



Next stop: future of transport ticketing

Open standards pave the way for cost efficiency and upgradability



From big data to big impact on public transport

To date, Infineon has delivered over **2 billion** chips for transport ticketing projects worldwide

Clear trend toward open standards (CIPURSE™)



Public transport™

In 2021, the multi-application market will reach USD 1 billion



Ticketing

50 million transactions run smoothly every day in Seoul's public transportation network thanks to Infineon

Especially high growth rates in corporate, educational and entertainment, for instance, where access and services are combined



Access management

Opportunities

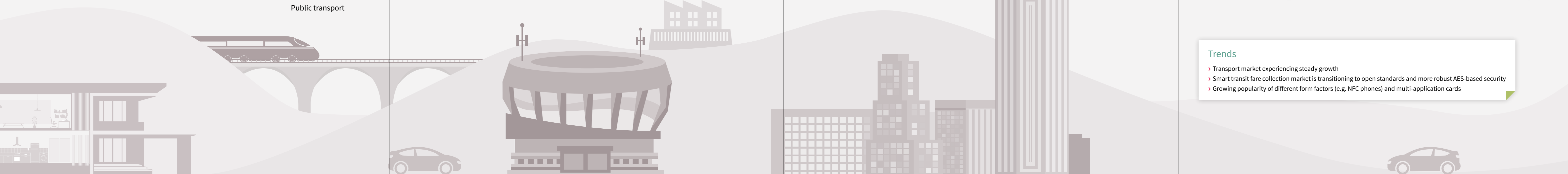
- › Utilize open standards to bring cost savings to operators and commuters
- › Prepare to deliver mobile ticketing and multi-application solutions – also on the basis of open standards
- › Increase adoption rates through mobile ticketing and multi-application solutions offering greater passenger convenience

Challenges

- › Public transport systems are usually very cost-sensitive. This limits the flexibility and innovation capabilities of transport operators
- › Operators of many existing systems need simple and fast migration paths toward open platforms
- › The only way to achieve a smooth migration path is by offering cards and tickets that support current and future applications on one single chip such as CIPURSE™4move with CIPURSE™ and NRG™ (ISO/IEC 14443-3 type A with CRYPTO1)

Trends

- › Transport market experiencing steady growth
- › Smart transit fare collection market is transitioning to open standards and more robust AES-based security
- › Growing popularity of different form factors (e.g. NFC phones) and multi-application cards



Urban mobility in motion

According to the World Health Organization (WHO), 70 percent of the world's population will live in cities or megacities by 2050. And they will all be looking for **smart, sustainable, accessible** and **secure** urban mobility choices. In an age of ubiquitous connectivity, consumers expect a personalized and convenient commute experience.



Discover a new travel experience

The future of transport ticketing will be driven by convenience. Today's city-dwellers want seamless, multi-modal services that include more flexible schemes such as car-sharing and bike rentals. They are looking to access all these different services with one single form factor - whether it be a ticket or, reflecting the growing Bring Your Own Ticket (BYOT) trend, with their own cellphone, bank card, smart wearable or ID card.

Speed and performance challenge

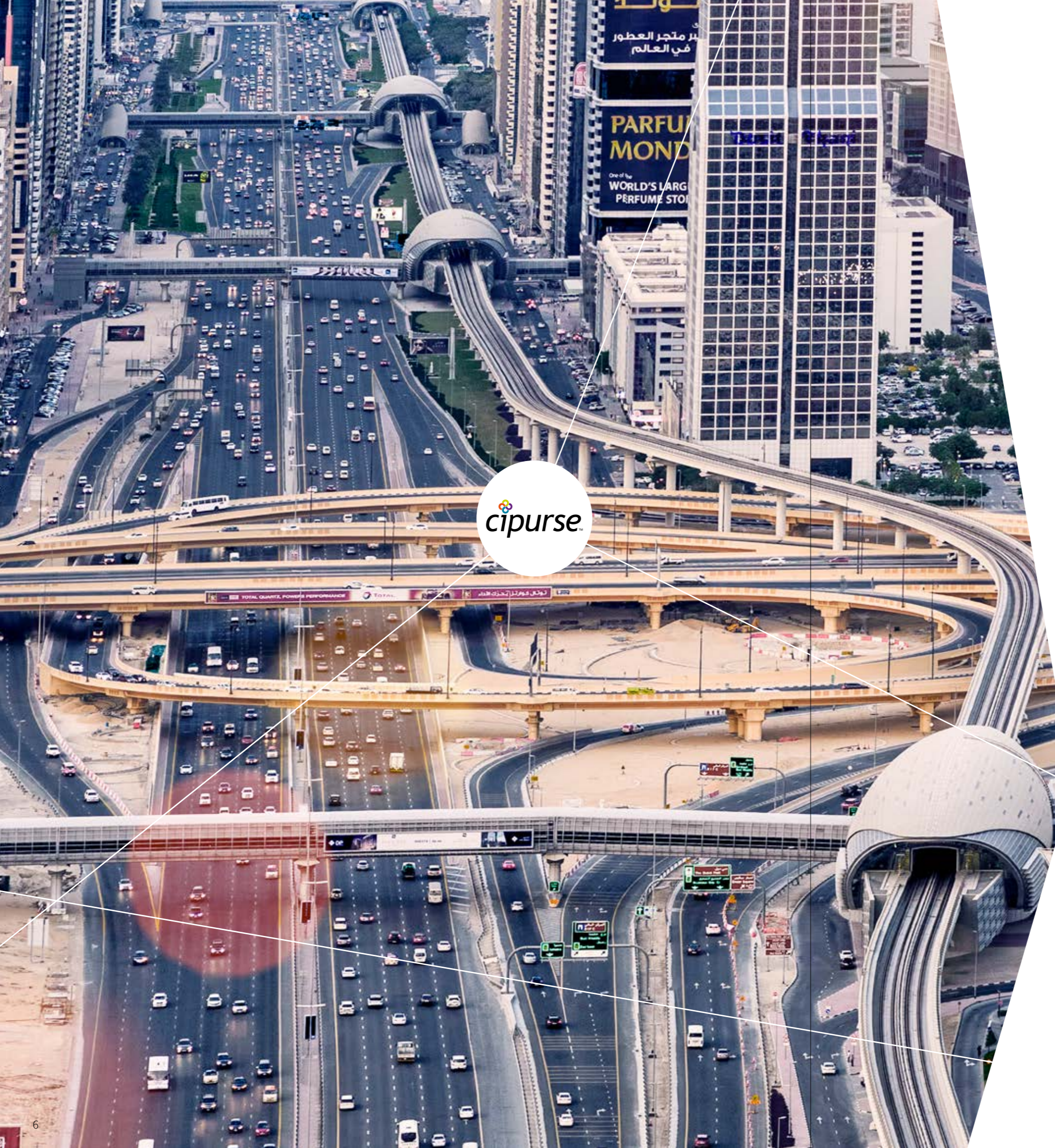
These new multi-purpose form factors have to combine the security associated with payment applications with the speed and performance typical of contactless ticketing schemes. This calls for new, more robust and faster security solutions capable of protecting passenger credentials and saving operators the costs associated with proprietary solutions, fraud and identity theft.

Proprietary lock-in

At present, most public transport systems collect fares using closed-loop applications and smart cards. Many of these collection systems rely on proprietary contactless technologies. The potential downsides of proprietary systems include vendor lock-in and single-source supply limitations, limited security and future interoperability issues. These can put transport operators and agencies at a significant cost disadvantage.

Call to multi-application with contactless or dual-interface cards

Interoperability problems will become more pronounced and costly as demand for multi-application cards with contactless or dual-interface (combining contactless with contact-based) functionality rises. In a bid to improve performance and interoperability, transport authorities are increasingly replacing proprietary legacy fare-collection deployments with future-oriented platforms based on open standards.



Interoperability through open standards

But what is an open standard? It is a standard that is publicly available and can be used by any market player. Open standards have equal, transparent terms and conditions – more commonly known as reasonable and non-discriminatory terms. Ideally, an independent body certifies open standard products and all industry players are free to join the standardization body and contribute to the standardization process.

This is a far healthier and more robust situation than a certification process that is controlled by a single company. In a nutshell, not only do open standards encourage healthy competition to the benefit of users, they also pave the way for new, interoperative and innovative multi-modal services – even across borders.

Popular open standards include Calypso, CIPURSE™ and ITSO. Places like China and Singapore also have their own national standards. CIPURSE™ for instance is one of the world's truly open, non-proprietary security standards for the transport ticketing industry and beyond. Managed and further developed by the OSPT Alliance, an independent standardization body, CIPURSE™ is open for all market players to join. It is highly flexible, supporting today's cards and tickets while also providing an evolution path toward multi-purpose solutions that integrate mobile ticketing without compromising on security. Offering a future-proof security architecture based on Advanced Encryption Standard (AES) 128-bit key length, CIPURSE™ eliminates the fraud problems that compromise so many existing proprietary systems.



Success factors

- › Protection of investment through systems that can be easily upgraded and evolved to support future requirements
- › Open infrastructure and reader design to support complete range of solutions from tickets and cards through multi-application solutions to mobile ticketing

Pioneering smart mobility solutions based on open standards

Infineon is firmly committed to solutions based on open standards and building on them to create a solid base for secured, successful transport ticketing and multi-application schemes that are fit for the future. As a leading supplier of semiconductor security solutions for transport ticketing applications, Infineon has already sold more than 5 billion ICs worldwide and offers the market's most comprehensive portfolio of transport ticketing chip solutions.

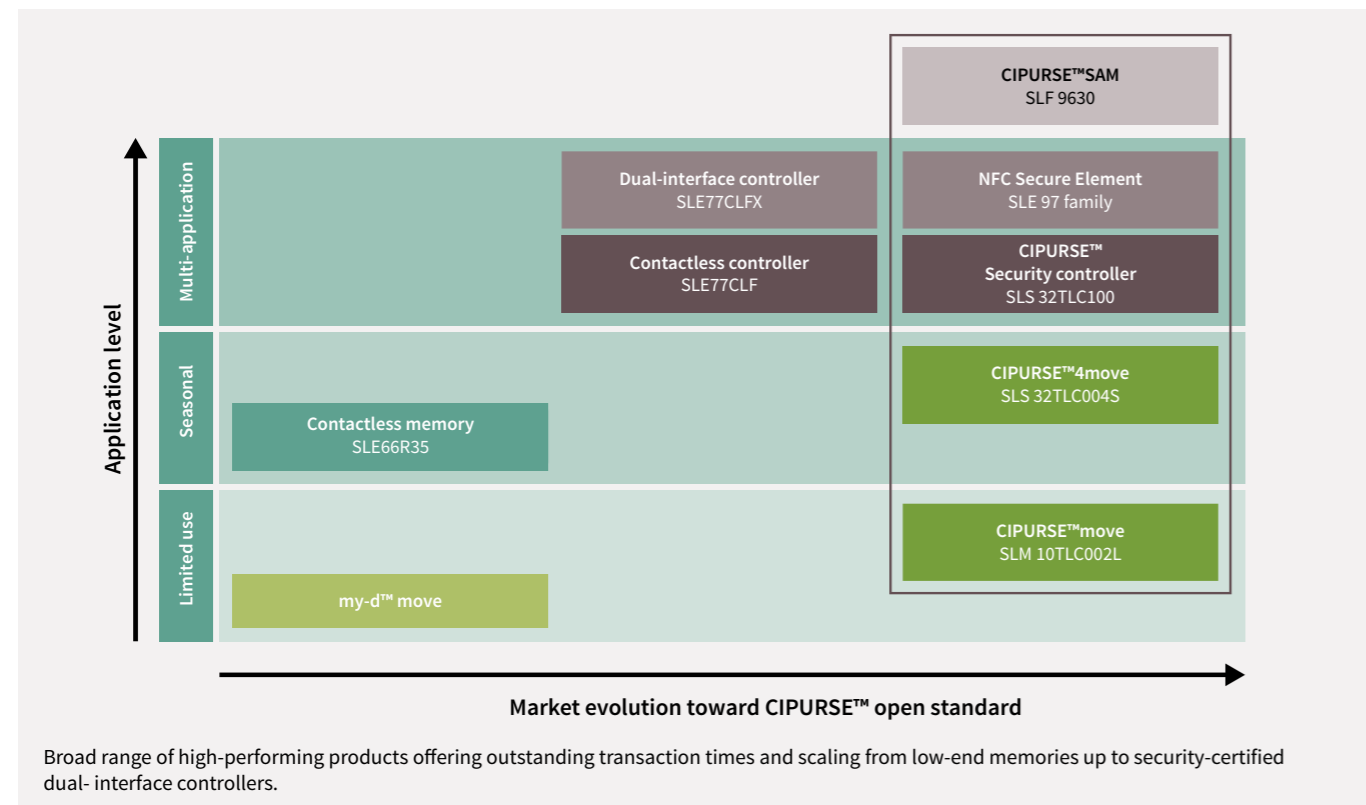
Infineon's position

- › Our transport ticketing portfolio is the market's most comprehensive, supporting all national and global open standards and everything from limited-use tickets to mobile ticketing
- › Our products allow smooth step-by-step migration to state-of-the-art transport ticketing systems
- › We also enable capability upgrades toward multi-application solutions and mobile ticketing
- › 50 million transactions run smoothly every day in Seoul's public transportation network thanks to Infineon

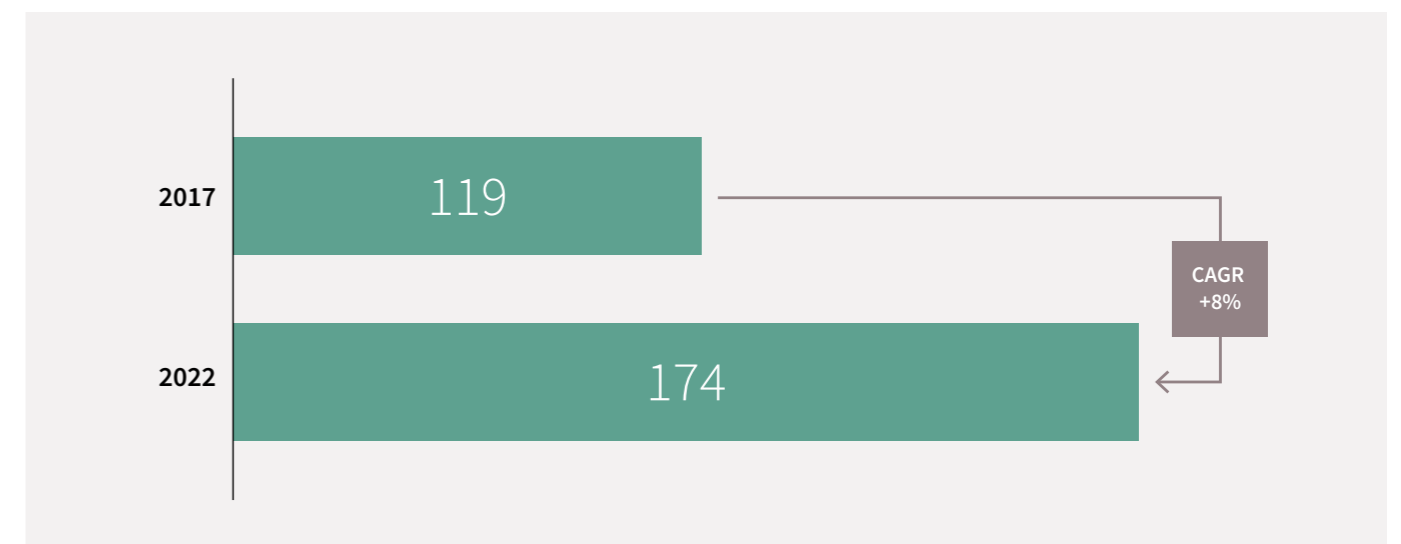
Designed to meet today's and tomorrow's ticketing security and performance challenges, this broad, best-in-class range benefits operators and end users by enabling the perfect fit for every application level.

It includes

- › Dedicated transport ticketing products such as low-end limited-use tickets (LUTs)
- › Security-certified multi-application ICs
- › Dual-interface solutions providing upgradability to EMV contactless deployments
- › Embedded secure elements for NFC-enabled mobile phones



Transport microcontroller and memory market (million USD)



Source: ABI Smart Cards and Embedded ICs, Q3 2017

Facts



Our CIPURSE™ products enable secured, interoperable and cost-efficient transport ticketing applications worldwide



CIPURSE™ Cryptographic Protocol with Inherent Side-Channel Resistance was awarded the German Prize for IT Security



For many years, we have been delivering our security controllers for Calypso projects around the world, offering the best contactless performance at ultra-competitive prices



ATM in Barcelona continues to implement CIPURSE™ in the city's T-Mobilitat project



We are proud to be the #1 foreign supplier for all MoT/MoC (Ministry of Transport / Ministry of Construction) projects in China



São Paulo and Rio were the first cities in South America to start using CIPURSE™



As a member of the OSPT Alliance and Calypso Network Association, we commit to open and fair access to worldwide markets

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Infiniteon distribution partners and sales offices:

www.infineon.com/WhereToBuy

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Infiniteon offers its toll-free 0800/4001 service hotline as one central number, available 24/7 in English, Mandarin and German.

- > Germany 0800 951 951 951 (German/English)
- > China, mainland 4001 200 951 (Mandarin/English)
- > India 000 800 4402 951 (English)
- > USA 1-866 951 9519 (English/German)
- > Other countries 00* 800 951 951 951 (English/German)
- > Direct access +49 89 234-0 (interconnection fee, German/English)

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