



Harman's OTA and Device Management Solution enables connected medical device manufacturers to patch, fix and enhance their regulated device fleets throughout their lifetime and at scale.

Medical devices are becoming increasingly connected. This trend is driven by the healthcare providers' willingness to reduce the cost of healthcare while improving its objective quality, availability of wireless connectivity infrastructure and the now proven ability to remotely self-diagnose, measure and even treat patients using advanced sensor technologies. As such, recently released innovative healthcare products and services leverage connected smart home, portable and/or wearable devices on the patient side. Analysts estimate that by 2021 there will be at least 50 Million wirelessly connected Remote Patient Monitoring (RPM) devices in use.¹

However, with connectivity comes increased security risk. Security of medical devices is of critical importance; Hacking of medical devices has already put patients at risk and caused major recalls; leading the local regulatory bodies worldwide, such as the FDA in the US, to better frame their device upgradability and security requirements, beyond their existing Health IT compliance rules. Along with cyber-security measures, the ability to remotely update the embedded software components (e.g. Firmware, OS, software components and applications) on such devices, is a key mechanism for medical device manufacturers and service providers to ensure security, safety, time-to-market acceleration and increased product value proposition over time.

Leveraging its 18 years of experience in this domain, Harman supports Connected Health device manufacturers worldwide to securely and efficiently manage the multitude of devices, and their embedded software. Sourcing the service from Harman, these players can fully focus on their core competence – providing excellent healthcare and medical results for their patients.

Why HARMAN?

Focus on building your medical solution

Utilizing a turnkey OTA service from the market leader allows you to focus on core activities.

Lowest cost, best features

Take advantage of our experience in multiple industries and many platforms to rapidly deploy a best in class OTA service, with unmatched efficiency and reliability.

Global delivery & footprint

Our global presence and SI force means skilled, local engineers can rapidly integrate the solution onto your device platform and build custom features based on your evolving business requirements.

Solution accelerators

Harman's OTA client is flexible to support many hardware/OS platforms, 3rd party installers and firmware/software formats in addition to our optimized smart delta installer.

¹ Berg insight – mHealth and Home Monitoring Analyst Report – M2M Research Series

Key features of the solution include:

- **Advanced Device Management capabilities:** enabling Healthcare providers to conveniently view their deployed device fleet status down to a single device including software inventory, remotely modify device settings and configuration, upload logs for diagnostics, view integrated dashboard and derive advanced device analytics from the exported operational data.
- **Extensive admin functions and workflows,** enabling the administrator to schedule campaigns, define policies for software updates, and create attribute-based device groups to execute phased rollouts. Define various update modes (silent, forced, optional) and installation conditions using a smart rule engine. In addition, advanced management of multiple software components on devices is supported (e.g. applications and firmware managed separately).
- **100% field-proven Smart Delta update technology,** successfully embedded in more than two billion devices to date, Harman’s Smart Delta patented technology allows update of device software or firmware with the smallest possible payloads with uncompromising reliability, which significantly reduces costs (like network bandwidth consumption), enhances security, and improves user experience.
- **Supporting the main Medical IoT connectivity topologies out of the box** No need for your engineering team to re-invent the wheel, with more than 18 years in this domain, Harman's solution supports all the end-device connectivity topologies known in the medical IoT space to date, including but not limited to over Cellular or Wi-Fi, via Gateway or via mobile phone.
- **Compliance-Ready solution** Harman's solution complies with the various Health regulatory cyber-security requirements known as of today. Our winning model is to enable fast deployment and reduce the operational complexity coupled with the deployment of large Health IT systems: Harman's device management solution is separated from the heavily regulated patient-oriented IT systems, and offers full control to the service administrator via siloed easy-to-use management and analytics tools

Key Highlights

- Advanced Campaign Management providing the required operational flexibility and control.
- Built-in Analytics providing the service administrator with clear view of its medical device fleet.
- Built-in administrative tools for real-time troubleshooting and investigations
- Built-in end-to-end security
- Global CDN infrastructure for optimized downloads at scale
- Flexible Deployment Model: Cloud, On-premise, or Hybrid.

Benefits for connected medical device manufacturers

Focus on building your medical solution	<ul style="list-style-type: none"> • Leveraging a turnkey OTA/Device Management service from the market leader allows you to focus on your core activities and allocate your engineering resources to the areas that bring your firm a long-lasting competitive advantage.
Reduced time-to-market for your medical innovations	<ul style="list-style-type: none"> • Taking advantage of Harman’s proven OTA/Device Management end-to-end solution, enable medical device manufacturers to gradually introduce innovation into their embedded product with confidence.
Enabling new business models and unlocking new billable services	<ul style="list-style-type: none"> • Getting full control of the device software and configuration of their fleets, device manufacturers and their B2B service provider customers are empowered with the possibility to exploit new business models and to offer new

billable services.

Close the product design loop based on real device usage data from production

- The solution enables the operations team to get access to aggregated non-medical device usage data from the field, providing the internal product management teams with key insights to prioritize new feature development and improve the overall user experience, creating a true competitive advantage and stickiness for their flagship medical device products.

Comply with cybersecurity counter-measure requirements and reduce the risk of costly device recalls.

- Harman's solution complies with the most-recent Health regulatory cyber-security counter-measure requirements and best-practice recommendations.
- Our winning model enables fast deployment and reduces the operational complexity and the risks of deploying large Health IT systems and with potential device recalls.
- The solution addresses security risks via digitally-signed and fully-authenticated update packages delivered directly to devices under strictest compliance with standard device management protocols.
- Further security includes encryption of the channel, OAuth 2.0 and 2-way TLS-based server-client authentication, server access protection, and optional KMS integration.

Ease of integration and portability

- With vast experience in porting to many OS/device platforms, Harman OTA client easily integrates with leading Health device platforms, from Linux to Free RTOS.
- Selecting Harman greatly reduces the engineering complexity, and increases product quality. Utilizing Harman reduces the overall medical device software development cost.

Proven Scalability based on a cloud-agnostic global infrastructure

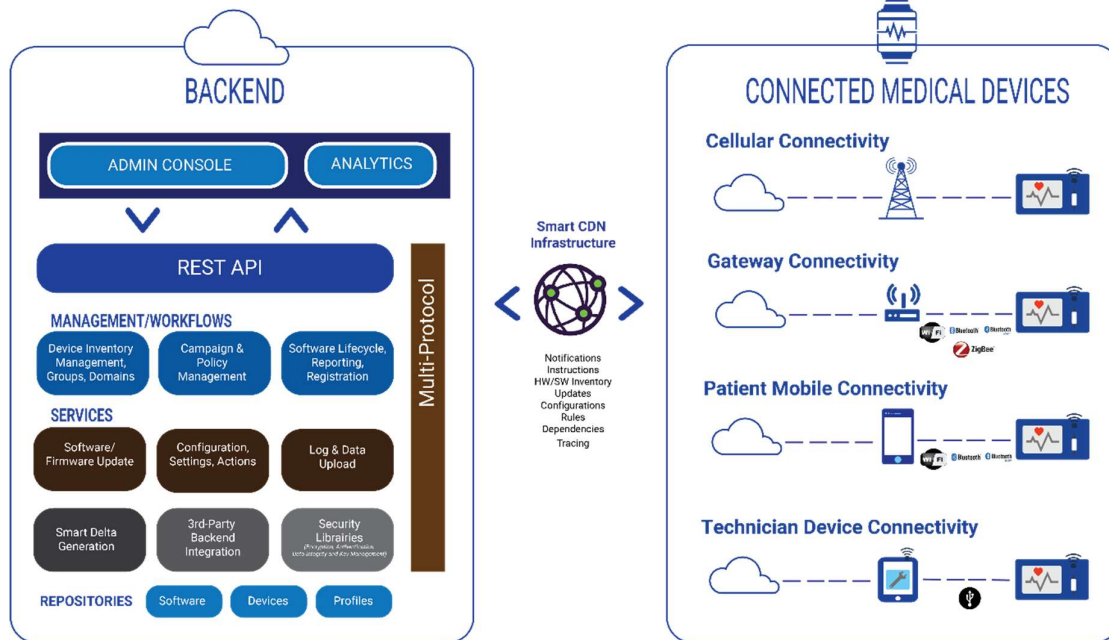
- Harman's back-end system can either be deployed on-premise or be hosted on Cloud environments such as Amazon AWS, or Microsoft Azure using dedicated or shared hosting.
- Multi-domain hierarchy enables separation for multiple product lines or business units.
- Harman's OTA and Device Management solution is one of the only platforms in the market that can guarantee scalability to support tens of millions of devices, leveraging global CDN Infrastructure to optimize downloads. Why? Because we already did it for our other Tier-1 customers from various industries.

www.harman.com

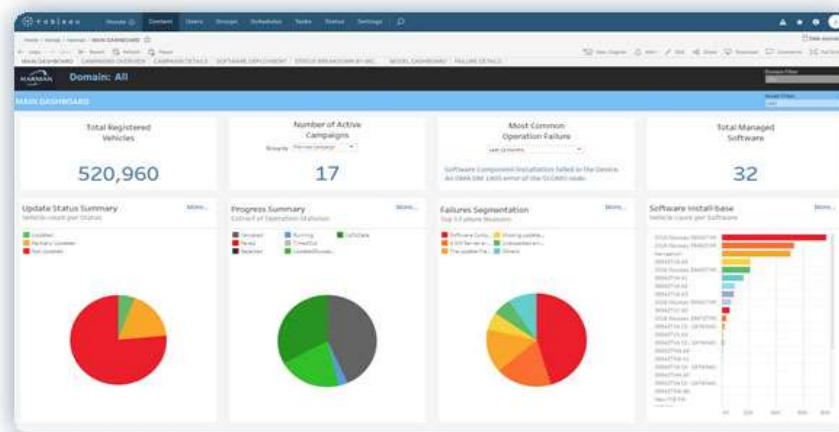
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Reference Solution Architecture



Productivity-driven Management Console



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 IOT businesses drive innovation-led growth. Via our over-the-air (OTA) software update 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. Visit our website at <https://services.harman.com/>