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## Voting Machine Leaves Paper Trail  By Joanna Glasner ◈

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Voting machines that print individual ballots -- an election accessory many computer scientists have clamored for -- are moving a step closer to widespread availability.

In response to concerns raised by election officials and security-minded techies, one of the largest makers of touch-screen voting machines has introduced a prototype capable of producing paper ballots.

Developed by Election Systems & Software of Omaha, Nebraska, the machine is currently in beta testing, with plans to make it commercially available by July.

"The idea is to provide a voter-verifiable ballot," said Lou Dedier, the ES&S vice president and general manager who built the original test model in his garage. Dedier said his mock-up was based on suggestions from elections administrators.

The planned rollout comes as a coalition of computer scientists, led by David Dill, a Stanford computer science professor, is lobbying election officials and voting machine manufacturers to fix security flaws in the current crop of touch-screen voting machines. The coalition believes the flaws are serious.

In particular, computing experts worry that hundreds of thousands of direct-recording electronic, or DRE, voting machines used in elections nationwide do not provide an auditable paper trail that records individual votes. In order to ensure that votes are not lost because of a computer malfunction or tampering, critics say DRE machines should be able to print and store individual ballots immediately after a vote is cast.

"I'm happy that some are trying to produce interesting solutions to the voter-verifiable audit-trail problem," said Dill. Although he does not endorse any particular voting machine vendor, he considers the ES&S prototype a

breakthrough for a major manufacturer.

As pressure mounts for paper receipts, ES&S is not the only one who may add on a ballot-printing feature.

Joe Richardson, a spokesman for Diebold Election Systems, one of ES&S's chief competitors, said the company would be willing to provide such a feature to U.S. customers if the demand is there. Richardson said the company included ballot-printing capability in more than 300,000 voting machines it sold to Brazil.

Avante International Technology, a developer of smart-card technology, recently introduced a machine called Vote-Trakker, which creates a paper ballot that voters can view and verify before exiting the polls.

Sequoia Voting Systems, another large maker of DRE machines, recently agreed to provide machines for Santa Clara County, California. Officials there plan to petition the secretary of state to approve a pilot project with paper records that voters can inspect starting in this November's election.

For ES&S, providing a ballot-printer capability isn't solely an altruistic move. Dedier said municipalities can expect to pay between $400 and $500 to add the ballot-printing feature to an existing machine.

The ballot-printing prototype by ES&S is quite similar to its standard DRE machine. In both cases, voters make their choices by touching the name of their preferred candidate or ballot proposition position on a computer screen.

The primary difference with the prototype model is that after votes are entered, a copy of a printed ballot appears behind a clear plastic screen. A voter can look at the printed ballot and press a button to submit it or to make changes. Submitted ballots get dropped in a box at the bottom of the machine for later counting.

Dedier said much of his original design was based on suggestions from Warren Slocum, chief elections officer for San Mateo County, California. Slocum, in turn, said his recommendations were influenced by security concerns raised by computer scientists.

"Part of my goal is to try to influence this public policy," said Slocum, who favors using printed ballots, rather than electronic records of votes, as the official ballot in case of a recount. Slocum said San Mateo, which primarily used optical-scan ballot machines, also made by ES&S, doesn't plan to use the printer-enabled machines this year, but may next year.

He believes touch-screen machines offer some advantages, such as the ability to provide voting in multiple languages without having to pre-print ballots for non-English speakers.

But the main purpose of adding ballot-printing capability, he said, is to ensure voters that in the event of a computer malfunction, their votes will still be accurately recorded on paper.