MOBILE PAYMENT
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Abstract: The advancement of Technology in the Telecommunication sector and information technology innovation give rise to several payment methods which include online payment or e-payment , MasterCard, credit card and debit card which are only limited to developed countries and urban areas. Which need to setup pc or laptop to access internet or searching for cash machine before payment transaction can be made. But there is a new type of payment system that is convenience, easy to use, accessible at any time anywhere payment transaction can be made via the use of mobile handsets. This is the type of payment know as mobile payment. Mobile payment is the process of carrying out payment of financial transaction for goods and services with the use of mobile phone or any coreless gadgets. Mobile payment was introduced to solve the problem that associated with the conventional online payment limitation of inaccessibility. In this paper first introduction, secondly mobile payment stakeholders and continue in the order of mobile payment characteristics, types of mobile payment, mobile payment technologies, mobile payment systems, trend-future of mobile payment, and security for mobile payment ,analysis of mobile payment systems and finally conclusion.

Keywords: Mobile Payment, Technology, Systems, Transaction and Mobile Device.

1. INTRODUCTION

The recent Technology evolution in telecommunication and wireless in sector as emerges a new payment system, that believed to solve the problems and shortcoming of the traditional or conventional payment systems such as visa card , paypal debit card credit card and master card etc. where it is seeing to be present at anytime , anywhere and easy to carry out transaction at anytime from anywhere such as money transfer, buying of goods and paying for services etc. this new innovative payment system is known as mobile payment or mobile money, where it involves coreless gadgets like personal digital assistant (PDA), mobile phone, and

other related digital devices. Payment or transaction that initiated by the use of mobile phone or mobile device. These include online banking website, online payment website, web browser or sending text messages.

2. DEFINITIONS OF MOBILE PAYMENT

'Mobile payment as means that users adopt mobile terminals such as mobile phones to conduct payment for bills, goods and services.'(Zhou, 2013)

' Mobile payment is kind of payment in which at least one part of the transaction is performed via a mobile device (such as mobile phone or a personal digital assistant) through a mobile Telecommunication network or a wireless technology.' (Rahimian and Habibi, 2008)

'Mobile payment is a point – of – sale payment through a mobile device' (Soni, 2010)

Mobile payment is a type of utility that enables persons as usage of theirs mobile terminal (normally handsets) for remuneration of it commodities as well as utilities consuming.(Yan et al., 2011)

Mobile payment it is the period where transfer of remuneration is carry out via mobile handsets, like coreless gadgets as well as Smart handsets, is mobile that supports the transfer of data needed in the real forwarding funds. (Singh and Jasmine, 2012)

In my own view mobile payment can be define as the way of any transaction being carried out with mobile devices these can include buying of goods, payment for services and any related wireless transactions.
The mobile payment environment constituents the financial institutions, consumers, retailers and different mobile payment service providers, these financial institutions authorized the transaction flow and security.

3. MOBILE PAYMENT STAKEHOLDERS

The deployment process of mobile payment involves various stakeholders, these stakeholders includes. (Singh and Jasmine, 2012)

    i.   Consumers
    ii.   Merchants
    iii.   Mobile Network Operators
    iv.   Mobile device manufactures
    v.   Financial institutions and banks
    vi.   Software and technology providers
    vii.   Government

4. MOBILE PAYMENT CHARACTERISTICS

The mobile payment service, must act relevant at the trade environment for the ways about remuneration, its requirements must be attained (Karnouskos and Fokus, 2004).

These include:

i. Simplicity and Usability: the mobile payment software should exist as consumer amicable and easy to operate with the consumer. The consumer should be able to change or set the application to fit in her or his desire kind of operation or business platform at any given time without the requirements of special skills or techniques that is at the consumer luxury.

ii. Universality as well as Interoperability: Mobile payment utility should be able carry out transactions between peer to peer (P2P), either like business toward customer (B2C) as an alternative within business to business (B2B). these supported services must comprise modest, local as well as international surroundings. The Payments service has to support in terms of both low value micro-payments and high value macro-payments. The Development of the mobile payment must be depended on non-closed technologies that are open technologies and standards that will allow connectivity between systems without delay.

iii. Protection, Secrecy as well as Confidence: the consumer must capable of having confidence in the mobile software producers whereby their credit card either MasterCard data protected from data confidentiality and identity theft. Whereas the consumer privacy transactions histories record of his or her credit card must not be misplaced and

the consumer shopping behaviour should be concealed from the public or thirty party requests for inspection or investigations. Mobile payments must obtain some forms of secret like money business dealings either undertaking. The mobile payment must be protected from any form of attacks from hackers and terrorists. The mobile payment solution architectures should include security infrastructure that will consists public key, biometric and passwords integrated in it for foolproof.

iv. Cross border payments, Speed and Cost: the mobile payment solution has to support other ways of remuneration which include amount as well as easy to operate and interoperability. The consumer and the retailer will determine the speed of mobile payment executed that will widely acceptable to mobile payment.

4. TYPES OF MOBILE PAYMENT

The types of mobile payment which are briefly explained as follows: (Singh and Jasmine, 2012)

i. C2C - Consumer to Consumer

This is the kind of commerce among individuality as well as customer. It is the e-commerce that outstanding as a result of its evolution of electronic commerce as well as on the internet bargain or sell-off setup, particularly the aspect of firms/trade applies it to offer the area of they need with collective producers. It can acquire maximum achievability as long as developing fresh merchandises C2C business dealing occurs within end-consumers, beyond a trade medium especially obtained toward clarify transaction. eBAY as an example is among the best famous in C2C firms, the firm involves paypal to service as payment section of eBAY, that remarkably facilitate at C2C commerce which restraining the customers funds in guarantee accounts, when the consumers acknowledge receive of the products, therefor it assure the product must be in acceptable quality. The essential medium base on paypal which is considered for excellent performer in worldwide pertaining to the C2C mobile payments. Also fresh performers are fast increasing regionally, which

introduced newly, with internet payment which is they major focus. With the development of the technology across the global, this new performers will easily adopt mobile payment as the way of remuneration for good and utilities or transaction which the new performer non even. (Singh and Jasmine, 2012)

ii. B2C-Business to Consumer.

B2C e-Business ,or dealings within firms as well as consumers, which contained the purchaser data, whereas acquiring substantial stuffs that includes tangible like stationary either consumer commodities ,(either commodities of electronic form either digitized gist, like software , either ebooks); as well as , with data commodities, then electronic interconnection service as a platform of receipt of commodities. B2C- Business to consumer is one of the earliest as well as largest method of electronic Business, which its pedigree draw from the internet retailing. Hence, likewise conventional B2C trade modes in the internet hawk firms which includes Amazon.com, Barnes as well as noble also ToysRun. Different B2C examples linking data commodities as E-Trade as well as Travelocitys.

iii. B2B-Busiess to Business

This is the electronic business that performs transaction within firms. It is a kind of business which transaction including association within as well as surrounded by trades. The various form of payment method in B2B generally includes: the ones that change customary aspect of treasury either finance firms ,the ones that which act between treasury as well as finance firms that produce service in order for treasury and finance firms which bids for its consumers also the persons that operates ACH system toward practice of payments. (Singh and Jasmine, 2012)

iv.B2G – Business to Government

B2G it is commonly describe on the point of business within firms as well as general division . is considered to the application of web in such as general appropriation certify operations, also various government affiliated performance. Is the type of e-

business which contain double speciality : one of them are the general division presumed guide/directs the action which accomplishing e-business ; as well as the other presume which general division have the biggest requirement of generating its own appropriation method best efficient. The online buying administration grows the clarity concerning appropriation (as well as eliminating uncertainty about abnormalities), till now, nevertheless capacity about B2G business merchandise being the part and parcel of overall e-business remain not important which government e-procurement methods being backward or immature. (Singh and Jasmine, 2012)

v.P2P - Person to Person

P2P mobile payment is non-public business dealing within twin persons which is mainly on SMS-dependent. It includes distribution of airtime (for instance forwarding minutes what of airtime as fee transaction for commodities), mobile banking forwarding funds either electronically utility which include transaction about subject either basically earth commodities .

Hence, commissary arean can still include enterprise, although the business dealing which is straightforward from individual to a different individual. The growing of person –to-person (P2P) payment is developing to online payment, include mobile medium. Approach of technology allows another performance regards as mobile phone across the easier mission of producers of mobile phones either coreless connection planning helping recent as well as other medium in mobile banking utility, these are bill fee, as well as account forwarding, local and global P2P transference, proximity deposit from point of sale, as well as inaccessible disbursement of buying commodities and works.

Mobile funds forwarding has encounter quick acceptance in several business, with constant advantage of upkeep, globally anywhere anytime handsets, demanded for online P2P payment order than the cash-dependent method. The advancement of telecommunication utility presently increases to the extension of banking utility beyond coreless interconnection from undeveloped regions, making conceivable as important improvement in mobile

business as well as banking involvement. (Singh and Jasmine, 2012)

6. MOBILE PAYMENT TECHNOLOGIES

The mobile Technology platform generates different potentiality of carrying out mobile payments. More especially GSM mobile handsets can forward either get data via the following mediums such as SMS, USSD and WAP/GPRS. The selection of medium controls the approach of mobile payment systems of performance. In most cases the mobile payment software located in the mobile handset either consist in the subscriber identity module (SIM). The following mobile payment technologies are shortly explained: (Singh and Jasmine, 2012).

i. SMS-Short Message Service
It is the text message service which allows brief messages not more than 140 -160 characters in length which also transfers from one mobile phone to other mobile phone. The short message service centers stocked and delivered messages. Both SMS message and audio medium get separate entrance to the mobile phone. SMS has being used to produce details of account in banks or account statement to the account own, also carry out transaction of any kind via the phone. The advantage of SMS messages includes texting is reliable, texting is quick and easy, texting is cheap and texting is discreet and confidential.

ii. USSD
Unstructured Supplementary Service Data (USSD) is particular type of technology in GSM. Which has potentiality embedded with the GSM regulation that allows the sending of data across the signalling medium of GSM network. USSD produces period depended communication, that allow different usages. USSD is period informed performance informed technology whereas SMS is the stock-and-delivery technology. Through put time of USSD is more than that of SMS in collective usages.

iii. WAP/GPRS
General Packet Radio Service (GPRS) it is the present mobile data service for the GSM patronage. The GPRS generates packet switched data for GSM networks. GPRS allows service which includes Wireless Application Protocol (WAP) gain, Multimedia Message Service (MMS), as well as

internet service which involves web browsing as well as email via the use of mobile phone.

iv.   *Phone –based Application (J2ME/BREW)*

The client of mobile payment software application always located in the mobile phone of the consumer. These software can be created with Java (J2ME) for GSM mobile handset as well as Binary Runtime Environment for CDMA mobile handset. Over the air (OTA) is used for the customization of the mobile phone.

v.   *SIM-based Application*

The subscriber identity module (SIM) it is the sim card that applied with the GSM hand set which consists of microchip and that of memory also perform execution. The security feature secure data like cryptographic algorithm keys. The sim application is more reliable than client application which is located in handsets. If consumer gets recent mobile phone, is the sim card that required removal and also has to customize the recent handset with application software.

vi.   *Near field Communication (NFC)*

NFC performs the mixture of contactless smartcard (RFID) as well as the handsets, where the handsets service as contactless card. NFC allows handsets function as RFID tags either readers. This will cause event to generate modernization usages particularly that of ticking also couponing. The GSM association introduced "Pay – Buy Mobile" aim at 900 million subscribers with the general worldwide method of applying NFC that involves fourteen mobile Network operators.

viii.   Dual Chip

Commonly, mobile payment applications often combine with the sim card. Telecom. Firms bought sim cards in very huge quantity and personalize the sim card before selling. Mobile payment application service provider developing the mobile payment software in the sim card must be carry out in combination of both the Telecommunication operator (sim producers) and the mobile payment service provider. In other way of preventing combination situation, dual chip handsets contain double slot where the first slot used as sim card also second slot used as payment chip card. Banks adopted the dual chip handsets so as to direct and check the activities of mobile

payment method. Whereas consumers need to invest on dual chip handsets. (Karnouskos and Fokus, 2004).

ix.   *Mobile Wallet*

The mobile payment application software which located in the handsets contains every information concerning the consumer, that enables the consumers to carry out transaction via handsets is known as mobile wallet. The mobile wallet consists of many debits either credit card payment mechanism. The mobile wallet is firms –particular oriented as a result of practice in worldwide.

7. MOBILE PAYMENT SYSTEMS

The mobile payment systems are systems that allow the consumer to carry out mobile transactions these include:

i.   *M-paisa*: it is a mobile payment system that enable Vodafone clients to perform banking transaction through the use of mobile phones. The consumer uses M-Paisa to deposit and makes withdraw of money, also send cash to different mobile phone user. The M-Paisa can buy recharge or airtime and then receipt of money into it's Vodafone mobile device. Presently the Vodafone M-Paisa service has about 2200 retailers in 320 villages and 54 cities at Rajasthan in India. The M-Paisa uses SMS, USSD technologies for it platform in mobile payment.

ii.   *Bestpay mobile payment app*: this is mobile payment system in China that grants China Telecom 3G users in carrying out electronic transaction and mobile purchases, which includes remuneration for telephone as well as associated bills, buying of raffle, films also event passport. Whereas it performs the checking of transaction records and account balances. The technology used in Bestpay mobile includes WAP/Internet via mobile phones.

iii.   *Quick Tap*: it is a mobile payment system which involves the use of contactless mobile payment to enable UK consumer to make payment in such a way that their tap, the Quick tap mobile phone against the contactless reader. About 50,000 stories are using Quick tap in Uk. The main stakeholders that involves in Quick tap are Orange UK, Barclay, Mastercard and Gemalt.

iv.   Mpass: it is a mobile payment system which allow merchants to receive direct carrier billed payment s for virtual, physical goods and digital; this mobile payment system is currently used in Germany. And it uses the technology of SMS, WAP/Internet to carry out one-time transaction. The merchant provides the user of Telefonica Germany subscriber with Euro 30 directly to the mobile phone owner carrier bill.

v.   Paypal here: it is mobile payment system that enables transaction of business via mobile phone. In a way, which road side trader transfer statement and admit debit as well as plastic money. Retailer uses paypal here to receive payment through wiping the card against the automate machine, examining card as well as bank note applying handsets polaroid either personally putting the card data inside the machine. The paypal here mobile payment system is currently in used in USA, Canada, Australia and Hong Kong, which employed the WAP/Internet technology.

vi.   M-pesa: it is the mobile payment system that enables users to make payment for good and service, which also used for other financial Transaction such as school fee, deposit, withdrawal and Transfer of money from person to other, via the involvement of mobile phone. the m-pesa was introduce at April 2007 to solve the problem of the huge population of Kenyan in Africa that does not have bank account as well as those of them that have no access to banks like the people from rural region of Kenya. M-pesa is currently used in Uchumi as well as Naivas stores market egress beyond Kenya, which includes others countries in Africa are Tanzania, South Africa, as well as Afghanistan.

8. SECURITY FOR MOBILE PAYMENT

Security is a major concern in m- commerce because of it nature of exchange of commercial information and protected electronic financial transaction which involved different area of security , such as security of mobile devices, security of network technologies, service security and transport layer security mechanisms.

The mobile payment must possess security properties for the protected mobile system. These security properties are as follows: (Varshney, 2002, Kadhiwal and Zulfiquar, 2007).

1. Authentication: authentication restricts an unauthorized third party from pretending to be as valid parties. With the right technologies and standards of code format, authentication can be obtained.

2. Data confidential/secrecy: in this case of business transaction, it has been conceived that only the sender and the receiver can understand the exchange message plaintext. Data confidentiality ensure that the confidential information can received by the user been authenticated only instead of the intruder or the wrong user.

3. Data integrity: the message can be changed entirely or partially outside the data integrity security, though authentication and encryption still exist. With the support of data integrity feature attackers can not deceive the receiver by changing the content of message exchanged.

4. Nonrepudiation:- it is very important in business-related operations. It ensures that the user can not deny of carry out any form of transaction thereafter and produce evidence if such thing happened.

5. Availability: the availability of a mobile payment system guarantees that a genuine user must be accessible as the business service assuredly and tightly, for authorized user at all time. This property reduced the attack of denial –of- service (DOS) attacker which creates wastage computation time in particular entity.

6. Authorization: it is the process that verify and allowed to request of transaction been made by the user. (Varshney, 2002 , Kadhiwal and Zulfiquar, 2007).

With the activities of attackers and eavesdroppers, the architecture of a mobile system to meet these properties has been to be difficult effort, so mobile payment system should go through critical investigation before it can be put use.

This paper is limited to the service security that involved the monetary transaction which includes the following in term of security in the mobile

payment technologies. (Kou and Yesha(Eds), 2006).

i.   SMS (Short message service) as the largest well-known data utility provided via mobile Network Operators (MNO) as well as often generally employed as mobile payment. With the applying of SMS as a result of launching either approved remunerations, the totality of the currency used is the SMS. The device may transfer data through the SMSC for forwarding as well as acquiring normal SMS message recognized by IMSI (International Mobile Subscriber Identity), where by assaulter may not be able to faked except cracking the GSM/UMTS security. Without the existence of end-to-end security in protection of radio interface terminal, the network operator as well as theirs infrastructure should be charged before transaction.

ii.   USSD (Unstructured Supplementary Service Data) is different from the asynchronous SMS service open service that can generate alternative network operator or USSD acknowledgement prior delivery the connection. But USSD does not have security properties and only depends on the GSM/UMTS security components.

iii.   WAP is a different approach for subscribers to carry out mobile payment. it is certainly to become the underlying technique of mobile payment with the evolution of 3G technologies. The wireless Transport layer security (WTLS) protocol executed the WAP security; it primarily depended on transport layer security (TLS), and can produce security, integration and collective authentication in the wireless communication.

WAP has a security weakness known to be WAP gap which exposes the encrypted message at the WAP gateway shortly when processed. The alternative solution this problem is to enforce WAP gateway to resides in the enterprise (SERVER) Network.(Kou and Yesha, 2006).

9. TREND –FUTURE OF MOBILE PAYMENT

The mobile payment platform continued to attract consideration increases for the past years. Truly, mobile payment s will continue to attract –even more attractive than before. The improvement of mobile phone technology has granted mobile payments to

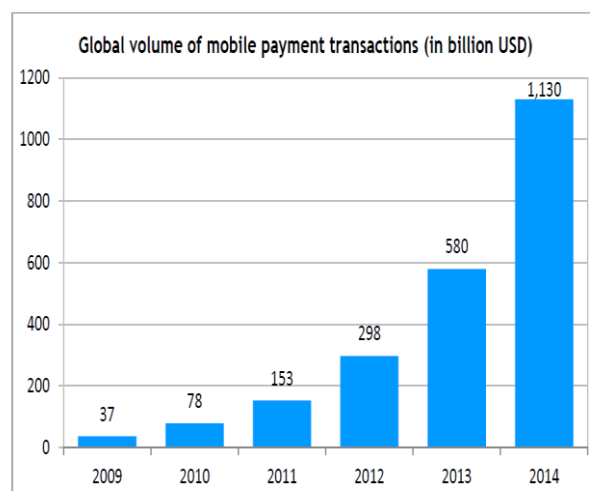accomplish in different ways. Whereas forecast for mobile payment have going to be aggressively high.

Figure 1. Global volume of mobile payment transactions: Source: IE Market Research, "Q3.2010 United State Mobile Payment Market Forecast, 2010-2014", 2010. (Innopay Mobile Payment (2012.)).

The IE Market Research (2010) reported "the global volume of mobile payment transactions is expected to grow from USD 37.4 billion in 2009 to over US 1.13Trillion in 2014, which means a CAGR of 94.8%."

The prediction of Gartner (2011) show that the number of mobile payment users generally is more than 141 million in 2011, 38.2% increase from 2010 and 2.1% represents mobile payment users of the mobile users generally, which means that there is strong potential for growth in mobile payment ecosystem particularly the regions that lacks alternative payment method.

The recent development in web browsing compatible handsets presumed that, will push mobile remuneration of business dealing dimension. In-state (2011) forecasted report stated in a yearly amount of mobile remuneration of business dealings will accumulate as 45 billion by 2015 worldwide inasmuch customers eventually gets educated about the mobile remunerations as well as amount of merchandisers advocating the mechanization steadily waxing.(Innopay mobile payments 20120).

Hence the mobile payment will likely be the leading or major form of payment for goods and services in the next five to seven years because of its characterized flexible accessibility of anywhere

anytime nature and attention were drawing from worldwide.

9.1 Legal And Regulatory Framework For Mobile Payment

The mobile payment ecosystem has not received any legal and regulatory framework across the global which bring a major drawback of the mobile payment adoption worldwide. The various stakeholders who constitute the mobile payment ecosystem are brain-storming to come up with universal acceptable technology, also laws that will enhance regulatory framework to earn the trust of consumers and retailers in worldwide.

The mobile payment ecosystem is presently control by the central banks and mobile network operators in their own various countries such as US, Kenya, South African, Nigeria, India, Canada, European countries etc. these countries engaged in mobile payment without a specific mobile payment technology but based on the mobile network operators available mobile payment technology.

10. ANALYSIS OF MOBILE PAYMENT

m-paisa mobile payment system is reliable in term of security because of the use of SMS technology that involved, where there is no opportunity for attackers to carry out attack like data confidentiality , data integrity, and replay attack but its only used in india not as widely used as Paypal here that cut across USA, Canada, Australia, and Hong Kong.

Paypal here only support mobile phone that are 3G enable technology because of WAP/ Internet platform it operates, which does not compactable with the mobile payment system that are SMS enable
.
Paypal here is not secure, only depends on WAP security which also inherits security weakness as WAP gap, make its even more vulnerable to different forms of attack. Paypal here is limited to internet connectivity unlike m-paisa that dot not require internet service.
M-paisa mobile payment system is faster when compare to Paypal here as well as easy to performance transaction with m-paisa and not limited to any kind of mobile phone.

The m-pesa when compared to quick Tap and Bestpay mobile payment app is more reliable in the aspect of security as well as easy and simple to carry out any forms of payment. It does not require any peripheral or device to performance transaction unlike Quick Tap that need special device like contactless Reader for any transaction to be made. Where the Best mobile payment app also limited to only 3G enable mobile phones like Quick Tap and Paypal here mobile payment systems. But m-pesa just like m-piasa is not limited any type of mobile phones.

M-pesa also gain popularity than that of Quick Tap only used in UK , Best mobile payment app only limited to 3G subscribers in china whereas m-pesa have been used in Kenya, South Africa , Tanzania and Afghanistan, like paypal here that widely used but different technologies of mobile payment .

11. CONCLUSION
The mobile payment will be one of the major leading payment systems in worldwide despite the challenges of related security issues from the technologies behind the mobile payment ecosystem and lack of universal acceptable legal and regulatory framework. But various stakeholders and players are brain-stormy to introduce legal and regulatory framework that will solve the related concern, which associates along mobile payment ecosystem.

It has very large potentials to grow across the global and will be the biggest payment method in the world, in next three to five years' time, because of its character of portable, always with the own, anywhere and anytime nature.

Further, the adoption of mobile payment in carrying out transaction in worldwide will reduce cost of producing such as MasterCard, debit card as well as credit card, and increase profit making in financial institutions also maximize consumers and retailers time of business dealings. It is the glorious future of payment system in this evolving arena of innovative technology.

Au, Y. A. and Kauffman R. J., (2007): The economics of mobile payments: Understanding stakeholder issues for an emerging financial technology application, Electronic Commerce Research and Applications.

S/no	NAME	TECHNOLOGY USED	COUNTRY	WEBSITE
1.	Buyster	NFC	France	http://buyster.fr/
2.	M-Paisa	SMS,USSD	India	http://www.hdfcbank.com
3.	Digital wallet service	WAP / Internet	China	www.okpay.com
4.	eMoney XChange	SMS	The Philippines	http://www.unionbankph.com
5.	QkR	QR codes	Australia	https://play.google.com
6	M pass	SMS, WAP / internet	Germany	http://www.mpass.de/
7	Quick Tap	NFC	UK	http://shop.orange.co.uk/mobile-phones/contactless/
8	RuRu	WAP / internet	Russia	https://www.ruru.ru/
9	Mobile commerce & payments services for retailers	NFC	UK in 2012,	http://mobilemoneynetwork.com/
10	Cep-T ParaCard	SMS, USSD	Turkey	http://www.paracard.com.tr/Hangi-Paracard/cep-t-paracard
11	Warid Pesa	SMS, USSD	Uganda	http://waridtel.co.ug
12	moneto Wallet	NFC	USA	http://www.moneto.me/
13	PayPal Here	WAP / Internet	USA, Canada, Australia, Hong Kong	https://www.paypal.com/webapps/mpp/credit-card-reader
14	ZimSwitch Ready	SMS, WAP / internet	Zimbabwe	www.zimswitch.co.zw
15	ChamsMobile	SMS, WAP / internet	Nigeria	www.chamsplc.com/web/pages/chamsmobile-limited.html
16	M-pesa	SMS	Kenya, South Africa, Tanzania and Afghanistan	https://www.nic-bank.com/bank/mpesa/

Table 1: List of mobile payment systems this table illustrates the various mobile systems, website and place of use.

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