MANAGING THE 'DEVICE ON WHEELS'

Collecting and analyzing vehicle data as well as updating vehicle software have always been sporadic, slow, garage-based processes. In a world full of connected cars, they will be continuous and conducted in real time over-the-air.

Can you remember the last time you installed software using a CD? Do you still carry memory sticks or extra hard drives around with you to keep your data synced and up to date? If not, it's a sign of the times – because to all intents and purposes, the days of updating computers using physical media are over.

Today, applications, configuration changes and updates are now simply downloaded from central servers, and data is synchronized via the cloud. When it comes to mobile devices, updates and applications are delivered directly 'over-the-air' on demand, or sometimes automatically without the user even being aware of the process. And, in the coming years, exactly the same principles will apply to connected cars.

This new reality will have a transformative effect on how vehicle data is collected, analyzed and used. For example, instead of vehicle information only being available during service inspections, a constant stream of data will pass between drivers, vehicles, and manufacturers via wireless connections. In other words, the car will essentially become a 'device on wheels'. As a result,

car diagnostics will be transformed from a stop / start process that takes place over months and years, to a continuous one that happens in real time.

In addition, new process mechanisms and business opportunities will be created, enabled by over-the-air data and content provisioning. These will include:

• Remote firmware upgrades
• Remote command and control
• Apps, content and user profile deployment
• Post-sales car customization and self-service

By deploying market leading technologies in VMware's Pulse™ IoT Center it is perfectly positioned to manage the secure collection, analysis, management and delivery of the data being transmitted between drivers, vehicle head units and vendors in the 'device on wheels' era. In other words, VMware is a key enabler of the automotive future, in which vehicles will become continuously updateable and personalized conduits for increasingly mobile lifestyles.

DIAGNOSTICS ON-THE-MOVE

Getting faster access to more detailed car diagnostic data is a key challenge for automotive manufacturers. This data is usually only accessible when the car is being physically serviced at the garage. This means that data collection points are often separated by a year or more. In addition, the process of manually collecting, analyzing and using the data is anything but efficient.

First, an engineer must physically connect a computer to the vehicle's OBD II port to download the relevant information from various sensors and ECUs. The information must then be interpreted and decisions made about how best to use it to optimize the customer experience, and maximize revenue for the garage or dealership. Not only is this inefficient, preventable hardware and software problems cannot be proactively identified and fixed. As a result, the risks of recalls, warranty cases, and lower customer satisfaction and loyalty increase. In the connected car era, these issues will disappear. But the road to this bright future is littered with challenges. For example, there are no common industry end-to-end solutions for remotely collecting

data from vehicles, and there is little or no cooperation between vendors within the value chain to create standards and integrate systems. That's why AirWatch by VMware is such a potentially crucial solution for automotive manufacturers. It uses an agent to collect customizable sets of data from vehicle head units running, and transmits them securely over-the-air in real time. Vehicle data can then be processed in the back end, ideally in a cloud environment, so the data storage and processing is scalable as the volume and variety of data collected increases.

Not only can this approach help manufacturers pro-actively identify existing or potential future problems with a vehicle, it also opens the door to resolving them remotely over-the-air. This is a truly revolutionary prospect, which will lower costs and risk for manufacturers, and improve service quality for drivers, with a positive knock-on impact on customer satisfaction and loyalty.

THE END OF MANUAL UPDATES?

Just like a wide range of modern electronic devices, vehicle head units require regular firmware updates. The delivery of these updates over-the-air gives customers instant access to the benefits without the inconvenience of a workshop visit.

VMware's Pulse™ IoT Center in combination with partner solutions has the technology to enable this by deploying 'products' (sets of files, actions, conditions, assignments, deployment options and dependencies) that allow the remote provisioning of software updates. These packages can be standardized centrally according to vehicle model, year of construction, equipment levels, etc., making the update process much more scalable and efficient. Products are provisioned in a distributed way through a network of relay servers to avoid undesirable congestion and latency. And, in addition to larger updates for head units, micro-updates can also be pushed to individual ECUs to fix specific local issues. This helps avoid the need for expensive vehicle recalls that can also have a potentially damaging effect on brand image, customer satisfaction and loyalty.

Giving customers control

Over-the-air vehicle management is not just about maintenance; it is also about putting more control in the hands of customers. From remote locking to car location tools, over-the-air features allow drivers to improve the user experience in many different ways.

Enabling this requires ever-deeper integration of multiple in-car and back-end systems. VMware's Pulse™ IoT Center uses remote software provisioning, supported by a software-defined data center, to accelerate this integration by streamlining and automating the relevant processes.

PROFILE ROAMING FOR THE VEHICLE SHARING FUTURE

Adapting cars to individual drivers used to be about moving the seat or the steering wheel. Today, high-performance cars have settings that can change engine behavior and vehicle dynamics to suit individual driving styles. But the next revolution is on the way.

Over the-air updates provide many new opportunities for adapting aspects of the driving experience remotely. For example, customers could limit the amount of engine

power available when an inexperienced driver is at the wheel, or automatically activate a specific set of apps or entertainment options when a particular driver 'signs in' to the car. Moreover, the shift away from traditional models of vehicle ownership towards car sharing will make this capability increasingly important.

Increasingly, drivers will demand roaming profiles that can be activated in multiple vehicles, regardless of who owns them. As well as improving the user experience and satisfaction levels, this may have additional benefits such as reducing accidents, because drivers will imme-diately feel comfortable in unfamiliar vehicles. Roaming profiles will also allow separate collection and distribution of data according to the individual driver, or between 'business' and 'personal' driving modes. This will have significant implications in terms of vehicle insurance and may also influence driver behavior in specific circumstances.

The software provisioning capabilities within VMware's Pulse™ IoT Center solution are key enablers of this new functionality, and the new business models that can be derived from it.

POWERING THE NEW ERA OF CONNECTED CUSTOMIZATION

Despite the availability of hundreds of configuration options when buying a new car, many of them are hard-wired into the vehicle's structure. This is expensive for manufacturers, because it increases complexity and cost on the production line. But it's also limiting for customers, because many of these features are impossible or difficult, time-consuming and expensive to change.

As vehicles become increasingly defined by software, everything from engine performance to in-car entertain-ment will become easy to modify frequently and almost in real-time. This kind of post-production optimization opens up new business models and revenue streams for manufacturers and third-parties. And for consumers, it creates a new world of possibilities for matching the vehicle experience to their personality, driving style, or even their mood on any given journey. Examples include the delivery of entirely new features or applications, such as pay-as you go access to reports on driving behavior

and real-time tips on how to improve efficiency, or access to more horsepower on demand. The over-the-air provisioning capabilities of VMware's Pulse™ IoT Center will play a key role in enabling people to shape their driving experiences dynamically.

CONNECTED CAR BUSINESS BRIEF SERIES

The VMware Connected Car Business Brief Series explains how VMware helps automotive OEMs build a highly scalable and secure infrastructure for the connected car and driverless vehicle era. The brochures cover the following topics:

01 Vision: Powering new automotive business models through the secure and efficient sharing of data and intelligence between vehicles, users and vendors via the cloud.

02 Security: Innovative segmentation-based approaches to security in data centers, vehicle head units and wireless networks that minimize business risk and protect drivers.

03 Software over-the-air: Secure collection, analysis, management and delivery of real-time data transmitted over-the-air between drivers, vehicle head units and vendors.

04 Data collection & analysis: Maximum value from connected car data supported by the software-defined data center, secure public cloud infrastructure, cloud-based data management and intelligent in-vehicle device agents.

05 New business models: Driving new revenue streams through data recycling, shaping the in-vehicle user experience on demand, driverless transport services, and more.

	01
Defining the Connected Car Revolution	

02	03	04	05
Protecting the future of connected cars	Managing the 'device on wheels'	Winning the race to the data-driven future	Generating connected car revenue streams

Your Contact

Matthias Schorer
Lead Business Development Manager – IoT, EMEA

Since 2017 Matthias Schorer leads the Business Development for IoT in EMEA. Before he was Head of Strategy Consulting and responsible for the VMware Accelerate Advisory Services Team in Central and Eastern Europe. He has extensive expertise in IT architecture, legacy system migration, cloud computing and virtualization across multiple industries, with a focus on the automotive sector and connected car innovations.

mschorer@vmware.com
Tel. +49 89 / 3706 17108

VMware, a global leader in cloud infrastructure and business mobility, helps customers accelerate their digital transformation. VMware enables enterprises to master a software-defined approach to business and IT with its Cross-Cloud Architecture™ and solutions for the data center, mobility, and security. With 2016 revenue of $7.09 billion, VMware is headquartered in Palo Alto, CA and has over 500,000 customers and 75,000 partners worldwide.

vmware®

VMware Global, Inc.
Zweigniederlassung Deutschland

Freisinger Str. 3
85716 Unterschleißheim

www.vmware.com/de

1704