The State of Texas

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Carlos H. Cascos
Secretary of State

REPORT OF REVIEW OF HART INTERCIVIC's VERITY 2.0 VOTING SYSTEM

PRELIMINARY STATEMENT

On June 29th and 30th, 2016, Hart InterCivic, Inc. (the "Vendor") presented Verity Voting 2.0 Voting System for examination and certification ("Verity 2.0"). 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. Stephen Berger, an expert in electronic data communication systems;
2. Mr. Tom Watson, an expert in electronic data communication systems;
3. Mr. Brandon Hurley, an expert in election law and procedure; and
4. Ms. Christina Worrell Adkins, an expert in election law and procedure.

Pursuant to Section 122.035(a), the Texas Attorney General appointed the following examiners:

1. Dr. Jim Sneeringer, an expert in electronic data communication systems
2. Ms. Amanda Crawford, Texas Attorney General's Employee.

On June 29, 2016, Mr. Berger, Mr. Watson, Dr. Sneeringer, and Ms. Adkins witnessed the installation of the Verity 2.0 software and firmware that the Office of the Texas Secretary of State (the "Office") received directly from the Independent Testing Authority. Ms. Adkins examined the accessibility components of the Verity Touch Writer and Verity Touch with Access. Also, Mr. Tim Juro, a staff attorney with the Office, reviewed the accessibility components of the Verity Touch Writer and Verity Touch with Access.

On June 30, 2016, the Vendor demonstrated the system, answered questions presented by the examiners, and test ballots were then processed on each voting device. Each examiner attended. The results were accumulated and later verified for accuracy by the Secretary of State staff.

Other members of the Office of the Texas Secretary of State's Elections Division staff and other staff from the Office of the Attorney General were present at various points during the two day examination. Examiner reports on the system are attached hereto and incorporated herein by this reference.

On August 31, 2016, a public hearing was conducted in which interested persons were given an opportunity to express views for or against certification of the system.

BRIEF DESCRIPTION OF VERITY 2.0

With the exception of Verity Data, Verity Controller, Verity Touch and Verity Touch with Access, the products listed below are upgrades to previous qualified versions of either hardware and/or software that have been certified for use in the State of Texas.

The Verity 2.0 Voting System has been evaluated at an accredited independent voting system testing laboratory for conformance to the 2005 Voluntary Voting System Guidelines (VVSG). It has received Elections Assistance Commission (EAC) # HRTVerity2.0 on April 27, 2016. The components of Verity 2.0 include:

Component	Version	Description
Verity Build	2.0.2	Election definition software application
Verity Central	2.0.2	Central scanning software
Verity Count	2.0.2	Central count tabulation and reporting software application
Verity User Management	2.0.2	User Management Software application
Verity Election Management	2.0.2	Data Management Software application
Verity Desktop	2.0.2	Workstation management software
Verity Scan	2.0.3	Digital scanner (precinct scanner) (firmware)
Verity Touch Writer with Access	2.0.3	Ballot Marking device with audio/tactile interface
Verity Data	2.0.2	Election definition software application
Verity Controller	2.0.3	Controller unit for Verity Touch/Verity Touch with Access
Verity Touch	2.0.3	Direct recording electronic voting machine (DRE)
Verity Touch with Access	2.0.3	Controller for Verity Touch DAU unit

FINDINGS

The following are the findings, based on written evidence submitted by the Vendor in support of its application for certification, oral evidence presented at the examination, Texas voting system examiner reports, comments received at the public hearing held on August 31, 2016, and written public comments received.

The majority of the public comments received regarded the Verity Touch direct recording electronic (DRE) voting machine not producing a Voter Verified Paper Audit Trail (VVPAT). There is no federal or state law requiring VVPAT, and therefore, is not a requirement for certification. There were a number of other comments expressing concern that the Verity Touch DRE did not meet the requirements of the Texas Constitution in regards to the numbering of ballots. The Verity Touch DRE numbers ballots through the public counter, which is the method of numbering ballots prescribed by state law, and meets the requirements of the Texas Constitution. There were a number of comments regarding the requirements of the Texas Election Code in regards to the storage of ballot images and use of ballot images in a recount. The Verity Touch meets the requirements of storing

and producing ballot images, which are the electronically produced records of all votes cast by a single voter. In addition, there were a number of public comments received requesting an additional time to review the examiner reports and other materials. The Secretary of State provided more than the ten days after the date of the public hearing for written public comments required under 1 T.A.C. § 81.60, permitting comments outside the ten day public comment period, until November 30, 2016, to allow any interested persons to submit comments.

Each component of Verity 2.0, among other things:

1. Preserves the secrecy of the ballot;
2. Is suitable for the purpose for which it is intended;
3. Operates safely, efficiently, and accurately and complies with the voting system standards adopted by the Election Assistance Commission;
4. Is safe from fraudulent or unauthorized manipulation;
5. Permits voting on all offices and measures to be voted on at the election;
6. Prevents counting votes on offices and measures on which the voter is not entitled to vote;
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, prevent 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.

CONDITIONS

During the examination of the system, some examiners identified certain aspects of Verity 2.0 they thought might be improved, though each examiner recommended certification notwithstanding these aspects. There is only one condition on certification:

1. Precinct devices used during early voting by personal appearance, and central accumulators, pursuant to 1 T.A.C .§§ 81.52(h) and 81.62(a), are required to attach continuous feed audit log printers. Due to 1 T.A.C. §§ 81.52(h) and 81.62(a), end-users shall not use Verity Scan 2.0.3 as (1) a precinct device during early voting by personal appearance or (2) a central accumulator.

CONCLUSION

Accordingly, based upon the foregoing, I hereby certify Verity 2.0 for use in elections in Texas, subject to the above condition.

Signed under my hand and seal of office, this 15th day of December 2016.

Coby Shorter III

COBY SHORTER, III
DEPUTY SECRETARY OF STATE

KEN PAXTON
ATTORNEY GENERAL OF TEXAS

July 29, 2016

Mr. Keith Ingram
Director of Elections, Texas Secretary of State
Elections Division
P.O. Box 12060
Austin, Texas 78711-2060

Re: Hart InterCivic Verity 2.0 System – June 29 and 30, 2016, Examination

Dear Mr. Ingram:

Pursuant to Texas Election Code §122.036 and 1 Texas Administrative Code §81.60, by this letter I am transmitting my examiner's report for the Secretary of State's ("SOS") June 29th and 30th, 2016, voting system examination. The subject of that examination was Hart InterCivic's Verity 2.0 system ("Hart").

The factual background for this report includes Hart's presentation to the examiners made during an examination at the Secretary of State's office, statements made by Hart's representatives during that examination, and e-mail answers to follow-up examiner questions sent by Hart to SOS and then forwarded to the examiners.

Both during and after the examination, the examiners raised specific concerns about legal compliance of the Verity system. After a thorough review of the system as well as the relevant laws and applicable rules, the Office of the Attorney General concludes there are no legal compliance issues with the Verity 2.0 system. Thus, we recommend certification of Verity 2.0.

Sincerely,

Amanda Crawford

Amanda Crawford
Deputy Attorney General for Administration and General Counsel
Office of the Attorney General

cc: Examiners
Christina Adkins, SOS

KELLY HART

BRANDON HURLEY
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TELEPHONE: 817-878-3542
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August 2, 2016

Mr. Keith Ingram
Director of Elections
Texas Secretary of State
Elections Division
208 East 10th Street
Austin, Texas 78711

VIA EMAIL

Re: Inspection of Hart Verity 2.0 System Application on June 29th and 30th, 2016

Dear Mr. Ingram:

Pursuant to my appointment by the Texas Secretary of State as a voting systems examiner under TEXAS ELECTION CODE § 122.035, please allow this letter to serve as my report concerning the above referenced examination. All of the statutory examiners and various members of the Secretary of State staff examined the Hart InterCivic Verity 2.0 voting system on June 29th and 30th of 2016, at the offices of Elections Division of the Texas Secretary of State in Austin, Texas.

We examined the above referenced software and equipment (collectively referred to herein as "the Hart 2.0 System") for compliance with the relevant provisions of the TEXAS ELECTION CODE and Texas Administrative Code related to the requirements for election machines and software. I also reviewed the written materials submitted by Hart for compliance with the TEXAS ELECTION CODE and Texas Administrative Code requirements for voting equipment.

ACCESSIBILITY TESTING

The examiners and staff tested the physical equipment for the Hart 2.0 System, including different voting terminals and accompanying software for accessibility compliance with the applicable state laws and regulations. All of the equipment and software complied with requirements set out in the applicable statutes and regulations for accessibility for voters with physical disabilities.

TESTING OF HARDWARE AND SOFTWARE

Hart officials explained the new 2.0 system. This system was an upgrade of many of the elements of the Hart Verity 1.0 system. For this reason, all the components of the 1.0 system that were carried over to the 2.0 system have already been examined (and certified). The new portions of the system in included a new DRE device and other improvements. Examiners cast a

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Kelly Hart & Hallman, a Limited Liability Partnership | www.kellyhart.com

script of paper ballots on each voting machine into the optical scanners. The mock votes were tabulated and sorted with the Hart software.

OBSERVATIONS

General Compliance with Texas Election Code. Each of the separate pieces of hardware and software examined that were used for actually casting a ballot complied with t requirements listed in §§ 122.001 *et seq.* of the TEXAS ELECTION CODE and the related regulations in Texas Administrative Code

Use of COTS printers and scanners. Different from other vendors, Hart allows commercial over-the-counter printers and scanners to be used in its system. Initially, this caused me some concern simply because it would appear that it would create an opportunity for security breaches and simple human errors. However, these concerns were later alleviated when it was shown that the applicable software provides adequate safeguards that would prevents any issues with the use of COTS devices.

Internal Audit Logs. The internal audit logs of the Hart 2.0 System present an upgrade from previous systems. Improved digital signatures and ability to run audit reports from each device make the security and utility of the logs better than in past versions.

Distinction of Functions of "Count" vs. "Central". I was also initially confused by the function of the "Count" portion of the system as process to only ***count*** case ballots, *but not tabulate them.* The name clearly suggests this, but the fact that "Central" is the location where ballots are actually tabulated is something that should be made clear to the end-user of the Hart 2.0 System to ensure no one has unreasonable expectations about what the various components of the system will do in the field.

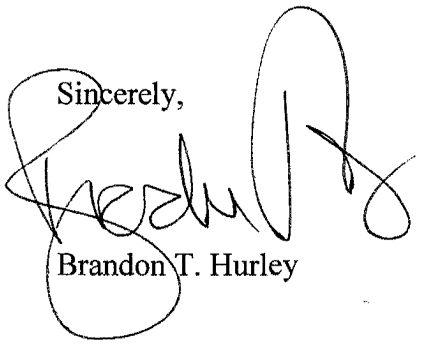
CONCLUSION

Based on the examination and review of the materials, it is my opinion that the Hart 2.0 System meets the requirements of Texas law and the applicable administrative rules.

This report should not be construed as a comment on any of the technical aspects of the Hart 2.0 System except as expressly stated herein. In the event any of the equipment, software or security devices examined are altered, changed or decertified by any accrediting agency (other than a "minor modification qualified for administrative certification process" as that term is defined in § 81.65 of the Texas Administrative Code), this report should be considered withdrawn.

Thank you for the opportunity to serve as an examiner and participate in this important process that protects the integrity of Texas' voting systems.

Sincerely,



Brandon T. Hurley

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Carlos H. Cascos
Secretary of State

MEMORANDUM

TO: Keith Ingram, Director of Elections, Secretary of State's Office

FROM: Christina Worrell Adkins, Staff Attorney, Elections Division Legal Section

DATE: July 30, 2016

RE: Hart InterCivic Verity 2.0 Voting Systems Examination

On June 29-30, 2016, Hart InterCivic ("Hart") presented for examination Verity Voting 2.0. This system includes both components that were certified under Verity Voting 1.0 and new components that had never been through the Texas certification process.

Component Submitted for Certification	Version	Previous Texas Certification
Verity Build	2.0.2	2/26/2016
Verity Central	2.0.2	2/26/2016
Verity Count	2.0.2	2/26/2016
Verity User Management	2.0.2	2/26/2016
Verity Election Management	2.0.2	2/26/2016
Verity Scan	2.0.3	2/26/2016
Verity Touch Writer with Access	2.0.3	2/26/2016
Verity Data	2.0.2	N/A
Verity Controller	2.0.3	N/A
Verity Touch	2.0.3	N/A
Verity Touch with Access	2.0.3	N/A

Pursuant to Texas Administrative Code §81.60, Hart submitted their application for state certification, Forms 100 and 101, authorization letters, and a copy of all firmware/software and source codes sent directly from SLI Global Solutions, a nationally accredited voting system test laboratory. Examiners were given a copy of the application and testing materials for review prior to the two-day in-person examination that occurred on June 29 and 30, 2016.

Examination

On Day 1 of the examination, the technical examiners, Stephen Berger, Tom Watson and James Sneeringer, were present to observe and verify the installation of the vendor's software. I was present for observation purposes, but did not participate in the installation portion of the exam. In addition to observing the installation of the software, the technical examiners also verified version numbers of the software and component parts. On request from the technical examiners, Hart also presented information related to how data flows through the system and what security and reliability protections exist within the system.

After the installation was completed, I received assistance from Secretary of State Staff Attorney Tim Juro with testing the Verity Touch Writer with Access and Verity Touch with Access for compliance with state and federal accessibility guidelines. After reviewing and testing the tactile, audio, and visual input devices and approaches to marking and casting a ballot, we determined that both devices met the accessibility guidelines dictated by both federal and state law.

On Day 2 of the examination, all examiners were present. The vendor presented an overview on the Verity system and the component parts that were part of the certification examination. The vendor also provided an explanation of the differences between Verity 1.0 and Verity 2.0. Examiners were then given the opportunity to test each piece of equipment with a pre-marked "test deck" of ballots to ensure that the equipment performed the tasks required under state law and accurately tabulated the ballots cast. The vendor was not previously made aware of how the ballots would be marked. Ballots were cast by the examiners using Verity Touch with Access, Verity Touch, and Verity Scan. Additional pre-marked ballots were scanned using Verity Central. Write-ins were adjudicated using both Verity Count and Verity Central, and the final tabulation for all ballots was completed using Verity Count. The pre-marked test deck was marked and hand tallied by staff from the Secretary of State's office on ballots provided by the vendor. The tabulation report from Verity Count matched the hand tally of the pre-marked test deck that was completed by the Secretary of State's office.

Notable Findings:

1. **Correction to Invalid vDrive issue in Verity 1.0.3**: In the examination of Verity 1.0 that occurred in September 2015, the examiners discovered that when certain ballots were scanned on Verity Central and the write-in votes were also adjudicated on Verity Central, a problem would occur when the corresponding vDrive was read into Verity Count. A message would indicate that the vDrive was invalid. Hart subsequently resolved the error prior to the issuance of the Verity 1.0 certification order. To ensure that this issue did not carry over to Verity 2.0, a test deck was prepared that was identical in voter selections to the test deck that discovered the error in Verity 1.0. This test deck was scanned on Verity Central and the write-in votes were adjudicated in Verity Central as well. There were no issues reading the corresponding vDrive into Verity Count. The vendor demonstrated that this issue had been adequately resolved; therefore, I do not see that this issue poses any risks to the certification of Verity 2.0.

2. **Improvements to Audit Logs**: During the Verity 1.0 exam, the examiners noted that while the internal audit logs had improved in readability and format, we would still like to see some improvements in this area with respect to how accessible the audit logs were for post-election review. In Verity 2.0, the vendor made improvements to this area as all audit logs can now be exported into PDF or CSV formats.

3. **Cumulative Voting:** Verity 2.0 now supports a true cumulative voting scenario. While cumulative voting is not widely used in Texas Elections, there are some entities that still require this type of vote selection. Previous voting systems had been able to allow for this type of voting through modified ballot programming and vote selections. However, in Verity 2.0.3 the process has been simplified and is more streamlined.

CONCLUSIONS

Over the course of the two-day in-person examination, and in the review of the materials that were contained in the vendor's application, there was no evidence that Verity 2.0 and its components failed to comply with the Voting System Standards outlined in Sections 122.001, 122.032, 122.033, and 122.0331 of the Texas Election Code or the rules outlined in Chapter 81, Subchapter C of the Texas Administrative Code.

Overall, Verity 2.0 met the requirements prescribed by the Texas Election Code, and the Texas Administrative Code that pertain to voting system certification. Therefore, I recommend certification of the aforementioned system.

Voting System Examination
Hart Verity 2.0

Prepared for the
Secretary of State of Texas

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

This report conveys the findings of the Attorney General's technical 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: June 29-30, 2016
Report Date: July 30, 2016

Component	Version
Verity Data	2.0.2
Verity Build	2.0.2
Verity Central	2.0.2
Verity Count	2.0.2
Verity User Management	2.0.2
Verity Election Management	2.0.2
Verity Desktop	2.0.2
Verity Scan	2.0.3
Verity TouchWriter w Access	2.0.3
Verity Controller	2.0.3
Verity Touch	2.0.3
Verity Touch with Access	2.0.3

The version numbers of the equipment examined matched those above.

System Summary

Overview. The Verity system comprises equipment for the polling place (Verity Scan, TouchWriter with Access, Controller, Touch, and Touch with Access), software components that run under Windows (the remaining components listed above), and commercial-off-the-shelf (COTS) components (such as computers, high-speed scanners, and utility software).

New Since the Last Exam (on Dec. 13, 2015)

- The "Invalid vDrive" bug (which was discovered in the last examination) has been fixed.
- The Verity Verify system now has a DRE (a *direct-recording electronic* voting machine), the Verity Touch and Touch with Access.
- The Verity Touch has support for provisional electronic voting.
- The new Verity Data provides a graphical user interface for creating and managing election definitions.
- There is full support for cumulative voting.
- Reporting has been improved.

Security

Image Verification. To verify that the Build, Central, Count, User Management, Election Management, and Desktop software we tested is exactly the same as that certified by the Election Assistance Commission (EAC), the Secretary of State obtained the software images directly from the EAC. The software was then decompressed, loaded, and configured by Hart personnel under the supervision of the technical examiners, thus maintaining the chain of custody. This software is normally delivered to customers on hard drives that are pre-installed in the machines.

There is also a procedure that allows the county to verify that the software has not been tampered with. This is done by creating a manifest containing hashes of the files that the system comprises. The hashes are then compared with those on a manifest downloaded from the National Software Reference Library. If the hashes are the same, the files are also.

Verity Keys are USB drives used to control access to various parts of the Verity system. They contain no election data, and are used solely to restrict access to only those people who have the appropriate Verity Key. To gain access, the authorized person must insert the Verity Key and also enter a password. Verity Keys are not used in polling places, where only a user id and password are needed.

Election Setup

Election Definition. An election definition (containing races, candidates, etc.) is normally created with Verity Data. This is different from Verity 1, where the election definition was imported from a text file in XML format.

Verity Build. The election definition is then read by the Verity Build program, which allows the county to (a) proof the election, (b) proof the

layout of ballots, (c) print ballots or create PDF files to send to a printer, (d) create Verity Keys, and (e) create vDrives (see next paragraph).

The election definition is carried from Verity Build to other components on *vDrives*, which are USB drives that are easily distinguishable from Verity Keys by color. All vDrives contain the entire election definition and any vDrive for the election can be used to convey the election definition to any Verity device. For example, vDrives are used in polling places to initialize devices such as Verity Touch or TouchWriter.

When voting is over, the vDrives convey any cast-vote records and logs to the location where they will be counted.

Verity User Management manages users – their passwords and the parts of the Verity system they have access to. For the more sensitive parts of the system, a Verity Key is required in addition to a username and password.

Verity Desktop has three functions that it performs on central computers, such as the one that runs Verity Build or Verity Count. It sets the system clock, exports file hashes to a removable drive for verification that the files have not been tampered with. It also allows Hart personnel to have access to the operating system using a pass code. This is for maintenance, such as installing device drivers. (For security, Verity computers used in the central-count office are run in *kiosk mode,* denying access to the operating system to anyone who does not have the pass code.)

Voting

There are three ways of voting:

- By hand-marking a paper ballot,
- On a Verity TouchWriter, or
- On a Verity Touch DRE.

Verity Touch/Controller. Verity Touch is a DRE, or direct-recording electronic machine. Up to 12 of these can be connected to a single Verity Controller. The Verity Controller allows pollworkers to enter a voter's precinct and split, and generate a five-digit code that the voter can then use to vote on any connected Verity Touch.

TouchWriter. The TouchWriter allows the voter to make selections and then prints a marked ballot. The TouchWriter does not record the votes, except (of course) on the marked ballot that it prints.

Voting on the TouchWriter can be done using the touch screen, but there is also support for disabled voters, such as audio, paddles, and sip-and-puff. Support for disabled voters was tested by the Secretary of State, and is not covered by this report.

The TouchWriter seemed well-designed and easy to use. It presents one electoral race at a time to the voter, which in my opinion is the best method. It does, however, have one behavior which I found confusing. See item 1 under 'Concerns.'

Each voter who wants to vote on a TouchWriter must be authorized by a poll worker who physically walks to the TouchWriter, enters a password to gain access, and then selects the voter's precinct. In my opinion, this awkward procedure makes it impractical to have many TouchWriters in use at the polls. When several voting stations are required, the Verity Touch DRE is preferable. Where voting is primarily on paper ballots, TouchWriters allow private voting for those who are unable to mark a paper ballot, although they are not limited to that use.

Each TouchWriter is paired with an OKI model B431d printer. This is a duplex (two-sided) printer that prints the user's ballot along with his choices. As with most duplex printers, the paper comes almost all the way out of the printer during the printing of the first side. Then it is pulled back in for printing of the second side. We observed that every examiner who tested the TouchWriter would instinctively reach to receive the half-printed ballot from the printer, so we tested forcibly pulling the half-printed ballot completely out. The TouchWriter responded to this event exactly as it should. It (1) showed the voter an error message, (2) waited for a poll worker to retrieve the spoiled ballot and clear the error, and finally (3) automatically re-printed the ballot. It responded equally well to other unusual events, such as the printer's losing power or running out of paper.

Verity Touch is the DRE of the Verity family. It behaves just like the TouchWriter, with the following exceptions:

- It directly records the voter's choices, instead of printing a paper ballot.
- Pollworkers authorize voting using a connected Verity Controller, where the voter's precinct and split are entered. The Verity Controller then prints a five-digit code that the voter can use to vote on any connected Verity Touch.

Concern number 1 below applies to the Verity Touch as well as the TouchWriter.

Verity Scan. Hart also offers Verity Scan, which can be used to scan ballots in the polling place and store cast-vote records for later tabulation.

Components. Verity Scan, Touch, and TouchWriter share many common components. For example, they can be collapsed into almost identical units that look like small suitcases. Although they are identical in size they are easily distinguishable from each other. They also fit on identical stands. Most importantly, they share identical *tablets*, which is what Hart calls the component that contains the touch screens. Any tablet can be mated with either a TouchWriter or a Verify Scan.

Access to these components is controlled with user names and passwords created and maintained by Verity User Management.

Tabulation, Reporting, and other Central Activities

Verity Central does ballot scanning, resolving ballot issues, processing write-in and provisional votes, producing reports, and auditing data. It can resolve issues and process write-ins, both for ballots it scanned and for those scanned in the precinct and then transported on a vDrive. Verity Central does not tabulate votes.

Verity Count actually tabulates the votes (stored in cast-vote records on a vDrive) and produces reports. It can also resolve issues and process write-ins.

Concerns

1. ***Multi-select Overvote (Hart is planning to fix).*** The TouchWriter and Touch have one behavior which I found confusing. Consider a race where one can vote for multiple candidates – say the voter can choose three of seven. If the voter has selected three candidates and tries to select a fourth, the TouchWriter will automatically deselect the first candidate selected. There is no message or warning, and no reason to think the deselected candidate is the one the voter would have deselected. I found this confusing and unexpected. I believe many voters will have a similar experience, and the TouchWriter should instead give a message to the effect that the voter must deselect a candidate before selecting another.

   I understand from Hart that they plan to address this issue. Their plan is to give the voter a message explaining which candidate was deselected. This is acceptable, but I believe my solution is significantly better, because it is easier for the voter to understand. With the Hart solution, it is very likely that the candidate Hart chose to automatically deselect is not the right one. In this case the voter must still figure out how to deselect that candidate and select the right one.

2. ***Paper audit log is very difficult to read.*** In order to save paper, Hart decided not to start each log entry on a new line. In my opinion, this significantly reduces the usability and therefore the value of the paper log.

Conclusion

The Hart Verity system is a solid, well-designed, reliable voting system -- one of the best we have examined. It's unfortunate that is marred by Concern 1, Multi-select Overvote, and I highly recommend to Hart that they fix this. However, it is acceptable for now.

I recommend certification of this system.

Report Prepared for the
Texas Secretary of State
Elections Division

Voting System Certification Evaluation Report

Hart InterCivic (Hart)
Verity Voting System 2.0

Introduction

The Hart Verity Voting System 2.0 was evaluated for certification by the State of Texas on June 29-30, 2016. This reports the findings and observations regarding the conformance of the Election Hart InterCivic (Hart) Verity Voting System 2.0 to the requirements of the State of Texas.

Pursuant to Texas Administrative Code §81.60, HART submitted their application for state certification. Included with their application was their Technical Data Package (TDP) and the test report upon which the EAC based their national certification. The EAC/NIST NVLAP accredited Voting System Test Laboratory (VSTL) was SLI Global Solutions. The system was evaluated for EAC certification to the 2005 version of the VVSG.

Verity Voting includes the following components:

- Verity Data – Ballot setup software
- Verity Build - Election definition software application
- Verity Central - Central scanning software application
- Verity Count - Tabulation and reporting software application
- Verity User Management - User management software application
- Verity Election Management - Data management software application
- Verity Desktop – Workstation management software
- Verity Scan - Digital scanning voting device
- Verity Controller – Controller for Verity Touch and other verity voting devices
- Verity Touch – Touch screen voting device
- Verity Touch with Access – Touch screen voting device with accessibility features
- Verity Touch Writer with Access – Ballot marking device, with audio tactile interface

To provide chain-of-custody, a copy of all firmware/software and source code was s sent directly from SLI, the VSTL for this system. It was installed in the early part of the examination under the supervision of the Texas examination team.

The major additions to the previous Hart system certified in Texas, the Hart Verity Voting System 1.0, were:

- The Verity Data data management software.
- Introduction of direct record electronic (DRE) voting supported by the Verity Controller, Verity Touch and other DRE components.
- The ability to export ballot previews from Verity Data or Verity Build.
- Support for electronic provisional ballots.
- Support for cumulative voting.
- Additional exports options, including CSV exports of consolidated audit logs.

These additions to the system were one of the areas of focus for this exam.

Recommendation

The Hart Verity Voting System 2.0 was judged to comply with the voting system requirements of the State of Texas, outlined in Sections 122.001, 122.032, 122.033, and 122.0331 of the Texas Election Code and the rules outlined in Chapter 81, Subchapter C of the Texas Administrative Code, and therefore is recommended for certification.

Additional observations and recommendations for improvement are also presented in this report.

Sincerely,

H. Stephen Berger

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Candidate System

This section describes the candidate system, the Hart Verity Voting System 2.0.

System Components

The system is comprised of the components listed in Table 1 and shown functionally in Figure 1. This information is based on companies "Application for Texas Certification of Voting System" (Form 100).

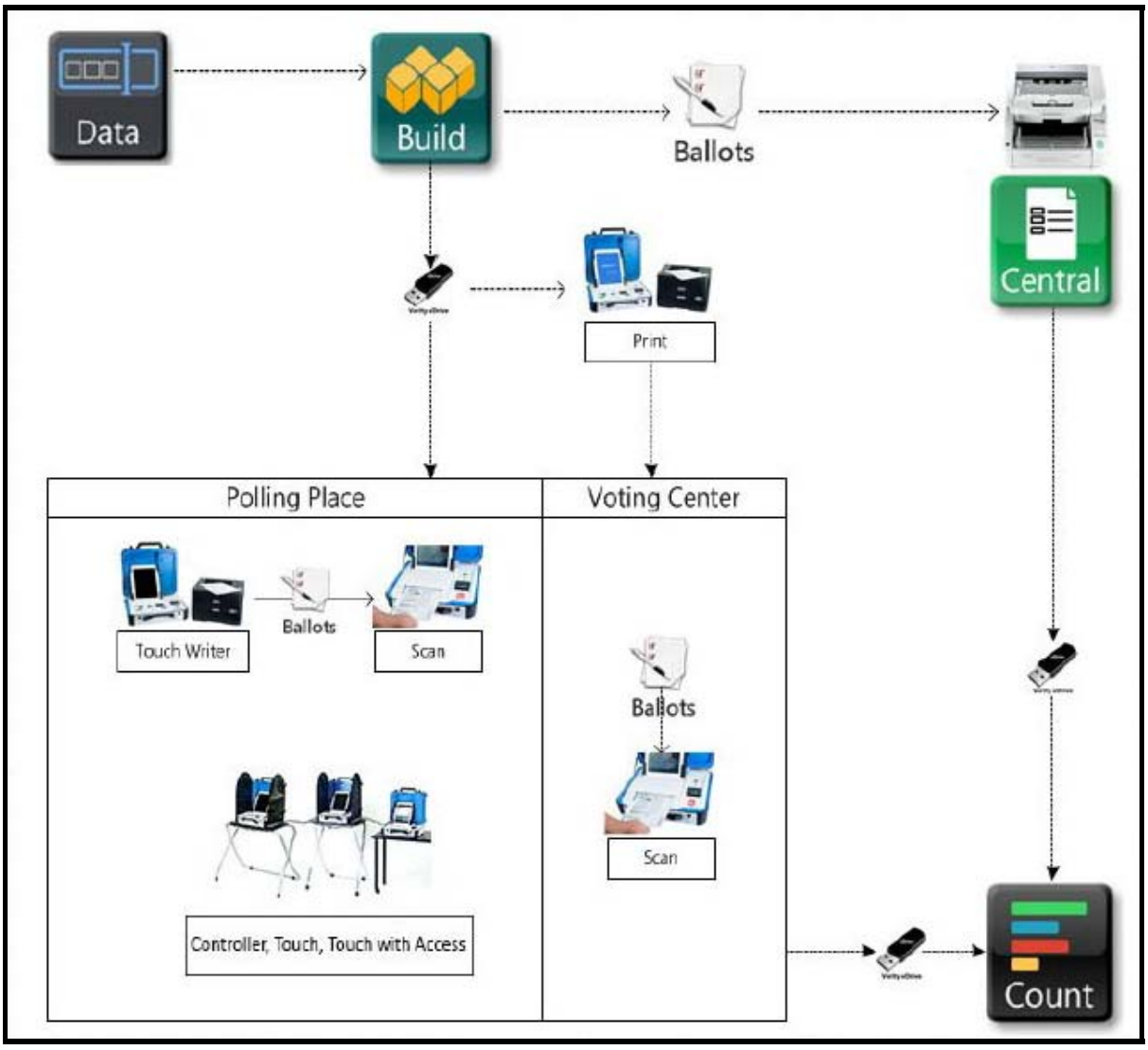

Figure 1 - Hart Verity Voting System 2.0 Process Flow[1]

[1] Graphics from the EAC document, "Hart Verity 2.0 Certificate and Scope of Cert FINAL 4.27.16.pdf".

Table 1 - Hart Verity Voting System 2.0 System Components

System Components			
#	**Unit/Application**	**Version**	**Function**
Hart Verity Voting System 2.0			
1	Verity Data	2.0.2	Ballot setup software
2	Verity Build	2.0.2	Creates election definitions.
3	Verity Count	2.0.2	Central count accumulation and tallying software.
4	Verity Central	2.0.2	High-volume scanner software.
5	Verity User Management	2.0.2	User account and access management.
6	Verity Election Management	2.0.2	Election-definition and data loading and management.
7	Verity Desktop	2.0.2	Workstation management software
8	Verity Scan	2.0.3	Scans completed ballots, creating Cast Vote Records (CVRs).
9	Verity Touch Writer with Access	2.0.3	Provides digital voting through a touch screen tablet system or accessibility interface.
10	Verity Controller	2.0.3	Controller for voting devices.
11	Verity Touch	2.0.3	Touch screen voting device.
12	Verity Touch with Access	2.0.3	Touch screen voting device with accessibility features.

System Limits

Hart reports the system limits recorded in Table 2.

Table 2 - Hart Verity Voting System 2.0 System Limits[2]
(Increased limits highlighted in blue text. Decreased limits highlighted in maroon text.)

System Limits			
#	Element	System Limit	
		Verity 1.0	Verity 2.0
1	Precincts	1,000	2,000
2	Splits per Precinct	20	20
3	Total Precincts + Splits in an election	6,000	2,000
4	Districts for voting devices and applications	100	75
5	Parties in a General Election	24	24
6	Parties in a Primary Election	10	10
7	Contests and Propositions combined	200	200
8	Contest Choices in a Contest	75	200
9	Total Contest Choices (voting positions) in an election	600	600
10	Maximum length of contestant name (characters)	100	100
11	Maximum write-in length	25	25
12	Ballot Styles	N/A	N/A
13	Voting Types	5	5
14	Maximum Polling Places per election	1,200	1,200
15	Maximum devices per election	2,400	2,400
16	Maximum Central Count Scanners in a single network	not listed	4
17	Media Device – Scan voting device (sheets per vDrive)	9,999	9,999
18	Media Device – Central application (sheets per vDrive)	60,000	80,000
19	Number of voters definable per election	1,000,000	1,000,000
20	Maximum sheets per ballot	4	4
21	Scan – single sheet ballots	9,999	9,999
22	Scan – two sheet ballots	4,999	4,999
23	Scan – three sheet ballots	3,333	3,333
24	Scan – four sheet ballots	2,499	2,499

[2] EAC Scope of Certification for the Hart Verity 2.0 Voting System, "Hart Verity 2.0 Certificate and Scope of Cert FINAL 4.27.16.pdf".

System Limits			
#	Element	System Limit	
		Verity 1.0	Verity 2.0
25	Central (ballots)	1,000,000	1,000,000
26	Count (CVRs)	4,000,000	4,000,000
27	Count (vDrives)	1,200	1,200
28	Ballot Sizes	not listed	8.5" x 11" 8.5" x 14" 8.5" x 17" 8.5" x 19" 11" x 17"

Changes from Previous Version

Table 3 – Changes from the Previous Version Certified in Texas, Verity 1.0[3]

Category	Change
New	Verity Data – data management software
New	Verity Touch DRE – electronic voting device
New	Verity Touch with Access DRE – accessible electronic voting device, with ATI
New	Verity Controller – DRE polling place management device
New	Export of electronic ballot previews from Data or Build in PDF
New	Support for electronic provisional ballots
New	Support for cumulative voting
New	In Verity Count, HTML exports for Canvass, Cumulative, and Precinct Reports
New	In Verity Count, CSV and XLS exports for Canvass, Cumulative, and Precinct Reports
New	CSV exports for all System Logs and Audit Logs from all software applications
New	In Verity Count, CSV exports for consolidated audit logs for all devices
Changed	On Touch and Touch Writer, the "Contest List" that appears under "About your ballot" has enhanced
Changed	Verity Build - Improved ballot processing speed (export to PDF)
Changed	Verity Build – Maximum number of ballots per import file for ballot printing increased from 10,000 to 100,000
Fixed	Verity Build – When printing ballots, replaced the Windows dialog with a print dialog designed specifically for Verity

[3] Copied from: 6_Final_Verity20_Deltas_For_TX.pdf

Fixed	Verity Data and Build – On Ballot Preview screen, precincts are now displayed in sequence order, rather than in precinct name
Fixed	Verity Central – No longer possible to create an invalid vDrive in a General Election with Straight
Fixed	Verity Central – Precinct Detail Report correctly sorts by precinct sequence order, rather than by
Fixed	Verity Count – In Precinct Groups, the order of the precincts listed on the screen now displays in
Fixed	Verity Count – Grid with *vDrives Read* now sorts by the date/time the vDrive was read, with the
Fixed	All devices – on the polling place selection screen for poll workers, the polling places are now listed

Examination Report

Description of the Examination

The examination occurred on June 29-30, 2016. It was preceded by the delivery of the companies Forms 100 and 101, Technical Data Package, authorization letters and related documents. The system software and firmware was provided directly from the VSTL that had examined the system to the VVSG for national certification.

On the first day of the examination, the technical examiners (Stephen Berger and James Sneeringer), Christina Adkins and some members of the election division staff were present to observe and verify the installation of the vendor's software. The VSTL directly provided encrypted images for the exam with SHA-256 HASH codes to verify digital signatures of the decrypted files. After the images were decrypted, SHA256 Hash Generator was used to generate the digital signature and confirm that it was the same as the signature provided by the VSTL.

Photos of the equipment and labels were taken and where hardware and firmware versions could be provided either on a screen or printed, those were produced and recorded.

Observations & Further Recommendations

In Schedule A, Attachment 1 to Hart's Form 100 they address findings and observations from the certification of the previous version, Verity 1.0. Their responses demonstrate both attention and responsiveness to the issued raised in that examination.

Table 4 – Responses to findings and observations from the examination of the prior system[4]

	Component	Issue	How Addressed
1	Central/Count	Invalid vDrive	**This issue has been corrected in Verity Voting 2.0.** A mismatch in character limits that existed in Verity Central and Verity Count in Verity Voting 1.0 has been reconciled in version 2.0. Additional detailed information about this specific issue, including root cause analysis and other corrective actions taken, has also been provided to the State of Texas in previous (separate) submissions.
2	System Audit Logs	Examiners requested availability in electronic format	**This issue has been addressed in Verity Voting 2.0, through enhanced new features.** All Audit logs can be exported into PDF or CSV formats.

[4] Source for this table is: "4_Final_Form100_A_Attachment 1.pdf"

3	Touch Writer	Multi-select overvote	**Improvements for this issue are currently in the design stage, for a future release.** The human factors use case that is the subject of item #3 has long been studied by a variety of researchers and other vendors, and no single design or implementation has satisfied everyone. In our legacy Hart Voting System, we included UI behavior similar to that recommended by the Texas examiner, and it was also deemed confusing to voters. Particularly given the fact that Verity 2.0 followed close on the heels of Verity 1.0, the development and testing cycle did not allow time for the design review that this topic requires to result in the best usability. That design review is currently underway, and Hart InterCivic plans to include additional voter interface alerts in future versions of Verity Touch Writer and Verity Touch, likely to be released in 2017.
4	Internal Audit Logs	Changes to audit logs appear as corruptions but are not prevented	**The Verity system is working as designed, and this functionality has not changed.** From the outset, Verity was designed to be a transparent system that relies on NIST-compliant digital signatures to provide tamper evidence, and to prevent data that has been altered from being accepted/validated by the system. If the log file on a vDrive is altered, and the vDrive is returned to the same device, the vDrive fails signature validation. The device recognizes that the vDrive has been altered and automatically recovers the vDrive from the CFAST backup. These actions are all recorded in the device's audit log.

5	Scan	Real-time audit log with continuous feed printer	The functionality of Verity Scan can be configured to **disallow** the accumulation of results, so that the machine simply counts *quantities* of ballots scanned and cannot produce results. In this configuration, Verity Scan does not function as a central accumulator, and it does not tabulate and/or consolidate the vote totals for multiple precincts/devices. Furthermore, because it is impossible for Verity Scan to print a tally tape when so configured, the only way a user can access tabulation reports for the ballots processed on the device is by tabulating the Cast Vote Records from the vDrive in Verity Count, which does print a real-time audit log with continuous feed printer. In addition, regardless of the mode in which Verity Scan is configured, it always maintains robust, detailed audit logs in an intuitive plain-language format, and audit logs for Verity devices and Verity software can be exported from the system in CSV format, to allow additional careful review and searchable "data mining."

Missing Audio File

While evaluating voting using an audio ballot on the Verity Touch with Access there was no audio for part of the screen under "Learn to Use This Ballot". Audio was available for all other elements examined. Further the missing audio was not on the ballot but on one part of the instructions to the voter. This finding was judged to be an oversight. No other examples of missing audio were found.

The quality of the audio was judged to be good. Voting using the audio ballot was found to provide a good alternative for voters who need to use an audio ballot.

Compliance Checklist

The following checklist includes all Texas voting system requirements.

The checklist is provided as detailed support for the conclusion and recommendation of this report.

Texas Secretary of State Voting System Examination

Vendor_____Hart InterCivic (Hart)_____

System, Version No.___Verity Voting System 2.0_____

Date of Examination: __June 29-30, 2016_____

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
General Requirements	122.001(a)(1)	Must preserve the Secrecy of the Ballot	General Review	Yes ☒ No ☐	One of the better security implementations.
	122.001(a)(2)	Must be suitable for the purpose for which it is intended	General Review	Yes ☒ No ☐	The system is well designed and responsive to requirements required of voting systems.
	122.001(a)(3)	Operates safely, efficiently, and accurately and complies with the voting system standards adopted by the EAC.	EAC Certification #	Yes ☒ No ☐	EAC Certification Number: HRTVerity2.0
	122.001(a)(4)	Is safe from fraudulent or unauthorized manipulation	General Review	Yes ☒ No ☐	
	122.001(a)(5)	Permits voting on all offices and measures to be voted on at the election.	L&A test	Yes ☒ No ☐	
	122.001(a)(6)	Prevents counting votes on offices and measures on which the voter is not entitled to vote	L&A Test	Yes ☒ No ☐	
	122.001(a)(7)	Prevents counting vote 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 which the voter is entitled to vote.	L&A Test	Yes ☒ No ☐	

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
	122.001(a)(8)	Prevents counting a vote on the same office or measure more than once	L&A Test	Yes ☒ No ☐	
	122.001(a)(9)	Permits write-in voting	L&A Test	Yes ☒ No ☐	
	122.001(a)(10)	Is capable of permitting straight-party voting (See also, Straight Party Voting in checklist)	L&A Test	Yes ☒ No ☐	
	122.001(a)(11)	Is capable of providing records from which the operation of the voting system may be audited.	Review of Audit Logs	Yes ☒ No ☐	
	122.001(e)	For an election for federal office in which a state or federal court order has extended the time for voting beyond the time allowed by Subchapter B, Chapter 42, a voting system must provide a separate count of the votes cast after the time allowed by that subchapter.	General Review	Yes ☒ No ☐	
	122.033(1)	Must be equipped with a security system capable of preventing operation of the machine	General Review	Yes ☒ No ☐	
	122.033(2)	Must be equipped with registering counter that can be secured against access	General Review	Yes ☒ No ☐	
	122.033(3)	Must be equipped with a public counter	General Review	Yes ☒ No ☐	
	122.033(4)	Voting system must be equipped with a protective counter.	General Review	Yes ☒ No ☐	
	122.0331(a)	Copies of program codes and other user and operator manuals and copies or units of all other software and any other information, specifications, or documentation required by the SOS related to an approved electronic voting system and its equipment must be filed with the Secretary.	Certification Packet	Yes ☒ No ☐	
	122.001(d)(2)	Must not use a punch-card ballot or similar form of tabulating	General Review	Yes ☒ No ☐	

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
	122.001(d)1)	Must not be a mechanical voting machine	General Review	Yes ☒ No ☐	
	127.1231	Procedure to ensure that any computer terminals located outside the central counting station that are capable of accessing the automatic tabulating equipment during the tabulation are capable of inquiry functions only	General Review	Yes ☒ No ☐	
	127.1231	No modem access to the tabulating equipment is available during the tabulation	General Review	Yes ☒ No ☐	
	129.054	A voting system may not be connected to any external communications network, including the internet.	General Review	Yes ☒ No ☐	
		A voting system may not have the capability or permitting wireless communication unless the system uses line-of-sight infrared technology that shields the transmitter and receiver from eternal infrared transmission and the system can only accept transmissions generated by the system.	General Review	Yes ☒ No ☐	
	85.032	Ballot box in which voters deposit their marked EV ballots must have two locks, each with a different key and must be designed and constructed to that the box ca be sealed to detect any unauthorized opening of the box and that the ballot slot can be sealed to prevent any unauthorized deposit in the box.	Review of Equipment	Yes ☒ No ☐	
	127.154	Each unit of automatic tabulation equipment must have a permanent identification number Each part of that equipment that contains the ballot tabulation must also have a permanent identification number.	Review of Equipment	Yes ☒ No ☐	
	272.005	Ballots must be printed with all ballot	Review Ballot	Yes ☒ No ☐	

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
		instructions, office titles, column headings, proposition heading, and propositions appearing in English and Spanish.			
	129.055	The sole purpose of voting system equipment is the conduct of an election, and only software certified by the SOS and necessary for an election may be loaded on the equipment.	General Review	Yes ☒ No ☐	
	11.054, Education Code	Must allow for cumulative voting.	General Review	Yes ☒ No ☐	
Straight-Party Voting	122.001(b)	Must be capable of allowing straight party voting in accordance with 65.007(c) and (d)	L&A test	Yes ☒ No ☐	
	65.007 (c)	If a ballot indicates a straight-party vote and a vote for an opponent of one or more of that party's nominees, a vote shall be counted for the opponent and for each of the party's other nominees whether or not any of those nominees have received individual votes. (**cross-over voting)**	L&A test	Yes ☒ No ☐	
	65.007 (d)	If a ballot indicates straight-party votes for more than one party, those votes may not be tallied. Only candidates receiving individual votes will be counted.	L&A test	Yes ☒ No ☐	
Ballot Requirements	43.007	DRE's only authorized for CWPP --- must have the capability of more than 1 ballot style.		Yes ☒ No ☐	
	124.001	In an election in which voters are entitled to case straight-party votes, the voting system ballot shall be arranged to permit the voters to do so.	Review of Ballot	Yes ☒ No ☐	
	124.002(a)	In an election in which a candidate's name is to appear on the ballot as the nominees of a political party, the voting system ballot shall be arranged	Review of Ballot	Yes ☒ No ☐	

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
		(1) in party column in the same manner as for a regular paper ballot, or (2) by listing the office titles in a vertical column in the same manner as for a regular paper ballot on which a party nominee does not appear, except that the nominees' party alignment shall be indicated next to their names.			
	124.002(b)	The order in which party nominees listed by office title appear on a voting system ballot is determined in accordance with the same priorities and in the same manner as for party nominees listed in party column, with the changes appropriate to the circumstances.	Review of Ballot	Yes ☒ No ☐	
	124.062(b)	The SOS may authorize the use of electronic system ballots that comprise two or more separate parts and may prescribe conditions and limitation under which the multipart ballots may be used. Multipart ballots must comply with the same standards as a voting system using a ballot consisting only of a single part. **(See op scan ballot requirements in TAC rules 81.43 – at end of checklist.)**	Review of Ballot	Yes ☒ No ☐	
	124.063	Certain Instructions Required on Electronic Voting System Ballot -- "Vote for the candidates of your choice in each race by making a mark in the space provided adjacent to the name of that candidate" "Make a mark in the space provided beside the statement indicating the way you desire to vote" (b)Instructions can be changed in certain	Review of Ballot	Yes ☒ No ☐	

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
		circumstances (c) Must contain instructions for casting a write-in vote. SOS will prescribe wording. (d) Must contain instruction under Section 52.071(b) of the code for straight party voting. (Vendor must show that instructions are customizable to fit appropriate ballot)			
	129.002(a) **(DRE Only)**	Each direct recording electronic voting machine must provide the voter with a screen in summary format of the voter's choices for the voter to review before the vote is actually cast.	Review of Summary Screen	Yes ☒ No ☐	
Provisional Ballots	124.006	The SOS shall prescribe the form of a provisional ballot and the necessary procedure to implement the casting of a provisional ballot as described by Section 63.011 and the verification and processing of provisional ballots under Subchapter B, Chapter 65.	Review Provisional Ballot	Yes ☒ No ☐	
	52.074	The authority responsible for having the official ballot prepared shall have a provisional ballot prepared in a form approved by the Secretary of State for use by a voter who executed an affidavit in accordance with Section 63.011 of the Code. **(NOTE: Need to show SOS how provisional ballot works)**	Review Provisional Ballot	Yes ☒ No ☐	
	81.173, TAC **(DRE ONLY)**	Provisional ballots may be cast electronically on a Direct Record Electronic (DRE) voting system if: (C) the system segregates provisional votes from regularly-cast votes on the precinct returns; and	Review Provisional Ballot	Yes ☒ No ☐	

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
		(D) the system provides a method for the cast provisional ballots to be accepted and added to the election results by the Early Voting Ballot Board or central counting station personnel, as applicable.			
	127.063	Sealed ballot box must be: 1. Equipped with a lock to prevent opening the box without a key 2. Ballots can be deposited and delivered w/o damage 3. Box can be sealed to detect any unauthorized opening of the box 4. Slot used by the voters to deposit ballots can be sealed to prevent any unauthorized deposit in the box. NOTE: for Ballots to be counted at CCS.	Review of Equipment	Yes ☒ No ☐	
Optical scan Systems	81.43, TAC	1. Optical scanner ballots may be divided into parts and printed upon two or more pages. 2. When party columns appear on the ballot, the names of the parties and spaces for voting a straight-party ticket must be printed oat the head of the ballot so the voter may cast a straight ticket by making a single mark on the first page. 3. Where all candidates for the same office cannot be placed on the same face of the same page, the names can appear on more than one page, but the first page must contain a statement that the names of other candidates appear on the following pages(s). 4. If the ballot is printed on more than one page, different tints of paper other than yellow, or some other suitable means may be used to facilitate the sorting of	Review of Ballot	Yes ☒ No ☐	

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
		ballots. 5. Each page shall bear the same ballot number.			
	81.52(1)	If the machine returns a ballot to the voter because the ballot is blank, mismarked damaged, or otherwise spoiled, the voter may either attempt to correct the ballots, request another ballot, or request the election official to override the rejection so that the precinct counter accepts the ballot and outstacks the write- in.	L&A Test	Yes ☒ No ☐	
	81.52, TAC	The precinct counter must be set up to reject and return the ballot to the voter rather than outstack the ballot if it is blank, mismarked, undervoted, or overvoted.	L&A test/General Review	Yes ☒ No ☐	
	81.52, TAC	If a precinct ballot counter is to be used during early voting by personal appearance, a continuous feed audit log printer must remain attached to the precinct counter throughout the early voting period	General Review	Yes ☒ No ☐	
	81.62, TAC	1. For any Election Management System's central accumulator to be certified for use in Texas elections, **the central accumulator shall include a continuous feed printer dedicated to a real-time audit log**. All significant election events and their date and time stamps shall be printed to the audit log. 2. The definition of "significant election events" in subsection (a) of this rule includes but is not limited to: a. error and/or warning messages and operator response to those messages; b. number of ballots read for a given	Review of Audit Logs	Yes ☒ No ☐	VVSG 2005: 2.2.5.2.1.d: "The audit record shall be active whenever the system is in an operating mode. This record shall be available at all times, though it need not be continually visible." 2.2.5.2.1.g: "The system shall be capable of printing a copy of the audit record." Also VVSG 2005 Section 2.2.5.2.2.a, 4.4 & 6.5.5

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
		precinct; c. completion of reading ballots for a given precinct; d. identity of the input ports used for modem transfers from precincts; e. users logging in and out from election system; precincts being zeroed; f. reports being generated; g. diagnostics of any type being run; and h. change to printer status.			
Accessibility for Disabled Voters	81.57, TAC	See checklist for details of requirement.	Checklist for Voting System Accessibility for more details.	Yes ☒ No ☐	
	64.009, TEC	If a voter is physically unable to enter the polling place without personal assistance or likelihood if injuring the voter's health, on the voter's request, an election officer shall deliver a ballot to the voter at the polling place entrance or curb. NOTE: "Curbside voting"	General Review	Yes ☒ No ☐	

Supplemental Checklist

The following additional items were check. This supplemental checklist provides details on additional items check or adds detail on how specific aspects of the Texas voting system requirements were evaluated.

Vendor: Hart Intercivic	**Voting System: Verity 2.0**	
General Requirements		
• Is Form 100 complete and satisfactory?	Yes ☒	No ☐
• Review Form 100 - Schedule A - Have recommendations/issues made from previous exams been corrected or addressed?	Yes ☒	No ☐
• Review Form 101 - Are responses satisfactory?	Yes ☒	No ☐
• Review change logs and provide information for testing or questioning vendor	Yes ☒	No ☐
• Training manuals appear complete?	Yes ☒	No ☐
• Training manuals appear to be easy to use?	Yes ☒	No ☐
• Check with other jurisdictions where system is in use and ask questions regarding system, support and training.	Yes ☒	No ☐
• Did the system receive favorable reviews?	Yes ☒	No ☐
• Do all configurations listed in application seem feasible? Keep this in mind during the examination to make sure components necessary to ensure the security are included in all configurations and that the configurations will meet the county's needs (scanner used as central and/or precinct, etc..)	Yes ☒	No ☐
• Vendors' proposals shall state a clear, unequivocal commitment that the election management and voter tabulation software user's application password is separate from and in addition to any other operating system password.	Yes ☒	No ☐
• Vendor's system shall support automated application password expiration at intervals specified by a central system administrator.	Yes ☒	No ☐
• Vendor shall discuss the steps required by the system administrator to implement and maintain automated password expiration. This discussion will include narrative concerning the degree to which the application password expiration capabilities are based on (a) the server or client's operating system, (b) the software application, or (c) both	Yes ☒	No ☐
• The vendor's proposal shall state the name of any automated incident, issue, or problem tracking system used by the firm in providing support to its election system clients.	Yes ☒	No ☐
Verify Installation		
• Verify/List all hardware	Yes ☒	No ☐
• Verify/List all COTS hardware/software versions	Yes ☒	No ☐
• Is the COTS hardware being demonstrated the same version as what was tested at the VSTL?	Yes ☒	No ☐
• Is the COTS software being demonstrated the same version as what was tested at the VSTL?	Yes	No

Vendor: Hart Intercivic	Voting System: Verity 2.0	
	☒	☐
• Witness or actual install the software and firmware with the SOS CDs received from VSTL.	Yes ☒	No ☐
System Review		
• Warns of Undervote	Yes ☒	No ☐
• Is it easy to choose the appropriate ballot style?	Yes ☒	No ☐
• Is the number of ballot styles available on a unit limited?	Yes ☒	No ☐
• Can you cancel the marking of a ballot after starting? Explain how.	Yes ☒	No ☐
• Is there a way to properly secure all ports on the system?	Yes ☒	No ☐
• Are instructions provided in the documentation for securing the system?	Yes ☒	No ☐
• Usable for curbside voting?	Yes ☒	No ☐
• How to setup or modify audio files	Yes ☒	No ☐
• How to adjust volume	Yes ☒	No ☐
• Test both early voting and election day - all functions opening/closing	Yes ☒	No ☐
• Does system include sip 'n puff for accessibility	Yes ☒	No ☐
Texas Real-time Audit Log Review		
• Print any attempt to tally or load votes that have already been tallied or counted, identifying the precinct or source of the votes and flagging it as a duplicate	Yes ☒	No ☐
• Print starting the tally software (e.g. from the operating system) or exiting the tally software, or any access to the operating system.	Yes ☒	No ☐
• Record if a printer is paused, turned off, turned on, disconnected, and when reconnected.	Yes ☒	No ☐

Appendix A - EAC Certificate of Certification

United States Election Assistance Commission

Certificate of Conformance

Hart InterCivic Verity 2.0

VVSG 2005 VER. I

EAC CERTIFIED

The voting system identified on this certificate has been evaluated at an accredited voting system testing laboratory for conformance to the 2005 *Voluntary Voting System Guidelines (2005 VVSG)* . Components evaluated for this certification are detailed in the attached Scope of Certification document. This certificate applies only to the specific version and release of the product in its evaluated configuration. The evaluation has been verified by the EAC in accordance with the provisions of the EAC *Voting System Testing and Certification Program Manual* and the conclusions of the testing laboratory in the test report are consistent with the evidence adduced. This certificate is not an endorsement of the product by any agency of the U.S. Government and no warranty of the product is either expressed or implied.

Product Name: Verity

Model or Version: 2.0

Name of VSTL: SLI Global

EAC Certification Number: HRTVerity2.0

Date Issued: 4/27/2016

Executive Director
U.S. Election Assistance Commission

Scope of Certification Attached

Appendix B - Digital Signatures of Software Examined

There SHA-256 digital signatures of the software files were confirmed to match the signatures provided by SLI. This was done to document continuity of the software certified in this exam with that tested by SLI and certified by the EAC. These signatures can be used to verify that the software used in the future is identical to that examined during this exam.

Further analysis of the files provides useful insights to the system's software structure. A large percentage of the files are common to several units and often to all units. There was a total of 175 unique files for these 5 units. Of those 134 or 76.6% were common to all five units. Other files were used on several units. Only 22 files or 12.6% were unique to one unit.

The Verity Central and DBC were also checked. For Verity Central a total of 151 files had digital signatures computed. The Verity DBC had 173 files checked.

Table 5 - Hart Verity Voting System 2.0 System Components

Software Verification			
#	Unit	Total Files	
Hart Verity Voting System 2.0			
1	Verity Controller	145	
2	Verity Scan	151	
3	Verity Touch	148	
4	Verity Touch with Access	148	
5	Verity Touch Writer with Access	153	
	Unique Files	22	12.6%
	Files Common to 2 Units	7	4.0%
	Files Common to 3 Units	9	5.1%
	Files Common to 4 Units	3	1.7%
	Files Common to 5 Units	134	76.6%

Hart InterCivic Verity 2.0

The Hart InterCivic Verity version 2.0 voting system was examined at the Office of the Secretary of State in Austin on June 29-30, 2016. It is a modification to the previous certified version 1.0.This is the identical system reviewed for the U.S. Elections Assistance Commission (EAC). Its EAC certification # is HRT-Verity-2.0.

The following tables lists the applications and COTS hardware components used during the examination.

Table 1 - Proprietary Software Components

Product (election central)	Application/Firmware	Release #
Verity Build	Election ballot definition validation and election media creation	2.0.2
Verity Data	Data management software	2.0.2
Verity User Management	Election system user management	2.0.2
Verity Election Management	Election database management system	2.0.2
Verity Desktop	Software used to manage computer settings and export	2.0.2
Verity Central	High speed digital scanner	2.0.2
Verity Count	Central count accumulation and tallying	2.0.2
Product (voting center)	Application/Firmware	Release #
Verity Scan	Precinct or early-voting ballot scanner (firmware)	2.0.3
Verity Touch Writer	Ballot marking device (BMD)	2.0.3
Verity Touch	DRE Voting Device	2.0.3
Verity Touch with Access	Accessible DRE Voting Device	2.0.3
Verity Controller	DRE polling place management device	2.0.3

The components listed above for the election central location run on a server or PC running Windows Embedded Standard 7 with Service Pack 1, 64-bit. The OS is configured for Verity kiosk operations to prevent direct access to the OS.

The software components listed above for the voting center run on proprietary hardware running Windows Embedded Standard 7 with Service Pack 1, 32-bit. The OS is configured for Verity kiosk operations to prevent direct access to the OS.

Table 2 - COTS Hardware Components

Component/Description	Manufacturer	Model/Part #
Verity Touch Writer/Ballot/Report Printer	OKI	B431d
	OKI	C831dn & C911 dn
Verity Central Scanner	Canon	DR G1100 & DR G1130
	Kodak	i5600
Verity Application Workstation	HP	Z230
Verity Application Workstation Monitor	HP	P231

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Component/Description	Manufacturer	Model/Part #
Verity Application Workstation Keyboard	HP	N/A
Verity Application Workstation Mouse	HP	N/A
Ethernet Switch	HP	1405-8G
Verity Tablet	ADLink	2005301
Verity vDrive	Apacer	AH322
Verity Device AC-DC Power Supply	AP Power	VEH60WS24
Verity Print, Controller, Touch, Touch with Access AC-DC Power Supply	SL Power	TE60B2449F02
Verity Device Battery	TOTEX	1005015 U80327
UPS for Touch Writer Printer	EATON	5P1500

For a detailed explanation of the hardware components and applications of the system please refer to the EAC certification test report here.

Findings

- The responses provided for Form-101 are acceptable.
- The system software components listed in Table 1 were built successfully and the file hashes were verified to be correct.
- The prepared test ballots and the manually voted test ballots were recorded and tallied correctly.
- The accessibility devices worked as expected.
- The real-time audit log still did not start each new log entry on a newline. This makes it difficult to read the log. The vendor said that this was to conserve paper. The saving of paper does not justify the lack of readability. This was called out in my report for version 1.0. It should be corrected in the next release of the Verity system.
- External USB ports are customized to prevent non-Verity created thumb-drives or COTS cables from being used. The cables that connect the precinct machines in a network are custom cables. A jurisdiction should have spare cables on-hand on election night if they are using the Verity Touch precinct devices. The cables must be acquired from Hart.
- The internal write buffers have been disabled for the CFAST and vDrive drive write operations to increase reliability in the case of power failures. This seems like a unnecessary customization because the machines are required (federal requirement) to be sustained by a battery backup until a machine can be gracefully shutdown. However, the disabling of the buffers does not present a problem.
- Each precinct Verity Controller can support up to 12 Touch DRE voting machines (via the Ethernet over USB network). This seems to be adequate for most precincts.

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- The Verity Touch Writer is slow printing the (marked) paper ballot. Therefore, a jurisdiction should not plan to use it for all voters in a voting location.

- A tally report at a voting location cannot be run during an early-voting period. The report can only be run when the date/time that was configured in Verity Build has been reached. The report also requires the Admin role and password.

- A Verity Touch DRE can be taken to a voter at the curb if necessary. The votes will be recorded (transferred to the Verity Controller) once the machine is reconnected to the network.

- The logs from the precinct devices are automatically backed-up to the vDrives. They imported into the Verity Election Management system when the vDrives cast vote records (CVR's) are processed. The log entries are in clear language and complete. Logs can be filtered to search for specific events and can also be exported in either XML or CSV formats.

- Verity Scan can be configured to use unique ID's (printed on the ballot stock). If configured this way, SCAN will reject a duplicate ballot (same ID).

- If the real-time log at election central is taken off-line, the operator on Verity Count system is logged-out. This prevents the processing of ballots until the printer is back on-line and the operator has logged back in.

- The central servers are using a RAID-1 (mirroring) disk sub-system so the data is not going to be lost due to a single disk failure.

- The Verity Scan (precinct device) can be configured to save images on the vDrives in addition to the CVR's. I recommend for it to be configured this way.

- The 2.0 release fixed a serious problem that was discovered in the 1.0 release examination. The problem occurred when importing the vDrives created from the Verity Central (scan) system into the Verity Count system. This only occurred when ballots were adjudicated on the Central Scan system and there was a straight-party vote with a write-in selected on a ballot. This “corrupted” the vDrive and it could not be loaded into Verity Count. It was verified that the problem has been corrected.

- There was one anomaly during the examination. A ballot scanned by both the Verity Scan and Verity Central scanners was not processed the same. The pre-printed ballot had a blank spot on the selection box (see below). The Verity Scan machine rejected the ballot twice and a pop-up error message stated that there was a problem with the ballot's bar code. There was no problem with the bar code. This message was erroneous and should be corrected. On the 3rd attempt the ballot was accepted and recorded correctly.

The exact same ballot was rejected repeatedly when it was fed into the Central scanner.

All voting system scanners have difficulty reading marginal (in terms of density, size and location) marks, consistently. Previous federal testing has revealed that sometimes there are differences in the scan processing of the same batch of ballots from machines of the exact model and configuration. Even the same machine can sometime have a discrepancy when scanning the same batch.

I do not believe this indicates a significant problem. If a voter gets a error message on the Scan machine during an election, they will ask for help. The ballot will likely be spoiled and a new ballot issued. Scanning the same ballot at the voting and central locations should never happen during a real election.

The fact that the Central machine rejected the ballot each time is because it has a different scanning engine. The anomaly in this case was not even for a marginal voting mark, but rather a mis-print on the pre-printed ballot stock.

Conclusion

Overall, the Verity system is easy to use for both voter and election workers. It worked very well and tallied correctly. I believe it is suitable for the intended purpose. I believe the system meets the requirements of the Texas Election Code and recommend certification.

Tom Watson
Examiner