

Scantegrity

Transparent Integrity for Any Optical-Scan Voting System

The Scantegrity system offers an audit capability that can be used alongside any conventional optical-scan voting system. Voter experience, procedures and equipment need not be changed. Scantegrity works by printing extra symbols on the optical-scan ballot forms, posting data online, and an in-person voter-dispute resolution procedure that always yields convincing definitive results. Voters each have the option to check online that their vote was recorded correctly. A comprehensive audit process transparently provides compelling proof to anyone who checks it online. The conventional system clearly only benefits. Thus, with no added risk and at low cost, ballot secrecy is improved and the public is provided very high certainty that essentially all votes are tallied as cast.

Current optical-scan ballots are adapted for Scantegrity only by including a letter next to each oval that voters can fill and by ballot serial numbering if not already present. The scanning, tabulating, and announcing of election results, however, can all be conducted with current optical-scan systems unchanged. Ballots can be cast as today by mail or at polling places having scanners or using ballot boxes for centralized scanning. Voters with difficulties reading ballots at polling places can also continue use of headphones with marking templates or ballot marking computers. In fact, all voters can have the option to vote in exactly the same manner as with current optical-scan systems.

Voters who wish, however, can take additional steps to check that their own votes are recorded correctly. Such voters make a note, for instance on a piece of scratch paper, of the letters labeling some or all of the particular ovals they have marked. The notes can be made while voting in a booth at a polling place or when voting by mail from home. Such notes do not reveal who the voter voted for, since the assignment of letters to the ovals they label is in effect randomized per ballot.

After marking the ballot, a corner is separated along perforation provided. This yields a counterfoil chit printed with the serial number and that the voter should keep as a record. Voters who made notes can, once the ballots are scanned and processed, enter the serial number from their chit onto the election website or an automated 800 number. When the system reports the same letters as those noted, voters have verified that their votes are correctly recorded. It's like tracking a package today—but then also seeing, protected by a kind of coding, the actual content delivered. Even if just a few percent of voters check, however, the public is consequently ensured that essentially all printed letters must have been recorded correctly.

Inconsistency between voter notes and published data need never occur, especially if a scan captures the serial number, marks, and letters in the same image. If, however, some voters believe that the letters posted online don't match the letters in their notes, they can resolve the matter in person at election headquarters on an appointed day after the close of polls. If there are too many such requests, candidates can be allocated quotas and in effect provide triage.

The resolution procedure will require officials to be able to locate corresponding ballots from the serial numbers on chits. A database for this stores, for instance, which shelf, in which bundle on that shelf, and where within that bundle the ballot with each serial number is located. So that anyone can observe the proceedings, first an envelope with a window exposing only the serial-number portion of the ballot is shown. This is enough to establish even forensically, by matching up the voter's chit, that the two pieces of paper were once one.

The resolution procedure then focuses on a particular contest whose letter the voter claims is wrong online. First the ballot is transferred face down so as not to expose votes, to an envelope with a window revealing only that contest. Then this envelope is shuffled in among a number of similar window envelopes. These contain ballots each with a different candidate marked, but all the marks are labeled with the same letter as the original ballot. The vote is not revealed when the windows are shown, since each exposes a mark for a different candidate. But the letter labeling the mark on the voter's original ballot is thus proved to be the one labeling all the marks visible through the windows and thus must match that posted.

Voters can optionally also participate in overall checking, like limited observers in manual-count elections today—but then “plainclothes” and by any voter. This checks that the printing of labeling letters corresponds properly with serial numbers. Mail-in voters can keep an unvoted ballot, while still voting provisionally at a polling place. Polling-place voters should also be able to keep an unvoted ballot, once officials punch a spoiling hole through the ballot and chit and provide a fresh form to the voter. The spoilt forms are then checked against what should be identical letters published under matching serial-numbers online.

All letters and serial numbers are actually published online before the election, but in encrypted form. When they are to be revealed such as for the unvoted ballot checks, the keys initially used to encrypt them are published. Such data thus cannot differ from its originally hidden value. This aspect of Scantegrity is essentially a simplification

of the Punchscan voting system, which has been well-documented and detailed in the scientific literature and proven in practice for binding elections. In such systems anyone can check the consistency of the data published on the website by using software that they can run locally and are even free to write themselves.

Scantegrity offers an alternative to voters with difficulty reading ballots that lets them also verify. Such voters are allowed to hear through the familiar headphones first the serial number and then the candidates, but listed in order of the corresponding letters. Voters vocalize the letter they hear corresponding to the candidate of their choice. Poll workers then fill ovals on a scannable ballot form that only lists letters. Voters too can note their utterances, such as with their cellular phone, and later, by phone, check their own votes.

Without Scantegrity, optical-scan voting systems expose voters to simple vote buying and coercion schemes that can improperly influence votes. An influencer can instruct voters to make the ballot form uniquely recognizable. This can be by the device of certain locations marked with pinholes, creases, scratches with coins, or even use of special inks. Other examples include patterns formed from recognizably different ways to fill an oval, such as varying the slant of zigzags or which sides of the oval's printed boundary line is covered by fill. Even patterns of votes for down-ballot contests have been used.

The improper influence problem results because ballots have a high probability of being scrutinized by partisans in costly and protracted procedures such as audits and recounts aimed at improving integrity. Scantegrity removes the need for such inspection of ballots, even in its resolution procedure, thereby reducing the threat of improper influence. Integrity is ensured instead at lower cost, more quickly, and to a much higher level.

In fact, voters who make the checks, and as a result all voters, can be extremely sure—even against a national adversary level of threat—that essentially all marks on ballots are properly included in the final tally.