

vmware® intel®



The new age of mobility Powered by you

Accelerate innovation, drive growth and become more sustainable
through digitization across the value chain

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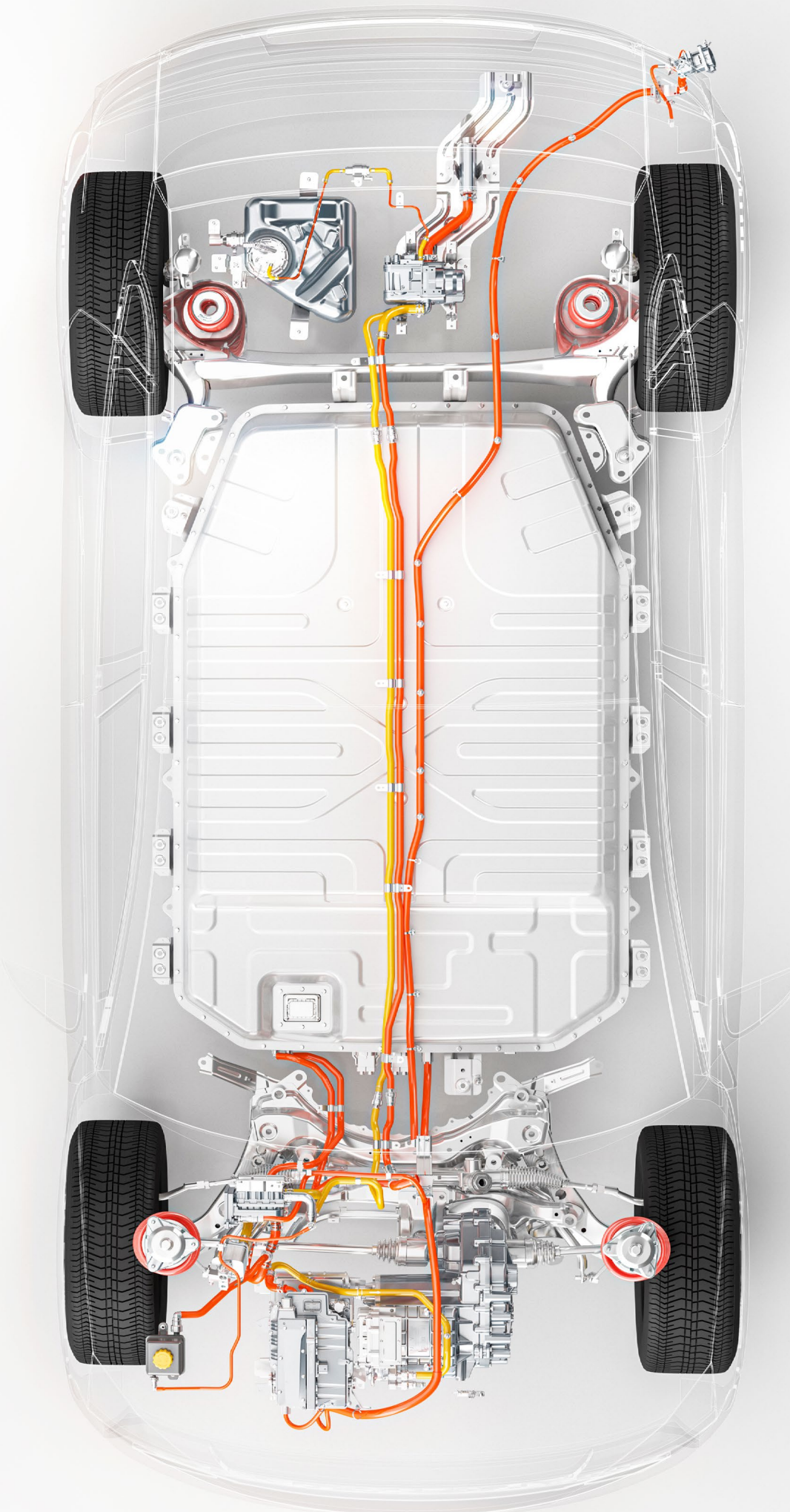


Keep the world moving, no matter what

As an automotive manufacturer, you are the engine of everyday life – making a vital contribution to society’s wellbeing and evolution. But how will you continue to fulfil this role in a fast-changing and disrupted world?

Rapid technological advances are turning vehicles into moving supercomputers, with an ever-increasing number of features digitized and connected. This opens a vast number of opportunities for OEMs, suppliers and, most importantly, customers. To seize these opportunities, your operations must be future-ready.

Understanding and maximizing the potential of every customer touchpoint will be key to building loyalty and ensuring future growth. Customers, of course, are becoming ever more digitally-focused – millennials will make up over 45% of potential car-buyers by 2025.



Digital foundation

To truly deliver for them, today and in the future, it is imperative to create a standardized and consolidated digital foundation for your business – one that supports advanced operations across your value chains, making manufacturing processes smarter and enhancing innovation.

VMware and Intel provide auto manufacturers with that foundation: delivering consistent infrastructure and operations across data centers and clouds, accelerating application speed, and creating the agility needed for innovation-centered growth.

In this short guide, we'll discuss the benefits of a value chain driven by future-ready digital capabilities and show how VMware and Intel can help you realize them, sooner. Together, we can ensure that, no matter how the world changes tomorrow, the new age of mobility will be powered by you.

Automate for non-stop productivity

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The opportunity

As the automotive sector looks to toward connected mobility, it must address fundamental challenges to business resilience amid sustained global turbulence. From disrupted supply chains to volatile macro-economic conditions, to sustainability concerns, to skills shortages, companies face continuous challenges to their productivity and growth.

The answer can be found in technology. A study by BCG has shown that technological capabilities are key to building resilience across six dimensions: protecting and growing the top line; developing agile operations; enabling people; accelerating the adoption of data and digital platforms; enhancing cybersecurity; and strengthening financials.

The same research also highlighted that companies investing in digital technologies and Industry 4.0 have seen significant operational benefits, including: 12%-20% additional EBIT; 40-50% faster speed to market; 20%-30% higher workforce productivity; and up to 60% fewer IT errors and reworks.

The adoption of process automation technologies is vital to making these gains, and firms are therefore increasingly working to bring the benefits of information technology innovation to operational technology systems: virtualizing the OT environment to reduce the need for intervention from technicians on the ground and boost productivity.

This convergence of IT and OT can bring end-to-end digital continuity – from design to operations – enabling the benefits promised by emerging technologies and frameworks like digital twins and digital threads to become a reality.

Get there faster with VMware and Intel

VMware and Intel can help standardize and consolidate your digital foundation across IT and OT, enabling advanced operations. Bringing more compute capabilities and greater visibility to the OT environment will help auto manufacturers accelerate automation and increase intelligence across their value chains – deploying edge to cloud capabilities to bring speed, agility, and resilience.

Virtualization solutions from VMware and Intel, for instance, will help accelerate process automation in pursuit of efficiency. The collection and inferencing of real-time data at the edge will enable new services, such as predictive maintenance to increase uptime and eliminate costly maintenance windows.

Intel's continued innovation in predictive maintenance is leading to exciting opportunities that help companies avoid lost time and forecast maintenance needs with unmatched precision. And in quality control, AI algorithms and robots can detect product faults with speed and accuracy far beyond human capability. Processes can then be automatically paused, defects fixed, and waste minimized.

This enables a shift from time-consuming, repetitive tasks for people, to machines doing the work faster and more accurately: helping to improve decision-making, product quality, yield efficiency, customer service, and ultimately the bottom line.

VMware and Intel solutions have been built to work alongside one another and – no matter where you are on your digital transformation journey – we can assist. Our systems integrate seamlessly with many public cloud providers and deliver a platform capability that makes software-defined operations a reality.

Audi revolutionizes factory automation

With its rollout of Edge Cloud 4 Production based on hyper-converged infrastructure, the automotive giant has replaced countless expensive industrial PCs – saving time and effort on software rollouts, operating system changes, and IT-related expense

[Find out more here →](#)



Supercharge connectivity at the factory edge

The opportunity

Analysis by Capgemini suggest the automotive industry will have converted 44% of its factories into smart factories by 2025. To get there, most auto manufacturers need to modernize brownfield environments, where complex and fragmented legacy infrastructure and apps co-exist with modern automation technologies. In such an environment, achieving reliable networking for large data volumes – and the low latency connectivity needed for real-time processing – is one of the key success factors for any smart factory initiative.

Turning these brownfield environments into smart factories relies on multiple factors:

Industrial IoT platform and analytics capabilities: important for data collection and analysis in process, quality and asset management.

Flexible, secure and high-performance networking: essential to data processing and product management in digital twinning and digital threads.

Low latency connectivity: some 80% of manufacturers believe that connectivity such as 5G is a top-two enabler of their digital transformation, just behind cloud computing.

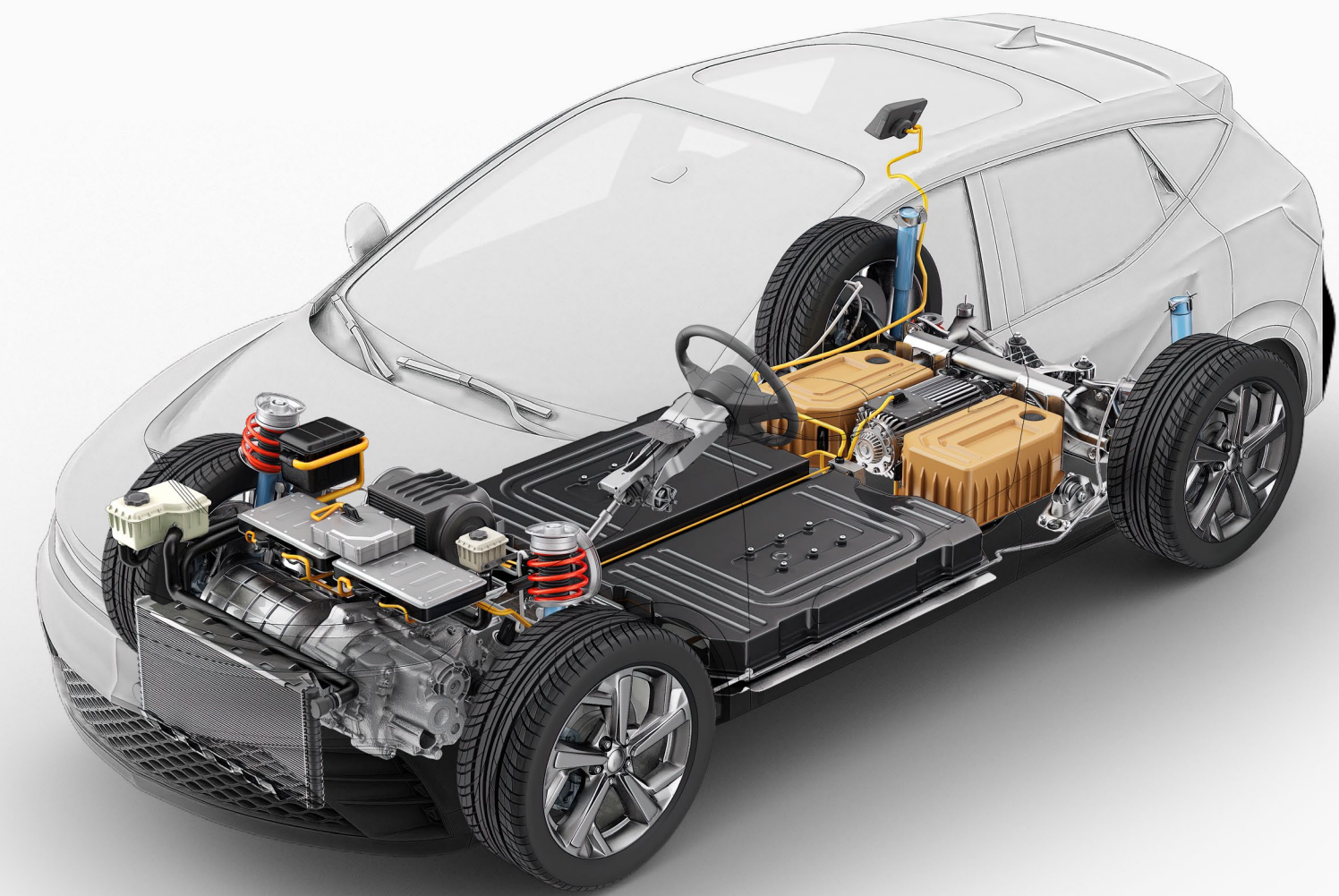
A hybrid approach from edge to cloud: for managing real-time and non-real-time applications, software-defined networking capabilities, and holistic zero trust security through an agnostic platform, this has shown to be the most successful way forward – providing the best choice for agile and smart operations.

Get there faster with VMware and Intel

Leveraging software-defined networking is one of the first steps toward flexible and reliable networking across a global manufacturing, distribution and dealership footprint. Because SD-WAN is cloud-delivered and software-based, it allows for quick adaptation to changing needs, including adding access to cloud-based services, standing up new factories or remote offices, and dynamic steering of all traffic for optimized application and data delivery.

Private Mobile Networking offers seamless networking from the edge to the cloud, enabling manufacturers to leverage the benefits of 5G, 4G, Wi-Fi and physical networks and then consistently turn operational data into intelligence and action.

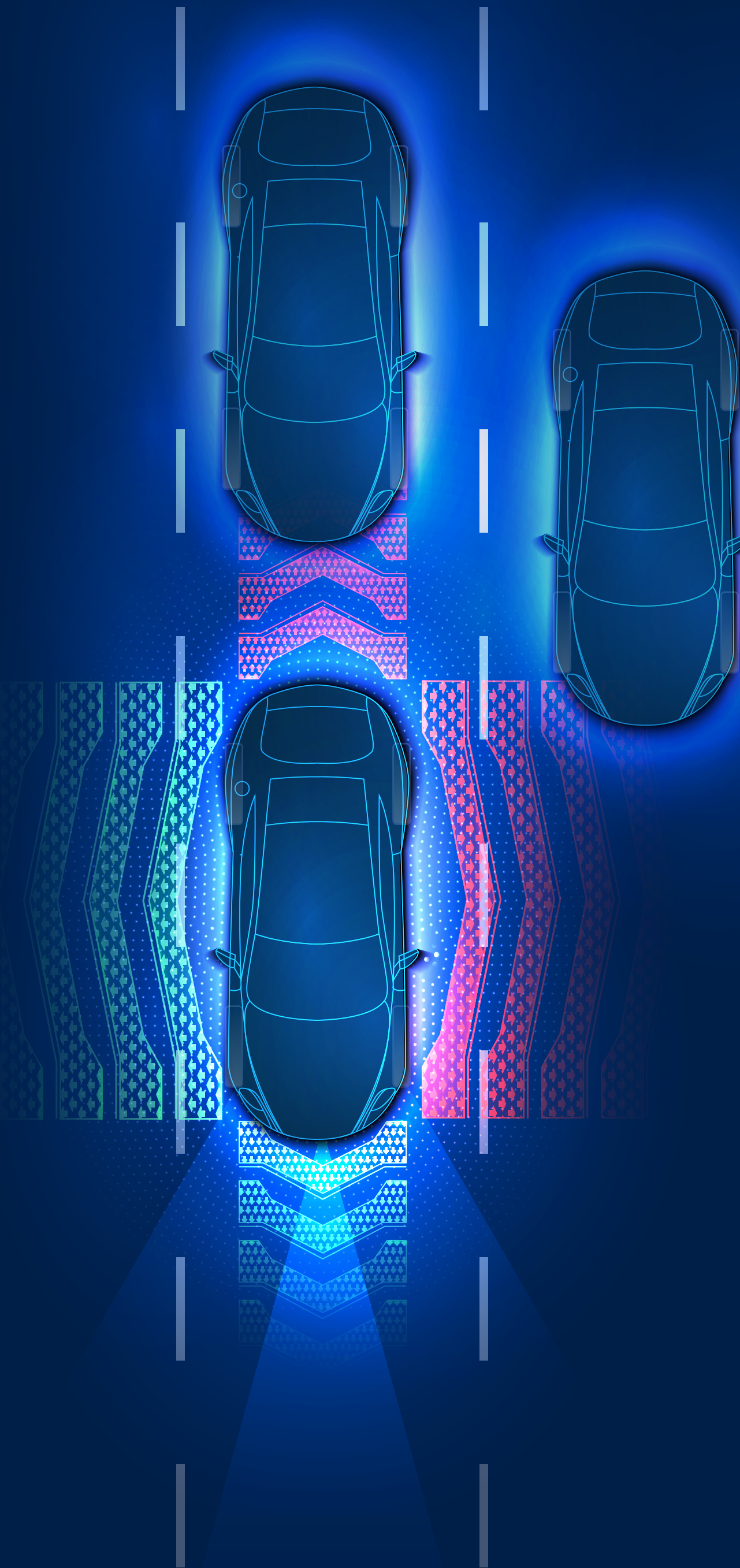
VMware and Intel deliver solutions that enable IT organizations to confidently integrate edge and cloud, facilitating real-time data analytics and providing the technology foundation for smart manufacturing adoption. These solutions include: a private mobile networking platform including 5G capabilities; an edge to cloud compute platform; software-defined networking and security management; application and container management; and AI/ML capabilities.



Master AI/ML to drive insights & performance

To demonstrate how VMware and Intel can support auto manufacturers to drive operational efficiencies and smart manufacturing, let's take the example of a robotic motion planning/control and perception workload that can be consolidated on a single Intel Si platform.

By consolidating the workload in this way, a manufacturer can gain automated real-time control of a robot arm with a 2ms cycle time – enhancing its performance. AI inferencing enables object detection, pose detection and object classification, and this is supported by the ability to port the workload from a single IPC to a server or cloud with virtualization technologies. Two solutions are key here



Intel RealSense™ model D415 camera.

With a field of view that covers the conveyors, the AI engine can make inferences from streamed 2D/3D camera images, using selected algorithms that have been optimized for best performance on Intel Si platforms.

Real-time Motion Planning.

The AI-inferred detection and pose of the objects is fed to the motion planning software, to enable the tracking of objects on the conveyor and the real-time update of the robotic arm travel plan toward them until the pick. In this scenario, Intel technologies enable real-time in-line inspection, autonomous operation, a shortening of robot training and repurposing, and accelerated time-to-value from robotics solutions. VMware technologies enable the workload management and distribution to the edge or cloud – bringing the scalability, flexibility, and manageability to ensure seamless integration of ground-breaking technologies into the smart connected factory.



Meet the expectations of a diverse workforce

The opportunity

As the smart factories of the future evolve – and the speed at which manufacturer innovate becomes more competitively important – organizations will need to increasingly empower their frontline workers. This will place a premium on the philosophy of open innovation, a focus on customer service beyond vehicle sales, and a strategy that positions technology as the key enabler to productivity.

In pursuit of such a future, leveraging new, digitally enabled ways of working can help reduce costs and improve efficiency, freeing up resources that can be directed into further connected, autonomous, shared, and electric (CASE) innovation.

And, as recruiting and retaining talent is one of the key challenges across the industry, providing the ultimate employee experience across the lifecycle can be a differentiator – achieved through seamless onboarding, the latest collaboration tools, DevSecOps platforms with ultimate flexibility of choice and interactivity, and on-the-job training solutions.

With the help of emerging VR and AR tools, automotive companies will also be able to drive better and faster research and development, improve engineering capabilities, create more jobs and develop more productive manufacturing facilities.

Ultimately, they will have a stronger, smarter workforce with the help of digital workplace technologies that enable truly open collaboration and innovation.

Get there faster with VMware and Intel

VMware can enhance your employee lifecycle experience from the very start – from swift onboarding and ease of device and application set-up to flexible, high performance work environments that increase productivity on any device and in any location.

We also enable a shortening of time-to-market for new products and improve collaboration across R&D and Design & Engineering teams, by building next-generation virtual desktop infrastructure (VDI) and enabling real-time video and app streaming through VXR (AR/VR) capabilities for remote and frontline workers or trainees.

Using a cloud-based approach enables IT to securely deliver a great user experience – managing identities and devices while delivering apps and desktops through

a unified, zero trust platform (see “Ensure security is future-ready” section). For example, the Intel vPro platform, a leading hardware-based manageability and security platform, and VMware Workspace ONE, a leading solution for modern PC management, are being integrated by auto manufacturers to complete more IT tasks from a single pane of glass.

Organizations can also take advantage of chip-to-cloud PC management, where devices are managed and secured inside and outside the firewall and in-band and out-of-band, while improving employee experience and productivity. In addition, Intel Select Solutions for VDI with VMware Horizon enables a digital workspace with the efficient delivery of virtual desktops and apps that equip workers anywhere, anytime, and on any device.



Deliver against sustainability targets

The opportunity

The EU has committed to cutting at least 55% of carbon emissions by 2030 – an aggressive target that demands the large-scale transformation of several sectors, including the automotive industry.

However, as powertrains electrify, the largest contributor to future automotive carbon emissions won't be from the tailpipe, but from the production of materials that make up the car. By 2030, at least one-third of vehicle-related carbon emissions will come from material production.

For example, while electric vehicles can significantly reduce use phase emissions, the energy- and emission-intensive production of materials – particularly batteries – will create a new challenge to the industry's efforts for decarbonization.

Future drivers and connected mobility service consumers will demand that automotive providers invest in ESG efforts and demonstrate progress. With a history of emissions scandals, the industry now has an opportunity build trust among tomorrow's drivers and the broader mobility market.

Get there faster with VMware and Intel

At VMware, we see virtualization technology as a bridge to the ambitious sustainability goals of the sector: and it comes with other significant business benefits. Our virtualization technology helps auto manufacturers reduce the environmental impact of IT and OT operations as organizations commit to digital transformation initiatives and increasing productivity.

VMware Edge Stack helps auto manufacturers lower energy consumption through the reduction of hardware footprint by introducing an Edge Compute Stack – a single platform for software-defined networking, application management, infrastructure and device management, and security at the edge.

Our seamless and agnostic approach to multi-cloud management and monitoring tools allows you to choose the most sustainable environments for your workloads, and helps you select the leading providers with the lowest carbon footprint across their operations.

Intel is also helping the automotive industry forge a path to sustainability by providing manufacturing technology solutions that enable businesses to capture, analyze, and act on operational data in near real-time. Leveraging more data with edge intelligence gives businesses the flexible controls and deeper perspectives they need to solve unique challenges and become sustainable smart factory leaders.



Ensure security
is future-ready



The opportunity

The automotive industry has always placed safety and security as top priorities but ensuring both has become an increasingly complex challenge as connected mobility evolves.

With the increase in vehicle connectivity and development of autonomous cars, the risks of cyberattack and its implications have risen. But many current safety-critical measures employed by auto manufacturers are not sufficient to cover these risks and comply with new standards – such as automotive cybersecurity certification ISO 21434.

And in the factory, as data from Industrial IoT technologies is collected and processed in multiple cloud, edge and on-premises environments, strict control and governance processes are needed to continually keep a business, its IP and its customers safe.

Automakers work in complex, multi-cloud ecosystems and need to provide a secure and safe environment for a distributed and remote workforce and enable real-time data exchange with numerous value chain partners: all while delivering outstanding mobility services and superior user experience.

Organizations therefore require a much more holistic security strategy which considers the interaction and interoperability of millions of devices, users and third parties.

Get there faster with VMware and Intel

Automotive organizations must approach security from a full-lifecycle perspective that starts at day one in product development, spans across the vehicle's ecosystem, customer interactions and data, all the way through to end-of-life.

VMware and Intel understand the auto industry's challenges and have developed a comprehensive security management platform to support organizations in securing an always-connected vehicle ecosystem.

We focus on proactively managing cyber risk through a zero-trust approach and enabling you to secure your operations from the data center to the distributed edge – through a holistic security solution portfolio that maximizes visibility, context and control, across any cloud, any app, and any device.

Intrinsic security from VMware, for example, uses threat intelligence and infrastructure to protect apps and data across endpoints, workloads, networks, workspaces, and clouds, while providing IT with visibility and control over policies that protect the business:

VMware Carbon Black is cloud-based protection technology that analyzes endpoint activity, identifies threats, and automates your response to block cyberattacks in real-time.

VMware SASE Platform provides secure, reliable and optimized access to traditional and new applications for mobile clients, branches and campuses, via a single, holistic solution.

VMware SD-WAN is a software-defined WAN overlay that ensures high-quality application performance and availability for end users while lowering networking costs.



Accelerate into the
shared mobility future

The opportunity

Today's automotive organizations have an incredible opportunity to lead a new age of mobility will benefit both citizens and them. Indeed, the mobility services industry has long proven its ability to play a pivotal role in tackling challenges such as congested cities and high carbon emissions – benefitting individuals, society and the planet.

Across the United States, Germany and China, for example, the mobility services market has grown to be worth more than \$140 billion over the last decade and will continue to do so as autonomous vehicles are launched.

The automotive industry's focus should be a transition from production of the technical product to shared services, intelligent mobility and an emphasis on customer experience. More players in the industry are now adopting an integrated value chain approach to mobility by developing new business models and service offerings.

Mobility services require integrated collaboration across a wide range of stakeholders and ecosystem players, app development and data management capabilities. OEMs, service providers and smart cities must work together to build common platforms based on open standards to facilitate data exchange and maximize the value for their end customers.

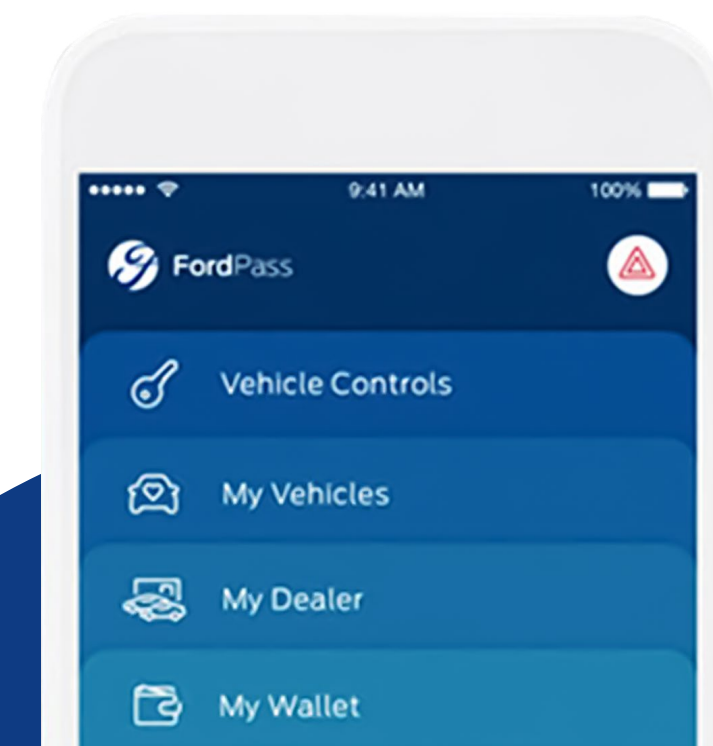
Get there faster with VMware and Intel

In the report Disruptive trends that will transform the auto industry, McKinsey predicted that “automotive revenues will significantly increase and diversify toward on-demand mobility services and data-driven services. This could create up to \$1.5 trillion – or 30% more – in additional revenue potential in 2030.”

VMware and Intel are dedicated to helping our automotive customers unlock that full potential via a transformative multi-cloud strategy – enabling the seamless delivery of new mobility services to customers and supporting secure data exchange in the automotive ecosystem.

VMware offers world-class expertise to help you implement and scale a production app platform that delivers enduring value for your business, and a great developer experience by leveraging our Tanzu Application Platform and Tanzu Labs services.

We drive multi-cloud capabilities to help build open platforms, easily and efficiently, integrating or shifting workloads in the wider ecosystem. Forrester named VMware a leader in both The Forrester Wave™: Cloud Cost Management and Optimization (CCMO), Q4 2020 and The Forrester Wave™: Hybrid Cloud Management, Q4 2020.



Ford accelerates connected mobility with groundbreaking app

The US-headquartered automotive leader developed a mobile app that lets users interact with their connected vehicle and perform tasks such as viewing diagnostic data and remotely locking/unlocking and starting the vehicle. It was created with a new approach to software development, enabled by VMware Tanzu Labs.



Your partnership for success

In the connected mobility future, sustained success in automotive manufacturing will come from investing in innovative new business models, effective data strategies, and integrated product and service capabilities built with modern applications. An efficient, sustainable and agile value chain is therefore vital for providing the exceptional employee and customer experiences that will create business growth.

The experience of VMware and Intel in the automotive sector means we are perfectly placed to transform your value chain using our latest technologies and industry-specific solutions.

We are so much more than IT providers. We are the perfect partners to accelerate technology adoption and help strengthen your entire value chain – from creating new business or operating models to modernizing IT infrastructure – wherever you are in your digital transformation journey.

Our platform-agnostic solutions will enable you to integrate existing legacy or cloud-based infrastructures, networks, and application ecosystems seamlessly and digitize your factories without reinventing your technology stacks.

As you power the new age of mobility for society, we are your trusted partners for automotive transformation and innovation in the fast lane.

Let's talk Get in touch to arrange a call:

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