DigiTally

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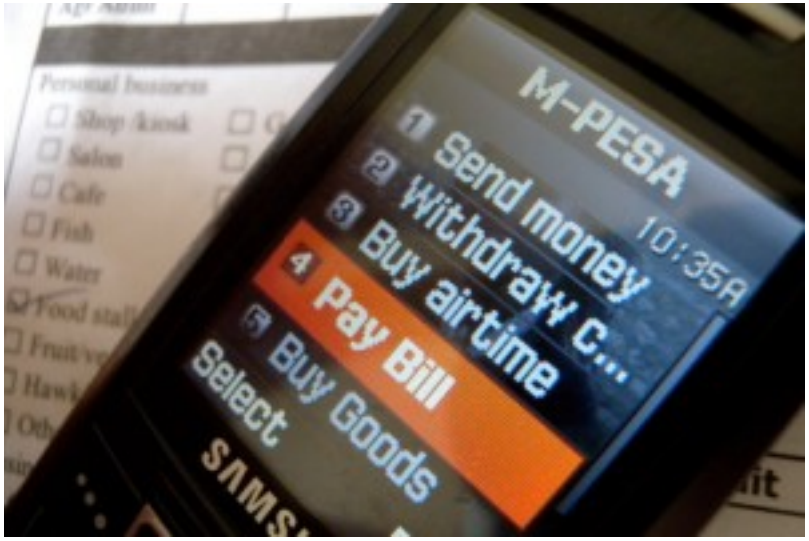
The mobile money revolution



Mobile money achievements

- Brought banking services to hundreds of millions who didn't have them
- Built mechanism for direct payments and remittances; store of value; personal safety; transaction history; access to credit
- Provided direct channel for government payments and services

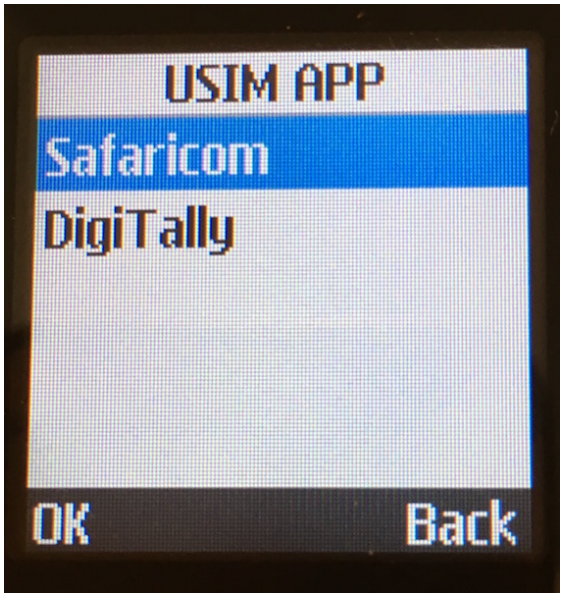
Remaining challenges: can we...

- Extend payments to areas with no mobile service (mountains, deserts, islands)?
- Make service work even when network service intermittent (congestion, power cuts)?
- Cut network charges (do we really need three SMSs per payment, even regular customers)?
- Provide a usable system for feature phones (without camera, Bluetooth, NFC, etc.)?

Goal: operate in offline or constrained environments

- Existing offline purses: UEPS, Geldkarte, etc
- These systems can be implemented in SIM toolkits (phone applets)
- Problem 1: money operators (usually MNOs) limit access to SIMs
- Problem 2: existing systems are designed for complex messages between devices
- Problem 3: simple phones lack features

Enabling tech: overlay SIMs



- Tamper-resistant SIM to compute authorization codes, as in EMV
- Sticks on top of the regular SIM
- Bypasses the mobile network operator
- Independent secure device

DigiTally

- DigiTally is a purse system we've built for offline mobile payments (prototype ready)
- Grant by Bill & Melinda Gates Foundation (GCE)
- It will be free open source software
- It can also be implemented in a SIM toolkit or as a smartphone app, or in overlay SIMs for simple phones (as our prototype is)
- It works by copying short authentication codes from one phone to another …

DigiTally payment (1)

- Initial step: Alice increases her purse balance by exchanging cash for DigiTally credit (e.g. via an agent, similar to the role of agents in current mobile payment networks)
- Contact information is entered manually or selected from a previously saved contact entry
- Now, Alice wants to pay Bob Ksh 450
- Both devices will authenticate transactions using PINs

DigiTally payment (2)

- Bob then enters “450” on his phone
- It shows an eight-digit authorization request

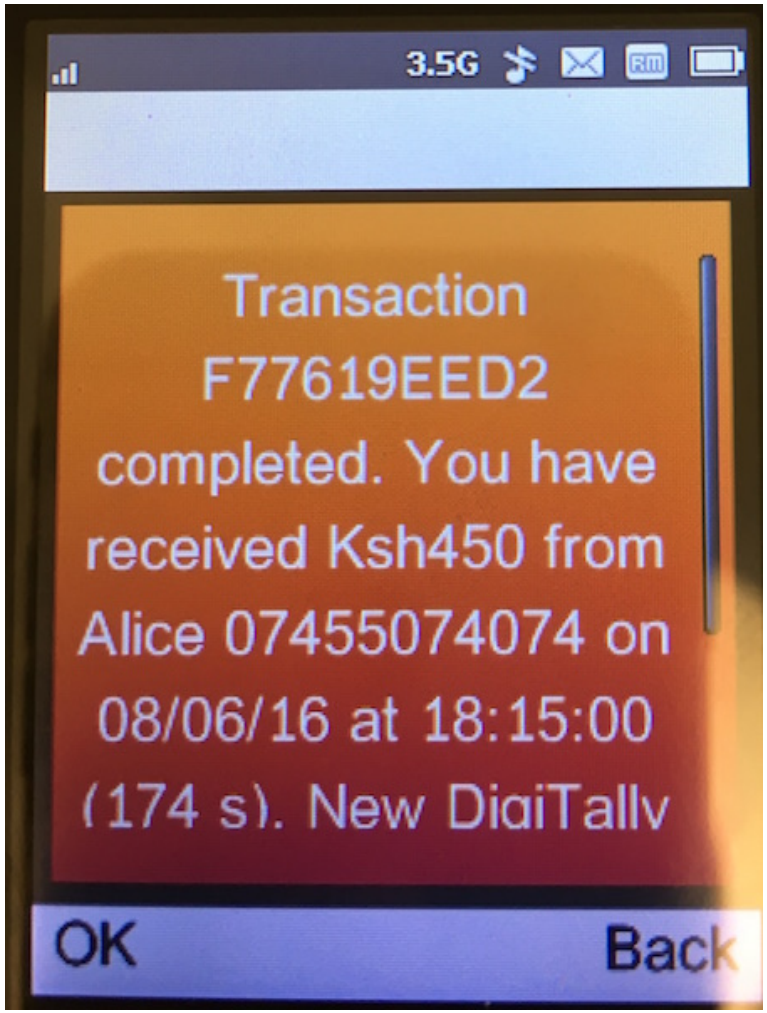
- Alice enters “450” and the code above on her phone
- Agreement: Alice’s phone shows “OK”

DigiTally payment (3)

- Alice's phone displays an eight-digit authorization response, which she shows or reads out to Bob

- If code 1 was correct (agreement), then code 2 authorises increasing Bob's balance by Ksh 450 (Alice's balance already decremented)

DigiTally payment (4)



- Both devices show the transaction log
- If the transaction is interrupted (on either device), it can be resumed at any time

Security case

- Implementation in tamper-resistant overlay SIMs, which will be EMV compliant by 2016
- Cryptography can use AES or 3DES to generate authentication codes
- Payment protocol formally verified and sent to a crypto conference for peer review
- White paper detailing the technical details available online (project page)

DigiTally benefits

- Serve customers in villages with no network
- Serve customers when the network is congested or down
- Cut network costs for repeated transactions between the same customer and merchant
- Works on feature phones and smartphones

Next steps

- Test prototype system using overlay SIM Java Card toolkit (from Taisys)
- Will do small-scale trial end of June 2016
- Incorporate lessons learned into larger-scale field trial
- Make first DigiTally reference implementation available Q1 2017
- Free open-source software for all to use!