

SOLUTIONS POWERING
DEPLOYMENT OF CHANGE
- THE LIVING FORCE OF
PROGRESS.

In today's connected world, change is more than a driver of revolutionary innovations. It's also increasingly about improving and extending the usefulness of existing technology investments.

The benefits of enhancing the functionality of existing technology investments – of adapting and continuously evolving these investments to provide useful service over as extended a period of time as possible – are obvious.

Delivering new functionality to existing devices and enhancing their performance and value can however be quite the challenge, especially in situations subject to connectivity, bandwidth or storage constraints.

And it's exactly this challenge that HARMAN OTA (Over-the-Air) Software Management can help you overcome.

A powerful OTA software management platform

Connectivity, bandwidth and storage capacity are only some of the constraints vendors need worry about when updating devices. As the diversity and complexity of connected devices grow, keeping them continuously up-to-date, functional and relevant can become an increasingly daunting task. HARMAN OTA Software Management can help alleviate this.

Core technologies

The “secret” behind the HARMAN OTA Software Management solution is our 100% field-proven Smart Delta update technology, which has successfully been deployed in more than two billion automotive, IoT and mobile devices to date. Smart Delta effectively allows any software component – firmware, software applications, map content, settings and configuration files – to be updated via the smallest possible, connectivity-, storage- and cost-efficient payloads, regardless of OS, chipset and device resource constraints, and with uncompromising security.

Rather than replace files or software images in their entirety, the technology determines even the slightest changes in code, then applies them “in place”, effectively creating target software images with full bit-for-bit integrity. Updates may autonomously be initiated via periodic device self-checks, or executed by administrators in the context of targeted update campaigns, with an intuitive Web interface offering them the ability to proactively monitor, analyze and manage device configuration and settings.

HARMAN Device Management further enables manufacturers and carriers to easily deliver mobile device settings and configuration updates, via a range of backend facilities. These include a scalable Device Repository and a Device Settings module, a Settings Orchestrator, which ensures device eligibility and compatibility, and coordinates configuration updates, and a Protocol Engine, which handles seamless delivery over a range of device management protocols, including the industry standard OMA DM.

End-to-end software update and management

HARMAN OTA Software Management provides anything and everything required to deliver and manage device software updates. The granular Software

Catalog, part of the solution's extensive enterprise backend infrastructure, enables manufacturers to manage and maintain a library of firmware and software versions of any size and intricacy, for a practically limitless array of diverse connected devices. When a new version of a device's software component needs to be deployed, HARMAN Smart Delta technology and our versatile Update Generator work hand-in-hand to produce the smallest possible update packages, or deltas. The solution's Update Orchestrator then handles the fine details of determining device update eligibility and compatibility, and coordinating over-the-air delivery of firmware and application updates.

On the device side, the Update Installer and Repartitioning modules ensure failsafe update implementation, even in cases requiring a target device's flash storage partitions to be resized to accommodate new firmware and OS versions. A lightweight Installer module is also available, allowing effective updating of even the most storage- and processing power-constrained target devices.

Rounding our software management and update facilities are powerful reporting functions that provide vendors with information and insights on the success rate of device update campaigns of any scope, diversity and complexity.

Among HARMAN OTA Software Management's key benefits are 100% update reliability, fast time-to-market with new functionality, bandwidth savings, reduced bills of materials due to small software delta footprint, and enhanced user experience.

Clear value for a range of industries

HARMAN Connected Car Software Management provides automobile manufacturers and tier-I suppliers with the ability to implement secure, standards-compliant updating and management of all in-car software-driven components. These include firmware, software applications and even map content for head units, ECUs (Electronic Control Units) and telematics boxes – all of which can be kept continuously up-to-date on the production line, at dealer lots and even on car owners' driveways.

Our IoT software management solutions enable remote, over-the-air updating and management of everything from wearables, through smart homes and cities, and all the way to industrial machines. Besides the obvious benefits of ongoing reliability and extended functionality,

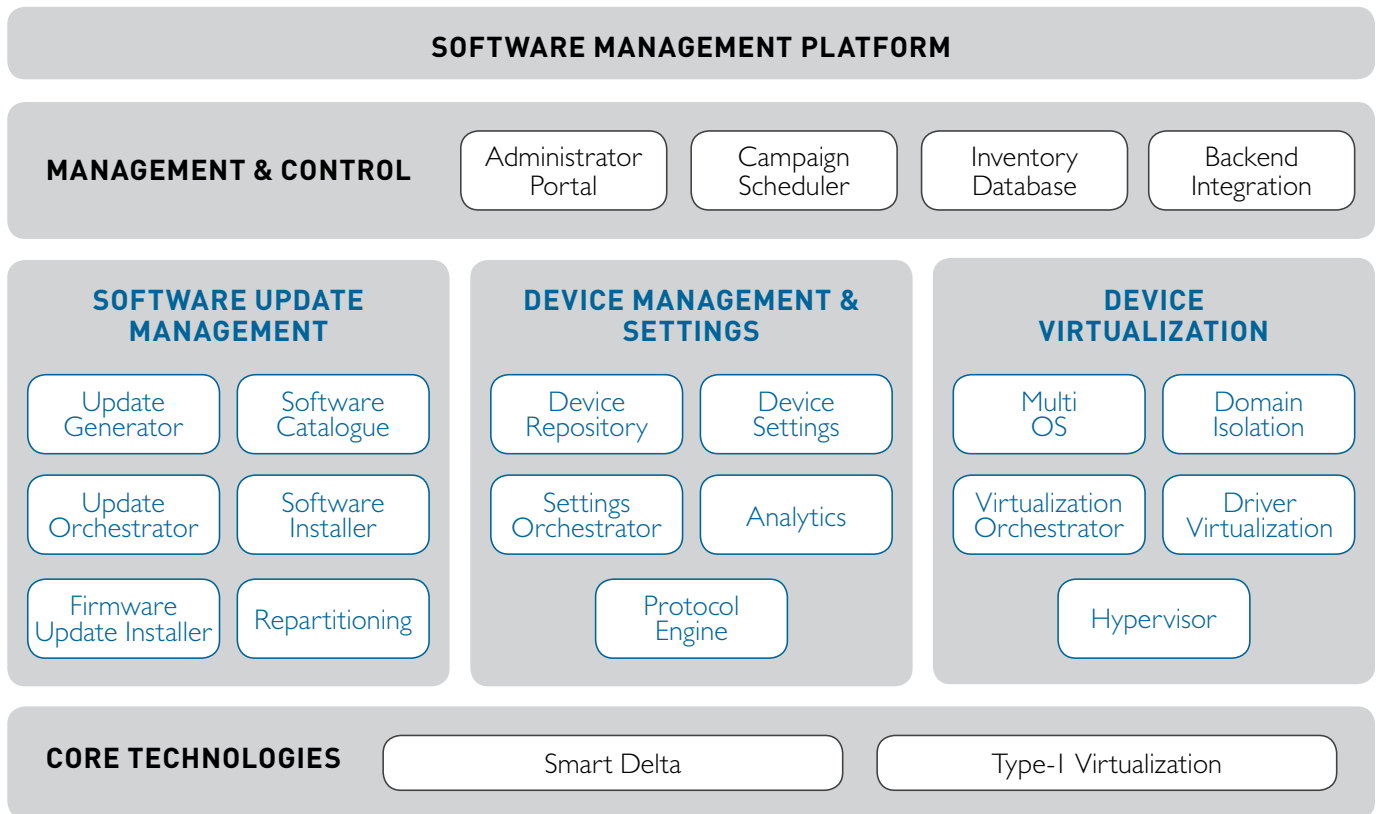
these solutions effectively help device vendors and service providers to avoid costly on-site technician maintenance.

Last but not least, the HARMAN FOTA (over-the-air firmware update) solution helps mobile device manufacturers ensure continuous smartphone and tablet relevancy by constantly keeping devices fresh and up-to-date. Our OMA (Open Mobile Alliance) DM client solution, which has already been deployed on many millions of devices worldwide, additionally ensures complete and ongoing mobile device compliance with any operator certification and interoperability requirement.

Backed by a strong services foundation

All HARMAN software management solutions are supported by a rich array of services designed to address both current and emerging device manufacturer needs. These include:

- **End-to-end on premise implementations** - with complete backend infrastructure deployed in customers' own IT environments, and featuring everything from software catalog, through device repository and update management, and all the way to on-device installation and analytics.
- **Hosted services** - equally comprehensive implementations hosted off site, for fast deployment and worry-free maintenance.
- **SaaS (Software as a Service)** - the fastest, most cost-effective turnkey approach to implementing end-to-end HARMAN solutions, with our software and full capabilities easily accessible as affordable Web-based services.



Target markets

HARMAN technology and solutions are designed to optimally address the specific needs of the following key markets:



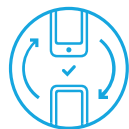
Automotive

Our advanced automotive market-centric capabilities optimize in-vehicle hardware and software, ensuring 100% reliability, and enabling secure, end-to-end remote and OTA software management for any vehicular platform throughout its operational life. HARMAN automotive solutions enable manufacturers to capitalize on the full business potential of connected cars by enhancing driver experience with rapid deployment of value-added in-car services, and minimizing costs through improved efficiency and a reduction in recalls.



IoT (Internet of Things)

Backed by our market-leading Smart Delta update technology, HARMAN IoT software and device management services help deliver uniquely reliable, flexible and scalable solutions. They enable manufacturers of even the most resource-constrained IoT devices to easily monitor, control and continuously add value to wearables, consumer and smart home electronics, automated meters and more – ultimately enhancing user experience and increasing ROI.



Mobile

End-to-end software and device management services backed by powerful update technology. HARMAN mobile solutions allow manufacturers and service providers to continuously increase the usefulness and value of connected devices throughout their entire lifecycle, while ensuring OMA DM protocol-compliant certification as per carrier interoperability requirements. They optimize device performance, deliver unique insights, facilitate rollout of innovative services and contribute to increased ARPU.

Partner with an industry expert

HARMAN Connected Services, a leader in software design and development, helps global brands dramatically reduce time-to-market while improving quality and productivity. Our end-to-end software engineering, IoT and data analytics services enable the world's top automotive, mobile and communications and software-enabled businesses drive innovation-led growth. Via our over-the-air (OTA) software update, virtualization and device management solutions we keep billions of mobile, automotive and IoT devices of all sizes and complexity continuously and reliably relevant and secure. The mobile devices and intelligent systems that we power are connected, integrated and protected across all platforms and reach every corner of today's digital world. HARMAN Connected Services is a division of HARMAN (NYSE:HAR), the leading global infotainment, audio and software services company.

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