OVERVIEW OF MOBILE PAYMENT LANDSCAPE

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Agenda

• Overview of Mobile Payments Landscape
• Challenges
• Mobile Payments Industry Workgroup
• Key Takeaways
Mobile Definitions

- **MOBILE PAYMENT**: Use mobile phone for proximity (point of sale/POS) or remote purchases, transit, digital content, P2P money transfer, online goods and services. Funded via credit or debit card, prepaid account, bank account, charge to mobile phone bill.

- **NEAR FIELD COMMUNICATION (NFC)**: Standards-based wireless radio communication to exchange data between devices a few centimeters apart (e.g., mobile phone and merchant POS terminal).

- **SECURE ELEMENT (SE)**: Tamper-resistant, encrypted smart chip in mobile phone to store and manage access to customer account credentials for NFC/contactless payments.

- **HOST CARD EMULATION (HCE)**: Software representing smart card. Eliminates need for secure element. Routes NFC communications through mobile phone’s host processor and stores and transmits payment card credentials via cloud.

- **CLOUD**: Remote server that stores mobile payment credentials. Payments initiated from mobile app, QR code, or NFC/HCE.
Mobile Payment Roots in Online Banking and Cards

- Online Banking & Card Payments
- Basic Mobile Banking - information
- Advanced Mobile Banking – Bill Pay, P2P
- m-RDC (Remote Deposit Capture)
- Remote Payments via App, Internet
- QR code Prepaid Access
- NFC/ Card Emulation, Cloud, Wallet

MOBILE/DIGITAL PAYMENTS

MOBILE BANKING
Drivers of U.S. Mobile Payment Adoption

- Convergence of online, mobile & POS channels
- Incentives – coupons, rewards, loyalty
- Increasing role of nonbanks & merchants
- Wallets: mobile, Digital, prepaid
- More smartphones and mobile apps
- New technologies QR, NFC, Cloud, HCE, BLE
- EMV migration reduces CP fraud, supports NFC mobile
- e-Commerce growth via mobile

Dynamic, Rapidly Evolving Mobile Payments Landscape
Smartphone Ownership is Rising

U.S Smartphone Penetration

<table>
<thead>
<tr>
<th>Year</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent</td>
<td>43.0%</td>
<td>55.0%</td>
<td>66.8%</td>
<td>71.0%</td>
<td>75.3%</td>
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Smartphone Market Share by Operation System

- **Android**: 52%
- **Apple**: 41%
- **Microsoft**: 3%
- **BlackBerry**: 3%

Source: comScore MobiLens, August 2014

Increasing Use of Mobile Phones for Internet Purchases

Percentage of retail e-commerce dollars spent via mobile device

Source: comScore E-commerce Measurement, August 2014
Consumer Adoption of Mobile Payments
Slowly Increasing

- Ubiquity of mobile phone is changing how consumers access and pay
- 2/3 of mobile payment users paid a bill online
- 17% of smartphone users made POS mobile payment
  - 39% QR code
  - 14% NFC tap at terminal
- Unclear value and security concerns limit adoption

Source: Federal Reserve Board, “Consumers and Mobile Financial Services,” March 2014
Nonbanks Strongly Influencing Mobile Payments Ecosystem

- Diverse businesses and industries
  - MNOs, start-ups, and technology solution providers
  - Merchants and online payment providers
- Easy market entry for start-ups
- Creating new relationships/partnerships with banks and other businesses
- Raising concerns related to security, consumer protection, data privacy, knowledge of payment regulations
- Need for enhanced vendor risk management programs
Mobile Payment Developments

2006-2008
- Remote Payments - SMS & Internet
- PayPal Text to Buy
- Text Buy It
- Mobile App Stores
  - Apple
  - Android
- Contactless Cards
  - Visa payWave
  - MasterCard payPass
- Direct Carrier Billing

2009-2010
- Mobile Browser
- First Mobile Card Acceptance / mPOS
- Proliferation of Mobile Apps

2011
- QR Codes
- NFC + SE Mobile Wallet
- Prepaid
  - AmEx
  - serve

2012
- mPOS
- PayPal Here
- NFC Mobile Wallet
- Cloud Digital Wallet
- Prepaid Bank Account
  - AmEx Bluebird
  - Green Dot

2013-2014
- Merchant Apps
- NFC + Host Card Emulation (HCE)
- Beacon BLE
- NFC iPhone case & NFC Apple Pay
Challenges to U.S. Mobile Payment Adoption

- Competing technologies impact merchant decisions
- Nonbanks cause disintermediation
- Fragmented market confuses consumers
- Data security and privacy
- Lack of standards & interoperability
- Complex regulatory structure
- Low merchant acceptance
- EMV migration distraction
# Different Types of Wallets Offered

<table>
<thead>
<tr>
<th>Wallet Provider</th>
<th>Features</th>
</tr>
</thead>
</table>
| Google Wallet   | • Host Card Emulation (HCE) replaces secure element  
|                 | • NFC to tap & pay at point of sale  
|                 | • Load any credit/debit account  
|                 | • Credentials stored in cloud |
| Softcard        | • JV between AT&T, Verizon and T-Mobile  
|                 | • NFC with secure element/SIM card to store payment credentials  
|                 | • Includes AmEx Serve prepaid account |
| PayPal          | • Mobile phone number & PIN at POS to access PayPal account to pay  
|                 | • Payment credentials stored in cloud |
| Visa Checkout   | • Cloud-based for mobile and online purchases; not POS  
|                 | • Customer can link Visa & other card accounts |
| MCX             | • Top U.S. merchants; mobile app and QR code to pay at participating retail/grocery stores, restaurants, gas stations |
### Other Mobile Solution Disruptors

<table>
<thead>
<tr>
<th>Company</th>
<th>Features</th>
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</table>
| Starbucks (Closed-loop prepaid account) | - Reload capability & rewards  
- 10M+ mobile app users, 5M mobile trans/week  
- 14% of in-store U.S. transactions from mobile |
| LevelUp (Small merchant white label mobile network) | - Link credit/debit to mobile app to get unique QR code  
- 1M+ users; 5K+ merchants |
| Apple (iTunes digital wallet) | - iTunes digital wallet (575m active accounts, 1.2m mobile apps)  
- Passbook - cloud-based digital wallet to aggregate merchant QR codes, loyalty, gift cards, movie tickets, boarding passes.  
- *Apple Pay announced 9/9/14! Mobile NFC, Secure Element, link cards through iTunes* |
| Square (Small merchant model) | - Small merchant model with mobile app & plug-in device to accept credit/debit cards, replace cash and check  
- As merchant acquirer assumes liability, charge-backs  
- Customer model - restaurant pre-order, pre-pay |
## What Consumers Want in a Wallet

<table>
<thead>
<tr>
<th>Feature</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Pay using loyalty points</td>
<td>30%</td>
</tr>
<tr>
<td>Store merchant loyalty/rewards cards in mobile wallet</td>
<td>28%</td>
</tr>
<tr>
<td>Make small purchases with mobile QR code</td>
<td>27%</td>
</tr>
<tr>
<td>Mobile P2P Transfers</td>
<td>26%</td>
</tr>
<tr>
<td>Pay for purchase with debit, credit or prepaid card account linked to mobile/digital wallet</td>
<td>25%</td>
</tr>
<tr>
<td>Set up prepaid account for small purchases, automatically reload from debit or credit card</td>
<td>22%</td>
</tr>
</tbody>
</table>

*Source: TSYS Survey, October 2013*
Prepaid Mobile Banking Solutions Gain Traction

| **Green Dot** | **Chase liquid** | **American Express**
<table>
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<th></th>
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</thead>
<tbody>
<tr>
<td>- FDIC-insured branchless mobile bank account</td>
<td>- FDIC-insured GPR prepaid account card</td>
<td>- FDIC-insured GPR prepaid account and plastic card</td>
</tr>
</tbody>
</table>
| - Open new account, alerts, mRDC, P2P, bill pay, direct deposit, ATM network, PFM, savings | - Mobile app  
  - Alerts, mobile RDC, direct deposit, cash reloads/withdrawals at Chase ATMs & branches | - Mobile app: New account open, direct deposit, alerts, bill pay, P2P, mRDC, ATM access, cash reload at Walmart; savings |
| - Cash deposits at some retail/convenience stores | | |
Multiple Points of Risk Create Security Challenge

- Progress requires trust, transparency & cooperation
- Convergence of mobile platforms and multiple parties
- Lines of responsibility and liability blurred
- New opportunities for compromise
  - Data breach
  - Data monetization vs. privacy
  - Use of location-based services
  - Malicious mobile apps
No one authority or law regulates payments or governs m-commerce.
### Mobile Payments Industry Workgroup

<table>
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<tr>
<th>Represents major U.S. mobile payment stakeholders</th>
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<tr>
<td>• Financial institutions</td>
</tr>
<tr>
<td>• Merchants and card networks</td>
</tr>
<tr>
<td>• Clearing/settlement organizations</td>
</tr>
<tr>
<td>• Payment processors</td>
</tr>
<tr>
<td>• Online payment providers</td>
</tr>
<tr>
<td>• Payment trade associations</td>
</tr>
<tr>
<td>• U.S. Treasury</td>
</tr>
<tr>
<td>• Mobile network operators</td>
</tr>
<tr>
<td>• Handset/OS manufacturers</td>
</tr>
<tr>
<td>• Chip makers</td>
</tr>
<tr>
<td>• Mobile solution providers</td>
</tr>
<tr>
<td>• Mobile carrier trade association</td>
</tr>
</tbody>
</table>

### PRINCIPLES FOR SUCCESSFUL RETAIL MOBILE PAYMENTS ADOPTION

- Interoperability between mobile & digital platforms
- Open/ubiquitous wallets
- Existing clearing/settlement channels, open to new rails
- NFC/Cloud security solutions

- Globally interoperable, technology-agnostic U.S. standards
- Understand roles/risks of nonbanks
- Regulatory clarity
MPIW Activity 2014-2015

- Monitor mobile industry trends to assess impacts of EMV, HCE, tokenization, and nonbank solutions
- MPIW Security workgroup
  - Analyzing mobile payment use cases and associated risks
- MPIW Tokenization subgroup
  - Stakeholder assessment of industry tokenization projects
- Identify gaps and potential need for broad mobile payment industry standards (informed through Fed ISO/X9 participation)
- Keep abreast of regulatory developments
Industry points that support New England FI survey results

• Share concerns about security related to consumer adoption
• FIs recognize market fragmentation is a barrier to adoption
• FIs recognize need for collaboration and partnerships with nonbanks to implement mobile payments as important