Activating New Mobile Services
and Business Models
With smartSD Memory Cards

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SD Association
2400 Camino Ramon, Suite 375
San Ramon, CA 94583 USA
Telephone: +1 (925) 275-6615,
Fax: +1 (925) 886-4870
E-mail: help@sdcard.org
Definitions

**App**  An application running on the mobile handset

**Applet**  A Java Card application running on the NFC SE; also called a cardlet

**APDU**  Command for Java Card applet (Application Protocol Data Unit)

**BoM**  Bill of Material, i.e. cost of the finished good

**Dematerialized card**  Many virtual loyalty cards sharing the same physical microSD memory card

**EMVCo**  Standard body that defined the Contactless Mobile Payment, Application Activation User Interface

**microSD**  A memory card format defined by the SD Association

**MNO**  Mobile Network Operator

**NFC**  Near Field Communication, a contactless communication, as defined by ISO18092 standard 18092

**NFC microSD**  A proprietary microSD form factor that embeds an SE and a contactless antenna

**Contactless smart microSD**  Self contained microSD card with SE and contactless interface. The contactless interface (i.e NFCard emulation) is not defined by SDA

**NFC SE**  A smartcard chip that is NFC capable, i.e. a Secure Element with SWP interface to NFC front end

**OTA**  Over The Air

**PPSE**  Proximity Payment System Environment defined by EMVco that specifies the default payment card

**PVR**  Personal Video Recorder

**SDA**  SD Association manages standards related to SD, miniSD and microSD memory cards

**SE**  Secure Element chip providing a secure run-time environment approved for banking applet

A tamper resistant component used to provide the security, confidentiality, and multiple application environments required to support various business models

**SIM**  The Subscriber Identification Module used to authenticate a subscriber on the mobile network

**smart microSD**  smartSD in a microSD form factor

**smartSD**  smartSD is the general term defined by SDA for memory card that embed a SE

**SWP**  Single Wire Protocol that allows interfacing with NFC front end as defined by ETSI SCP (TS102 613)

**TAM**  Total Available Market

**TSM**  The Trusted Service Manager provides a secure gateway to remotely administrate the NFC SE

**UICC**  Universal Integrated Circuit Card contains the SIM applets and can store other personal data
smartSD Memory Card Application Ecosystem
Executive Summary

Smartphones are everywhere and rarely outside consumers’ reach, giving service providers unprecedented reach into their customers’ daily lives. Mobile phones have created a new channel to deliver exciting new services to consumers and mobilization of services is becoming a strategic imperative to build and extend your brand. This white paper presents the compelling benefits of smartSD™ memory cards as not only the best, but also the easiest solution to enable Near Field Communications card emulation and deploy mobile security tokens on mobile devices.

Using smartSD memory cards as the Secure Element for mobile payment and identity enables value-added services to be interoperable across millions of devices, thousands of consumer products and hundreds of global brands. New opportunities in mobile commerce, advertising, location-based services, access control, rewards programs and transportation emerge.

At a minimum, smartSD memory cards can achieve security certification as smartcards and security tokens and, therefore, can be used to bridge existing services with various mobile devices, including mobile phones.

However, smartSD memory cards are more than just another option for contactless communication or smartcard and security features. smartSD memory cards carry the market weight of the SD™ standard, including access to more than 78 percent of mobile phones in the world, SD portability and removability that enables many business models and provides consumers with unmatched value for device and data control, and the global mindshare and familiarity with the SD memory card brand.

The smartSD memory card also supports a consumer-centric business model envisioned by GlobalPlatform™ that sets in motion a virtuous ecosystem and ultimately creates value for all parties.

smartSD memory cards offer service providers and card issuers a superior approach to deploy secure NFC services to the total available market using existing business processes. smartSD memory cards help service providers and card issuers reach the largest audience, retain business independence, launch easier and with lower costs, and differentiate their services.

The smartSD memory card also supports a consumer-centric business model envisioned by GlobalPlatform that sets in motion a virtuous ecosystem and ultimately creates value for all parties.
Introducing the smart microSD memory card

smartSD is the general term defined by the SDA for memory card that embed a Secure Element (SE). It is applicable to all SD memory card formats and form factors including full-sized SD and microSD memory cards.

Product Overview:
smart microSD memory cards for NFC

The smartSD memory card features a Single Wire Protocol (SWP) pin for NFC-compliant contactless communication and an SE running Java Card technology. As such, the smartSD memory card is transformed into a secure environment to run Java Card applets. It complies with legacy microSD specifications and maintains its portable and universal storage capabilities. The embedded SE is a typical smartcard chip that features the exact same level of security as other smartcard form factors.

Typical target usages are:

- **Security token**: in that configuration the card-secured run time environment is typically used to protect credentials used for authentication, digital signature, data encryption, etc.
- **Secure Element**: in that configuration the host device is NFC enabled and the smartSD memory card is used as an SE in the host device
- **NFC card emulation enabler**: some products also have an embedded antenna that is permitted to bring NFC card emulation to the host device with and without NFC

A single smartSD memory card with NFC supports multiple target usages simultaneously.

Product certification options

Smartcard certification is for the smartcard chip, not the smartSD memory card or any other smartcard form factor itself. Manufacturers can embed standard smartcard chips in smart microSD memory cards. The smartSD memory card form factor supports exchanging APDUs and allows for ISO14443 contactless communication. Therefore, certification depends entirely on the specific smartcard chip that has been embedded and the same certifications can be achieved as for any smartcards.

Manufacturers could embed smartSD memory cards with smartcard chips certified for common criteria target security profiles, including Visa®, MasterCard®, American Express®, FIPS 140-2 and more. Obtaining certification is a business decision.

The smartSD memory card ecosystem

smartSD memory cards present more benefits for stakeholders than any other contactless communication solution. The smartSD memory card category provides a variety of storage capacities and speed choices for both popular form factors: full-sized SD and microSD. This means it’s possible to issue cards:

- smart SD
- smart microSD
- smart SDHC™
- smart microSDHC™
- smart SDXC™
- smart microSDXC™

plus a variety of bus speed choices including legacy speed or the faster UHS-I and UHS-II bus speeds for each of the aforementioned card options.

Activating New Mobile Services and Business Models With smartSD Memory Cards

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These choices make it possible for service providers to offer smartSD memory cards with a wide variety of popular consumer-centric capabilities that only add to the value of cards used in the market today. Memory cards can be issued by service providers or purchased directly by consumers, as well as distributed by traditional operator-controlled smartcard channels. In particular, smartSD memory cards allow service providers to differentiate and determine a specific business model that does not have to involve a third party. It provides more freedom to the consumer who can change mobile phones and mobile operators without the hassle of losing or transferring contactless services.

The smartSD memory card with NFC enables an ecosystem that creates value for all parties. It is not like other approaches where a single party is perceived to extract all the value at a disproportionate cost to all other parties.

Furthermore, the GlobalPlatform Consumer Centric Model allows consumers, rather than issuers, to control multiple services on a single smart microSD memory card. This ecosystem becomes virtuous as more parties, users, services and applications use the same card, creating greater value for all parties.

The smart microSD memory card is not a transitional technology simply waiting for NFC handsets to become available to the masses or until another SE takes over; rather, smart microSD memory cards offer the market a compelling value for today and tomorrow.

Driven by the SD Association and with the support of GlobalPlatform, the smartSD memory card ecosystem will continually evolve to meet new industry needs, even gaining the ability for consumers to add third-party services on their smartSD memory card.

**App and Services**

The development of an NFC app is quite simple. It requires knowledge of standard mobile app development and takes advantage of a few APIs exchange APDUs (commands for the applets).

On devices with multiple SEs there is a need for the app or the user to specify where and which virtual card is the default to use. For payment, this is typically done by properly configuring the PPSE on each SE.

**Host integration**

smartSD defines a memory card that embeds an SE. The typical SE features JavaCard and global platform and communicates with APDU. SDA has defined ASSD as the transport mechanism for APDU.

Contactless smart microSD is a self-contained solution for SE and contactless card emulation for most microSD host devices.

SDA doesn't define the contactless interface.

smart microSD features a SE that is accessible through ASSD for host applications and may connect to the host NFC frontend via SWP.
Mobilization of services

With smartphones and super phones becoming available to the masses and various app stores making it very easy to download new applications, reaching the consumer’s phone is an emerging business requirement.

Mobilization of services is particularly relevant for services that involve security such as smartcard, contactless services and security tokens.

However, mobilization of a service is not only a must-have capability but also a strategic move. It is a real opportunity to create new revenue streams and strengthen customer relationships while differentiating with a better user experience and value-added services. As such, mobilization should be carefully considered. The choice of the main SE could be critical to keep control of the business model, easily differentiate from competition creating a specific user experience, facilitate the go-to-market process and the development and release of new features and value-added apps, and – perhaps most importantly – to reach all customers without any MNO or handset model limitation.

Mobilization is typically successful when it takes advantage of the display and the connectivity of the phone. This is really when value-add services shine on top of what contactless communication already provides.

The smart microSD memory card with NFC, or contactless smart microSD, are the best approach to mobilize security services by:

- Delivering the largest market reach as more than 78 percent of mobile phones and thousands of other devices have a microSD memory card slot
- Working on most users’ current phones independent from the mobile subscription and operator
- Offering unsurpassed portability and easy transfer by the consumer to a device of choice
- Allowing familiar issuance processes that fit contactless card and security token operation and business processes
- Providing an open choice of business models
- Simplifying the launch of services and reducing time to market and eliminating the need for third parties
However, the best solution isn’t enough to make it a long-term success without good consumer value propositions.

The smartSD memory card makes mobilization easier so you can focus on delivering your value propositions. The key to driving market adoption is to understand what it takes for consumers to change their habits and to understand their perceived value of the services as well as knowing what value would inspire them to buy the service or the smartSD memory card.

A smartSD memory card with NFC is not expensive to the consumer since it is likely comparable to the cost of one dinner at a restaurant. However, demonstrating and promoting consumer benefits is important to facilitate adoption and potentially transfer the entire cost of the card to the consumer.

| Cash Back: | 2% cash back for every purchase | From targeted promotions |
| $SAVE: | Using interchange rate | Up to 50% off at selected stores |
| Free Rewards: | Earn 1 point for every dollar | Typical loyalty program |
| VIP line: | VIP Line: skip the queue | Through mobile purchase / renewal / check-in |
| Pack lighter: | Downsize your wallet No extra badge or VPN token | Leverage dematerialized cards Use mobile phone for physical and IT security |
| Get Safer: | Protect your money! | PIN protection and on-demand RF |
| More Control: | Get back in control of your finances | Through mobile UI and alerts |

Here are some typical examples applicable to various markets:

- Plus, smartSD memory cards include the typical benefits from the world-leading memory card form factor
- Benefit of legacy memory cards: extra portable storage for end-user content and data
- Easy to upgrade mobile phone/tablet, keeping all services without service migration hassles
- Freedom to change mobile operator while keeping all services
smartSD memory card life cycle

The smart microSD memory card with NFC has a similar life cycle as legacy smartcards, SIM cards, contactless cards and other security tokens. Despite a different physical communication interface, the manufacturing is very similar to other solutions as many components are shared, including the embedded secure chip that meets the security and functional requirements mandated by the different markets (e.g. banking, identity, transport). The following table illustrates the similarities and differences for these different form factors:

<table>
<thead>
<tr>
<th>Silicon</th>
<th>Operating System</th>
<th>Packaging</th>
<th>Init and Perso</th>
<th>Distribution</th>
<th>Mobile Host Devices</th>
<th>Service Access</th>
<th>Remote Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security sensor detectors</td>
<td>Secure run time environment</td>
<td>Contactless NFC microSD</td>
<td>Retail</td>
<td>Most microSD host devices</td>
<td>TSM &amp; other (optional)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secure memory management</td>
<td>ISO7816-3,4 compliance</td>
<td>smart microSD with SWP</td>
<td>Banks</td>
<td>Phones with SWP to microSD</td>
<td>TSM &amp; other (optional)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contactless card</td>
<td>ISO 14443 compliance and ISO 18092</td>
<td>Security token</td>
<td>Service provider</td>
<td>N/A</td>
<td>PC solution only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIM card with SWP</td>
<td>Embedded SE</td>
<td>Contactless card</td>
<td>MNO</td>
<td>N/A</td>
<td>Only NFC phones from partner MNOs</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Handset bundle</td>
<td>Handset bundle</td>
<td>Phone model specific</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Physical personalization</td>
<td>After issuance through TSM</td>
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</table>

Existing smartcard personalization tools may be re-used to perform the personalization of the smartSD memory card thanks to an ISO7816-1 physical adapter or specific software driver for standard USB microSD memory card readers available from some smart microSD memory card makers. Other personalization options could also be available.

The software driver used on top of standard USB microSD memory card readers also permits the use of the smart microSD memory card as a typical security token that even works with Microsoft Windows™ SmartCard login when such smart microSD memory card is loaded with the appropriate applet.

Overall, the smart microSD memory card with NFC makes it very simple to launch as it easily fits existing business processes.

The GlobalPlatform Consumer Centric model will facilitate the post-issuance of additional cardlets on the SE embedded in the smartSD, which increases the value of the consumer’s device and service providers’ opportunities to reach consumers.
Issuance and acquisition

Smart microSD can be distributed to the consumer in different ways and with the SE in different states. The consumer can acquire the microSD in different ways: retail purchase, from the service provider, kiosk, received by mail, on-site issuance, bundled with the phone, etc. The secure element in the smartSD can be in different states: direct from the manufacturer with transport keys, initialized with a specific security configuration, ready for a service or personalized.

Configuration of the embedded SE and loading of cardlet services could involve: PC/SC desktop reader, ISO7816-1 adapter to use with standard smartcard mass deployment solutions, or automated machines that can handle the microSD memory card form factor.

smartSD is compatible with TSMs that can communicate to the card through mobile apps or services. Typically a compatible service would check in at the TSM and look for specific job(s) to perform.

The GlobalPlatform Consumer Centric Model will ensure that post-issuance of cardlets could be the same as getting a new app. GlobalPlatform provides all the security mechanisms and the user control to ensure such a user experience can be implemented.

Go to market

Once the type of card and SE have been chosen, launching smartSD memory cards with NFC is very easy as they fit existing business processes and do not require any agreement with third parties.
One of the challenges is creating awareness of the service with the consumer. Targeted consumers will only use the mobile service if they understand the benefits.

Creating awareness is key to informing potential consumers and persuading them to adopt the mobile service:

Typical methods to create awareness include:

- Signs or posters in waiting areas such as cashiers, kiosks or POS
- Posters at selected areas such as entrance, etc.
- Messages in the mobile app
- Advertising within end-user correspondence, e.g. account statement
- Enterprise help desk

Promotion could also include information about how to buy or sign-up for the smartSD memory card with NFC.

**Evolution of services**

App stores make it easy to inform users about updates and to deliver and install these updates. Updated apps can have additional features or present some options to download additional apps. This makes improving the user experience and differentiating the service easy.

Adding new applets on the SE embedded in the smartSD memory card is easy because the required underlying technology is available and can be used to meet various security requirements. In the future, a dedicated Applet Store app could make it easy to search, discover and install new services and applications, leveraging the SE embedded in the smartSD memory card. The user would have the option to look for a service starting from the mobile app, which can drive the issuance of a cardlet or proceed the other way around.

Applets could be added, configured or personalized with a simple data connection to the mobile device (Cell, Wi-Fi or tethered) through contactless communication or using on-site issuance.

Technically, there is also secure communication from the server to the SE. On the mobile phone, such communication is facilitated by an app acting as communication facilitator between the back-end and the SE. In some cases the app could also add an additional layer of confidentiality to ensure, for example, that the cap file containing the applets is not exposed during download over the Internet from the secure back-end to the SE.

Depending on the type of update, updates can be done by the service app itself or by a TSM service that meets needed security certification. The use of a TSM is also typically required when a third party has issued the card.

However, it is important to note that smartSD memory cards can be distributed personalized so TSM integration can be done at a later stage. This dramatically helps to reduce upfront costs. TSMs could become important for upgrading the service and deploying new ones, engaging a customer relationship with your brand.

Further, most TSM vendors can easily support smartSD memory cards with their TSM supporting data connection. This is typically the same as communicating over a data connection with other SEs, but some TSMs might be set for a specific SE and would require an additional module to handle a second SE such as smart SD.
Main Benefits

For service providers

Largest reach: User’s current and future mobile devices, any mobile operator and mobile plan, phones with and without NFC

Business independence: Easier launch, lower cost, large choice of business models, differentiation. No dependence on 3rd party

Easier launch: Fits existing business process. No need to involve a third party

Lower cost: Upfront TSM integration optional. Simplify service delivery

Differentiation: No constraints to differentiate from competition with your own user experience, set of features and business model

For the card issuers

Examples of benefits for the card issuers:

- Business independence
- Larger reach
- Any users, any phones
- Lower up front cost

- Typical retail model & revenue
- Opportunity for new revenue streams from services

- Lower up front cost for NFC (Targeted users)
- Reach more users and possibly acquire subscribers from competition

- New TSM opportunities
- Business independence
- Large Reach
- Direct relationship
For the consumer

- Instant gratification
- Easy to upgrade mobile device
- Easy to change mobile operator
- Vendors Distributor choice
- Control Apps and Applets
- Extra storage for pc, phones, tablets, etc.
Business case examples

While the consumer could purchase a smartSD memory card directly in any of the following scenarios, these business cases focus on the examples where the smartSD memory card is subsidized or provided at no-cost to the consumer. Furthermore, these business cases demonstrate how businesses could recover the cost of issuing the smart microSD memory card.

This focus does not detract from the consumer ability or interest in buying the smartSD memory card directly to access value-added services on their mobile phones. Also, a user-owned smartSD memory card could be available to push or pull new services for a simple issuance fee.

Payment card

The main revenue from a payment card is typically derived from serving as a deposit account. Nevertheless, there are other revenue streams that could cover costs of issuing a smartSD memory card:

When interchange fees are applicable, the cost of a smartSD memory card with average use is easily paid back within the first year. Furthermore, interchange fees revenue could be used to build a cash-back value proposition to the consumer that could both drive sales of the card and absorb the entire cost.

The revenue from a referral program with partners can also easily pay for the card within a few transactions. Program partner merchants would pay for customers to be directed to their stores or services.

A futuristic business case would capture smartSD memory card benefits in online payment scenarios where it could be used for card-present transactions and for 3D Secure using http(s) as an alternative to potentially costly SMS.

Transit pass

The ease and convenience delivered by smartSD memory cards should compel consumers to purchase the SD memory cards. However, some transit services may want to promote mobile phone usage to save on kiosk costs and to keep workforce costs low. In that case, a reloading fee would pay for the smartSD memory card. The consumer can easily accept a minor fee to take advantage of the convenience and shorter wait times. A regular user would pay for the card within the first year.

Transit operators could also consider the additional revenue opportunity from advertising in the mobile app; the smartSD memory card is the sole SE option without recurring fees and advertising would provide a new revenue stream after the smartSD memory card cost is recovered. This example provides real value for local shops and transit passengers, plus transit traffic numbers would attract advertisers.

Dematerialized loyalty card

Dematerialized loyalty cards not only reduce clutter in users’ wallets, they mobilize smartcard-based loyalty services by taking advantage of mobile phone communication channels and localization capabilities. The first allows for a direct marketing channel that could be used to increase sales and strengthen the brand and the second makes it easier to locate a nearby store. While increased sales would recover the costs of the smartSD memory card, targeted marketing would also affect customer retention.
For these programs the embedded SE in the smartSD memory card could play a role to locally and securely manage some of the rules so the consumer could redeem benefits even when offline.

**Express check out for retailers**

A familiar and basic program for a retail shop to issue smart microSD memory cards is sustained by the use of a retailer-specific mobile app to leverage shopping lists, target promotions, reward loyalty; the familiar program still requires payment from the user via credit card or cash transaction. A richer approach would also allow shoppers to use their phone cameras to scan the goods added to their cart (also allowing for instant promotions) to reduce checkout time. This richer approach would deliver an improved shopping experience for the user and require fewer cashiers for the retailer. Plus, this experience could also motivate shoppers to buy the smart microSD memory card to obtain this value-added service.

**Parking meter**

Contactless communication clearly reduces costs for parking meter service and maintenance. It facilitates money collection, reduces vandalism and dramatically lowers maintenance costs. The mobile app opens a new world of premium services for users. For example, a typical premium service uses the mobile app to secure a parking spot.

Additionally, like the transit pass business case, the parking meter app could be used for highly targeted advertising based on the user’s parking spot location.

**Ticketing / VIP event**

This business case is partially supported by reducing time at event checkpoints. Contactless technology presents many advantages over other technologies: it works even when it is dark and does not require a lens to focus, its built-in anti-cloning/anti-pass back security enables offline validation, the use of contactless communication also reduces the risk of failure as no mechanical parts are involved, and more. Overall, this new method helps reduce operation costs and, more significantly, reduces the number of people needed at the gates to ensure a good user experience.

Users would also gain the option to make purchases from within the mobile app. The app creates new revenue-generating premium services such as paying extra for VIP access and paying the issuer a percentage on resold genuine tickets.

Since the smartSD memory card typically does not present a reason for recurring fees, a card can be issued once and used for multiple events by the consumer.

**Machine to machine**

The smartSD memory card presents the perfect combination to leverage mass secure storage and a secure run time environment. One consideration for this business case is the communication cost savings yielded by using the smartSD memory card to securely store data for later transmission during lower cost, low-traffic times.

Another consideration for the business case is in the cost savings realized on a design potentially using a lower BoM and the option to adapt the storage capacity to need, thus optimizing inventory costs.

**Hotel room card**

Hotels will definitively benefit from the dematerialized loyalty card business case taking advantage of local advertising from partnering restaurants, bars and other local events. It would provide benefit to both service providers and users.
Additionally, the smartSD memory card with NFC reduces costs as it decreases staffing required for a good user experience at check-in and checkout. The user could take advantage of the hotel booking app to reserve a room and receive the credentials to access such room directly on its smartSD. Taking advantage of the smartSD contactless capabilities, the customer could go direct to his/her room while the booking system can benefit from strong authentication.

The value add for the consumer could justify the consumer purchase of a smartSD memory card, yet the cost savings and the optional revenue opportunities from referring local partners and advertising also provides a the hotel operator with ROI on the smartSD memory card.

Campus card

The cost of a campus smartSD memory card could easily be included in the students' tuition fees since it supports many use cases such as physical access control to campus premises, library and other campus assets, remote access to the school network and online courses, and payment of services and fees. It could also serve as a payment card for parents interested in managing their child’s spending, allowing them to remotely add funds when needed to provide additional functionality over typical credit/debit card setting.

Some campus usage may also generate revenue from this program. For example, payment could leverage an e-purse or pre-paid MasterCard or Visa that would generate interest on the pool of funds, which could help subsidize the cost of the card. This might be complemented as well by customer acquisition fees from partner banks.

This business case could also benefit from the sale of local advertising from partnering restaurants, bars and other local services. Ticketing and transport businesses cases are also applicable for college campuses.

Enterprise

The smartSD memory card in the enterprise is a perfect example of mobilization of services. The smartSD memory card with NFC can actually address multiple use cases such as physical access control and IT security, including secure email on mobile devices, secure data storage and VPN access. smartSD memory card storage can also be used to easily move files around the enterprise in a controlled manner. As such, in the context of mobilization of the enterprise, the smart microSD memory card with NFC has a clear business case based on cost savings. First, it does not have recurring costs unlike many other SEs. Then, it allows the enterprise to reduce the total cost of ownership by reducing the number of devices per employee and allowing use of the employees’ own mobile devices. This move cuts the cost of VPN tokens, sophisticated contactless badges, CDs and USB memory sticks, to name a few. Finally, having an SE entirely controlled by the enterprise adds freedom and facilitates bringing additional services.

Government/Secure communication

Today’s mobile devices provide the average consumer more communication abilities than a U.S. president could access 20 years ago. The mobile device is a must-have tool that provides instant access to most information, which could be critical in certain situations. So while the potential of mobile technology should be embraced, it should be very secure so that sensitive information and communication remains protected at all time. The cost of compromised information could have immeasurable consequences. The smart microSD memory card could be used to provide secure voice communication, emails and remote access. It can also secure the data on mobile devices to ensure that sensitive information is always protected.
**TSM operator & MNO**

There are various business models and opportunities to be considered by TSM operators and MNOs. Typically, the smart microSD memory card with NFC could be subsidized by charging a fee for loading a new applet on the SE. When charging a one-time fee, a few applets could easily cover the cost of the smart microSD memory card with NFC. Rental fees could also be considered as an alternative, but rental fees could have a more direct impact on the service provider’s business model. Also, additional revenue sources are created from managing the applet store and proposing additional services to the consumer.

When a TSM operator is an MNO, the smart microSD memory card allows the TSM to expand NFC services beyond its customers and to acquire subscribers from other MNOs. Furthermore, the removable smart microSD memory card allows TSMs to target specific users, keeping upfront NFC promotion costs very reasonable compared to other solutions where contactless communication is provided whether the user needs it or uses it.

**Handset bundle**

The removability of the smartSD memory card is a key asset when adapting a global device to local markets, as it reduces costs through higher production volume. Not only does the smart microSD memory card allow available storage capacity to be adapted to the desired level for the market and price point in regards to the device positioning, but it also facilitates enabling NFC where needed or requested by mobile operators. As such, adding smart microSD memory cards to targeted markets results in overall cost savings and potentially larger sales revenue through better market positioning.

**Self-service kiosks**

At the self-service kiosk – and photo kiosks in particular since content sizes are growing every day – there is opportunity for improvement and innovation in the way content and payment are handled. With smartphones and other mobile devices emerging as the de-facto content source, secure payment would significantly improve the user experience. Today, issues being reported from the kiosks include growing concerns with respect to user experience, including issues with Bluetooth™ pairing, cable management and accessing removable media. These problems multiply in heavy traffic zones and during peak engagement times such as the holiday season.

The smartSD memory card also offers additional upselling opportunities with the availability of additional storage capabilities. The removable feature offers consumers the option to store content from other sources like a camera or another mobile device. At the service point, the content from these sources can also be used to generate commerce like the printing of high-resolution pictures at a photo kiosk. The service provider could then communicate coupons and promotional materials based on the user activity. The presence of an SE in the smartSD memory card helps validate these upsell items both while dispensing and consuming them. The idea of a two-way communication between the SE host and the payment point expands the prospects for self-service at the kiosk. The limitations of the current contactless payment tokens are overcome with smart microSD memory cards.

Pairing of NFC and smartSD memory cards provides a secure and flexible way for transferring content and facilitates payment at self-service kiosks. This is an improvement on the current trend of fragmented services available to consumers. Providing the consumer with mobility, flexibility and security, smartSD technology can hasten the adoption of mobile device as payment source.
The GlobalPlatform Consumer Centric Model provides the technical framework to connect the token providers and the service providers in delivering a better retail experience for the consumers and the service providers.

**Secure services for multimedia in consumer devices**

smartSD memory cards also present a convenient approach to provide secure services such as payment or user authentication for HDTV sets, gaming consoles, e-books and more.

For example, a smartSD memory card could be used in gaming to buy credits or additional game tools to move forward and faster in a game. It can also be used to authenticate the gamer for online multi-players games or to easily report success on social networks. Overall, the smartSD memory card helps protect identity theft, which is crucial for online gaming where virtual goods are traded.

In the case of HDTV, the smartSD memory card could be used to create a link between payment and a Digital Rights Management feature to grant access to multimedia content. This smart microSD memory card could be included with the television, allowing support of DRM systems from different content providers or with the download of a new DRM system. In that architecture, the DRM licensing cost is only paid when the smartSD memory card is present, allowing for lower upfront cost on the television for customers who are not interested in personal video recording.

In the case of a connected camera, the smartSD memory card could be used to strongly and conveniently authenticate cloud services hosting the user’s photo store. The smartSD memory card could contain preferred parameters to configure the camera (e.g. macro, GPS tagging).

The contactless communication feature of the smartSD memory card allows an efficient pairing and connection on the Wi-Fi network for the transfer to the network or printing of photos. With a camera, the consumer already buys SD memory cards for storage. The convenience and additional security will justify the incremental higher cost of this new smartSD memory card.

The smartSD memory card may be used in e-books. In this case, the portability of the smart microSD memory card is convenient to change from one device display, like a mobile phone, to another device, like a tablet. With NFC technology, the payment could be performed without having to switch the smart microSD memory card into the other device.
Conclusion

The smartSD memory card is the most versatile solution to enable secure mobile services and to support contactless card emulation. It fits numerous use cases and brings value to both the service provider and the consumer. smart microSD memory cards extend the universal, convenient and portable value of SD memory cards to contactless communication services.

smartSD memory cards present the most benefits to mobilize existing service as it fits existing business process and ensure to remain business independent. Plus, a competitive and thriving ecosystem means smartSD memory cards are available for purchase from many SDA members.