

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

Prepared for the
Secretary of State of Texas

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Designee of the Attorney General

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

Examination Date January 15-16, 2020

Report Date February 16, 2020

Examination of ES&S Voting System (EVS) 6.1.0.0

EAC Certification Number: ESSEVS6100

Components Examined	Version
ExpressTouch	1.0.3.0
DS200 Precinct Ballot Counter	2.30.4.0
DS450 Central Scanner and Tabulator	3.4.0.0
DS850 Central Scanner and Tabulator	3.4.0.0
ExpressVote & Previewer, HW v. 1.0	4.0.0.0
ExpressVote & Previewer, HW v. 2.1	4.0.0.0
ExpressVote XL HW v. 1.0	1.0.3.0
Electionware	6.0.0.0
ExpressLink	2.0.0.0
Event Log Service	2.0.0.0
ExpressVote Activation Card Printer	NA
ExpressVote Previewer	4.0.0.0
PaperBallot	6.0.0.0
Removable Media Service	1.5.1.0
Toolbox	3.5.0.0

Changes from Last Version Examined (EVS 6.0.4.0)

The biggest change in EVS 6.1.0.0 is the switch of Electionware to use 64-bit Microsoft Windows operating systems. Here are the details:

Change from	Change to
Windows 7	Windows 10 Enterprise LTC
Windows Server 2008 R2	Windows Server 2016

More changes, listed in the ES&S document *System Change Notes*, were made to make the ES&S system more secure or efficient or easier to use.

System Overview

EVS is a comprehensive election system that supports most modern voting methods.

Election setup is done using the Electionware software and then transported to the various Election-Day devices on encrypted USB memory sticks.

On Election Day, voters can mark paper ballots manually, or use an ExpressVote, ExpressVote XL, or ExpressTouch voting station. ExpressVote is a touch-screen voting station that can be used either as a direct recording electronic (DRE) device that records voters' choices on electronic media, or for printing their choices on a paper ballot card for separate tabulation.

The printed ballot contains a complete record of the voter's choices in both human-readable form (so the voter can verify it) and machine-readable form (for tabulation).

ExpressTouch is a tablet voting station that is primarily for curbside voting.

At the polls, election workers first identify a voter's precinct and split, and then use ExpressLink to print an activation card to unlock a voting station. For manual voting, the voter is given a paper ballot.

The paper ballots and vote summary card can be scanned in the precinct using the DS200, or in a central-count location using the DS450 or DS850. The results of DRE voting and the ballots scanned in the precinct are written on USB memory, which is then carried to the central-count location for final tabulation.

Examination Procedures

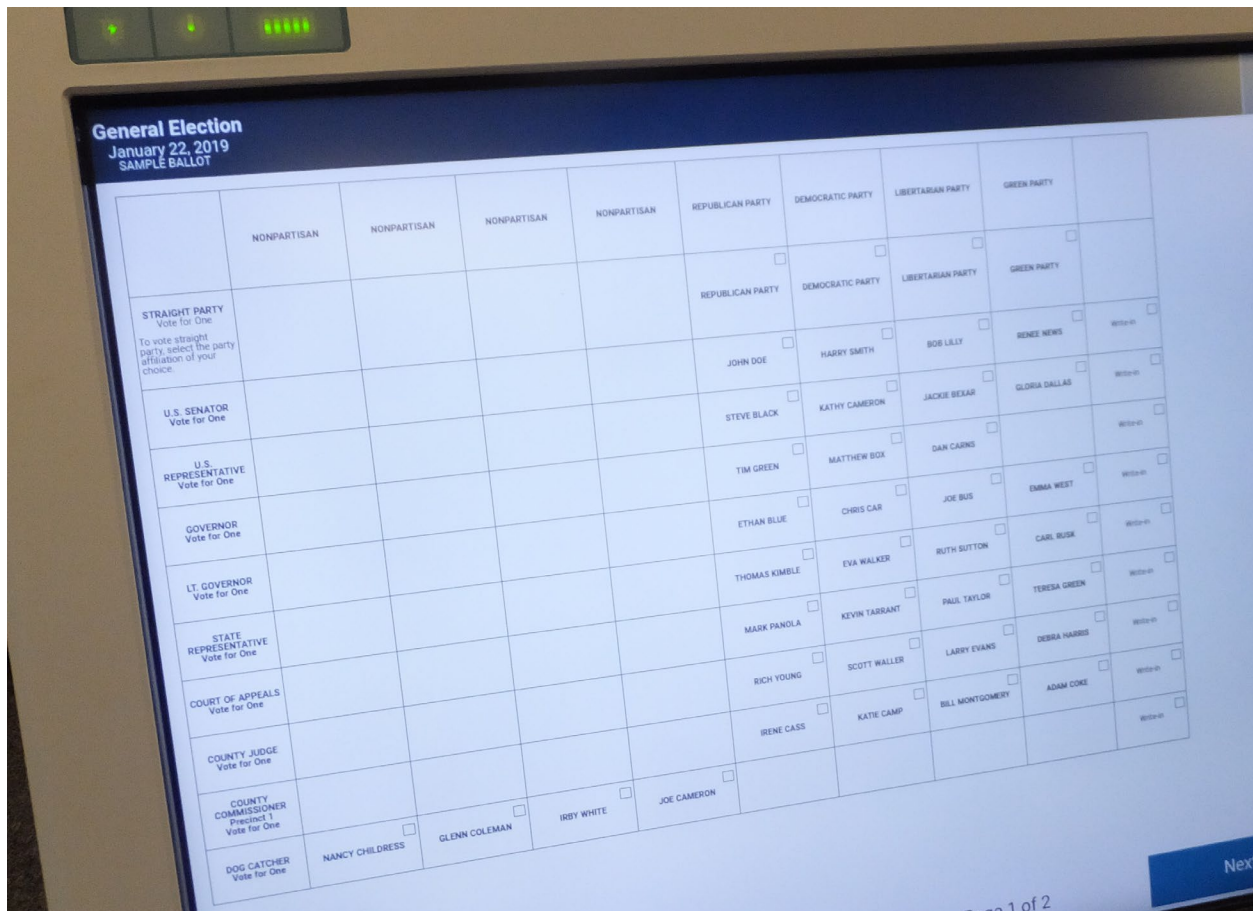
This was a two-day examination. On the first day, we observed as the vendor installed the firmware and software using files obtained directly from the VSTL by the Secretary of State, thus providing chain of custody. Then we verified version numbers, asked technical questions, and discussed the technical aspects of the system.

On the second day, we heard a presentation about the system, voted on the different voting stations, tabulated using each scanner, transported election results to the central-count system, and verified that the results were tabulated properly.

Concerns

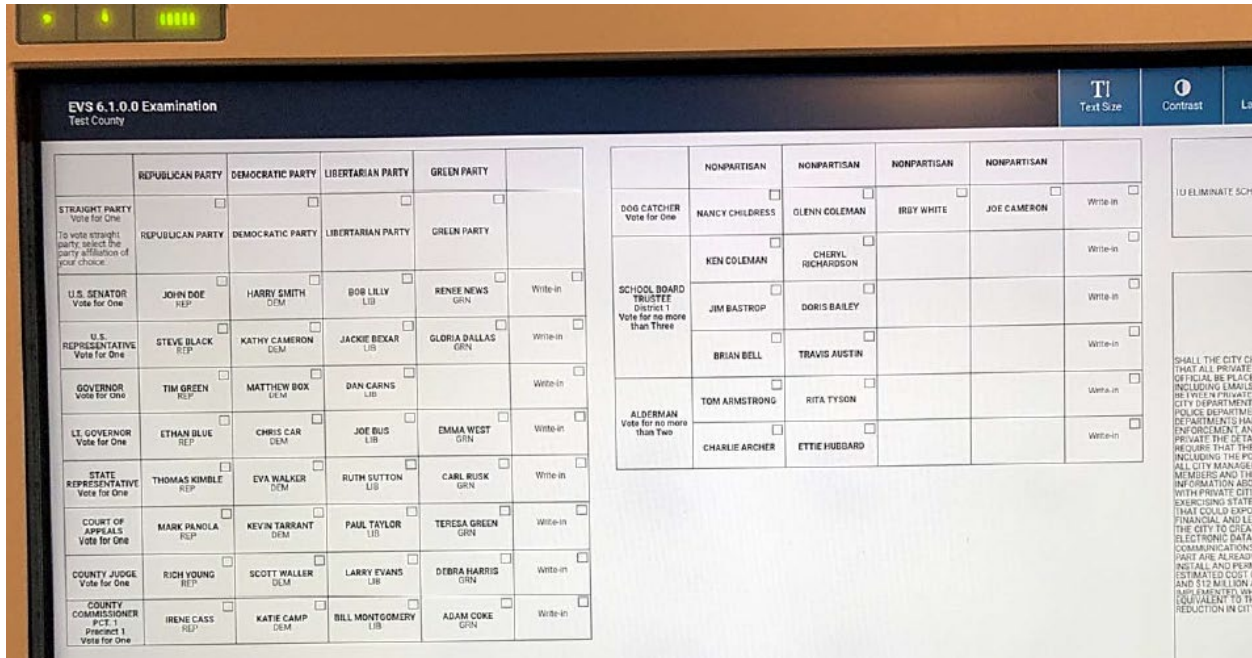
Concern 1. Confusing screen layout

ES&S has not addressed my concern about the ExpressVote XL, which was identified in my report from the previous exam, on January 22, 2019. My concern is that it is possible to create the confusing ballot layout shown in the photo (from the prior exam), with four columns labeled non-partisan and the others labeled with party names. In the example below, this confusing layout is made worse by the partisan races being listed on the right, so that the voter must scan across all the empty columns to see which party a candidate belongs to.

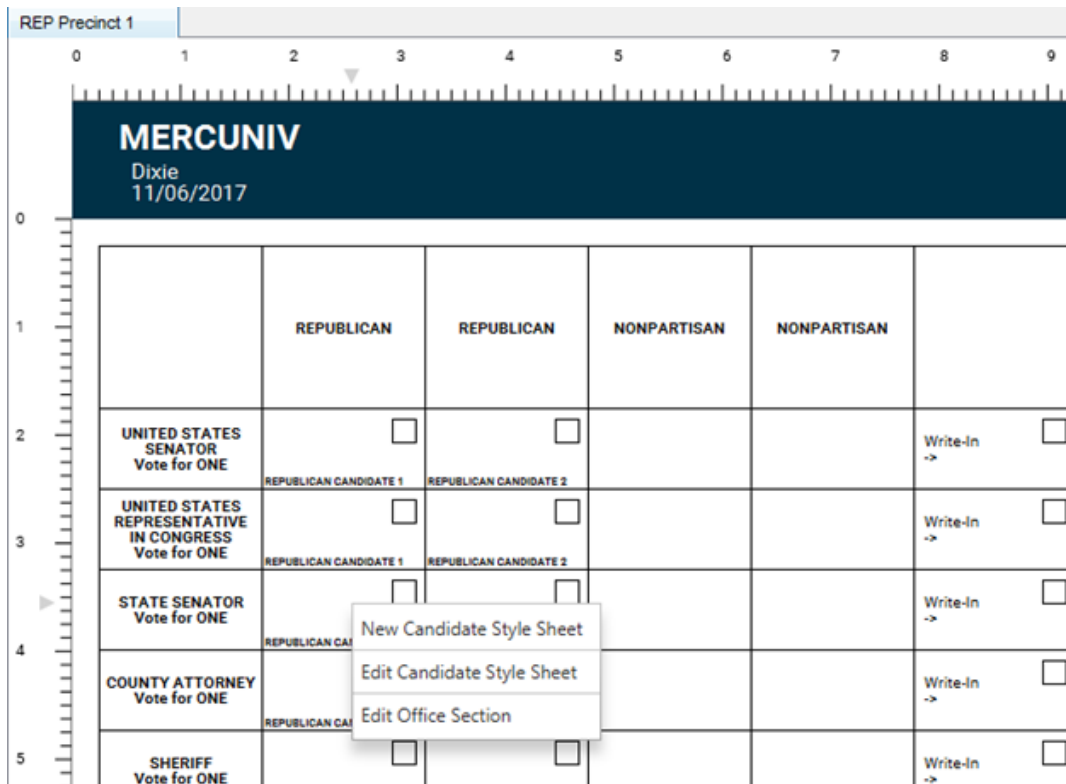


One solution to this would be to list the non-partisan candidates in a separate table from the ones with party affiliations. The second table could be displayed to the right of the first one, below it, or on a separate page.

ES&S has responded to my comments by proposing a ballot layout like the one shown below.



I completely agree with this approach (except for the blank columns under nonpartisan), but why does ES&S not use this approach in the example below, which is from *Electionware Vol. III: Design User Guide* in section 3.1.2, on page 235? This is the only example of a ballot layout I found in their documentation.



It's important to provide guidance to counties about how to use the ExpressVote XL to lay out ballots so they can be clearly understood by voters. ES&S argues that the Electionware software is merely a tool, and the responsibility for designing a user-friendly ballot resides with the customer. However, I believe that the vendor should provide guidance regarding best practices and cautions regarding misuse, where it cannot be prevented.

Concern 2. Verification of Hash Codes

The software and firmware in a voting system should be verified using hash codes. A *hash code* is a number that can be calculated from a file to verify that any copies are correct and have not been tampered with. For voting systems, this is usually done by comparing the hash code of the installed software to the hash code of the certified software. The hash codes of the certified software, often called *trusted hash codes*, are provided by the US Election Assistance Commission (EAC).

During the exam, about 7,000 files appeared to be invalid. It turned out this was because ES&S had missed an installation step where hashes are generated. ES&S provides a script to compare hashes, but it does not compare them directly against the trusted hashes. Instead, according to *ES&S Voting System Security*, this is done in three steps:

1. Hashes of the installation media are compared against the trusted hashes from the EAC.
2. After installation, new hashes are generated for the installed system.
3. Finally, when the system is configured or on Election Day, hashes from the configured system are compared to those generated in step 2.

On the test system ES&S forgot to perform step 2.

Even if they had remembered step 2, some files will change as the system is used, and it is difficult for the county to know which files are expected to change.

It would be better, I think, for the EAC to have hashes of only the files that should not change. Then only those files would need to be hashed on the configured system, and the county would know that all the generated hashes should compare.

This would also reduce the time required to generate and compare hashes, which during the exam was over two hours.

Summary

In my opinion the EVS 6.1.0.0 is an excellent voting system, and I recommend certification.

For the ExpressVote XL, I recommend the certification be conditional -- the condition being that ES&S modify their documentation by changing the example on page 235 and warning against the usability concern I have raised. In later versions, they should warn from within Electionware.