SECURE NFC AND PUBLIC TRANSPORT IN CHINA

NXP

SECURE CONNECTIONS
FOR A SMARTER WORLD

AS CHINA CONTINUES TO URBANIZE, THERE IS AN ONGOING NEED TO ***EXPAND PUBLIC TRANSPORT*** *AND INCREASE RIDERSHIP. ONE WAY TO ATTRACT PASSENGERS IS TO* ***IMPROVE THE USER EXPERIENCE****, WITH CONTACTLESS TICKETING AND APP-BASED SERVICES SUPPORTED BY* ***SECURE NFC-ENABLED SMARTPHONES****. A UNIQUE COLLABORATION, INVOLVING NXP, QUALCOMM, AND CHINESE TRANSIT HUB PROVIDER SNOWBALL, CREATES AN ALL-IN-ONE SOLUTION FOR FAST, COST-EFFECTIVE DEPLOYMENT OF SECURE NFC SYSTEMS.*

Content:

THE URBAN CHALLENGE

China has become a nation of cities. Shanghai and Beijing now rank as the two largest metropolitan areas in the world, in terms of population, and more than half of all Chinese now live in urban environments.

One side effect of urbanization – and the simultaneous increase in economic prosperity – is that China has also become a nation of drivers. There are more cars in China than ever before, and most medium and large cities already face serious problems with traffic congestion, air quality, and the other issues that accompany having so many vehicles on the road.

To address these various issues, several government agencies, including the Ministry of Transportation, are encouraging people to drive less and take public transport more. The past decade has seen huge investments in the public-transport infrastructure, with widespread efforts to improve and expand transport services. For example, the online statistics portal, Statista, reports that *the number of operating subway lines in China's cities has nearly doubled in recent years, going from 52 in 2010 to 92 in 2014.* Similarly, the number of public-transport vehicles in China per 10,000 inhabitants has risen from 3.7 in 1995 to 12.8 in 2013.

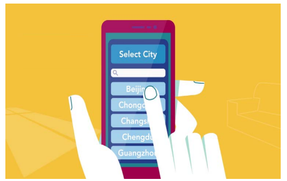
The investments are paying off. A recent survey, conducted by the National Geographic Society, found that ***60 percent of Chinese citizens agreed that public transportation was easily accessible to them,*** which is important, because easy access is a big selling point.

Another indication that public transport is succeeding is a recent article in the magazine Scientific American, which found that, while many Chinese still view car ownership as a symbol of prosperity, and plan to either keep their existing car or buy a new one in future, they're more likely to save the car for weekend getaways and longer trips. When it comes to day-to-day travel within the city limits, the car is looking less attractive.

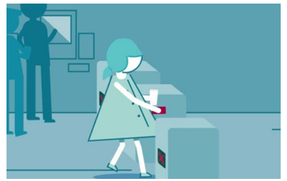
These are positive trends, but there's still work to be done. Many transport agencies struggle to keep up with demand, which means rush-hour commutes and other busy times involve fighting for space in tightly packed buses and trains. To handle the passenger loads of today and tomorrow, the infrastructure will need to keep expanding.

Having more trains, trams, and buses in operation will, of course, help make public transport more enjoyable, but there's more that can be done. Beyond the frequency of service and the ability to find a seat, there are other aspects of the passenger experience that can be improved, too.

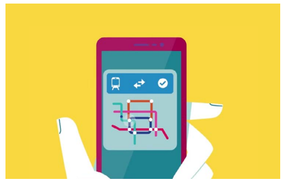
In particular, today's passengers are, for the most part, tech-savvy consumers who carry smartphones, interact with mobile apps, and, increasingly, use their phones as wallets, to make mobile purchases. By ***taking advantage of the widespread penetration of smartphones with mobile-payment capabilities***, China's public-transport system can offer passengers new levels of convenience, connectivity, and security. Also, the smartphone OEMs that support these new public-transport features can use these new features to attract more customers and, by extension, increase ridership. In other words, China can leverage smartphones and mobile payments to boost support for more sustainable modes of transport.



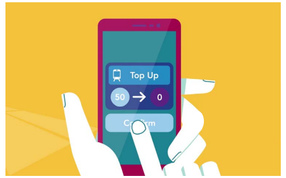
- Securely preload fare into the phone, even for different cities



- Tap the phone to a reader to use fare when boarding a bus or pass through a turnstile



- Check real-time schedules
- Determine the fastest route



- View ticket history
- Top-up your account

Tap to watch mobile transit animation

CONVENIENCE, CONNECTIVITY & SECURITY

There are several ways that that mobile phones equipped with Near Field Communication (NFC) and an embedded Secure Element (eSE) can improve the public-transport experience.
You can, for example, securely preload your fare into the phone, with an instant online purchase, then tap the phone to a reader to use your fare when you board a bus or pass through a turnstile. You can also use your phone to do things like check real-time schedules, determine your fastest route, view your ticket history, and top-up your account – all while being confident that your personal information is kept private and safe from harm.

There's ***no more waiting in line at ticket windows or self-service machines, and no more hassling with coins, tickets, tokens, or plastic cards*** at the entry point. Fast transaction times also mean quick throughput, with fewer lines and less time spent waiting, especially during busy times.

BENEFITS FOR ALL PLAYERS

Mobile ticketing based on NFC-enabled eSE solutions makes public transport more attractive to consumers, increases engagement for those who value their mobile lifestyles, and demonstrates support for environmentally-friendly city concepts. It also offers specific benefits to those who build and run transport services.

EFFICIENCY

NFC delivers the ***high-speed performance*** required by transport applications, so turnstiles and boarding areas can support higher throughput. The system can handle more people, and move them more efficiently, with less waiting and less frustration.

SCALABILITY

Because NFC + eSE solutions are based on industry standards and are ***compatible with the existing infrastructure for contactless ticketing***, they're less disruptive to a city's legacy infrastructure and can scale quickly. Passengers can continue to use their smartcards for ticketing and access, so adding smartphone capabilities to the mix doesn't alienate or inconvenience the existing ridership. The setup can evolve to meet growing demand, and lowers the cost of ownership, since technologies can be upgraded in stages, and with minimal effort.

LOWER COSTS

Since passengers can use their mobile phones to buy tickets, there's ***less need for ticket windows and ticket machines***, or their associated operating and maintenance costs. Also, replacing paper tickets means less waste and eliminates the need to handle cash, which makes operations that much more efficient and cost-effective.

LESS FRAUD

The NFC + eSE combination offers the highest protection from fraud and fare evasion. It implements multiple layers of security, including the use of cryptographic mechanisms to secure any data transferred to make a ticket purchase. Storing sensitive information encrypted in an ***eSE is more secure than transferring payment details over the cloud***, which is how other formats manage the transaction. The eSE format is so secure, in fact, that it is used and endorsed by the only global payment scheme, Europay, Mastercard, and Visa (EMV).

FASTER RESPONSES

Another aspect of security is the ability to defend the system against known threats. It can take the average transport operator 24 hours to update the smartcard blacklist on every validation terminal in the network, but an applet, implemented on the eSE, can ***immediately disable blacklisted user,*** via the mobile network.

OEM benefits

The various benefits listed serve to improve operations for public-transport agencies and enhance the user experience, but they also have the very important side effect of benefitting OEMs in the smartphone sector, too. This is because any OEM that supports new services, such as mobile ticketing, mobile payment, and other highly desirable public-transport features, can gain a competitive advantage in what has become a very crowded playing field. The fact that OEMs will be motivated to support these services, in their search for increased loyalty to their brands, can work in public transport's favor, since it can help increase adoption of NFC-enabled eSE solutions and, in turn, increase ridership.

Image: Co-op advert by Xiaomi and NXP to promote the mobile transit functionality of the Mi5 among travellers in Shenzhen's busiest metro stations

Table: Benefits to each members of the public-transport ecosystem

Passengers	Public-transport operators	Smartphone OEM
▸ Improved experiences with new, incremental add-on services ▸ Ticketless entry, no queuing ▸ Check balance ▸ Top-up services ▸ Loyalty programs ▸ Etc.	▸ Direct cost reduction, in terms of card hardware and supplier cost ▸ Zero additional indirect costs, with elimination of mobile-ticketing system integrators ▸ Potential upselling revenue for differentiated content ▸ Enhanced brand image	▸ Strong differentiation compared to non-eSE phones ▸ Key selling point for increased brand loyalty ▸ Improved lifecycle management with increases in switching revenue, due to differentiated apps & services

THE NEXT STEP: QUICK DEPLOYMENT

Mobile-transit transactions are a natural extension of mobile payments, which is something Chinese consumers have been very quick to adopt. According to PBoC statistics, 4.5 billion mobile transactions, worth 18 trillion RMB, occurred in Q3, 2015 alone. The user base is already there; the next step is to capture and service that base, so as to increase ridership.

NXP offers a unique approach that will make it easier to attract and keep passengers. There are several reasons why NXP has decided to pursue this opportunity. NXP helped build the essential ecosystem for mobile transit in China, enabling secure, mobile transit experiences. Now NXP is equipped to help China deploy NFC + eSE solutions. NXP's NFC + eSE solutions for mobile-transit applications are the ***most secure and most scalable solutions available***, and leverage the already established, already trusted infrastructure for contactless smartcards.

As a leader in the contactless market and the co-inventor of NFC, NXP understands that creating a secure mobile-transit solution isn't just about having the best silicon. It's also about creating an ecosystem of experts, with the know-how to provide a secure and highly scalable solution. NXP has already demonstrated its ability to shape ecosystems in the identification space, with more than 70 percent ownership of the total market, and has developed a unique solution specifically for the Chinese public-transport market.

NXP is a recognized leader in the design, manufacture, and provision of eSEs. NXP's eSE technologies reflect the proven expertise that comes from decades of leadership in smartcards, and in high-security applications like identification, banking, and access. Leveraging their deep knowledge of secure payments and contactless transactions, NXP ensures seamless transitions to mobile NFC functionality, and speaks credibly with transit merchants of every kind.

The NXP approach

Through a unique partnership with Qualcomm and Chinese Transit Hub provider Snowball, NXP brings together all the different parties involved in mobile transit, and provides the necessary tools and guidance to ensure the highest-quality and fast Time-To-Market deployment.

NXP has taken the complexity out of the process, by pre-validating through partnerships an end-to-end technical integration that bridges OEMs and service providers. The combination enables a unique user experience, while allowing city transit authorities and OEMs to deploy quickly. The result is ***fast, cost-effective commercialization of mobile payment devices, with the ability to scale rapidly.***

Unlike other approaches, which force mobile manufacturers to create a new integration and validation for each city, the NXP-driven approach lets mobile manufacturers do the integration just once with a transit hub, which results in significant time savings in the deployment phase.

SECURITY BY DESIGN

ONE SINGLE INTEGRATION ECOSYSTEM KNOW-HOW

RAPID SCALABILITY

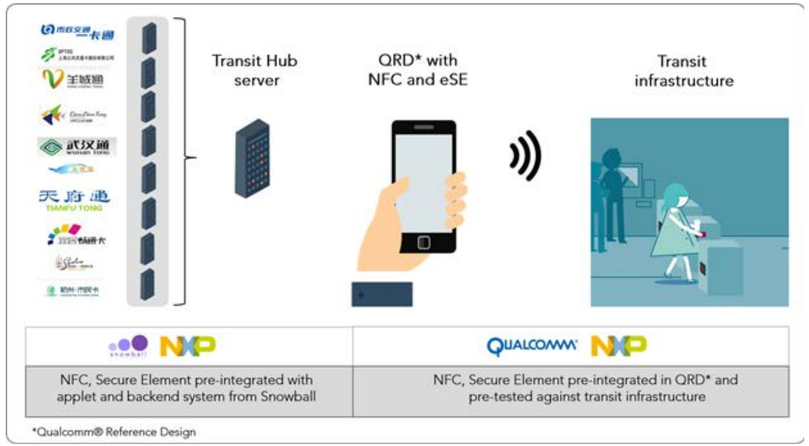


Image: End-to-end pre-validated solution for mobile transit

NXP mobile-transport solution
NXP's mobile-transport solution builds on the industry-leading PN66T, a true end-to-end solution that includes an NFC controller, an eSE, middleware, software, a JavaCard OS, JavaCard applets, and a deep integration of service providers. The PN66T leverages NXP's leadership in NFC and delivers seamless RF performance for an outstanding user experience.

Qualcomm processor platform
Qualcomm has integrated NXP's industry-leading NFC + eSE solutions across their Snapdragon processor-based platforms. The end-to-end solution now includes pre-validation of mobile-transaction services for transit, and offers a best-in-class, robust, fully tested and certified approach that's easy to design in and deliver. This pre-integration allows OEMs to quickly design devices Mobile transit feature "compliant"

Snowball transit hub
Snowball provides the wallet service, the transit applet in the eSE, and the backend infrastructure, referred to as the transit hub. The transit hub is the backbone of NXP's mobile-transit solution for the Chinese market. Designed for scalability, it's based on a strong backend infrastructure and seamlessly connects mobile handsets to existing and future transit services. Thorough testing guarantees full interoperability with the various transport authorities operating in China's largest cities.

CONCLUSION
Mobile transit is an emerging market for China. The initial deployments of NFC + eSE have started, though, there is likely to be a rapid domino effect, with cities moving quickly, one after the other, to deploy their own solutions.

NXP is working closely with public-transport operators and smartphone OEMs throughout China, especially in the ten largest metropolitan areas. Shenzhen and Guangdong have already announced the support of mobile transit, and eight of China's major OEMs have already plans to enable the service on their handsets.

By offering best-in-class technology, deep expertise, and a comprehensive ecosystem for mobile-transit transactions, NXP's NFC + eSE solutions offer everything needed to ***make the user experience more convenient, more connected, and more secure***. And that, in turn, will help China's rapidly expanding cities be more livable and more sustainable.

WHAT'S NEXT?
Gateway to more sophisticated services
Chinese consumers are eager to use self-service mobile apps that make life easier, inform their choices, simplify purchases, and improve their daily travel experience. Mobile-transit apps based on NFC + eSE are part of this modern approach, creating more enjoyable, more convenient journeys. Over time, the technology can be expanded to support comprehensive functionality that goes well beyond basic ticketing and trip planning.

For example, mobile-transit programs can be extended with co-branding and promotional opportunities for interactive mobile marketing initiatives presented in transit locations. Passengers can earn loyalty rewards, or access new sales channels and revenue streams through web and mobile portals, with potential support for location-based interactions. The system can also offer add-on attractions, such as admission passes to local events, exhibits, or festivals. Transport operators can offer real-time alterations and bundled ticketing, and at the same time can collect data on ridership trends for new insights and greater understanding of passenger habits and preferences.

Not to forget, mobile transit applications pave the way for mobile payment in China since it's processed on the same SE as used for mobile payment in phones. Together with our partners we continue to work for our vision to make tap-and-pay a common habit in China's metropolitan regions.

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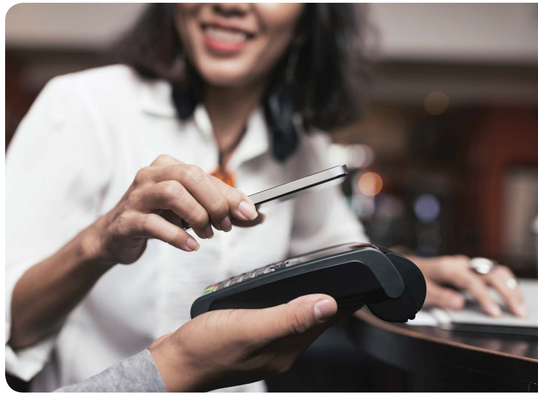

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