SMARTMATIC

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General Elections 2018
Instructions
To vote, touch a name. A check mark will appear to confirm your selection. To undo your choice touch the name again. The check mark will disappear. Press "Vote"
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TIVI Online Voting

Frequently Asked Questions

How can I be sure that only eligible voters can cast their ballots?

TIVI has been designed to support a variety of strong authentication and identity management methods, which permit only eligible voters to access the system and successfully cast their ballot.

These methods include PKI-based electronic identity (eID) frameworks, mobile digital (including biometric) platforms, multi-factor schemes, and existing government single sign-on (SSO) and authentication services. These tightly control access to ensure that only eligible permitted voters can cast their ballots.

How do I securely cast my vote?

TIVI ensures the secure casting of ballots and maintains voter privacy and integrity at all times. Security is provided by means of multiple levels of physical, logical and procedural protection.

Ballot secrecy is protected by means of strong 'end-to-end' encryption and vote integrity is ensured through digital signatures and digital time stamping of votes.

By providing end-to-end encryption, digital signing along with secure transmission the system provides the strongest assurance of any internet voting solution globally, that votes cannot be intercepted, read or tampered (changed, deleted) and that absolute privacy and anonymity is maintained.

TIVI is the only online solution in the world that allows **100% universal digital verifiability** to prove the integrity of the vote, from the point of casting to counting (cast as intended, stored as cast, counted as cast). It is the most technically advanced solution in terms of addressing security, secrecy and vote anonymity.

How does the system maintain voter privacy?

TIVI is engineered to provide 100% voter privacy at every stage of the election process and at no stage can voter preferences ever be correlated with a voters' identity.

Our solution features a cryptographic "mixing" process, which decouples the voters' identifying information from the still fully encrypted votes.

The anonymized encrypted votes are then taken to a 'clean', air-gapped decryption server, which has never been connected to the internet, where they are decrypted using a secret key-sharing process by a quorum of approved members of the election board.

The system features a secret-key sharing scheme that means that no single individual can decrypt and therefore delete, add or tamper with votes in the digital ballot box. The private key (used to decrypt the election) can only be formed by a collaborative process, in which the members of the electoral board combine their secret shares to recreate the private key.

There have been several large-scale TLS attacks/compromises recently – How does the solution protect against TLS vulnerabilities?

All TIVI system components communicate with the use of mutually authenticated TLS connections using only the latest, up-to-date implementation of TLS.

We continuously update all software implementations to ensure that we mitigate the exposure to new software vulnerabilities, and provide our customers with the absolute confidence and an assurance that our solution complies with the highest security standards.

If internet banking systems can be compromised, how can you guarantee the security of online voting?

Both online voting and internet banking are examples of convenient e-services, which have specific and high security requirements.

Anybody providing these services has to use a system designed to achieve these requirements, otherwise undesirable consequences arise - in case of internet banking somebody loses money, in case of online voting the election results can be tampered with, or the voter privacy is lost.

The underlying security problems for internet banking and online voting are fundamentally different. In internet banking, both the bank and the customer can see all the transactions and charges on the account. In the case of online voting the aim is to provide the correct aggregated voting result without revealing the choices of individual voters.

The challenges of online voting can be effectively solved, but require additional technologies and processes, which offer a level of security and auditability (verifiability) which is far in excess of that required by online banking. We have defined the security requirements for such a system, and we have rigorously designed a protocol to achieve these requirements.

We deal with issues such as ballot secrecy, vote integrity, safeguards against manipulations, and man in the middle attacks by applying application level security measures on top of widely adopted internet security practices. Such additional measures are not seen in internet banking applications.

The TIVI protocol is voter verifiable, enabling the voter to prove that their vote was cast correctly. All server-side operations can be audited by third parties, to ensure that the votes are correctly handled in the tabulation process.

How is online voting protected against denial-of-service (DoS) attacks that slow down the servers, so voters can’t vote, and the entire process must either be delayed or cancelled.

Denial of service (DoS) is a real threat that can potentially affect all web based systems. However, there are new and sophisticated means to avoid denial of service attacks on computer systems to mitigate their impact. TIVI implementations feature a range of anti-DDOS features, which ensure system availability for the duration of the election. These include:

- Performance benchmarking and knowledge of limits modelling
- Application level and DNS load balancing
- Stateless, highly scalable architecture
- Distributed, consensus-based vote storage
- Network level routing restrictions
- Continuous application and network monitoring

In addition, TIVI implementations can be offered over an extended voting period to ensure availability of the voting service. In Estonia, where online voting has been a success, internet voting is one of the options Estonians have to cast a ballot in advance. Voters can also cast their ballots by post prior to election day, and also at designated polling stations.

It is important to note that denial of service incidents are not endemic of digital elections and that many traditional paper-based elections have faced such issues due to lack of sufficient ballots, poor polling station management, and incorrect or missing voter registers.

Home computers are often infected with malware and are prone to hackers and cyber-attacks. How can I avoid this affecting my vote?

Smartmatic applies tested and proven risk management, and security testing processes in each election we undertake to ensure that we offer the highest level of security as the online voting threat models change and evolve.

Malware is a common manifestation of the internet and vulnerabilities associated with client-side malware are arguably the hardest security risk to mitigate. With this in mind, we have designed TIVI to strongly protect the security and privacy of the voting experience against eavesdropping and/or vote manipulating malware, but to still assume that the voters' computer may feature a malware infection. With this assumption the voter needs to have the ability to perform the following:

- Vote in an environment which protects against malware infection
- Detecting the unlikely presence of vote tampering malware
- Take remedial action in the unlikely event of a tampered vote

Voting in an environment which protects against malware infection

The overwhelming majority of malware infections can be detected and resolved by running up-to-date antivirus/malware software. As part of the voter outreach and communication we strongly recommend that voters practice good internet/computer 'hygiene' and keep antivirus software up to date.

Detecting the unlikely presence of vote tampering malware

This is achieved by offering voter verifiability. TIVI allows voters to verify the contents of the cast vote using a separate device to the one they voted on. This is achieved through the use of a smartphone application which allows the voter to prove that the content of their cast vote has not been altered. It would be virtually impossible to engineer a coordinated malware attack against the voter's voting computer, and smartphone, given that there is no physical/logical connection between the two devices.

How can I be sure that no one can change my vote?

The TIVI voting protocol is designed to guarantee the integrity of the vote throughout the process – from the point of casting until the point of tabulation.

The voter can use the verification application to make sure that the vote was sent to the system as intended. The server maintains a third-party verifiable audit trail for all votes, and is capable of proving up to the point of tabulation that all the votes were correctly handled according to the election rules.

This type of auditability together with cryptographic signatures eliminates all vote tampering possibilities and provides a universal assurance that voter preferences will be captured, stored and tallied as the voter intended.

The implementation of a permissioned Blockchain based bulletin board provides additional proof of the integrity of all cast ballots, showing that no ballot preferences have been changed, no valid votes deleted, or bogus votes inserted.

What safeguards does the system have to protect vote deletion or tampering by system administrators?

The TIVI voting protocol is designed to guarantee the integrity of the vote throughout the process – from the point of casting until the point of tabulation.

The server maintains a third-party verifiable audit trail about the vote and is capable of proving up to the point of tabulation that all the votes were correctly handled according to the rules. This type of auditability together with cryptographic signatures excludes the tampering possibilities, also by system administrators.

As mentioned previously, the system features a secret-key sharing scheme that means that no single individual can decrypt and therefore delete, add or tamper with votes in the digital ballot box.

The private key (used to decrypt the election) can only be formed by a collaborative process, in which the members of the election board combine their secret shares to recreate the private key.

In addition, the system features digital time stamping and daisy chaining of votes along with immutable system logs, which mitigate against the insertion of bogus votes or the deletion of valid votes.

Surely online voting is a “black box” system. How do you support the principle of election transparency within online voting?

The Smartmatic solution features a unique auditability layer, which despite the highest levels of security, offers ‘universal verifiability’ and the ability for stakeholders to audit the entire solution, and end-to-end process. In particular, this includes tools to verify that votes were ‘recorded as cast, stored as cast, and counted as intended’.

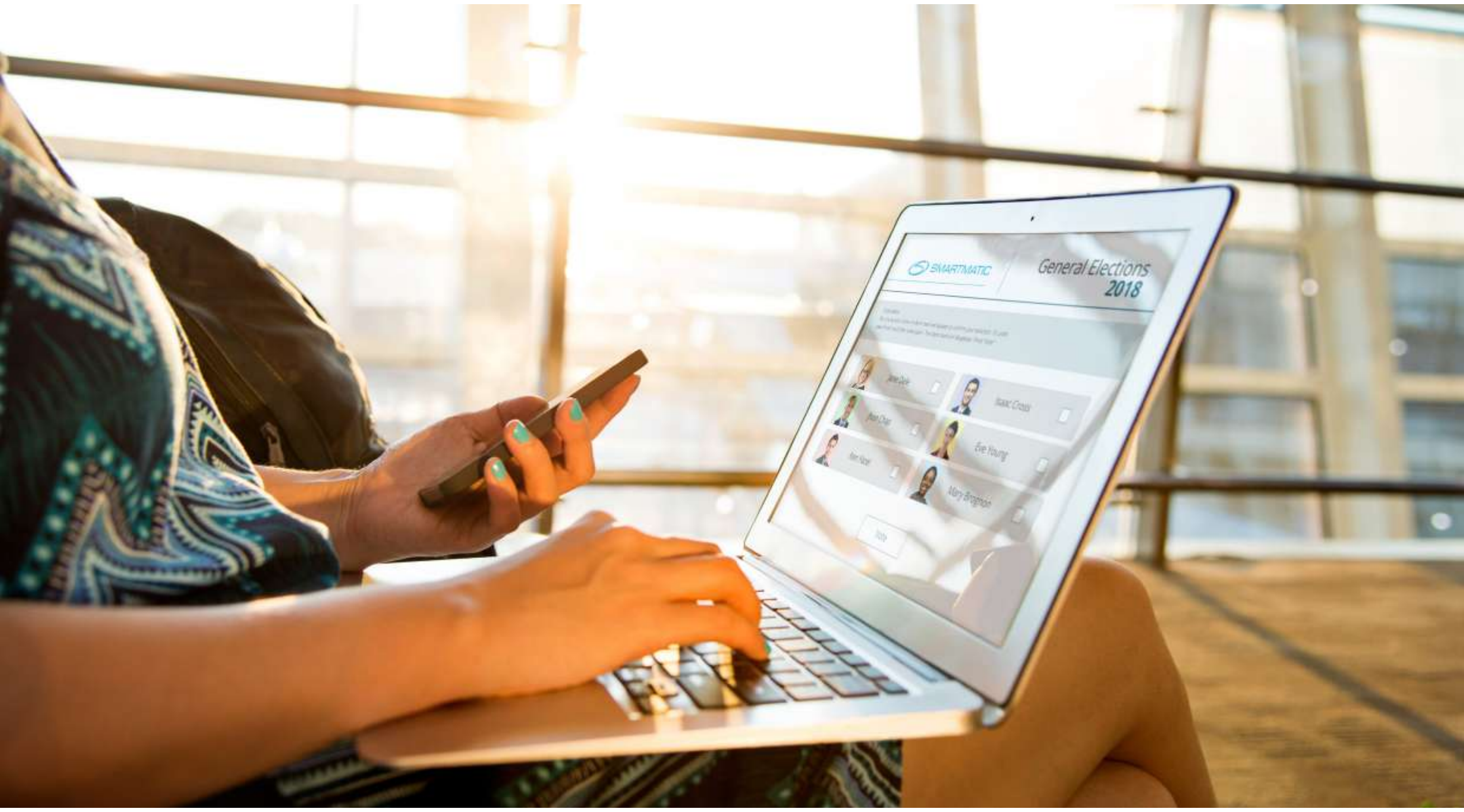
Not only do we provide a simple to use toolset for auditors, but also, we provide a unique API, which enables any stakeholder to use their own audit/verification tools.

In addition, we fully disclose the system source code to official auditors to offer a level of transparency, which exceeds that of traditional paper-based elections.

Is the source code open for review by independent authorities?

Yes. We disclose the source code to approved independent authorities to audit the solution to ensure that it complies with the highest levels of security and accuracy.

We strongly advocate the use of third party independent authorities as a mechanism of enhancing public trust in any automated election.



How does the system protect against voter coercion?

Remote voting outside of a controlled environment offers a different set of challenges. One of these is potential voter coercion. However, our solution mitigates this risk by offering the voter the opportunity to re-vote or re-cast their ballot as many times as they wish.

The system still maintains the principle of **‘one voter, one vote’,** and any previously cast ballots are discarded in favor of the last cast vote.

In this respect, if a voter is coerced into voting a certain way, they can access the system at a later time and re-vote in a coercion free environment.

Has the solution ever experienced any security breaches?

No. The solution has been used for eight nationwide elections in ten years in Estonia. At no time has there ever been a single documented security breach.

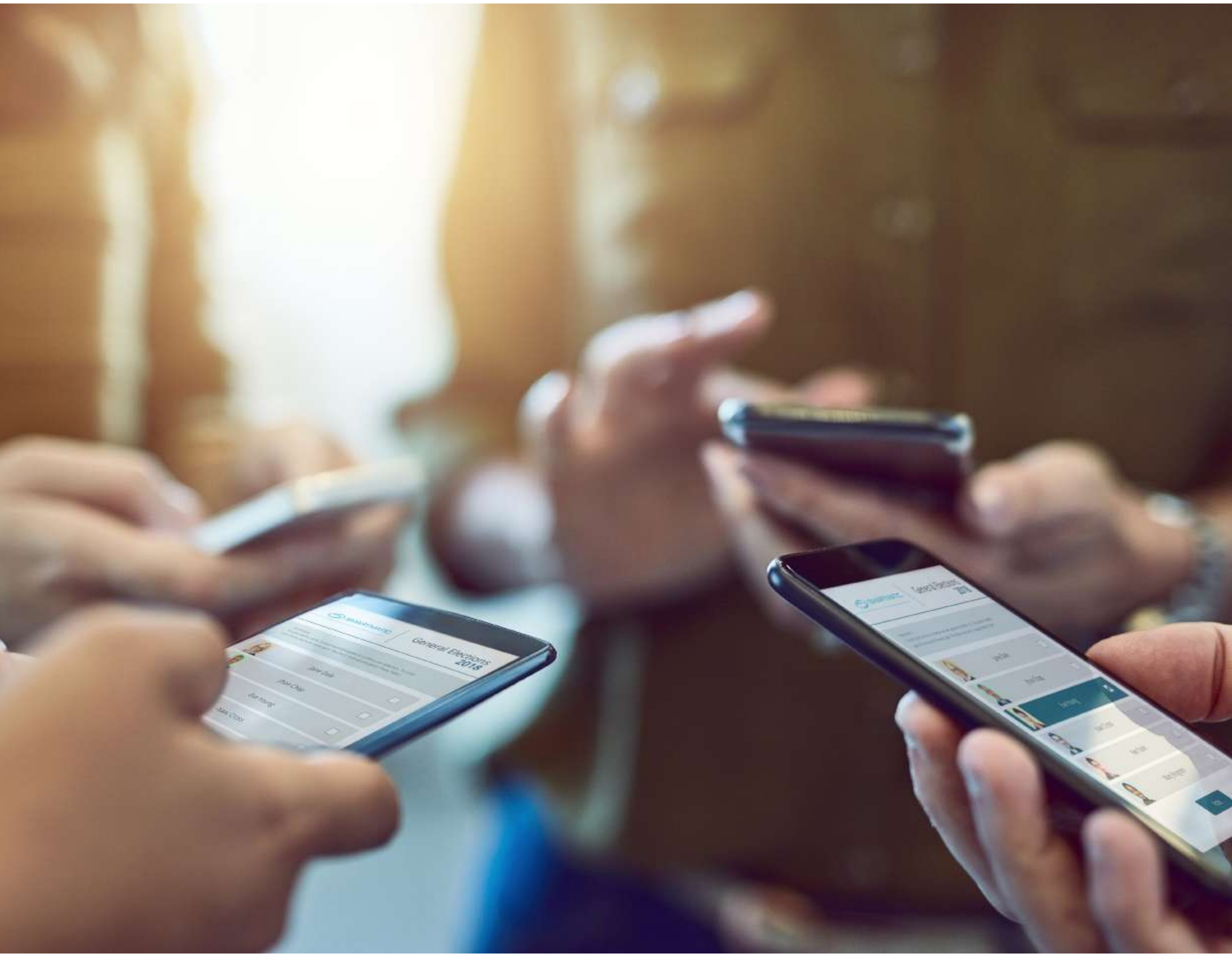
We apply tested and proven risk management and security testing processes in each election we undertake to ensure that this record is maintained, and that we continue to offer the highest level of security as the online voting threat models change and evolve.

Surely online voting is only appealing to younger, technologically savvy voters?

More and more citizens today engage using the internet on digital devices in all age groups and demographics.

In Estonia, the age group of 55+ are the largest users of internet voting constituting around 25% of all Internet voters. Internet voting offers greater accessibility for voters with disabilities and our solution has been designed to support the highest accessibility standards including the use of screen readers (such as JAWS, NVDA) and accessible hardware devices such as switches, paddles and 'sip & puff' tubes.

In this respect, we see internet voting as a solution, which appeals to voters of all ages and demographics, and not simply to younger technology aware voters.



Does online voting increase participation/turnout?

Online voting offers a convenient and simple platform to bring the ballot to the voter in a more accessible and secure way than other remote voting methods (postal voting). The following empirical evidence of increased turnout from online voting in the USA, Estonia and Australia is presented below:

USA

The introduction of electronic means for remote voting UOCAVA voters (Uniformed and Overseas Citizens Absentee Voting Act) in various US jurisdictions resulted in significant improvements in turnout.

- In Cook County (one of the largest electoral jurisdictions in the US), the provision of online voting for Uniformed and Overseas Citizens increased turnout from 11% to 53% after the introduction of Internet voting in 2012. Also, in Cook County, overall accuracy increased, going from 92% of ballots counted in 2008 to 99% in 2012.
- In the 2010 Primary, General and Special elections in West Virginia, absentee ballot return rates increased from 58% to 92.5%.

Estonia

In the case of Estonia, several studies have provided evidence that as many as 10% of Internet voters would not have voted if they hadn't had the internet as a voting channel (which results in an approximate 2.5% increase in turnout).

Australia

In the New South Wales State Elections in 2011, online voting (iVote) was made available to voters with disabilities and those who lived more than 20km away from the polling stations. The post-election report summarized that *“usage of iVote greatly exceeded expectations by threefold with almost 50,000 electors using it. We estimate that access to iVote enfranchised around 30,000 electors who were unlikely to vote had iVote not been available”.*

Switzerland

For many years now, various Cantons in Switzerland have used online voting to support their own particular form of representative democracy, using online voting methods to supplement polling-based voting in referenda. In this respect, we believe that online voting, if implemented correctly, in conjunction with a robust voter education initiative, is able to have a marked positive effect on voter turnout.

Norway

In a referendum in Finnmark County in Norway in May 2018, voters had the choice of casting their vote by traditional means in a polling station, or online using TIVI. Over 85.5% of the votes in the referendum were cast online, which clearly demonstrates an appetite by the voters for such services.

Surely online voting is more expensive than paper voting?

It is actually possible to reduce the overall cost of elections through the use of online voting. With an online voting system, the number of polling stations can be radically reduced and the requirement to print ballot papers and postal votes, which are significant cost elements of a traditional election, can also be reduced, or eliminated Electronic poll cards delivered through email or SMS can offer additional cost savings.

Counting ballots electronically would also reduce the need to hiring count centers to count ballots, eliminate transport and other logistical costs associated with the transfer of ballot boxes to central count venues. Staffing costs would also be dramatically reduced to deliver additional cost savings.

There exists the misconception that online voting is costlier than postal voting because of the cost of technology. While some internet voting experiments have been very costly, the best enduring example in the world of online voting is the case of Estonia, a system that has remained in operation for almost 10 years.

Even after going through two generations of the system in 8 national elections over the past 10 years, the government of Estonia has spent less on internet voting than on the provision of postal voting. In this regard, with the appropriate solution, efficient procurement process and long-term vision and commitment, online voting offers governments the opportunity to radically reduce the cost of elections, as well as delivering the previously described benefits.

Curious to learn more?

For more details, please have a look at the TIVI web site, or send us an email: **hello@tivi.io.**

tivi.io.
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www.smartmatic.com

Our clients benefit from our complete portfolio of solutions to make election administration more efficient and transparent.
We lead the electronic voting industry with our solutions, geographical presence and technological advancements.