Mr. John Mott-Smith *1 Sep 2004*
Director of Voting Systems
Office of the Secretary of State
1500 11th Street
Sacramento CA 95814

Subject: Certification of the Avante International Technology, Inc., Optical Vote-Trakker 1.5.0 with Vote-Tracker 4.7.5 in Absentee Central Count Mode.

Executive Summary

State certification testing was conducted 30 June-2 July, 2004, at the California Secretary of State Election Division Offices in Sacramento to certify the Avante International Technology, Inc., (Avante) Optical Vote-Trakker 1.5.0 with Vote-Trakker 4.7.5 in absentee central count mode of operation.

The Ballot on Demand feature and precinct operations were not tested

Review and testing of this proposed configuration showed problems with compliance with the California Election Code in regard with reporting precinct level results and requirements for reporting the breakdown and aggregation of partisan and non-partisan vote totals in Primary party elections.

References:

1. [Proc] Avante, *State of California Procedures Required for Use of the OPTICAL VOTE-TRAKKER™ (Rev A)*, undated (created 13 Apr, 2004).
2. [Manuals] Avante, [see list in attachment], 13 Apr 2004.
3. [Upd ITA Report] Ciber, *Avante International Technology, Inc. Software Qualification Test Report/Original Report for Vote-Trakker 4.7.5/Optical Vote-Trakker 1.5.0, Updated 12 May 2004.*

Introduction

In compliance with California Elections Code 19200 and 19205, Diebold Election Systems applied for certification for the following revisions:

1. Avante, Vote-Trakker, Version 4.7.5, NASED: N-1-12-22-22-002 (2002), NASED Date: 12 May 2004. Ballot Prep and Tally functions.
2. Avante, Optical Vote-Trakker, Version 1.5.0, NASED: N-1-12-22-22-002 (2002), NASED Date: 12 May 2004.

The Avante Optical Vote-Trakker system includes a minimum of two PC based units, referred to as the ballot generating machine and the voting machine. The Vote-Trakker suite of software consists of set of modules ("packages') which are selectively installed depending on the functions to be supported (see attachment

The Vote-Trakker 4.7.5 software system consists of a set of software packages used in preparing and managing the ballot database; transferring the ballot database between hardware components; and consolidating the vote tallies from the ballot counting components. It also includes the Optical Vote-Trakker packages necessary to enable optical scanner operations. This software application supports the both the Vote-Trakker Voting Station (not included in this test) and the Optical Vote-Trakker System. The Optical Vote-Trakker 1.5.0 software packages provides the capability to create paper ballots from the ballot database, to scan the voted paper ballots, and tally the votes from those ballots. The Optical Vote-Trakker unit requires, in addition to the computer, a COTS scanner which is used to scan the paper ballot. Avante claims that any COTS scanner meeting their specifications can be used based on the purchasing county's requirements but the only

scanner and confirmed to meet the Federal Voting System Standards accuracy and reliability tests and California requirement is the Canon DR5020. In full operations, a county may need to set up multiple Optical Vote-Trakkers to process the quantity of absentee ballots submitted in a timely manner; however, a smaller county or light absentee ballot count can take advantage of the design to require fewer units for a savings in cost.

Security

Security provisions are a dominant element in this system's design (See attachment B for an overview). The design encompasses many recommended high security practices but, in testing, several in points in the process led to observations where simple errors or losses of passwords could damage or delay the operations as the security restrictions blocked further progress. The design includes some protection or recovery routes but the operational procedures for recovery were not clear and may not be viable in the intensity of an Election Day schedule. If this system is adopted, security training for all workers and recovery planning will be essential.

Test Results

A description of the test election used for this testing with specific observations is provided in Attachment 3. Reporting was the most serious area with three items which have been identified as non-compliant with the California Election Code or related administrative directions. The common thread was an issue with showing what was happening at the precinct level. However, a query to other state and Federal test agencies which have seen the Avante system indicated that the precinct reporting was seen in other testing but may not be straight forward.

Conclusion

Review and testing of this proposed configuration showed problems with compliance with the California Election Code in regard with reporting precinct level results and requirements for reporting the breakdown and aggregation of partisan and non-partisan vote totals in Primary party elections...

Sincerely,

Steven V. Freeman

Two Attachments:

A. Hardware Description with a list of the test configuration components
B. Security Comments
C. Test Election Design with list of observations.

Attachment A.

Hardware Descriptions

Avante Optical Vote-Trakker Central Count Absentee system

Avnet's central count absentee system hardware setup uses a minimum of two computers: a "ballot generating machine" and one or more "voting machine". The ballot generating machine also serves as the device to consolidate and perform the central accumulation of results from the voting machines.

The voting machine consists of a PC-compatible computer with a TWAIN compatible page scanner. Only the Canon DR5020 scanner was tested for California certification. A printer may also be attached to print ballots on demand (not tested in this session). Due to the slow scan speed, multiple voting machines may be needed to support an actual election.

The ballot data, called the Ballot Database, is transferred from the ballot generating machine to the voting machines on CD-R disks. The results are returned on another CD-R disk.

The ballot generating machine is also a PC-compatible computer with a CD-R read/write capability and a printer used to print reports.

Test Configuration

1. Ballot generating machine/tally machine.
    a. Dell Latitude D500,
        i. 1.3GHz,
        ii. 128MB RAM,
        iii. 40GB H/D,
        iv. CD-R/W,
        v. No modem
        vi. Open PCMCIA slot
    b. Windows 2000
    c. MS Office Professional 2003
    d. Installed modules:
        1) Manage Ballot Date Rev. 3.8.1
        2) Generate VID Rev. 4.0.5
        3) Generate Ballot Data Rev. 5.1.1
        4) Load Ballot Data Rev. 3.5.1
        5) Event Log 4.0.0
        6) Tally 4.0.2
        7) Test Voting
        8) Voting
        9) Windows Log In

2. Optical Vote-Trakker, voting machine.
    a. Dell Dimension 2400, OR2034-42940-442-01LJ, Rev A01
        i. *No open slots*
        ii. *No modem,*
        iii. *Built in Ethernet*

b. HP LaserJet 1012
c. Canon DR5020 Scanner BR 309576, ROM 7.06
d. Windows 2000
e. MS Office Professional 2003
f. Installed modules:
    1) Optical Vote-Trakker Rev. 1.5.0
    2) Count Ballots Rev. 1.00.4
    3) Event Log 4.0.8
    4) Scan
    5) Windows Log In

3. UPS, APC Back-UPS VS 500va
   A UPS is required with the voting unit and recommended with the central tally machine.

4. Printer, HP LaserJet 1012, CNFB052232

5. Manuals
    a. California Procedures for OPTICAL VOTE-TRAKKER (Rev A)
    b. 4.7.5 System Administration Manual
    c. 4.7.5 Tally and Reporting Manual
    d. 4.7.5 Ballot Loading and Pre-Election Management Manual
    e. 1.5.0 Optical Vote-Trakker Manual
    f. 4.7.5 Maintenance & Repair Manual

Attachment B.

Security

The paper ballot includes a bar-coded identification that uniquely identifies each ballot and determines what ballot style is to be used to interpret the ballot. Sets of randomly generated voter id numbers are pre-generated during the ballot generation phase for each voting machine scheduled for use. The number of voter ids generated is based on values assigned for the number of registered voters in the precinct or ward and an estimate of the distribution of voters among Early Voting, Election Day, provisional, absentee, and other categories of voters. When the ballots are printed, a voter id number is picked from the list and printed as part of the bar-code along with precinct, party, or other information used to interpret the ballot. The optical scan operation captures a full electronic image of every ballot including the bar-code. The unique identification allows problem reviews or election challenges to match electronic images and paper ballots explicitly. Preserving secrecy of the voter is dependent on local procedures preventing any record of the ballot number being matched to the voter who cast the ballot. This may be aided by an option to turn off the human readable display of the unique identification number so that the voter can not easily record the number and 'sell' the ballot.

The unique identification number also supports strict restrictions from recounting the same ballot. A ballot whose image is subject to resolution before counting has to be accepted as is or replaced with a remade ballot. Once a ballot is accepted, should procedures or events result in it being identified as invalid or needing to be remade and recounted, the ballot tally for that machine has to be reset and all ballots for that unit need to be recounted. No capability exists to void a ballot and replace it.

The operating and support setup for both the central tally and the ballot scanning computers include recommended practices for a strong security. Internet and other services are disabled and the password for the administrative account is, per Avante documented procedures, retained by Avante. Should a problem occur requiring the use of the password, the unit is to be returned to Avante for recovery. This procedure has some serious risks, both in terms of the control of the basic server being retained by a vendor and because of the potential vulnerability of any simple attack which would require administrative access to recover. The latter risk is a method to deny the services of the system during a time critical phrase such as Election Day operations or even Early Voting.

The separate applications, election databases, and machines have distinct user accounts or access passwords following 'separation of function' and 'least privilege' principles (See Table 4A below). At each level, supervisory users allow usernames/passwords to be assigned but, once assigned, the general rule is only the assigned user can change the password. If a user becomes unavailable or forgets the password, their username can not be reassigned or reset without reinstalling the associated application or database from an earlier copy. Many of the critical user positions are expected to have an alternate user or username who can continue operations if the first username becomes disabled. Critical administrative username/passwords should be recorded and stored in a secure file.

The security design includes identifying four groups of users based on their need for access.

- High level administrators who can assign other users to usernames/passwords
- Poll level workers supporting ballot counting operations
- Users responsible for Ballot Generation
- Users who issue ballots/Voter Ids to users.

The high level security is manageable but will require careful planning and diligence to be effective. Otherwise, the security features themselves can pose a risk as they block or restrict operations. In practice, many local officials will simply violate basic protection of their passwords to avoid the potential problems.

Attachment C.

Test Election Design

	Precinct	1	2	2	3	4	5
Type	Split		1	2			
SW	Federal, STATE	x	x	x	x	x	x
SD	Board of Equal 3	x	x	x	x	x	x
SD	CONGRESS 49	x	x	x			
SD	CONGRESS 50				x	x	
SD	CONGRESS 51						x
SD	CONGRESS 52						
SD	CONGRESS 53						
SD	STATE SENATE 36	x	x				
SD	STATE SENATE 37				x		x
SD	STATE SENATE 38			x		x	
SD	STATE SENATE 39						
SD	STATE SENATE 40						
SD	ASSEMBLY 66	x					
SD	ASSEMBLY 74				x		
SD	ASSEMBLY 75		x	x			
SD	ASSEMBLY 76						x
SD	ASSEMBLY 77					x	
U	COUNTY, Unincorporated		x				
C	CHULA VISTA			x			
C	LEMON GROVE	x					
R	PORTER VISTA					x	
S	Measure	x	x	x	x	x	x

in a county.

The test election was modified from the San Diego by combining various districts and races into a selection of ten precincts which concisely included samples of state, statewide district (State Senate and Assembly Districts), judicial, (See Test Design Matrix above)

Testing was completed using a hand marked deck. The test deck was used to verify the ability to handle basic election definition and verify the rotation was set up correctly.

Additional ballots were marked to test response to common voter errors and some ballot tampering changes.

A total of 485 primary ballots were cast, exercising the following ballot logic and conditions:
Primary party ballots with DTS voting and reporting
Non-Partisan races
Split precinct

Vote for 2 of 5,
Write-in votes (including potential over-vote conditions)
Blank ballots
Rotation based on assembly district at state, state districts, and local levels
Multiple languages. Printed ballots or samples of ballot fields were provided in English, Spanish, and Chinese
Long names in candidate fields.
Turn-out statistics on final summary reports
Measures
Polls open, close, and report printing. (deficiencies noted)
Review of audit logs.
Only central count absentee voting was tested

Observations:

1. During the portion of the testing where section 2.4 of the California procedures were being tried, we were told by Avante technicians that several of the items listed did not apply to the Avante system. Testing using this part of the procedures was halted until Avante could complete a trial of that section and correct the procedures.
2. The automatic *Intentional Undervote "Skip Contest*" choice Avante provides is not permitted on a California ballot.
3. Assembly Bill 190 permits a voter to submit a provisional ballot in a different precinct than the one where they are eligible to vote. Only the contests for which the voter is eligible to vote shall be counted [CA Election Code 14310(c)(3)(B)]
4. The Zero Totals report is limited to only showing zero values in the race and candidate summary totals. No report is available that shows precinct level counts are cleared. There is some question if precinct level counts are even maintained (see items 5, 7, and 8).
5. The Test Voting form of Logic and Accuracy (L&A) test is inadequate to meet the full requirement for a public L&A. The generated test deck is limited to ballots In each unique style but does not test that the correct offices are assigned within each precinct.
6. The tally report produced as part of the final reporting lists all races by alphabetical party (non-Partisan races were reported before Republican party) and were inconsistent in order within the party order. When asked, the Avante representatives could not identify a method of ordering the election results without deleting and reentering the races in the desired order.
7. There is no supporting report or screen display that shows the election official which race is assigned to which precinct. The only proofing report is a copy of each ballot style.
8. Could not produce a report for the semi-official or official canvass that showed the counts for each race and candidate by precinct as required by California Election Code. [10264(e).& 10550 (c) are two references]. Based on ITA reports, a method exists to get precinct results but the Avante representatives were unable to provide a procedure in the scope of the test.
9. The final tally report for the Primary test set does not show a report for total vote counts from declared partisan voters, "decline to state" voters, and the aggregate of the total for all ballots in a Primary Party permitting "decline to state" voters to participate.