

Connected Opportunities

Mobile Performance Management in the Auto Revolution

Automobiles are no longer measured by horsepower, but by computing power. The market for software-enabled automotive is growing ten times as fast as the overall car market. By 2030, new business models built around mobility, connectivity services and over-the-air upgrades could add up to \$1.5 trillion in new revenues to the worldwide automotive market.

Automobiles will be highly mobile computers, and not only for the convenience of drivers and passengers. Software will be fundamental to the safe operation of the vehicle, and the fundamental issues of mobile-computing environments will apply to millions of cars on the road. Those issues include connection reliability, security, over-the-air-management and bandwidth management. Mobile Performance Management software resolves those issues, making it a key technology for a transformed industry.

The Connected Car

Over time, built-in connected-car capability will become ubiquitous as a standard feature, as industry analysts project that three quarters of the 92 million cars shipped globally in 2020 will have dedicated Internet-connection hardware. This connection model offers clear advantages to automakers for collecting data on vehicle performance, patching and remote updates.

The connected car will revolutionise every aspect of the industry:

- Updates and patches for fine-tuning performance and proactively avoiding repairs
- Wi-Fi connections for passenger convenience
- Advanced infotainment systems and apps
- Real-time location services and routing based on traffic conditions
- Navigation and systems that alert drivers to availability of parking spaces
- Vehicle-to-vehicle communications for improved safety
- Advanced driver assistance systems such as automated braking and adaptive cruise control
- Communication of sensor data for vehicle diagnostics and repairs

The more features are added to the various systems of the car, the more attack surface they present; and the more data services are intertwined with the road operation of the vehicle, the more important cybersecurity becomes. Automakers will need to convince consumers that they will be safe and secure in vehicles connected to the open Internet.

Role of Mobile Performance Management. The more automobiles depend on connectivity, the more essential Mobile Performance Management becomes, for its ability assure the connection. It creates and persists a secure tunnel from the network interface in the vehicle, over any combination of 3G or 4G networks, to a server farm hosted either on-premises or in the cloud. It has the unique ability to maintain that secure tunnel through gaps in wireless coverage, as often happens when vehicles enter a tunnel, drive through hilly terrain, or traverse rural areas where there simply is no coverage. Through the gaps, it suspends any pending transmissions, holds the data in queue and sends it when the signal returns, so automakers don't lose their stream of

Mobile Performance Management: Security, Acceleration, Optimisation

Mobility in the automotive industry requires connectivity in a wide variety of situations and settings. In the connected car or in the hands of mobile workers, Mobile Performance Management assures that data connections are delivering.

Traffic Optimisation ensures applications and resources are optimised for weak and intermittent network coverage, and workers, devices and connected vehicles can roam freely between networks as conditions and availability change.

Adaptive Policies fine tune the mobile experience and consumption of bandwidth, prioritising applications and network access based on network, situation and location parameters.

Performance Analytics and Diagnostics deliver constantly updated analytics on data use by devices, applications and networks, so IT can fine-tune the user experience. Root-cause detection quickly pinpoints problems for fastest troubleshooting to get workers productive again.

Security supports highly flexible and programmable secure access capabilities. IT can configure secure tunnels per-app or device-wide, securing access to applications, resources and proprietary data.

sensor data. Moreover, it makes connections more reliable in areas where coverage is marginal, either at the fringes of signal area or in urban settings where 3G and 4G networks are often congested.

Mobile Performance Management handles all of the following within the connected vehicle:

Encryption of Traffic at the highest-available standard, to protect the vehicle from injection attacks and other intrusions that might compromise vehicle operation and safety.

Policy Enforcement that allows use of the Internet for infotainment while protecting the operational systems; and that allows over-the-air upgrades while blocking unauthorised traffic.

Quality-of Service Enforcement that prioritises data streams that are fundamental to the operation of the vehicle, followed by real-time-streaming for consumer uses.

Compression and Optimisation algorithms that eliminate unnecessary overhead, preserving the operational data and consumer experience while sharply curtailing bandwidth use.

Capability for Over-the-Air Management that keeps large upgrades, firmware updates and application downloads from running over the cellular networks, reserving them for use over the owner's Wi-Fi connection or when the vehicle is at a dealership.

Predictive Analytics that combine geolocation with data about cellular connectivity, for understanding coverage problems, sensing potential problems in the wireless hardware, informing policies that make the connected-car telematics more-reliable for the OEM, and delivering a better experience for the driver and passengers.

Diagnosics and Repair

Service facilities are difficult to cover with Wi-Fi access points, and wireless networks intended for guests or other parts of the business can lead to contention issues and ultimately coverage problems. Technicians carrying ruggedised laptops or tablets need access to the OEM's service application for accessing essential technical information about the vehicle and placing parts orders. When they lose the connection with the service application they have to wait for a connection, re-log in and possibly re-boot the device — all of which cause frustration and waste valuable time. Both the OEM who provides the software and the tool supplier who furnishes the computing hardware are impacted, since they bear the costs of the resulting support calls while the root fault is in the dealer's Wi-Fi network.

Role of Mobile Performance Management. With its analytics capability and root-cause-analysis detection, Mobile Performance Management can clearly pinpoint the problems with the dealer's Wi-Fi coverage and hardware. That includes the ability to locate areas with weak or marginal coverage and monitor the performance of networking hardware. It measures bandwidth use by applications, quality of bandwidth and connections, unnecessary bandwidth use by other applications, and detects various hardware, modem and firmware types for tracing problems to specific hardware. This allows vehicle manufacturers and other providers of third-party service systems to recommend computing hardware and networking equipment.

Mobile Performance Management Deployments in the Auto Industry

Mobile Performance Management implements a secure tunnel in software on each end of the connection, rather than relying on a hardware appliance. This flexibility makes it ideal for the fast-evolving connection scenarios and business models within the auto industry.

Inside the car, as the connection point moves from the smartphone inside the car to the vehicle itself, the client can be embedded in the communications module on the platform of the manufacturer's choice. It can also be readily and remotely installed on rugged laptops and tablets used for diagnostics, in vehicle dashboard computers, and on any variety of laptops, tablets, handhelds and smartphones whether used in the dealership, shop floor or on the roadside.

Termination of the upstream end of the tunnel in software on a server lends itself to extremely flexible hosting scenarios. It can be hosted on-premises in a corporate data center on a dedicated server or in a private cloud, on a collocated server, or virtualised. Servers for the applications that use the tunnel can be located in the same facility, or routed to other data centers.

To serve the connected car, the OEM can terminate the tunnel services in its own network of data centers or contract with a third party; from this point, the automaker can direct the telematics and vehicle operations-related data flows to its internal servers, and the remaining traffic for exchange with its third-party partners or to the general Internet. A well-crafted set of policies enforced by the Mobile Performance Management software will be essential to keep general Internet traffic separate from traffic inbound to the vehicle's operational systems.

For diagnostics within the dealership, the OEM, supplier of diagnostics hardware, a third-party managed services provider, or dealer consortium could handle the tunnel services as a standalone or in conjunction with other systems. The flexibility afforded by a software-based tunnel allows it to be an adjunct to existing services or an all-new business opportunity.

Automakers, dealer franchises, service organisations, data/ audience aggregators, digital service providers, hardware manufacturers and managed-services providers all have a role to play in the emerging business models made possible by the connected car. However the business models and use cases emerge, Mobile Performance Management can be deployed to support them.

Moreover, Mobile Performance Management keeps connections alive through momentary loss of coverage so if a technician moves into an area of weak signal strength, he can focus on servicing the car and not his network connection. It also enforces quality-of-service for prioritising key applications, and can also prevent unnecessary applications from using the network and monopolising the available bandwidth. Moreover, it allows devices to be managed over-the-air for automatically pushing out updates.

Extensions Beyond The Service Bay. The optimised connections delivered through Mobile Performance Management make the dealership better-able to extend service functions to the parking lot such as remote diagnostics prior to committing the vehicle for service, or finish rides before returning the car to the customer.

These concierge-style services will be key for dealerships. Connected cars are capable of being diagnosed remotely, and online service aggregators are entering the market. Openbay in the U.S. allow cars to send diagnostic trouble codes to a central service so that facilities can bid on repairs. Through another, U.K.-based ClickMechanic, drivers obtain a quote and book a mobile service visit. Dealer service centers will similarly need to extend services outside the facility to secure their share of the market. When shops deploy their own field technicians, they are in a position to do the in-field diagnostic and perform the service in the field if possible. An online connection to the shop-management system allows the technician to complete the estimate, generate the service order, access pricing information and generate the receipt, just as if the customer was at a fixed service location.

If the repair can't be completed in the field, the technician can schedule an appointment at the organisation's central service facility on the spot, and order ahead for parts to speed the time-to-repair. So the roadside assistance not only captures service revenue that might otherwise be lost, but also secures the service-bay business plus the parts sales and provides a concierge-like service for the customer. Pre-diagnosis in the field also alleviates the morning rush and customer waits for diagnostics. The service manager already knows the work needed, has scheduled each job with the most-qualified technician, and can better-fill the service schedule through the entire workday.

Truck, Bus and Equipment Manufacturers

Most manufacturers of larger vehicles including delivery trucks, coaches, construction vehicles and farm equipment service through dealer networks and make documentation and parts information available for download. Making this technical information consistently and reliably available from rugged tablets and handhelds is essential for servicing. But when connections are interrupted while working around the vehicle in the dealership, or when servicing vehicles in the field over sporadic 3G or 4G connections, technicians lose valuable time when they constantly have to reconnect or re-boot their device.

Role of Mobile Performance Management. Mobile Performance Management assures that the technician's connection is reliable and always available, whether working in a dealership over Wi-Fi or using 3G and 4G networks. Just as it does within an automotive service center, it delivers multiple benefits in the areas of higher productivity, greater reliability, security and control, as well as lowering the costs for cellular connectivity.

Fleet Tracking

From 2013-2018, revenues for companies offering fleet management systems are projected to triple. More and more fleet operators are recognising the advantages: navigation that decreases fuel consumption, proactive servicing through use of telematics and predictive diagnostics, better resource utilisation leading to less downtime, and more-accurate delivery-time estimates for improved customer service. Major truck manufacturers in Europe are fitting their trucks with telematics. Brazil, Russia and China are among the countries that require telematics and fleet trackers on some classes of vehicles, for purposes of safety, emergency response, and promoting environmental quality.

Role of Mobile Performance Management. Since fleet-tracking relies on 3G and 4G connectivity, Mobile Performance Management offers numerous advantages. The fleet owner and provider of the service depend on reliable connections while vehicles are in motion and encountering areas of inconsistent or non-existent coverage. This is especially important for tasks that depend on real-time information because optimisations make marginal connections far more reliable. Examples include relaying turn-by-turn directions, proactively sending accurate delivery-time notifications to customers, and emergency-response alerts. The predictive analytics capability provides objective data about coverage conditions encountered while vehicles are on the road, so the organisation also knows when a driver is encountering a no-coverage area. This information is not only useful for ensuring that the fleet-tracking system is working reliably, but also plays a role in helping organisations meet their duty-of-care obligations.

Auto Clubs

Forward-thinking automobile clubs are combining the diagnostic capability of modern cars with portable computers and mobile communications technology. This allows them to deepen their breakdown assistance capabilities and often fix the vehicle on the roadside. In the U.K., the Automobile Association performs 3.5 million callouts annually. In the Netherlands, the Royal Dutch Touring Club handles nearly 1.1 million breakdowns every year, and is able to repair 90% of them on the spot.

Role of Mobile Performance Management. The auto club in-field service model depends on continuous connectivity wherever the service technician goes, whether enroute to the next call, conducting diagnostics and service at each remote location, or updating records and scheduling. This connectivity requires 3G and 4G networks, often from multiple mobile operators. The connections must be able to persist through coverage drops or when the computing device needs to switch to a different network — in fact, this continuity is vital. It allows the technician to deliver uninterrupted service without repeat log-ins and managing multiple connections.

The connected systems include:

Vehicle Diagnostics. Use of a ruggedised laptop computer rather than a dedicated device means there is one less device to carry, and all the diagnostic information can be stored or Immediately Uploaded.

Computer Assisted Dispatch. When a customer is stranded at the roadside, getting there as fast as possible earns appreciation and builds goodwill. A dispatching system speeds response with efficient routing and turn-by-turn instructions, and assists with Duty of Care compliance. It also allows the team of technicians to cover more calls, increasing revenue.

Online Shop Manuals and Service Bulletins. Access to all necessary service information increases the ability to perform repairs in the field. With robust and reliable connections, large PDF documents such as technical manuals can be sent on demand, arming the technician with information that previously was only available in the service facility. This translates into more first-time fixes, happier customers and a lower cost per repair.

Device Management. The ability to manage remote computing devices, run updates at times the technician isn't dealing with a customer or active repair, and enforce security at all times is fundamental to supporting the technician and serving the customer.

Dealer Retail

With the parts counter a key profit center for OEM dealers, they will need to be nimble from a customer-service perspective to grab their share of the business. Online auto parts retailers such as U.S. Auto Parts Network in the U.S., Oscaro in France and of course Amazon are carving out niches in the marketplace, and online sales of automotive parts and accessories is expected to become a \$20 billion business by 2020 in North America and Europe. Automakers are also beginning to set up digital storefronts, although they have to be mindful of channel conflicts in established markets.

Role of Mobile Performance Management. Mobile point-of-sale terminals in this setting present the opportunity to engage with customer in flexible ways such as greeting at the curbside, or with roving representatives for line-busting initiatives. Service writers can also use their interaction with the customer at checkin or checkout as an opportunity for add-on sales. In these settings, Mobile Performance Management's security capability is a must for protecting payment-card data. In addition, the ability to persist connections when networks are congested, or the signal is momentarily blocked by automobile frames while operating at curbside ensures that interaction with the customer proceeds without interruption and transactions are completed.

Research & Development

One of the biggest advantages of connected cars from the manufacturer's perspective is gathering diagnostic data from the entire base of vehicles on the road. The gathered data will be used to detect system failures so that manufacturers can make the cars more reliable, detect imminent failures and fix them proactively, improve fuel economy and vehicle performance, fine-tune to better meet emissions standards, and better-understand the use of the car to improve the driver and passenger experience. These improvements will be reflected not only in new cars being built, but in cars currently on the road because vehicle makers can push out updates. A car will become more like a piece of software that can be upgraded and improved over time.

Role of Mobile Performance Management. Mobile Performance Management makes the connection more reliable to ensure there are no interruptions in the flow of data. Compression and link optimisation sharply cut bandwidth use so the software will likely pay for itself on data costs alone. Furthermore, the ability to gather data on the conditions in the wireless network ensures the connections are delivering the coverage and bandwidth expected, and to predict when the vehicle is entering a no-coverage area for adjusting the collection and storage practices.

Manufacturing

Ruggedised laptops, tablets and handhelds have long been used in shop floor settings for work-in-progress tracking and parts

inventory, with broader extensions to the warehouse, logistics and other operations that are part of the supply chain. In an automotive factory, interference sources and signal-blocking structures are everywhere: conveyers ferrying large metal parts, electrical and electronic equipment, stamping machines and industrial robots. In this challenging environment for Wi-Fi signals, handheld devices carried by workers encounter unpredictable signal drops, causing them to stop what they are doing and repeat the log-in process.

Role of Mobile Performance Management. Mobile Performance Management resolves the often-difficult problem of providing reliable coverage in a vast automotive assembly plant. It not only makes the connections reliable in changing and challenging conditions, but also has real advantages when it comes to managing devices. Updates can be sent over the air, and policies can tightly limit the applications allowed to run over the device.

Conclusion

Mobile technologies are bringing unprecedented disruption to the automotive industry. Indeed, 90 percent of automotive executives believe their business model will change or broaden, and 80 percent expect that their business will be challenged by new competitors. However, disruption brings opportunity. Acquiring vehicle data will become increasingly critical for competitors in the changed marketplace. There will be new revenue sources in areas such as push advertising to passengers, streamed media content and selling of apps, as well as multiple opportunities to monetise the car data by working with entities such as insurance companies, media companies and retailers. The connection traffic optimisation, acceleration and security delivered through Mobile Performance Management will be foundational to the new automotive economy.

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