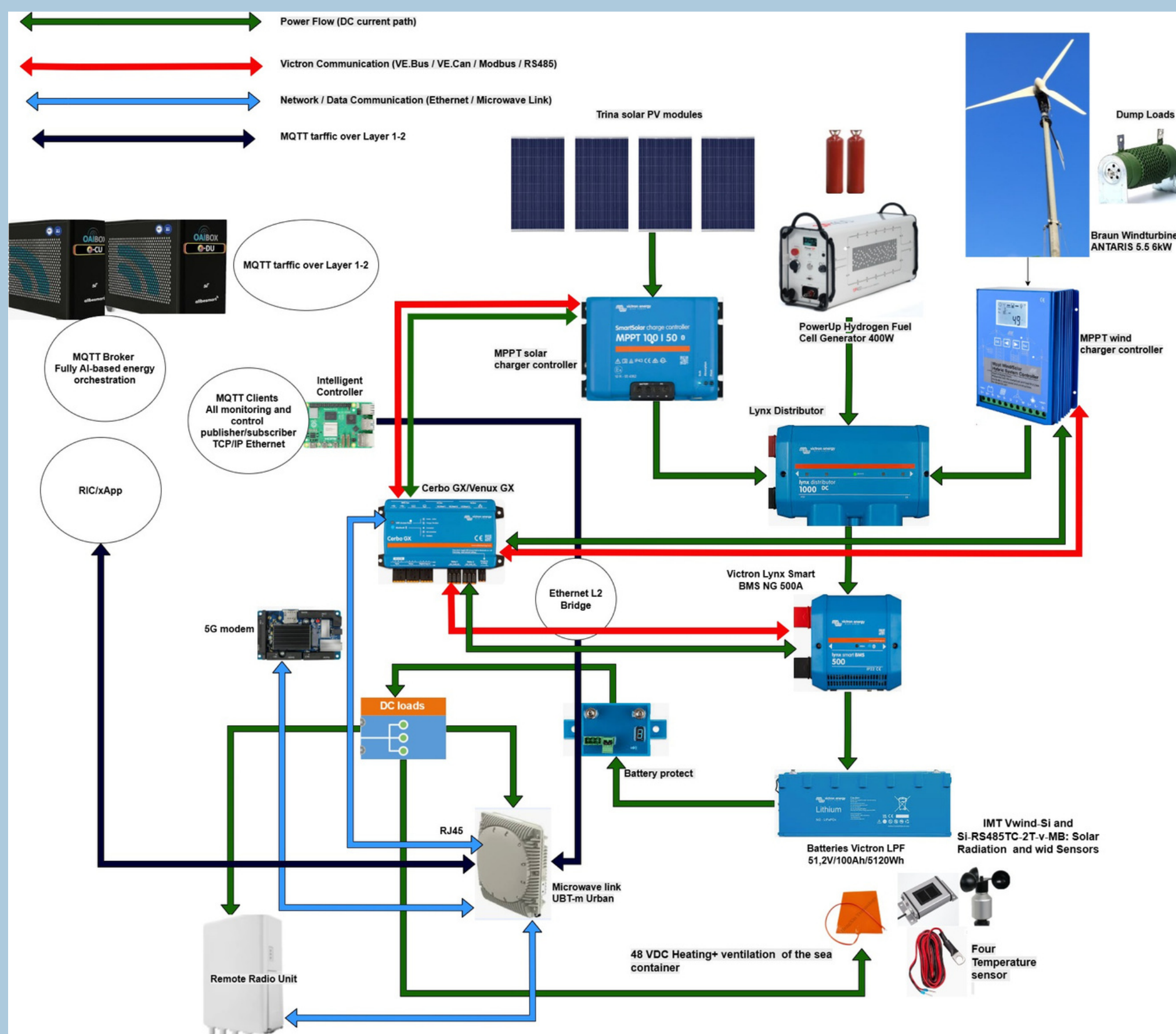
SCAN ME!



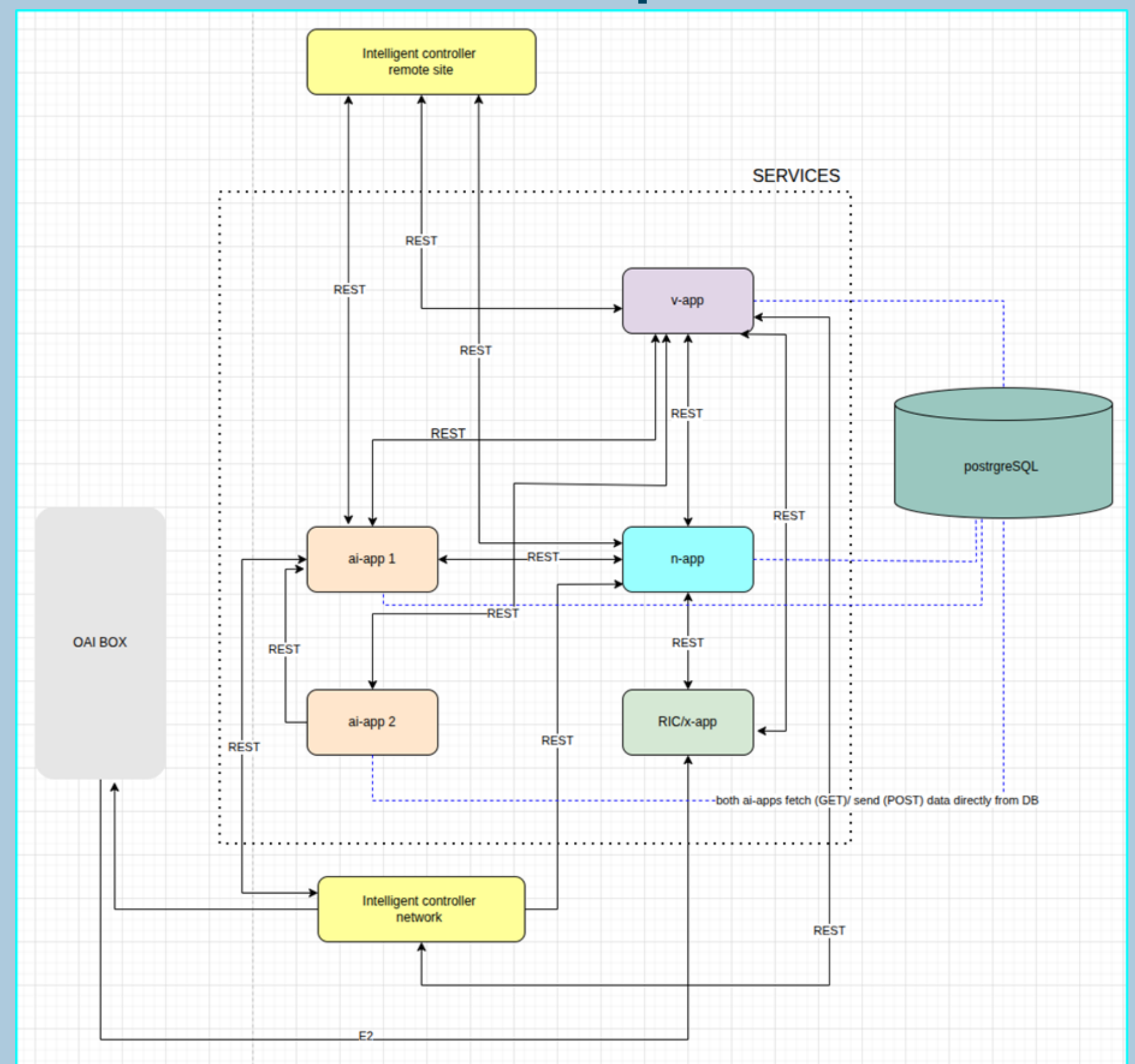
Objectives

- ✓ **Design and Develop a 6G-Enabled Application Framework for the triplet of V-app, AI-app and N-app**
- ✓ **The system features a remote radio head, RES (wind and photovoltaic with battery assembly and hydrogen fuel cell), using a microwave link as a wireless fronthaul connectivity**
- ✓ **The energy measurement framework enables real-time monitoring of energy production and consumption using external power meters and on-site weather sensors, supporting accurate environmental sensing and 48-hour energy weather forecasting.**
- ✓ **Finnish Pilot evaluates the societal and environmental impact of 6G networks to ensure alignment with sustainability goals and societal needs and create new business models.**
- ✓ **AI-based energy-aware decision making for real-time adaptation to energy and traffic conditions and proactive radio and network parameter tuning**

Architecture



Concept



N-App: A data-plane application that collects network traffic data per connected UE from the X-App and integrates energy consumption, production, and forecasting data from remote/network intelligent controllers for database storage

AI-App 1 – Arctic Energy Control: An energy-budgeting application that uses weather forecasts, traffic predictions, and site energy data to predict renewable production, determine power states and energy sources, and send control decisions to remote/network controllers via REST APIs

Remote Intelligent Controller: A Raspberry Pi-based remote site controller that collects system data via Cerbo GX, communicates with N-App, V-App, and AI-App through REST APIs, and applies AI-App instructions to manage battery discharge and hydrogen fuel cell operation to keep the site operational

V-App: A unified web-based dashboard that orchestrates the trial lifecycle, integrates system components through REST APIs, and provides real-time monitoring, visualization, and user notifications

AI-App 2- Arctic Traffic Control: A traffic prediction application that uses the previous hour of network data using a regression model to forecast traffic for the next hour and send the prediction via REST API to AI-App1 for further analysis and decision-making

Network Intelligent Controller: A real-time power monitoring and control application that measures energy consumption of the server and O-RAN setup, reports power data to the N-App via APIs, and dynamically adjusts RAN configuration based on AI-App decisions

34 Partners | 10 countries

13 academic and/or research organizations

10 industrial partners

9 SMEs

2 NGOs



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