Transport Ticketing

Driving multi-application & transport ticketing on open standards

www.infineon.com/transport-ticketing

Rapidly Growing Market

Every day, millions and millions of people around the world use contactless cards and tickets. They are a fast, convenient way to access public transport facilities, enter office buildings, clock up loyalty points, use sports facilities, visit entertainment parks and attend events. Of these applications, the public transport sector is one of the fastest growing markets for smart card and security ICs. Ticketing is also the most frequently added function to multi-application cards such as dual-interface payment or identification cards.

The demand for ticketing solutions is being driven by a number of factors:
- Rising number of megacities worldwide
- Increasing urbanization of rural areas
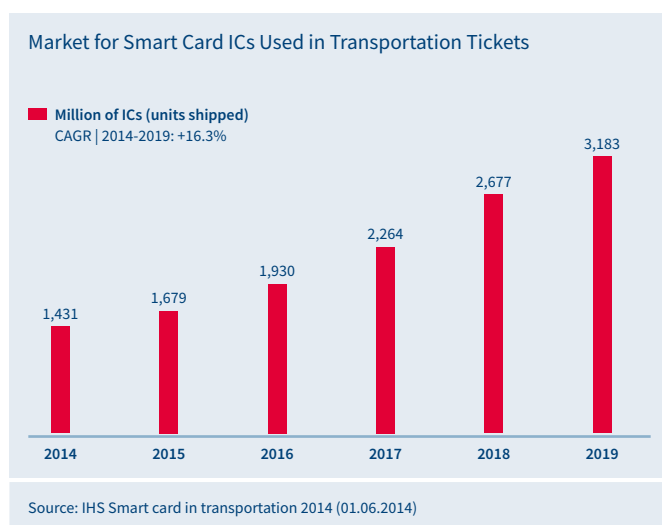- Need to connect outlying areas to metropolitan networks.

The world over, transport providers are thus challenged to put easy, affordable, secure and environmentally sound public transport services in place. Increasingly, private traffic is no longer viable in this context, not least because of the associated pollution and smog. Accordingly, governments are investing heavily in new and modernized infrastructures.

Many of these investments are also being prompted by the need to overcome the lack of interoperability and flexibility inherent in some of today's transport schemes, and to meet rising user demand for convenience. In particular, users are keen to have fewer cards in their wallets and the option of different payment methods for a trip, e.g. using an NFC-enabled mobile phone or dongle.

Rising performance and security challenges
Modernized infrastructures present their own technical challenges, however. Unlike other smart card applications for payment or identification, ticketing is contactless and has to rapidly handle extremely high – and rising – passenger numbers. Ticketing operators therefore have to deliver much greater speed and superior contactless performance than that typically required for other applications. In addition to speed, passengers expect the ultimate in convenience and reliability.

At present, many public transport systems collect fares using closed-loop applications and smart cards. Most of these collection systems rely on proprietary contactless technologies that often provide only a basic level of security. But the transport market is changing, demanding higher levels of security and greater flexibility through open standards as the most effective way of ensuring broad and highly competitive availability of components. The need for hack-resistant capabilities is also being driven by the growing trend to merge transport systems with other ticketing, identification and payment applications, which traditionally require much higher levels of security. These evolving standalone and multi-application requirements can only be met with platforms based on open standards.

Market for Smart Card ICs Used in Transportation Tickets

Million of ICs (units shipped)
CAGR | 2014-2019: +16.3%

2014	2015	2016	2017	2018	2019
1,431	1,679	1,930	2,264	2,677	3,183

Source: IHS Smart card in transportation 2014 (01.06.2014)

Open standards to unlock tomorrow's markets

In a bid to increase efficiency and performance, transport authorities are thus increasingly replacing proprietary legacy fare-collection deployments with future-oriented platforms supported by established market players and based on open standards. Embedded within a rich ecosystem, these new platforms offer greater scalability and interoperability across fare collection systems.

They also overcome the potential downsides of closed systems. These include vendor lock-in and single-source supply limitations, limited security and future interoperability issues due to different crypto algorithms and command sets across different product flavors. Interoperability problems will become more pronounced and costly as demand for multi-application cards with contactless functionality rises.

Broad Portfolio Scaling Across All Application Levels

As a leading supplier of secure semiconductor solutions for transport ticketing applications, Infineon has sold more than 5 billion ICs worldwide and offers the market's most comprehensive portfolio of chip solutions based on open standards. 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 ensuring 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.

Cost-effective LUT options

At the lower end of the spectrum, we have a range of chips compliant with ISO/IEC 14443. These devices are ideal for legacy schemes based on national standards. my-d™ move is a good example. This is a perfect drop-in replacement for Mifare Ultralight*, combining basic security with password protection, memory scalability and pre-configured NFC functionality. Reflecting the growing need for security in the LUT segment, our CIPURSE™move solution supports advanced AES 128 security capabilities and the CIPURSE™ L profile of the OSPT™ Alliance's CIPURSE™ open standard.

Path forward for seasonal cards and tickets

Our proven SLE 66R35 family featuring Mifare Classic* functionality is ideal for systems that cannot yet migrate to open standards. For state-of-the-art systems, we offer a range of future-proof CIPURSE™-compatible products for operators looking to upgrade existing infrastructures towards advanced AES 128-based security capabilities. These transport ticketing ICs are designed to deliver outstanding, robust contactless performance. For instance, CIPURSE™4move supports the CIPURSE™ S profile. It is compatible with Mifare Classic*, thus enabling easy transition of existing systems.

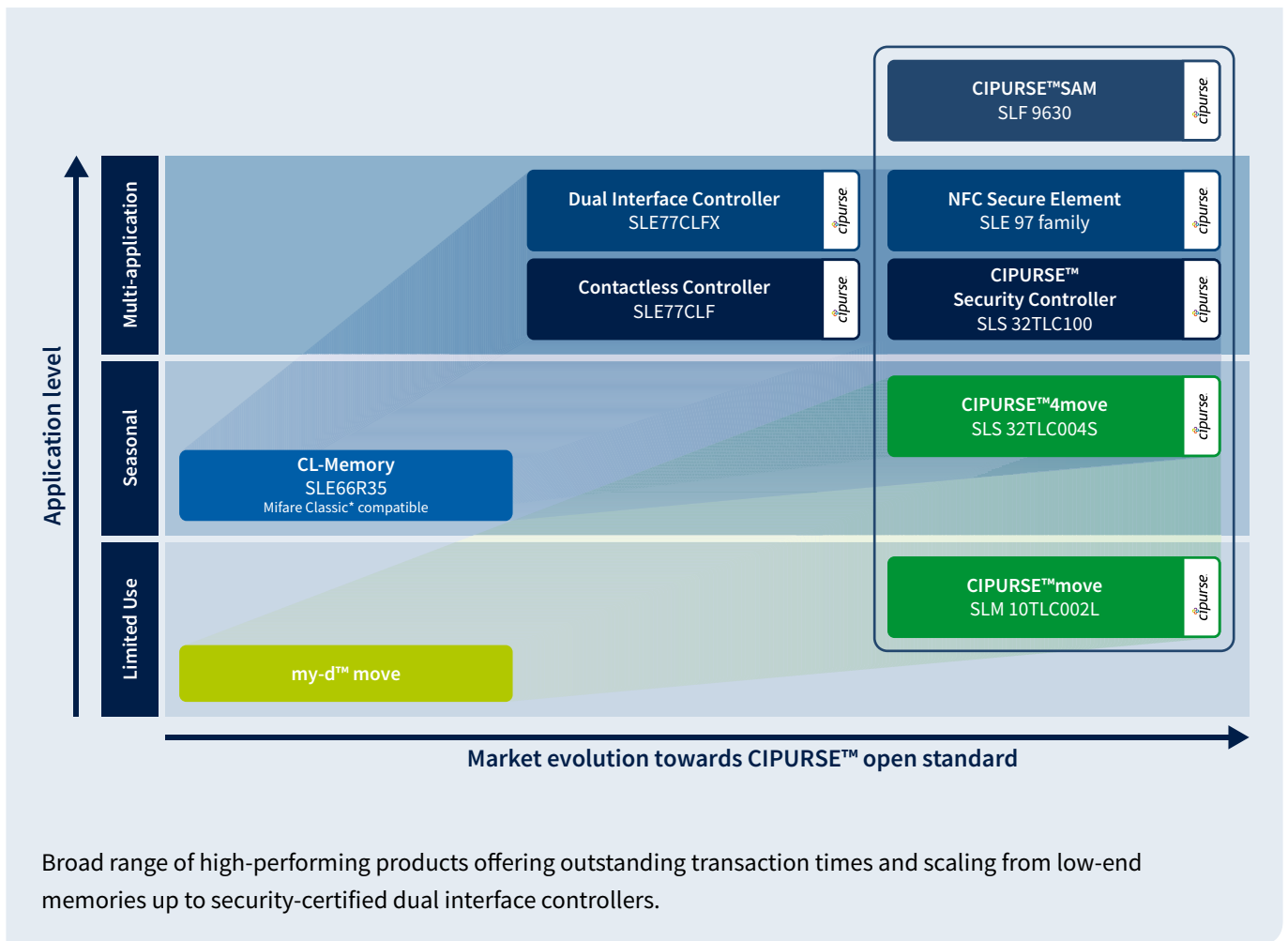## Adding value to high-end multi-application cards

For the most demanding needs, our high-end offering is built around our proven, high-performance, secure SLE 77 platform, available in various flavors for both national and open schemes. The latest series of contactless and dual-interface security controllers in the SLE 77 family features SOLID FLASH™ with EAL 5+ Common Criteria certification for the highest performance and security levels. With scalable memory and Mifare Classic* compatibility, the SLE 77 security microcontroller gives operators the flexibility to evolve towards multi-application functionality now and in the future. And thanks to support for the open CIPURSE™ standard, SLE 77 enables highly secure, flexible and extensible fare collection systems.

All of our multi-application product platforms (SLE 77, SLE 78, SLE 97) feature CIPURSE™ and NFC capabilities to combine transport with other functionalities on a single card across all form factors.

Building secure infrastructures

On the infrastructure side, our high-end security controller SLE 78 is suited to the most demanding applications. For ease of implementation, operators can rely on us for a comprehensive range of infrastructure components. Our CIPURSE™ SAM (Security Access Modules) for terminals is based on the CIPURSE™ open standard by additionally providing Mifare Classic* compatibility. We complement these solutions with development tools and support.

* Mifare Classic und Mifare Ultralight are registered trademarks of NXP

The chart illustrates market evolution towards CIPURSE™ open standard across Application levels.

Multi-application:
- Dual Interface Controller — SLE77CLFX
- Contactless Controller — SLE77CLF
- CIPURSE™ SAM — SLF 9630
- NFC Secure Element — SLE 97 family
- CIPURSE™ Security Controller — SLS 32TLC100

Seasonal:
- CL-Memory — SLE66R35 — Mifare Classic* compatible
- CIPURSE™4move — SLS 32TLC004S

Limited Use:
- my-d™ move
- CIPURSE™move — SLM 10TLC002L

Market evolution towards CIPURSE™ open standard

Broad range of high-performing products offering outstanding transaction times and scaling from low-end memories up to security-certified dual interface controllers.

Supported standards & functionality

To give designers flexibility and freedom to evolve and upgrade their platforms, all of our products across all three segments are compatible with established technologies and standards. In particular, we support:

- ISO/IEC 14443 Type A/B, ISO 18092 passive mode, and NFC on the same silicon
- Mifare Classic*
- CIPURSE™
- ISO 7816 for easy migration to more advanced security
- AES 128, -192, -256

Driving interoperability through CIPURSE™ open standard

At Infineon, we understand the market need for open, non-proprietary, interoperable and competitive solutions capable of spanning ticketing, identification, micropayment and mobile payment. CIPURSE™ is the only global open standard for secure, cost-effective and flexible fare collection solutions. All of our contactless platforms are available with CIPURSE™ compliance.

Supported by a global, multi-provider community, CIPURSE™

- provides a secure and flexible solution for public transport and multi-application schemes
- protects investments as operators migrate from proprietary to open schemes offering more security and efficiency
- promotes vendor neutrality, cross-vendor system interoperability, lower technology adoption risks, higher quality and improved market responsiveness
- is non-discriminatory and compliant with public procurement rules
- utilizes the advanced AES 128 encryption algorithm, which enables fast and secure transactions.

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

Infineon is the leading contactless controller supplier
to Chinese transportation projects.

So far, Infineon has delivered more than 5 billion chips
for transport ticketing projects worldwide.

The Netherlands, known for its excellent public transport system,
built its OV-chipkaart on an Infineon platform.

The Partner of Choice – for Today's and Tomorrow's Transport Ticketing Challenges

Market pioneer
Based on our core competencies in the fields of security, contactless communication and integrated microcontroller solutions (embedded control), our extensive portfolio of semiconductor-based security products for chip card and security applications is actively helping to improve security in an increasingly connected world. For over 25 years – from day one in fact – we have been shaping the chip card industry with hardware-based security innovations and have been global market leader for 15 consecutive years. Innovative technologies such as SOLID FLASH™ provide continued proof of our ground-breaking innovative capabilities.

Global partnerships and support
Building on the global reach of our worldwide support organization, we have also formed an exceptional network of partnerships and alliances, complemented by our engagement as a founding member of the OSPT (Open Standard for Public Transportation) Alliance. Here we focus on driving component interoperability by bundling intellectual property for standards such as CIPURSE™ and making it available to all members under fair, reasonable and non-discriminatory conditions.

Partner of choice
Through our long-standing relationships, we have developed a profound understanding of transport and ticketing requirements. These close ties have fostered the trust that enabled us to secure major market shares around the world. Our local technical and marketing experts work closely with our customers to find the right solution for each market segment and application challenge. Our customers value our in-depth experience, technical support capabilities and strong commitment to innovation – not to mention the choice that comes with the world's largest, most diversified one-stop offering. They also appreciate our speed and agility – demonstrated through fast delivery times and benchmark time-to-market.

Infineon is the no. 1 supplier for all Chinese Electronic Toll Collection (ETC) systems.

Infineon impressed on the innovation front …
its involvement with the OSPT alliance is priming Infineon towards additional multi-application enablement and support.**

São Paolo and Rio are the first cities in Latin America to start using CIPURSE™.

Impressive track record

The world over, we have successfully delivered transport ticketing solutions scaling from low-end my-d move chips through Mifare Classic*-compatible ICs to high-end contactless chips and controllers. The fast transaction times, outstanding contactless performance and robust security of our CIPURSE™-compliant solutions have already been proven in this broad and expanding footprint of reference projects around the world. Our customers know they can rely on an unbroken supply track record and the experience we have gained innovating the ticketing market for many years.

Awards

The CIPURSE™ open standard has already been implemented in many security products delivered by Infineon.

- In November 2012, one of our products, the SLS 32 TLC security controller, received the Sesames Award from chip card industry as the most innovative product in the "Transport" category.
- In addition, the CIPURSE™ Cryptographic Protocol with Inherent Side-Channel Resistance was awarded the German Prize for IT Security in 2012.

Selection of Infineon's TT Projects worldwide

Limited use/Low-end tickets
- USA
- Brazil
- Indonesia
- India
- South Korea
- Japan
- Spain
- Turkey
- Poland

Seasonal/Mid-range cards
- USA
- Chile
- China
- Turkey
- Russia
- Latvia

Multi-application/High-end cards
- Mexico
- Colombia
- New Zealand
- India
- China
- South Korea
- Italy
- UK
- Belgium

 * Mifare Classic und Mifare Ultralight are registered trademarks of NXP
** Source: ABI Research's Government & Healthcare IC Competitive Assessment 2014

Ask Infineon. Get connected with the answers.

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

Our global connection service goes way beyond standard switchboard services by offering qualified support on the phone. Call us!

- 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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