



Digital Car Key: **Secure, convenient and scalable solutions for the automotive industry**

Overview

The use of keyless and fob entry for vehicles has risen exponentially over the past five years. Technavio predicts that by 2020, the digital automotive car key market will increase by 11%, with an incremental growth of 1.93 million units year on year. However, global adoption is disrupted by concerns around security, with reports of vehicles being 'hacked' for remote access, so security is a prime concern for any OEM wishing to offer digital vehicle entry and operation services.

Leveraging G+D's technical excellence and expertise in mobile security, we provide a convenient yet highly secure solution that integrates seamlessly with existing OEM vehicle entry and operations, allowing users to access their vehicles through a smartphone app.

Built with the needs of customers at its heart, the solution allows multiple keys to be easily shared amongst friends or family members, whilst still enabling the vehicle owner to retain control – enabling and revoking access at the touch of a button. This sharing functionality is adaptable, versatile and easily scalable, serving as a secure platform for car sharing or fleet mobility use cases.

G+D's Digital Car Key solution provides a full end-to-end functional enablement and security management service allowing OEMs to launch car access solutions through wearables, smartphones or NFC cards/fobs, and across technologies like Bluetooth, Passive Entry Passive Start (PEPS) technologies or Near-Field Communications (NFC).

Components of the Digital Car Key solution

- Secure Mobile App - Enables all car key use cases, from locking and unlocking to vehicle engine ignition, as well as seamlessly sharing car keys with others.
- Digital Car Key Service - Manages the generation, download, activation, distribution and termination of keys, and governs the integration to any OEM service portal.
- Embedded Secure Element (eSE) - Part of the the in-vehicle Electronic Control Unit, it authenticates the mobile car key both inside and outside of network coverage.
- Lifecycle Management Process - Fully integrated with G+D service platform to ensure long lifespans for any OEM car key service. It provides future-proofing for changes in user mobile device technologies.

1.93m

The digital automotive car key market will increase by 11%, with an incremental growth of 1.93 million units year on year.

The Digital Car Key solution in action

G+D's revolutionary Digital Car Key platform is an end-to-end platform specifically designed to enable multi-person access to vehicles via a smartphone app without compromising security. Whether it's a case of sharing access to a family vehicle or managing a fleet of vehicles with multiple users having differing levels of access, the Digital Car Key can handle any scenario with ease.

The platform works by equipping each vehicle with a car access unit, which contains NFC and/or Bluetooth 5 technology. The unit also contains a G+D common criteria, security certified Secure Element (eSE) which communicates with a smartphone app, fully protected by G+D. Between the app, and the vehicle is a robust, secure, cloud-based authentication platform that handles the validation and access for the Digital Car Keys on each device.

Digital Car Keys can be issued to the smartphone app on a permanent, per-session or time-delimited basis, and each key can be configured to activate only certain sections of the vehicle, distinguishing between door/trunk opening and engine activation. The solution can also be configured to manage multiple usage scenarios.

For example, you might issue your valeting and cleaning staff keys that allow opening of vehicle doors only, whilst your mechanics may have access to start the engine. This flexible functionality can enable a host of commercial applications such as fleet management, concierge services and car and truck rental. In particular, newer automated car-sharing services where the vehicle is given to the customer remotely, will benefit from this solution.

The platform is set up so that one person is designated as the owner, and only that person can issue new keys or amend access levels - ensuring access control is tightly maintained. This owner can re-issue or deactivate digital car keys in real-time if, for example, a user changes or loses their smart device. The owner can also provide full access to another user allowing them to grant or revoke digital car keys to someone else in turn. Seamlessly integrating with existing OEM key management facilities, once a Digital Car Key is activated - the user can still use it to access the vehicle without requiring internet access, perfect for underground parking facilities or areas with poor connectivity.

¹Technavio : <https://www.technavio.com/report/global-automotive-digital-key-market-analysis-share-2018>

²<https://www.appannie.com/en/insights/market-data/app-annie-2017-2022-forecast/>

Security and convenience: The perfect package

By 2022, AppAnnie predict that global mobile app downloads will exceed 258 billion per year, a 45% increase from 2017. Developers understand that, to stand out amongst this crowded market, they need to have the trust of consumers, creating a perfect mix of security and convenience. When considering the adoption of digital car key solutions, cybersecurity is the critical concern for vehicle OEMs. Manufacturers need to assure their customers that this technology is safe to use whilst also protecting their own reputation, image and business against cyber-attacks.

G+D's Digital Car Key platform has been built to the highest of security standards, ensuring data and vehicle access security across the whole lifecycle of the vehicle. A dedicated management service securely manages the Digital Car Key experience across every part of the platform, from key generation and encryption, to authentication, distribution and key sharing. The mobile app's core security protection is powered by CyWall. CyWall is a layered application security framework consisting of three different security features:

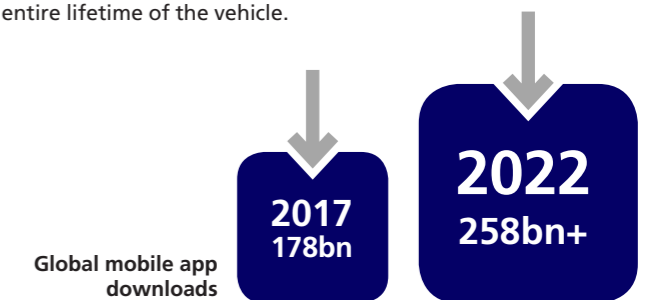
- Enhanced Security Functions: These functions provide the device's unique fingerprint and manage the secure connection between the CyWall client and the CyWall server.
- G+D White Box Cryptography (WBC): This is an attack resistant implementation of white box cryptography.
- It offers various algorithms like DES, TDES, AES, RSA as well as secure storage.
- Native Code Protection (NCP): The NCP prevents the binary code of the library from easily being reversed engineered and manipulated by hackers.

In preventing unauthorized analysis, modification, copying and usage of the most security-relevant parts of a mobile device, CyWall provides exactly what your customers demand, the prevention of illegal access to all-important user information.

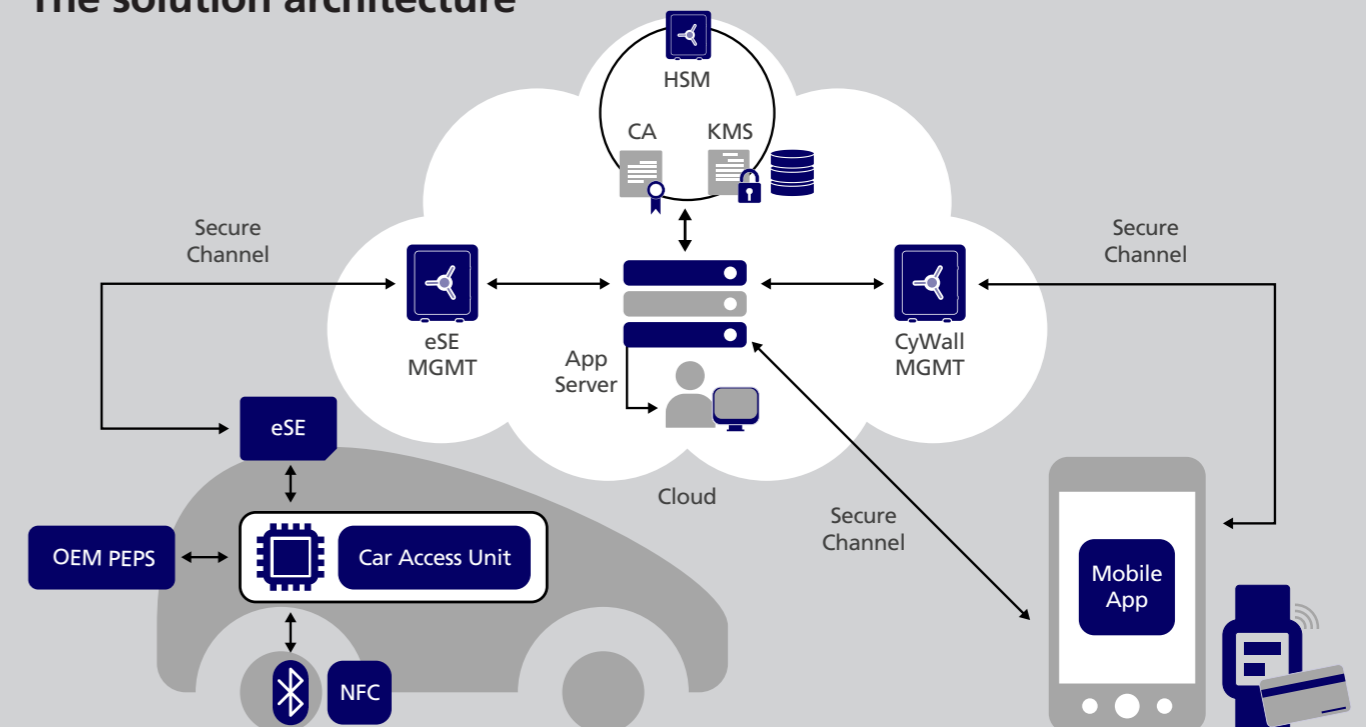
Apart from functional security, G+D's solution enforces process security. The app features two-factor authentication as standard via fingerprint or password to ensure only authorized users can access the app's functionality. All access information and vehicle interactions are securely logged for later auditing and investigations in the extremely unlikely chance that something does go wrong.

Before a user can download a key - the Mobile OS will present a security check, and the platform can notify OEMs if the app has been manipulated or the users' device is 'jailbroken' to allow the OEM to instantly take action. This is coupled with detailed forensic accounting and anti-fraud procedures.

No matter which version of G+D's Digital Car Key solution an OEM chooses to implement, they can be confident that security is woven in to every part of the experience, throughout the entire lifetime of the vehicle.



The solution architecture



Digital Car Key in action: XPENG Motors

The Chinese vehicle manufacturer, XPENG Motors, has equipped their latest next-generation vehicle, the P7, with an NFC-based implementation of G+D's Digital Car Key service. As standard, all vehicles will be sold with two NFC access cards in place of standard vehicle keys to open and operate the vehicles. In addition to this functionality, the Digital Car Key platform will seamlessly integrate with Chinese smartphone manufacturer Xiaomi's mobile NFC solution, enabling P7 drivers to share car keys securely over the air, and access their vehicle through their Xiaomi smartphone.



“ As an emerging intelligent vehicle brand, XPENG views the partnership with G+D as part of our extreme pursuit to excellence in information security and service innovation.



Rocky Liu,
Vice Product General Manager, XPENG

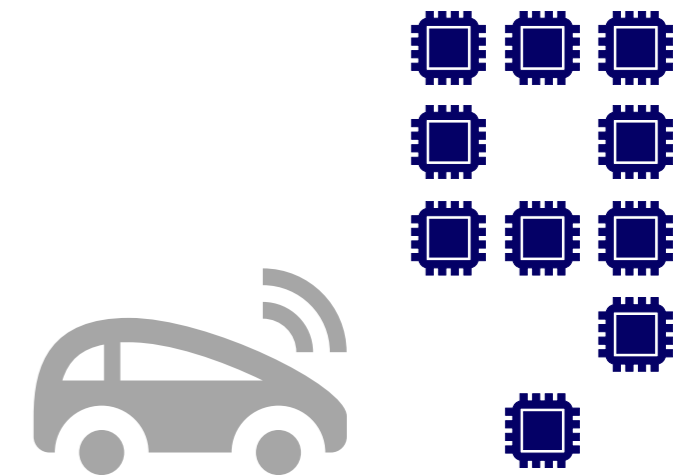
Why choose G+D for your digital car key?

G+D is one of the leading experts worldwide in security solutions for connected devices with years of experience in the mobile security field. The Digital Car Key solution benefits from this expertise, with every part of the solution rigorously tested and developed in CC-certified research and development centers. The functionality of the components is based on products that are in the field now and have already proven to be extremely reliable.

G+D joined the Car Connectivity Consortium as a core member to further pursue a standardized approach. CCC is a cross-industry organization advancing global technologies for smartphone-to-car connectivity solutions and developing digital keys, an exciting new open standard to allow smartphones to act as a vehicle key.

Managing identities in a connected world

As a global leader of identity management services, G+D ensures that digital identities and data remain secure and reliable at all times across industries. G+D brings comprehensive solutions that enable you to position yourself as a key player in the marketplace, ready to respond to the threats posed by agile game changers entering the market. G+D started its connected car SIM journey globally in 2012. Today 9 of the top 10 car manufacturers trust in our connected car solutions. G+D's automotive grade products that have been launched since 2010 are all produced in G+D's TS16949 certified production site. G+D is a member of the Car Connectivity Consortium.



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About Giesecke+Devrient

Giesecke+Devrient (G+D) is an international Group providing security technology and headquartered in Munich, Germany. Innovations by G+D make the lives of billions of people in the digital and physical world more secure. With its products and solutions, G+D is one of the market and technology leaders in payments, connectivity, identities, and digital infrastructures.

Established in 1852, the company achieved sales of €2.45 billion in the fiscal year 2019 and employs 11,500 people. G+D has a presence in 33 countries. Its customer base includes central and commercial banks, mobile network providers, automotive manufacturers, health insurance companies, and governments and public authorities. Further information: www.gi-de.com.



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CyWall products and services mentioned herein are currently only available in The People's Republic of China.

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