



# WHY VOTEFILER, AND WHY NOW: A PRACTICAL EVALUATION

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## Introduction

As a society, we've lived with certain systemic quirks in our electoral system for many years, and have not worried overly about the impact that voting machines themselves can have on the outcomes. If anything, we've taken comfort in the presumption that any errors stemming from problems with these machines would tend to even themselves out during the course of an election and thereby do not adversely affect the outcome. And as a matter of practical reality, events may well have supported this rationalization because any given candidate's margin of victory usually is large enough to overcome any margin of counting error.

However, the results of the past two Presidential elections have thrown the issue of voting technology into sharp relief, for the closeness of those races have combined with numerous high-profile claims of election-site improprieties to cause the nation to question whether the people declared to be the winners actually received the most votes. Consequently, new legislation has been passed by both the federal and many state governments to tighten the election process and to assure proper vote-counting and auditability. While the intention is pure, the net effect has been to create an environment that is fraught with both urgency and uncertainty.

One of the most influential responses was the signing into law of the Help America Vote Act of 2002, which has set a January 1, 2006 deadline for ensuring that all voting systems used in federal elections meet a number of critical requirements. Because most of these requirements mirror the states' own needs and desires, election officials around the country are looking to HAVA for guidance; however, there are so many voting systems and election procedures for them to deal with that many now worry they will be unable to meet the January deadline.

The requirements they're contending with address the issues that have been discussed and debated – often heatedly – in the last four years, especially in the context of using electronic technology to facilitate voting. As articulated in HAVA, they boil down to the following:

- Voter privacy and anonymity,
- Paper-based vote verification and results auditability, and
- Accessibility by the disabled, the blind, and the visually impaired.

At the end of the day, the objective of all concerned is to ensure all registered voters have ready access to the voting process, and to enable and ensure the quick and accurate tallying and checking of all the votes cast. Security expert Bruce Schneier, who has written extensively on the subject of using information technology to sup-

port electronic voting, pragmatically defines accuracy as being “how well the process translates voter intent into properly counted votes.” In today’s environment, any technology designed to facilitate voting through electronic means must be faithful to this principle while complying with what promises to be a patchwork quilt of possibly conflicting deadlines and certification procedures promulgated by federal, state, and county agencies.

## **Core Functionality**

VoteFiler is a patented electronic voting solution that effectively addresses the issues highlighted above without requiring changes be made to the existing voting process. It is not a specialized voting machine, but rather a simple, familiar system that uses off-the-shelf equipment – nothing more than Web-connected personal computers and centralized servers in a secure data center – to support secret, secure, and auditable voting.

This foundation on standard technology means it requires neither the alteration nor replacement of existing voting devices or procedures, nor the outlay of significant funds – in fact, it can run just fine on pre-existing computers, meaning *no* additional equipment may need to be purchased at all. Consequently, VoteFiler is not at all disruptive and can be phased in at whatever pace is desired. And perhaps best of all, it can actually shorten the time required for voters to cast their votes, thereby speeding the process itself and easing congestion at busy polling places.

The voting experience using VoteFiler calls for the voter to (a) visit a special Web site prior to voting and create a bar-coded placeholder “ballot” in much the same way he or she places items in an online shopping cart, (b) print that ballot on his or her regular home printer, (c) fold that bar-coded printout – which also includes clear-text presentation of the voter’s selections but obscures it via the folding – into a special window envelope, and (d) personally hand that envelope to a designated election official at the polling place. That official then initials the envelope to signify receipt, scans the bar code in the same way a grocery store clerk rings up items at the cash register, and inserts the envelope into a locked box.

Significantly, everything else about the voting process remains the same as it exists today, including the requirement that voters present themselves at the polling place to be authenticated in person in whatever way is currently mandated by the local authorities.

Behind the scenes, VoteFiler operates two databases that work together to effect the solution. The Ballot Database is connected to the Internet and is used to capture and store the ballots that voters create online, and to verify via the bar code scan that the printed ballot presented at the polling place is indeed the ballot that was created online. The Votes Database is connected to the Ballot Data-

base by a firewall-protected network connection of the sort that connects financial institutions with their online banking Web sites – *not* the public Internet – and logs one official ‘vote’ each time a ballot is verified. The Votes Database therefore is not reachable by Web hackers and keeps a running total of the votes cast by electronic means.

VoteFiler’s use of electronic technology thus does not obviate or eliminate the need for the personal safeguards instituted over the years to assure voting rights and election integrity; rather, it facilitates the *mechanics* of voting and vote-counting and improves their overall speed, efficiency, and effectiveness. Creating the placeholder ballot in advance means the voter mulls over his or her choices before ever setting foot in the polling place, eliminating the opportunity for any “thinking time” delays to cause voter traffic to back up at the voting booth. Further, the ability to simply hand the special envelope over to the election official obviates the need to wait for a voting booth at all.

Significantly, the same procedure can be instantly used to serve absentee voters, who can create their ballot online and mail in their bar coded printout for scanning instead of presenting it in person. This scenario has the advantage of being able to include the absentee votes in the tally the instant they are scanned – in some cases, perhaps even *before* Election Day – rather than allowing them to pile up to be dealt with separately, days or weeks later, perhaps by hand, and only if deemed necessary, as is generally the case today.

## **Ability to Address E-Voting Concerns**

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As was noted above, much debate these past several years has swirled around the advantages and evils of voting technology, and electronic voting increasingly has taken center stage because of its potential to dramatically improve both voting efficiency and voter reach. Though there is relatively little consensus about just what an acceptable solution should look like, it is possible to triangulate on a success scenario by examining and distilling the viewpoints of such notable commentators as Avi Rubin and Rebecca Mercuri, the opinions of multiple state election officials, HAVA’s core requirements, and even the marketing collateral of several leading technology vendors. Doing so results in this list of largely universal key concerns:

### Accuracy/Accountability

- Presentation of complete and proper ballots (e.g., accurate listings of contests, candidates, and issues)
- Verification that all votes cast reflect the voters' intentions, are entered, are entered correctly, and are properly counted

- Creation of a paper-based audit trail
- Ability to support recounting, especially manually

#### Accessibility/Anonymity/Privacy

- Ability to handle large elections, in terms of both number of candidates/issues and voter traffic
- Ability to authenticate qualified voters
- Support for absentee ballots
- Support for provisional ballots
- Support for the disabled, the blind, and the visually-impaired
- Support for anonymity and physical privacy

#### Usability

- Ease of use for both voters and poll workers
- Ability to speed the voting process
- Foundation on non-proprietary technology to facilitate maintenance and repair

#### Security/Integrity

- Security in terms of both data encryption and access control
- Fault tolerance and disaster recovery capabilities
- Tamper resistance
- Openness to public scrutiny to expedite bug fixes and to increase public confidence
- Ability to vet nationality, criminal status, and intentions of on-site technicians, as well as programmers and manufacturers of e-voting software and machines

Attachment A summarizes the ways in which VoteFiler addresses each of these key concerns.

### **Primary Competitive Advantages**

VoteFiler was conceived not only to address the key concerns just described, but to do so in ways that give it significant performance and cost advantages over many of today's voting solutions, be they electronic or non-electronic. Perhaps the most pragmatically significant of these advantages are listed below.

- VoteFiler builds paper into the voting process by beginning with the creation and submission of a paper ballot, thereby instantly supporting paper-based verification, auditing, and

recounting as needed. Market leader Diebold, by contrast, offers an optional component (its AccuView Printer Module) at an additional cost, while the ES&S Web site says that company is still developing a prototype for paper receipts.

Either way, all known alternatives to VoteFiler with paper capabilities require that the paper be viewed under glass after the voter has made his or her selections but before those selections have been approved, whereas VoteFiler allows the voter hands-on access to the paper for review and alteration as many times as desired even before he or she goes to the polling station.

- VoteFiler instantly and immediately verifies the accuracy of the vote cast – and eliminates opportunity for duplicate voting – by matching the bar code presented at the polling place against the online ballot created in advance. The known alternatives rely solely on human (voter) verification of a receipt printed under glass in the voting booth, and the result is either a longer stay in the booth as the voter reads and verifies the receipt, or the opportunity for a mistake to be made as the voter hastens to complete the task.

Avante says its Vote-TRAKKER “has a patent-pending protocol to tag each paper record with a randomly-generated voting session identifier so that each ballot cast electronically can be traced back to each printed paper record,” but this still requires reconciliation to wait until after the polls close, and only if auditing becomes necessary. The VoteFiler approach, on the other hand, is both immediate and automatic.

- VoteFiler runs on common computing technology that is inexpensive and readily available. Polling stations require only a standard personal computer and a communications connection, both of which are likely well within the means of every municipality, and likely already exist at every voting location in the form of a computer that can be moved to the polling site from the classroom or office in which it usually resides. Most of the available alternatives require some sort of specialized hardware, and because they cannot be used for any other function, they lay idle – and thus return no value – on every day but Election Day.
- VoteFiler uses familiar process metaphors (e.g., online shopping cart, grocery store check-out), so it requires little or no training and is immediately usable by voters and election staff. The alternatives are often uncomplicated, but their methods of use may not be as instantly recognizable,

and because many require the use of a voter smart card and/or some dexterity to touch the proper place on-screen, they may not be quite as straightforward to use as VoteFiler.

- VoteFiler eliminates need for voters to wait in line for a voting machine during busy periods by requiring only a quick swipe of the ballot by the bar code scanning wand. All other known alternatives, save perhaps for Hart Intercivic's Ballot Now component, are intended to replace existing stand-alone voting machines, change nothing about the process, and do nothing to speed the voting process.
- VoteFiler's use of standard personal computing and Web technology readily supports the on-the-fly (or election-by-election) reassignment of poll workers and/or voting machines to accommodate changes in voting traffic. The alternatives use stand-alone devices that would have to be physically transported from location to location to meet spikes in demand, whereas the number of computers communicating with VoteFiler can be increased or decreased simply by moving other available units into or out of the other rooms on site, making VoteFiler eminently flexible.
- VoteFiler is designed to be used in parallel with existing voting techniques, rather than to supplant them. As noted, the alternatives are intended to replace current systems.

None of this is to suggest that VoteFiler is completely without pitfall, but the sources of any potential problems it will face likely will have little to do with the technology itself. For instance, it is possible – likely even – that some voters will misfold the ballot they print out so the bar code does not show through the window in the special envelope. Similarly, some people inevitably will think they actually voted online when all they really did was create their placeholder ballot.

VoteFiler recognizes these as possibilities and includes mechanisms to mitigate their effect: for instance, the election official charged with scanning the bar codes will notice and respond to the misfold the instant the envelope is handed over, while every screen on the ballot-creation Web site informs voters that they must bring their printout to the polling station to actually cast their vote. But the point here is that existing systems are fraught with comparable opportunities for error – if they weren't, no one ever would have heard of a “hanging chad” – and as long as people are involved in the process, voting will never be 100% glitch-proof.

## **Conclusion**

The standard by which to measure the effectiveness of a voting solution therefore needs to reflect that solution's ability to improve upon the current state of the art, not necessarily its ability to com-

pletely and utterly close every conceivable loophole. While perfection certainly is the desired goal, it is important to remember that simple *progress* is significant unto itself. Just as financial lenders can save millions of dollars with every fraction-of-one percent reduction in credit card fraud, so can voters and election officials benefit significantly from seemingly small improvements in the way votes are cast and counted.

In this context, many electronic voting solutions are on at least equal footing with their conventional counterparts and must not be dismissed out of hand. To this point, a Trusted Agent Report prepared in January 2004 for the Maryland Department of Legislative Services by RABA Innovative Solution Cell (Dr. Michael A. Wertheimer, Director) said that the debate over electronic voting “must center on whether using e-voting systems introduces *additional* vulnerabilities,” and even a cursory evaluation of VoteFiler clearly reveals it does not.

VoteFiler *does*, however, do a superior job of attenuating the effect of all the negative publicity that electronic voting has received in recent months by carefully targeting the matters at hand and making a very effective case for why VoteFiler, and why now:

- It makes fundamental use of paper, rather treating it as a bolt-on capability.
- It is private and anonymous.
- It is usable by the disabled, the blind, and visually impaired, who can utilize whatever supports they may already have in place (e.g., text-to-speech software, Braille printers) to facilitate their computer use.
- It runs on standard office technology, so it is familiar to those who use it, it is inexpensive to procure, and it requires no specialized skills to maintain or repair.
- It is secure, combining advanced data encryption, password protection, and private line communications techniques and applying them where appropriate.
- It is easily scalable on demand and can adapt to changes in voter traffic and/or election complexity without slowing or disrupting the voting process.

Though VoteFiler does not claim to be the last word in such matters, it may well have the potential to be. Meanwhile, is a “must see” for anyone involved in the upgrade to, or procurement of, an electronic voting system.

– Steve Weissman

## ATTACHMENT A

KEY CONCERN	VOTEFILER RESPONSE
<b>Accuracy/Accountability</b>	
Presentation of complete and proper ballots (e.g., accurate listings of contests, candidates, and issues)	By creating and maintaining all ballots at a central location, using ballot information obtained from the board of elections and/or the Office of the Secretary of State, thereby eliminating the opportunity to introduce errors during "installation" into multiple, separate, physical/mechanical machines
Verification that all votes cast reflect the voters' intentions, are entered, are entered correctly, and are properly counted	By matching the bar codes on the printed ballots with those in the Ballot Database; via the ability to identify and log any votes that were successfully matched but not delivered to the Votes Database; by reconciling information actually contained in the Ballot and Votes Databases; via the clear text presentation of the choices available and choices made
Creation of a paper-based audit trail	By creating paper-based bar-coded ballots and inserting those ballots into a locked box at the polling place after the bar code is scanned
Ability to support recounting, especially manually	By collecting paper ballots and inserting them into locked boxes; via support for various levels of recounting including rescanning the paper ballots, spot-checking counts by opening ballots collected in selected districts, optically processing the clear-text sections of the collected ballots, and manual recounting

**KEY CONCERN**

**VOTEFILER RESPONSE**

<u>Accessibility/Anonymity/Privacy</u>	
Ability to handle large elections, in terms of both number of candidates/issues and voter traffic	By virtue of the use of Ballot and Votes Databases that run on flexible, scalable, off-the-shelf commercial database technologies
Ability to authenticate qualified voters	Through current procedures, applicable to all voting systems
Support for absentee ballots	Through current procedures, applicable to all voting systems, and/or by the creation of Ballots online and the mailing of the bar coded printouts for scanning instead of their in-person presentation, thus allowing them to be immediately included in the overall tally of votes
Support for provisional ballots	Through current procedures, applicable to all voting systems, and/or by normal VoteFiler voting, and the holding aside of the votes cast for use if/as deemed appropriate
Support for the disabled, the blind, and the visually-impaired	Through current procedures, applicable to all voting systems, and/or the use of whatever supports already may be in place (e.g., text-to-speech software, Braille printers) to facilitate their computer use
Support for anonymity and physical privacy	Via the creation of an anonymous bar coded ballot in private prior to going to the polling place, the folding and insertion of that ballot into an unmarked special window envelope, the absence of any log of the IP addresses from which the ballots are created, and the non-use of Internet cookies

KEY CONCERN	VOTEFILER RESPONSE
<b>Usability</b>	
Ease of use for poll workers and voters	By virtue of the use of familiar, standard personal computing and Web technology and existing polling procedures
Ability to speed the voting process	Via the elimination of the need to wait for or even use conventional voting machines by selecting candidates and creating ballots in advance; by supporting the instant entry and tabulation of votes cast via the use of the bar code scanning
Foundation on non-proprietary software to facilitate maintenance and repair	By virtue of the use of standard, inexpensive personal computers and Web technology that require no specialized skill to repair, maintain, or even replace, and the absence of the need for any specialized software to be used at the polling place

KEY CONCERN	VOTEFILER RESPONSE
<p><b>Security/Integrity</b></p> <p>Security in terms of both data encryption and access control</p>	<p>Via the use of SSL when voters create their ballots, password protection when election officials access the bar code scanning system, SSL when the ballot is validated against the Ballot Database, private line technology when the Ballot Database communicates with the Votes Database, and conventional means of physically securing the computer room in which the Ballot and Votes Databases reside</p>
<p>Fault tolerance / disaster recovery capabilities</p>	<p>For voter and election officials creating and scanning ballots respectively: by virtue of current techniques and procedures for safeguarding standard personal computing and Web technology, and/or storing the data locally. For election officials maintaining ballots listing candidates and races, monitoring communication between Ballot and Votes Databases, and tallying of votes: by virtue of current techniques and procedures for safeguarding the secure, reliable data center in which they run. Ultimate fallback is the existence of the actual paper ballots.</p>
<p>Tamper resistance</p>	<p>For voter ballots and votes: by cross-checking the data encoded in the printed bar code against that created in the Ballot Database against the information entered into the Votes Database. For election official lists of candidates and races: data is available before election day and can be spot-checked in advance</p>
<p>Open to public scrutiny to expedite bug fixes and to increase public confidence</p>	<p>By virtue of the use of standard personal computing and Web technology, the vendor's willingness to open its code and databases to authorized reviewers, and the open structure of the code that allows auditors to readily verify maintenance of voter anonymity and compliance with certification requirements.</p>
<p>Ability to vet nationality, criminal status, and intentions of on-site technicians, as well as programmers and manufacturers of e-voting software and machines</p>	<p>Through current procedures, applicable to all voting systems</p>