

Voting System Examination

Election Systems & Software EVS 6.3.0.0

Prepared for the Secretary of the State of Texas

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This report conveys the opinions of the Attorney General's designee from an examination 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 January 24-25, 2023 examiners appointed by the Texas Secretary of State and Attorney General met with representatives of Election Systems & Software (“ES&S”) at the offices of the Texas Secretary of State for an interactive demonstration of the EVS 6.3.0.0 system and an opportunity to test its operation. On March 31, 2023, the examiners held a follow-up meeting with ES&S to address several outstanding concerns; these are discussed below.

Based on ES&S’ Form 100 as revised December 6, 2022, the components of the EVS 6.3.0.0 that ES&S presented for examination included the following:

Components Examined	Version/ Firmware #
Hardware	
ExpressTouch	4.2.1.0
DS200 Precinct Ballot Tabulator (HW 1.2)	3.0.0.0
DS200 Precinct Ballot Tabulator (HW 1.3)	3.0.0.0
DS200 Precinct Ballot Tabulator (HW 1.3.13)	3.0.0.0
DS300 Precinct Ballot Tabulator	3.0.0.0
DS450 Central Ballot Tabulator	4.2.0.0
DS850 Central Ballot Tabulator	4.2.0.0
DS950 Central Ballot Tabulator	4.2.0.0
ExpressVote (HW 1.0)	4.2.1.0
ExpressVote (HW 2.1)	4.2.1.0

Software	
Electionware	6.3.0.0
ExpressLink	3.0.0.0
Event Log Service	3.0.0.0
ExpressVote Activation Card Printer	NA
PaperBallot	6.3.0.0
Removable Media Service	3.0.0.0
Toolbox	4.3.0.0
Regional Results	1.5.0.0

ES&S reported amending Form 100 prior to the January examination to include the 1.3.13 sub-version of DS200.

Overviews of component functions and integrated system configurations are included in the *ES&S 6.3.0.0 Certification and Scope of Conformation* document of the US Election Assistance Commission (“EAC”) dated November 17, 2022.

Examination Process

On January 23, ES&S representatives delivered the EVS 6.3.0.0 equipment to a secure conference room in the offices of the Texas Secretary of State. They subsequently extracted the trusted build from a hard drive provided by the Voting System Test Laboratories (“VSTL”).

January 24 focused on the firmware and software installation and hash validation processes. Examiners also completed accessibility testing on the ExpressVote and ExpressTouch equipment, which demonstrated their compliance in this release with Texas requirements. ES&S introduced the DS300 scanner.

Examiners performed regression testing of EVS 6.3.0.0 on January 25 using a pre-defined election and standard set of test cases. This testing yielded expected results across supported voting and tabulation hardware. Examiners also conducted ad hoc testing of this equipment. Ballot jams occurred during DS300 scans in this testing. Also observed was ExpressVote printing ballots whose bar codes were unreadable. This latter problem was linked to gaps in the bar images on those ballots; it was attributed to irregularities in the thermal card stock.

ES&S demonstrated uploading ballot images and data into Electionware from the USB drives of various scanners. They then performed adjudication on these images and generated reports on voting results. ES&S also demonstrated Regional Results reading tabulation files from similar USB drives and transmitting results to a dedicated and air-gapped ElectionWare system. A detailed discussion ensued regarding technical and logistical considerations for a jurisdiction deploying this application.

The follow-on examination on March 31 involved first repeating the installation and hash verification process for both the 2.1.0.0 and 2.1.2.0 revisions of ExpressVote as well as revision 1.3.13 of the DS200 scanner. Examiners then tested DS200 scanning to verify correction of the ballot jamming problem;

they also tested ballot casting on the different ExpressVote models. During this testing the examiners evaluated printed ballots to assure their barcode codes were consistently readable by both the ExpressVote and DS200 equipment.

Version Changes

EVS 6.3.0.0 is a modification of EVS 6.2.0.0, which was certified by the EAC on December 23, 2021. EVS 6.2.0.0 was examined June 22-23, 2022 by the office of the Texas Secretary of State; its Texas certification is currently pending. EVS 6.1.1.0 is the most recent version to receive Texas certification, which occurred on January 8, 2021.

In addition to updating the versions of equipment firmware, EVS 6.3.0.0 has the following, notable changes from EVS 6.2.0.0:

- Introduced the DS300 scanner, which provides improved performance over the DS200
- Upgraded the DS200 scanner's operating system to Linux (Yocoto)
- Added an option for ExpressVote to print contest and candidate names in a selected, second language as well as English
- Enabled adjudication of write-in votes on the vote summary card in Ballot Review in the Electionware Reporting module

Additional details on changes incorporated into EVS 6.3.0.0 are available in the EAC certification document referenced above.

Key Observations

Multiple Revisions of ExpressVote and DS200

Concern arose among examiners regarding multiple revisions of the ExpressVote and the DS200 hardware that ES&S submitted to Texas for EVS 6.3.0.0 certification. The issues were (1) how did revisions differ for each device, (2) was each revision tested and certified by the EAC for this EVS release, and (3) was each revision presented to the examiners for EVS 6.3.0.0 certification.

Versions 1.0 and 2.1 of ExpressVote were identified on the vendor's Form 100 application for Texas certification. However during the exam, ES&S clarified that they currently manufacture and distribute two sub-versions of this device: 2.1.0.0 and 2.1.2.0. The second of these sub-versions of ExpressVote 2.1 was not onsite for EVS 6.3.0.0 evaluation in January.

Similarly, versions 1.2 and 1.3 of DS200 were identified for Texas certification of EVS 6.3.0.0. Sub-versions 1.3.1 and 1.3.13 of the latter revision of this component are currently manufactured and distributed, but were not differentiated on Form 100 until ES&S amended it just prior to the January examination. Both sub-versions were available onsite for testing.

In responses to a January 31 request from the Secretary of State's office for additional information on these component variations, ES&S stated that they use sub-versions internally to differentiate successive production runs where the form, fit, and function of the major version of a particular device are deemed unchanged. ES&S provided no further clarification of differences between sub-versions 1.3.1 and 1.3.13 of the DS200 scanner.

Regarding ExpressVote 2.1.2.0, ES&S explained this incrementing of the sub-version in 2018 reflected their beginning under ECO 975 to use a second source for LCD displays to replace those that were entering end-of-life. ES&S also stated incremental sub-versions may identify de minimis changes to system components for which the EAC does not require an ECO. As such, version 2.1.2.0 also reflected ES&S changing the USB sliding drive cover from metal to plastic.

ES&S and the EAC may consider incremented sub-versions of a component for such reasons to be functionally equivalent and therefore not needing differentiation in reports and certification requests. However, Texas examiners require that all component sub-versions be both certified by the EAC and included in the examination of any EVS release that supports those hardware sub-versions.

To that end, in a letter to the Texas Secretary of State's office dated February 6, 2023, Pro V&V clarified their testing of DS200 hardware sub-versions. Pro V&V is the VSTL that tested EVS 6.3.0.0 for compliance with the version 1.00 of the EAC's *Voluntary Voting System Guidelines* ("VVSG"). Their testing covered all three revisions: 1.2, 1.3, and 1.3.13. Pro V&V further clarified that they typically only list major versions in their final reports with the assumption that coverage of sub-versions is implicit. Because Texas requires EAC certification of this testing, the Secretary of State obtained a similar letter from the EAC dated March 29, 2023. In it the EAC confirmed that their certification reflected the testing scope Pro V&V described in their letter.

With completion of the follow-on examination on March 31, the examiners had successfully tested all sub-versions of ExpressVote and DS200 supported by EVS 6.3.0.0 and distributed in Texas. Based on this testing as well as the clarifications and confirmations provided from Pro V&V, the EAC, and ES&S as described above, the examiners deemed all these sub-versions eligible for certification with EVS 6.3.0.0.

DS300 Paper Jam and Imprinters

During the exam, the DS300 equipment under test repeatedly jammed when ballots were inserted in both the upper and lower slots with the second ballot feeding immediately after the first before its scan completed. Only the entries on the first ballot processed were tabulated and the ballot then deposited into the collection bin beneath; the second would jam. However, the public counter was incremented twice with a message on the DS300 display indicating that both were successfully counted, but a jam had to be cleared. Although an unlikely scenario, except perhaps when a two-part ballot is used, this failure mode is still an issue because it mis-represents the actual tabulated votes.

ES&S reproduced this problem and determined it occurred only when the imprinter was installed in the DS300 hardware as it was during the onsite examination. The cause is a backward movement of the

first ballot after insertion to allow the printing of a ballot number. If the second is inserted during that printing step, DS300 pulls it into the paper path, which causes the second ballot to lay about 1 inch atop the first. The device increments the public counter as each ballot is detected, but only the first ballot is read and its processing completed.

Because removing the imprinter eliminates the problem, and Texas currently has no requirement for ballot numbering, the use of imprinters should not be certified for any scanner supported by EVS 6.3.0.0. ES&S stated they will investigate a prevention of this problem for inclusion in a future EVS release.

Regional Results Usage

No concerns arose with the operation of the Regional Results application in EVS 6.3.0.0. Instead, concerns focus on the limited applicability to most Texas counties of faster accumulation of unofficial poll results given the application's incremental cost and deployment complexity. Of equal concern is the lack of attention ES&S has conveyed for the significant need of metropolitan jurisdictions to accelerate completion of overall vote tabulation, adjudication, and reporting.

ES&S introduced its Regional Results application in EVS 6.2.0.0. This application supports sending preliminary results from a remote polling location over a closed network to an Electionware system running with restricted functional capabilities at the jurisdiction's central location. This system is dedicated to Regional Results transmission and air-gapped from the jurisdiction's official version of Electionware running at that central location. No ballot images, logs, or Cast Vote Record ("CVR") files are transmitted via Regional Results; adjudication of write-in votes and tabulation of mail-in ballots occur only at the central location on the official version of Electionware.

As such, the sole problem Regional Results addresses is how unofficial tabulations of votes cast at polling places can be accumulated faster for reporting to parties interested in such early results. Addressing this problem improves communication. Jurisdictions can benefit from this functionality where physical transportation of a polling place's USB with unofficial results is unduly time consuming. This occurs in very large rural counties and in densely populated metropolitan counties with congested roadways. Of these two types of counties, only the latter likely have (1) the public pressure to communicate early poll results and (2) the budget and IT expertise to deploy the required computer networks and systems as well as the secure facilities to house them. ES&S needs to communicate these considerations clearly to counties when they evaluate purchasing and deploying Regional Results.

ES&S also needs to document and communicate how metropolitan jurisdictions can architect and deploy a collected set of EVS systems to accelerate the overall tabulation, adjudication, and reporting of all jurisdictional voting, which must complete within 24 hours of polls closing in Texas. Addressing this problem improves compliance. This might take the form of logically sub-dividing a metropolitan county into multiple sub-jurisdictions that could independently aggregate in separate Electionware systems all mail-in ballots and cast votes for each such area. These aggregated results could then be rolled up to the jurisdiction's central Electionware system to produce an integrated set of results with supporting ballot images, logs, and CVR files.

Bar Codes on Thermal Paper

ExpressVote prints bar codes on each ballot card during voting that correspond to a voter's candidate selection for each election contest. This is a thermal printing process. ES&S scanners read these bar codes to tabulate votes and create CVRs. ExpressVote also can read the bar codes if a voter reinserts a completed ballot to have selections re-displayed (although no changes can be made).

During testing in the January examination of the ballot casting process, some printed bar codes had gaps in individual bars that prevented a device from successfully reading them. When this occurred, a message was displayed instructing the voter to seek poll-worker assistance. This issue occurred only when using a particular batch of cards; speculated causes were heat exposure, poor manufacturing process, or damage to card stock during manufacturing. ES&S agreed to investigate further. However, they were unable to subsequently isolate the problem's cause; they recommended that jurisdictions transport, store, and condition card stock according to ES&S documented guidelines.

Conclusions

Inconsistent and imprecise labeling of component sub-versions by ES&S, the VSTL, and the EAC led to uncertainty regarding which instances of ExpressVote and DS200 had been certified by the EAC and submitted to Texas for certification. If ES&S uses a 4-digit number (e.g., "xx.xx.xx.xx") to differentiate equipment sub-versions, then their applying this convention to labeling and reporting across all equipment revisions could significantly reduce such uncertainty. For any component sub-version being deployed with a voting system seeking Texas certification, the examiners require certification by the EAC and inclusion in the examination to be unambiguous.

The presence of an imprinter on a DS300 scanner can result in a jammed ballot under EVS 6.3.0.0. Because removing the imprinter eliminates the problem, and Texas currently has no requirement for ballot numbering, imprinters should not be installed on any scanner this release supports.

Issues with Regional Results focus not on its operation in EVS 6.3.0.0, but on the implicit conditions for its cost-effective deployment: (1) pressing need to communicate early poll results, (2) significant delays in transporting USBs from polling places, and (3) ample budget and IT expertise to deploy the required computer networks and systems as well as the secure facilities to house them. Because few jurisdictions likely satisfy all three conditions, ES&S needs to clearly communicate cost, complexity, and benefit considerations to counties as they evaluate purchasing and deploying Regional Results.

These considerations notwithstanding, this examiner finds EVS 6.3.0.0 to be an effective, highly usable voting system that complies with the necessary requirements for a voting system under Texas law. As such, its certification is recommended with the condition that imprinters not be installed on ES&S scanners deployed in Texas.