



Pitfalls on the Journey to the Connected Vehicle, and How to Avoid Them

WHITE PAPER

Leverage a Trusted and Proven Technology Partner to Lower Costs, Minimize Risks, and Speed Up Time-to-Market for Connected Cars, Trucks, Motorcycles, and More

EXECUTIVE SUMMARY

As an OEM, you're among the best at building world-class vehicles, whether they be cars, motorcycles, trucks, buses, or construction equipment. Thanks to the innovations of OEMs, the past hundred years have seen safer, faster, and more efficient vehicles on streets, highways, and construction sites around the globe.

OEMs are now facing the challenge of how to get over the next hump of innovation: creating a connected vehicle solution. The question then becomes: is it better to build your own platform, or seek the help of a partner?

The good news is that while you've been focused on bringing better vehicles to market, companies like Aeris have been focused on building connected vehicle platforms. Aeris partners with OEMs to minimize costs, mitigate risks, and speed up time to market for connected vehicle deployments.

Together, we can innovate the next generation of connected vehicles and help you:

- *Get to market faster*
- *Manage costs*
- *Deploy new features quickly*
- *Design with users in mind*
- *Scale efficiently*

The last 10% of bringing an idea to life is 90% of the effort, but that final 10% of the project is a lot easier when you're working with someone who has already accomplished it before. With the Aeris Mobility Suite (AMS), you can leverage hundreds of man-years of experience in developing custom connected vehicle platforms and save all the time and expense of going it alone. You're not just buying a product for today; you're investing in a roadmap for the future.



"The Aeris Mobility Suite is designed for maximum scalability and flexibility for creating, launching and managing evolving connected car services."

— Roger Lanctot
Strategy Analytics

The Push for a Connected Vehicle Platform

OEMs of consumer vehicles are taking note of the demand and revenue potential of connected vehicles. McKinsey's 2020 consumer survey on autonomous driving, connectivity, electrification, and shared mobility (ACES) found that 37% of respondents would switch car brands if it meant having access to connected vehicle features in their next vehicle. That figure is likely to increase as more and more drivers become acquainted with the benefits of connected car solutions such as:

- *Connected safety features*
- *Over-the-air (OTA) updates*
- *Vehicle health reports*
- *Infotainment*
- *Driver assistance and convenience functionality*

Connected car brands are also establishing new revenue streams and business insights from their connected solutions such as selling subscriptions, partnering with digital entertainment platforms, and using data to further enhance their offerings.

OEMs of fleets and construction equipment are also seeing a rapid increase in the demand for connected solutions. Connected vehicle platforms for fleets can include such tools as driver monitoring, efficiency reporting, and tracking capabilities.

But going from an unconnected offering to a fully-fledged connected vehicle platform has many obstacles, especially when developing the solution in-house.

The Uphill Battle of In-House Connected Vehicle Solutions

Developing a connected vehicle platform without outside assistance requires the same energy and resources, if not more, as opening a sister company completely focused on software development. It is a monumental task no small OEM should attempt and a potential money pit for large corporations.

The three biggest obstacles that OEMs face when developing a connected vehicle platform are, **cost, time to market and market risks**.



Cost: The Added Price of Going it Alone

Early adopters of technology are willing to pay a premium for the latest automotive features, but most customers are likely to wait for a price drop or buy a used vehicle if prices are too high. Businesses cannot entirely pass connected vehicle platform development costs on to customers if they expect to keep their brand competitive.

Nevertheless, significant capital must be devoted to:

- *Hiring, training, and managing software specialists, integration experts, programmers, security teams, and other IT professionals*
- *Designing, developing, and testing of the connected vehicle platform*
- *Rollout of the platform*
- *Updating and maintaining the connected vehicle platform and the cars that use the platform*

Investing in a specialized team

Specialists from a variety of scientific, engineering, programming, and user experience backgrounds are required for the day-to-day operation of a connected vehicle platform program. These experts are in high demand, making it difficult to attract and retain a world-class team over a long period of time.

Design, development, and testing of the connected vehicle platform

OEMs must make a large initial investment to research, design, develop, test, and integrate their platform if they decide to build on their own. OEMs can expect to spend anywhere between \$20M to \$25M. Cost overruns, often in excess of 100% of the initial budget, are also the norm in the industry.

Updating and maintaining the connected vehicle platform and the vehicles that use the platform

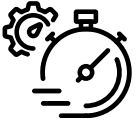
In home-grown software development scenarios, connected vehicle project costs typically sky-rocket after deployment. This increase in costs is primarily driven by corner cases which are difficult to envision during the product development process. Furthermore, any issues after launch get exponentially more expensive to address as it may be necessary to recall vehicles.

Emergency calls in a poor service area are a good example of a classic corner case for connected vehicle platforms. A minimum set of data (MSD) is typically uploaded to call center agents handling the call. However, when the MSD cannot be uploaded due to spotty coverage, fallback strategies are necessary. Integration of these contingency protocols can drive up costs.



For customers reliant on emergency call features, service failures in their time of need can have very real consequences, waste precious life-saving moments, and ultimately destroy trust in the OEM.

Such failures may also become a serious liability for OEMs as drivers, insurance companies, and local and national authorities may each have a claim to restitution.



Time to Market: The Long Journey to a Working Platform

Speed is everything. The success of your deployment hinges heavily on how fast you can bring it to market. Competitors are continuously innovating or even inspiring one another, and it is important to stay ahead in the race.

Manufacturers should expect delays in time-to-market when introducing a new connected platform. It may take significant time to develop an in-house solution—two to three years or more—and there is a high potential for schedule slips.

The assumption of risk is a given any time manufacturers set out to develop a new design. However, when companies assume the risk of internally developing a new connected vehicle platform while also investing in electrification, shared mobility, and autonomous technologies, they may find themselves spread too thin between competing priorities and funding. OEMs must focus, investing in areas that are core competencies, and using trusted partners for solutions in other areas.



What it Takes to Build a Connected Vehicle Platform

Building a viable connected vehicle platform can be nearly as complex as building a vehicle. Planning, creativity, and organization must all come together to create a seamless finished product that works across each vehicle using the platform. The architecture and capabilities of connected vehicle platforms vary between automotive manufacturers, but the best platforms share several common architectural principles.



Key Tenets

Keep it modular

The best connected vehicle platforms are modular, meaning that any new component or feature can be added onto an existing base of software to expand the services offered without needing to rewrite the entire connected vehicle platform.

Build to scale

Connected vehicle platforms must be stable enough so that every new vehicle produced can be added in a timely, reliable fashion. A connected vehicle platform that isn't built with exponential growth in mind—both in terms of number of vehicles and depth of functionality—is doomed to fail.

Make your platform extensible

Once a connected vehicle platform is released, the work to keep it up to date continues. Connected vehicle platforms should be extensible to allow updates on top of the existing program.

Build a Memorable User Experience (UX)

Drivers expect immediate responsiveness from their vehicles. No one wants to sit behind the wheel of a car that doesn't shift gears at the right time or accelerate when the gas pedal is pressed. The same is true for connected features.

While the connected car platform typically won't wreck a car if it doesn't respond at the right time, a driver testing new cars may think twice before choosing a vehicle whose connected features take a long time to load or function.

In many cases, the connected service interface is easy enough to use and helps preserve car batteries, but such platforms frequently take several minutes or seconds to load. If a test driver sees that it takes more than 20 seconds for a remote engine-startup sequence to get going, they're likely to pass on purchasing that vehicle, even if the car itself is otherwise top tier.

Maintaining Platform Security

Adding a vehicle to an unsecured connected vehicle platform exposes critical software and hardware to potential attacks. Malware, for instance, could cause malfunctions of the vehicle. Unsecured data sources within a connected vehicle platform, meanwhile, could be siphoned off for exploitation by hackers.

Additionally, the more vehicles that use a connected vehicle platform, the wider the threat landscape. Tracking and controlling threats on a large connected vehicle platform requires sophisticated network security. The network must prevent attacks by staying up to date with the latest protections against emergent digital threats, detect attacks as soon as they happen, and respond to threats by isolating and regaining control of any infiltrated components along the network.

Your Vehicles Connected Your Way on the Aeris Mobility Suite (AMS)

All the time, effort, and money spent on developing an in-house solution for connected vehicles depletes resources and energy better spent developing the best vehicle possible for your customers. Fortunately, getting your vehicles connected can be a team effort.

When you choose a partner that already has extensive experience and resources in place for getting cars connected, you position your project ahead of competitors, and more importantly, you deliver a better experience for drivers.

With the Aeris Mobility Suite, you can get to market within 180 days and add new applications to your platform in as little as 30 days. The Aeris Mobility Suite is trusted by international leaders in the automotive industry.

Unparalleled, Seamless Architecture

Keep only what you want with a modular architecture

Select applications and components best suited to your needs from an extensive modular library. Piece together a connected vehicle platform that does exactly what you want it to do. Built with intelligence at its core, the modular architecture of AMS also allows you to extend with your own features.

Scale your deployment

As your program grows, AMS grows with you. Whether you are connecting hundreds, thousands, or millions of vehicles, you will never need to put your expansion on hold to let Aeris' connected vehicle platform catch up.

Extend your offerings as you grow

When you're ready to make changes, you can add new features and updates on top of AMS at any time. Leverage Aeris' extensibility to make improvements to your connected vehicle offering and quickly integrate any change with minimal manual labor on your end.

Best-in-Class Components for Best-in-Class Companies

Your vehicles inspire brand loyalty, lead innovation, and help drivers do so much more than get from Point A to Point B. Choosing a partner who offers best-in-class components for connected vehicles just makes sense. Aeris is always evolving to offer the best and most innovative solutions to support some of the world's most innovative brands.

Aeris Mobility Suite

Continuous feature enrichment for a high degree of user satisfaction

Security

- Movement & status change alerts
- Alarm notification
- Stolen vehicle tracking
- Remote engine disable
- Curfew alerts

Location & Usage

- GPS tracking
- Point of interest
- Trip history
- Find my car
- Utilization analysis
- Boundary drawing/alerts
- Idle alerts

Convenience

- Remote door lock, fuel, trunk
- Remote engine start/ climate control
- Remote horn/ light
- Remote battery charge
- Schedule battery charge/ climate control

Partner Integration

- Amazon Echo/ Alexa
- Google Home
- Amazon Key
- Chamberlain Garage Door
- DealerFX

Health & Status

- Vehicle Status & health check
- Remote diagnostics
- Service alerts
- Maintenance reminders
- Schedule appointments

Safety

- Location sharing
- Harsh driving alerts (speed, braking, turns)
- E-call / Collision notification
- B-Call / Roadside assistance

Vehicle Management

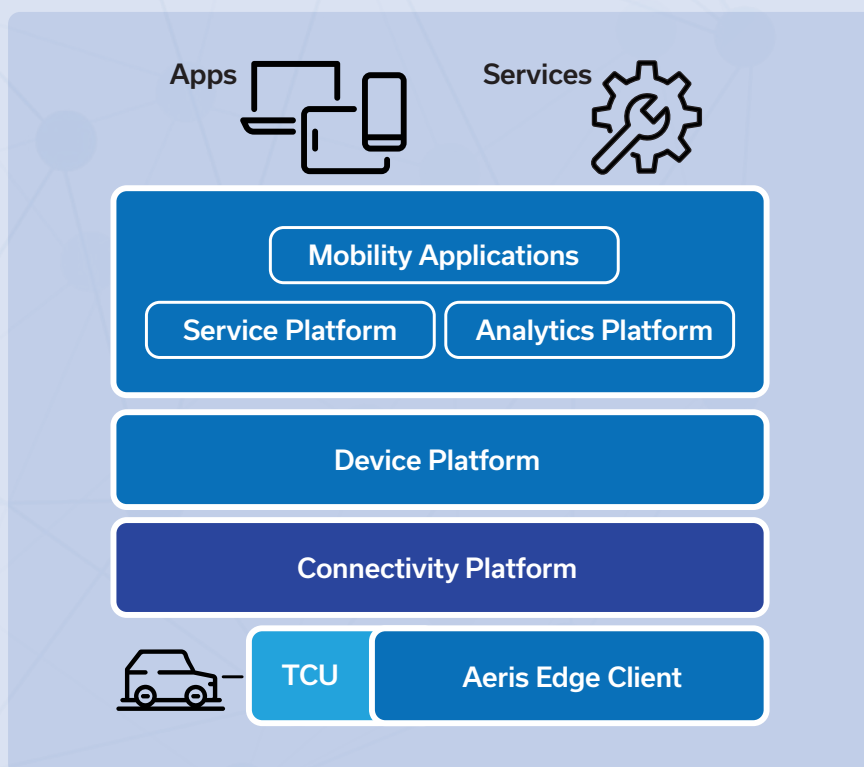
- Vehicle/Device/Software Inventory
- Device provisioning
- Device Configuration
- Over-the-air- updates

User Management

- Multi-user administration
- Parental control
- Compliance reports (time, geo)
- E-Store / Subscription Management

Administration

- Access Control
- Business Intelligence



End-to-End Technology Stack

Simplify your connected car program with AMS' end-to-end mobility stack—from network to application. Get connectivity, OTA updates, subscription management services, and application development framework from a single source.

Free your data with cloud-agnostic service

Your data should never be locked into one cloud. Especially if you have a global business, it doesn't make sense to use only one cloud solution because no single cloud provider is optimal for all regions.

Unfortunately, most big name cloud solutions lock their users in and make it difficult to transport data and operations from one cloud system to another. Bypass this common frustration with a cloud-agnostic structure. Seamlessly utilize multiple clouds with AMS to increase flexibility and reduce overall costs.

With the emergence of data sovereignty laws, the ability to pivot between clouds is even more imperative for the smooth operation of applications such as connected vehicle platforms. Ostensibly, data sovereignty laws came about to protect personal privacy and national security, however, the reach of such legislation now extends far beyond these intentions within the digital borders of several nations and may even regulate the digital exportation of intellectual property.

As such, it is essential to separate clouds for data that must remain only in its country of origin and clouds for data that can flow across borders.

India, China, and Russia already have stringent regulations restricting data movement between countries. OEMs planning for global deployment will have to think carefully about data sovereignty requirements and work with a partner to create a deployment strategy where all platforms are in sync and also meet regulations. Because Aeris operates in over 190 countries, including countries where data sovereignty laws are the most stringent, we are well-positioned to consider these laws while deploying and servicing global connected vehicle solutions.

Keep your data secure

Drivers share a lot of data with connected vehicles, and it's important to keep their identity private while also keeping your assets safe. Protect your data with AMS, a platform backed with intelligent security that protects, detects, and responds to attacks. Continuous security updates keep AMS ahead of the latest digital threats.

Enjoy military-grade security at the network, transportation, and application data layers, including two-factor authentication.

Enhance user experience

For your connected vehicles to succeed, potential buyers must immediately see the value in your connected features, not question if your offering is the right choice. Give your customers a responsive connected experience that works on the first try. First impressions are everything with a connected vehicle. With less than 3 second response times for remote operations with best-in-class power management, AMS sets the standard in performance, all while optimizing power usage to ensure long-term battery life.

Built to enable new use cases: vehicle sharing, on-demand services, and OTA updates

Your customers want to be able to customize their driving experience as much as possible across the life of their vehicle. Whether that means settings that remember the preferences of each driver or streaming services for backseat passengers, it's important to stay up to date with features-on-demand (FOD). FOD lets vehicle owners build a completely unique experience, but developing a structure for management of these features can be complicated without a partner.

FOD requires a state-of-the-art architecture to handle the product catalog, subscription management, payment, and your digital marketplace. AMS offers a ready-to-deploy architecture for your FOD needs so that you can more easily bring features such as streaming audio or heated seats to your customers.

Support when you need it

In addition to lowering costs, minimizing risks, and quickly getting to market, having a partner means having someone to count on when you need a fast solution to a pressing challenge.

With AMS, you will receive white glove customer service and one-on-one technical support whenever you need it, whether you have a simple question or need in-depth remote access supported assistance. Receive help from technical experts that know your connected vehicle platform at every level.



Connecting Your Cars with Aeris Mobility Suite

In an age of highly competitive IoT and automotive solutions, you deserve a partner with experience and flexibility. Choosing AMS means backing your new program with the know-how of the industry's leading authority on connected vehicle platforms.

Aeris has been working in the Internet of "Moving" Things for close to a decade, and we have nearly three decades of experience in IoT connectivity. Wherever you are with your connected vehicle project, we're here to help.

Contact our global sales team today by emailing auto_info@aeris.com to see AMS in action, or to discuss becoming an Aeris partner. We'd love to have a conversation about how you can get your next line of connected vehicles to market.

Customer Story:

Mitsubishi's Connected Vehicle Success Story



"Aeris delivered the industry-leading know-how and telematics necessary to allow MITSUBISHI CONNECT to provide safety, security, and connectivity behind the wheel of the all-new Mitsubishi Eclipse Cross."

— Don Swearingen EVP, COO
MMNA Mitsubishi Motor Company

In 2018 Mitsubishi and Aeris announced a one-of-a-kind partnership to create a first-class connected car experience—Mitsubishi Connect.

The connected car platform, built on AMS, was launched in 2018 and now operates across 3 continents.

Aeris provides the end-to-end connected car stack for Mitsubishi from connectivity and OTA, to applications, third-party services integrations and mobile/web apps.

Drivers have access to connected features from inside the vehicle or through a mobile application or web portal.

