

Misprogramming Threat

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Taxonomy

Wholesale.

Applicability

Voting phases: Any type of system is vulnerable, but paper-less systems, such as DREs and lever systems are particularly vulnerable.

Method

When programming the voting machines, an insider could accidentally or intentionally misprogram the machines to count votes incorrectly. Examples of such misprogramming include:

- Counting votes for the wrong candidate/position. This has happened in several recent elections, including one where “yes” and “no” votes on a ballot initiative were reversed in some jurisdictions. [I believe this was on DREs in California, but have not located the details.]
- Counting party line votes incorrectly. In 2004, election results in North Carolina’s 11th House results were reversed when it was discovered that party line votes were not initially counted. In that case, due to use of optical scan ballots, it was possible to recount and correct the results.
- In a demonstration (not a real election) by a vendor, votes cast in the Spanish ballot were not counted, but votes cast in English were counted correctly.
- In the June 2005 Republican Primary in Virginia, the home precinct of one of the candidates showed zero votes for the candidate. The machine in use was a lever system with no contemporaneous paper trail. No cause was established, but it is assumed to be misprogramming.

All of the above cases appear to be due to accidental misprogramming, and not due to any deliberate effort to change election results.

This case is not addressing problems of miscounting due to touchscreen alignment; it is focused exclusively on incorrect counting.

Resource Requirements

The perpetrator must have the ability to program voting systems. For the purposes of this threat paper, I assume that the perpetrator is an authorized insider. Methods used by an outsider to gain access for reprogramming is a separate threat.

Depending on the policies of the jurisdiction, misprogramming could impact a single precinct, a city or county, or a state.

Potential Gain

Ability to modify vote totals. The smaller the election (i.e., more local), the greater the likelihood of being able to change the election results, whether accidentally or intentionally.

Likelihood of Detection

As long as the vote totals are not too far outside the expected range, the likelihood of detection may be high if logic & accuracy tests are thorough, or low if they are not. The fact that the above listed counting flaws occurred (despite L&A testing) indicates that the L&A tests are insufficient for this purpose.

If the misprogramming is deliberate (vice accidental), the perpetrator can take steps to make miscounting arbitrarily difficult to locate through L&A tests.

Countermeasures

Preventative Measures

Review of the voting machine programming will make it harder to hide misprogramming code. However, review is only moderately effective even when flaws are accidental, and is reasonably ineffective against deliberately hidden flaws.

Policies and procedures to ensure that no single person can program a voting machine can ameliorate the risk. In order for this to be an effective countermeasure, both people (or at least two, if more than two are present) must be capable of understanding the programming process and detecting failures. A second person who watches but does not understand is not a countermeasure.

Staff authorized to program voting machines can be vetted to reduce the risk of their deliberately misprogramming voting machines. This will not address accidental misprogramming.

Detection Measures

Detection is difficult if the modifications made in vote totals are relatively small, but a 5% change in vote totals could easily be made without detection.

Voting systems that provide a paper backup (e.g., optical scan or DRE with VVPAT) can be recounted; a hand recount would detect any tampering.

Citations

None.

Retrospective

This is a variation on historical problems with miscounting ballots. The difference is the scope of miscounting – an accidental or deliberate error in the counting logic can impact a larger number of voters than a simple miscounting of paper ballots.