Voting System Examination
Hart Verity Voting 2.7 System

Prepared for the Secretary of the State of Texas

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Designee of the Attorney General

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This report conveys the opinions of the Attorney General's designee from examinations of the hardware and software components listed below pursuant to Title 9, Chapter 122 of the Texas Election Code, section 122.036(b).

Examination Scope

On March 1-2, 2023, examiners appointed by the Texas Secretary of State and the Attorney General met with representatives of Hart InterCivic, Inc. ("Hart") at the offices of the Texas Secretary of State for an interactive demonstration of the Verity Voting 2.7 system ("Verity 2.7") and an opportunity to test its operation. On July 6, 2023, the examiners held a follow-up meeting with Hart at their offices to examine the Verity Transmit components and their operation within Verity 2.7.

Based on Hart's Form 100 as revised July 6, 2023, the components of Verity 2.7 that Hart presented for examination included the following:

System Component	Description	Version
Verity Data	Data management software	2.7.1
Verity Build	Election definition software	2.7.1
Verity Central	High speed central scanning and review software	2.7.1
Verity Count	Tabulation, adjudication, and reporting software	2.7.1
Verity User Management	User management software for applications	2.7.1
Verity Election Management	Election database management software	2.7.1
Verity Desktop	Software to manage settings and export hashes	2.7.1
Verity Scan	Digital scanning device	2.7.1
Verity Touch Writer Duo Standalone	Ballot marking device ("BMD")	2.7.1
Verity Touch Writer with Access	BMD with an Audio Tactile Interface ("ATI")	2.7.1
Verity Controller	Polling place BMD management software	2.7.1
Verity Touch Writer Duo	BMD for use with a Verity Controller	2.7.1
Verity Transmit	Election data transmission software	2.7.1
Verity Transmit Receiving Station	Software for receiving election data transmissions	2.7.4

On June 7, 2022, the United States Election Assistance Commission ("EAC") issued a *Certification of Conformance for the Hart Verity Voting 2.7 system* ("Verity 2.7 Certification") document. Verity 2.7 is a modification of Verity Voting 2.6, which was certified by EAC on April 20, 2021. Hart's Verity Voting 2.5 system, the prior version to undergo examination in Texas, was certified by the EAC on September 24, 2019 and by the Texas Secretary of State on April 1, 2021.

System Component Details

The Verity 2.7 Certification document provides the following, elaborated descriptions of the system components listed in the table above:

- **Verity Data** provides the user with controls for entering and proofing data and audio. Verity Data also performs validation on the exported information to ensure that it will successfully import into Verity Build.
- **Verity Build** opens the election to proof data, view reports, and print ballots, and allows for configuring and programming the Verity Scan digital scanners, and Verity Touch Writer and Controller/Touch Writer Duo BMD devices, Verity Print, as well as producing the election definition and auditing reports.
- **Verity Central** is a high-speed, central digital ballot scanning system used for high-volume processing of ballots (such as vote by mail). The unit is based on COTS scanning hardware coupled with custom Hart-developed ballot processing application software which resides on an attached workstation.
- **Verity Count** is an application that tabulates election results and generates reports. Verity Count can be used to collect and store all election logs from every Verity component/device used in the election, allowing for complete election audit log reviews.
- **Verity User Management** enables users with the correct role and permissions to create and manage user accounts within the Verity Voting system for the local workstation in a standalone configuration, or for the network in a networked configuration.
- **Verity Election Management** allows users with the Administrator role to import and manage election definitions. Imported election definitions are available through the Elections module in Build. Users can also delete, archive, and manage the election definitions.
- **Verity Desktop** enables users with the correct roles to set the workstations' date and time, gather Verity application hash codes (in order to validate the correctness of the installed applications), and access to Windows desktop using a one-time access code provided by Hart technical support.
- **Verity Scan** is a digital scan precinct ballot counter (tabulator) that is used in conjunction with an external ballot box. The unit is designed to scan marked paper ballots or Verity Touch Writer Duo printed vote records, interpret and record voter marks on the marked paper ballot or record voter selections on the printed vote records, and deposit the ballots into the secure ballot box.

- **Verity Touch Writer** is a standalone precinct level Ballot Marking Device (BMD) which also includes an Audio Tactile Interface (ATI), which allows voters who cannot complete a paper ballot to generate a machine-readable and human readable paper ballot, based on vote selections made, using the ATI.
- **Verity Touch Writer Duo** is a daisy chained configuration of a **Verity Controller** device configured with up to twelve Verity Touch Writer Duo BMD devices, which allows voters to utilize the touchscreen or optional Audio Tactile Interface to generate a machine-readable and human readable printed vote record, based on vote selections made.
- **Verity Touch Writer Duo Standalone** is a standalone BMD device, which allows voters to utilize the touchscreen or optional Audio Tactile Interface to generate a machine-readable and human readable printed vote record, based on vote selections made.
- **Verity Transmit** provides remote transmission capability. Utilizing an optional modem, Wi-Fi, or Ethernet accessory kit. Results from the Verity Scan and Verity Central are transmitted to the Verity Transmit Receiving Station workstation.
- **Verity Transmit Receiving Station** is a remote transmission software application that receives election data transmissions sent by Verity Transmit devices.

All Verity 2.7 equipment have the Windows 10 Enterprise operating system installed, but are configured to run securely as kiosks using Verity firmware and applications. Additional details on these components, their configurations, and changes incorporated in this release are available in the Verity 2.7 Certification document.

Examination Process

On the day prior to the examination, Hart representatives delivered and setup the Verity 2.7 equipment in a secure conference room at the offices of the Texas Secretary of State. They extracted the trusted build from a hard drive provided by SLI Compliance (“SLI”), a Voting System Test Laboratory, and performed workstation installations.

The examiners’ primary focus on March 1 was firmware installation and hash verification on polling-place equipment. All verifications were successful, except for the Touch Writer Duo and the Controller devices, which were found to be running version 2.7.2. Hart agreed to obtain a trusted build from SLI containing this certified sub-version for use in the planned follow-on exam. Additional concerns regarding hash verification overall are discussed below.

On March 2, Hart representatives discussed notable features in Verity 2.7 together with changes from the prior certified release. Examiners voted a standard set of test ballots using all the BMD and scanning equipment present; the results were as expected. They also successfully completed standard accessibility tests on Verity’s Audio Tactile Interface (“ATI”) device. Using vDrives with cast vote records (“CVRs”) for ballots cast and scanned by the examiners, Hart representatives demonstrated CVR review using Verity Central as well as adjudication and reporting using Verity Count. Particular attention was given to the process and challenges of managing early voting using Verity 2.7. Observations are included below.

The follow-on exam on July 6 focused on Verity 2.7 Transmit, which comprises a set of components that enable network transmission of unofficial results from a remote precinct to a jurisdiction's central location. Hash verification was completed for the configured equipment – including a Touch Writer Duo and Controller with version 2.7.2 installed. Hart representatives and the examiners then worked through concerns regarding network security, use of multiple Receiving Stations, segregation of unofficial and official results, and managing incremental transmissions from a set of remote locations involving multiple vDrives.

Key Observations

Hash Verification

Identifying files on SLI's certified manifest for use in hash verification is needlessly difficult and error prone due to their directory naming convention. SLI's certified manifest uses device serial numbers to name the directories containing each device's files. These numbers can be differentiated only by a unique initial letter indicating the device type. For workstations, whose initial letter is W, the directory for a specific product – such as Central or Date-Build-Count – can only be determined by examining the version dll contained in a particular directory.

Hart stated that they sent a file manifest using product names for directories to SLI for their testing. SLI should commit in the future to using Hart's naming convention in its certified manifest for Verity releases.

Early Voting

For a county with a population of over 100,000, Texas election law allows counting of early votes to begin after the early voting period ends several days prior to election day. However, the law also prohibits printing a final tally report on a scanner before the device is closed on election day. Based on examiner testing with Verity 2.7, the following process should satisfy these requirements.

At the close of early voting,

- Power-off the scanner at a particular polling place, which effectively suspends the election: do not close the election on the scanner.
- Remove the vDrive, securely transfer it to the central location, insert it into Verity Count, and read the vDrive's accumulated CVRs.
- Enter the administrative password to 'close' the vDrive so that Verity Count can tally those accumulated CVRs as part of the early voting results for that polling place.
- Remove the vDrive, securely transfer it back to the original polling place, and reinsert it into the scanner from which it was removed.

As election day begins, power-on that scanner to 'reopen' that election. The ballot count will have not changed from when its vDrive was removed. At the close of election day,

- Close the election on the scanner and its vDrive, which automatically prints a final tally report.
- Remove the vDrive, securely transfer it to the central location, and insert it into Verity Count
- Verity Count will recognize the vDrive and indicate that additional ballots have been added
- Read these into Count to obtain the full CVR count from the vDrive with no duplicates

The Secretary of State documenting procedures that reflect this process could facilitate early vote tabulation in large counties in compliance with Texas election law.

Verity Transmit

As exercised during the exam, the Verity 2.7 Transmit functionality appeared well conceived and implemented for its stated purpose. Its use in an election will require a county to (1) invest in additional equipment and software, (2) complete solution-specific setup steps, and (3) perform additional network configuration tasks. It will likely also require additional staffing to operate the Receiving Stations and to perform unofficial Verity Count tasks on election night in parallel with those performed sometime later that night using the official voting data on the official Verity Count workstation.

The full Verity Transmit solution as implemented by Hart comprises

- An air-gapped Verity tablet running either the Scan with Relay or the Transmit software at a remote location.
- A separate set of vDrives at both the remote and central locations whose use is dedicated to physical, local transfer of tabulation data as part of the Transmit solution
- Network access using a 4G Modem, 802.11 Dongle, or Gigabit Ethernet Adapter; a Verity Transmit network connection configured over a jurisdiction's local and wide-area networks per Hart specifications to enable and secure internet data transmission.
- A Verity Receiving Station workstation for either a Relay or Transmit configuration running only the Verity Transmit application.
- An air-gapped Verity Count workstation placed at the central location and dedicated to Transmit transfers of unofficial voting data.

One Receiving station can support multiple remote transmitting devices. Moreover, an implementation may include deployment of a primary and two secondary Receiving stations to balance the incoming transmission load across all three. The solution's overall configuration and operation are described in Hart's *Verity Transmit Field Guide* its *Verity Remote Transmission Administrator's Guide* documents for version 2.7.

Network transmission of voting data appears to be effective and secure; it includes several distinct layered technologies:

- Each CVR, image, and log file is encrypted as written from a precinct scanner to its vDrive. That vDrive's collected set of encrypted files is again encrypted before it is transmitted using Verity Transmit.

- A Receiving Station generates a host file that must be installed during the setup of a Verity Scan with Relay or Verity Transmit tablet that will be communicating with that station; this file enables a network connection to be established from the remote device to the central Receiving Station using a specific port in the central LAN's firewall.
- A Public Key is used to authenticate the connected devices.
- Before initiating data transfer, a remote Transmit tablet must request an access code from its corresponding Receiving Station. The operator at that station must speak by phone with the operator of the remote Transmit tablet to obtain the code verbally.

Deployment of Verity Transmit, or other systems for electronically transmitting polling station results, must be evaluated in the context of Texas election code section 127.123, Security of Automatic Tabulating Equipment, and section 129.054, Network Connections and Wireless Technology. Key considerations are as follows:

- The primary focus of these sections is systems for securely capturing and handling voting data for official tabulation, counting, and reporting.
- All aspects of deploying and using a voting system for unofficial voting data and results must be segregated from that for official results.
- The Secretary of State may establish procedures for the use of a system for securely transmitting unofficial results.
- No transmissions are permitted until polls close on election day.

To assure (1) compliance with Texas election laws and (2) the security and segregation of systems used for unofficial results, this examiner recommends the following configuration and procedural conditions for Texas deployments of a Verity Transmit solution:

- A county intending to obtain and deploy Verity Transmit, must submit an application to the Secretary of State's office with component and networking details.
- Transmission of voting data from a polling place or remote location will be permitted only after the scanners at respective polls are closed on election day.
- Only unofficial voting data may be transferred electronically using the Verity Transmit network: all vDrives containing official voting results must be physically transferred to the central location.
- Only air-gapped Verity Transmit tablets will be permitted for use at a polling place or regional center: no Verity scanner may be configured with a 4G modem transport kit or have Scan with Relay software installed.
- Transmit tablets may only be configured with a wired Ethernet for internet communication: no such tablet may be configured with either a 4G modem or 801.11 WiFi. This ethernet cable may be used with a Wifi router dedicated to Transmit data transfer and a cellular service such as that deployed for first responders in many counties. Use of a VPN is advised.

- The corresponding Transmit Receiving Station workstation(s) at the central location together with supporting Verity Central and Count workstation(s) must be air-gapped and physically segregated.
- vDrives used to transfer unofficial results within the central counting facility must be carefully managed to assure they are not intermingled at that location with those physically delivered to provide official results.

Recommendation

Overall, I find Verity 2.7 to be an effective, highly usable voting system that complies with the necessary requirements for a voting system under Texas election law. As such, I recommend its certification with deployment conditions for Verity Transmit that are consistent with those noted above.