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VIA FAX: (512) 475-2761

September 22, 2004

Secretary of State
Texas Department of State
FOIA Officer, Press Office
P.O. Box 12887
Austin, Texas 78711-2887

PUBLIC RECORDS REQUEST

Dear Records Custodian:

Pursuant to the Texas public Information Act, Tex. Government Code Ann. 552.001 to 552.353, on behalf of Electronic Privacy Information Center, I request access to and copies of the following records:

1. All records relating to recommendations of voting systems examiners, and decisions by the Secretary of State, as to the certification of Voting Technologies International, Inc., DRE systems examined in May 2002.

2. All records relating to recommendations of voting systems examiners, and decisions by the Secretary of State, as to the certification of Sequoia, Inc., DRE systems examined on January 8, 2003.

3. All records relating to recommendations of voting systems examiners, and decisions by the Secretary of State, as to the certification of Election Systems & Software, Inc., DRE systems examined on January 9, 2003.

4. All records relating to recommendations of voting systems examiners, and decisions by the Secretary of State, as to the certification of Election Systems & Software, Inc., DRE systems examined on May 28, 2003.

5. All records relating to recommendations of voting systems examiners, and decisions by the Secretary of State, as to the certification of DRE systems examined in August 2003.

6. All records relating to recommendations of voting systems examiners, and decisions by the Secretary of State, as to the certification of Election Systems & Software, Inc., DRE systems examined on January 7, 2004.

7. All records relating to recommendations of voting systems examiners, and decisions by the Secretary of State, as to the certification of Diebold, Inc., DRE systems examined on January 9, 2004.

8. All records showing the Secretary's independent inquiry into and consideration of the certifiability of specific voting systems independent of the recommendations of the voting systems examiners.

Please redact any personal information incidentally submitted in conjunction with any complaint. In addition, please redact any confidential information pursuant to Tex. Gov't Code Ann. § 552.110, or as otherwise required under applicable state law. EPIC reserves the right to challenge any unnecessary redactions.

For purposes of fee assessments, we request that EPIC be placed in the category of "news media" requester. EPIC publishes a biweekly electronic newsletter, issues regular public reports and analyses, and maintains a free online electronic library. EPIC staff members are also regular contributors to numerous newspapers, newsletters, magazines, and law reviews. Any information that is obtained as a result of this request will be disseminated through these publications and others. We note that the FTC, the National Security Agency, and other agencies have previously recognized that EPIC qualifies for "news media" status. We also request a waiver of all applicable duplication fees, as release of this information will contribute significantly to the public's understanding of the activities and operations of government. This information is being sought on behalf of EPIC for dissemination to the general public.

If my request is denied in whole or part, I ask that you justify all deletions by reference to specific exemptions of the act. I will also expect you to release all segregable portions of otherwise exempt material. I, of course, reserve the right to appeal your decision to withhold any information or to deny a waiver of fees.

As I am making this request as a member of a news media organization and this information is of timely value, I would appreciate your communicating with me by telephone, rather than by mail, if you have questions regarding this request.

I look forward to your timely reply within 20 business days. Thank you for your assistance.

Sincerely,

Lillie Coney

Lillie Coney
EPIC, Senior Policy Analyst

Phone: 202-483-1140 x 111
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The State of Texas

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Geoffrey S. Connor
Secretary of State

October 5, 2004

Ms. Lillie Coney
Electronic Privacy Information Center
Suite 200
1718 Connecticut Ave NW
Washington, DC 20009

RE: Your Request for Information Pursuant to the Public Information Act, Chapter 552, Government Code ("PIA")

Dear Ms. Coney:

We received on September 22, 2004 your request for information related to the certification of direct record electronic voting devices in Texas.

Please find enclosed a set of responsive materials that you requested. Because there is less than 100 pages of responsive material, there is no charge associated with producing the enclosed materials.

Finally, in accordance with Section 552.267(a) of the Texas Government Code, this office has concluded that it shall waive all charges for copying and compiling the documents enclosed herewith because such information primarily benefits the general public.

If you have any questions or need additional information, you may contact me at the address above or at (512) 475-2813.

Sincerely,

Benjamin M. Hanson
General Counsel

Enclosures

cc: Ann McGeehan (*w/ enclosures*)
Director, Elections Division
Office of the Secretary of State

PIR Correspondence File

EPIC REQUEST / 92 PAGES

1. VOTING TECHNOLOGIES INTERNATIONS MAY 2002 REPORT (14 pages)
2. SEQUOIA, INC. LETTER OF WITHDRAWAL (1 page)
3. ES&S HAD NO SYSTEMS EXAMINED FOR JANUARY 2003
4. ES&S MAY 2003 REPORT (29 pages)
5. NO EXAMINATIONS FOR THE MONTH OF AUGUST 2003
6. ES&S JANUARY 2004 REPORT (32 pages)
7. EXAMINERS REPORTS /SOS REPORT UNDER REVIEW (16 pages)
8. N/A

The State of Texas

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Gwyn Shea
Secretary of State

REPORT OF EXAMINATION OF VOTING TECHNOLOGIES INTERNATIONAL'S VŌTWARE VOTING SYSTEM v.3.3.4

PRELIMINARY STATEMENT

On May 22, 2002, Voting Technologies International, Inc. (the "Vendor") presented its VŌTWARE voting system (the "VTI system") for initial certification. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Barney Knight, an expert in election law and procedure; and
4. Mr. Glenn Glover, an expert in electronic data communication systems.

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneeringer, an expert in electronic data communication systems.

The Vendor first demonstrated the system; the examiners thoroughly examined the system. Examiner reports on the system are attached hereto and incorporated herein by this reference.

BRIEF DESCRIPTION OF THE VTI SYSTEM

The VTI system consists of touch screen computers connected through an ethernet network to a server. Votes are recorded on the server's hard drive and written to CD. After the polls close, the CD is transported to a central counting station and the results uploaded and tallied. The election definition is created via the internet on a website of the Vendor's design; the jurisdiction creates its election on the site and the Vendor mails them the CDs to be loaded onto the server. The election setup is then recorded directly onto PCs to be used by the voters for casting votes at the polling location. The PCs require the use of a HASP® (Hardware Against Software Piracy) Key, sometimes called a dongle, to be attached to the USB port in order to verify the election setup and open the polls. The version presented for examination was 3.3.4

FINDINGS

The following are my independent findings, based on oral evidence presented at the examination, written evidence submitted by the Vendor in support of its application for certification, and the findings of our voting system examiners as set out in their written reports.

The VTI system v. 3.3.4 does not meet the standards for certification as prescribed by Section 122.001 of the Texas Election Code. Specifically, the system:

1. does not preserve the secrecy of the ballot;

Certified under my hand and seal of office, this 1st day of August, 2002.

Gwyn Shea

Gwyn Shea
Secretary of State

Voting Technologies International

The VTI system was examined in Austin on May 22, 2002. This was the first time the system was examined. This is a DRE system; the current release is version 3.3.4.

This system is unique in that the ballot preparation is done via a web interface. The vendor will setup a jurisdiction's election or the county must do it online through the Internet. Once the setup has been approved a cdrom is burnt with the complete election setup. The cdrom is sent to the county to be loaded into a Linux based PC server which has multiple touch-screens. A PC is needed for each polling location since the votes are recorded directly onto the PC.

The PC's require a proprietary dongle to be attached to the USB port in order to verify the election setup and open the polls. At the close of the election, the precinct results are burnt onto the same Cdrom and sent to the central-counting center where they are uploaded into the tally system running on a PC.

The system also has a unique audit capability. The actual graphic image that the voter saw when casting his votes is recorded and can be used later to do an audit or re-count.

The system performed well and accurately tallied the test election.

The system as demonstrated requires the following corrections in order to satisfy the requirements of the Texas Election Code:

- A strategy for a backup dongle is needed since a voting location will not operate without it.

- The voter is given a paper ticket with a random voter number and ballot style number that they use to type into the terminal in order to activate the correct ballot. The voter number should not be displayed. This number should be displayed only for a challenged ballot so that it can be recorded by the election official. It should be unnecessary for a voter to type in two numbers.

- The number(s) used by a voter to activate the voting machine should time-out so that the voter can not walk out without voting and sell the numbers.

- The Texas sample ballot was not programmed so all tests could not be performed.

- If a voter changes his straight-party selection the system will reset crossover votes. A warning message is needed.

- The display did not show all the races (until the summary screen) when a straight-party was selected.

- The system needs a automated L&A test or force a manual test before opening the polls.

- The precinct report did not indicate the undervotes.

- The data should be encrypted in the database so it is not easily modified by another program.

- The precinct results should be retained on the PC for a period of at least 22 months. Currently, the previous election results are written over when the current election is backed-up.

- The demonstration consisted of tallying only one precinct. At lease two precinct must be tallied.

•The central-count PC did not have a real-time audit printer.

Conclusion

The system does not meet the standards outlined in the Texas Election Code. I do not recommend certification of the system.

Tom Watson
Examiner

Barney Knight & Associates

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Sheila I. Jalufka
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May 22, 2002

Ann McGeehan
Deputy Assistant
Secretary of State
P.O. Box 12060
Austin, Texas 78711-2060

Re: Voting Technologies International, Touch-Screen Voting System Version 3.3.4

Dear Ms. McGeehan:

Pursuant to my appointment as an examiner under §122.035 of the Texas Election Code, I examined the Touch-Screen Voting System, Version 3.3.4, (the "System") submitted for examination by Voting Technologies International (the "Vendor").

I examined the System with respect to Texas Election Law and procedure on Wednesday, May 22, 2002. In that examination, I observed a demonstration and the operation and use of the System and relied on representations of the Vendor concerning its use and operation. Those representations were made during an extended examination and were considered together with those contained in the material distributed by the Vendor. In this respect, a full and complete examination of the System was made problematic by the Vendor's failure to present an election in the required format necessary to exhibit all functions necessary to show compliance.

The System was presented as one unit, and not as individual segments. Although the System as presented appears to offer possible benefits and potential, it should not be certified by the Secretary at the present time. This report is concerned solely with the ability of the System to operate and comply with Texas Election Law and procedure. No opinion is expressed regarding the suitability of the system for the purposes of or use by any jurisdiction.

The System In General. The System includes a personal computer and the software, including that required for ballot set-up and design *via internet*, a personal computer and up to twelve (12) voting stations at each polling place, and a computer for the compilation and tabulation of votes at election central using CD ROMS transported from the polling places. At the voter level the System includes operating systems for poll opening, voter check-in, ballot activation, recording

of votes cast, poll closing, compiling a precinct total votes report, and the transfer of results to a CD ROM for transport to election central. A random voter number and a random voter pin number are assigned to each voter for use in activating the voting station for voting. The random voter number determines the ballot to be received by the voter on the electronic screen. The voting station is a "dumb" terminal and when the vote is cast the vote is automatically forwarded to a computer that serves as an electronic voting machine. The electronic voting machine (computer) prepares a zero totals tape when the election is opened and, as configured, on the close of the election it presents a tape that is both the voting machine tape and the precinct report. The ballot images are stored on dual hard drives and are transferred to a CD ROM for transport to election central.

Software. The System is not safe from fraudulent or unauthorized manipulation and does not at present satisfy the requirements for audit as required by § 122.001(a)(11), Tex. Elec. Code. The security for the software appears limited as to encryption. It is possible to enter into the election operating system and change vote totals during the operation of the election. There is no audit log provided or required by the System for the tabulation of results at election central.

The System is unable to provide for absentee voting or challenge voters. When voting, if straight party is selected, the voter is automatically taken to the referendum issues and all intervening ballot pages are skipped. If this is not caught by the voter at the ballot summary page, the voter casts a ballot with a great number of under votes. The software should be modified to step from the straight party selection through each office and issue in order on the ballot, to assure opportunity that cross over votes may be considered and the voter will be presented with a ballot issue on each office that does not have a candidate from the straight party selected. In an apparent abnormality that arises in part from the straight party vote, if a vote for two of three is attempted an undervote warning appears, but if the voter has backed up from the summary page and delists one of the three no undervote warning appears. It is also recommended that an undervote warning appear as appropriate prior to the voter casting a vote.

The software permits an election judge to skip L&A and test mode, and proceed directly to open the polls for voting. It is recommended that skipping start-up testing not be an option.

Election Creation and Ballot Set-Up. Uniquely, creation of the election and ballot must be accomplished on-line via the internet at the Vendor's site. When the customer completes the ballot set-up and election, the Vendor burns a CD ROM and forwards it to the customer. If the customer discovers an error, or is required to make any change, the customer must repeat the process on-line at the Vendor's site. The CD ROM is then rewritten in JSP, sent to the customer and loaded by the customer on a personal computer to create the election. The security is limited to checksum and the password given the election administrator. The System is currently not capable of providing for absentee voting, or for challenge voters.

Voting Stations. The voting stations are electronic apparatus on which voters select their candidate of choice, etc. by "touch screen" and utilizes an electronic ballot system. The voting stations have no hard drive, and are dumb terminals. Upon a voter completing the ballot, the ballot is transferred electronically to the precinct controller (a computer), and stored in the computer on dual hard disk drives. The voter number and voter pin numbers are used to reactivate a voting station after one voter has completed voting and another voter is prepared to vote (the voting station is deactivated on use and may not be used again except upon again being activated by the required voter and pin numbers). The voter pin number does not expire, and the program should be changed to make the number expire after a reasonable period of time (20 minutes). When a voter casts the vote, the voter's selections are transferred directly to the precinct controller database (the hard disks of the personal computer) for the polling place. The computer runs Lennox with JAVA. Neither summary results nor ballot images can be observed prior to the closing of the polls.

Precinct Controller. An electronic key ("dongle") is required for the computer that serves as the voting machine at the polling place. The protective counter is on the small, easily portable dongle and is not on the hard drive of the computer, i.e. the voting machine. The public and protective counter numbers appear on the screen of the voting station when they are activated. Dual hard disks are provided to record votes and provide security in case one hard disk fails. The ballot images are randomly stored, i.e. there is no association between the order the ballots are stored and the order in which voters cast ballots. The precinct controller is also used to count and tabulate ballots for the precinct. The count and tabulation process is accomplished by directly counting from the ballot images. The voting machine/precinct report tape does not list undervotes, etc. An electronic audit log is provided.

The precinct controller/electronic voting machine does not have the protective counter and the public counter permanently on the computer/hard drive. This does not comply with the Texas Election Code. In addition, as currently configured, the ballot images are erased from the computer when the next election is loaded. In order to provide for the retention of election results as required by law, the election and ballot images should be maintained on the computer or other secure media when additional elections are loaded.

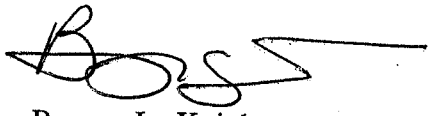
Election Central. It was not reasonably possible to confirm the accuracy of the central tabulation because only the results from one precinct was reported to election central. In addition, questions concerning security control and access were not answered satisfactorily or resolved regarding the System. The System does not at present satisfy the requirements of § 122.001(a)(11), Tex. Elec. Code.

Conclusion. The Vendor failed to demonstrate that the System meets the requirements of Chapt. 122, Tex. Elec. Code and re-examination should be required. The re-examination should include a complete election ballot as required by the Secretary, in order that all items required by the Texas Election Code may be examined, including challenge voters. The re-examination

should also be a complete demonstration from the opening of the polls, to voting, to the final tabulation and reporting of election results. The issue of the protective and public counters must be addressed. And it will be beneficial for the Vendor to: (a) give additional attention to the security/encryption of the election and ballot as loaded onto the CD ROMs; (b) the content of the voting machine/precinct report at the polling place; (c) the real time log printer logging every function, event and intervention at election central; (d) the requirement that the System not be able to continue tabulating and compiling votes if the real time log printer is disabled; (e) that the operating system for the election may not be entered while the election program is running; and (f) that security is in place that prevents any manual change or corruption of election data.

Recommendation I recommend the System not be certified by the Secretary at this time.

Sincerely,



Barney L. Knight

The State of Texas

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Gwyn Shea
Secretary of State

TO: Ann McGeehan
Elections Division Director

FROM: Glenn Glover
Voting System Examiner

DATE: June 17, 2002

A voting systems certification examination was held at the Office of the Secretary of State Elections Division on Wednesday morning, May 22, 2002.

Voting Technologies International presented their Touch-Screen Voting System (VŌTWARE) version 3.3.4 for examination and certification. The VŌTWARE voting system consists of multiple components including a direct recording electronic (DRE) that uses a touch screen to collect votes. For each race in the election, the touch screen displays a list of the available candidates to the voter. The voter then chooses a candidate by touching the area of the screen next to the candidate's name. The voter can also use VŌTWARE to review and make changes to his ballot before casting his final vote. After the polls have been closed, VŌTWARE's Tally Tools component imports votes from the DRE devices, then tallies all votes, and then is able to prepare an election report.

The VŌTWARE system uses an interesting approach to meet election security requirements on its DRE device. The DRE uses a HASP® key (Hardware Against Software Piracy) that is a hardware-based software protection system that prevents unauthorized use of the election software. The HASP key is a small hardware device (sometimes called a dongle) that connects to a computer and protects the VŌTWARE software applications against tampering. The DRE software seemed to handle all tasks efficiently and reliably. However, one problem noted was that the DRE was not programmed to deal with challenged ballots.

The demonstration of Voting Technologies International's VŌTWARE system revealed that the Tally Tool component of the VŌTWARE system can not meet the tabulation requirements for large Texas jurisdictions that have multiple ballot types. Many Texas jurisdictions require tabulation of results from different ballot styles, i.e. a single jurisdiction may have one precinct ballot with races and candidates which are different than the races and candidates found on another precinct ballot, with both precincts found within the same jurisdiction. VŌTWARE's Tally Tool is designed to import and tabulate only identical ballot styles from one or more precincts.

The Tally Tools software is installed on a PC at the central count location running Windows 95 or a later Microsoft operating system version. The Tally Tools software has no built in security feature and relies solely on the security of the underlying operating system. Texas voting system standards require that the operating system be not accessible to the system users so as to prevent access and tampering with the election results data. It was demonstrated that a knowledgeable user could access the election results data stored in an XML or other file format and potentially alter the data within it. The Tally Tools software also fails to meet the requirement for real-time audit printing to a continuous feed printer which is required of all vote tabulation devices used in Texas elections.

Based on the observations documented above, I recommend that VŌTWARE Touch-Screen Voting System version 3.3.4 be not certified in Texas elections. My finding of VŌTWARE's non-compliance of Texas Voting Systems requirements are made after review of the submitted VŌTWARE system documentation and Voting Technologies International's presentation of their VŌTWARE system to the examination board.

Voting System Examination for Voting Technologies International

Prepared for the
Secretary of State of Texas

James Sneeringer, Ph.D.
Designee of the Attorney General

This report comprises the findings of the Attorney General's designee from an examination of the equipment listed above, pursuant to Title 9, Chapter 122 of the Texas Election Code, section 122.036(b).

Examination Date	May 22, 2002
Report Date	May 25, 2002

Purpose	**Component**	**Version**
Voting	VOTWARE VOT CENTER (including VOT STATIONS)	3.3.4
Scanning	None.	
Election Setup	VOTWARE Ballot Builder	3.3.4
Tabulation	VOTWARE Tally Tool / Election Reporter	3.3.4

Summary

This is a new system, and although it shows great promise, it fails to meet several Texas requirements, as detailed below, and should not be certified at this time.

All Components: Questions, Risks and Problems

1. No ITA report was presented, although we do have a letter saying that one is coming. *The system should not be certified until this is provided.*

Voting

Election Setup	Use VOTWARE Ballot Builder, and send information to VIT, which will create the ballots. Ballots are taken to the precinct on CD and loaded into the VOT CENTER. All CDs contain the ballots for all precincts, and a dongle or key is used in the precinct to determine what ballots are available in that precinct.
Zero-total report	Yes, on the PIN printer in the precinct.

Authorization to vote / Ballot selection	Voter Number and PIN are printed on a Voter Security Card that is given to the voter.
View / Vote	Monitor (LCD or CRT) with touch screen. Up to 12 touch screens can be attached to a single computer.
Vote Storage	There are two hard drives. The data is written to both. The data is stored unencrypted in a standard database (MySQL).
Precinct Consolidation	Unnecessary, since all the touch screens in a precinct are run by the same computer, so all the ballot images and results are on the same computer. If a precinct had more than 12 voting stations (touch screens), precinct consolidation would have to be done manually.
Transfer Results	Write a CD in the polling location and carry it to the Tally Tool at a central location. The data is protected with and MD-5 checksum.
Challenge Ballot	No support.
Print precinct results	Yes, on the PIN printer in the precinct.
Straight party / crossover	Yes. A straight-party vote can cancel previous crossover votes without warning.
Protective Counter	On the dongle, not in the voting computer itself.
ADA	No support yet.
Absentee	No direct support for paper ballots. They recommend manually tallying them separately, and using a spreadsheet to combine absentee totals with DRE totals. This is satisfactory. (Note that the system is intended for smaller jurisdictions, where this is very reasonable.)

Voting: Questions, Risks and Problems

2. No support for challenged ballots. *The system should not be certified until this is fixed.*
3. No ADA support. *The system should not be certified until this is fixed.*
4. The protective counter is on the dongle, not on the voting computer itself. I do not see any great risk in this, but I will leave it to the lawyers to determine if it is legal.
5. The votes are redundantly stored on two hard drives in two MySQL databases. The data is not encrypted or protected in any way during voting. However, the machine is sealed and no account or password is available to access the operating system and tamper with the data. *The votes appear to be vulnerable to tampering by a skilled person, and I would have to be convinced of its security before I could recommend certification.*
6. The system assigns a random voter ID to each voter, plus a PIN. (Together, these identify the voter at the voting station to the computer, and allow the correct ballot to be presented.) This voter ID is stored with the ballot, and the audit program can retrieve the ballot images by voter ID. If a voting clerk writes down a voter ID and later has access to the audit program, he can find out how the person voted. For example, during early voting, the administrator may be the voting clerk and have access to the voter IDs; later that administrator could see how people voted. They make this works by recommending that the poll workers recover from the voter the paper with the voter ID and password,

which makes it easier for poll owrkers to determine voter's IDs.. *The system should not be certified until the voter ID's are eliminated or hidden from poll workers, except in the case of challenged ballots.*

7. There is no time limit on the use of the voter ID / PIN. Someone could obtain a voter ID / PIN at 7 a.m. and use it to vote at 7 p.m. After a certain amount of time has elapsed from when a voter ID / PIN is issued, the voting station should no longer accept it, to prevent someone other than the registered voter from slipping in and casting the voter's ballot. *The system should not be certified until this is fixed.*
8. The precinct report does not report undervotes. *The system should not be certified until this is fixed.*
9. If you vote straight-party, then when you step through the races, the system does not show races that you have already voted through your straight-party vote. (They do show up on the summary, however.) *The system should not be certified until it always shows every race.*
10. If you vote straight-party, then make some crossover votes, and then change your straight-party vote, all crossover votes are changed without warning. *The system should warn you that your crossovers are about to be lost.*
11. I am concerned about using CD-R disks for transporting ballot data and election results. CD-R is probably the least reliable medium in common use today. CD-R's are frequently unreadable, especially on other systems. (For example, one of the CD-R's that I received from a vendor for this series of exams could not be read on my computer. I had to take it to another computer, an option not normally available to an election judge.) This effect will probably be mitigated by using the same brand of CD-R drive in all systems, but it is still a concern. *If Voting Technologies International wants to use CD-R disks to transport ballots and election results, they should present acceptable evidence of reliability. I would suggest choosing another medium, such as flash memory, possibly in a USB drive. CD-R drives are not worth the risk of problems.*

Tabulation

Results Storage	Hard drive.
Tamper Resistance	No real barriers to tampering.
OS access	Yes. The operating system can be accessed freely during tally.
Real-Time Audit Log	None.
Data Integrity	Probably OK, since the data is stored in XML and the entire file must be re-written.
Absentee Votes	Handle manually.

Tabulation: Questions, Risks and Problems

12. There is no real-time audit log printer. *The system should not be certified until this is fixed.*

13. There is access to the operating system during tabulation. Furthermore, the results are stored in easily accessible XML format, and could easily be modified during tabulation. The skill required to do this is much lower than usual. *The system should not be certified until this is fixed.*
14. If something should go wrong during tabulation (such as a power failure), it is important that the data remain consistent. For example, if power fails while precinct data is being loaded, either all the totals should be updated and the precinct marked "tallied," or none of the totals should be updated and the precinct not marked "tallied." From the description given, this is probably OK, *but Voting Technologies International needs to provide complete information about how this works before the system is certified.*

Election Setup

Election setup service is provided using an Internet site. When the jurisdiction has completed election setup at the site, CD-R disks are mailed to them along with the dongles necessary to use them.

Tabulation: Questions, Risks and Problems

15. The Internet connection used is not secure (SSL). The election information is public, so it would not cause a problem if it were intercepted. However, if the password were intercepted, someone could log on and corrupt the election data. This would probably be discovered and fixed, but why take the risk. It is easy to fix. *The system should not be certified until this is fixed.*

SEQUOIA
voting systems

January 3, 2003

Ann McGeehan, Director of Elections
State of Texas, Secretary of State Election Division
P. O. Box 12060
Austin, Texas 78711-2060

Dear Ann:

I am writing to notify you of Sequoia Voting Systems' intention to withdraw our voting system certification examination scheduled for January 8, 2003. It is our understanding that the $3,000 application fee will be carried over to the May Certification. We will contact you at a later date to schedule May Certification.

If you have any questions concerning this matter, please contact David Reeves or me.

Sincerely,

Phil Foster

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Geoffrey S. Connor
Secretary of State

REPORT OF EXAMINATION OF MODIFICATIONS TO ELECTION SYSTEMS AND SOFTWARE, INC.'S iVOTRONIC VOTING SYSTEM v. 8.0.0.0

PRELIMINARY STATEMENT

On May 28, 2003, Election Systems and Software, Inc. (the "Vendor") presented modifications to its iVotronic voting system for examination and certification. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Glenn Glover, an expert in electronic data communication systems; and
4. Mr. Barney Knight, an expert in election law and procedure

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneeringer, an expert in electronic data communication systems.

The Vendor first demonstrated the system; the examiners then examined its accuracy and security features. Examiner reports on the system are attached hereto and incorporated herein by this reference.

In addition to the May 28, 2003 examination, on January 8, 2004, the Secretary of State reviewed iVotronic v. 8.0.0.0 to determine its compliance with provisional voting requirements that were not in effect at the time of the May 2003 examination. As a result, an additional condition has been added.

BRIEF DESCRIPTION OF MODIFICATIONS TO iVOTRONIC

The iVotronic is a direct recording electronic system ("DRE") used for precinct voting and accumulation. The system consists of one or more voting terminals and a supervisor Personalized Electronic Ballot ("PEB"), which election officials use to activate and load the appropriate ballot into the terminal. The examined version of iVotronic was v. 8.0.0.0.

NATIONAL ASSOCIATION OF STATE ELECTION DIRECTORS (NASED) QUALIFICATION NUMBER

Elections Systems and Software, Inc. iVotronic v. 8.0.0.0. is qualified by NASED under the designation N-1-02-12-11-001 (1990 Voting System Standards). The final report date is February 19, 2004.

FINDINGS

The following are the findings, based on oral evidence presented at the examination to our

7. Prevent counting votes by the same voter for more than one candidate for the same office or, in elections in which a voter is entitled to vote for more than one candidate for the same office, prevent counting votes for more than the number of candidates for whom the voter is entitled to vote;
8. Prevent counting a vote on the same office or measure more than once;
9. Permit write-in voting;
10. Are capable of permitting straight-party voting; and
11. Are capable of providing records from which the operation of the system may be audited.

CONDITIONS

The flash card contained in each iVotronic shall be retained by the custodian of election records for the appropriate retention period following the election.

Provisional voting must be conducted by paper ballot or optical scan ballot. The system's method of recording provisional ballots does not comply with current state procedure.

CONCLUSION

Accordingly, based upon the foregoing, I hereby certify the iVotronic, v. 8.0.0.0. for use in elections in Texas, subject to the above conditions.

Certified under my hand and seal of office, this 27th day of July, 2004.

Luis Saenz
Assistant Secretary of State

DEPARTMENT OF INFORMATION RESOURCES

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July 11, 2003

Ms. Ann McGeehan
Deputy Assistant
Office of the Secretary of State
1019 Brazos Street
Austin, TX 78701

RE: Re-examination of the Unity Election System Version Release 2.4 and Firmware for vote tabulation devices from Election Systems and Software (ES&S)

Dear Ms. McGeehan:

I attended a scheduled examination May 28, 2003, at 9:30 am, for the purpose of examining the voting systems from Election Systems and Software (ES&S). The report below summarizes my findings.

Voting Systems Versions

Hardware/Software Version

Unity Election System v2.4
Audit Manager v7.0.2
EDM – Election Data Manager v7.2.0.0
Ballot Image Manager v7.2.0.0
HPM – Hardware Program Manager v5.0.0.0
DAM – Data Acquisition Manager (Host) v5.0.0.0
ERM – Election Reporting Manager v 6.4.0.0

Tabulation Systems (all currently certified)
Model 100 Precinct Count System Firmware v5.0.0.0
Model 650 Central Count v1.2.0.0

DRE voting systems

IVotronic DRE Voting System Firmware v8.0.0.0

System description

Unity is an umbrella marketing designation that includes all of the software modules noted above. The modules are upgraded as a single package; none of them can be upgraded individually.

The core functionality demonstrated in prior versions has not been changed. Changes to be certified at this examination addressed issues that reviewers brought up at the September 11, 2002 review. In addition, ES&S made changes to the way votes were tabulated for large jurisdictions to eliminate most

unnecessary entries printed to the log printer.

Issues addressed

Issues addressed by this examination and their resolution are as follows:

- *The ES&S Model 550 Central Tabulator audit log option was not initially enabled, and therefore did not print until it was reconfigured.* Resolution: the default setting was changed in the software as shipped from ES&S.

- *The Unity Real Time Audit Log was confusing, must have accurate time stamps, needs to be clearer and must be more usable.* The audit log messages were considerably improved. It might be advisable to develop an online viewer for the log that would include even more detailed information for each entry. This would help auditors decipher the audit trail more easily. The time stamp problem was just an artifact of the way the prior examination was set up, not one of system malfunction.

- *The ES&S Model 100 Precinct Tabulator does not have a real time audit log printer.* This issue was addressed by change to 1TAC 81.62 that removed some requirements for precinct-level tabulation device audit logs.

- *The slow initialization of the ES&S iVotronic Precinct Tabulator was noted.* The vendor demonstrated an elegant, low-cost solution to this problem. In addition, the system now provides better boot-up and administration messages, eliminating some areas of potential errors.

- *An iVotronic supervisor PEB used to open the polls already contained previous vote counts.* This issue surfaced just because of the way the prior examination was set up. The vendor addressed this by providing additional warning messages and including the warnings and responses in the audit log for the device.

- *A printer is not always attached to the iVotronic for the purpose of real time log functions, forced printing of zero tapes from each terminal, and real time printing of events such as the transfer of vote totals from an iVotronic terminal to the PEB.* This issue was addressed by 1TAC 81.62 that removed some requirements for precinct-level tabulation device audit logs.

The vendor illustrated the problems Bexar County was having with the real time log printer. The proposed solution was to not transfer any vote totals that were zero. This reduced the number of log entries by more than an order of magnitude. In addition, this made the log much easier to read since all the entries contained useful data rather than zeros.

The vendor demonstrated changes to the model 650 Central Tabulator audit log. The audit messages have been expanded and the usability of the log has been improved.

The Model 100 scanner was demonstrated with the new firmware that improves scanning accuracy.

The software is now supported on Windows 2000 and Windows XP, and the HPM and DAM modules have been ported to Windows.

Recommendations

The vendor continues to make significant strides in integrating its diverse product line and improving its auditability and security. This exam also set new standards for documentation and delivery.

The Department of Information Resources (DIR) finds no technical objection to certifying the Unity Election System and firmware demonstrated at this examination.

Respectfully,

Nick Osborn
Systems Analyst

CP:MM:NO:sk

The State of Texas

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Gwyn Shea
Secretary of State

TO: Ann McGeehan
Elections Division Director

FROM: Glenn Glover
Voting System Examiner

DATE: June 11, 2003

A voting systems certification examination was held at the Radisson Hotel at Town Lake in Austin, Texas on Wednesday, May 28, 2003. Election Systems & Software, Inc. (ESS) presented for State of Texas recertification the following voting systems and versions:

iVotronic DRE Voting System	8.0.0.0
Model 100 OMR Precinct Counter	5.0.0.0
Model 650	1.2.0.0
Unity Election System Software consisting of	2.4
Ballot Image Manager	7.2.0.0
EDM – Election Data Manager	7.2.0.0
HPM – Hardware Program Manager –	5.0.0.0
DAM – Data Acquisition Manager	5.0.0.0
ERM – Election Reporting Manager	6.4.4.0
Audit Manager	7.0.2

ESS began the certification presentation with a discussion of issues regarding their voting systems including the audit log problems with their iVotronic and Unity system in the recent Bexar County elections. As a result, ESS revised the audit log functionality of the systems by removing unnecessary lines of output, consolidating data output, and by providing more readable and descriptive events. Also, changes to the Voting Systems Certification chapter in the Texas Administrative Code (TAC), now permits the real-time printed audit log to be waived if an alternative method of logging significant events can be accomplished. The iVotronics provides a detailed internal logging alternative, eliminating the need for the real-time audit log print out. The iVotronic revisions also include the addition of a status bar display providing users a visual queue of the machine's status when it is powered up on election day. This corrected a problem with election workers not knowing the operational status of a machine after it was powered on. The iVotronics zero totals printout is now enforced whereas before it was an option. To expedite iVotronic bootup for elections with a large amount of ballot information, a flash media card is used to hold information. This is to prevent problems that occurred in recent Dade County elections with voting delays when powering up the iVotronic systems.

The examiners spent the day voting and reviewing all ESS's voting system component changes to ensure compliance with the TAC and Texas Election Voting System standards and found no apparent problems. I find the ESS systems itemized above to be in compliance and recommend their certification for use in Texas pending NASED certification.

ES&S

The ES&S systems were re-examined in Austin on May 28, 2003. The names and releases of the hardware and software are as follows:

Unity - version 2.4 - an election setup, and central accumulator and reporting system
- Unity subsystems:
  - Audit Manager v- 7.0.2
  - Election Data Manager – v- 7.2.0.0
  - Ballot Image Manager – v- 7.2.0.0
  - Hardware Programming Manager – v – 5.0.0.0
  - Data Acquistion Manager – v – 5.0.0.0
  - Election Reporting Manager – v – 6.4.0.0

Model 650 – firmware v. 1.2.0.0 - optical central-counting scanner
Model 100 – firmware v. 5.0.0.0 - optical precinct-counting scanner
iVotronic - version 8.0.0.0 - DRE voting machine

The examination revealed no problems with the overall system. The system has been improved and operated very smoothly. The Unity and Model 650 audit logs have been improved. Unity now records the significant events in a concise and timely manner. It can handle the logging for large early-voting accumulations. The iVotronic boot-up time has been shortened.

The Ivotronic voting machines are accumulated at the precinct onto 1 PEB. The accumulation process is recorded on an electronic log, not a real-time log, as allowed by the recent ammendment to the Texas Election Code. The log from each Ivotronic can be printed from the electronic log saved on the flash card. Flash memory cards are inexpensive today. The cards should be kept as part of the election record for the required retension period before being reused.

The Data Acquistion Manager should be changed so that **only** precinct files for the current election appear in the list of results to be uploaded. During the examination, results from a previous election, appeared on the list. If the wrong file was chosen by the operator on election night, Unity would reject it. However, it would be less confusing if previous election files were not displayed.

Ballots cast by the examiners were recorded correctly by each of the voting systems and accumulated accurately by Unity.

Conclusion

The Unity, Model 650, Model 100 and iVotronic systems meet the standards outlined in the Texas Election Code. I recommend certification for each system.

Tom Watson
Examiner

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May 31, 2003

Ann McGeehan
Deputy Assistant
Secretary of State
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Re: Election System & Software ("ES&S")-iVotronic DRE Voting System, Version 8.0.0; Model 650 Central Count System, Version 1.2.0.0; Model 100 Precinct Count System, Version 5.0.0.0; and the Unity Election System, Version 2.4, composed of the following modules: Audit Manager, Version 7.0.2; Election Data Manager, Version 7.2.0.0; Ballot Image Manager, Version 7.2.0.0; Data Acquisition Manager, Version 5.0.0.0; Hardware Program Manager, Version 5.0.0.0; and the Election Reporting Manager, Version 6.4.0.0.

Dear Ms. McGeehan:

Pursuant to my appointment as an examiner under §122.035 of the Texas Election Code, I examined the above referenced software and hardware (collectively the "Election Systems") as presented by ES&S for examination. I examined the Election Systems with respect to Texas Election Law and procedure on May 28, 2003.

This report is concerned solely with the ability of the Election Systems, and each individual module thereof, to function in compliance with Texas Election Law. Further, this report is based on the presentation of ES&S and the testing completed by the examiners on May 28, 2003. ES&S gave a particularly well organized presentation, and the casting, tabulation and reporting of votes, together with the reminder of the examination, did not evidence any function that was not in compliance with the Code. However, no opinion is expressed regarding the suitability of the Election System for the purposes of or use by any jurisdiction.

The Election Data Manager, V. 7.2.0.0, is used to set-up the election and jurisdiction area covered by the election. The Ballot Image Manager, V. 7.2.0.0 is used to construct the ballot for each election. The Data Acquisition Manager, V. 5.0.0.0, is used as an integral part of and with each of the alternative election systems. The Election Reporting Manager, V. 6.4.0.0, functions at election central for the tabulating and reporting of results. And the Audit Manager,

Version 7.0.2, supports an improved audit function, including a functional real-time audit log. The Hardware Program Manager, V. 5.0.0.0, is part of the operating systems. The Model 650, V. 1.2.0.0, is used as a central tabulation device at election central for jurisdictions that use paper ballots. The Model 100 Precinct Count System, V. 5.0.0.0, is used to scan and tabulate paper ballots at the precinct. The iVotronic DRE, V. 8.0.0.0, consists of voting stations and a precinct controller, using PEBs for the casting, recording and tabulation of votes at the precinct level.

The Unity Election System, Version 2.4, and each of the constituent modules, to-wit: the Audit Manager, Version 7.0.2; the Election Data Manager, Version 7.2.0.0; the Ballot Image Manager, Version 7.2.0.0; the Data Acquisition Manager, Version 5.0.0.0; the Election Reporting Manager, Version 6.4.0.0; and the Hardware Programming Manager, Version 5.0.0.0, appeared to function accurately and efficiently, and in a manner to meet the requirements of *Chapt. 122, Subchapt. A, Texas Election Code* for use in an election. These functions included the real-time audit log for both the Model 650 and the electronic central tabulation functions. I recommend these versions, programs and segments of the ES&S Election Systems be certified by the Secretary as meeting the requirements of the Texas Election Code.

The iVotronic DRE and the Model 100, as demonstrated, also functioned accurately and appropriately at the precinct level. Further, the improvements in the audit log program, function and operation resulted in the audit log meeting the revised requirements set forth in Sec. 81.62. In my opinion, the Model 650 was also demonstrated to function accurately and appropriately, including the audit log. I recommend the iVotronic, V. 8.0.0.0, the Model 100, V. 5.0.0.0, and the Model 650, V. 1.2.0.0, be certified as in compliance with the requirements of *Chapt. 122, Subchapt. A, Texas Election Code*.

Sincerely,

Barney L. Knight

Voting System Examination
Election Systems & Software (ES&S)

Prepared for the
Secretary of State of Texas

James Sneeringer, Ph.D.
Designee of the Attorney General

This report comprises the findings of the Attorney General's designee from an examination of the equipment listed, pursuant to Title 9, Chapter 122 of the Texas Election Code, section 122.036(b).

Examination Date	May 28, 2003
Report Date	May 28, 2003

ES&S offers a complete line of products for every aspect of conducting an election, including election setup, DRE, optical scanning, punch-card reading, tallying and reporting.

Components Examined	Type	Version	Suf*	NASED
iVotronic DRE Voting System	Voting	8.0.0.0	ZS	Submitted
Model 100 OMR Precinct Counter	Scanner	5.0.0.0		Submitted
Model 650	Scanner	1.2.0.0	Q	Submitted
Unity Election System Software	Setup & Tabulation	2.4		Submitted
Audit Manager	Part of Unity	7.0.2		Submitted
Ballot Image Manager	Part of Unity	7.2.0.0		Submitted
EDM – Election Data Manager – Election Setup	Part of Unity	7.2.0.0		Submitted
HPM – Hardware Program Manager – Programs PEBS, EPROMS, etc from election definition	Part of Unity	5.0.0.0		Submitted
DAM – Data Acquisition Manager (Client)	Part of Unity	5.0.0.0	M	Submitted
DAM – Data Acquisition Manager (Host)	Part of Unity	5.0.0.0	O	Submitted
ERM – Election Reporting Manager	Part of Unity	6.4.0.0	ZE	Submitted

* The "Suf" column is the suffix (if known) that is added to make the internal or development version number. See concern 1 below.

Note: The following were not submitted for re-certification because they are unchanged:

- Votronic DRE Voting System
- Model 150/550 OMR Scanner

Notes	• The Data Acquisition Manager is used in regional centers to collect precinct data for forwarding to central counting by modem or by carrying a PEB. • The Data Acquisition Manager does not need to know election-specific data or understand the results. It does not tabulate.

Improvements

ES&S reports the following improvements to their products since the last examination:

Election Reporting Manager

- A reduction in the number of audit-log entries (for Bexar County). In my opinion, the reduced log is acceptable because the lines removed were not significant. The volume of printing in the old log could be unreasonable. There is still an entry in the log for each terminal, which is the critical information. The difference is that the precinct results are consolidated rather than being shown for each terminal.
- Printer pause and spool control (for Bexar County)
- Group name included in audit report record
- Update mode (replace or add) noted on each line
- Eliminated confusing page headings on real-time log
- Short (three row) heading printed upon each restart of the real-time log
- Greater detail on selection / parameter active during update process

Model 650 Central Tabulator

- Audit log notes number of ballots added and cumulative number, by precinct
- Audit log notes total ballots scanned, saved, and sorted
- Displays number of ballots cast, updated with each ballot processed

iVotronic DRE

- Able to print event log and candidate total (summarized from ballot images) directly from each terminal's audit data, with write-ins optional
- Poll-opening speed and usability improved (precinct, ballot style and spacing)
- Expanded election size, eliminating early-voting limitations
- Improved early-cast message
- Opening of polls with a PEB that has votes (purpose, warnings, audit)

Model 100 Scanner

- Improved scanning capabilities (skew and lateral ballot shift compensation)

Operating System Upgrades

- Supported on Windows 2000 and Windows XP
- Hardware Programming Manager now runs on Windows
- Data Acquisition Manager now runs on Windows

Notes

- I recommend that the Secretary of State approve the ES&S audit log of precinct consolidation activities. Although the log is not sent to the printer in real time, it is adequate in my opinion, given the difficulty of real-time printing..
- ES&S should be commended for improving their products and for addressing issues raised in past examinations. Overall, this was an excellent exam, and ES&S is making a lot of progress.

Concerns

All Components	1.	ES&S uses a very unusual version-numbering scheme that can be misleading if not completely understood. The best way to understand it is to consider an example. The documentation provided by ES&S for this examination says that we will be examining version 8.0.0.0 of the iVotronic DRE. The version they actually ship will also be version number 8.0.0.0, *even though it will probably be different from what was examined.* This is because the version examined was not actually 8.0.0.0, but 8.0.0.0zs. The "zs" suffix will be dropped when the product ships. **Recommendation**: I believe it is critical to know exactly what version is being examined, and that no equipment should be certified without an exact, unique version number. Therefore ES&S should be required to provide the complete version number, including the development suffix, of each product examined. Certification should be withheld until this information is provided. I have indicated the complete version numbers that I was able to glean during the examination. **Justification**: If ES&S does not know the exact versions they brought for certification, how can they tell us in the future what the changes have been made since that version? If they do know, why do they not disclose the information to us?
iVotronic	2.	The messages provided for the "Early Cast" feature are confusing, and should be revised. The "Early Cast" feature allows the voter who selects a straight party to choose whether to review the individual partisan races, in case he wants to cross over. The current messages read as follows: Press here to review or change partisan selections or Press here to bypass partisan contests **Recommendation**: I suggest something like this: "You have voted for all the REPUBLICAN candidates. Would you like to see the individual races, in case you want to change some of your REPUBLICAN votes? Yes No" **Question**: What happens if the voter selects a straight Republican ticket and there are races with no Republicans? I suggest that those races should be shown even when the voter selects the "Early Cast" option.

Voting: Characteristics of the Votronic and iVotronic DRE

Election Setup	Personalized Electronic Ballots (PEB) and separate flash memory cards are created with Unity software. Nothing is pre-programmed in the terminals; all the election information is in the PEB and flash memory. Anything that is precinct specific goes in the PEB. The flash memory is only required if the election is large or there are image or audio files.
Zero-total report	On the thermal printer in the communication pack.
Authorization to vote / Ballot selection	There are two modes: • Voter inserts a PEB, which is created at a Supervisor station using a supervisor PEB, both of which are red to distinguish them from voting stations. The voter's PEB cannot be reused without re-activation. • Poll worker inserts a PEB, immediately removes it, and selects the appropriate ballot. The PEB is retained by the poll worker and is reusable without re-activation.
View / Vote	LCD display / touch screen
Vote Storage	Three redundant flash memories
Precinct Consolidation	Allowed using PEB's. An audit log of this is kept in memory and can be printed at the precinct.
Transfer Results	PEB transported or data transmitted by modem to Unity software (or a regional site from which data is sent to the Unity software at central counting). The data is protected by a Cyclical Redundancy Check (CRC).
Print precinct results	On the thermal printer in the communication pack.
Straight party / crossover	Yes. A straight-party vote cannot cancel crossover votes that have already been selected, which protects the voter against mistakenly canceling a crossover vote.
ADA	Yes. Because it is battery-powered, the iVotronic can be taken to the curbside for voting. However, this was not demonstrated, because the Secretary of State verifies ADA compliance.

Setup & Tabulation: Characteristics of the Unity System

Tamper Resistance	Cyclical Redundancy Check (CRC) on each record in the election files.
OS access	Not permitted during tabulation.
Real-Time Audit Log	Yes.
Data Integrity	There are no special transaction-processing features. However, according to ES&S, there is no need, because all the data is written in a single write statement, making it impossible for partial results to be entered into the database. Also, it is easy to recalculate everything if a problem is suspected, and everything is automatically re-calculated when you request a canvass report. Since a canvass report would always be requested, this is satisfactory. In short, it is nearly impossible to get an incorrect result and not know it.

April 8, 2004

To: The State Election Director

Re: ES&S NASED Qualification Number

ES&S is pleased to announce that an official NASED number has been issued for the corporation's current election system release. The number will be posted on the NASED web site within one week.

Number issued: **NASED # = N-1-02-12-11-001 (1990)**

Software Systems included:
Unity Election Management Software v2.4.2

Hardware Systems included:
- iVotronic DRE voting system v8.0.0.0
- Model 100 Document Based OMR precinct count system v5.0.0.0

The software and hardware have been tested by an accredited ITA, both at the component level and as an integrated system as required by the FVSS 2002. In addition, the hardware components were tested successfully to all new environmental tests required under the FVSS 2002. The Model 650 Document Based OMR central count system v1.2.0.0 will be forthcoming and will be included under this NASED number.

Respectfully:

Sue L McKay
Certification Director

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January 19, 2004

Ann McGeehan
Deputy Assistant
Secretary of State
P.O. Box 12060
Austin, Texas 78711-2060

Re: Election System & Software ("ES&S")-Unity Election System V. 2.4.2; iVotronic DRE, V. 8.0.0.0; Votronic DRE, V. 5.19; Model 100 Precinct Count System, V. 5.0.0.0; Model 150/550 Central Count, V. 2.1.0.0Q; Model 650 Central Count, V. 1.2.0.0; the Optech Eagle Precinct Count, V. HPS 1.28, APS 1.50, CPS 1.02a, and the Optech IV-C Central Count, V. 1.06a.

Dear Ms. McGeehan:

Pursuant to my appointment as an examiner under Chapt. 122, Texas Election Code, I examined the above referenced software and hardware (collectively the "Election Systems") as presented by ES&S for examination. I examined the Election Systems with respect to Texas Election Law and procedure on January 8, 2004.

This report is concerned solely with the ability of the Election Systems, and each individual module thereof, to function in compliance with Texas Election Law, and is based on the presentation by ES&S and the testing completed by the examiners on January 8th. ES&S gave a well organized presentation, and the casting, tabulation and reporting of votes, together with the remainder of the examination, did not evidence any function that was not in compliance with *Chapt. 122, Subchapt. A, Texas Election Code*, for use in an election, except as specifically noted below. However, no opinion is expressed regarding the suitability of the Election System for the purposes of or use by any jurisdiction.

The Unity Election System v. 2.4.2 functions with all of the ES&S product line referenced above. And, in that respect, the testing and examination of the Election Systems was divided roughly into three parts. One grouping consisted of the Votronic voting station, the Optech Eagle and the Optech IV-C. A second group consisted of the Model 100, the Model 650 and the Model 150/550. The iVotronic was also voted and included in the tabulation. The

third grouping was election central and the tabulation and reporting of the election results from each of the above groups.

The earlier versions of the above referenced machines, devices and increments of the Election System have been previously certified.

Group One. A test deck of ballots was provided and the examiners added a material number of additional ballots, all to be read and processed separately through the Optech Eagle and the Optech IV-C. The Votronic was included in this group and additional votes were cast on the Votronic. Other than inclusion of the Votronic for convenience, this group was configured because it uses "arrow" ballots. The results from the Optech Eagle, the Optech IV-C and the Votronic were each separately verified, and then all were transported to election central for a central count combined tabulation and election report. Due to an issue, discussed below, additional ballots were cast and this process from the precinct level through election central was repeated. Except as noted specifically below, the examination and testing evidenced that the machines and devices included in Group One, and Unity Election System v. 2.4.2 functioning with the group as election central, operated in compliance with Chapt. 122, Texas Election Code.

Group Two. Except for the retesting and re-voting, the above process was also completed on the iVotronic, the Model 100, the Model 650 and the Model 150/550. Again, except as noted specifically below, the examination and testing evidenced that the machines and devices included in Group Two, and Unity Election System v. 2.4.2 functioning with the group as election central, operated in compliance with Chapt. 122, Texas Election Code.

Exceptions and recommendations.

Exception No. 1. Tabulation of Paper Ballots. (1) Felt tip pens were provided and used in the marking of the paper ballots. This resulted in the Optech IV-C and the other tabulation models reading and recording as a vote a bleed through mark from the opposite side of the ballot. *Recommendation.* (a) I recommend the Secretary prohibit the use of felt tip markers with this Election System, and specify the pens or markers that may be used with this Election System. (b) I also recommend a procedure be adopted that requires double-sided paper ballots to have one side be "off-set" in a manner that will prevent a ballot mark in a race on one side of the ballot from lining up with a ballot mark for a race on the opposite side. The "bleed through" issue is potentially material. And, there is a real potential for such an event to affect a race and not be discovered unless a recount is requested.

Exception No. 2. Tabulation of Paper Ballots. The Optech IV-C read one very lightly marked vote approximately 50% of the time as a vote and 50% of the time as blank. This may be unavoidable, but the preference is that it read the ballot the same way each time. *Recommendation.* I recommend the Secretary give this matter some consideration in conjunction with Exception No. 1 above. It appears whether or not the tabulation device records the vote, or does not, may depend in part on the way the ballot is positioned when it runs through the tabulation device. However, this may be an issue that can only be effectively addressed in a hand recount.

Exception No. 3. Ballot Set-Up. At least in part due to all standard procedures not being followed in setting-up the test ballot, the candidate names were switched on one race. Except for a careful audit, the resulting error would not have been found and the votes for the candidates would have been reversed. ES&S states that adequate procedures are in place, between their proofing ballots and the election program and requiring the election jurisdiction to also proof the ballots. *Recommendation.* I recommend the staff review this issue to determine if any additional procedure or requirement will prevent this potentially serious possibility. One possibility would appear to require specific pre-testing by race prior to final election set-up.

Exception No. 4. Audit Log Printer. The Unity Election System at election central has a functioning audit log printer. However, at least some functions on the audit log printer are still not recorded on a real-time basis. For example, one observed failure to record real-time was that if the election system is exited or closed the audit log does not record that action until the next time when the election program is started up or accessed. *Recommendation.* I recommend the Secretary require the real-time audit log printer to record on a real-time basis each event, function or interface with the election system.

Summary.

Properly used with the appropriate procedures and avoidance of human error that can be present in any election, the Election System appears generally to function in compliance with the Texas Election Code, and to accurately tabulate and report results. However, there are several recommendations for improvements that should be required pursuant to Chapt. 122, Texas Election Code.

I recommend the iVotronic and Votronic be certified as meeting the requirements of Chapt. 122, Subchapt. A, Texas Election Code.

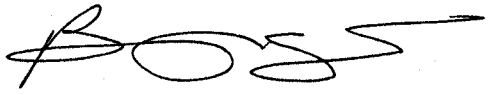
I recommend the Unity Election System V. 2.4.2 central election reporting programs be certified as meeting the requirements of

Chapt. 122, Subchapt. A, Texas Election Code, subject to the following: (1) the real-time audit log printer being modified to require every event be printed and logged real time; (2) procedures being adopted to require specific race by race testing of the tabulation software and the paper ballots prior to the certification of the ballot -- to make certain the names and places in the electronic election set-up and tabulation program are in the same order as the names printed on the ballot; and (3) the staff examine and confirm the sufficiency of these actions.

I recommend the Secretary determine an appropriate pen or marker that must be used by ES&S and voting jurisdictions, in order that a mark on one side of a ballot will not bleed through the ballot when read with the following equipment: Model 100 Precinct Count System, V. 5.0.0.0; Model 150/550 Central Count, V. 2.1.0.0Q; Model 650 Central Count, V. 1.2.0.0; the Optech Eagle Precinct Count, V. HPS 1.28, APS 1.50, CPS 1.02a, and the Optech IV-C Central Count, V. 1.06a (collectively the "Tabulation Equipment"). I also recommend the following with respect to the Tabulation Equipment: (1) the Secretary specify that the front side and the reverse of ballots to be used with the Tabulation Equipment be off-set in a manner to prevent a voter selection mark on one side of the ballot from lining up with a voter selection mark on the opposite side; and (2) the Secretary's staff examine use of the Tabulation Equipment with the approved pen or marker and off-set ballot to assure that a vote on one side of a ballot will not affect the voter's choice in a race on the other side of the ballot.

If the Secretary's staff takes these steps and determines the above listed Tabulation Equipment functions properly with the specified pens/markers and off-set ballots, I recommend the above listed Tabulation Equipment be certified by the Secretary as meeting the requirements of Chapt. 122, Subchapt. A, Texas Election Code.

Sincerely,



Barney L. Knight

ES&S

The ES&S systems were re-examined in Austin on January 8, 2004. The names and releases of the hardware and software are as follows:

Unity - version 2.4.2 - an election setup, and central accumulator and reporting system.

Unity subsystems:
- Audit Manager v- 7.0.2.0
- Election Data Manager – v- 7.2.1.0
- Optech Image Manager – v- 3.2.0.0
- ES&S Image Manager – v – 7.2.0.0
- Hardware Programming Manager – v – 5.0.2.0
- Data Acquistion Manager – v – 5.0.3.0
- Election Reporting Manager – v – 6.4.2.0

Model 650 – firmware v. 1.2.0.0 - optical central-counting scanner
Model 100 – firmware v. 5.0.0.0 - optical precinct-counting scanner
Model 150/550 – firmware v. 5.0.0.0 - optical central counting scanners
Model IV-C – firmware v. 1.06a - optical central counting scanner
Eagle - firmware v. 1.50APS,1.28 HPS, 1.02 CPS - optical precinct-counting scanner
iVotronic - version 8.0.0.0 - DRE voting machine
Votronic - version 5.19 - DRE voting machine

The examination revealed two serious problems and a few minor problems with the systems:

- An op-scan ballot marked with the pens handed out by the vendor caused a "bleed-through" mark to be counted incorrectly. This reveals a potentially serious problem. The "bleed-through" can cause a candidate on the opposite side of the ballot to lose a vote because the errant mark triggers an overvote.

  If the ballot layout is done correctly, the marking positions will be offset so that a "bleed-through" will not be read. However, a ballot may intentionally be designed to cause this problem.

  This can be prevented by poll workers issuing voters the correct marking pen. An explicit warning about using pens that can bleed through (e.g. Sharpies) should be part of the documentation. There is no way to guarantee that the wrong pen will not be used (perhaps intentionally) in a precinct. It was the vendor who issued the examiners the wrong pens.

- When the Model IV-C and Eagle ballots were accumulated in Unity, the results were incorrect. It was explained that the ballots were coded for a previous test election. There was no indication of a problem by Unity. The fact the examiners were checking for specific counts revealed the error.

  Unity should have detected an election setup mismatch. To prevent this a checksum, CRC or some other code should be coded in the setup. Additionally, an L&A test which has various counts for the candidates would reveal a mismatch.

  When Unity was re-programmed to match the Eagle/IV-C ballots, it tallied correctly.

- The Report Manager audit log did not indicate the program was exited, in real-time. Only after the program was restarted did the message print.

- The message on the Unity audit log was inconsistent regarding "replacemode" when loading the results from Model 100 versus the iVotronic.

Conclusion

The "bleed-through" problem is not easy to correct. Explicit warnings about using the correct pens should be communicated to the precinct workers.

The election setup mismatch problem (between Unity and the Model IV-C) could have been prevented procedurally (i.e. a good L&A test with different expected results for each candidate). However, since it occurred at the examination, it indicates the possibililty that a good L&A test may not happen . Therefore, the vendor should find a way to prevent an election mismatch programmically.

The second two problems mentioned can easily be corrected.

The systems worked well overall and do meet the standards outlined in the Texas Election Code. I recommend certification for systems but the problems indicated should be addressed before the next examination.

Tom Watson
Examiner

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Geoffrey S. Connor
Secretary of State

MEMORDUM

TO: Ann McGeehan
Elections Division Director

FROM: Glenn Glover
Voting System Examiner

DATE: January 15, 2004

A voting systems certification examination was held at the Radisson Town Lake Hotel on Thursday, Jan. 8, 2004, administered by the Office of the Secretary of State Elections Division.

ES&S submitted their Voting System Product Suite for examination and certification by the State of Texas examination board. The ESS Voting System Product Suite consists of the following components:

iVotronic DRE Voting System 8.0.0.0
Model 100 OMR Precinct Counter 5.0.0.0
Model 650 1.2.0.0
Model 150/550 Central Count 2.1.0.0Q
Optech Eagle Precinct Count HPS 1.28, APS 1.50, CPS 1.02a
Optech IV-C Central Count 1.06a
Votronic DRE Voting System 5.19
Unity Election System Software 2.4.2
Election Data Manager (EDM) 7.2.1.0
iVotronic Image Manager 1.2.3.0
ES&S Image Manager 7.2.0.0
Optech Image Manager 3.2.0.0
Hardware Program Manager (HPM) 5.0.2.0
Data Acquisition Manager (DAM) 5.0.3.0
Election Reporting Manager (ERM) 6.4.2.0
Audit Manager 7.0.2.0
Figure 1

ESS began the certification presentation with a discussion of issues regarding their voting systems. ES&S discussed their versioning conventions, the Independent Testing Authority review process and in general terms security for their product suite. After the discussion, the examiners evaluated the Optech Eagle Precinct Count & Optech IV-C Central Count Scanner. Both devices are tabulation products which an operator feeds marked/voted ballots into. The Optech IV-C can handle a stack of ballots whereas the Eagle is fed one ballot at a time. The

examiners began a test election on the Optech IV-C and Optech Eagle Scanners. The test identified an irregularity with the Optech IV-C scanning function. The ink of a "sharpie" pen had soaked through one test ballot and had appeared as a mark on the other side of the ballot. The Optech IV-C erroneously counted a vote in a contest on the reverse side of the ballot because the ink had soaked through to the exact position where a candidate selection would have been marked/voted.

The examination team wanted to replicate the Optech IV-C scanner's miscounts of the bleed-through ink ballot. They fed the same ink spotted ballot multiple times into the Optech IV-C with inconsistent results – sometimes the contest was counted and other times the contest was not counted. ES&S explained that they recommend that the alignment of races on a printed ballot be offset as not to have a contest selection position directly behind another contest selection position on the reverse side of the ballot page, that pencils be used to mark the ballot so as to prevent ink soaking through the ballot, and that customers use their Ballot Image Manager product to create ballot layouts that automatically provide position offsets on the ballot so as to prevent this anomaly from happening. ES&S was unable to produce upon request their Optech IV-C documentation concerning pencil and alignment recommendations.

The examination continued with testing of the other voting components presented to the panel. The Model 150/550 and iVotronic DRE accurately tallied and uploaded to the Unity system with no problems revealed. The panel also examined the Election Reporting Manager's new capability of manually loading scanner totals from Optech IV-C's 3.5 inch diskettes and from the Optech Eagle memory packs; no problems were observed.

The Unity ERM Reporting/Display computer was evaluated and proved to be accurate in reporting election results. It was noted that the attached audit log printer did not report an "exit or close election" event from the software until the next election had begun. An "exit or close election" event should be printed immediately to the continuous-feed printer because of its' significance as an election event.

After review of the documentation and ES&S's presentation of their voting equipment, I recommend the following:

1) Optech IV-C Central Scanner only be certified for use under the following conditions
   a) the Optech IV-C Central Scanner has a sign, easily readable by the operator, "pencil marked ballots only".
   b) the Optech IV-C Central Scanner documentation / manual reflect the pencil and ballot alignment guidelines recommended by ES&S.
   also ballots scanned into the Optech IV-C meet the following criteria
   c) ballots can only be voted with pencils
   d) ballot image layouts have contests aligned so as not to have a contest selection area directly behind a contest selection area on the reverse side of the ballot
2) Full certification of all other ES&S voting system components identified in Figure 1. I find that these components are in compliance with Voting System Certification requirements of the Texas Administrative Code and should be approved for use in Texas elections.

DEPARTMENT OF INFORMATION RESOURCES

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February 2, 2004

Ms. Ann McGeehan
Deputy Assistant
Office of the Secretary of State
1019 Brazos Street
Austin, TX 78701

RE: Examination of the Unity Election System Version Release 2.4.2 and vote tabulation devices from Election Systems and Software (ES&S)

Dear Ms. McGeehan:

I attended a scheduled examination January 8, 2004, at 9:30 am, for the purpose of examining the voting systems from Election Systems and Software (ES&S). The report below summarizes my findings.

Voting Systems Versions

Hardware/Software Version

Unity Election System v2.4.2, last certified May 2003
Unity Election System is comprised of the following subsystem modules:
Election Data Manager v7.2.1.0
IVotronic Image Manager v1.2.3.0
ES&S Image Manager v7.2.0.0
Optech Image Manager v3.2.0.0
Hardware Programming Manager v5.0.2.0
Data Acquisition Manager v5.0.3.0
Election Reporting Manager v6.4.2.0
Audit Manager v7.0.2.0

Hardware
Model 100 Precinct Count System v5.0.0.0
Model 650 Central Count System v1.2.0.0
Model 150/550 Central Countv2.1.0.0Q
Optech Eagle Precinct Count v HPS 1.28, APS 1.50, CPS 1.02a

DRE voting systems
Ivotronic DRE audio balloting system v8.0.0.0
Votronic DRE Voting System v5.19

System description

Unity is an umbrella marketing designation that includes all of the software modules noted above. The modules are upgraded as a single package; none of

them can be upgraded individually.

ES&S provided a list of functional changes from the prior version of Unity. Most of the changes were to peripheral functions, usually for minor bug fixes. The core functionality demonstrated in prior versions has not been changed. The new version just allows tabulated totals from "arrow" systems to be brought over to Unity. ["Arrow" systems are those in which a voter casts a vote by connecting arrows beside a candidate's name (e.g. "candidate name" => <=) with a solid line. This is in contrast to "oval" systems in which a voter casts a vote by filling in an oval on the ballot.]

ES&S explained the versioning conventions that identify all their software and firmware releases. For purposes of voting systems examinations, the relevant conventions are as follows:

- First number is reserved for a new release or a major functional revision
- Second number is reserved for minor functional revisions
- Third number is reserved for bug fixes
- Fourth number is reserved for one-off functionality, usually state specific

In addition to the new revisions of software and firmware, ES&S personnel explained the Provisional Ballot functionality in response to a query from the Texas Secretary of State.

System performance

The arrow system had an interesting problem due to the way the test ballots were printed. The examiners used a "Sharpie" pen that bled through the ballots. The test election ballots were not properly designed, and the pen bled through to an arrow on the reverse side of the ballot and made it appear as though the voter had overvoted a contest on the reverse side.

The ballot was red in all four orientations and the overvote was counted on two of the orientations, indicating that the scanner was sensitive to the bleed-through only in one set of sensors.

ES&S personnel indicated that their ballot preparation software prevents such alignment, but were not used to prepare these ballots. In addition, they advise election officials to use high-solid markers rather than Sharpie-type markers to avoid this kind of problem.

Other than this self-inflicted problem, the arrow systems appeared to count votes correctly. The votes appear to import into Unity correctly, along with votes from other equipment.

The audit log functionality was not tested, however, and should be reviewed during the next examination for this vendor.

The oval systems also appeared to count votes correctly and import them into Unity correctly. It was noted that the log printer for Unity does not print the system shutdown message until the next time the system is brought up. This may lead an auditor to believe that a user's session was not terminated correctly or that the log might be missing some key data. Therefore it is recommended that the system shutdown be recorded on the real-time log before the system exits.

Recommendations

The Department of Information Resources (DIR) finds no technical objection to certifying the Unity Election System and firmware demonstrated at this examination.

Respectfully,

Nick Osborn
Systems Analyst

MM:NO:sk

Voting System Examination
Election Systems & Software (ES&S)

Prepared for the
Secretary of State of Texas

James Sneeringer, Ph.D.
Designee of the Attorney General

This report is the findings of the Attorney General's designee from an examination of the equipment listed, pursuant to Title 9, Chapter 122 of the Texas Election Code, section 122.036(b).

Examination Date	January 8, 2004
Report Date	January 19, 2004

ES&S offers a complete line of products for every aspect of conducting an election, including election setup, DRE, optical scanning, punch-card reading, tallying and reporting.

Components Examined	**Type**	**Version**	
EDM- Election Data Manager – Election Setup	Part of Unity	7.2.1.0	
iVotronic Image Manager	Part of Unity	1.2.3.0	
ES&S Image Manager		7.2.0.0	
Optech Image Manager	Part of Unity	3.2.0.0	
HPM – Hardware Program Manager – Programs PEBS, EPROMS, etc from election definition	Part of Unity	5.0.2.0	
DAM – Data Acquisition Manager (Client)	Part of Unity	5.0.3.0	
DAM – Data Acquisition Manager (Host)	Part of Unity	5.0.3.0	
ERM – Election Reporting Manager	Part of Unity	6.4.2.0	
Audit Manager	Part of Unity	7.0.2.0	
iVotronic DRE Voting System	Voting	8.0.0.0	*
Model 650	Scanner	1.2.0.0	*
Model 100 OMR Precinct Counter	Scanner	5.0.0.0	*
Model 150/550	Scanner	2.1.0.0Q	
Eagle	Scanner	1.50 APS 1.28 HPS 1.02a CPS	*
IV-C	Scanner	1.06a	
Votronic	DRE	5.19	

* Unchanged from the last time it was examined

Voting: Characteristics of the Votronic and iVotronic DRE

Election Setup	Personalized Electronic Ballots (PEB) and separate flash memory cards are created with Unity software. Nothing is pre-programmed in the terminals; all the election information is in the PEB and flash memory. Anything that is precinct specific goes in the PEB. The flash memory is only required if the election is large or there are image or audio files.
Zero-total report	On the thermal printer in the communication pack.
Authorization to vote / Ballot selection	There are two modes: • Voter inserts a PEB, which is created at a Supervisor station using a supervisor PEB, both of which are red to distinguish them from voting stations and PEB's. The voter's PEB cannot be reused without re-activation. • Poll worker inserts a PEB, immediately removes it, and selects the appropriate ballot. The PEB is retained by the poll worker and is reusable without re-activation.
View / Vote	LCD display / touch screen
Vote Storage	Three redundant flash memories
Precinct Consolidation	Allowed using PEB's. An audit log of this is kept in memory and can be printed at the precinct.
Transfer Results	PEB transported or data transmitted by modem to Unity software (or a regional site from which data is sent to the Unity software at central counting). The data is protected by a Cyclical Redundancy Check (CRC).
Print precinct results	On the thermal printer in the communication pack.
Straight party / crossover	Yes. A straight-party vote cannot cancel crossover votes that have already been selected, which protects the voter against mistakenly canceling a crossover vote.
ADA	Yes. Because it is battery-powered, the iVotronic can be taken to the curbside for voting. However, this was not demonstrated, because the Secretary of State verifies ADA compliance.

Setup & Tabulation: Characteristics of the Unity System

Tamper Resistance	Cyclical Redundancy Check (CRC) on each record in the election files.
OS access	Not permitted during tabulation.
Real-Time Audit Log	Yes.
Data Integrity	There are no special transaction-processing features. However, according to ES&S, there is no need, because all the data is written in a single write statement, making it impossible for partial results to be entered into the database. Also, it is easy to recalculate everything if a problem is suspected, and everything is automatically re-calculated when you request a canvass report. Since a canvass report would always be requested, this is satisfactory. In short, it is nearly impossible to get an incorrect result and not know it.

Notes	• The Data Acquisition Manager is used in regional centers to collect precinct data for forwarding to central counting by modem or by carrying a PEB. • The Data Acquisition Manager does not need to know election-specific data or understand the results. It does not tabulate.

Concerns

1.	During testing, the optical scanners were found to sometimes read marks that bleed through from the other side of the ballot. **Recommendation**: The Secretary of State should consider regulations requiring that the areas that a voter marks on the two side of the ballot never align, so that any marks that bleed through will not be read on the other side. It might also be useful (but less important) to have regulations about the types of writing instruments to be used for marking optical ballots. Improving the scanners themselves is probably very difficult and not cost effective.
2.	During the exam, an election was incorrectly tabulated because the ballot layout did not correspond to the programming of the scanner. ES&S says that (a) this would not occur if the ballot were laid out using their software and (b) it would normally be caught by their procedures, such as logic and accuracy testing and proofing the ballots for candidate order. **Recommendation**: When preparing for an exam, ES&S should follow their own standard procedures. I do not see how this problem can be solved by changes in their system. Note that L&A test decks should not have the same number of votes for multiple candidates, since you then cannot detect errors in candidate ordering.
3.	It is my understanding that multiple provisional ballots can be assigned the same ID. If this were to happen, all ballots with the same ID would have to be counted or none would be counted. **Recommendation**: The ES&S system should reject a second provisional ballot with the same ID, and force the election workers to assign another, unique ID. Until this change is made, certification should carry the following conditions: a) The follow procedure should be required: Labels should be preprinted with unique provisional ballot IDs. When such an ID is used, its label should be removed and placed on the documentation in the provisional envelope, thus preventing its accidental re-use. b) Certification should expire on January 1, 2005, unless the system is changed to reject duplicate use of the same provisional ballot ID.

ES&S has an excellent product line and it was a very successful exam.

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Geoffrey S. Connor
Secretary of State

REPORT OF EXAMINATION OF ELECTION SYSTEMS AND SOFTWARE, INC.'S UNITY ELECTION SYSTEM v. 2.4.2

PRELIMINARY STATEMENT

On January 8, 2004, Election Systems and Software, Inc. (the "Vendor") presented modifications to its Unity Election System v. 2.4.2 for examination. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Barney Knight, an expert in election law and procedure; and
4. Mr. Glenn Glover, an expert in electronic data communication systems.

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneeringer, an expert in electronic data communication systems.

The Vendor first demonstrated Unity and the examiners then examined the system. Examiner reports on the system is attached hereto and incorporated herein by this reference.

BRIEF DESCRIPTION OF UNITY

Unity is an integrated suite of modular software programs that enable an election official to enter and maintain a database of jurisdiction and election information, format ballot layouts, and program election equipment. The system also collects, accumulates, and reports the voting results from the vendor's various voting systems. The overall version presented for re-examination was version 2.4.2, which consists of minor changes from previously-certified versions, and consisted of the following components:

Election Data Manager	version 7.2.1.0
Ballot Image Manager	version 7.2.0.0
Optech Image Manager	version 3.2.0.0
iVotronic Image Manager	version 1.2.3.0
Hardware Program Manager	version 5.0.2.0
Data Acquisition Manager	version 5.0.3.0
Election Reporting Manager	version 6.4.2.0
Audit Manager	version 7.0.2.0

FINDINGS

The following are the findings, based on oral evidence presented at the examination to our examiners, written evidence submitted by the Vendor in support of its application for certification, and the findings of our voting system examiners as set out in their written reports.

7. Prevents counting votes by the same voter for more than one candidate for the same office or, in elections in which a voter is entitled to vote for more than one candidate for the same office, prevents counting votes for more than the number of candidates for whom the voter is entitled to vote;
8. Prevents counting a vote on the same office or measure more than once;
9. Permits write-in voting;
10. Is capable of permitting straight-party voting; and
11. Is capable of providing records from which the operation of the system may be audited.

CONDITION

As noted by one of the examiners, Unity audit log does not record the system shutdown message until the next time the system is brought up; therefore, the audit log must include a record of the system shutdown in real time before this version of the system may be used in Texas.

CONCLUSION

Accordingly, based solely upon the findings of the independent examiners, I hereby certify the Unity Election System v. 2.4.2 for use in elections in Texas, subject to the above condition.

Signed under my hand and seal of office, this 27TH day of April 2004.

LUIS SAENZ
ASSISTANT SECRETARY OF STATE

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January 19, 2004

Ann McGeehan
Deputy Assistant
Secretary of State
P.O. Box 12060
Austin, Texas 78711-2060

Re: Election System & Software ("ES&S")-Unity Election System V. 2.4.2; iVotronic DRE, V. 8.0.0.0; Votronic DRE, V. 5.19; Model 100 Precinct Count System, V. 5.0.0.0; Model 150/550 Central Count, V. 2.1.0.0Q; Model 650 Central Count, V. 1.2.0.0; the Optech Eagle Precinct Count, V. HPS 1.28, APS 1.50, CPS 1.02a, and the Optech IV-C Central Count, V. 1.06a.

Dear Ms. McGeehan:

Pursuant to my appointment as an examiner under Chapt. 122, Texas Election Code, I examined the above referenced software and hardware (collectively the "Election Systems") as presented by ES&S for examination. I examined the Election Systems with respect to Texas Election Law and procedure on January 8, 2004.

This report is concerned solely with the ability of the Election Systems, and each individual module thereof, to function in compliance with Texas Election Law, and is based on the presentation by ES&S and the testing completed by the examiners on January 8th. ES&S gave a well organized presentation, and the casting, tabulation and reporting of votes, together with the remainder of the examination, did not evidence any function that was not in compliance with *Chapt. 122, Subchapt. A, Texas Election Code*, for use in an election, except as specifically noted below. However, no opinion is expressed regarding the suitability of the Election System for the purposes of or use by any jurisdiction.

The Unity Election System v. 2.4.2 functions with all of the ES&S product line referenced above. And, in that respect, the testing and examination of the Election Systems was divided roughly into three parts. One grouping consisted of the Votronic voting station, the Optech Eagle and the Optech IV-C. A second group consisted of the Model 100, the Model 650 and the Model 150/550. The iVotronic was also voted and included in the tabulation. The

third grouping was election central and the tabulation and reporting of the election results from each of the above groups.

The earlier versions of the above referenced machines, devices and increments of the Election System have been previously certified.

Group One. A test deck of ballots was provided and the examiners added a material number of additional ballots, all to be read and processed separately through the Optech Eagle and the Optech IV-C. The Votronic was included in this group and additional votes were cast on the Votronic. Other than inclusion of the Votronic for convenience, this group was configured because it uses "arrow" ballots. The results from the Optech Eagle, the Optech IV-C and the Votronic were each separately verified, and then all were transported to election central for a central count combined tabulation and election report. Due to an issue, discussed below, additional ballots were cast and this process from the precinct level through election central was repeated. Except as noted specifically below, the examination and testing evidenced that the machines and devices included in Group One, and Unity Election System v. 2.4.2 functioning with the group as election central, operated in compliance with Chapt. 122, Texas Election Code.

Group Two. Except for the retesting and re-voting, the above process was also completed on the iVotronic, the Model 100, the Model 650 and the Model 150/550. Again, except as noted specifically below, the examination and testing evidenced that the machines and devices included in Group Two, and Unity Election System v. 2.4.2 functioning with the group as election central, operated in compliance with Chapt. 122, Texas Election Code.

Exceptions and recommendations.

Exception No. 1. Tabulation of Paper Ballots. (1) Felt tip pens were provided and used in the marking of the paper ballots. This resulted in the Optech IV-C and the other tabulation models reading and recording as a vote a bleed through mark from the opposite side of the ballot. *Recommendation.* (a) I recommend the Secretary prohibit the use of felt tip markers with this Election System, and specify the pens or markers that may be used with this Election System. (b) I also recommend a procedure be adopted that requires double-sided paper ballots to have one side be "off-set" in a manner that will prevent a ballot mark in a race on one side of the ballot from lining up with a ballot mark for a race on the opposite side. The "bleed through" issue is potentially material. And, there is a real potential for such an event to affect a race and not be discovered unless a recount is requested.

Exception No. 2. Tabulation of Paper Ballots. The Optech IV-C read one very lightly marked vote approximately 50% of the time as a vote and 50% of the time as blank. This may be unavoidable, but the preference is that it read the ballot the same way each time. *Recommendation.* I recommend the Secretary give this matter some consideration in conjunction with Exception No. 1 above. It appears whether or not the tabulation device records the vote, or does not, may depend in part on the way the ballot is positioned when it runs through the tabulation device. However, this may be an issue that can only be effectively addressed in a hand recount.

Exception No. 3. Ballot Set-Up. At least in part due to all standard procedures not being followed in setting-up the test ballot, the candidate names were switched on one race. Except for a careful audit, the resulting error would not have been found and the votes for the candidates would have been reversed. ES&S states that adequate procedures are in place, between their proofing ballots and the election program and requiring the election jurisdiction to also proof the ballots. *Recommendation.* I recommend the staff review this issue to determine if any additional procedure or requirement will prevent this potentially serious possibility. One possibility would appear to require specific pre-testing by race prior to final election set-up.

Exception No. 4. Audit Log Printer. The Unity Election System at election central has a functioning audit log printer. However, at least some functions on the audit log printer are still not recorded on a real-time basis. For example, one observed failure to record real-time was that if the election system is exited or closed the audit log does not record that action until the next time when the election program is started up or accessed. *Recommendation.* I recommend the Secretary require the real-time audit log printer to record on a real-time basis each event, function or interface with the election system.

Summary.

Properly used with the appropriate procedures and avoidance of human error that can be present in any election, the Election System appears generally to function in compliance with the Texas Election Code, and to accurately tabulate and report results. However, there are several recommendations for improvements that should be required pursuant to Chapt. 122, Texas Election Code.

I recommend the iVotronic and Votronic be certified as meeting the requirements of Chapt. 122, Subchapt. A, Texas Election Code.

I recommend the Unity Election System V. 2.4.2 central election reporting programs be certified as meeting the requirements of

Chapt. 122, Subchapt. A, Texas Election Code, subject to the following: (1) the real-time audit log printer being modified to require every event be printed and logged real time; (2) procedures being adopted to require specific race by race testing of the tabulation software and the paper ballots prior to the certification of the ballot -- to make certain the names and places in the electronic election set-up and tabulation program are in the same order as the names printed on the ballot; and (3) the staff examine and confirm the sufficiency of these actions.

I recommend the Secretary determine an appropriate pen or marker that must be used by ES&S and voting jurisdictions, in order that a mark on one side of a ballot will not bleed through the ballot when read with the following equipment: Model 100 Precinct Count System, V. 5.0.0.0; Model 150/550 Central Count, V. 2.1.0.0Q; Model 650 Central Count, V. 1.2.0.0; the Optech Eagle Precinct Count, V. HPS 1.28, APS 1.50, CPS 1.02a, and the Optech IV-C Central Count, V. 1.06a (collectively the "Tabulation Equipment"). I also recommend the following with respect to the Tabulation Equipment: (1) the Secretary specify that the front side and the reverse of ballots to be used with the Tabulation Equipment be off-set in a manner to prevent a voter selection mark on one side of the ballot from lining up with a voter selection mark on the opposite side; and (2) the Secretary's staff examine use of the Tabulation Equipment with the approved pen or marker and off-set ballot to assure that a vote on one side of a ballot will not affect the voter's choice in a race on the other side of the ballot.

If the Secretary's staff takes these steps and determines the above listed Tabulation Equipment functions properly with the specified pens/markers and off-set ballots, I recommend the above listed Tabulation Equipment be certified by the Secretary as meeting the requirements of Chapt. 122, Subchapt. A, Texas Election Code.

Sincerely,

Barney L. Knight

ES&S

The ES&S systems were re-examined in Austin on January 8, 2004. The names and releases of the hardware and software are as follows:

Unity - version 2.4.2 - an election setup, and central accumulator and reporting system.

Unity subsystems:
- Audit Manager v- 7.0.2.0
- Election Data Manager – v- 7.2.1.0
- Optech Image Manager – v- 3.2.0.0
- ES&S Image Manager – v – 7.2.0.0
- Hardware Programming Manager – v – 5.0.2.0
- Data Acquistion Manager – v – 5.0.3.0
- Election Reporting Manager – v – 6.4.2.0

Model 650 – firmware v. 1.2.0.0 - optical central-counting scanner
Model 100 – firmware v. 5.0.0.0 - optical precinct-counting scanner
Model 150/550 – firmware v. 5.0.0.0 - optical central counting scanners
Model IV-C – firmware v. 1.06a - optical central counting scanner
Eagle - firmware v. 1.50APS,1.28 HPS, 1.02 CPS - optical precinct-counting scanner
iVotronic - version 8.0.0.0 - DRE voting machine
Votronic - version 5.19 - DRE voting machine

The examination revealed two serious problems and a few minor problems with the systems:

- An op-scan ballot marked with the pens handed out by the vendor caused a "bleed-through" mark to be counted incorrectly. This reveals a potentially serious problem. The "bleed-through" can cause a candidate on the opposite side of the ballot to lose a vote because the errant mark triggers an overvote.

  If the ballot layout is done correctly, the marking positions will be offset so that a "bleed-through" will not be read. However, a ballot may intentionally be designed to cause this problem.

  This can be prevented by poll workers issuing voters the correct marking pen. An explicit warning about using pens that can bleed through (e.g. Sharpies) should be part of the documentation. There is no way to guarantee that the wrong pen will not be used (perhaps intentionally) in a precinct. It was the vendor who issued the examiners the wrong pens.

- When the Model IV-C and Eagle ballots were accumulated in Unity, the results were incorrect. It was explained that the ballots were coded for a previous test election. There was no indication of a problem by Unity. The fact the examiners were checking for specific counts revealed the error.

  Unity should have detected an election setup mismatch. To prevent this a checksum, CRC or some other code should be coded in the setup. Additionally, an L&A test which has various counts for the candidates would reveal a mismatch.

  When Unity was re-programmed to match the Eagle/IV-C ballots, it tallied correctly.

- The Report Manager audit log did not indicate the program was exited, in real-time. Only after the program was restarted did the message print.

- The message on the Unity audit log was inconsistent regarding "replacemode" when loading the results from Model 100 versus the iVotronic.

Conclusion

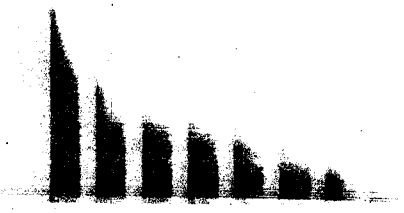
The "bleed-through" problem is not easy to correct. Explicit warnings about using the correct pens should be communicated to the precinct workers.

The election setup mismatch problem (between Unity and the Model IV-C) could have been prevented procedurally (i.e. a good L&A test with different expected results for each candidate). However, since it occurred at the examination, it indicates the possibililty that a good L&A test may not happen . Therefore, the vendor should find a way to prevent an election mismatch programmically.

The second two problems mentioned can easily be corrected.

The systems worked well overall and do meet the standards outlined in the Texas Election Code. I recommend certification for systems but the problems indicated should be addressed before the next examination.

Tom Watson
Examiner



The State of Texas

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Geoffrey S. Connor
Secretary of State

MEMORDUM

TO: Ann McGeehan
Elections Division Director

FROM: Glenn Glover
Voting System Examiner

DATE: January 15, 2004

A voting systems certification examination was held at the Radisson Town Lake Hotel on Thursday, Jan. 8, 2004, administered by the Office of the Secretary of State Elections Division.

ES&S submitted their Voting System Product Suite for examination and certification by the State of Texas examination board. The ESS Voting System Product Suite consists of the following components:

iVotronic DRE Voting System 8.0.0.0
Model 100 OMR Precinct Counter 5.0.0.0
Model 650 1.2.0.0
Model 150/550 Central Count 2.1.0.0Q
Optech Eagle Precinct Count HPS 1.28, APS 1.50, CPS 1.02a
Optech IV-C Central Count 1.06a
Votronic DRE Voting System 5.19
Unity Election System Software 2.4.2
Election Data Manager (EDM) 7.2.1.0
iVotronic Image Manager 1.2.3.0
ES&S Image Manager 7.2.0.0
Optech Image Manager 3.2.0.0
Hardware Program Manager (HPM) 5.0.2.0
Data Acquisition Manager (DAM) 5.0.3.0
Election Reporting Manager (ERM) 6.4.2.0
Audit Manager 7.0.2.0
Figure 1

ESS began the certification presentation with a discussion of issues regarding their voting systems. ES&S discussed their versioning conventions, the Independent Testing Authority review process and in general terms security for their product suite. After the discussion, the examiners evaluated the Optech Eagle Precinct Count & Optech IV-C Central Count Scanner. Both devices are tabulation products which an operator feeds marked/voted ballots into. The Optech IV-C can handle a stack of ballots whereas the Eagle is fed one ballot at a time. The

examiners began a test election on the Optech IV-C and Optech Eagle Scanners. The test identified an irregularity with the Optech IV-C scanning function. The ink of a "sharpie" pen had soaked through one test ballot and had appeared as a mark on the other side of the ballot. The Optech IV-C erroneously counted a vote in a contest on the reverse side of the ballot because the ink had soaked through to the exact position where a candidate selection would have been marked/voted.

The examination team wanted to replicate the Optech IV-C scanner's miscounts of the bleed-through ink ballot. They fed the same ink spotted ballot multiple times into the Optech IV-C with inconsistent results – sometimes the contest was counted and other times the contest was not counted. ES&S explained that they recommend that the alignment of races on a printed ballot be offset as not to have a contest selection position directly behind another contest selection position on the reverse side of the ballot page, that pencils be used to mark the ballot so as to prevent ink soaking through the ballot, and that customers use their Ballot Image Manager product to create ballot layouts that automatically provide position offsets on the ballot so as to prevent this anomaly from happening. ES&S was unable to produce upon request their Optech IV-C documentation concerning pencil and alignment recommendations.

The examination continued with testing of the other voting components presented to the panel. The Model 150/550 and iVotronic DRE accurately tallied and uploaded to the Unity system with no problems revealed. The panel also examined the Election Reporting Manager's new capability of manually loading scanner totals from Optech IV-C's 3.5 inch diskettes and from the Optech Eagle memory packs; no problems were observed.

The Unity ERM Reporting/Display computer was evaluated and proved to be accurate in reporting election results. It was noted that the attached audit log printer did not report an "exit or close election" event from the software until the next election had begun. An "exit or close election" event should be printed immediately to the continuous-feed printer because of its' significance as an election event.

After review of the documentation and ES&S's presentation of their voting equipment, I recommend the following:

1) Optech IV-C Central Scanner only be certified for use under the following conditions
   a) the Optech IV-C Central Scanner has a sign, easily readable by the operator, "pencil marked ballots only".
   b) the Optech IV-C Central Scanner documentation / manual reflect the pencil and ballot alignment guidelines recommended by ES&S.
   also ballots scanned into the Optech IV-C meet the following criteria
   c) ballots can only be voted with pencils
   d) ballot image layouts have contests aligned so as not to have a contest selection area directly behind a contest selection area on the reverse side of the ballot
2) Full certification of all other ES&S voting system components identified in Figure 1. I find that these components are in compliance with Voting System Certification requirements of the Texas Administrative Code and should be approved for use in Texas elections.

DEPARTMENT OF INFORMATION RESOURCES

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February 2, 2004

Ms. Ann McGeehan
Deputy Assistant
Office of the Secretary of State
1019 Brazos Street
Austin, TX 78701

RE: Examination of the Unity Election System Version Release 2.4.2 and vote tabulation devices from Election Systems and Software (ES&S)

Dear Ms. McGeehan:

I attended a scheduled examination January 8, 2004, at 9:30 am, for the purpose of examining the voting systems from Election Systems and Software (ES&S). The report below summarizes my findings.

Voting Systems Versions

Hardware/Software Version

Unity Election System v2.4.2, last certified May 2003
Unity Election System is comprised of the following subsystem modules:
Election Data Manager v7.2.1.0
IVotronic Image Manager v1.2.3.0
ES&S Image Manager v7.2.0.0
Optech Image Manager v3.2.0.0
Hardware Programming Manager v5.0.2.0
Data Acquisition Manager v5.0.3.0
Election Reporting Manager v6.4.2.0
Audit Manager v7.0.2.0

Hardware
Model 100 Precinct Count System v5.0.0.0
Model 650 Central Count System v1.2.0.0
Model 150/550 Central Countv2.1.0.0Q
Optech Eagle Precinct Count v HPS 1.28, APS 1.50, CPS 1.02a

DRE voting systems
Ivotronic DRE audio balloting system v8.0.0.0
Votronic DRE Voting System v5.19

System description

Unity is an umbrella marketing designation that includes all of the software modules noted above. The modules are upgraded as a single package; none of

them can be upgraded individually.

ES&S provided a list of functional changes from the prior version of Unity. Most of the changes were to peripheral functions, usually for minor bug fixes. The core functionality demonstrated in prior versions has not been changed. The new version just allows tabulated totals from "arrow" systems to be brought over to Unity. ["Arrow" systems are those in which a voter casts a vote by connecting arrows beside a candidate's name (e.g. "candidate name" => <=) with a solid line. This is in contrast to "oval" systems in which a voter casts a vote by filling in an oval on the ballot.]

ES&S explained the versioning conventions that identify all their software and firmware releases. For purposes of voting systems examinations, the relevant conventions are as follows:

- First number is reserved for a new release or a major functional revision
- Second number is reserved for minor functional revisions
- Third number is reserved for bug fixes
- Fourth number is reserved for one-off functionality, usually state specific

In addition to the new revisions of software and firmware, ES&S personnel explained the Provisional Ballot functionality in response to a query from the Texas Secretary of State.

System performance

The arrow system had an interesting problem due to the way the test ballots were printed. The examiners used a "Sharpie" pen that bled through the ballots. The test election ballots were not properly designed, and the pen bled through to an arrow on the reverse side of the ballot and made it appear as though the voter had overvoted a contest on the reverse side.

The ballot was red in all four orientations and the overvote was counted on two of the orientations, indicating that the scanner was sensitive to the bleed-through only in one set of sensors.

ES&S personnel indicated that their ballot preparation software prevents such alignment, but were not used to prepare these ballots. In addition, they advise election officials to use high-solid markers rather than Sharpie-type markers to avoid this kind of problem.

Other than this self-inflicted problem, the arrow systems appeared to count votes correctly. The votes appear to import into Unity correctly, along with votes from other equipment.

The audit log functionality was not tested, however, and should be reviewed during the next examination for this vendor.

The oval systems also appeared to count votes correctly and import them into Unity correctly. It was noted that the log printer for Unity does not print the system shutdown message until the next time the system is brought up. This may lead an auditor to believe that a user's session was not terminated correctly or that the log might be missing some key data. Therefore it is recommended that the system shutdown be recorded on the real-time log before the system exits.

Recommendations

The Department of Information Resources (DIR) finds no technical objection to certifying the Unity Election System and firmware demonstrated at this examination.

Respectfully,

Nick Osborn
Systems Analyst

MM:NO:sk

Voting System Examination
Election Systems & Software (ES&S)

Prepared for the
Secretary of State of Texas

James Sneeringer, Ph.D.
Designee of the Attorney General

This report is the findings of the Attorney General's designee from an examination of the equipment listed, pursuant to Title 9, Chapter 122 of the Texas Election Code, section 122.036(b).

Examination Date	January 8, 2004
Report Date	January 19, 2004

ES&S offers a complete line of products for every aspect of conducting an election, including election setup, DRE, optical scanning, punch-card reading, tallying and reporting.

Components Examined	**Type**	**Version**	
EDM- Election Data Manager – Election Setup	Part of Unity	7.2.1.0	
iVotronic Image Manager	Part of Unity	1.2.3.0	
ES&S Image Manager		7.2.0.0	
Optech Image Manager	Part of Unity	3.2.0.0	
HPM – Hardware Program Manager – Programs PEBS, EPROMS, etc from election definition	Part of Unity	5.0.2.0	
DAM – Data Acquisition Manager (Client)	Part of Unity	5.0.3.0	
DAM – Data Acquisition Manager (Host)	Part of Unity	5.0.3.0	
ERM – Election Reporting Manager	Part of Unity	6.4.2.0	
Audit Manager	Part of Unity	7.0.2.0	
iVotronic DRE Voting System	Voting	8.0.0.0	*
Model 650	Scanner	1.2.0.0	*
Model 100 OMR Precinct Counter	Scanner	5.0.0.0	*
Model 150/550	Scanner	2.1.0.0Q	
Eagle	Scanner	1.50 APS 1.28 HPS 1.02a CPS	*
IV-C	Scanner	1.06a	
Votronic	DRE	5.19	

* Unchanged from the last time it was examined

Voting: Characteristics of the Votronic and iVotronic DRE

Election Setup	Personalized Electronic Ballots (PEB) and separate flash memory cards are created with Unity software. Nothing is pre-programmed in the terminals; all the election information is in the PEB and flash memory. Anything that is precinct specific goes in the PEB. The flash memory is only required if the election is large or there are image or audio files.
Zero-total report	On the thermal printer in the communication pack.
Authorization to vote / Ballot selection	There are two modes: • Voter inserts a PEB, which is created at a Supervisor station using a supervisor PEB, both of which are red to distinguish them from voting stations and PEB's. The voter's PEB cannot be reused without re-activation. • Poll worker inserts a PEB, immediately removes it, and selects the appropriate ballot. The PEB is retained by the poll worker and is reusable without re-activation.
View / Vote	LCD display / touch screen
Vote Storage	Three redundant flash memories
Precinct Consolidation	Allowed using PEB's. An audit log of this is kept in memory and can be printed at the precinct.
Transfer Results	PEB transported or data transmitted by modem to Unity software (or a regional site from which data is sent to the Unity software at central counting). The data is protected by a Cyclical Redundancy Check (CRC).
Print precinct results	On the thermal printer in the communication pack.
Straight party / crossover	Yes. A straight-party vote cannot cancel crossover votes that have already been selected, which protects the voter against mistakenly canceling a crossover vote.
ADA	Yes. Because it is battery-powered, the iVotronic can be taken to the curbside for voting. However, this was not demonstrated, because the Secretary of State verifies ADA compliance.

Setup & Tabulation: Characteristics of the Unity System

Tamper Resistance	Cyclical Redundancy Check (CRC) on each record in the election files.
OS access	Not permitted during tabulation.
Real-Time Audit Log	Yes.
Data Integrity	There are no special transaction-processing features. However, according to ES&S, there is no need, because all the data is written in a single write statement, making it impossible for partial results to be entered into the database. Also, it is easy to recalculate everything if a problem is suspected, and everything is automatically re-calculated when you request a canvass report. Since a canvass report would always be requested, this is satisfactory. In short, it is nearly impossible to get an incorrect result and not know it.

Notes	• The Data Acquisition Manager is used in regional centers to collect precinct data for forwarding to central counting by modem or by carrying a PEB. • The Data Acquisition Manager does not need to know election-specific data or understand the results. It does not tabulate.

Concerns

1.	During testing, the optical scanners were found to sometimes read marks that bleed through from the other side of the ballot. **Recommendation**: The Secretary of State should consider regulations requiring that the areas that a voter marks on the two side of the ballot never align, so that any marks that bleed through will not be read on the other side. It might also be useful (but less important) to have regulations about the types of writing instruments to be used for marking optical ballots. Improving the scanners themselves is probably very difficult and not cost effective.
2.	During the exam, an election was incorrectly tabulated because the ballot layout did not correspond to the programming of the scanner. ES&S says that (a) this would not occur if the ballot were laid out using their software and (b) it would normally be caught by their procedures, such as logic and accuracy testing and proofing the ballots for candidate order. **Recommendation**: When preparing for an exam, ES&S should follow their own standard procedures. I do not see how this problem can be solved by changes in their system. Note that L&A test decks should not have the same number of votes for multiple candidates, since you then cannot detect errors in candidate ordering.
3.	It is my understanding that multiple provisional ballots can be assigned the same ID. If this were to happen, all ballots with the same ID would have to be counted or none would be counted. **Recommendation**: The ES&S system should reject a second provisional ballot with the same ID, and force the election workers to assign another, unique ID. Until this change is made, certification should carry the following conditions: a) The follow procedure should be required: Labels should be preprinted with unique provisional ballot IDs. When such an ID is used, its label should be removed and placed on the documentation in the provisional envelope, thus preventing its accidental re-use. b) Certification should expire on January 1, 2005, unless the system is changed to reject duplicate use of the same provisional ballot ID.

ES&S has an excellent product line and it was a very successful exam.

Barney Knight & Associates

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Attorneys
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Sheila I. Jalufka
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January 19, 2004

Ann McGeehan
Deputy Assistant
Secretary of State
P.O. Box 12060
Austin, Texas 78711-2060

Re: Election System & Software ("ES&S")-Unity Election System V. 2.4.2; iVotronic DRE, V. 8.0.0.0; Votronic DRE, V. 5.19; Model 100 Precinct Count System, V. 5.0.0.0; Model 150/550 Central Count, V. 2.1.0.0Q; Model 650 Central Count, V. 1.2.0.0; the Optech Eagle Precinct Count, V. HPS 1.28, APS 1.50, CPS 1.02a, and the Optech IV-C Central Count, V. 1.06a.

Dear Ms. McGeehan:

Pursuant to my appointment as an examiner under Chapt. 122, Texas Election Code, I examined the above referenced software and hardware (collectively the "Election Systems") as presented by ES&S for examination. I examined the Election Systems with respect to Texas Election Law and procedure on January 8, 2004.

This report is concerned solely with the ability of the Election Systems, and each individual module thereof, to function in compliance with Texas Election Law, and is based on the presentation by ES&S and the testing completed by the examiners on January 8th. ES&S gave a well organized presentation, and the casting, tabulation and reporting of votes, together with the remainder of the examination, did not evidence any function that was not in compliance with *Chapt. 122, Subchapt. A, Texas Election Code*, for use in an election, except as specifically noted below. However, no opinion is expressed regarding the suitability of the Election System for the purposes of or use by any jurisdiction.

The Unity Election System v. 2.4.2 functions with all of the ES&S product line referenced above. And, in that respect, the testing and examination of the Election Systems was divided roughly into three parts. One grouping consisted of the Votronic voting station, the Optech Eagle and the Optech IV-C. A second group consisted of the Model 100, the Model 650 and the Model 150/550. The iVotronic was also voted and included in the tabulation. The

third grouping was election central and the tabulation and reporting of the election results from each of the above groups.

The earlier versions of the above referenced machines, devices and increments of the Election System have been previously certified.

Group One. A test deck of ballots was provided and the examiners added a material number of additional ballots, all to be read and processed separately through the Optech Eagle and the Optech IV-C. The Votronic was included in this group and additional votes were cast on the Votronic. Other than inclusion of the Votronic for convenience, this group was configured because it uses "arrow" ballots. The results from the Optech Eagle, the Optech IV-C and the Votronic were each separately verified, and then all were transported to election central for a central count combined tabulation and election report. Due to an issue, discussed below, additional ballots were cast and this process from the precinct level through election central was repeated. Except as noted specifically below, the examination and testing evidenced that the machines and devices included in Group One, and Unity Election System v. 2.4.2 functioning with the group as election central, operated in compliance with Chapt. 122, Texas Election Code.

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Exceptions and recommendations.

Exception No. 1. Tabulation of Paper Ballots. (1) Felt tip pens were provided and used in the marking of the paper ballots. This resulted in the Optech IV-C and the other tabulation models reading and recording as a vote a bleed through mark from the opposite side of the ballot. *Recommendation.* (a) I recommend the Secretary prohibit the use of felt tip markers with this Election System, and specify the pens or markers that may be used with this Election System. (b) I also recommend a procedure be adopted that requires double-sided paper ballots to have one side be "off-set" in a manner that will prevent a ballot mark in a race on one side of the ballot from lining up with a ballot mark for a race on the opposite side. The "bleed through" issue is potentially material. And, there is a real potential for such an event to affect a race and not be discovered unless a recount is requested.

Exception No. 2. Tabulation of Paper Ballots. The Optech IV-C read one very lightly marked vote approximately 50% of the time as a vote and 50% of the time as blank. This may be unavoidable, but the preference is that it read the ballot the same way each time. *Recommendation.* I recommend the Secretary give this matter some consideration in conjunction with Exception No. 1 above. It appears whether or not the tabulation device records the vote, or does not, may depend in part on the way the ballot is positioned when it runs through the tabulation device. However, this may be an issue that can only be effectively addressed in a hand recount.

Exception No. 3. Ballot Set-Up. At least in part due to all standard procedures not being followed in setting-up the test ballot, the candidate names were switched on one race. Except for a careful audit, the resulting error would not have been found and the votes for the candidates would have been reversed. ES&S states that adequate procedures are in place, between their proofing ballots and the election program and requiring the election jurisdiction to also proof the ballots. *Recommendation.* I recommend the staff review this issue to determine if any additional procedure or requirement will prevent this potentially serious possibility. One possibility would appear to require specific pre-testing by race prior to final election set-up.

Exception No. 4. Audit Log Printer. The Unity Election System at election central has a functioning audit log printer. However, at least some functions on the audit log printer are still not recorded on a real-time basis. For example, one observed failure to record real-time was that if the election system is exited or closed the audit log does not record that action until the next time when the election program is started up or accessed. *Recommendation.* I recommend the Secretary require the real-time audit log printer to record on a real-time basis each event, function or interface with the election system.

Summary.

Properly used with the appropriate procedures and avoidance of human error that can be present in any election, the Election System appears generally to function in compliance with the Texas Election Code, and to accurately tabulate and report results. However, there are several recommendations for improvements that should be required pursuant to Chapt. 122, Texas Election Code.

I recommend the iVotronic and Votronic be certified as meeting the requirements of Chapt. 122, Subchapt. A, Texas Election Code.

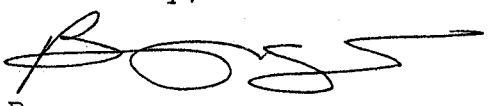
I recommend the Unity Election System V. 2.4.2 central election reporting programs be certified as meeting the requirements of

Chapt. 122, Subchapt. A, Texas Election Code, subject to the following: (1) the real-time audit log printer being modified to require every event be printed and logged real time; (2) procedures being adopted to require specific race by race testing of the tabulation software and the paper ballots prior to the certification of the ballot -- to make certain the names and places in the electronic election set-up and tabulation program are in the same order as the names printed on the ballot; and (3) the staff examine and confirm the sufficiency of these actions.

I recommend the Secretary determine an appropriate pen or marker that must be used by ES&S and voting jurisdictions, in order that a mark on one side of a ballot will not bleed through the ballot when read with the following equipment: Model 100 Precinct Count System, V. 5.0.0.0; Model 150/550 Central Count, V. 2.1.0.0Q; Model 650 Central Count, V. 1.2.0.0; the Optech Eagle Precinct Count, V. HPS 1.28, APS 1.50, CPS 1.02a, and the Optech IV-C Central Count, V. 1.06a (collectively the "Tabulation Equipment"). I also recommend the following with respect to the Tabulation Equipment: (1) the Secretary specify that the front side and the reverse of ballots to be used with the Tabulation Equipment be off-set in a manner to prevent a voter selection mark on one side of the ballot from lining up with a voter selection mark on the opposite side; and (2) the Secretary's staff examine use of the Tabulation Equipment with the approved pen or marker and off-set ballot to assure that a vote on one side of a ballot will not affect the voter's choice in a race on the other side of the ballot.

If the Secretary's staff takes these steps and determines the above listed Tabulation Equipment functions properly with the specified pens/markers and off-set ballots, I recommend the above listed Tabulation Equipment be certified by the Secretary as meeting the requirements of Chapt. 122, Subchapt. A, Texas Election Code.

Sincerely,



Barney L. Knight

ES&S

The ES&S systems were re-examined in Austin on January 8, 2004. The names and releases of the hardware and software are as follows:

Unity - version 2.4.2 - an election setup, and central accumulator and reporting system.

Unity subsystems:
- Audit Manager v- 7.0.2.0
- Election Data Manager – v- 7.2.1.0
- Optech Image Manager – v- 3.2.0.0
- ES&S Image Manager – v – 7.2.0.0
- Hardware Programming Manager – v – 5.0.2.0
- Data Acquistion Manager – v – 5.0.3.0
- Election Reporting Manager – v – 6.4.2.0

Model 650 – firmware v. 1.2.0.0 - optical central-counting scanner
Model 100 – firmware v. 5.0.0.0 - optical precinct-counting scanner
Model 150/550 – firmware v. 5.0.0.0 - optical central counting scanners
Model IV-C – firmware v. 1.06a - optical central counting scanner
Eagle - firmware v. 1.50APS,1.28 HPS, 1.02 CPS - optical precinct-counting scanner
iVotronic - version 8.0.0.0 - DRE voting machine
Votronic - version 5.19 - DRE voting machine

The examination revealed two serious problems and a few minor problems with the systems:

- An op-scan ballot marked with the pens handed out by the vendor caused a "bleed-through" mark to be counted incorrectly. This reveals a potentially serious problem. The "bleed-through" can cause a candidate on the opposite side of the ballot to lose a vote because the errant mark triggers an overvote.

  If the ballot layout is done correctly, the marking positions will be offset so that a "bleed-through" will not be read. However, a ballot may intentionally be designed to cause this problem.

  This can be prevented by poll workers issuing voters the correct marking pen. An explicit warning about using pens that can bleed through (e.g. Sharpies) should be part of the documentation. There is no way to guarantee that the wrong pen will not be used (perhaps intentionally) in a precinct. It was the vendor who issued the examiners the wrong pens.

- When the Model IV-C and Eagle ballots were accumulated in Unity, the results were incorrect. It was explained that the ballots were coded for a previous test election. There was no indication of a problem by Unity. The fact the examiners were checking for specific counts revealed the error.

  Unity should have detected an election setup mismatch. To prevent this a checksum, CRC or some other code should be coded in the setup. Additionally, an L&A test which has various counts for the candidates would reveal a mismatch.

  When Unity was re-programmed to match the Eagle/IV-C ballots, it tallied correctly.

- The Report Manager audit log did not indicate the program was exited, in real-time. Only after the program was restarted did the message print.

- The message on the Unity audit log was inconsistent regarding "replacemode" when loading the results from Model 100 versus the iVotronic.

Conclusion

The "bleed-through" problem is not easy to correct. Explicit warnings about using the correct pens should be communicated to the precinct workers.

The election setup mismatch problem (between Unity and the Model IV-C) could have been prevented procedurally (i.e. a good L&A test with different expected results for each candidate). However, since it occurred at the examination, it indicates the possibililty that a good L&A test may not happen . Therefore, the vendor should find a way to prevent an election mismatch programmically.

The second two problems mentioned can easily be corrected.

The systems worked well overall and do meet the standards outlined in the Texas Election Code. I recommend certification for systems but the problems indicated should be addressed before the next examination.

Tom Watson
Examiner

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Geoffrey S. Connor
Secretary of State

MEMORDUM

TO: Ann McGeehan
Elections Division Director

FROM: Glenn Glover
Voting System Examiner

DATE: January 15, 2004

A voting systems certification examination was held at the Radisson Town Lake Hotel on Thursday, Jan. 8, 2004, administered by the Office of the Secretary of State Elections Division.

ES&S submitted their Voting System Product Suite for examination and certification by the State of Texas examination board. The ESS Voting System Product Suite consists of the following components:

iVotronic DRE Voting System 8.0.0.0
Model 100 OMR Precinct Counter 5.0.0.0
Model 650 1.2.0.0
Model 150/550 Central Count 2.1.0.0Q
Optech Eagle Precinct Count HPS 1.28, APS 1.50, CPS 1.02a
Optech IV-C Central Count 1.06a
Votronic DRE Voting System 5.19
Unity Election System Software 2.4.2
Election Data Manager (EDM) 7.2.1.0
iVotronic Image Manager 1.2.3.0
ES&S Image Manager 7.2.0.0
Optech Image Manager 3.2.0.0
Hardware Program Manager (HPM) 5.0.2.0
Data Acquisition Manager (DAM) 5.0.3.0
Election Reporting Manager (ERM) 6.4.2.0
Audit Manager 7.0.2.0
Figure 1

ESS began the certification presentation with a discussion of issues regarding their voting systems. ES&S discussed their versioning conventions, the Independent Testing Authority review process and in general terms security for their product suite. After the discussion, the examiners evaluated the Optech Eagle Precinct Count & Optech IV-C Central Count Scanner. Both devices are tabulation products which an operator feeds marked/voted ballots into. The Optech IV-C can handle a stack of ballots whereas the Eagle is fed one ballot at a time. The

examiners began a test election on the Optech IV-C and Optech Eagle Scanners. The test identified an irregularity with the Optech IV-C scanning function. The ink of a "sharpie" pen had soaked through one test ballot and had appeared as a mark on the other side of the ballot. The Optech IV-C erroneously counted a vote in a contest on the reverse side of the ballot because the ink had soaked through to the exact position where a candidate selection would have been marked/voted.

The examination team wanted to replicate the Optech IV-C scanner's miscounts of the bleed-through ink ballot. They fed the same ink spotted ballot multiple times into the Optech IV-C with inconsistent results – sometimes the contest was counted and other times the contest was not counted. ES&S explained that they recommend that the alignment of races on a printed ballot be offset as not to have a contest selection position directly behind another contest selection position on the reverse side of the ballot page, that pencils be used to mark the ballot so as to prevent ink soaking through the ballot, and that customers use their Ballot Image Manager product to create ballot layouts that automatically provide position offsets on the ballot so as to prevent this anomaly from happening. ES&S was unable to produce upon request their Optech IV-C documentation concerning pencil and alignment recommendations.

The examination continued with testing of the other voting components presented to the panel. The Model 150/550 and iVotronic DRE accurately tallied and uploaded to the Unity system with no problems revealed. The panel also examined the Election Reporting Manager's new capability of manually loading scanner totals from Optech IV-C's 3.5 inch diskettes and from the Optech Eagle memory packs; no problems were observed.

The Unity ERM Reporting/Display computer was evaluated and proved to be accurate in reporting election results. It was noted that the attached audit log printer did not report an "exit or close election" event from the software until the next election had begun. An "exit or close election" event should be printed immediately to the continuous-feed printer because of its' significance as an election event.

After review of the documentation and ES&S's presentation of their voting equipment, I recommend the following:

1) Optech IV-C Central Scanner only be certified for use under the following conditions
   a) the Optech IV-C Central Scanner has a sign, easily readable by the operator, "pencil marked ballots only".
   b) the Optech IV-C Central Scanner documentation / manual reflect the pencil and ballot alignment guidelines recommended by ES&S.
   also ballots scanned into the Optech IV-C meet the following criteria
   c) ballots can only be voted with pencils
   d) ballot image layouts have contests aligned so as not to have a contest selection area directly behind a contest selection area on the reverse side of the ballot
2) Full certification of all other ES&S voting system components identified in Figure 1. I find that these components are in compliance with Voting System Certification requirements of the Texas Administrative Code and should be approved for use in Texas elections.

DEPARTMENT OF INFORMATION RESOURCES

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February 2, 2004

Ms. Ann McGeehan
Deputy Assistant
Office of the Secretary of State
1019 Brazos Street
Austin, TX 78701

RE: Examination of the Unity Election System Version Release 2.4.2 and vote tabulation devices from Election Systems and Software (ES&S)

Dear Ms. McGeehan:

I attended a scheduled examination January 8, 2004, at 9:30 am, for the purpose of examining the voting systems from Election Systems and Software (ES&S). The report below summarizes my findings.

Voting Systems Versions

Hardware/Software Version

Unity Election System v2.4.2, last certified May 2003
Unity Election System is comprised of the following subsystem modules:
Election Data Manager v7.2.1.0
IVotronic Image Manager v1.2.3.0
ES&S Image Manager v7.2.0.0
Optech Image Manager v3.2.0.0
Hardware Programming Manager v5.0.2.0
Data Acquisition Manager v5.0.3.0
Election Reporting Manager v6.4.2.0
Audit Manager v7.0.2.0

Hardware
Model 100 Precinct Count System v5.0.0.0
Model 650 Central Count System v1.2.0.0
Model 150/550 Central Countv2.1.0.0Q
Optech Eagle Precinct Count v HPS 1.28, APS 1.50, CPS 1.02a

DRE voting systems
Ivotronic DRE audio balloting system v8.0.0.0
Votronic DRE Voting System v5.19

System description

Unity is an umbrella marketing designation that includes all of the software modules noted above. The modules are upgraded as a single package; none of

them can be upgraded individually.

ES&S provided a list of functional changes from the prior version of Unity. Most of the changes were to peripheral functions, usually for minor bug fixes. The core functionality demonstrated in prior versions has not been changed. The new version just allows tabulated totals from "arrow" systems to be brought over to Unity. ["Arrow" systems are those in which a voter casts a vote by connecting arrows beside a candidate's name (e.g. "candidate name" => <=) with a solid line. This is in contrast to "oval" systems in which a voter casts a vote by filling in an oval on the ballot.]

ES&S explained the versioning conventions that identify all their software and firmware releases. For purposes of voting systems examinations, the relevant conventions are as follows:

- First number is reserved for a new release or a major functional revision
- Second number is reserved for minor functional revisions
- Third number is reserved for bug fixes
- Fourth number is reserved for one-off functionality, usually state specific

In addition to the new revisions of software and firmware, ES&S personnel explained the Provisional Ballot functionality in response to a query from the Texas Secretary of State.

System performance

The arrow system had an interesting problem due to the way the test ballots were printed. The examiners used a "Sharpie" pen that bled through the ballots. The test election ballots were not properly designed, and the pen bled through to an arrow on the reverse side of the ballot and made it appear as though the voter had overvoted a contest on the reverse side.

The ballot was red in all four orientations and the overvote was counted on two of the orientations, indicating that the scanner was sensitive to the bleed-through only in one set of sensors.

ES&S personnel indicated that their ballot preparation software prevents such alignment, but were not used to prepare these ballots. In addition, they advise election officials to use high-solid markers rather than Sharpie-type markers to avoid this kind of problem.

Other than this self-inflicted problem, the arrow systems appeared to count votes correctly. The votes appear to import into Unity correctly, along with votes from other equipment.

The audit log functionality was not tested, however, and should be reviewed during the next examination for this vendor.

The oval systems also appeared to count votes correctly and import them into Unity correctly. It was noted that the log printer for Unity does not print the system shutdown message until the next time the system is brought up. This may lead an auditor to believe that a user's session was not terminated correctly or that the log might be missing some key data. Therefore it is recommended that the system shutdown be recorded on the real-time log before the system exits.

Recommendations

The Department of Information Resources (DIR) finds no technical objection to certifying the Unity Election System and firmware demonstrated at this examination.

Respectfully,

Nick Osborn
Systems Analyst

MM:NO:sk

Voting System Examination
Election Systems & Software (ES&S)

Prepared for the
Secretary of State of Texas

James Sneeringer, Ph.D.
Designee of the Attorney General

This report is the findings of the Attorney General's designee from an examination of the equipment listed, pursuant to Title 9, Chapter 122 of the Texas Election Code, section 122.036(b).

Examination Date	January 8, 2004
Report Date	January 19, 2004

ES&S offers a complete line of products for every aspect of conducting an election, including election setup, DRE, optical scanning, punch-card reading, tallying and reporting.

Components Examined	**Type**	**Version**	
EDM- Election Data Manager – Election Setup	Part of Unity	7.2.1.0	
iVotronic Image Manager	Part of Unity	1.2.3.0	
ES&S Image Manager		7.2.0.0	
Optech Image Manager	Part of Unity	3.2.0.0	
HPM – Hardware Program Manager – Programs PEBS, EPROMS, etc from election definition	Part of Unity	5.0.2.0	
DAM – Data Acquisition Manager (Client)	Part of Unity	5.0.3.0	
DAM – Data Acquisition Manager (Host)	Part of Unity	5.0.3.0	
ERM – Election Reporting Manager	Part of Unity	6.4.2.0	
Audit Manager	Part of Unity	7.0.2.0	
iVotronic DRE Voting System	Voting	8.0.0.0	*
Model 650	Scanner	1.2.0.0	*
Model 100 OMR Precinct Counter	Scanner	5.0.0.0	*
Model 150/550	Scanner	2.1.0.0Q	
Eagle	Scanner	1.50 APS 1.28 HPS 1.02a CPS	*
IV-C	Scanner	1.06a	
Votronic	DRE	5.19	

* Unchanged from the last time it was examined

Voting: Characteristics of the Votronic and iVotronic DRE

Election Setup	Personalized Electronic Ballots (PEB) and separate flash memory cards are created with Unity software. Nothing is pre-programmed in the terminals; all the election information is in the PEB and flash memory. Anything that is precinct specific goes in the PEB. The flash memory is only required if the election is large or there are image or audio files.
Zero-total report	On the thermal printer in the communication pack.
Authorization to vote / Ballot selection	There are two modes: • Voter inserts a PEB, which is created at a Supervisor station using a supervisor PEB, both of which are red to distinguish them from voting stations and PEB's. The voter's PEB cannot be reused without re-activation. • Poll worker inserts a PEB, immediately removes it, and selects the appropriate ballot. The PEB is retained by the poll worker and is reusable without re-activation.
View / Vote	LCD display / touch screen
Vote Storage	Three redundant flash memories
Precinct Consolidation	Allowed using PEB's. An audit log of this is kept in memory and can be printed at the precinct.
Transfer Results	PEB transported or data transmitted by modem to Unity software (or a regional site from which data is sent to the Unity software at central counting). The data is protected by a Cyclical Redundancy Check (CRC).
Print precinct results	On the thermal printer in the communication pack.
Straight party / crossover	Yes. A straight-party vote cannot cancel crossover votes that have already been selected, which protects the voter against mistakenly canceling a crossover vote.
ADA	Yes. Because it is battery-powered, the iVotronic can be taken to the curbside for voting. However, this was not demonstrated, because the Secretary of State verifies ADA compliance.

Setup & Tabulation: Characteristics of the Unity System

Tamper Resistance	Cyclical Redundancy Check (CRC) on each record in the election files.
OS access	Not permitted during tabulation.
Real-Time Audit Log	Yes.
Data Integrity	There are no special transaction-processing features. However, according to ES&S, there is no need, because all the data is written in a single write statement, making it impossible for partial results to be entered into the database. Also, it is easy to recalculate everything if a problem is suspected, and everything is automatically re-calculated when you request a canvass report. Since a canvass report would always be requested, this is satisfactory. In short, it is nearly impossible to get an incorrect result and not know it.

Notes	• The Data Acquisition Manager is used in regional centers to collect precinct data for forwarding to central counting by modem or by carrying a PEB. • The Data Acquisition Manager does not need to know election-specific data or understand the results. It does not tabulate.

Concerns

1.	During testing, the optical scanners were found to sometimes read marks that bleed through from the other side of the ballot. **Recommendation**: The Secretary of State should consider regulations requiring that the areas that a voter marks on the two side of the ballot never align, so that any marks that bleed through will not be read on the other side. It might also be useful (but less important) to have regulations about the types of writing instruments to be used for marking optical ballots. Improving the scanners themselves is probably very difficult and not cost effective.
2.	During the exam, an election was incorrectly tabulated because the ballot layout did not correspond to the programming of the scanner. ES&S says that (a) this would not occur if the ballot were laid out using their software and (b) it would normally be caught by their procedures, such as logic and accuracy testing and proofing the ballots for candidate order. **Recommendation**: When preparing for an exam, ES&S should follow their own standard procedures. I do not see how this problem can be solved by changes in their system. Note that L&A test decks should not have the same number of votes for multiple candidates, since you then cannot detect errors in candidate ordering.
3.	It is my understanding that multiple provisional ballots can be assigned the same ID. If this were to happen, all ballots with the same ID would have to be counted or none would be counted. **Recommendation**: The ES&S system should reject a second provisional ballot with the same ID, and force the election workers to assign another, unique ID. Until this change is made, certification should carry the following conditions: a) The follow procedure should be required: Labels should be preprinted with unique provisional ballot IDs. When such an ID is used, its label should be removed and placed on the documentation in the provisional envelope, thus preventing its accidental re-use. b) Certification should expire on January 1, 2005, unless the system is changed to reject duplicate use of the same provisional ballot ID.

ES&S has an excellent product line and it was a very successful exam.

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Geoffrey S. Connor
Secretary of State

REPORT OF EXAMINATION OF ELECTION SYSTEMS AND SOFTWARE, INC.'S MODEL 100 OPTICAL SCAN VOTING SYSTEM

PRELIMINARY STATEMENT

On January 8, 2004, Election Systems and Software, Inc. (the "Vendor") presented its Model 100 optical scan voting system for examination. The examination was conducted in Austin, Texas. Pursuant to Sections 122.035(a) and (b) of the Texas Election Code, the Secretary of State appointed the following examiners:

1. Mr. Nick Osborn, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Barney Knight, an expert in election law and procedure; and
4. Mr. Glenn Glover, an expert in electronic data communication systems.

Pursuant to Section 122.035(a), the Texas Attorney General appointed Dr. Jim Sneeringer, an expert in electronic data communication systems.

The Vendor first demonstrated the system, followed by review and testing by the examiners. Examiner reports on the system are attached hereto and incorporated herein by this reference.

BRIEF DESCRIPTION OF THE MODEL 100 OPTICAL SCAN VOTING SYSTEM

The Model 100 is an optical scan ballot scanner designed for use at the precinct polling place. The version of the Model 100 presented for examination was 5.0.0.0.

NATIONAL ASSOCIATION OF STATE ELECTION DIRECTORS (NASED) QUALIFICATION NUMBER

The Model 100 v. 5.0.0.0 is qualified by NASED under the designation N-1-02-12-11-001 (1990 Voting System Standards). The final report date is February 19, 2004.

FINDINGS

The following are the findings, based on oral evidence presented at the examination to our examiners, written evidence submitted by the Vendor in support of its application for certification, and the findings of our voting system examiners as set out in their written reports.

The Model 100 voting system:

1. Preserves the secrecy of the ballot;
2. Is suitable for the purpose for which it is intended;
3. Operates safely, efficiently, and accurately;
4. Is safe from fraudulent or unauthorized manipulation;
5. Permits voting on all offices and measures to be voted on at the election;

CONDITION

The examiners were concerned about the "bleed-through" on the ballot that is possible when ballots are marked with a felt tip pen, such as a Sharpie. The vendor must emphasize in its user manuals that black medium ball point pens must be distributed for use at the polling place, and counties adopting the Model 100 must ensure that black medium ball point pens are included with the precinct election supplies.

CONCLUSION

Accordingly, based upon the foregoing, I hereby certify Model 100 Optical Scan Voting System v. 5.0.0.0 for use in elections in Texas, subject to the above condition.

Signed under my hand and seal of office, this 24th day of August, 2004.

Luis Saenz
Assistant Secretary of State

DEPARTMENT OF INFORMATION RESOURCES

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February 2, 2004

Ms. Ann McGeehan
Deputy Assistant
Office of the Secretary of State
1019 Brazos Street
Austin, TX 78701

RE: Examination of Voting Hardware and software from Diebold Election Systems

Dear Ms. McGeehan:

I attended a scheduled examination January 9, 2004, at 9:30 am, for the purpose of examining the Global Election Management Systems (GEMS) software and changes to Ballot Station firmware produced by Diebold Election Systems. The report below summarizes my findings.

Voting Systems Versions

Hardware/Software Version
GEMS 1.18.18
GEMS 1.18.18.114
Ballot Station 4.3.15.C

Results of the examination

Core functionality of GEMS has not changed. The vendor made changes to the vote tallying software that improves handling of challenged votes. The changes reduce the possibility of conflicting or confusing challenged ballot identification numbers. The possibility was already rather small, and the change eliminates the chances for all practical purposes.

In addition, the vendor added the ability to change supervisor card Personal Identification Number (PIN) for each election. This adds another small measure of security to elections administration.

Voting was straightforward and quite easy. The user interface is one of the best in the field. However, the colors of the opening (sign-on) screen for the voter made it difficult for this examiner to read. It is suggested that the vendor change the size of the characters or the colors to make it a little easier for the voter to start using the system.

The challenge/provisional ballot functions appeared to count ballots correctly and to delete specific challenged ballots.

Recommendations

It is strongly suggested that the company provide a comprehensive change log that accounts for *all* changes, large or small, the vendor has made since the prior examination. At this time, the Department of Information Resources (DIR) finds no objections to certifying the system as presented at this examination.

Respectfully,

Nick Osborn
Systems Analyst

MM:NO:sk

Diebold Election Systems

The Diebold system was examined in Austin on January 9, 2004. The system is made up of three sub-systems. The names and current releases are as follows:

Accuvote-TS - version 4.1.15 – DRE voting machine
GEMS- version 1.18.18 – Election preparation, tally and reporting system

The main change to system was to provide a provisional ballot capability. The system worked well accept that if more than one DRE is used in a precinct for provision ballots, the unique number used to flag the ballot may be duplicated across machines. The DRE's machines are stand-alone machines (not networked). consequently, there in no way to prevent this programmatically.

During the examination, the same "provisional ballot" number was used on two different DRE's. Provisional ballots are not counted in the DRE. When the ballots are tallied in GEMS, the provisional ballot are displayed so that the operator can accept or reject the ballot. There is no way to determine which ballot to accept if two ballots have the same "provisional" number.

However, this can be prevented procedurally: issue a sheet to each polling place with a random list of unique numbers on tear-off stickers so that a poll worker cannot issue the same number twice. The GEMS election setup software could provide this functionality.

Another change to the system allows a jurisdiction to change the supervisor card PIN. The PIN was previously hard-coded into the program. This is a security enhancement.

Conclusion

The system worked efficiently and accurately and appears to meet the standards outlined in the Texas Election Code. However, I cannot recommend certification of the system without the following:

1) A complete list of all the changes, functional and technical, since the last certified release. The changes can be reviewed to determine if further examination is required.

2) A demonstration of GEMS ability to handle multiple simultaneous inputs from at least two precincts. The demonstration does not require the full examination board.

Tom Watson
Examiner

Voting System Examination
Diebold Election Systems

Prepared for the
Secretary of State of Texas

James Sneeringer, Ph.D.
Designee of the Attorney General

This report is the findings of the Attorney General's designee from an examination of the equipment listed above, pursuant to Title 9, Chapter 122 of the Texas Election Code, section 122.036(b).

Examination Date	January 9, 2004
Report Date	January 19, 2004

Components Examined

Purpose	Component	Version	NASED Number
Election Setup & Tabulation	Global Election Management System	1.18.18	N03060011818

Voting

- The voting stations used to demonstrate GEMS were version 4.1.15.0, which is already certified in Texas.
- Although 4.1.15.0 was not formally being presented for examination, we did verify the provisional ballot feature that was already present when 4.1.15.0 was certified, but was not tested at that time.
- We also saw that the Voter Card Encoder was capable of supporting provisional ballots.

Election Setup	PCMCIA card. Nothing is pre-programmed in the terminals; all the election information is in the PCMCIA card.
Zero-total report	On the thermal printer.

Authorization to vote / Ballot selection	Voter cards (PCMCIA cards), which authorize voting, are generated by • A handheld Voter Card Encoder, which can handle up to 8 ballot styles, • A laptop running VC Programmer software, or • An AccuVote R6 (occasionally). A manager card is used to authorize a machine to generate voter cards. The voter cards are automatically erased after voting, so they cannot be reused. The manager card and password authorize someone to perform any operation that the R6 is capable of, including clearing elections (although the last copy is never erased). There is no hierarchy of management functions.
View / Vote	LCD display / touch screen
Vote Storage	Internal flash memory and on the PCMCIA card.
Precinct Consolidation	Any R6 can accumulate results from other R6 devices in the same precinct, and forward all the results to election central in a single modem call. The R6 has a real-time audit printer.
Transfer Results	PCMCIA cards or a modem.
Print precinct results	On the thermal printer
Straight party / crossover	Yes. Canceling a straight-party vote does not affect any crossover votes.
Provisional Ballots	The poll worker can designate a ballot as provisional and enter a number that will identify the ballot so it can later be included in or excluded form the count. The voting station will verify that the ballot ID is a valid one, preventing most entry errors.
ADA	Yes, but ADA capability is verified separately by the Secretary of State's office, so it was not demonstrated to the examiners.
Note	Each R6 is an independent stand-alone system, which can communicate with other stations or election central only when the polls are closed.

Election Setup / Tabulation

Results Storage	Encrypted, proprietary database on the hard drive.
Tamper Resistance	The OS is locked down during tabulation and the data is encrypted.
OS access	None during tabulation.
Real-Time Audit Log	Yes.
Transaction Processing	They use the transaction processing/rollback feature in the Microsoft Jet database to ensure that data remains consistent in the database.

Changes in 1.18.18

- Support for provisional ballots.
- Bug fixes.

Concerns

1	Although Diebold's support for provisional ballots worked correctly, the voting stations will accept multiple provisional ballots with the same identifying number. If multiple ballots in the same precinct were to have the same ID, it would be necessary to count all or none of them. Notes: • Diebold has already programmed their voting stations to reject a second provisional ballot with the same ID number, but they were not prepared to certify it and do not expect it to be certified in Texas until May. • Even when this change is introduced, it will be possible to vote multiple provisional ballots with the same ID number if they are voted on different stations, because the voting stations are not connected to each other during voting, and therefore cannot detect this error. **Recommendations.** Certification should carry the following conditions: a) This procedure should be used: Labels should be preprinted with unique provisional ballot IDs. When an ID is used, its label should be removed and placed on the documentation in the provisional envelope, thus preventing its accidental re-use. As a secondary procedure, it would be good to either record the voting station used as part of the documentation of the provisional ballot, require all provisional ballots to be cast on the same station, or both. b) After January 1, 2005, GEMS 1.18.18 should only be permitted to be used with voting stations that reject duplicate use of the same provisional ballot ID.
2	The precinct totals printed at the polling place do not show the number of provisional ballots cast. This number can be calculated by subtracting the values of two of the totals that are reported, but it is confusing. An election worker might easily think that the machine was broken, rather than realizing that the difference is due to provisional ballots. **Recommendation.** The number of provisional ballot should be printed on the tape, and Diebold should review the tape messages for clarity (especially the way the results are labeled) in light of the new provisional ballots.
3	In the future, the Voter Card Encoder should be explicitly listed as a component to be examined, and its version should be reported on Form 100.

The State of Texas

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Geoffrey S. Connor
Secretary of State

MEMORADUM

TO: Ann McGeehan
Elections Division Director

FROM: Glenn Glover
Voting System Examiner

DATE: January 21, 2004

A voting systems certification examination was held at the Office of the Secretary of State Elections Division on Friday morning, Jan. 9, 2004.

Diebold Election Systems Inc. submitted their Global Election Management System (GEMS) 1.18.18 for examination and certification to the State of Texas examination board.

The initial demonstration was to prove the new functionality of the revised GEMS software to identify and segregate a ballot image designated as "challenged" from the other valid "non-challenged" ballot images.

GEMS indeed differentiated and presented the challenged ballot images to the GEMS screen for an operator to accept or reject. GEMS's challenged ballot presentation screen listed all challenged ballots in a table format with each challenged ballot represented in a record and assigned a key number. During testing the examiners noted that the challenged ballots displayed in GEMS had duplicate key numbers assigned to them. With duplicate key numbers assigned, there is no logical way to differentiate challenged ballots from each other. The challenged ballot number assignment occurs when a poll worker programs a number into the voter card encoder unit needed to program a smart card that allows the AccuVote-TS R-6 Touch screen DRE version 4.1.13 to record a challenged vote. A poll worker could conceivably use the same number twice which would be associated with the challenged votes entered into the AccuVote-TS R-6 Touch screen DRE version 4.1.13. After the vote is cast on the AccuVote-TS R-6 Touch screen DRE version 4.1.13, and all voting is completed, the ballot image data is loaded into GEMS.

The AccuVote-TS R-6 Touch screen DRE version 4.1.13 should have prevented duplicate reference numbers from being assigned to challenged ballots. The 2002 certification of the AccuVote-TS R-6 touch screen DRE 4.1.13, did not require challenged ballot functionality therefore it was not evaluated. However, todays Texas voting system standards do require this functionality

Diebold then suggested that the examination board certify the Touchscreen Ballot Station 4.3.15 (which they had available for evaluation) and decertify the 4.1.13. The key differences between the 4.1.13 version and the 4.3.15 version are that it does not allow duplicate reference numbers to be assigned to challenged ballots and the audio files are stored in mpeg file format instead of the PCM file format. The board examined the Touchscreen Ballot Station 4.3.15 and found that it indeed did not allow duplicate numbers to be assigned to challenged ballots. Subsequent testing also found that the Touchscreen Ballot Station 4.3.15 operated accurately and is in compliance with Texas Voting Systems standards. One recommendation for enhancing the Touchscreen Ballot Station 4.3.15 is to display the party affiliation on each contest, within the vote summary screen, when a voter makes a straight party vote.

I recommend that GEMS version 1.18.18 and the Touchscreen Ballot Station 4.3.15 be certified for use in Texas. I also recommend the decertification of the AccuVote-TS R-6 touch screen DRE version 4.1.13 because of it inability to prevent duplicate reference numbers from being assigned to challenged ballot images.

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January 12, 2004

Ann McGeehan
Director of Elections
Secretary of State
P.O. Box 12060
Austin, Texas 78711-2060

Re: Diebold Election Systems GEMS V. 1.18.18 and TCBS V. 4.1.15.0 modifications to accommodate challenge ballot

Dear Ms. McGeehan:

Pursuant to my appointment as an examiner under §122.035, Texas Election Code, I attended an examination on Friday, January 9 2004, for the purpose of examining the above referenced TCBS V. 4.1.15.0 functioning on the AccuVote TSR6. In addition, GEMS V. 1.18.18 as modified to function and tabulate ballots cast using TCBS V. 4.1.15.0 was examined. The modifications to both systems were represented as having been made for the purpose of providing for challenge or provisional ballots. At that time, Diebold made a presentation and the examiners asked questions and examined the use and function of the AV-TSR6, using TCBS V. 4.1.15.0, and tabulated the results of a test election using GEMS 1.18.18.

In that examination, I relied upon representations of Diebold concerning operation of the software and electronic components. Those representations were made during an extended examination and were considered together with those contained in the printed materials for GEMS 1.18.18, and related materials previously provided by Diebold for prior examinations. Other than examining the materials provided, observing the demonstration, participating in the casting and tabulating of ballots, presenting questions and observing the response of Diebold to my questions and those presented by the other examiners, I did not conduct an independent examination of the software or the electronic components.

This report is concerned solely with the ability of the TCBS V. 4.1.15.0 functioning on the AV-TSR6, and GEMS V. 1.18.18 used at election central to tabulate votes, to comply with Texas Election

Law. No opinion is expressed regarding the suitability of the system for the purposes of or use by any jurisdiction. TCBS V. 4.1.15.0 is software that operates the AV-TSR6, a voting machine and voting system equipment. GEMS V. 1.18.18 is the operating system for an electronic voting system (including tabulation) as those terms are defined in § *121.003, Tex. Elec. Code.*

AV-TSR6. Use as a voting station. The AV-TSR6 was previously certified. The AV-TSR6 is a DRE device that allows a voter to vote by touching the LCD Screen. **TCBS V. 4.1.15.0 Operating System.** TCBS V. 4.1.15 the current operating system for the AV-TSR6 was previously certified. That version was modified to provide for challenge or provisional ballots, and is now TCBS V. 4.1.15.0.

The AV TSR6 operating on TCBS V. 4.1.15.0 automatically prints a zero total votes tape when the election is opened, and prints a full report tape at the close of voting. Such precinct report tape accurately reported the votes cast, provided that the provisional ballots are not included in the vote totals for the precinct. In this respect, no listing of "provisional ballots" is reported on the tape, rather the number of ballots recorded (inclusive of the number of provisional ballots) is shown at the top of the tape, the number of ballots actually cast is shown below in the precinct report. The provisional ballots are not actually cast and recorded until a determination is made that the voter was qualified to vote.

Diebold provided only one AV TSR6 for precinct level voting. As a result, we were unable to examine whether or not the software changes made to result in TCBS V. 4.1.15.0 resulted in any problem with more than one AV TSR6 voting station serving a precinct, or combining the results from more than one voting station to obtain the precinct report. However, the system as previously certified did perform these tasks in compliance with the Election Code. It also appears that additional procedures will be necessary to assure the challenge ballot functions in compliance with Chapt. 122.

An identification number is assigned to persons that are given a provisional or challenge ballot, in order that the ballot can be identified if the person is found not to be qualified to vote. Upon the voter receiving the number, the information on that voter is placed in an envelope and identified with the assigned number. TCBS V. 4.1.15.0 will currently permit the same number to be used multiple times in the same voting station. The possibility then exists that more than one provisional voter can be given and use the same number to vote, resulting in an inability to separate permitted ballots from those that are not later found to be by a qualified voter. In this respect, Diebold advised that the soon to be examined V. 4.1.15.C. prevents the same number from being used in the same voting station, but permits the same number to be used

in any other voting station at the precinct. As a result, additional procedures should be required to assure that a number assigned to a provisional ballot is assigned only one time during each election at each precinct.

Modifying TCBS V. 4.1.15.0 to prevent the same provisional ballot number from being used more than once in any one voting station, will provide some added level of safety. However, if TCBS V. 4.1.15.0 is certified by the Secretary, it is recommended that procedures require each precinct to be provided with pre-printed stickers, each containing a different number for assignment to a provisional ballot voter, that are required to be placed on the envelope containing the identification and information on the voter. In this manner, there should be little opportunity for more than one provisional voter to be assigned the same number.

Recommendation TCBS V. 4.1.15.0. Given the possibility that problems with the changes to V. 4.1.15 could arise only with the use of multiple voting stations at the precinct level, or the producing of a precinct report from multiple voting stations, and the fact the assigned provisional number can be used more than once, I have reservations concerning certification. Although the version as examined appeared to be satisfactory, excluding the ability to use one provisional ballot number for all the provisional ballots, the function of V. 4.1.15.0 with multiple voting stations warrants review. As a result, I recommend the Secretary consider having staff members examine the function of V. 4.1.15.0 with the use of multiple voting stations as a precinct level set-up. If that review is acceptable, I recommend the Secretary consider granting a conditional certification to TCBS V. 4.1.15.0, to expire December 31, 2004. If granted, I recommend such conditional certification include specified procedures regarding the provisional ballot and require sequentially numbered stickers to be issued to each polling place for use only when a provisional ballot is issued. The procedures should require that such sticker be placed on the envelope applicable to the voter obtaining the provisional ballot, be recorded as an assigned number, and be entered by the Voter into the AV TSR6 for the voter to receive a provisional ballot.

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1.18.18. I recommend that GEMS V. 1.18.18 be certified as meeting the requirements of Chapt. 122, Subchapt. A, Texas Election Code.

Very truly yours,

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Very truly yours,

Barney L. Knight