



Voting from the Home or Office? Don't Hold Your Breath

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It sounds so easy — why *can't* people vote online in national and state elections with the same security and convenience that they enjoy while banking or buying books? Considering how far e-commerce has come, it's rather surprising that Internet voting is nowhere near to being a mainstream practice.

As nations deal with the problems of using electronic machines at polling places for federal, state, and local elections, it seems natural to look to the future and ask, "Why not hold major elections by Internet, where voters could cast ballots from their homes or offices?" Because so many other online services are available from the home or office, why *can't* we vote for a president or senator this way in the next few years? It still seems a long way off, even though a British columnist predicted that "by 2010, you just might be able to vote in your pajamas" (<http://technology.guardian.co.uk/weekly/story/0,,1851486,00.html>).

This article describes the challenges of Internet voting — defined here as casting an electronic national or state direct election ballot from a location other than a polling station. The widely used terms "electronic voting" or "e-voting" represent the highly publicized (and controversial) use of special electronic devices at polling stations. Our interest here is the next step in governance — remote voting via the Internet, without having to physically go to a polling place.

I Voted?

The 2000 Democratic primary in Arizona was

billed as a first attempt at using the Internet to vote in a federal primary election. The two major Democratic Party presidential contenders, Al Gore and Bill Bradley, agreed to the arrangement — with fewer than 50,000 votes expected, the thinking was, why not see if using the Internet would make a difference?

Although Gore and Bradley agreed to the procedure, considerable dissent arose on several fronts: some groups were concerned with fraud and were prepared to sue to cancel the experiment, whereas others argued that Internet elections excluded people who weren't net savvy, such as the old and the poor. Nevertheless, Internet voters had a two-day window to cast their electronic ballots, and the early results were encouraging. Gore had won enough primary states to assure his nomination, usually a signal of light turnout, but more than 36,000 people ultimately voted by Internet, accounting for almost half of the total ballots cast. Despite the obvious IT challenges — security, password confusion, and server overload — one analyst said, "The biggest challenges are political, not technological" (www.fcw.com/article61799). Even if it were possible to solve the complex problems of data security, password protection, and voter anonymity, public

Sources for Internet Voting

These resources include examples of Internet voting applications and ideas from government and the private sector:

- ElectionsOnline (www.electionsonline.us) and BigPulse (www.bigpulse.com) offer comprehensive services for setting up online elections for unions, corporations, and some government groups.
- The Center for American Politics and

Citizenship at the University of Maryland (www.capc.umd.edu) specializes in research on voting technology and other public policy issues.

- Michael Alvarez and Thad Hall's *Point, Click, and Vote* (Brookings Institution Press, 2004) is an excellent primer on Internet voting and related topics.
- *The Electronic Journal of e-Government* (www.ejeg.com) has occasional articles on Internet voting, like the Geneva case

described in the main text.

- The CalTech/MIT Voting Technology Project (<http://vote.caltech.edu>) offers an excellent collection of articles, tables, and opinion pieces about voting technology with some articles on Internet voting.
- The Election Updates blog (<http://electionupdates.caltech.edu>) provides current, authoritative commentary on voting issues, including Internet voting.

officials would still be concerned about under and over representation of constituencies, discrimination against minorities, and other political issues.

Four years later, the 2004 Michigan straw poll for the Democratic Party nomination attempted to use Internet balloting to supplement normal voting procedures. Election officials estimated that roughly 130,000 votes would be cast over the Internet, but the actual results were far less – roughly 46,000 Internet ballots (or one-third of the total votes cast). Perhaps complicating the situation, potential online voters had to apply for paper ballots; by return mail, they received the necessary forms to vote by mail or online. Each Internet voter then had to enter a social security number, password, and birth date and place.

The technical flaws in the process, which resembled the results of the US Department of Defense's (DoD's) costly Secure Electronic Registration and Voting Experiment (SERVE) plan for overseas personnel to use Internet voting in 2000 and 2004, included occasional server overloads and complaints about security. The US Department of Defense abruptly stopped the SERVE project before the 2004 national election, forcing 100,000 overseas voters from seven states and 50 counties to use the old system of mailed ballots. Moreover, Johns Hopkins professor Avi Rubin found the DoD experience and Michigan's similar in terms of

hackers' ability to redirect traffic and collect voter passwords and usernames and make systems more vulnerable to denial-of-service attacks (<http://news.zdnet.co.uk/security/0,1000000189,39145665,00.htm>).

Internet voting still seems far off for national US elections, but it's flourishing in other areas, including balloting for labor union leadership, awards, employee agreements, pledges, petitions, industry-wide forums, and other nonfederal and state offices. A variety of services such as ElectionsOnline (www.electionsonline.us) and BigPulse (www.bigpulse.com) help facilitate such elections. The BigPulse site describes the advantages of its services in considerable detail: increased voter turnout, one-day readiness, convenience, security and independence, options for vote-counting techniques (simple majority, preferential, instant runoff, and so on), control of over- and undercounts, and even services to randomly vary the sequencing of candidates names. Both sites offer sample ballots and provide FAQ sections.

European Elections

The US isn't alone in its attempt to conduct some of its federal elections online: European countries are starting to ramp up their efforts as well. In 2000, the European Commission initiated the Cybervote Project, which aimed to integrate Internet voting into the mainstream of election procedures. Election

officials performed trials in Sweden, France, and Germany, but the results over the next few years weren't promising. Surprisingly, a city, not a country, seems to be on its way toward breaking this trend (www.geneve.ch/evoting/english/welcome.asp).

Researchers recently noted that Geneva is as close to an ideal environment for Internet voting for government candidates as can be found. In a study of Geneva's Internet voting trials, they found that roughly 20 percent of the voters participated online, twice the expected number.¹ The study's authors examined several voter classes, including abstainers, polling station voters, postal voters, and Internet voters, and found that most Internet voters came from those who had previously voted by mail (thus decreasing the number of postal votes significantly). More than half the voters who described themselves normally as abstainers ended up choosing the Internet; citizens who classified themselves as only occasional voters also chose Internet voting, at a 30 percent rate. The only sociopolitical issues that differentiated Internet voters were age (negatively correlated) and wealth (positively). The authors found no significant differences in terms of political identification, but some small biases indicated that the ecologist party was more likely to use Internet voting and the right-wing populist parties less so. Not surprisingly, individuals who perceived themselves as skilled in IT were

more likely to prefer Internet voting. (Note that the numbers involved in this study were relatively small, about half of the Michigan straw poll voters.)

Many other European countries are taking small steps toward Internet-based elections. In February 2005, for example, Spain conducted an Internet voting pilot experiment, involving all 52 of the country's municipalities (states) and more than 2 million potential voters. This pilot rolled out a few weeks in advance of the normal paper ballot voting, and anyone with an Internet connection was eligible to participate as long as they had an authorized smart card and PIN code. Unfortunately, the results were disappointing. Only 10,543 voters – roughly 0.54 percent of those eligible – participated, but even such a small turnout still generated allegations of fraud and software glitches. Spain has also experimented with other Internet voting techniques, including Short Message Service (SMS) ballots, but the results haven't been encouraging to date (<http://ec.europa.eu/idabc/en/document/3923/358>).

Estonia in the Lead

So far, the leader in federal Internet election success is Estonia – even though the country's Internet voting percentage is low, citizens have at least participated in a national election that had Internet voting as a mainstream option. Officials conducting the 2007 parliamentary election – not a pilot project or a straw poll – put elaborate procedures in place to make Internet voting a viable, desirable option. Estonia offered an early version of Internet voting for its general elections in 2005, but the March 2007 parliamentary election featured significant new safeguards and extremely detailed procedures. All Internet voters had to have valid Estonian digital identification and two PINs, one for entering the system and casting a digital ballot and the other for encrypting the ballot and

sending it to the server. Voter anonymity was protected through “double envelope” security – the digital ballot wasn't decrypted until the voter's identity was separated from it. In spite of these advances, two Estonian political parties objected (www.nature.com/news/2007/070305/full/070305-1.html):

The Estonian People's Union and the Estonian Centre Party informed the NAM that they oppose the use of remote internet voting primarily due to concerns regarding secrecy of the vote. These parties expressed concerns that the unsupervised nature of remote voting makes it impossible to observe, thereby creating the potential for illegal pressure, coercion or inducement of voters. They noted that such occurrences could potentially take place in a voter's home or workplace, and additionally stated that any person with a laptop computer and ID card reader could travel to residences and ‘collect’ votes.

Unfortunately, the Internet ballot totals didn't meet expectations: of the more than 550,000 votes cast from Estonia's 15 counties and two cities at 657 polling stations, only 3 percent of the vote occurred over the Internet (www.vvk.ee/r07/paeveng.stm). In other European developments, Lithuania is in negotiations with a developer for an Internet voting system, and the UK is establishing pilot projects for Remote Voting by Electronic Means (RVEM), with a possibility of offering Internet voting in its next general election (<http://technology.guardian.co.uk/weekly/story/0,,1851486,00.html>).

What About the US?

Although Internet voting is flourishing in nongovernment sectors, with companies such as BigPulse and Electionsonline providing apparently safe and secure election services, will US national elections ever be Internet-based? The answer is most likely “yes,” but probably not for a very long time. A democracy will always have concerns about

fraud and unfair advantages for the wealthy and computer literate, not to mention the many reported cases of hardware and software problems, but we'll need to see success stories on a much larger scale than Arizona, Geneva, Michigan, or Estonia before Americans will be able to cast their national ballots from home or work. Even if there is an improvement in Internet voting procedures, Harvard professor Pippa Norris worries that Internet voting in major elections can exacerbate the “socioeconomic voting gap” and might not improve voter turnout (<http://ksghome.harvard.edu/~pnorris/ACROBAT/Magic%20Ballot.pdf>).

The US National Institute of Standards and Technology (NIST) and the US Election Assistance Commission (EAC) are working on standards for laboratories that certify voting systems, according to NIST's Mark Skall. Only after EAC has developed proposed standards, probably September 2007, can NIST begin to work on subsequent steps—including the evaluation of Internet voting technologies. The SERVE system's failure in 2004 might force NIST to be especially careful before certifying a substitute system for overseas absentee ballots. Michigan is the only US state that will offer Internet voting in the 2008 primary.

Perhaps the best way to sum up the Internet voting challenge is the following excerpt from an editorial in the Taipei Times (www.taipeitimes.com/News/editorials/archives/2004/10/15/2003206979):

“Voting from home sounds convenient, but it removes the assurance that everyone's vote is a genuinely free choice. The supervised voting environment provided by the ballot box system ensures that everyone can cast their vote in secret, free from coercion or intimidation.

If voting happens in the home, you cannot

be sure that a parent or an employer is not standing over the voter's shoulder ensuring that he votes the expected way. Nor is it even possible to know that someone's vote is being cast by that voter. Voter credentials in the form of PINs and passwords can easily be bought and sold. Allowing home voting gives the green light to all sorts of electoral malpractice which are at least very difficult under a properly-run election based on the ballot box."

But there are many new approaches being considered in the US. Michael Alvarez and Thad Hall's book *Point, Click, and Vote* (Brookings Institution Press, 2004) offers a relatively upbeat view. Although the authors agree that problems such as security, underrepresentation of minorities and the poor, and so forth are significant, they call for greater government funding of Internet voting experiments, more attention to reducing the digital divide, and a bigger emphasis on "deliberative democracy," in which voters can scan the Web for full discussions of the issues and then vote for their preferences instead of facing dichotomous decisions (raise taxes or cut spending). Alvarez, a professor at Cal Tech, maintains an active blog site (see the sidebar) where new ideas frequently appear.

For now, widespread Internet voting in US national elections isn't likely to be a mainstream practice because of political and technical problems. But once it becomes more routinely and successfully used for absentee balloting, it could gradually gain traction. But don't count on voting in your pajamas for quite a while. ☐

Reference

1. M. Chevallier, M. Warynski, and A. Sandoz, "Success Factors of Geneva's e-Voting System," *Electronic J. of e-Government*, vol. 4, no. 2, 2006, pp. 55-62; www.ejeg.com.

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