



Association for  
Computing Machinery

*Advancing Computing as a Science & Profession*

October 1, 2007

Senator Diane Feinstein  
Chairwoman  
Senate Rules Committee  
United States Senate  
305 Russell Building  
Washington, D.C. 20510

Dear Chairwoman Feinstein:

The Association for Computing Machinery (ACM) – a leading society for computing professionals – and its U.S. public policy committee are leaders in educating the public and policymakers about issues associated with electronic voting machines. We thank you for your leadership on voting reform issues and for the opportunity to comment on S. 1487, the Ballot Reform Act of 2007.

This legislation takes several steps to improve the transparency of the voting process. Two of them are particularly important: (1) voter-verified paper trails coupled with manual audits and (2) controlled review of the technology by independent experts. We are encouraged that the legislation contains these provisions, which are consistent with a policy position on e-voting ACM members overwhelming supported in 2004<sup>1</sup>. However, we are concerned with some provisions of the legislation and make the following recommendations, based on our technical expertise:

- Require the audits be random, mandatory, and manual or software independent (not reliant on the machine that produced the vote for the audit)
- Ensure that best practices for auditing elections are followed by state and local officials
- Expand the scope of the software review provisions to include all elements of the system and clarify reviewers' responsibilities
- Add more transparency to the emergency certification provisions
- Charge the National Science Foundation with e-voting research
- Provide further voter privacy protections

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<sup>1</sup> See <http://usacm.acm.org/weblog/index.php?p=73> for ACM's adopted position

Attached is a detailed document discussing these recommendations. We would be happy to discuss any of these issues in more detail with you or your staff.

Thank you for considering the computing community's views on this important legislative effort. The community has recommended many of the provisions embodied in your legislation for a number of years. We welcome your leadership on this important issue and look forward to working with you as the process moves forward. If you have any questions, please feel free to contact ACM's Office of Public Policy at (202) 659-9711 if we can provide any assistance on this or related issues.

Sincerely,

Eugene H. Spafford, Ph.D.  
Chair, U.S. Public Policy Committee of ACM

Barbara Simons, Ph.D.  
Chair, USACM Voting Subcommittee

### **About ACM and USACM**

ACM is a non-profit educational and scientific computing society of more than 84,000 computer scientists, educators, senior managers, and other computer professionals in government, industry, and academia, committed to the open interchange of information concerning computing and related disciplines. The Committee on U.S. Public Policy acts as the focal point for ACM's interaction with the U.S. Congress and government organizations. It seeks to educate and assist policy-makers on legislative and regulatory matters of concern to the computing community. (See <http://www.acm.org> and <http://www.acm.org/usacm>.)

## USACM's Detailed Comments on S. 1487 – the Ballot Reform Act of 2007

### Voter-verification and Audits

We support the provisions ensuring that voters have an independent way of verifying their votes. Paper-based audit trails are currently the only transparent way for voting systems to be auditable independent of the underlying software (software independent). Recent reports from California and Florida have emphasized the vulnerabilities of the software and firmware of both direct recording electronic (DRE) and optical scan systems.

We are also encouraged to see the requirements that paper trails be durable, private, clearly readable, and accessible. We note that optical scan voting systems, combined with ballot marking systems and tactile ballots, do satisfy those requirements, and those technologies are currently available. As a result, we disagree with the argument that no voting system would currently meet those requirements. Further, once these standards are established in law, still more technologies might be developed that satisfy those standards.

Paper trails are only half of what is needed to ensure that systems are truly software independent. One of the more disturbing aspects revealed in the California top-to-bottom review was the ability to compromise the paper trail in some of the reviewed systems.<sup>2</sup> We are concerned that the current auditing language could be interpreted to allow completely electronic audits or audits that are not software or machine-independent (meaning independent of all machine(s) used to cast, count, or audit the vote). A random, mandatory, manual or machine-independent audit of elections will help to verify the reliability and accuracy of the voting technology. Section 304 of the legislation requires two of these elements – random and mandatory audits – but it does not require that the audits be conducted manually or by a method that is machine-independent and as statistically accurate as a manual audit of the votes. We recommend adding to the requirements listed in section 304 that audits should be manual or machine-independent. We also recommend requiring the National Institute of Standards and Technology to determine whether the alternative methods are as statistically valid as manual audits.

We further recommend that states *must use*, rather than *should consider*, model guidelines for their audits. A recently published report by the Brennan Center at NYU<sup>3</sup> and the Samuelson Center at University of California at Berkeley has many best practices and compares various audit methods. While we understand the reluctance to legislate in an area that is traditionally a matter for state and local jurisdictions, this report demonstrates the need for strong federal guidance. It indicates that at least 23 of the 38 states that require paper audit trails fail to require any sort of audit, and that none of the

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<sup>2</sup> Bishop, Matt. July 2007. Overview of Red Team Reports. [http://sos.ca.gov/elections/voting\\_systems/tbtr/red\\_overview.pdf](http://sos.ca.gov/elections/voting_systems/tbtr/red_overview.pdf)

<sup>3</sup> Norden, Lawrence, Aaron Burstein, Joseph Lorenzo Hall and Margaret Chen. 2007. *Post-Election Audits: Restoring Trust in Elections* [http://brennancenter.org/dynamic/subpages/download\\_file\\_50197.pdf](http://brennancenter.org/dynamic/subpages/download_file_50197.pdf)

states that do conduct audits have used models likely to capture errors, attacks or bugs that could compromise an election.<sup>4</sup>

### Certification and Disclosure

The current disclosure and review provisions balance between the interest of protecting proprietary information and the interest of fully, independent analysis of voting systems. Further, the legislation rightly defines the scope of the review by stating that election-dedicated software includes existing software that has been modified as well as software specifically designed for the system. However, the legislation currently allows the Election Assistance Commission to determine whether commercial off-the-shelf (COTS) software will be subject to certification and review. Currently, all of the components of a voting system must be certified. We recommend that all of the technology (including all appropriate documentation) should be subject to certification and review. This would include unmodified COTS, existing software that has been modified for the voting system and any software that has been custom-designed for the voting system. The review should also include ballot definition files. These elements interact with one another: restricting technical experts to reviewing parts of an entire system reduces the chances that they will discover flaws that should be addressed.

The legislation also places requirements on recipients of disclosed information. We agree that individuals reviewing these systems should not disclose trade secrets. However, the current provisions state that individuals “may not compromise the integrity of the software” or disclose “other confidential commercial information” are vague and undefined concepts. We recommend removing this language so the restrictions are transparent and based on established and understood legal concepts (i.e. trade secrets) and so that the law cannot be used to shield the use of unsound systems for voting.

We also have some concerns about the legislation’s emergency certification provisions. While we understand the need to patch serious flaws before an election, allowing uncertified software is a loophole that could introduce new risks to a voting system. We would be troubled if patches were introduced right before an election and were never subject to review or disclosure. We recommend strengthening the review provisions to ensure that officials publicly disclose that they are using the emergency certification provisions afforded by the legislation, that they digitally sign patches before installation, that they provide justification for why the authority was being exercised, and allow a fixed time after a patch is installed for disclosure review and certification. If the patch has not been certified within a reasonable period of time, then it should be removed from the system.

### Accessibility Research Provisions

We welcome the provisions encouraging research into voting technologies, particularly research with an emphasis on accessible voting systems. While it has been argued that

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<sup>4</sup> Ibid, page 3-4.

paper-based audit trails should not be used because they are not accessible, the recent top-to-bottom review of voting systems in California noted several barriers to accessibility in many aspects of DRE systems.<sup>5</sup> We also note that there are paper-based systems that are in use today that are accessible to voters with a variety of disabilities, including lack of sight. Vendors have yet to address accessibility issues related to the voting machine interfaces as well as the readability of audit trails and other voting system output. For example, in many DRE systems what is read back to a voter is not from the VVPAT, but from what is on the screen. Such work can go a long way in improving the voting system for all voters, able-bodied and otherwise.

The legislation currently charges the Election Assistance Commission with carrying out research established under the Help America Vote Act. We note that the EAC's resources have been limited and that the agency does not have a research mission. We recommend shifting the research programs to the National Science Foundation. NSF works closely with the scientific community on numerous issues and has experience in e-voting research. We stress that appropriations need to be made to support this research, wherever it is situated.

Furthermore, the language that deems eligibility for grantees developing systems that are "completely accessible for all individuals" could stifle applications for this program. No system is completely accessible; if grantees were required to stipulate that a system was completely accessible as a condition of receiving the grant few would apply. Instead, the program should strive to improve voter accessibility for all individuals. Multiple approaches may be necessary to achieve full accessibility.

### Voter Privacy

The legislation currently does much to protect voter privacy by requiring that voter-verified paper records remain private. This would likely end the sequential printing of ballots by some systems. However, as the recent California top-to-bottom review found, several systems also maintain sequential electronic recording of votes. This could allow for relatively easy reconstruction of how a person voted by comparing the voter registration list to the order of votes in voting booths. The same privacy problem arises with audit logs that have timestamps for all voting activities. As recently demonstrated in Ohio, these records, along with the poll book information, can reconstruct how voters cast their ballots. If these records are subject to public records law, a reconstruction becomes even easier. We recommend extending the privacy provisions to the entire voting system.

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<sup>5</sup> Runyan, Noel and Jim Tobias. July 2007. *Accessibility Review Report for California Top-to-Bottom Voting Systems Review*