

**RESEARCH PAPER**

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**A FRAMEWORK FOR EXERCISING VOTING RIGHTS FROM ANYWHERE  
USING ICT INFRASTRUCTURE**

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**Abstract:** In the past days the voting methods was manual system and it was very much booth dependent. There was a geographical barrier. The voter can cast his/her vote only from a particular booth. Since the voting process was through ballot paper and hence after the entire voting process all ballot papers to be checked manually before counting. This method was reliable but unscientific. So slowly this method of voting is been changed. Now in most of the developing countries, the process of political election for a democratic government is mainly confined to collecting the votes in the particular constituency of a voter. This means that the electorate can cast his/her voting rights only in a particular polling centre assigned to the voter. In this paper the authors have tried to explore the difficulties of voting confined to a polling centre and suggest a framework for the use of ICT infrastructure to get rid of these difficulties.

**INTRODUCTION**

*Constitutional democracy* is a system of government in which political authority--i.e., the power of government--is defined, limited, and distributed by a body of fundamental law called "the Constitution". The government is formed by the election process of appointing a person to public office or a political party to government by the electorate or the general voting populace by voting. The modern constitutional democracy is *representative democracy* where political authority is acquired and retained either directly or indirectly as the result of victory in free and competitive elections. The voting citizenry, through participation in free and competitive elections held periodically, can effectively control their elected representatives and hold them responsible for the consequences of their exercise of governmental power as well as for the manner in which and the purposes for which they exercise that power.

A democratic government has peoples' representatives elected from a particular constituency. The election for a constituency is held in various voting centres within the localities of that particular constituency. Although the most sustainable method of voting - the Paper Ballots, Electronic Voting is used extensively to deploy the voting system. The ballot papers or the voting machines are customized according to the candidate list of a particular constituency. This makes the system complicated, time consuming and lots of effort are required to implement this system. However, if the EVM system can be replaced by Information and Communication Technology (ICT) enabled design, the election process can be made much more flexible and easy to implement.

In the conventional election process, the voting takes place in the poll centres which are located within the constituency of a voter. The voting machines are different for each

constituency because the list of candidates is dependent on the constituency. Because of this constraint the following difficulties may be faced by an electorate:

- He/she has to cast the vote at the assigned polling centre only
- The person cannot exercise the voting right in case of being away from his/her constituency on the polling day
- The electorate is highly influenced by the presence of local factors such as political leaders, goons etc.
- The electorate cannot choose polling centre of his/her preference or convenience

The idea of this framework is to free an electorate from the binding of voting in an assigned polling centre and enable the voter to exercise his/her voting right from any one of the polling centres spread across a state or a country.

**PROPOSED ARCHITECTURE OF ICT ENABLED VOTING SYSTEM:**

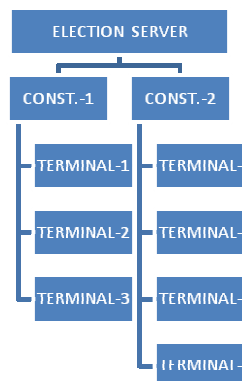


Figure-1: Architecture for ICT election system

Figure-1 above shows that there are several terminals connected to a server and can be placed in the voting centres of the different constituencies. The server contains the following information:

Voter:	Voter ID Constituency code Voter details
Constituency:	Constituency code Constituency details
Candidate:	Candidate code Constituency code Candidate details
Vote:	Voter code Candidate code

All the terminals are connected to the server through high speed digital communication technology and have a mechanism to send and receive secured data. The clients can be Direct Recording Electronic (DRE) Voting Systems or Touchscreens which can be connected to the server.

The major steps in the voting process are explained with the help of the process diagram and block diagram in figure-2 and figure-3 respectively.

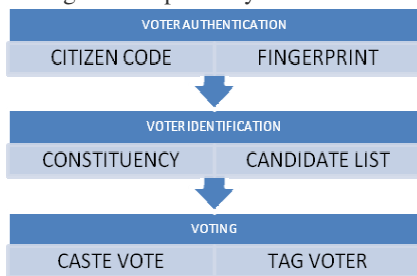


Figure-2: Steps in voting process

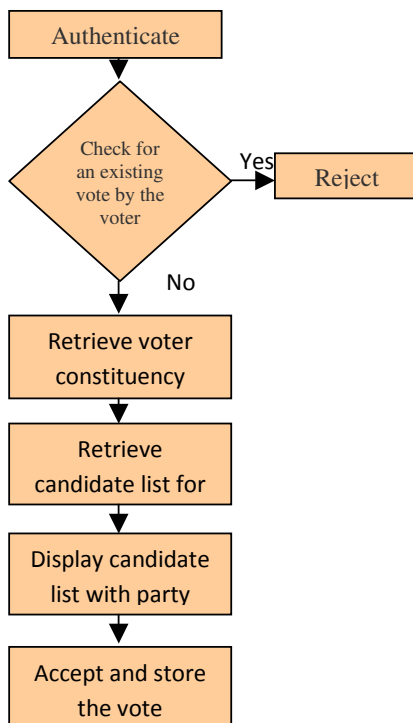


Figure-3: Flowchart for voting process

To implement of such a system we require the following:

- An ICT enabled infrastructure is required to have electronic data interchange
- A database system must be robust to handle voluminous data and to handle a large number of online queries and updates
- Design and implementation of server processes, database and client software
- Security of Data on server and during communication is a must
- A user friendly terminal to accept the vote
- Technical expertise is required to design and to develop and maintain the system

**FRAMEWORK ARCHITECTURE:**

The proposed Framework uses **n**-layered architecture where the layers are as follows:

**(i) Client Tier** – The terminals that are at different constituencies running a web browser.

**(ii) Web Server / External Tier** – These are the front end servers running Web logic Application Server 11g (Clustered - Redundancy 2) . The authentication of a client is verified in the terminals at various constituencies. Here the RSA encryption algorithm is used. The firewall uses IP based authentication. The Electorate hosting facility also uses IP filtering and IDS mechanisms.

This tier should only contain systems that provide services directly to the Constituencies. This includes HTTP protocols, and applicable HTTPS protocols. These are connected to terminals using VPN connectivity to ensure security and would also be cost effective.

**(iii) Database Server Tier** – It is the main data store of the application and runs Oracle 10g (RAC - Redundancy 2). TDE applied to the Oracle installation for security

**(iv) Storage Area Network Tier** – This is at the hosting facility and provides fast secure access to data and a centralized storage pool.

**(v) Backup Tier** – This is the most important tier where the incremental backup of all data in the Oracle database is carried out with RMAN in every 30 mins interval. A full backup is also taken at the end of the polling period and is transferred to tapes.

*The Operating System can be used in the server is RHEL 6.0 with OpenSSL.*

**ADHERENCE TO VOTING PRINCIPLES:**

Unlike the electronic voting machines or the ballot papers which are specific to a particular constituency, the terminals are not related to or dependant on the constituency of a particular voter. This is because all the terminals are connected to a common server and are accessing the same database. Hence, any terminal can be used at any voting

center. At the same time, an electorate can cast vote from any voting centre and is not confined to his/her locality.

One major concern in developing and implementing such a system is to adhere to the voting principles of a constitution. The basic voting principles ensures the following:

- Universality (everyone has the same rights to vote)
- Directness (everyone has to vote by himself without deputies)
- Freedom (everyone should vote without impact of any kind)
- Equality (everyone's vote has the same weight)
- Secrecy (everyone must cast his vote unobserved)
- Simultaneity (everyone must cast his vote in the same period)

In Table-1 we have shown how the voting principles are adhered to in the proposed voting system.

**Table-1: Principles in voting system**

Voting Principle	As sustained in the proposed system
Universality	Voters are issued ID with a unique code and are identified by biometric process
Directness	User friendly terminal with the option to select vote by a key press or a touchpad
Freedom	A voter can vote at any voting centre, thus impacts due to local factors are eliminated
Equality	One voter can cast only one vote
Secrecy	The terminal is placed in a secluded enclosure
Simultaneity	Voting takes place on specified dates

Election through this system may take place following the conventional method of setting up polling centres at specific locations on the election days only. Polling officers may be deputed at the centres to ensure free and fair election and the entire process may be supervised by a team of experts. The officers will authenticate the identity of an electorate and allow the person to exercise his voting rights through the terminals. An electorate from any constituency/locality can vote at any of the polling centres.

**CONCLUSIONS AND DISCUSSION**

ICT enabled voting is regarded by many governments as the next natural step in the evolution of electoral processes because of its potential to increase voter turnout rates, facilitate the voting process to citizens and enfranchise voters such as overseas voters, military voters and voters with disabilities.

Such voting system offers many advantages over the conventional paper-based electoral systems, including mobility and convenience for voters, greater speed and accuracy in the counting process, prevention of involuntary voting errors, better accessibility, lower costs, support of multiple languages, greater flexibility, etc.

The greatest concern in implementing such a system is security and accountability. We understand that it is vulnerable to hacker attacks, identity fraud and vote count manipulation. But because of biometric identification process the identity fraud problem can be easily tackled and eliminated. With proper security checks at various levels of access to the system functions, chances of manipulation may be eliminated. As for the hacker attack, the entire system may be implemented using a private network which may not be susceptible to threats as in case of internet. So, it is not that much difficult to make the voting system free from hacker attacks and identity fraud.

Another challenge is the digital divide between the citizens where we find that, especially in 3rd world countries, the acceptability of electronic and automated systems are always with some apprehension. At the same time, we know that banks and payment processors have gradually gained the trust from people for their online transactions system. At the same time Electronic Voting System, though devices which use press of button, are already in use and are well accepted. A lot of care is to be taken towards the user friendliness of the interface so that the first time computer user can also easily cast their vote. Also, proper counseling and guidance will help to eliminate the nervousness from the citizens' mind.

The recent initiatives by some countries to give unique id number (UID) for each person will also help to implement this ICT enabled voting system.

This voting option may help to increase the voters turn out in elections. Thousands of people serving in the military and living away from their local constituency can cast their vote at any of the polling centres across the country.

However, some major concerns in the implementation of such a system are the infrastructural setup, availability of technical expertise and the cost involved.

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