Proposal for free, fair and safe elections through mobile phones in Papua New Guinea

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Abstract

Frequent concerns on the credibility of election results continue to be expressed across PNG. Election related violence has also been commonly witnessed. More recently, the limited preferential voting system was introduced to improve the voting system and to give voters more choice in exercising their democratic rights. Despite this, corruption and related disputes show no signs of decreasing. This paper proposes the use of mobile phones as a cost effective and secure voting medium through the use of short messaging service and multi-media messaging service. The proliferation of mobile phones across PNG can be harnessed to implement a voting scheme offering citizens the opportunity to vote from the privacy of their homes and communities without the fear of being harassed. The pervasiveness of mobile phones can be utilized to improve the election process towards more freer, fair and safer elections in PNG.

Key words: Mobile phones**,** elections**,** Electoral Commission**,** democracy, SMS, voting system

Introduction

Elections in Papua New Guinea (PNG) are highly contested events, organized, coordinated and funded through the office of the National Electoral Commission (NEC). For the 2014 fiscal year, the electoral commission was allocated a sum of 37 million Kina to carry out its legislative functions (Isu, 2013b). The magnitude of the budgeted Kina amount is a reflection on the importance of the national, provincial and local level government elections. In recognition of this, the office of the electoral commission is often adequately financed through annual government budgets. Yala (2014) asserted that elections are important for a functioning democracy. Against this backdrop, electoral commissioner Andrew Trawen has continuously called on the people of PNG to *'take ownership and make sure that the elections are conducted in a peaceful manner'* (p.5). The 2013 Madang by-elections, saw a fight among voters at Sagalau polling station, where polling officials were assaulted and ballot boxes opened (Mark, 2013b). In past elections, similar cases in many parts of the Highlands region led to the negation of elections by the electoral commission.

A report produced in 2013 highlighted that the electoral roll was often manipulated by candidates and their supporters for self interest with ulterior motives and often led to disputes between parties. Also the manipulation of the electoral roll has undermined the integrity and outcomes of elections (Belden,

2013). Across PNG, many election results over the years have been challenged in the court of disputed results citing discrepancies in electoral rolls, polling and counting (Mathias, 2013). Government and other agencies have continuously emphasized the importance of the opportunity for people to cast their votes freely without the fear for intimidation (Sakal, 2013).

In the Middle East, the Egyptian elections are often cross-pollinated with religious fundamentalism resulting in loss of lives from sectarian violence (AFP, 2013). It is not unusual for opposing factions to enforce their interests through the use of force, often protracted by mass street protests. The overthrow of long time president Hosni Mubarak through violent protests gave way to the elevation of Mohammad Morsi to presidency. But Morsi's tenure has been continuously shaken by fierce fighting between the Islamic Brotherhood fighters, Army and the government forces using all manner of weapons ranging from suicide bombers to surface-to-surface missiles (AAP, 2013).

In Syria, sectarian violence paved the way for the illegal use of chemical weapons blended with small arms leaving thousands of people dead, as competing factions energized their efforts for political power (BBC, 2013a). Rebels and loyalists have clashed using missiles to take control of key cities locations leaving tens of thousands people death. While PNG has not reached this level of political violence, efforts need to be put in place using strategies that can make elections free, fair and safe.

Many African countries have also experienced protracted civil wars emanating from election related disputes. Zimbabwe has witnessed violence between government and opposition forces seeing many lives lost and many people injured. Robert Mugabe has held on to power, despite claims of vote manipulation enforced through police brutality towards opposition parties (ARF, 2013). In Nigeria, thousands of people have been killed since 2009, in an election- related war between the rebel group called Boko Haram and the Army (BBC, 2013b). These and other accounts of election- related violence all over the world suggest that voting for leaders is often accompanied by violence and bloodshed. This is much more pronounced in the developing world rather than the developed world where election processes are conducted in a more mature and orderly fashion.

Mobile phones

More recently, since 2007, mobile phones have seen increased diffusion among the population across PNG, now being the most pervasive form of electronic communication device (Suwamaru & Anderson, 2012). This trend can be expected to continue as mobile phone operators expand their network and service coverage areas across PNG (Isu, 2013a). The simplicity and portability of mobile phones makes them an excellent option for use in national, provincial and local level government election. The simplicity, portability and ease with which mobile phones can be recharged and used offer an attractive alternative for consideration for election purposes in PNG. This near ubiquity of mobile

phone usage can be harnessed for use in improving common rolls, polling and counting.

The current efforts to improve the election processes and procedures for national, provincial and local level governments have been in motion through workshops and seminars. The electronic identification system and its potential to improve election processes have been given serious consideration by the electoral commissioner (Editorial, 2013). Stakes are usually high in all elections both at the national and local levels of government. Such is manifested by the level of funds expended in conducting elections in PNG which occurs every five years. Notwithstanding the generous government allocated funds, the 2013 by-elections for Madang open and Ambunti-Drekikir by-elections were not supervised by police who refused to perform their duty because of claims that they were not paid their allowances on time (Mark, 2013b). However, amidst much negative publicity, a report from the Ambunti-Drekikir by-election declared the polling trouble-free, with no allegations of bribery and malpractices (Ellison, 2013).

Rural and remote rural PNG

PNG is spread over a large land mass and many inhabited islands stretching over oceans and included in archipelagos, making the movement of election officials challenging. Planes, boats, helicopters are used to transport election materials including officials thereby expending time and economic resources. The challenges in transport systems have also been reported to have contributed to the tampering of ballot boxes, where delays in reaching counting destinations, presented opportunists the chance to undertake illegal activities.

It has been suggested that information and communication technology (ICT) has the capability to overcome temporal and spatial boundaries (Laudon & Laudon, 2012). This capability can be harnessed in voting systems to lessen the probabilities of tampering with ballot boxes by opportunists intending to manipulate election processes. In PNG, technologies such as computers, laptops, scanners and photocopying machines have not significantly diffused into many rural areas due to their cumbersomeness and the unavailability of the electrical power grid. However, mobile phones can be found in many rural and remote areas of the country (Weber, Damon, & Scott, 2013). Despite the lack of electricity in many parts of rural PNG, citizens were found to use portable solar panels, car batteries or the nearby generators, where available, to charge up their mobile phones (Suwamaru, 2013).
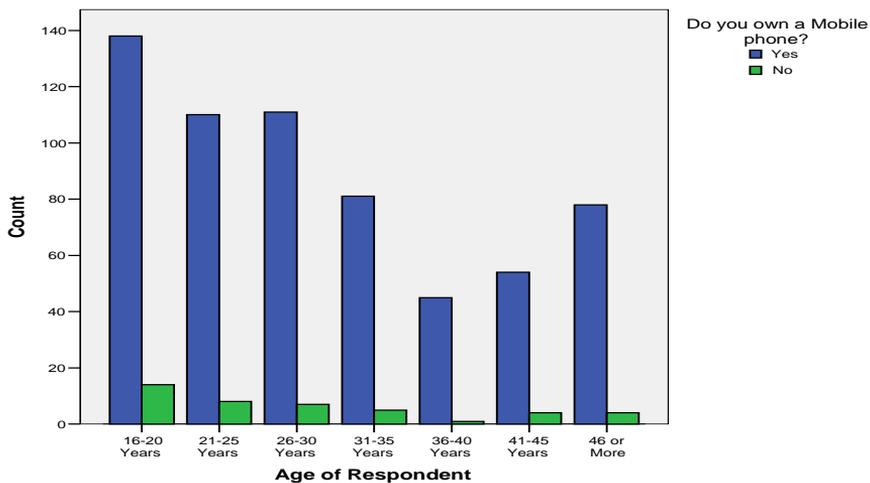
Figure 1: Different age groups and mobile phone ownership - N=727

The widespread adoption and use of mobile phones is opening up new opportunities for many citizens. SMS banking through mobile phones has been noted to be increasing in PNG (King, 2010; Suwamaru, 2012a). Regionally, the Pacific is leading the world in its approach to mobile banking, with many people being able to acquire a bank account for the first time (Isu, 2013c). For language developers and bible translators, mobile phones are used to spread messages by using mini-SD cards for circulating and letting people view and listen to translated materials (Weber, et al., 2013). In light of current challenges faced in elections, there is a real potential to utilize the ubiquity of mobile phones to promote free, fair and safe elections through SMS/MMS based voting system. The mobile system already installed and operating across urban and rural PNG, may be harnessed without authorities having to investigate other means which pose unforeseen challenges.

Political

Amidst many debates on whether PNG was capable of managing its own affairs, the country gained independence in 1975 adopting the Westminster form of government (Hetri, 2013). During most of its 38 years of independence, elections at national, provincial and local level governments were conducted through the first-past-the-post system (Hetri, 2013). In this system of voting, the candidate with the highest number of votes may be declared the winner, even though on many occasions, the number of votes was not necessarily the majority. A better system that represents the majority votes was felt necessary, in particular emphasizing free, fair and safe elections.

More recently the government through the electoral commissioner introduced the limited preferential voting (LPV) format, with the view to giving more choice to voters. In the LPV system, the winner can be declared based on an absolute majority through elimination from successive rounds of counting.

Despite the well meaning intentions of the LPV, the courts of disputed returns have been kept busy by disputing parties (Mark, 2013a; Mathias, 2013). These disputes incurred opportunity and economic costs, thereby negatively impacting on service delivery to the populace. Toreas (2103) reported that in Bougainville delays in conducting by-elections were an impediment to development and voters in constituencies supported the smooth conduct of elections. Having elected representative ensured that the electorates received necessary government services (Toreas, 2013).

In theory, politics in PNG is guided by democratic principles where elections are meant to be free and fair. Citizens have the right to be free and must be able to vote for the candidate of their choice without undue influence. However in practice, various aspects of elections are often manipulated by people intentionally manipulating votes to satisfy their own ends. It was reported that there were 27 failed local level government (LLG) elections in the Highlands of PNG, due to issues ranging from intimidation, violence, double voting, and tampering of ballot boxes and counting process (Taru, 2013). In some cases there were allegations of electoral returning officials engaging in corrupt practices to favour certain candidates.

Current challenges

In 2013, there were a total of 24 local level government elections that were declared failed by the election commissioner, using Section 97(1) of the organic law on national and LLG elections (Wama, 2013). The main reasons for failing these elections were cited as:
- Hijacking of ballot boxes and papers
- Illegal signing of ballot papers by candidates' supporters
- Kidnapping of electoral and security officials
- Destruction of ballots boxes and papers, and
- Violence resulting in death.

Many of these illegal activities occurred in geographically dispersed and mountainous places and were difficult to monitor and control. Mobile phones in PNG have seen increased uptake even over mountains, valleys and the islands separated by large temporal and spatial boundaries. However, with careful thought and design, it is possible to offers ways within which these election related challenges can be mitigated.

Cultural challenges

Other challenges have cultural connotations buried deeply within customary practices of tribal groups across PNG. Certain tribes, especially in the highlands region are traditionally aggressive and tend to maintain their supremacy even during elections. As different tribes compete for supremacy for their leaders to win elections, violence often flares up. In this age of technology, it makes sense to devise ways and means to allow people to cast their votes freely without the fear of harassment from the safety of their homes, villages or communities.

Literacy and numeracy

Commentators have commented on the existing gaps on numeracy and literacy skills within the population of PNG (Kukari, Paraide, & Kippel, 2008), which pose challenges on the use of SMS/MMS based election model. However, a recent mobile phone survey (Suwamaru, 2013) showed increasing use of SMS based services across gender and age groups, including regions, showing that citizens may adopt and use the proposed voting system.
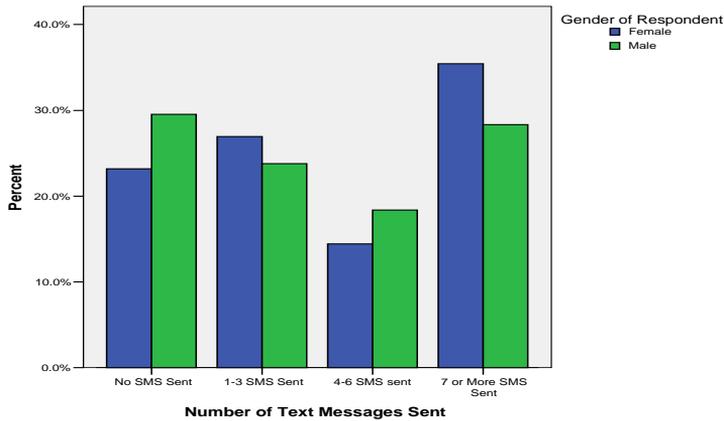

Figure 2: SMS usage across gender in PNG (Source: Suwamaru, 2012)
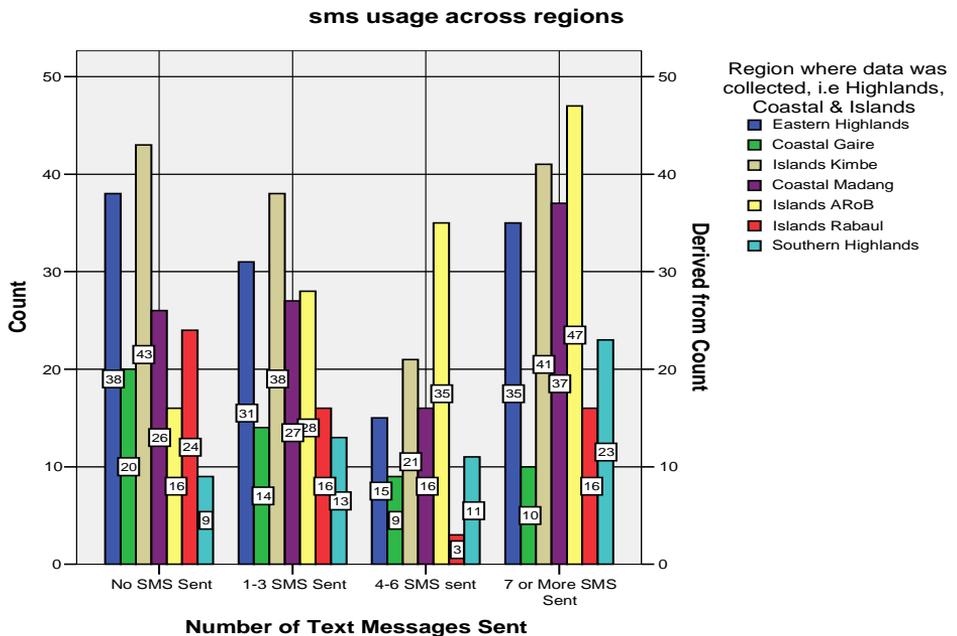

Figure 3: SMS usage across regions in PNG - N=727

The potential of SMS as a convenient data collection method across PNG by the law and justice sector was trialed with signs of success over two months (Mandui, 2013). Data collection through SMS from 35 district courts across PNG involved clerical staff texting information about cases referred by village courts to districts. Over the trial period, more accurate and timely data was collected as opposed to the existing paper based method of data collection.

The successful use of SMS for data collection by the law and justice sector, may point to the possibility of designing and deploying free, fair and safe elections through SMS/MMS voting over mobile phones in PNG. With carefully thought through, design and implementation, accurate and timely election related material may be disseminated allowing citizens to cast their votes freely without the fear of violence or intimidation.

Attributes of mobile phones

Since 2007, mobile phones have permeated across PNG at unprecedented levels, making them the most possessed electronic item by citizens (Suwamaru, 2012b). Certain attributes of mobile phones promoted their adoption and use. These attributes include relative advantage over existing modes of maintaining connectivity within and between distant groups of people within PNG (Suwamaru, 2012b). The relative advantage of mobile phones over other media, such as the SMS based data collection previously noted which demonstrated timely and accurate data over the existing paper based *modus operandi.* This relative advantage can be harnessed with careful thought and trial assist the electoral commission achieve time and accurate elections for PNG.

The second attribute of mobile phones is their less complex nature as compared to other technologies such as computers or laptops. Computers and laptops are generally perceived as devices that require certain competency levels to operate and use. On the contrary, mobile phones are easy to use for the intended purposes.
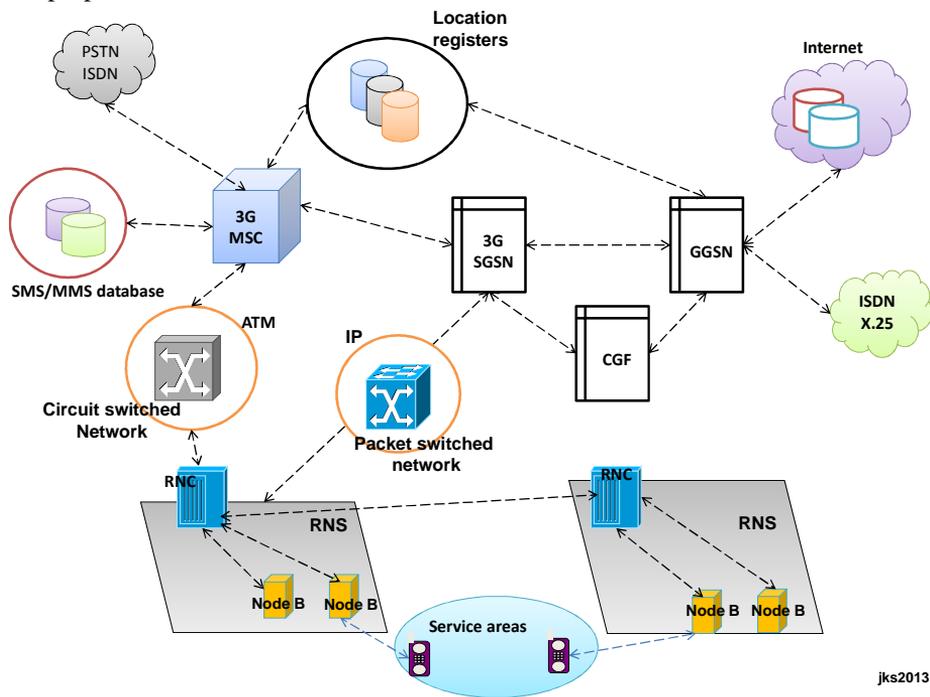
The third attribute is trial-ability which is directly proportional to probability that mobile phones can be adopted and used if they could be easily trialed (Rogers, 2003). While mobile phones can be easily trialed and used, the proposed model, can be designed and implemented, with complementary training covering its purpose and ways to respond to SMS/MMS

The next attribute is observe-ability of mobile phones or the intended purposes for which they are being deployed. If an innovation can be observed to be useful by citizens, there is high probability for its adoption and usage (Rogers, 2003). During the implementation and trial or training stage of the SMS/MMS based voting system, citizens may have the opportunity to observe the workability and make an informed decision to adopt and use (or otherwise). If citizens are able to observe for themselves, the features of the proposed model, there is a possibility that the model can be adopted and used.

The final attribute of mobile phones relates to compatibility, which is the degree to which it is congruent with existing felt needs. Similarly, the compatibility of the proposed model with the pursuit towards improving the election processes and procedures, there will be increased potential for its adoption and use. If an innovation is compatible with felt needs of potential users, this increases the possibility of adoption and use (Rogers, 2003).

SMS/MMS election model

The proposed SMS/MMS election model may be implemented on an existing mobile network similar to that illustrated in Figure 4. The service areas are normally scattered over distant locations, across highlands, coastal and islands regions. These areas include LLGs, electorates, towns and cities, where potential voters reside who could potentially cast their votes through the proposed SMS/MMS model.

Figure 4: Typical network to support the proposed SMS/MMS based voting model

An entry level 3G mobile phone system allows the option for external connectivity to the public switch telephone network (PSTN), integrated services digital network (ISDN) and the Internet (Figure 4). It is through these network elements that SMS/MMS can be used to access and interrogate the database populated with eligible voters and candidates.

Performing the routing and switching of SMS/MMS traffic on demand between source and destination through the network elements is the mobile switching centre (MSC). The integration and accessibility of appropriate databases with the MSC enables flexibility for the use of SMS/MMS for perusal and voting. In particular, access can be originated from the service areas (voter's locations) scattered across the country through the radio network system (RNS), comprising of Node B and radio network controller (RNC) units. The RNS forms a wireless link between the end users (eligible voters) and the appropriate database system for use through SMS/MMS over the mobile phone network.

Typical mobile phone handsets may be used to interrogate the SMS/MMS voting module through the communication network system. The radio network centre (RNC) provides the voter access to the network interrogating the SMS/MMS database through the mobile switching centre (MSC). The asynchronous transfer mode (ATM) provides the circuit switch option in a 3G system for voice traffic while the internet protocol (IP) switch is the packet switched network for data and high speed multi-media service. Both options are necessary to support the SMS/MMS voting system because election materials include pictures of candidates which voters may check against the appropriate candidate names. Accordingly, voters take a decision and appropriate action through SMS/MMS.

The serving GPRS support node (SGSN) interfaces with the location registers to retrieve the end user's profiles for authentication purposes to support SMS/MMS traffic completion. This is a necessary requirement The SGSN and gateway GPRS support node (GGSN) also enable the MSC to work external networks such the Internet or other integrated service digital network (ISDN) which transport voice and multi-media traffic. This is required because electoral commissions' election related material or even related database may be accessed over the Internet through mobile phone handsets. The charging gateway function (CGF) ensures users are authenticated and authorized to access and use the network by maintaining and reconciling traffic costs and bills.

SMS/MMS voting system

The proposed SMS/MMS voting model encompasses three main areas that have been identified as critical to ensuring free, fair and safe elections. These areas are the accurate common roll, polling and counting processes. Therefore diligence in the registration of eligible voters is a necessary starting point, which needs to be reconciled with the national census data (Figure 5). The registration process requires the accurate records of subscriber identification module (SIM) cards and the associated phone numbers against the eligible voters. The recent submission on the compulsory registration of SIM cards in PNG could be an important and integral part of the SMS/MMS voting system (Nakau, 2013).
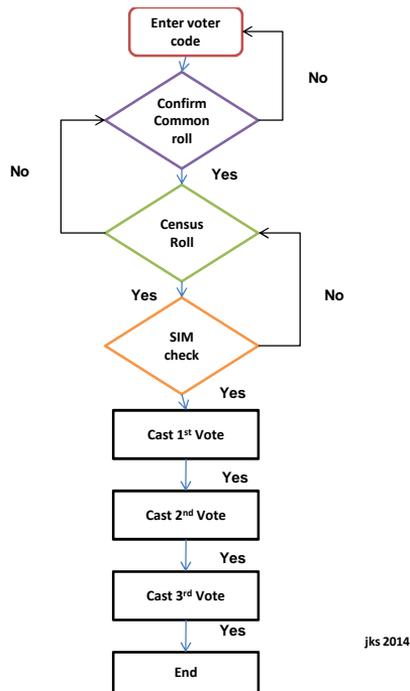
Figure 5: Conceptual voting scheme through mobile phones

Together with this, the eligible voters and their respective electorates may be registered and entered onto the database. This information may be electronically cross checked to check and verify that there are no multiple entries of the same name, by cross checking with the census database and the electoral roll. This information also encompasses other parameters including age and gender of eligible voters. The information may be compiled through a collaboration effort with the census and the electoral commission office.

Advantages of the digital voting system

There are a number of advantages of the SMS/MMS based voting system for PNG. As well as having relative advantage over other communication modes, mobile phones are less complex to operate, easily trial-able and observable. Mobile phones are also compatible with the national needs for supporting national and local level government elections in PNG. Other advantages include the following:
- Cost effectiveness due to existing extensive mobile phone network
- Pervasiveness of mobile phones
- Portability and wear-ability of mobile phones
- Personalization of mobile phones and
- Ease with which citizens may recharge their mobile phones.

In recognition of the aforementioned advantages, there is a real possibility to design and implement an SMS/MMS voting systems through mobile phones in pursuit of free, fair and safe elections. A mobile phone being a personal device can efficiently and effectively support the SMS/MMS voting system which can allow citizens to vote from the safety of their communities, villages and homes without the fear of being attacked.

Other advantages include circumventing the costs of employing security personal, returning officers, and other logistics because the SMS/MMS system would be an automated system encompassing the common roll, polling and counting and the ultimate declaration of the winners.

Some issues

As with any new system, there are always issues that need to be clearly understood and strategies developed to minimize them. Some issues including ghost names, under-age voting and stolen phones can be controlled through collaboration by updating and improving national census records, reconciled with the database from the NEC's office to achieve increased accuracy. This can be cross checked the mobile phone users' records from available from the operator to ensure that existing names belong to eligible voters.

Stolen phones can be disabled by reporting the international mobile equipment identity (IMEI) number to the service provider. By re-issuing the subscriber identity module (SIM) card and a new handset to the user, the opportunity to vote can be easily restored. Other considerations including the use of passwords and personal identity number (PIN) can be easily integrated with the phones for improved authenticity. By combing good design and awareness for personal responsibility, mobile phones can enable free, fair and safe elections for citizens. Mobile phones are personal items which are easily wearable and if applied through informed use can assist with the election and voting process.

Conclusion

While it is accepted that the government is embarking on a new electronic system to improve voting in PNG, this paper proposes an alternative SMS/MMS based model that may have several relative advantages. The primary advantage of the SMS/MMS model is the high proliferation levels of mobile phones across PNG. The stakeholders in the SMS/MMS based voting model are the census office, electoral commission, mobile phone operators, telecommunication regulatory bodies and all layers of government.

The SMS/MMS based voting model, can circumvent high costs associated with election materials and logistics, since it is a fully automated system that can be used from the comfort of the citizens' communities. The SMS/MMS model can support both text and graphics enabling citizens to view the candidates' photo and offering the citizens to cast their preferences. This is possible through combination of multiple choices with the flexibility of supporting the limited preferential system, so that citizens can select and elect their choices.

The SMS/MMS voting model may be designed, implemented and trialled over a specified period of time to identify flaws or security issues which can render it ineffective. Other issues such as under-age and ghost names can be eliminated by reconciling name electoral rolls with the census database. Strategies to safeguard against stolen or hijacked mobile phones can be perfected through collaboration with mobile phone operators and electoral commission and the census office.

While the SMS/MMS voting model may not be a perfect solution, it is argued that mobile phones provide a less expensive and relative advantageous mode of voting over other modes because it based on an existing and extensive communication network. There are cost benefits realizable as opposed to designing a completely new system where the essential components may be heavily dependent on a reliable electricity supply or even cumbersome to be easily transported and used in rural areas.

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Glossary

ATM	asynchronous transfer mode switch supporting the voice compatibility within 3G network
RNC	Radio network controller is 3G version of base station controller
RNS	Radio network system encompassing the base stations and 3G enabled bas station controllers
GGSN	Gateway GPRS support node
SGSN	Serving GPRS support node