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Case Study

Global reach: prompt, reliable phone compatibility testing for infotainment systems in key world regions.

Challenge

Modern automotive infotainment systems bring expanded functions and enjoyment to the driving experience. With each new automotive platform and model year, as well as for major infotainment system updates, automakers and their key suppliers must ensure in-market compatibility of these systems with a wide range of consumer electronic devices and service providers including, but not limited to cellular phones and cellular carriers in markets worldwide.

This compatibility testing of infotainment systems is conducted for the start of production launch (i.e. fourth months prior to the actual vehicle production start date) and continues on an ongoing basis for Bluetooth, WiFi, and phone projection (Android Auto; Apple CarPlay) with cellular phones. The complexity of this assignment recognizes that for any given platform and infotainment system, multiple iterations will simultaneously undergo testing, with test sample size reflecting the vehicle volume for a given region.

As it is neither possible nor desirable to test every cellular phone available, a key element of this compatibility testing is to know in any given market the popular cellular phone models that drivers are most likely to use and the prominent cellular carriers.

In this case study, a major automaker and several of their tier-one suppliers need to confirm that the infotainment systems would function properly in two key regions—Australia and the Middle East.

Solution

With its global reach and proven expertise in compatibility testing, EagleTC was assigned this multi-year project, which includes the start of production testing for each model year's new infotainment system, as well as ongoing maintenance testing for existing systems. The start of production testing and maintenance testing is and will continue on a quarterly basis until the projected end date of 2028.

On the ground in Melbourne, Australia and Amman, Jordan, EagleTC's engineering team quickly established the processes and acquired phones and tools to start testing. Phones and cellular carriers are selected based on popularity and regional demographics. Testing is conducted on different benches and hardware based on the model year and vehicle line. Initially, for the extensive start of the production phase of the assignment, the Middle East team tested 15 different phones for compatibility; and the Australia team tested 25 different phones. Subsequently, 15 phones in each region were assigned to maintenance testing. Maintenance testing validates system updates made during the course of a year.

A sample distribution of testing phones throughout the year for multiple model vehicle lines
are demonstrated in table (1). The number of test cases per phone used for the start of production (SOP) testing is 250, while maintenance testing uses 150. Test cases were distributed across several Bluetooth profiles (i.e., Hands-free Profile (HFP), Phone book Access Profile (PBAP), Advanced Audio Distribution Profile (A2DP), and Audio/Video Remote Control Profile (AVRCP)), phone projection, and WIFI features.

	No. of Phones Per Quarter Per Region Tested in 2020								Total No. of Phones Tested in 2020		
	Australia				Middle East				Australia	Middle East	
Model Year	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4			Average No. of Test Cases Per Phone
2018	15	15			15	15			30	30	200
2019	15	15	15	15	15	15	15	15	60	60	200
2020			25	15			15	15	40	30	200

Table (1) – Sample Schedule in Australia and the Middle East in a given year (i.e., 2020). Two cellular carriers are used in each region.

As the testing progresses, EagleTC continues to discover several compatibility issues, which are promptly reported to the automaker's tier-one suppliers. If a vehicle infotainment system is responsible for the issue, the tier one supplier would make improvements that are tested in the subsequent quarter during the maintenance testing. If the incompatibility could be isolated to a specific cellular phone model, no changes would be needed to the vehicle's infotainment system.

Thus, an important part of compatibility testing is root cause analysis, to determine whether a compatibility issue derives from the automaker's infotainment system or a given cellular phone.

Results

EagleTC's thorough compatibility testing of infotainment system with cellular phones in these regions over the span of this project permitted the automaker and its tier-one suppliers to be fully confident that their customers in Australia and the Middle East would have a positive experience with their vehicle's infotainment systems.

In doing so, EagleTC is continuing to demonstrate its ability to:

- Have teams on the ground, deployed and testing, with short-term notice.
- Have an understanding of the popular cellular phones in specific regions and the cellular carriers in which drivers subscribe.
- Provide cost-effective solutions with a full understanding of regional infrastructure and telecommunications protocols and regulations.
- Find software issues during testing resulting in infotainment software improvements for the current and future vehicle model years.
- Adapt to unpredictable circumstances due to a Pandemic. EagleTC's team continued to work remotely to deliver accurate and timely results.

In summary, EagleTC thrives for excellence with quality, and agility. In this case study, we continue to provide our clients with the peace of mind that any assignment will be conducted without delays and that deadlines are met without exception.