

Optimizing Edge Connectivity with NATS JetStream

With Synadia and NATS.io, PowerFlex powers its intelligent fleet of EV charging stations, batteries and solar arrays at the edge – with zero data loss

CHALLENGES

- Modernizing to an event-driven architecture for both cloud and edge
- Optimizing the NATS architecture to scale to thousands of sites
- Ensuring communication in low-connectivity or harsh conditions at the edge
- Decreasing data loss and increasing visibility into its fleet – EV charging stations, batteries and solar arrays

NATS

- Open source, cloud-agnostic, edge-native messaging & communications platform
- Scalable, low latency & resilient system – no multiple specialized tools or middleware
- Simple to use, lightweight & fast, secure & compliant
- Includes NATS JetStream, a highly configurable message persistence layer across nodes

BENEFITS AND RESULTS

- Increased developer efficiency and time to market
- Ensured scalability and reliability for continued growth
- Enabled fast cloud-to-edge/edge-to-cloud connectivity in variable environments
- Delivered zero data loss via JetStream data persistence

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“NATS’ lightweight, reliable messaging system perfectly fits our edge-to-cloud and cloud-to-edge architecture, allowing us to scale effortlessly, ensuring real-time communication and enabling seamless energy management.”

- David Morley,
Director of Software Engineering,
PowerFlex

ABOUT POWERFLEX

Leveraging NATS, [PowerFlex](#), a subsidiary of EDF, the French utility, is leading the charge in intelligent “green” energy solutions at the edge – EV charging stations, storage batteries in large-scale commercial and residential complexes and photo-voltaic systems with solar panels on rooftops across the US and in Canada.



“Collaborating with the Synadia experts accelerated the development of a highly reliable platform that met our strategic vision and enabled business growth. The whole Synadia team was fantastic to work with.”

- Robert Hughes,
Senior Engineer,
PowerFlex

For more information about how Synadia’s solutions can transform your operations, visit [Synadia.com](#) or [contact](#) our team.

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Challenges

Recently, PowerFlex, a clean technology solutions company with green offerings, has experienced expansive growth across its supply chain of EV charging, energy storage and solar solutions at the edge. The company helps communities and businesses in the move to carbon-free electrification despite unreliable or insufficient power due to overuse of the power grid, difficult or harsh conditions and climate impacts. PowerFlex leveraged NATS for its edge-to-cloud and cloud-to-edge data transmission, ensuring efficient communication between devices, even in challenging environments. With NATS, PowerFlex can optimize the use of EV charging stations, manage battery storage and streamline innovative solar energy usage at the edge for customers across the US and Canada.

NATS

PowerFlex’s architecture built on NATS with JetStream ensured lightweight, reliable and secure messaging with data persistence across the cloud-to-edge and edge-to-cloud continuum. To optimize EV charging and battery operations, data from the cloud, such as solar forecasts and electricity pricing, are sent to the on-site controller and combined with information from batteries and solar production. Telemetry and other data are then sent to the cloud for aggregation and analysis. JetStream’s persistence capabilities allowed PowerFlex to buffer data locally, eliminating concerns of data loss. NATS enabled fast, reliable communication across all their distributed energy assets, while JetStream ensured data synchronization with the cloud once intermittent connections were re-established, providing PowerFlex with the stability they needed to scale.

“NATS is fast, reliable and lightweight – perfect for the edge.”

- David Morley

Results

PowerFlex turned to Synadia experts and its 24/7 support to refine and scale its NATS-based system to ensure no data loss due to location or conditions, comprehensive data visibility, improved disaster recovery and security.

- **Increased Developer Efficiency:** Synadia experts were able to accelerate the NATS development process with their responsiveness and recommendations such as adding a new sourcing stream for each new site in its strategic expansion.
- **Data Persistence:** With variable conditions at the edge – extreme heat, freezing temperatures and networking barriers like building enclosures and intermittent connectivity, NATS’ data reliability and ability to persist data with JetStream over several hours were critical to scaling, company growth and doubling the number of managed EV charging stations.
- **Self-Protecting:** NATS’ leaf node topology enabled independent site operation even during network outages, ensuring uninterrupted service.
- **Observability:** By moving all the edges into one NATS cluster, PowerFlex increased performance and unlocked observability of events in its dashboards and the CLI, enabling alerting to any lags, for example, and rapid resolution. “We know a customer site is having a bad day before the customer even knows it,” Morley explained.
- **Disaster Recovery:** PowerFlex leveraged JetStream streaming replicas for disaster recovery out of the box.
- **Security:** Working with Synadia on its security profile at the edge, PowerFlex implemented JSON Web Token (JWT), an open standard for securely sharing JSON data, and a key authentication model. PowerFlex can create users and assign permissions to users, on the fly, without a restart of the server, which is valuable in a dynamic distributed system, as well as revoke and add tokens for fine-grained control over the NATS system access, while keeping the NATS server continuously available.

“NATS and JetStream have nearly eliminated data loss for us, even when cellular connections drop in harsh environments like parking garages or remote solar installations.”

- Robert Hughes