Over-the-air software is increasingly becoming the go-to solution for car manufacturers that want to create a better user experience for drivers. By using over-the-air software to update the technology in autos, these manufacturers are able to improve functionality and fix software defects. Both GM (OnStar) and Daimler (MBRACE 2) have embraced over-the-air software as a key tool in improving its infotainment systems, which is exemplified through GM’s recent update of its Bluetooth technology.

The ability to update the infotainment system—even manually—is an improvement over requiring car owners to visit the dealership every time new software is available. As an example, Ford recently launched a program for consumers to update their own MyFord Touch system by mailing owners a USB drive loaded with the appropriate software updates. However, many consumers view manual updates as bothersome and complicated, which means some systems simply don’t get updated. Instead, today’s car owners expect the same user experience they have with mobile devices to be available for their infotainment systems, and that’s performing software updates over-the-air (OTA).

According to ABI Research, there will be 210 million connected cars by 2016, and together with the ability to tether the smartphone to the infotainment system, the main enabler for doing over-the-air update is there: connectivity.

The updating solution must have scope and scale. Scope is the ability and the flexibility to update all of the memory including the user and system space with full or discrete components. As well, the solution must scale to manage millions of updates without any failure and with the highest security possible. This, for example, will enable QNX CAR 2 users to update not only the QNX CAR 2 software but also individual applications such as Pandora or the Weather Channel.

In the mobile industry, where over-the-air software updating is a well-established practice, manufacturers and service providers realize many benefits:

- **Cost Reduction** - OTA software updates have reduced warranty costs
- **Update success rate** - OTA software updates deliver the highest success rate
- **Faster Updates** - Sending only the code that is different between the original software and the update (often called the delta) is faster and uses less bandwidth
- **Customer Satisfaction** - A fast and automatic over-the-air process eliminates the need for the consumer to go to the dealer

The mobile industry has enjoyed these benefits for some time. The automotive industry needs over-
the-air updating even more so because the infotainment system includes millions of lines of code and updating this software requires a holistic solution that can manage the whole software life-cycle.

Red Bend Software has integrated its vRapid Mobile update technology, which currently exists in more than 1.6 billion devices, into QNX CAR 2. This gives car manufacturers and Tier 1 providers the flexibility to create an OTA update strategy that is optimized for infotainment systems and other embedded systems in the car. Today, infotainment systems are central in the car cockpit experience. These systems contain not only the QNX CAR 2 platform but also a variety of applications. Applications for the auto industry are not like applications for mobile devices – they have been modified to suit the car environment, and rely more on voice activation and larger soft-buttons so driver distraction is minimized.

Car manufacturers are looking at their infotainment system as a differentiator when selling the car and a valuable asset to generate revenue after the sale. The automobile industry doesn’t want Over-the-Top (OTT) companies controlling the delivery channel to the infotainment system and weakening the automotive brand, similar to what happened in the mobile industry. With a holistic FOTA (Firmware OTA) solution, car manufacturers can guarantee ownership of the infotainment firmware and applications, increasing perceived value through stronger branding.

The FOTA update process comprises three primary stages: generating the update, managing the delivery of the update, and performing the update.

**Generating the update package**
To perform a FOTA update, a software update package containing defect fixes or new features must be generated. In order to make this package as small as possible (in general it is less than 5% of the original code size), the update package includes only the changes (also referred to as the “delta”) between the version that already exists on the ECU and the new version being deployed to the vehicle. This update package is typically generated by the owner of the software, most often a Tier 1 vendor.

**Managing the delivery of the update package**
Once generated, the update package is published to a distribution platform. In the mobile industry, this platform is managed by either the mobile phone manufacturer or the network operator. In
The platform manages the various versions of the update packages, and handles the actual network delivery (download) of the packages to the appropriate vehicle model and specific ECU. There are typically multiple versions of update packages, each intended for particular vehicle models and configurations. This portion of the process can be an integral part of an overall telematics or OTA diagnostics system.

A centralized software package repository is used for FOTA. This centralized repository replaces the distribution of software updates to dealers. It significantly reduces the time to market of any new software version. This system is also responsible for the delta package delivery to the device. There are several ways to perform such a delivery. In mobile, most market players use a standard protocol developed through the Open Mobile Alliance Device Management (OMA-DM) organization.

**Performing the update**

In the third stage of the process, the downloaded update package is used to perform the actual update (“re-flashing”) of the original software image. To address the challenges associated with limited memory resources, the update code and FOTA software occupy as small an amount of space as possible within the embedded device in the vehicle. In this stage, the FOTA update software validates that the correct update package has been received, and finally that the update process has been successfully completed. FOTA updates do not need to be sequential and can support any-to-any software version update.

No longer is the auto industry asking whether or not to perform over-the-air updates. Now, car manufacturers and tier one suppliers are asking *how often* and *when* should updates be provided during the life-cycle of the infotainment system.

**Also see:**

- [Automotive System & Software Development Challenges – Part 1](#)
- [Automotive System & Software Development Challenges – Part 2](#)
- [Extracting M2M vehicle data](#)
- [Connected cars: Managing and securing data exchange and processing](#)
- [Cars run HTML5-based applications](#)