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From Data to Insights: How ACM Transforms EV Interoperability Testing with QualityLogic's CCS Analyzer

ACM and a Path to Better EV Compatibility

The American Center for Mobility (ACM) is a global development center dedicated to advancing safe, sustainable, and secure mobility technologies. As a collaborative hub open to private industry, start-ups, government, standards bodies, and academia, ACM provides comprehensive testing and development resources including an Advanced Mobility Proving Ground, innovation campus, and specialized EV charging infrastructure. Central to ACM's EV initiatives is addressing one of the industry's most critical challenges: ensuring seamless interoperability between electric vehicles and charging infrastructure across different manufacturers and platforms.

To tackle these compatibility challenges, ACM established the EV Charging & Interoperability Testbed (also known as "EV Charging Basecamp"). This specialized facility focuses on ensuring seamless operation between electric vehicles (EVs) and electric vehicle supply equipment (EVSEs) across different manufacturer platforms. The testbed supports ACM's participation in Charging Interface Initiative (CharIN) "Testivals" – collaborative multi-OEM events where industry partners validate EV/EVSE pairings across diverse real-world scenarios.

To enhance the depth and efficiency of this testing work, ACM integrated QualityLogic's Combined Charging System (CCS) Analyzer, providing the advanced data analysis and visibility needed to scale their interoperability testing efforts.

Implementing the CCS Analyzer

The CCS Analyzer is a post-analysis tool that processes packet capture (PCAP) files from charging sessions, delivering anomaly detection, visual analytics, and automated report generation. At ACM, its adoption has been spearheaded by engineers Ashwin Kumar and Shreeprasad Jadhav under the direction of Dr. Sushanta Das, VP, Research & Development.

Since Q4, 2024, ACM has conducted regular EV/EVSE interoperability testing. While their existing data acquisition platform effectively captured session data, the CCS Analyzer became essential for analyzing and visualizing protocol communication between EVs and chargers using output PCAP files. Testing focuses on DIN and ISO 15118 protocols, timeout behaviors, and system responses to user-initiated actions such as emergency stops or connector latch operations.

A key strength of the CCS Analyzer implementation has been its ability to visualize charging session data through customizable charts. This functionality allows engineers to isolate specific events and inspect critical metrics like voltage, current, and power output. The ACM team captures screenshots of these charts for inclusion in their reports.

Transforming Data into Actionable Insights

According to Ashwin, "The CCS Analyzer's report structure is especially useful in identifying communication anomalies and prioritizing probable root causes, such as reset events or session ID mismatches."

Building on this foundation, Shreeprasad developed custom workflows to extend the tool's capabilities. He converted the tool's JSON data to CSV using custom Python scripts to extract and plot specific test metrics in a more tailored reporting format. This custom approach allows ACM to generate OEM-specific compatibility summaries from raw PCAP files—an important deliverable for their industry partners.

Paving the Way for Automated Interoperability

Beyond immediate testing needs, the CCS Analyzer plays a strategic role in ACM's broader vision for the future of interoperability testing. While current testing processes are manual, ACM envisions developing fully automated, self-executing test systems. The CCS Analyzer's ongoing enhancements position it as a cornerstone for this evolution.

The CCS Analyzer has enabled ACM to conduct thorough analysis of charging sessions and create impactful client reports faster, with greater depth and accuracy. This makes it a valuable complement to ACM's existing tools for capturing CCS charging sessions.

The partnership between ACM and QualityLogic showcases the value of collaborative innovation in advancing EV interoperability. Through practical feedback, rapid iteration, and a shared vision, CCS Analyzer is being refined into a uniquely powerful tool that not only supports interoperability efforts today but also lays the groundwork for standardized, automated testing frameworks in the future. ACM's application of this versatile product illustrates a pragmatic and forward-thinking approach to resolving the complexities of the EV ecosystem—ensuring the reliable interoperation of vehicles, chargers, and networks throughout the rapid electrification of the transportation landscape.

For a demonstration or to learn more, contact us at info@qualitylogic.com

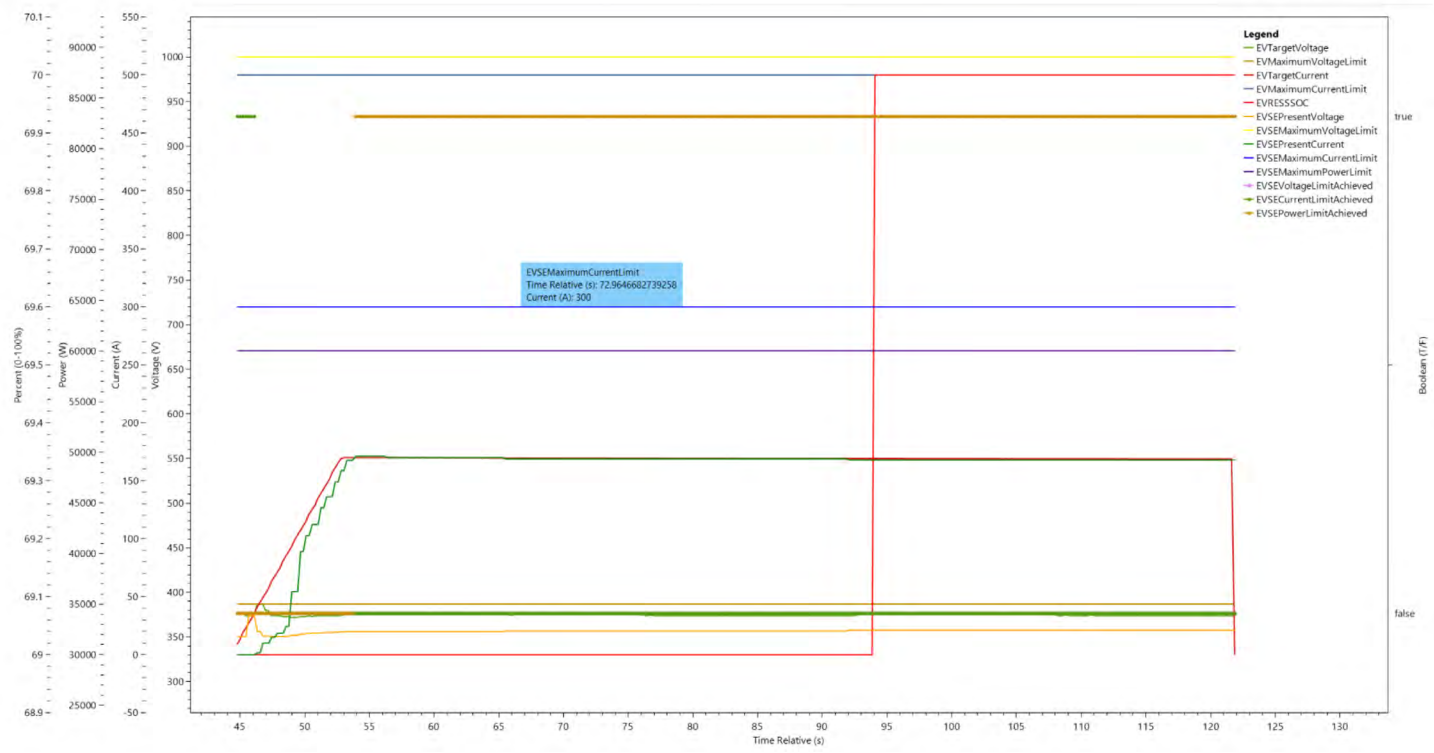

Figure 1: Chart derived from CCS Analyzer showing voltage and current during the charging session