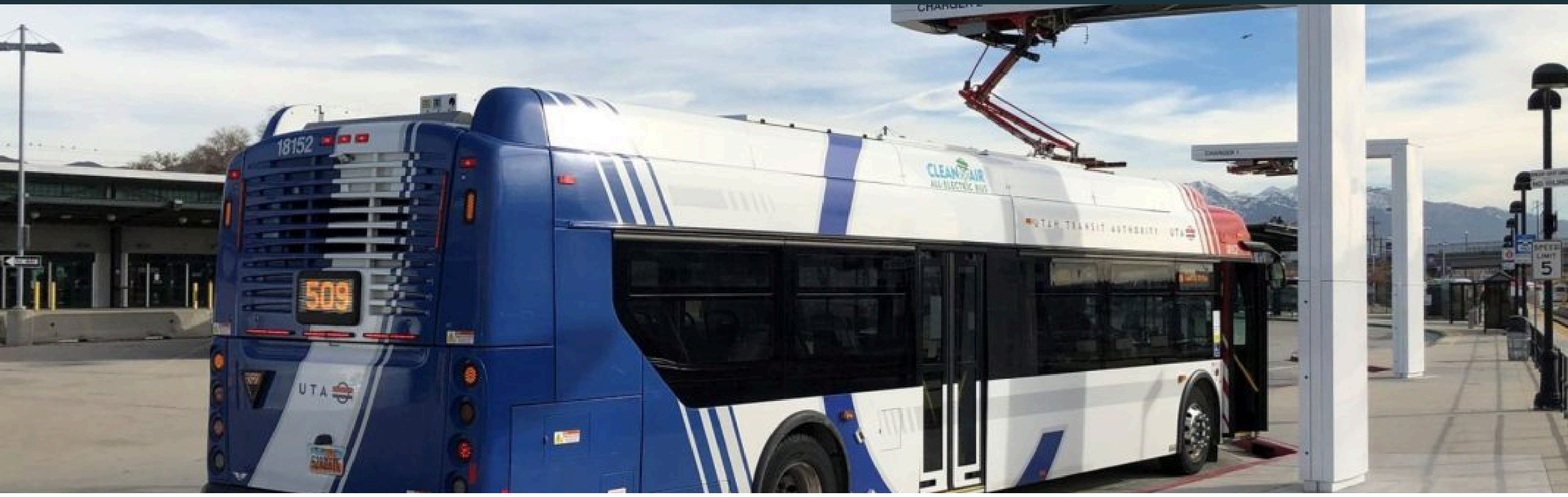
UTA Transit Reliability Monitoring Platform

UTAH STATE UNIVERSITY
ASPIRE
FOUNDATION



Executive Summary

ASPIRE's software team at Utah State University built and deployed an integrated monitoring platform at the Utah Transit Authority (UTA), Utah's largest transit agency. The platform has been in continuous production use for over a year. It monitors UTA's full fleet of DC fast chargers, rated between 150 kW and 300 kW maximum draw and spanning both on-route pantograph and depot configurations, alongside their battery-electric bus fleet across two depot facilities and several on-route charging stations.

Before this platform existed, charger status, vehicle telemetry, and energy consumption data all lived in separate vendor systems with no way to cross-reference them. The platform pulls these together into a single interface. UTA's fleet planner uses it for charge scheduling, demand curtailment, and equipment accountability. It was recently extended to UTA's Ogden facility.

1 Problem Statement

As UTA's electric bus deployment grew, operational problems emerged that existing vendor tools didn't address. Charger data, vehicle telematics, and energy consumption each lived in separate platforms that didn't talk to each other. When a bus failed to charge overnight, figuring out whether the fault was with the charger, the bus, or the communications layer required manually cross-referencing multiple systems. That process could take hours and frequently ended without a clear answer.

This fed a broader problem: technician mistrust of the charging infrastructure. Without clear evidence pointing to specific failure modes, maintenance staff tended to blame charging failures on the OCPP connection between the chargers and the management system, whether or not that was actually the cause. Genuine charger hardware faults went underreported, warranty claims got delayed, and there was a general reluctance to rely on the electric fleet for service.

UTA also had no visibility into the energy demand patterns driving commercial electricity costs at its depot facilities. Demand peaks went unmanaged, and there was no tooling to set or enforce power curtailment schedules.

2 Data Sources

2.1 OCPP 1.6, Charger Data

The platform ingests charger data via OCPP 1.6, the prevailing communications standard for networked EV charging equipment. OCPP 1.6 provides session-level data including start and stop events, metered energy delivery, connector status transitions, and fault notifications.

In practice, ABB chargers (which make up UTA's primary fleet) often implement OCPP 1.6 inconsistently. Commands are sometimes silently ignored or acknowledged without actually being executed. Error codes are frequently generic or just missing entirely. A significant part of the development effort went into figuring out which portions of ABB's implementation could actually be relied on, and then building reporting logic around that trustable subset rather than the full spec.

2.2 Vehicle Telematics, Bus Data

Vehicle data comes in via a websocket stream from UTA's telematics provider (ViriCiti), providing geolocation, state-of-charge, and basic operational statistics for each bus in near-real-time. The data is useful but sparse. There's no error reporting, no connection-state information, and no diagnostic detail about charging events from the vehicle's perspective.

2.3 Correlation as the Core Capability

On its own, OCPP tells you what a charger did but not which bus it served. Telematics tells you a bus's state of charge but not which charger delivered it. The platform's main technical contribution is correlating the two, matching geolocation data from buses with session data from chargers to build a unified record of which vehicle charged at which station, when, for how long, and with what result.

3 Methodology

ASPIRE's software team built the platform in direct collaboration with UTA operations, maintenance, and management staff. The long-term objective has always been smart microgrid management for charging cost reduction, where the platform actively controls charge scheduling and power allocation in response to grid conditions and operational needs. The monitoring platform was built as a necessary precursor to that goal. Before UTA would allow automated charge management, their staff needed to trust the data, understand the system's behavior, and have confidence that issues could be identified and dealt with quickly.

The platform works as a centralized monitoring and control system that ingests both data streams in real time, correlates them against a unified equipment model, and presents the result through a web-based interface. Users can view system-wide status across all facilities or drill down to individual charging sessions.

Development has been iterative, with UTA feedback shaping what got built and when as the agency's understanding of its electric fleet matured.

4 Issues Encountered and Future Development

4.1 Charger Protocol Compliance

The most persistent challenge has been ABB's inconsistent OCPP implementation. The platform works around this by building its operational logic around the subset of OCPP behaviors that have proven reliable through sustained observation, rather than assuming spec compliance. This works, but it requires re-evaluation with each charger firmware update since updates can change which behaviors remain trustable.

4.2 Data Feed Reliability

Both data streams have intermittent gaps: dropped connections, delayed messages, occasional periods of missing data. This is expected for networked field equipment. When data is missing, the platform simply won't produce correlations for that period, and reporting surfaces data-quality indicators so equipment faults can be distinguished from communications interruptions.

4.3 Future Development

There is active development underway on a rebuilt OCPP central system. Rather than relying on chargers to faithfully execute charge profiles and report their composite schedules, the new system holds charge profile state server-side and issues only the minimal, well-tested subset of OCPP commands that have proven reliable. The goal is to move critical scheduling logic out of charger firmware and into infrastructure the software team controls directly.

This work is in early stages. The system currently handles basic OCPP message exchange, with significant development remaining before production readiness. If it works as intended, this rebuilt central system should be the final piece needed to offer UTA reliable, automated charge profile management with the confidence to respond to issues in real time. The timeline will depend on how field testing against UTA's actual equipment goes.

5 Operational Impact

Fault identification and maintenance accountability. The platform flags charging anomalies, most notably plug-in events that don't result in a charge session, giving UTA's fleet planner a reliable indicator of charger-side failures. Combined with per-charger session histories and the vehicle-charger correlation data, this has supported more targeted warranty claims to ABB with specific sessions and timestamps attached.

Energy cost management. Demand-profile reporting gave UTA its first actionable view of the load patterns driving their commercial electricity costs. Using the platform's recurring schedule feature, UTA has implemented time-based power curtailment at its depot facilities to reduce peak demand charges. UTA leadership has indicated the platform is producing meaningful monthly savings.

Adoption and expansion. The platform has been used primarily by UTA's fleet planner since deployment. As of April 2026, access has been extended to UTA's Ogden operations team. Its role has also shifted from monitoring to active operations; it's now used for routine charge scheduling and equipment management, not just after-the-fact analysis.

Applicability beyond UTA. The platform's architecture is not specific to UTA's fleet or facilities. Any transit agency or fleet operator with OCPP 1.6-connected charging infrastructure and ViriCiti telematics could deploy it against their own equipment. Integration with other telematics providers is feasible and could be discussed on a case-by-case basis depending on the provider's data availability and API access.

This report describes work performed by ASPIRE's software team at Utah State University under the center's applied research program. The platform remains under active development in collaboration with the Utah Transit Authority.