Mobile Technology
threats and opportunities for
taxation and government payments

E/C.18/2012/CRP.13

Chris Williams / Jo Marie Griesgraber
# Global penetration of mobile technology

## Key Global Telecom Indicators for the World Telecommunication Service Sector in 2011

(All figures are estimates)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Global</th>
<th>Developed nations</th>
<th>Developing nations</th>
<th>Africa</th>
<th>Arab States</th>
<th>Asia &amp; Pacific</th>
<th>CIS</th>
<th>Europe</th>
<th>The Americas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile cellular subscriptions (millions)</td>
<td>5,981</td>
<td>1,461</td>
<td>4,520</td>
<td>433</td>
<td>349</td>
<td>2,897</td>
<td>399</td>
<td>741</td>
<td>969</td>
</tr>
<tr>
<td>Per 100 people</td>
<td>86.7%</td>
<td>117.8%</td>
<td>78.8%</td>
<td>53.0%</td>
<td>96.7%</td>
<td>73.9%</td>
<td>143.0%</td>
<td>119.5%</td>
<td>103.3%</td>
</tr>
<tr>
<td>Fixed telephone lines (millions)</td>
<td>1,159</td>
<td>494</td>
<td>665</td>
<td>12</td>
<td>35</td>
<td>511</td>
<td>74</td>
<td>242</td>
<td>268</td>
</tr>
<tr>
<td>Per 100 people</td>
<td>16.6%</td>
<td>39.8%</td>
<td>11.6%</td>
<td>1.4%</td>
<td>9.7%</td>
<td>13.0%</td>
<td>26.3%</td>
<td>39.1%</td>
<td>28.5%</td>
</tr>
<tr>
<td>Active mobile broadband subscriptions (millions)</td>
<td>1,186</td>
<td>701</td>
<td>484</td>
<td>31</td>
<td>48</td>
<td>421</td>
<td>42</td>
<td>336</td>
<td>286</td>
</tr>
<tr>
<td>Per 100 people</td>
<td>17.0%</td>
<td>56.5%</td>
<td>8.5%</td>
<td>3.8%</td>
<td>13.3%</td>
<td>10.7%</td>
<td>14.9%</td>
<td>54.1%</td>
<td>30.5%</td>
</tr>
<tr>
<td>Fixed broadband subscriptions (millions)</td>
<td>591</td>
<td>319</td>
<td>272</td>
<td>1</td>
<td>8</td>
<td>243</td>
<td>27</td>
<td>160</td>
<td>145</td>
</tr>
<tr>
<td>Per 100 people</td>
<td>8.5%</td>
<td>25.7%</td>
<td>4.8%</td>
<td>0.2%</td>
<td>2.2%</td>
<td>6.2%</td>
<td>9.6%</td>
<td>25.8%</td>
<td>15.5%</td>
</tr>
</tbody>
</table>

Source: International Telecommunication Union (November 2011)
http://www.itu.int/ITU-D/ict/statistics/at_glance/KeyTelecom.html

via: mobiThinking
http://mobithinking.com/mobile-marketing-tools/latest-mobile-stats
The rise of mobile payments

At the end of 2011, there were **6 billion** mobile subscriptions - that is equivalent to **87% of the world population**.

Mobile subscribers in the developed world has reached saturation point with at least one cell phone subscription per person.

At the end of 2011 there were **4.5 billion** mobile subscriptions in the developing world (76% of global subscriptions).

There will be **212.2 million m-payment users** in 2012 (up from 160.5 million in 2011)

m-payments will total **US $171.5 billion** in 2012 (up 61.9% from $105.9 billion in 2011)

By 2016 there will be **448 million m-payment users**, in a market worth **$617 billion**. Asia/Pacific will have the most m-payment users, but Africa will account for the highest revenues
Mobile payments

In the developing world in particular, mobile payments and mobile PoS technologies mean new populations are included in electronic payments.
MasterCard Mobile Readiness Index

http://mobilereadiness.mastercard.com
MasterCard Mobile Readiness Index

CONSUMER READINESS

Measures how familiar with, how willing to use, and how frequently consumers are currently using all three types of mobile payments.

KEY FINDINGS

About this component

http://mobilereadiness.mastercard.com
Mobile technology in m-Government

Most innovative payment products still mostly for P2P transfers, utility payments and direct payments to merchants

Less than 10% of the products supporting government-to-person payments

Some limited use of mobile apps in tax collection

• France mobile app for self assessment collection
• Malawi delivery of emergency aid via mobile
• Basque region collection of fees on face-to-face services (traffic fines, taxes and customs duty)

*Innovations In Retail Payments Worldwide: A Snapshot, Financial Inclusion Practice of the World Bank, July 2012*
Countering fraud

The need for security
Countering fraud

*Mobile Attack Incentives*

- Mass consumer adoption
- Faster processors
- Chip design new and flawed
- Apps rushed to market without testing
- Phones ship with little protection
- Multiple attack vectors
- Increased storage of personal data
Countering fraud

*Mobile Attack Vectors*

- SMS
- PDF's with malware
- Auto diallers / spam mailers
- Information stored on phone
- Mobile phone apps
- Email
- Security apps with malware
Countering fraud

Security vulnerabilities in mobile transactions

Source: Prof. Yong-Nuo Shin, Hanyang Cyber University
Security threats and countermeasures

Vulnerable Point

- Mobile Device
  - Applications
  - Platform
  - Storage
  - Hardware (Multiple Sensors)
  - Communication Channels
  - Application Sources
  - Communication Services

Threats

- T1. Phishing program
- T2. Virus & Malware
- T3. Keyboard Hooking
- T4. SMS hooking
- T5. Memory dump
- T6. Extraction privacy information
- T7. Software reverse engineering
- T8. Acquisition by attacker
- T9. Rogue AP
- T10. Infection Route
- T11. Financial fraud using fishing

Countermeasures

<table>
<thead>
<tr>
<th>User</th>
<th>Developer</th>
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<tbody>
<tr>
<td>C2</td>
<td>C1, C2</td>
</tr>
<tr>
<td>C2, C3</td>
<td>C2, C3</td>
</tr>
<tr>
<td>C3</td>
<td>C3, C4, C5</td>
</tr>
<tr>
<td>C2, C3</td>
<td>C2, C3</td>
</tr>
<tr>
<td>C3</td>
<td>C3, C6, C7, C8</td>
</tr>
<tr>
<td></td>
<td>C9, C10, C11</td>
</tr>
<tr>
<td></td>
<td>C8</td>
</tr>
<tr>
<td>C12-C18</td>
<td>C15, C17, C18</td>
</tr>
<tr>
<td>C21, C22, C23</td>
<td>C19, C20, C21, C23</td>
</tr>
<tr>
<td>C26-C29</td>
<td>C24, C25</td>
</tr>
<tr>
<td>C23, C30, C31</td>
<td>C23</td>
</tr>
</tbody>
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Source: Prof. Yong-Nuo Shin, Hanyang Cyber University
Countering fraud

Software defence

- App store publishing controls
- Firewalling applications
- Apps signed with encrypted keys
- Antivirus / Antimalware
- Apps with data encryption
## Countering fraud

### Other measures

- Biometric security
- Timely patching / upgrading
- Location tracking / remote wipe
- Reduce storage of sensitive data
- Monitor logs / network traffic
Countering fraud

Ensuring the identity of the citizen

Tying the handset to the account holder:
- Passwords and PINs
- Biometric tests – fingerprints, handwriting, facial recognition, voice recognition, retina

Reliable underlying database of taxpayers
- UTIN allocations
- Cross-referencing with other government databases

Verifying taxpayer identity in international transactions
- Central facility connected to local services
Countering fraud

Anti Money Laundering and Anti-Terrorism

Problems of regulation
- Systems operated by non-financial institutions
- KYC, AML and AT standards

Role of intermediaries
- Telcos
- Payment processors
- ‘Trusted third parties’

Licensing issues
- Who?
- On what basis?

Partnerships and consortia
- Banks
- Telcos
- Application developers
- Online service providers
Possible stakeholders in mobile payments

- Application Providers
- Payment processor
- Issuing Bank
- Mobile Operator
- Trusted Service Manager
- Payment Network
- Merchant
- Consumer
- Transit Operator
- Acquiring Bank
- SIM / payment software developers

- Required stakeholders
- Optional additional stakeholders
key factors for mobile phone-based payment licenses

<table>
<thead>
<tr>
<th>Interoperability – competitiveness and spread of users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role of telcos – message passing, not banking</td>
</tr>
<tr>
<td>Security of messaging</td>
</tr>
<tr>
<td>Security of data – real time fraud analysis</td>
</tr>
<tr>
<td>Cost – competitive with card costs</td>
</tr>
<tr>
<td>Loading – simplicity</td>
</tr>
<tr>
<td>Using to make payments – incentives to stay electronic</td>
</tr>
</tbody>
</table>
Electronic Transaction Payment types (ETPs)

- Electronic bank transfers
- Online banking
- Credit cards
- International debit cards
- Local debit cards
- Electronic wallets / travel payments
- Online virtual currencies
- Social network currencies
- Mobile phone based payment services
Requirements for a robust system

- Internationally agreed standards
- Robust fraud countermeasures
- Standardization of licensing
- Interoperability – with m-payments and other EPTs
Central hub for electronic payments

- **PAYER**
  - Licensed ETPs
    - Banks
    - Credit Card Associations
    - Local card issuers
    - Mobile operators
    - Non-traditional Online PS

- **Central Hub**
  - Calculation of taxes and benefits.
  - Automated payment of taxes and benefits.
  - Payment for purchases.
  - Payroll Payment
  - Access to account information/book-keeping
  - Fraud scrub
  - Government accounts

- **Licensed ETPs**
  - Banks
  - Credit Card Associations
  - Local card issuers
  - Mobile operators
  - Non-traditional Online PS

- **RECIPIENT**
System components

• Point-of-Sale Data Capture devices / transaction data input
• Licensed Electronic Transaction Processing providers
• Interoperable spine for exchange of data between ETPs, central systems and the Central Hub
• Funds transfer conduit
• Firewalls between ETPs and central hub
• Central hub processing and data storage
• Central hub rulebase containing regulations and calculation rules
• Central hub calculation modules
• Real-time fraud analysis application
Hub-based system

**Benefits payments:**

- Benefits can be paid on specific goods and services (such as foods, petrol, utilities) for targeted recipients in an **entirely confidential** manner.
- **The merchant is paid full price** for the goods with the subsidy added directly at the hub from government funds.
- All regular benefits such as **employment, social, housing, pensions etc** can also be paid through the system.
- Increased benefits payments can be offset from additional revenue raised by efficient, fraud-resistant tax collection.
Hub-based system

**Payroll control:**

- Employers can submit *gross salaries* to the central hub – reducing workload
- Employees can submit claims for allowances, dependents etc. in a *confidential* manner
- **Due taxes extracted automatically in real-time** and settled to appropriate tax authorities
- Employees can establish regular payments for utilities, pensions, insurance etc. from a virtual account on the hub
- Net pay can be transferred directly to nominated bank or mobile phone-based accounts for each employee
- Multiple incomes can be incorporated into the single account
Hub-based system

**VAT collection:**

- Merchants given Point of Sale capability via mobile phones or POS terminals
- Merchants can accept electronic payment, from cards, mobile phones or online
- VAT is deducted at the server level and paid to the relevant tax authority
- For applicable Business to Business (B2B) transactions, reclams can be calculated and issued in real time
## Benefits of Central Hub System

<table>
<thead>
<tr>
<th>For the tax authority:</th>
<th>For retailers:</th>
<th>For large employers:</th>
<th>For telcos:</th>
<th>For government:</th>
<th>For citizens:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic, simple VAT and payroll tax collection</td>
<td>Efficient compliance, reduced admin, little reporting effort.</td>
<td>Major saving in admin of employees’ tax and benefits records.</td>
<td>Greater traffic over networks</td>
<td>Major increase in tax revenue.</td>
<td>Incentives including upgrades, price discounts or special bonuses</td>
</tr>
<tr>
<td>Real time fraud analysis reduces losses</td>
<td>Facility to market goods more effectively</td>
<td>A facility to bill customers to their quasi bank account for collection of regular bills.</td>
<td>Income stream from central clearing</td>
<td>Capability to provide secure and confidential benefits.</td>
<td>Assurance of correct tax calculation</td>
</tr>
<tr>
<td>Interface with other tax authorities</td>
<td>VAT refunds automated</td>
<td>Automated VAT collection and refund for all transactions.</td>
<td>More information facilities.</td>
<td>Additional data stored on central servers.</td>
<td>Potential rebates or discounts on electronic purchases</td>
</tr>
</tbody>
</table>
m-Government payments for the new millennium

m-Government payments for the 21st Century:

- Processed in real-time
- The tax component of each payment split in the course of the transaction
- Fraud analysis applied at each stage
- Interoperable with any ETP
- Benefits, refunds and discounts paid directly
Action points

- Further studies on the issues of management and regulation associated with m-payments, m-banking and m-retail applications
- Establish a Committee of Experts under the remit of the United Nations
- Establish a cross-organization forum involving contributions from a number of relevant international organizations
- ‘Invitation only’ conference in March 2013
The Guernsey model