

# From automobile to autopilot.

## 2.8cm

are added to the braking distance when a self-driving vehicle going 100 km/h is stopped remotely over a 5G network. 2.40 meters would be added under the current standard.

Source: www.mobileworldlive.com



## 5G

has a latency of 1 millisecond. Humans cannot perceive a delay that short. However, 25 milliseconds can be too much for a driverless vehicle or a surgical robot. 5G will respond within around one millisecond.

Source: www.sueddeutsche.de



THREE THINGS WILL REVOLUTIONIZE THE FUTURE OF MOTOR VEHICLES: CONNECTIVITY, ARTIFICIAL INTELLIGENCE AND PREDICTIVE ANALYTICS WITH BIG DATA. TODAY'S CARS ALREADY FIND THEIR OWN PARKING SPACES, AUTOMATICALLY PAY PARKING FEES, REPORT THEIR STATE OF WEAR TO AUTO REPAIR SHOPS AND FIND THE CHEAPEST GAS STATION. CARS OPEN THEIR TRUNKS TO ACCEPT PACKAGES IN PARKING SPACES OR SEND ESSENTIAL DATA TO SHOPPERS' CELL PHONES ON THE SHOWROOM FLOOR. AS CARS BECOME MORE CONNECTED, THEY ARE ALSO GAINING AUTONOMY. DRIVING FROM THE DEALERSHIP TO THE PARKING SPACE OR FROM THE GAS STATION TO THE REPAIR SHOP IS JUST THE FIRST STEP.

<Copy> Guido Reinking

WHILE THE ELECTRIC CAR is not the blockbuster everyone thought it would be – at least not in Germany – the connected car is conquering the market without financial incentives or special lanes. Every day, customers adopt brand-new services enabled by fast, stable and secure Internet connections.

One of them is BMW. "Digitization will massively change how we use cars in the years to come. Soon, we will have digital services that completely connect us to the world around us, on the road and at home," explained Dieter May, Senior Vice President Digital Services and Business Models at BMW

Group. "Cars will become smart devices: intelligently networked, seamlessly integrated and perfectly tailored to each user's unique needs. We've demonstrated this vision in the first version of BMW Connected."

### DATA CENTERS ON WHEELS

BMW Connected supports seamless communications between the car and the driver's smartphone, Apple Watch or other devices. For example, an electronic smartphone calendar can communicate with the car navigation system. Using real-time traf-

fic information, it then displays the perfect time to leave in order to arrive at the next scheduled appointment on time. Not only that, but the destination is already loaded in the navigation system when the driver gets into the car. BMW Connected also helps import locations and special points of interest from other apps. Drivers of hybrid or BMW i vehicles can even check their vehicle's range or state of charge while still outside the car and adjust their travel plans accordingly.

Thanks to a solution jointly developed by BMW and T-Systems, BMW Connected users can surf the

“CARS WILL BECOME SMART DEVICES, PERFECTLY TAILORED TO EACH USER’S UNIQUE NEEDS.”

Dieter May, SVP Digital Services and Business Models BMW Group

Internet from their car at maximum LTE speeds. The solution supports a wide array of end-user devices, from BMW Touch Command to laptops, tablets and mobile phones from various manufacturers. All told, up to ten devices can link up to the BMW WLAN hotspot at a time. The devices communicate via a SIM card embedded in the vehicle and a WLAN hotspot obtained through Deutsche Telekom’s HotSpot Drive service. That makes it possible to access the Internet across Europe and in non-European countries. Users can easily sign up for rate plans after registering for the service and switch between them as needed.

Reinhard Clemens, Member of the Board of Management Deutsche Telekom AG and CEO of T-Systems, noted, “We are providing cars with the best possible networks. Car digitization depends heavily on IT and telecommunications. Being an experienced automotive industry partner, we are thrilled about this alliance.” This also marks the first time that motor vehicles are being equipped with an integrated eSIM. This device can be updated over the air and, unlike old SIM cards, doesn’t have to be physically replaced. eSIM is the brainchild of Giesecke & Devrient (G&D). The banknote, credit card and SIM card specialist has been working with

Deutsche Telekom in international committees for years to develop an open eSIM standard that is not only versatile, but also reliably wards off abuse, data theft and hacking attacks on cars. Security matters: first-generation connected cars are vulnerable, as successful hacks have repeatedly demonstrated.

Connected cars account for 80 percent of new vehicles. Many see this as the start of a beautiful friendship: automobiles are moving from dumbly following orders to intelligently interacting with drivers. Others, by contrast, are worried: these “data centers on wheels” will be juicy targets for cyber-criminals. That’s why security comes first when digitizing motor vehicles. Effective cyber protection is the only way for connected cars to travel safely on the data superhighway. To address this concern, T-Systems and Deutsche Telekom have developed an end-to-end security solution – a form of cyber defense as a service – for the entire automotive ecosystem, from mobile security to backend security.

**PROTECTING CARS FROM CYBER CRIME 24/7**

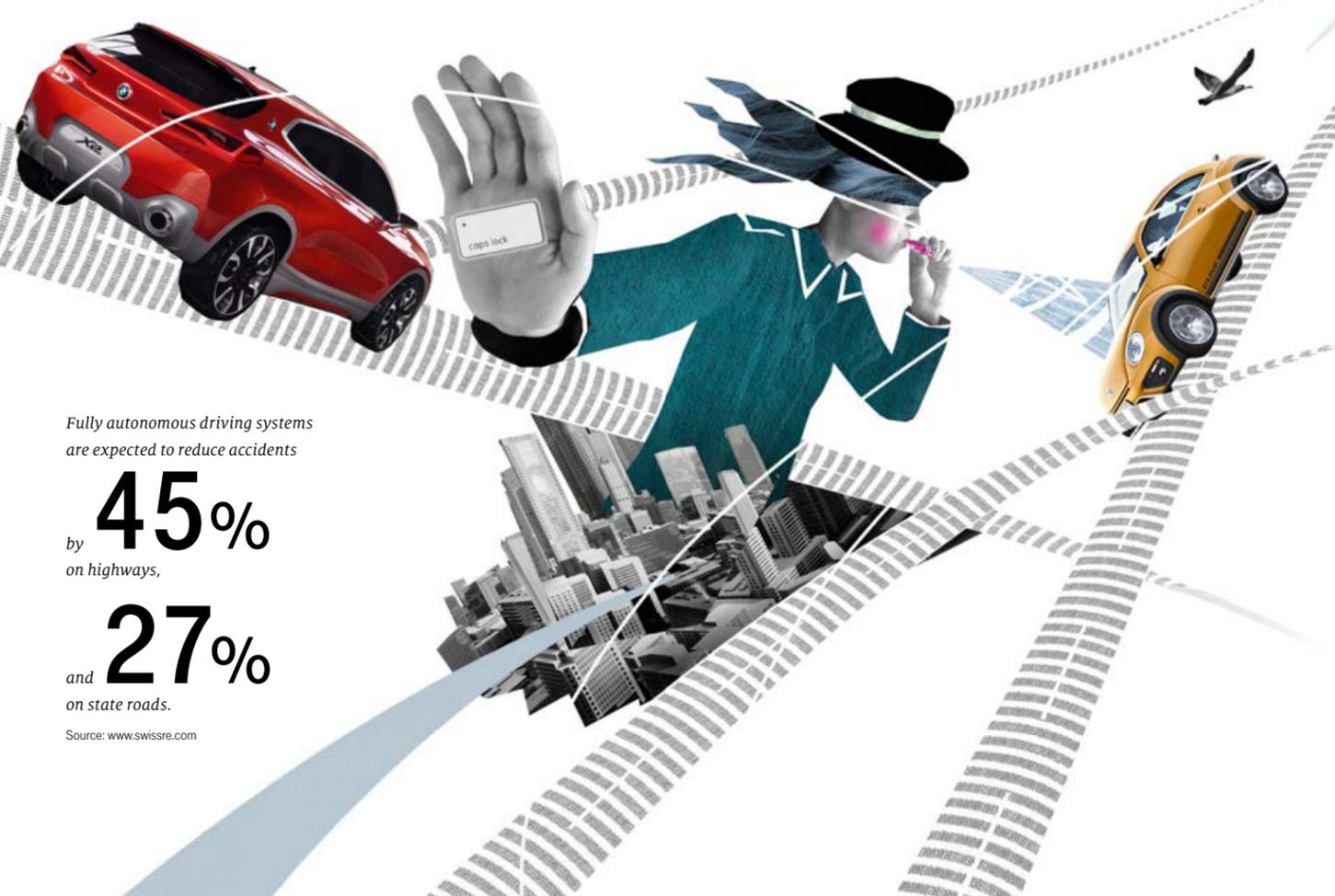
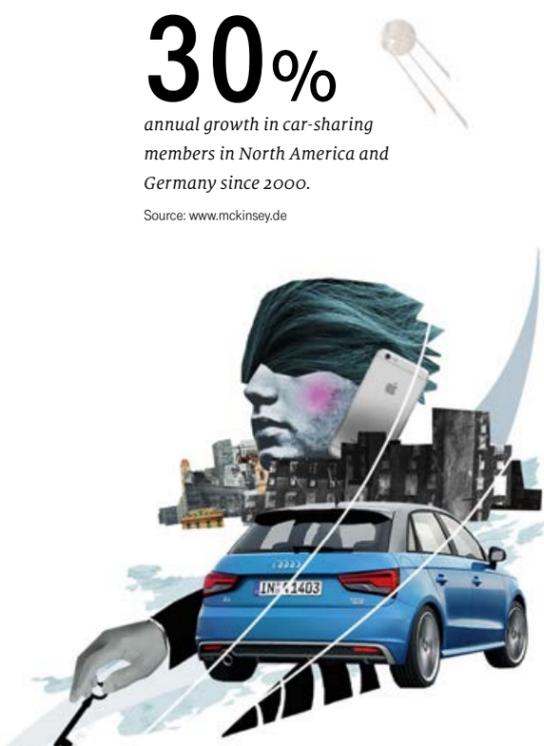
The solution’s core is an application known as Embedded Security Locks, or ESLOCKS for short. This cloud-based intrusion detection system recog-

There has been over

**30%**

annual growth in car-sharing members in North America and Germany since 2000.

Source: www.mckinsey.de



Fully autonomous driving systems are expected to reduce accidents

by **45%** on highways,

and **27%** on state roads.

Source: www.swissre.com

nizes cyber attacks launched against the car and immediately takes countermeasures, for example if a hacker tries to disable the windshield wipers during a rainstorm. The self-learning system doesn’t just spot anomalies in a single vehicle, though; it also tracks irregularities across entire fleets. The resulting insights are bundled into constant security updates for the entire vehicle network.

Integration is the secret to e-mobility success. This has been demonstrated in Austria by the SEAMLESS project (Sustainable Efficient Austrian Mobility with Low Emission Shared Systems). The SEAMLESS consortium, comprising T-Systems, the Austrian Institute of Technology and Austria Post, is working on a multimodal mobility solution. This system, which will initially focus on corporate fleets, lets users choose from a variety of transit options: not just cars, but also buses, trains and other means of transportation. SEAMLESS should be market-ready in two years. When it launches, users in the Vienna metro area – and later in other Austrian cities – can simply enter their travel dates and destinations and then reserve and pay for the best possible form of transportation, from bike sharing to electric cars to train tickets.

Illustration: Cindy Schmidt; Photo: Audi AG

**Showroom practice**

**AUDI’S POCKET-SIZED CAR SALESMAN.**



WHAT WILL TOMORROW’S CAR DEALERSHIP LOOK LIKE? Can brick-and-mortar businesses survive in the Internet age? These questions hit home for Germany’s 7,400 independent car dealers. They currently operate around 38,000 dealerships, but that number is dwindling. Now, a new answer has come from the Audi Center in Stuttgart: digitization. “By the time customers come to the showroom, they’ve already researched their desired model on the Internet,” said Aaron C. Arena, General Manager of Audi Center Stuttgart in Feuerbach. A few years ago, the average new-car buyer walked into dealerships five times before closing the deal. Today, it’s only 1.4 times. That raises the stakes for each visit.

The Audi Center in Stuttgart, the largest in Europe, has therefore invested in a T-Systems Customer Experience Management (CEM) module: “Showroom Proximity”. Arena explained, “We’re starting to digitize car dealerships.” The moment customers reach the dealership door, they are invited to download the CEM app onto their smartphone. The app steers them through the showroom. As they

approach each car on the sales floor, an “iBeacon” device in the vehicle beams information onto their smartphone via Bluetooth. They can download vehicle data, product images and videos from the cloud onto their smartphone with a single click.

Customers don’t just see technical details and upgrade options. “They also see special financing offers and sales promotions,” said Arena. Customers can save the information and compare it at their leisure once they get home. Dealers, for their part, know exactly what models visitors looked at, and they can provide specific information or suggest a test drive or one-on-one consultation to prospects who have provided their contact details.

There’s another benefit, too. The system is available outside regular dealership hours, on Sundays and holidays, for example, and at showroom windows. T-Systems engineered the CEM solution with the Stuttgart Audi Center and developed the interface for software and vehicle data so it would specifically address auto dealers’ needs. It now plans to extend the module to include used-car sales and auto service.

**Organizations see the biggest challenges of car connectivity in:**



Source: PAC, Connected Car in Europe, 2015

**43%**

of Europe's 250 automotive companies are already working on implementing projects for connected cars.

Source: PAC, Connected Car in Europe, 2015

Much of the development focuses on electric cars. "People going on long trips get cars with enough battery charge to reach their destination. If you're only driving a short way, you are given a car with less charge," explained Fritz Vogel, Partner and CEO of Enio. The Austrian start-up specializes in smart, connected charging infrastructure and operates 3,000 charging stations in Europe. As a member of the SEAMLESS consortium, Enio is seeking ways to charge vehicles primarily during peak periods for green power production since clean electricity will be cheap, or even free, during these times.

**E-MOBILITY NEEDS INTERACTIVE CHARGING INFRASTRUCTURE**

"Car sharing is the ideal application for electric cars," said Vogel. It avoids many of the drawbacks that stop companies and individuals from buying a vehicle. Car sharing users don't have to worry about range, charging infrastructure or high sticker prices. They pick up a car that is charged enough for their trip. And the operating costs are virtually unbeatable thanks to lower energy costs than diesel or gasoline. The system will first be

used with Austria Post's corporate fleet. However, SEAMLESS is also working with a car sharing provider that serves smaller communities. The project therefore has the potential to give tremendous impetus to e-mobility.

"Like many innovations, car sharing relies on cloud applications that intelligently link data and information from multiple sources and provide anytime, anyplace access to it," explained Dr. Marc Schmickler from T-Systems. The SI expert is convinced that "the implementation of innovations cannot be permanently separated from an organization's standard IT set-up, but rather requires an integrated strategy for a holistic digital concept".

One fast, painless way to the cloud is Cloudifier, a managed service offered by TSI Global IT. It quickly and reliably transforms applications to cloud services on a defined schedule for a fixed price, or simply builds cloud-native applications from the ground up for customers. "Cloudifier is a customer promise that enables organizations to easily and rapidly deploy business ideas and innovation projects while retaining full cost and performance control and visibility."

**VPN: THE SECURE TUNNEL**

At the same time, T-Systems is working to refine central information portals for carmakers. Drivers who log into the portals can communicate with their cars from anywhere and download relevant vehicle data. In the remote online version, they can even turn on the car's block heater or lock or unlock its doors from afar. The systems also help drivers in the event of an accident, breakdown or maintenance event – including scheduling appointments at a repair or service shop.

To shield data and in-car systems from hackers, the vehicle communicates with the OEM's connected car platform over a secure virtual private network (VPN). This specially protected connection allows data to be securely transferred. The architecture also acts as a gateway to external service providers and anonymizes requests sent from the car in order to meet customers' demanding privacy expectations. One manufacturer already has up to 2.5 million vehicles registered on the platform that T-Systems operates for it.

Connecting vehicles to drivers, central backends and the surrounding environment is essential for autonomous mobility. However, since self-

driving vehicles produce and consume vast amounts of data – from road conditions to nearby hazards to speed limits and traffic information – conventional cellular networks struggle to keep up. That is why T-Systems is collaborating with the German Research Center for Artificial Intelligence to build a communications system based on the future 5G mobile network standard. The German state of Saarland, in particular, is supposed to serve as the nation's pilot region for this vital technology that will enable safe, secure driverless cars. Once the system is rolled out, it will provide smart traffic management by communicating directly with vehicles, preventing accidents and traffic jams and thereby improving safety and reducing pollution. Simply alerting vehicles to available parking spaces during peak periods could reduce downtown traffic volumes by up to 30 percent. In the end, rush-hour chaos could become a calm, orderly procession. All thanks to connected mobility.

<Contact> [hermann.haenle@t-systems.com](mailto:hermann.haenle@t-systems.com)  
 <Links> [www.t-systems.com/automotive](http://www.t-systems.com/automotive)  
[www.t-systems.com/cloudifier](http://www.t-systems.com/cloudifier)

**Interview**

**DIGITAL TRANSFORMATION IS HERE TO STAY.**

Volkswagen Group CDO Johann Jungwirth on the challenges faced by auto manufacturers due to digitization and how VW is driving change at three levels: the customer, the product and the company.



**The digital transformation of the automotive industry is running on four different tracks: production, product, sales and in-house data administration. Which area do you think offers the greatest profit potential?**

We've defined three main tiers at Volkswagen: digital customer, digital products and digital company, or "D cubed". Our activities revolve around the customer, the user and the person. Digital transformation needs to be taken seriously. Some trends are here-today, gone-tomorrow hype. Not digitization, though. It's here to stay. Digital transformation will disrupt many different industries. And we know from experience that established players don't always emerge from disruptions as the winners. That's why we're proactively driving this change ourselves at every level in order to be one of the winners.

**Connectivity is an important aspect of digitization. How connected do we have to become in order to see significant improvements in traffic safety? How can we get to the point where all makes of vehicles speak the "same language" worldwide?**

We're not primarily focused on getting the vehicles to speak the same language. The

real disruption of the automotive industry is happening simultaneously along three different axes: the transformation from the internal combustion engine to the electric motor; the move from human drivers to self-driving vehicles; and the shift from owned to shared mobility. We will see the biggest improvement in traffic safety – which could potentially reduce traffic accidents by up to 90 percent – when we introduce safe driverless vehicles.

**What's your mobility vision? What stages do we still have to complete to finally achieve the goal of autonomous driving? Or is that not the real goal?**

The real goal and vision is this: mobility for everyone! We have a huge opportunity to democratize mobility and improve social mobility by introducing self-driving vehicles and rolling out sizable shared autonomy fleets across the globe. We can enable sustainable, personal mobility for everyone – even the blind, sick, old, very young or less well-off – and significantly improve their quality of life. And we can reclaim the 38,000 hours of time that the average person spends at the steering wheel. In the future, we'll be able to read, study, work, relax, play with the kids or enjoy the scenery during the drive.