



Executive Grant Summary

Project Title

BLOCK VECTOR ER-Series Micro Data Center Rack & Testbed

Organization

BLOCK VECTOR Technologies, LLC
(Arizona-based, research and education focused)

Overview

BLOCK VECTOR Technologies, LLC is developing the ER-Series rack: a 12U, furniture-grade micro data center enclosure paired with a documented testbed for real-world measurements. The platform combines Raspberry Pi 5 full nodes, miner clusters, multi-WAN networking, and power and thermal sensing in a compact, living-room-ready cabinet.

The ER-Series is designed as a **grant-ready, reproducible lab platform** for STEM programs, makerspaces, and small research groups that need hands-on infrastructure without the cost and complexity of a traditional server room.

Need / Problem Statement

Most students encounter “the cloud” and public blockchains only as diagrams or dashboards. Schools and small labs lack affordable, documented hardware that lets learners:

- See and touch real networking and computing hardware
- Measure power, thermals, and performance under load
- Experiment with multi-WAN failover, VLANs, and routing
- Explore full nodes and miner behavior in a controlled environment

As a result, infrastructure topics are often taught abstractly, with limited connection to real-world systems or measurable data.

Proposed Solution: ER-Series Rack & Testbed

The ER-Series platform addresses this gap by packaging a complete micro data center and testbed into a compact, easy-to-assemble rack:

- **ER-Series Rack Enclosure (“Easy Rack”)** – 12U furniture-grade cabinet built from modular 2×4 panels with threaded inserts, designed for assembly by educators and lab staff using basic tools.
- **Compute & Generation Nodes** – Raspberry Pi 5 full nodes with dual-NVMe storage, ASIC miners (e.g., BitAxe), and service nodes for monitoring and data collection.



- **Networking Layer** – TP-Link Omada multi-WAN routers, managed switching, VLAN segmentation, and APs for resilient home-office / lab scenarios.
- **Measurement & Sensing** – Power monitoring, thermal and environmental sensors, and structured workflows for repeatable data collection.

The rack is quiet and visually appropriate for classrooms, offices, or studios, while still behaving like a serious lab rack on the inside.

Educational & Research Outcomes

The ER-Series testbed supports:

- Networking labs on VLANs, routing, and failover using real outages and multi-WAN paths
- Energy-use and efficiency studies using measured power, thermals, and workload profiles
- Storage and throughput experiments on dual-NVMe Raspberry Pi full nodes
- Cluster and switching exercises using 30–40 Raspberry Pi units as controllable load nodes
- Data-driven projects where students analyze time-series datasets instead of screenshots

Learning activities are documented as repeatable workflows, enabling faculty to run the same labs across semesters and sites.

Facilities & Capabilities

BLOCK VECTOR Technologies maintains a dedicated ER-Series reference rack and lab environment that includes:

- Multi-WAN, VLAN-aware Omada networking
- Raspberry Pi 5 clusters with dual-NVMe storage
- ASIC miner load generators and educational miners
- Managed switching for controlled load routing and stress testing
- Power and environmental instrumentation
- In-house documentation and software tooling for reproducible builds and measurements

This lab serves as both a development platform and a reference implementation for partner sites.

Use in Grants & Programs

The ER-Series rack can be deployed as:

- A pilot micro data center for STEM programs or makerspaces
- A repeatable lab platform for grants focused on resilient networking or energy-aware computing



BLOCK VECTOR TECHNOLOGIES, LLC

13231 W. Ventura St.
Surprise, AZ 85379
USA

blockvectortech@gmail.com
www.blockvectortech.com

- A measurement-ready environment for documenting outcomes and reporting to funders

BLOCK VECTOR can provide hardware, documentation, lab workflows, and technical support aligned with proposal goals.

Contact

For collaboration or grant partnership inquiries:

Email: blockvectortech@gmail.com

Web: www.blockvectortech.com