125 E. 3rd Street, #100
Rochester, MI 48307
USA

+1.248.790.7929
info@eagletc.com
www.eagletc.com

Field Testing: comprehensive, dynamic, and data-driven solutions for the optimal in-vehicle experience

Challenge

Building a safe, efficient, and user-friendly connected vehicle ecosystem requires collaboration between original equipment manufacturers (OEM), technology providers, and regulatory bodies. A comprehensive understanding of these technologies is crucial for efficient and effective development, testing, and integration.

In the current global market, OEMs are determined to provide their consumers with a next-level driving experience.

A Chinese OEM plans to launch a high-end electric vehicle (EV) in North America (USA and Canada) in 2025. High-end vehicles, integrated with advanced features, have a higher likelihood of encountering issues, necessitating rigorous testing to ensure quality and customer satisfaction. Field testing ensures vehicles are optimized for real-world challenges, meeting consumer expectations and regulatory standards while enhancing the overall driving experience.

EagleTC partnered with the OEM to perform comprehensive field system level testing, targeting, but not limited to, the infotainment system, telematics, digital key, and Heads-Up Display (HUD) for the North American market.

Solution

EagleTC assigned a dedicated team of test engineers and a program manager to lead this project. The team received a comprehensive list of general test cases to validate the vehicle's features. Figure (1) illustrates a high-level overview of these features, while Table (1) provides detailed descriptions of each. The project was structured into three key phases:

Phase One (Planning):

- Reviewed and customized the test cases based on North American standards, leveraging EagleTC's regional expertise to enhance coverage.
- Aligned testing activities with the software release schedule.
- Planned multiple long-distance trips for mileage accumulation evaluate and to evaluate software stability.

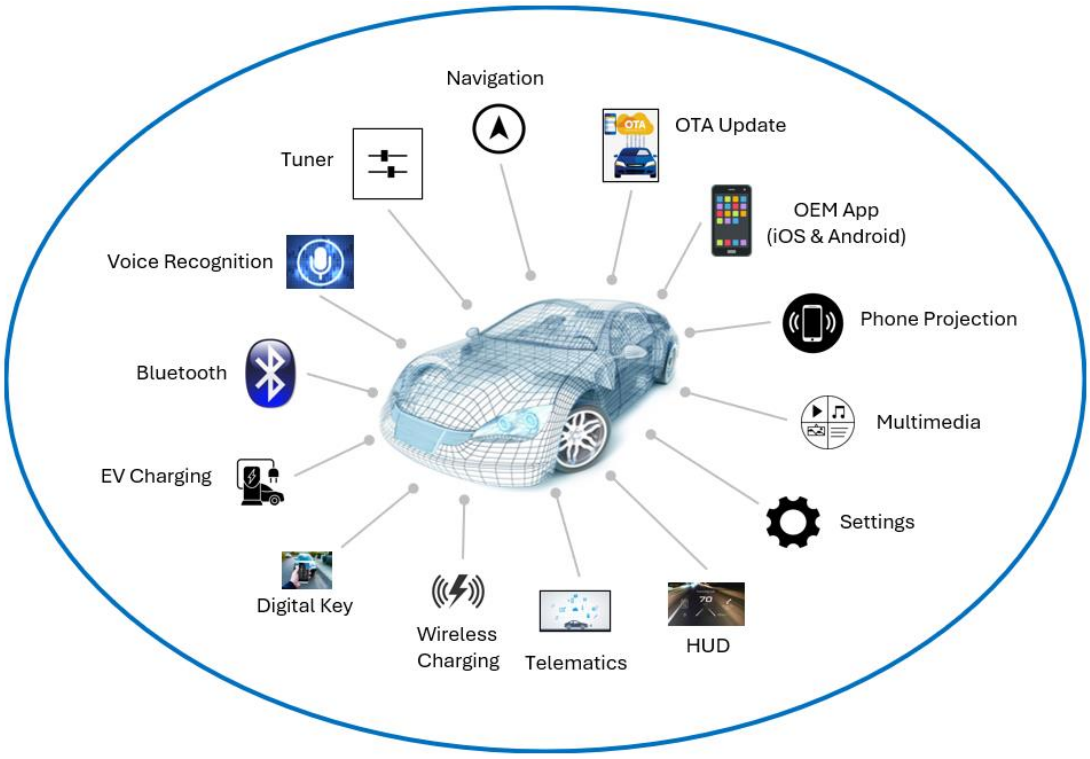

Figure (1) – List of Features Tested.

Phase Two (Functional Testing):

- Updated infotainment system software using Over-the-Air (OTA) when new versions were released.
- Used Diagnostic Software Application (DSA) to update telematics and EV Communication Controller (EVCC) firmware as needed.
- Conducted smoke and sanity tests on each build and promptly communicated results to the OEM.

- Performed vehicle level functional testing for the features listed in Table (1) and updated results in SharePoint.
- Reported software issues in JIRA daily, attaching relevant logs and videos. For instance, QUALCOMM eXtensible Diagnostic Monitor (QXDM) and Android Debug Bridge (ADB) commands.
- Held daily review calls with the OEM to discuss testing details and new software releases.
- Retested to confirm that identified issues were resolved.

Domain	Features
Bluetooth	Hands Free Profile (HFP), Phone Book Access Profile (PBAP), Advanced Audio Distribution Profile (A2DP), Audio Video Remote Control Profile (AVRCP), Message Access Profile (MAP)
Navigation	Turn-by-Turn Directions, Real-Time Traffic Updates, Points of Interest (POI), Route Planning, User Reviews and Ratings
Tuner	FM, AM and XM
Phone Projection	CarPlay and Android Auto (Wired and Wireless)
Multimedia	Media Apps (Spotify, Apple Music, YouTube) and USB
Voice Recognition	Virtual personal assistant / Commands and Voice Search
Over the Air Update	Remote Management and User control
Settings	Date and Time, Audio levels, Display Lighting
Wireless Charging	Cordless / Secured
EV Charging	Alternate Current (AC) and Direct Current (DC) Charging
Telematics	Emergency and Road Assistant Calls, WIFI, Cellular Connectivity, Frequency Bands, Network Speed
OEM App (iOS and Android)	Settings, Climate/charging controls, Lock/Unlock, Navigation, Geofencing, Theft Alarms
Digital Key	Apple Wallet
HUD	Navigation Assistance, Speed Monitoring, Vehicle Alerts, Integration with Smartphones

Table (1) * – Detailed List of Features Tested.

*This list is a sample and is not all inclusive.

Phase Three (Field Testing):

- The team embarked on multiple long-distance trips, with Figure (2) depicting a sample planned route. The focus of these drives included:
    - Cross-functional and ad-hoc testing to assess the functionality of key features such as navigation, tuner, telephony, phone projection, voice recognition, and system settings.

- Infotainment software stability and performance evaluation under real-world driving conditions.
- Road environment testing to analyze performance across varying conditions, including tunnels, bridges, high-traffic areas, city centers with tall buildings, and border crossings.
- Telematics connectivity assessment across different regions and major carriers, including AT&T, Verizon, T-Mobile, Tellus, and Bell.
- Verification of EV charging interoperability with various Electric Vehicle Supply Equipment (EVSE) manufacturers and charging networks. (For further details, please click here).

- Continuously uploaded test results, logs, and photos to the customer portal for immediate analysis.

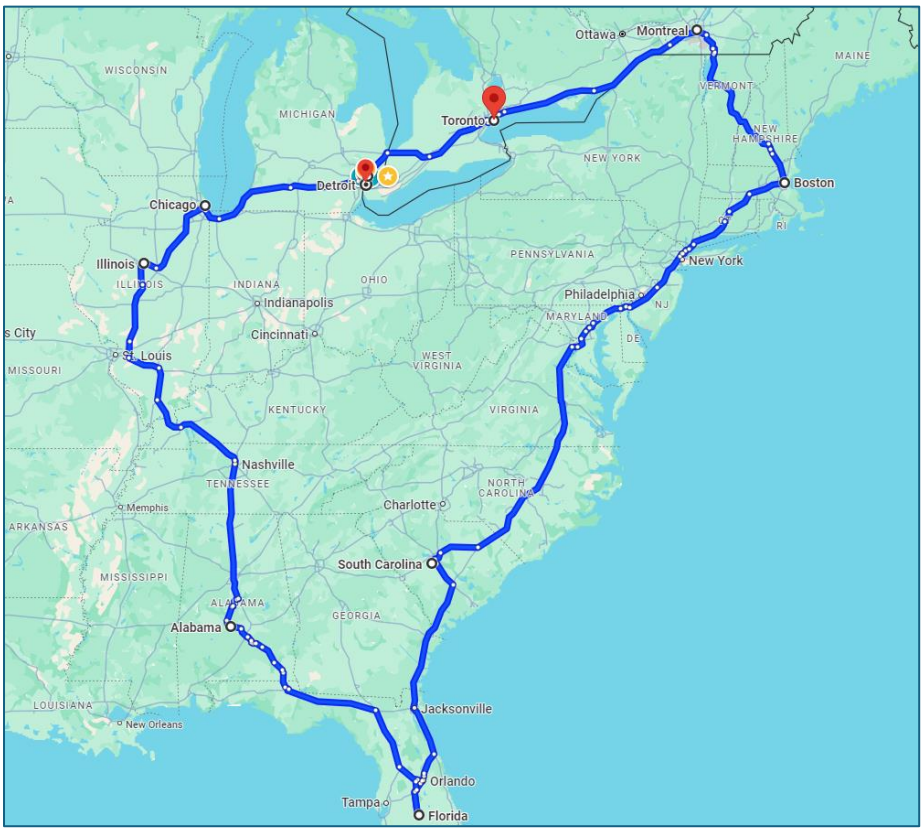

Figure (2) – Sample Planned Route for Testing.

Results

Since commencing this ongoing project in 2024, EagleTC has closely collaborated with the OEM to conduct field tests across the United States and Canada. Notable achievements include:

- Seamlessly transferring knowledge through comprehensive project documentation.
- Accumulating over 16,000 miles and testing more than 600 EVSE units across seventeen U.S. states and two Canadian provinces.
- Providing valuable, real-time feedback and assisting the OEM in resolving all software issues by continuously testing pre-development builds.
- Summarizing test results for the OEM after completing key milestones.

This project illustrates EagleTC's capability to:

- Deploy on-ground teams with strategic route planning on short notice.
- Implement cost-effective testing solutions through efficient resource allocation, rigorous training, and effective program management.
- Deliver prompt customer support and communicate issues in real-time.
- Adapt to dynamic conditions while consistently achieving accurate and timely results.