INNOVATIVE SOLUTIONS FOR A CHANGING AUTOMOTIVE WORLD

As automobiles become increasingly computerized, automated and connected, so grows the need for effective and comprehensive automotive software management, and for continuous, failsafe over-the-air updating of in-vehicle software resources.

HARMAN
A **SAMSUNG** COMPANY

Automobile manufacturers are required to address the ever-increasing challenge of achieving seamless, ongoing integration of emerging software-rich assets and technologies, while simultaneously keeping manufacturing efficiencies high and production costs down to a minimum. HARMAN automotive solutions can provide you with everything you need to do just that.

A uniquely comprehensive automotive solution offering

HARMAN's end-to-end range of automotive software management solutions can help you:

- Reduce costs via secure and failsafe consolidation of hardware assets
- Minimize recall-related financial liabilities with secure OTA (Over-the-Air) software updates
- Enhance manufacturing efficiencies with comprehensive automotive software modeling and management
- Boost brand loyalty with proactive upgrades and functional fixes

Connected Car Software Management

HARMAN Connected Car Software Management provides automobile manufacturers and tier-1 suppliers with the ability to implement secure, standards-compliant management of all in-car software components. These include head unit, ECU (Electronic Control Unit) and TCU (Telecommunication Control Unit) software, settings and configuration files, all of which can be managed on the production line, at dealer lots or on car owners' driveways.
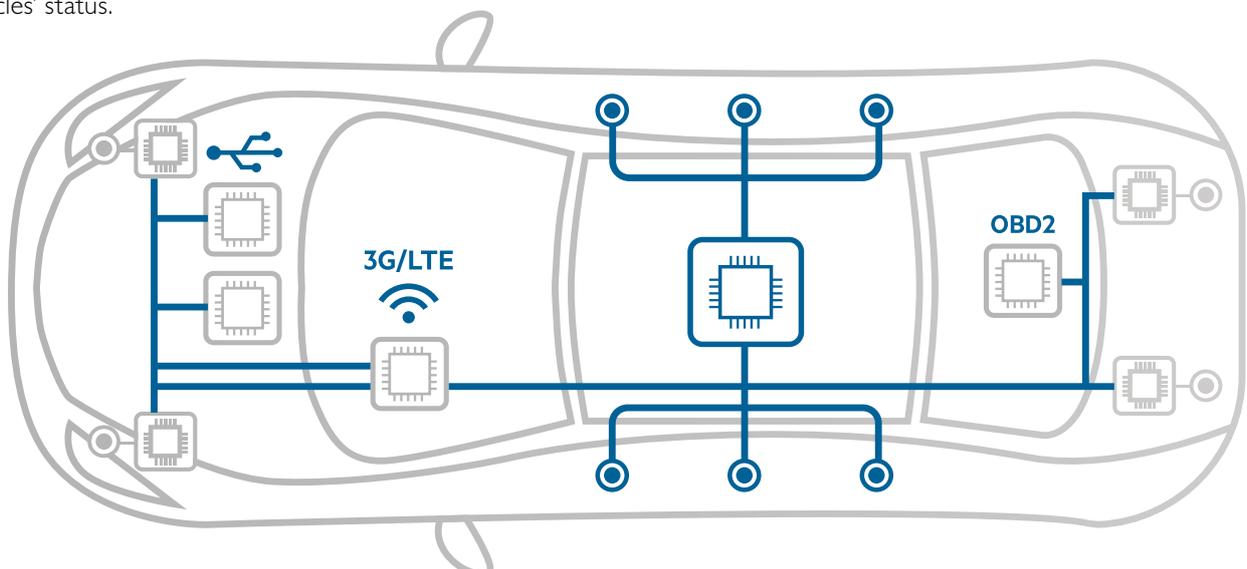
The "secret" behind this highly scalable solution – our 100% field-proven Smart Delta update technology, which has successfully been serving on board more than 15 million cars, trucks and heavy machines to date. It effectively allows any software component – regardless of OS, chipset and device resource constraints – to be updated via the smallest possible, connectivity-, storage- and cost-efficient payloads. Smart Delta also has much to offer in terms of security – it closely adheres to AACI (Authentication, Authorization, Confidentiality and Integrity) principles, in both Cloud-to-vehicle and vehicle-confined update scenarios.

A powerful, versatile and scalable backend system supports the solution with comprehensive automotive software catalogs and inventories. These are designed to quickly integrate with existing parts management and reporting systems, for the fastest time-to-market, and are capable of faithfully modeling all in-car software elements, ultimately granting OEMs continuous, real-time visibility of all connected vehicles' status.

Head Unit Virtualization

Our automotive virtualization solution enables automobile manufacturers to implement head units that can seamlessly and securely host multiple software environments and components, for such in-vehicle applications as integrated digital clusters, infotainment centers, and rear-view and environmental visualization systems. HARMAN Virtualization essentially helps achieve the highest possible utilization of head unit processing power, and share hardware resources across a range of in-vehicle functions. It contributes to a reduction of BOMs (Bills Of Materials) and automobile weight, and to increased hardware, fuel and cost efficiencies.

Complete security is maintained throughout, with HARMAN type-1 virtualization providing uncompromising isolation between the various integrated components. Further benefits are ensured via inherent IP contamination prevention and resource prioritization for critical systems, such as digital instrument clusters. The solution delivers full interoperability out-of-the-box, with virtualized Bluetooth, Wi-Fi and camera drivers, among others, and support for QCOM, TI, Renesas, Samsung and Intel platforms, as well as for QNX, Android, Linux and AUTOSAR operating systems.

ECU Consolidation

HARMAN ECU Consolidation is the ideal means to achieve increased hardware resource utilization and cost savings. Doing away with the need for dedicated ECUs for each individual sensor, the solution employs our proven virtualization technology to consolidate numerous in-vehicle sensor applications, such as door, window and seat controllers, all within a single hardware platform. The result – a significant reduction of automobile manufacturing BOMs and high management optimization.

HARMAN type-1 virtualization technology works its magic here too, ensuring full isolation among virtualized ECU software components, and between different device vendors' software resources. It supports TI, Renesas and Freescale chipsets, and QNX, AUTOSAR, Linux and other real-time OSs.
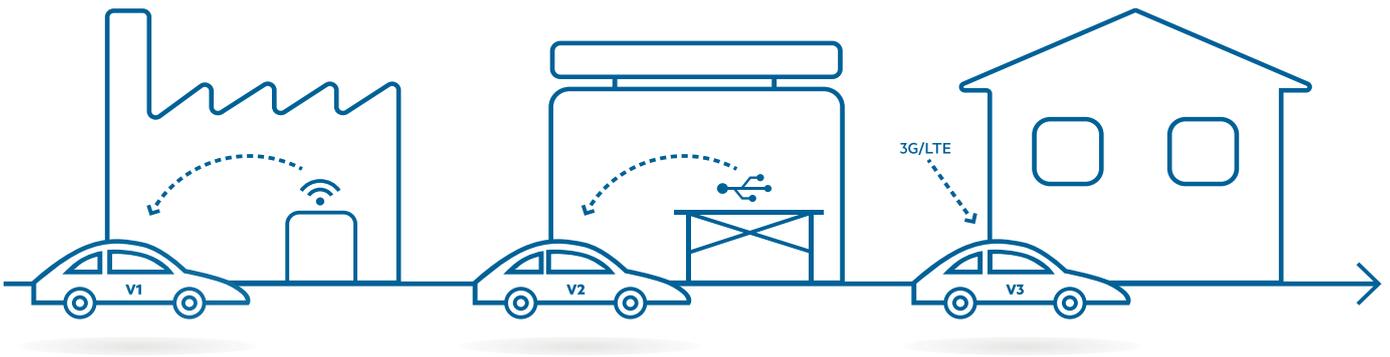
Map Update

Rounding off our automotive portfolio is Map Update, a powerful, OS-, chipset- and network-agnostic map data and POI (Point Of Interest) update solution. Already useful in present-day applications, Map Update is bound to prove even more valuable as autonomous vehicles emerge, and as delivery of current and accurate map data of increasing scope to resource-constrained vehicular systems becomes more critical than ever. Leveraging our unique Smart Delta technology, which delivers updates via the world's smallest, most efficient payloads, Map Update enables automobile manufacturers to continuously provide customers with the fastest map and POI updates. These may be delivered over the air, either directly to connected head units or via a companion smartphone app. The solution is highly scalable, can be implemented as either on-premise or Cloud-based server infrastructure, and features a powerful backend Web interface providing full map management and monitoring flexibility.

Backed by a strong services foundation

All HARMAN automotive solutions come with a rich array of support services designed to address both current and emerging automobile manufacturer needs.

These include turnkey delivery via highly scalable Cloud-based SaaS or hosted service offerings, extensive integration, custom UI and business logic configuration options, customer-tailored consulting and expert professional services, among others.

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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