

SDV Readiness Levels Explained

Foundation Technologies

Vehicle SDV readiness level	Level 0 Not connected	Level 1 Connected	Level 2 Basic upgrades	Level 3 Efficient upgrades	Level 4 Dynamic upgrades	Level 5 Full SDV
Vehicle capabilities	Static features	Can update maps over the air	Can update, debug, and upgrade infotainment and ADAS or powertrain	Can upgrade efficiently multiple domains in same OTA update	OTA updates across 3+ domains, dynamic compute power and memory allocation, and 24/7 cybersecurity updates	Real-time updates and dynamic resource allocation across 4+ domains, ensuring future-proof adaptability to new hardware configurations
Foundation technology						
OTA	Over the air (OTA)	No OTA	Basic OTA	Intermediate OTA		Full OTA
Software	Software architecture type	Signal type		Mix signal-service		Full service oriented
	Cybersecurity	Basic cybersecurity		Full embedded cybersecurity		Full embedded + cloud cybersecurity
	Unified Auto OS	Individual operating systems			Partially unified OS	Fully unified OS
Hardware	E/E architecture	Distributed or Domain		Basic Zonal		Advanced Zonal
	Backbone BUS	CAN				Ethernet

Source: S&P Global Mobility

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What consumers and OEMs gain at each level

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Benefit						
Consumers						
Feature freshness	-	✦✦	✦✦ ✦✦ ✦✦	✦✦ ✦✦ ✦✦	✦✦ ✦✦ ✦✦ ✦✦	✦✦ ✦✦ ✦✦ ✦✦ ✦✦
Customization	-	-	⊖	⊖	⊖ ⊖	⊖ ⊖ ⊖
Avoid dealership visits	-	🕒	🕒 🕒	🕒 🕒 🕒	🕒 🕒 🕒 🕒	🕒 🕒 🕒 🕒 🕒
Reduced recall costs	-	-	💰	💰 💰	💰 💰 💰	💰 💰 💰 💰
Streamlined developments	-	-	💰	💰 💰	💰 💰 💰	💰 💰 💰 💰
Reduced hardware cost	-	-	💰	💰 💰	💰 💰 💰	💰 💰 💰 💰
OEMs						
Dynamic resource utilization (compute & storage)	-	-	-	-	💰 💰	💰 💰 💰
Streamlined OTA deployments	-	-	☁️	☁️ ☁️	☁️ ☁️ ☁️	☁️ ☁️ ☁️ ☁️
New revenue streams	-	🪙	🪙🪙	🪙🪙	🪙🪙🪙	🪙🪙🪙🪙
Customer loyalty	-	-	♥️	♥️	♥️ ♥️	♥️ ♥️ ♥️

Source: S&P Global Mobility

Moving up SDV Readiness Levels: what's in End Customers and OEM?

	Foundation technologies	Towards SDV Readiness Level 5	Advantages for End Customer	Advantages for OEM
Connectivity	OTA	From Basic OTA (just map updated) to Full OTA (all domains, at least once a quarter)	Continuous software updates enhance vehicle performance and features across all vehicle domains, ensuring that customers always have access to the latest functionalities . Reduces the need for dealership visits for updates, improving convenience and satisfaction.	Reduces recall costs by allowing remote software fixes Improve fleet management capabilities, enabling OEMs to monitor and update vehicles efficiently. Facilitates new revenue streams through subscription models for updates and enhanced features.
	Software Architecture	From Signal-Type to Mix Signal-Service to Full Service-Type Software Architecture	Improved customization and feature updates without hardware changes, allowing customers to personalize their vehicle experience easily. Enables the addition of new features and enhancements over time , keeping the vehicle relevant as technology evolves.	Enables dynamic communication between software components, enhancing modularity and flexibility in software development . Streamlined development reduces costs and time-to-market by allowing for easier integration of new features across different vehicle models. Promotes cross-domain software reuse , optimizing resource allocation and reducing hardware costs.
Software	Cybersecurity	From Basic Cybersecurity (at ECU level only) to Full Embedded Cybersecurity	Enhanced security protects personal data, payment credentials , and driving behavior, providing peace of mind to customers. Reduces risks of hacking and data breaches, ensuring a safer overall driving experience.	Ensures compliance with regulations such as UNECE R155, reducing legal and reputational risks. Enhances the brand's reputation for safety and security, fostering customer loyalty and trust.
	Unified Auto OS	Individual OS to Fully Unified OS	Provides a consistent user experience across different vehicle models, making it easier for customers to transition between vehicles. Streamlines access to features and updates, improving overall usability .	Simplifies software management and integration processes, reducing fragmentation and improving efficiency. Enables dynamic allocation of compute and storage resources, reduces need for redundant hardware leading to lower hardware costs Lowers operational costs by enabling standardization of software across different models, accelerating development cycles and enhancing customer loyalty .
	E/E Architecture	From Distributed or Domain to Advanced Zonal Architecture	Allows for seamless and more frequent software updates across multiple domains, ensuring vehicles remain up-to-date with the latest features and optimizations.	Lowers wiring costs, weight and complexity and streamlines assembly processes . Facilitates easier integration of new features and faster model updates, improving scalability across different vehicle models.
Hardware	Backbone BUS	From CAN to Ethernet Backbone BUS	Enables seamless connectivity for higher-resolution streaming and improved vehicle-to-cloud communication, enhancing the overall ownership experience .	Supports high data demands for advanced features such as autonomous driving. Reduces wiring costs and complexity by consolidating communications into a single, scalable, and standardized network. Ensures compatibility with next-generation digital services , facilitates easier integration of cloud services and AI-driven features, and helps OEMs attract skilled developers from IT and consumer electronics sectors