Apple CarPlay: Ready for Connected Car Prime Time?

March 24, 2014
Introduction

Apple’s® entry into the connected car market with CarPlay and 2014 Geneva Motor Show adoption announcements by multiple automotive OEMs has spawned discussion and questions across the automotive ecosystem. From the Airbiquity® perspective this isn’t surprising given a market entry by a player of Apple’s magnitude (admired brand, respected technology, global influence, deep resources, marketing muscle, etc.), and we expect the same as Google® reveals more details about their Open Automotive Alliance (OAA).

Airbiquity believes a perpetual truth about the automotive industry is the relentless drive for competitive differentiation. In our eyes competitive differentiation is essential to the short and long-term vitality of any OEM brand, and is influenced by user exposure to every aspect of the vehicle, inside and out. We also believe the ability for connected car technology to contribute positively to competitive differentiation is significant, and shall weigh heavily on OEM decisions regarding wide-scale CarPlay deployment.

Consider MirrorLink™, a proposed automotive industry standard for smartphone integration that attracted industry-wide support and attention. Although MirrorLink offered a viable integration approach with “mirroring” technology, it limited the ability for OEMs to competitively differentiate the infotainment delivery component of their connected car systems. In spite of MirrorLink’s initial popularity the standard has yet to gain widespread adoption as OEMs continue to invest in developing and deploying proprietary systems that service a broader set of connected car program management requirements in a competitively differentiated way.

“In the end, for OEMs, proprietary solutions provide all of the things MirrorLink is seen by some as taking away including differentiation and control.”\(^1\) – Roger C. Lanctot, Associate Director, Strategy Analytics

Given the on-going importance of competitive differentiation – and the necessity of end-to-end support for connected car program management - OEMs will carefully consider the following issues which have significant implications on the quality of the connected car user experience:

1) Limitations of 3\(^{rd}\) Party Apps, Cloud Content, Devices, and Differentiation
2) Disjointed Connected Car Experiences Negatively Impacting User Satisfaction
3) Lack of End-to-End Connected Car Program Use Cases and Management
4) Incremental Hardware Costs Associated with Solution Implementation
5) Unclear Accountability and Liability for Driver Distraction Mitigation
6) Unproven Experience and Commitment to the Connected Car Market

\(^1\) Strategy Analytics - Automotive Smartphone-as-a-Server Solutions Multiply as MirrorLink Drifts – March 7, 2013
Limitations of 3rd Party Apps, Cloud Content, Devices, and Differentiation

One strategic objective for Apple CarPlay is to extend the Apple ecosystem into the vehicle (iPhone, iTunes, iMessage, Email, Maps, Siri, etc.) while displacing competitive ecosystems to capture market share and revenue. Another is to address the needs of Apple iPhone users who are driving connected cars, and potential iPhone users on competing mobile operating systems and handsets.

OEMs considering providing CarPlay exclusive access to their vehicle need to recognize that not all users may be interested in an Apple only device and ecosystem in their vehicle. Especially the millions of Google Android users representing 794M global smartphone operating system (OS) shipments, 79% market share, and 59% year-over-year growth rate in 2013 according to IDC. On a global basis Android is a significantly larger market opportunity than Apple’s 153M OS shipments, 15% market share, and 13% year-over-year growth rate for the same period. Based on these facts the prudent business and customer centric decision would be to invest in connected car technology that enables compatibility with both Apple and Google ecosystems.

When it comes to smartphone app and cloud content Apple will be the sole decision maker and gatekeeper regarding what will be available through CarPlay. Apple’s decisions will likely reflect a corporate strategy favoring their ecosystem over all others, and the outcome may not always be in the best interests of OEMs. As a result, OEMs handing over the decision of app and content availability for their vehicles to Apple are giving up two things. First, an increasingly important competitive differentiation opportunity because all CarPlay equipped vehicles will have an identical infotainment portfolio and user interface (UI) regardless of OEM brand. Second, access to valuable data regarding customer utilization of the infotainment component of the broader telematics system due to Apple ownership and control.

Apple has publicly stated an intention to incorporate non-Apple-owned apps into CarPlay, and we’re seeing that start to happen with support for Spotify, iHeartRadio, Stitcher, and Beats. However, given Apple’s historical resistance to open platforms they will need to show steady progress to make good on their intention. An example of Apple stating an intention to be “open” but lacking in delivery is the FaceTime open standard for video telephony. At the Apple 2010 Worldwide Developers Conference Steve Jobs announced the company would work towards giving other companies access to FaceTime, even saying Apple would go to the standards bodies the very next day to make it an industry standard. Three years have passed and FaceTime remains an Apple exclusive user experience.

Disjointed Connected Car Experiences Negatively Impacting User Satisfaction

CarPlay only works with the Apple iOS 7.1 operating system and iPhone 5 handsets or later. This lack of backward compatibility will require users running older versions of

---

2 IDC - Worldwide Mobile Phone Tracker – February 12, 2014
iOS on pre-iPhone 5 handsets to upgrade before they can begin using the system in their brand new vehicles. Additionally, if an OEM chooses to integrate CarPlay exclusively (versus a more complex CarPlay + Google OAA stack for example), non-iPhone 5 or later users will need to switch from their current OS/handset to Apple, and potentially establish new wireless carrier contracts. Either of these scenarios introduces critical communication and awareness burdens for OEM marketing and dealer channels to ensure customers are well informed throughout the vehicle purchase process. Both scenarios also introduce a new purchase decision tiebreaker versus competitive brands: a vehicle purchase that may not be immediately compatible with a customer’s existing personal technology.

CarPlay’s user interface (UI) and the native OEM center stack UI will operate independently with little to no interaction between the two. Users must choose the specific environment they want to be in (native OEM or CarPlay), and from within the CarPlay UI select an OEM app icon to return to the native OEM UI. Personalized user content (favorite locations, contacts, history, etc.) are not shared between the CarPlay and native OEM UIs, and previous navigation destinations or call lists from the native OEM UI will not be available in the CarPlay UI, and vice versa.

Screen design will also be different between the CarPlay and native OEM UIs. When CarPlay is running the entire head unit screen is taken over in most cases by the CarPlay UI, and OEM branding is displaced in favor of the Apple brand, with the exception of a small OEM app icon on the application selection screen. UI interactions will also differ greatly between the CarPlay and native OEM UIs. Gestures used by Apple in their UIs (such as pinch to zoom or swiping within a list) might not be supported by the native OEM UI. CarPlay and native OEM UI voice recognition systems, grammar, prompts, and voices will also behave and sound differently. In both instances users will have to constantly be aware of the system they’re using and adjust their behavior accordingly. This will also pose challenges for dealer and OEM customer service and support personnel.

**Lack of End-to-End Connected Car Program Use Cases and Management**

In Airbiquity’s opinion the Holy Grail for OEMs is an end-to-end connected car platform that enables automotive manufacturers to centralize and simplify the creation, deployment, and on-going management of their connected car programs. CarPlay is focused on a single connected car use case: infotainment delivery. Airbiquity expects Apple will do a very good job pulling together a well integrated – although proprietary - infotainment solution with the Apple hallmarks of simplicity, usability, and elegance for their devices. However, it must be understood that CarPlay is not a solution that provides crucial aspects of end-to-end connected car program delivery and service management, and offers limited global coverage with initial availability in 13 countries excluding the majority of South America, Eastern Europe, Middle East & Africa, and China.

Given CarPlay is focused on infotainment delivery it has no extensibility for enabling other important connected car use cases such as safety & security, electric vehicle,
fleet, and usage-based insurance. Not to mention an inability to enable fundamental connected car services such as integration into non-smartphone based on-board devices like embedded controllers, vehicle telematics gateways for off-boarding diagnostic data, and mobile network operator (MNO) gateways for overall connectivity. OEMs need critical platform services for user and vehicle subscription management, program and user application management, dynamic system updates (non-infotainment related), customer communications and notifications (CRM), and cross platform data collection, reporting, and analytics (B.I.). CarPlay was not designed with these needs in mind. Apple has a line of sight as to what their role should be in the connected car ecosystem, and it’s about bringing Apple devices, the Apple ecosystem, and the Apple brand into the vehicle.

The headline on Apple’s CarPlay website says it all: 
*Apple CarPlay: The Best iPhone Experience on Four Wheels.*

**Incremental Hardware Costs Associated with Solution Implementation**

A technical requirement of CarPlay is utilization of H.264 via USB Lightning cable for low bandwidth/high resolution video streaming before a planned shift to Wi-Fi sometime in the future. In order to make H.264 work OEMs will need to support decoding methods in their head units. One option is to go with a less powerful CPU supplemented with a dedicated decoder chip set. Another option is to go with a more powerful CPU supplemented with decoder software. Regardless of which implementation an OEM selects Airbiquity estimates additional costs to be a minimum of $20 per head unit to accommodate H.264 decoding alone. At first glance this may not seem like a lot of money relative to the total cost of the vehicle, but multiplied by a global OEM production run of 2M vehicles per year it adds up to $40M in incremental expense – a sizable sum.

OEMs will also need to factor in decisions regarding head unit options for hardware-based acceleration (requires less head unit CPU) versus non-hardware based acceleration (requires more head unit CPU), and the probability that the head unit may be called upon to process CarPlay and other vehicle functions simultaneously (requires even more head unit CPU). Additional costs associated with managing hardware acceleration and the integration of CarPlay APIs into the vehicle telematics system are not included in the $20 per unit cost increase estimate to accommodate H.264 decoding.

**Unclear Accountability and Liability for Driver Distraction Mitigation**

A critical aspect of implementing infotainment delivery is integrating smartphone apps and cloud content in a way that ensures driver distraction mitigation. This requires customization of app and cloud content features based on a vehicle’s real-time state, and utilization of technologies such as voice recognition and text-to-speech. An example is customizing an app to block user access to the head unit keyboard when a vehicle is in motion and utilization of text-to-speech for news feed playback and voice recognition for status updates. It’s unclear at this point what accountability Apple will
take for the necessary customization of CarPlay apps and cloud content in the vehicle environment.

“But even more pronounced was Apple’s failure to deliver a solution capable of mitigating driver distraction or leveraging the smartphone to summon assistance in the event of a crash.”  

– Roger C. Lanctot, Associate Director, Strategy Analytics

OEM’s typically have head unit UI guidelines to mitigate driver distraction. It is also common for individual head units to have their own unique sets of driver distraction mitigation guidelines depending on capability, model, and trim. Apple’s sole proprietorship and total control of CarPlay - and its uniform UI - will hamper OEM ability to comply with the slew of mandatory driver distraction mitigation rules, as well as new and potentially legislated rules in the future.

As far as speech recognition technology Apple has communicated that Siri will play a key role in enabling driver distraction mitigation. However Siri has yet to demonstrate an ability to perform as well as finely tuned on-board voice recognition technology engineered into today’s vehicles that continues to innovate at a rapid pace. Based on experience with Siri, Apple will have to work quickly to meet the demanding requirements for reliably managing and executing in-vehicle voice commands in the continuously variable and unpredictably noisy cabin of a vehicle in motion.

**Unproven Experience and Commitment to the Connected Car Market**

Apple is new to the automotive market. As such they have yet to demonstrate implementation and support capabilities for connected car solutions, and related technology and integration expertise. Apple also has a documented history of jumping into new markets with initial implementations only to abandon their commitment (and the partners and vendors along with it) when the company’s strategic interests shifted elsewhere. Examples of this that have impacted the software development community and associated suppliers are the OpenDoc multi-platform framework standard (1992-1997), Dylan multi-paradigm programming language (1990-1995), and HyperCard programming tool (1987-2004).

**In Closing**

Rest assured the connected car isn’t going away. It’s going to grow rapidly as more and more people extend their digital lifestyles across more and more devices, including the vehicle, and expect those devices to be seamlessly connected and provide useful information 24/7. Along with this growth will come increasing user expectations about the availability, choice, and quality of the connected car experience, and user expectations will be impacted by perceptions from daily interaction with the technology. Connected car system performance and differentiation versus competitors will be increasingly important to closing the sale on initial and repeat vehicle purchases.

---

3 Strategy Analytics – Apple Fails to Deliver the Goods with CarPlay – March 12, 2014
In spite of the issues cited in this paper about CarPlay implementation, Airbiquity remains committed to the continued integration of Apple technology into our OEM customers connected car programs given the importance of the Apple market. In fact, we routinely integrate and test our deployments for iPhone handset compatibility, and the apps that run on them, in 50+ countries and 30+ languages around the world.

If any of Airbiquity’s customers select Apple for infotainment delivery (or MirrorLink, Google OAA, or RealVNC for that matter) our Choreo™ platform’s service management functions can activate - or deactivate - CarPlay based on vehicle subscription information while enabling other critical components of a broader connected car solution. Airbiquity also has the ability to provide 100% of an infotainment delivery solution using our own Driver Experience offering and smartphone app and cloud content portfolio which is fully compatible with both Apple iOS and Google Android operating systems and handsets.

Airbiquity understands the needs of automotive OEMs and is dedicated to providing the latest technology and ecosystem agnostic approaches in the industry. Choreo provides the end-to-end services OEMs need today; iOS and Android compatibility; enablement of the leading connected car use cases; driver distraction mitigation at the system, app, and content level; and comprehensive program management features allowing customized program deployment in 50+ countries and 30+ languages. Working in partnership with Airbiquity, OEMs are deploying customized connected car programs complementing their vehicle designs, ambitions, and user favorability goals today.