



**Report Prepared for the
Texas Secretary of State
Elections Division**



Voting System Certification Evaluation Report

Election Systems and Software (ESS) EVS 5.4.0.0 Voting System

Introduction

The Election Systems and Software (ESS) EVS 5.4.0.0 Voting System was evaluated for certification by the State of Texas on April 18-20, 2017. This report summarizes the findings and observations of the ESS EVS 5.4.0.0 voting system and its compliance with the requirements of the State of Texas.

Pursuant to Texas Administrative Code §81.60, ES&S submitted their application for state certification. Included with their application was their Technical Data Package (TDP) and their test report, upon which the EAC based their national certification. The EAC/NIST NVLAP accredited Voting System Test Laboratory (VSTL) was NTS Laboratories, formerly Wyle Labs.

The EAC certified the system on February 24, 2017. The certification of this system was to the 2005 version of the Voluntary Voting System Guidelines (VVSG), see Appendix A - EAC Certificate of Certification.

The system was evaluated by the VSTL and certified by the EAC to the 2005 version of the VVSG.

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

Recommendation

The ESS EVS 5.4.0.0 Voting System is recommended for certification. The system was judged to comply with the voting system requirements of the State of Texas.

This recommendation is being made with the observation that prior versions of the system are being successfully used to run elections, including in Texas. A variety of features introduced in this version bring improvements to the version of the system currently in use and would be a step

Evaluation Report of the ESS EVM 5.4.0.0

forward for the counties that currently use the previous system. In particular, moving from the older Unity system to ESS' new EVS system appears to bring significant benefit.

Further, the ESS EVS 5.4.0.0 or very closely related versions of the system has been deployed and are being used successfully in other states. Detail of jurisdictions that use this or a similar version of this system will be discussed later in this report.

Observations and Recommendations

The following are observations of and recommendations for the system.

Documentation of Audit Logs

As will be discussed in more detail in the body of this report, the audit logs continue to improve and provide a more detailed record of an election. However, a number of questions continue to be unanswered regarding the system logs. Among those are:

1. The number of messages defined for the audit logs from the DS200 has risen from 125 event and error messages with Unity 3.2.0.0 to 914 messages with EVS 5.4.0.0. While the greater detail in the DS200 logs for most recent systems is encouraging it also raises questions. Are there now enough messages defined to accurately record the events of importance during an election? If the EVS 5.4.0.0 requires 914 messages to record the events and errors that could occur during an election how can the Unity 3.2.0.0 Rev. 2 system be considered adequate with only 125 event and error messages defined? What is the basis for confidence that 914 events completely contain the errors and events that may occur? The DS850 has hundreds fewer messages defined than the latest version of the DS200, raising the question of whether its logging needs to undergo a similar maturation process?
2. Is there enough information given so that an election official can gather a full set of logs from a system to have a complete record of the election? There is no single list in the documentation of all the logs that are needed to have a complete record of an election. Typically, each scanner has a log from its election software and a second log is kept by the scanner engine. The system user documentation does not discuss these scanner engine logs. Further each application has its own log and the operating system a separate log.

As observed with its predecessor, the process for gathering the full set of log files was found to be complex and unclear. Further, the messages vary across the system components with cryptic or sometimes absent explanation of the meaning of the message or the action that should be taken. For a large percentage, the only action recommended is to call the company's service representative.

It is recommended that ESS be asked to provide a clear process for gathering a full set of system log files and clear explanations for understanding them. For errors and abnormal events both the meaning of the message and the correct action to be taken should be clear. Equally important is clear guidance on the relevance of errors to election accuracy.

Evaluation Report of the ESS EVM 5.4.0.0

Which messages call for immediate corrective action and which are relatively routine errors?

3. For risk limiting election audits are the logs sufficiently detailed and documented to support the intended purpose of an evidence based election?
4. When an election is contested or evidence is revealed of irregularities, are the logs sufficiently useable and unambiguous to determine if irregularities occurred and if they did, the extent to which the election results were impacted?

While the improvements in the current system are appreciated, continued work is needed if the audit logs are to be the tool they should be in running evidence based elections, risk limiting audits and forensic post-election analysis.

An important improved is to review the documentation and log functions from the perspective of a person responsible for performing a risk limiting audit or investigating an election where there are claims of irregularities or evidence that irregularities occurred. It should be very clear which errors or events indicate potential problems with the reported results. For most potential problems mitigating measures are in place to prevent potential harm from being realized. It is therefore important that it be clear when an event is recorded that potentially gives evidence of a problem what succeeding events would document that the appropriate mitigation was triggered and performed as intended. The investigator needs to know if there are indications of a possible problem. Then the investigator needs to know, based on what the log records, if the possible problem actually occurred or was it avoided. Having poorly described log message, particularly if the description is not given from the perspective of potential impact to an election, make answering these questions difficult, if not impossible to answer.

An example of this need is the error 6001033, “Cannot un-mount ESS Memory Device”, which occurred during the test election conducted during this examination. If this error occurred during an election is there the possibility that ballots or cast vote records were not accurately recorded? If so, is further action necessary or do the following events in the log show that the potential for an error was averted by subsequent actions? The documentation does not provide the information an election official would need to answer these questions.

Mark recognition thresholds

The EAC Certification Certificate for the EVS 5.4.0.0 system states:

ES&S’ declared level mark recognition for the DS200 and DS850 is a mark across the oval that is 0.02” long x 0.03” wide at any direction.

A comparable statement was not included in the Unity 3.4.1.4 EAC Certification Certificate or earlier ESS systems examined in Texas. This information is important because it allows state and local election officials to make their own determination as to whether they agree with the mark rejection criteria.

A similar but different statement is included on the EVS 5.2.2.0 EAC Certification Certificate, which states:

ES&S’ documentation declares that the DS200, DS450 and DS850 will reject anything seen inside the oval area that is smaller than .005 square inches (i.e. a circle of diameter

Evaluation Report of the ESS EVM 5.4.0.0

.025", a rectangle of .02" by .025") as a marked response on a pixel count basis and will be listed as an unmarked oval and not be evaluated further.

Notice that the description of the EVS 5.4.0.0 states that the mark must cross the entire oval while the description for the EVS 5.2.2.0 only requires that the area exceed a certain size within the oval. Neither description mentions color or how dark the mark must be, both of which are important parameters for mark recognition.

In the system documentation, it is stated that the DS200 and DS850 use:

... our patented Positive Target Recognition and Compensation™ (PTRAC) and Intelligent Mark Recognition™ (IMR) technology to determine what constitutes as a mark for a candidate.

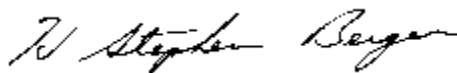
It must be concluded that marks will be evaluated differently by ESS scanners than those of other vendors. The fact that ESS uses its own patented and trademarked technology to identify marks ensures that its scanners will identify marks differently from other scanners. Consequently, the count will be different for the same ballots processed by different scanners, certainly between scanners from different vendors.

The PTRAC and IMR functions may be, and likely are, superior innovations that improve mark recognition accuracy. Such improvements should be encouraged and welcome. However even improvements introduce problems. In an extremely close election it should be election policy and election officials who make the final determination of mark validity, not technology. Having different technology used in different jurisdictions means that in a very close election the same ballot marks could result in different outcomes. This is hardly desirable. Mark recognition should be decided by established policy determined by election officials.

To have vendor and scanner independent mark recognition, hence mark recognition guided by policies set by election officials, but to still encourage innovation and technological improvement requires two things. First, the process used by each scanner must be documented in detail and documented in ways that allow election officials to relate the technical specifications to marks they see on ballots. Second, for close elections, where a few marks treated differently have the potential to change the outcome, the technology should allow for efficient review of marks that are within a threshold differentiating scanners. A count, on an individual selection basis, would be needed from the original scan of those marks that potentially would be counted differently by a different scanner. Then, in close elections, where those marks have the potential to change the outcome, further review of those marks but only those marks would be justified.

The mark recognition process needs to be clearly described with the support election officials will need to deal with elections that are extremely close.

Sincerely,



H. Stephen Berger

Evaluation Report of the ESS EVM 5.4.0.0

Contents

Introduction.....	1
Recommendation	1
Observations and Recommendations.....	2
Documentation of Audit Logs	2
Mark recognition thresholds	3
Contents	5
Candidate System.....	6
System Components.....	6
Components Not Previously Certified	9
Comparison to Prior and Successor Systems.....	10
System Limits	13
System Limitation.....	13
Component Limitations	14
Use in other States	16
Examination Report	18
Description of the Examination	18
Observations & Findings	18
System Verification	18
Audit Logs	19
Compliance Checklist.....	23
Supplemental Checklist	33
Appendix A - EAC Certificate of Certification	35
Appendix B - Digital Signatures of Software Examined.....	36
Signature of Directory.....	36
Directory Structure.....	36

Evaluation Report of the ESS EVM 5.4.0.0

Candidate System

This section describes the candidate system, the ESS EVS 5.4.0.0 Voting System.

System Components

The system is comprised of the components listed in Table 1 and shown functionally in Figure 1.¹ The previous ESS system certified in Texas is shown in Figure 2.

Notable differences are the consolidation of several functions into EVM and the absence of the M100 and M650 ballot scanners. EVM is ES&S's newest election management software. It is the next generation, replacing the previous Unity system. ExpressVote a universal touch-screen ballot marking devices is also introduced with this system.

¹ This information is based on the companies "Application for Texas Certification of Voting System" (Form 100).

Table 1 - ESS Unity 5.4.0.0 System Components

System Components			
#	Unit/Application	Version	Function
Election Management Software			
1	ElectionWare	4.8.0.0	Election Management Software (EMS) suite, providing end-to-end election management support.
2	Event Log Service	1.5.6.0	A background function that monitors the proper functioning of the Windows Event Viewer.
3	Removable Media Service	1.4.5.0	Supports installation and removal of election and results media.
4	Election Reporting Manager (ERM)	8.13.0.0	Results consolidation and reporting software.
5	VAT Previewer	1.8.7.0	Allows user to preview screen layout and audio for the Automark.
6	ExpressVote Previewer	2.1.0.0	Allows user to preview screen layout and audio for the ExpressVote.
Universal Voting System			
7	ExpressVote	2.1.0.0	Universal touch-screen vote capture device, with independent voter-verifiable paper record that is digitally scanned for tabulation.
Voter Assist Terminal			
8	AutoMARK	1.8.7.0	Accessible ballot marking system that supports audio ballot playback and ballot marking for voters with low vision or with physical disabilities.
Ballot Scanners			
9	DS200	2.14.0.0	Precinct ballot tabulator used to process ballots at a polling place.
10	DS850	2.11.0.0	Central ballot scanner for high-volume tabulation of mail ballots, absentee ballots or Election Day ballots.

Evaluation Report of the ESS EVM 5.4.0.0

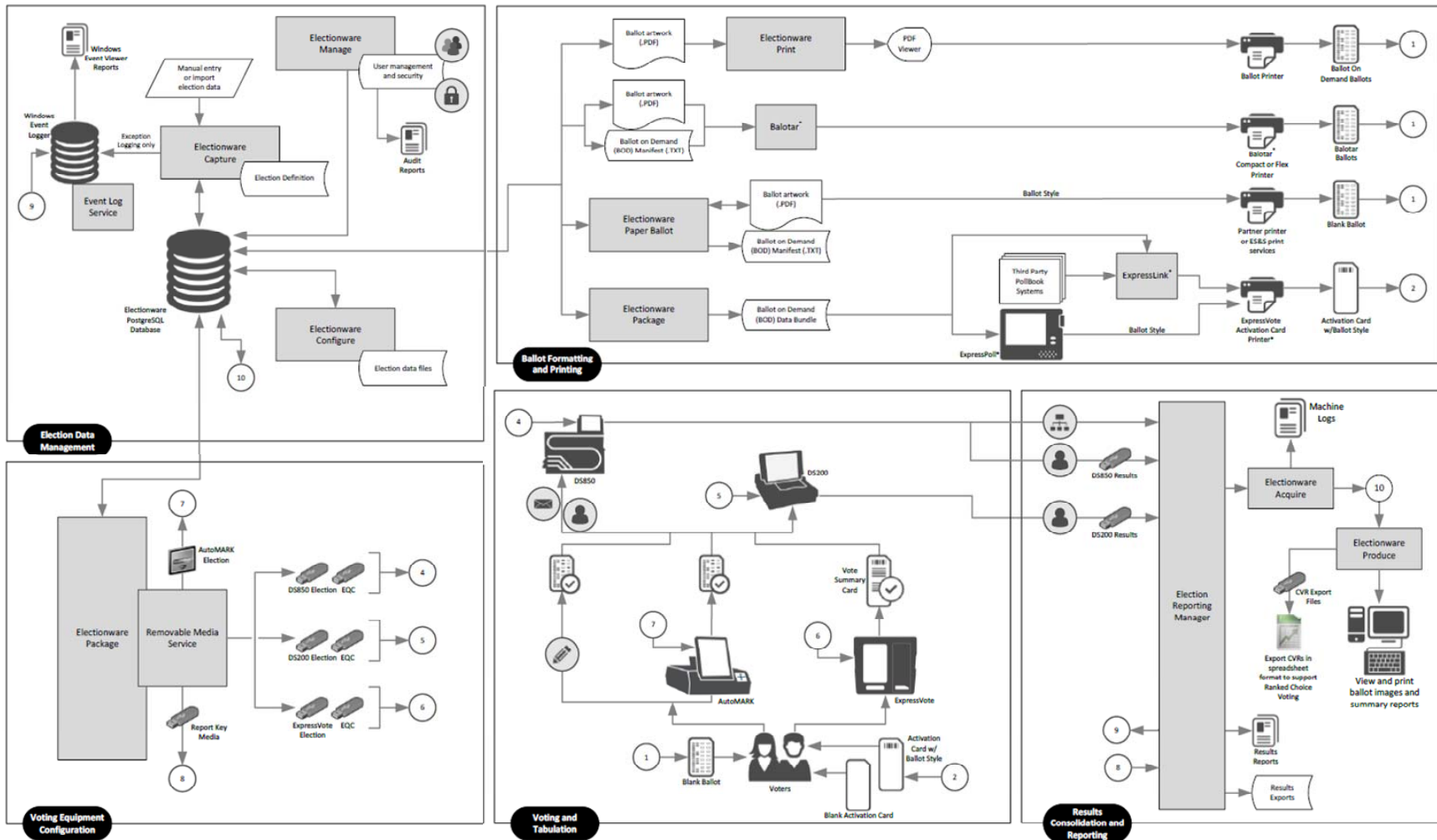


Figure 1 - ESS Unity 5.4.0.0 Process Flow

Evaluation Report of the ESS EVM 5.4.0.0

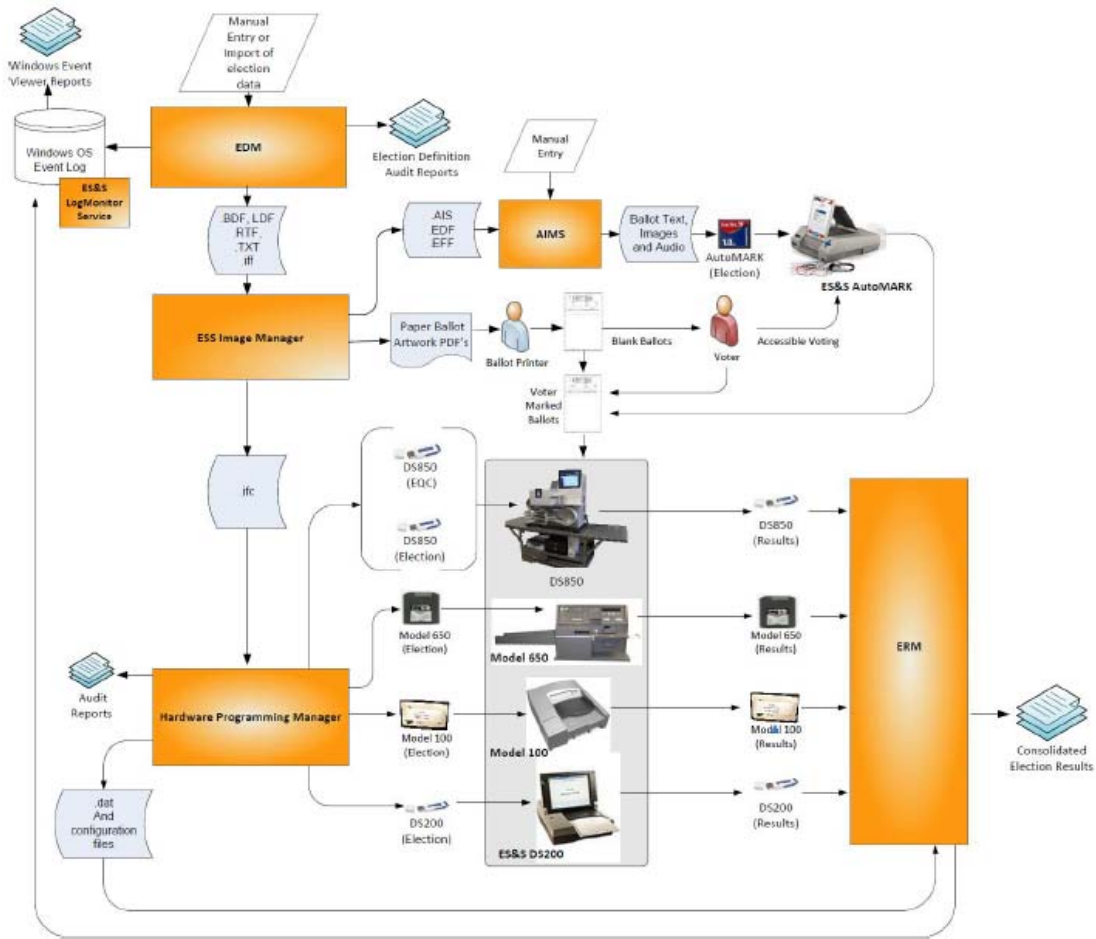


Figure 2 - ESS Unity 3.4.1.0 Process Flow

Components Not Previously Certified

The following components have not previously been certified in Texas:

System Components		
#	Unit/Application	Version
1	ElectionWare	4.8.0.0
2	Election Reporting Manager (ERM)	8.13.0.0
3	VAT Previewer	1.8.7.0
4	Event Log Service	1.5.6.0
5	ExpressVote	2.1.0.0
6	ExpressVote Previewer	2.1.0.0
7	AutoMARK	1.8.7.0
7	DS200	2.14.0.0
8	DS850	2.11.0.0

Evaluation Report of the ESS EVM 5.4.0.0

Comparison to Prior and Successor Systems

The prior ESS voting system certified in Texas was the EVS 5.2.1.0, certified on December 15, 2016.

ES&S has two separate branches of the voting systems they offer, the Unity and EVS systems. Many components and changes are made in common. While there are significant differences in the Unity and EVS product line, in some areas what is done for one branch is also done for the other branch. However, typically separate firmware/software version numbers are assigned to make up a release. For example, the Unity 3.4.1.0 system is considered functionally equivalent to EVS 5.2.0.0 from a DS200, DS850, and AutoMARK firmware standpoint.

Comparison to Previous Version							
#	Unit/Application	3.0.1.1 Version	3.4.1.0 Version	5.2.1.0 Version		5.2.2.0 Version	5.4.0.0 Version
1	Unity	3.0.1.1	3.4.1.0				
2	EVS			5.2.1.0		5.2.2.0	5.4.0.0
Election Management Software							
3	ElectionWare			4.7.1.0		4.7.1.1	4.8.0.0
4	Election Data Manager (EDM)	7.4.4.0	7.8.2.0				
5	Election Reporting Manager (ERM)	7.1.2.1	7.9.0.0	8.12.1.0		8.12.1.1	8.13.0.0
6	ESS Image Manager (ESSIM)	7.4.2.0	7.7.2.0				
7	Hardware Programming Manager (HPM)	5.2.4.0	5.9.0.0				
8	Audit Manager (AM)	7.3.0.0	7.5.2.0				
9	Log Monitor Service		1.1.0.0				
10	VAT Previewer		1.3.2907	1.8.6.0		1.8.6.1	1.8.7.0
11	Event Log Service			1.5.5.0		1.5.5.0	1.5.6.0
12	ExpressVote			1.4.1.0		1.4.1.2	2.1.0.0
13	ExpressVote Previewer			1.4.1.0		1.4.1.2	2.1.0.0
14	Removable Media Service			1.4.5.0		1.4.5.0	1.4.6.0
AutoMark							
15	AutoMARK	1.1.2258	1.3.2907	1.8.6.0		1.8.6.1	1.8.7.0
16	AIMS	1.2.18	1.3.257				
Ballot Scanners							
17	M100	5.2.1.0	5.4.4.5				
18	M650	2.1.0.0	2.2.2.0				
19	DS200		1.7.0.0	2.12.1.0		2.12.2.0	2.14.0.0
20	DS450					3.0.0.0	
21	DS850		2.9.0.0	2.10.1.0		2.10.2.0	2.11.0.0

Evaluation Report of the ESS EVM 5.4.0.0

ESS has received EAC national certification for several preceding, Table 2.

Table 2 – Recently EAC Certified ES&S Systems

Predecessor Voting Systems		
#	System	Date of EAC Certification
1	EVS 5.0.0.0	May 16, 2013
2	EVS 5.0.1.0	March 18, 2014
3	EVS 5.2.0.0	July 2, 2014
4	EVS 5.2.0.3	August 5, 2015
5	EVS 5.2.0.4	April 27, 2016
6	EVS 5.2.1.0	December 18, 2015
7	EVS 5.2.1.1	May 4, 2016
8	EVS 5.2.2.0	February 27, 2017
Voting Systems Being Examined		
9	EVS 5.4.0.0	February 24, 2017

The EAC Certification Certificate states that the following differences and improvements are introduced by the EVS 5.4.0.0, as compared to its predecessor EVS 5.2.0.0 system:

Modifications to the voting system include changes to address conformance with new RFIs released before application submission, functional upgrades, software fixes, software to enhance usability, and replacement of hardware parts nearing end-of-life. This modification includes a new hardware component with two operating modes: the ExpressVote 2.0 Tabulator and the ExpressVote 2.0 Marker. Additional testing on the ExpressVote was requested by the EAC to prove the ability to reliably manufacture these units. ExpressVote 2.0 was replaced by ExpressVote 2.1 to eliminate the EMC concerns and be reproduced/manufactured in a consistent and reliable manner.

Important insights for the evaluation of the ESS Unity 5.4.0.0 can be gained by comparing it to its predecessor and successor systems.

Many components are common to the version of the system previously certified in Texas. It may be assumed that the experience using the prior version of the system will be similar to that of the new system. However, some prior issues in earlier versions of the system have been resolved. These may be identified by studying the change log and engineering change orders on the system from the Unity 3.0.1.1 version to the EVS 5.4.0.0 version.

It is noteworthy that the Automark is no longer being manufactured.

Evaluation Report of the ESS EVM 5.4.0.0

Another noteworthy difference is that the ballot used in Unity is limited to a 3-column vs. ElectionWare's 24-column ballot. Underlying this difference is a significant change in the scanning technology used.

Evaluation Report of the ESS EVM 5.4.0.0

System Limits

System Limitation

The system has the following limitations, per the EAC certificate of certification:

Table 3 – ESS Unity 3.4.1.0, EVS 5.2.1.0 & EVS 5.4.0.0 System Limits²

System Limits					
#	System Variable	System Limit			Limiting Component
		Unity 3.4.1.0	EVS 5.2.1.0	EVS 5.4.0.0	
1	Precincts in an election	9,900	9,900	9,900	ERM
2	Maximum count for any precinct element	500,000 65,500 for any tabular media	500,000 65,500 for any tabular media	500,000 99,990 for any tabular media	ERM
3	Candidates per election (max. counters)	21,000 ³	21,000 ³	21,000 ³	ERM
4	Contests per election (max. counters)	21,000 ⁴	21,000 ⁴	21,000 ⁴	ERM
5	Maximum counters per precinct	1,000	1,000	1,000	ERM
6	Contests allowed per ballot style	200	200	200	N/A
7	Candidates (ballot choices) per contest	175	175	175	ERM
8	Parties in a General Election	75	75	75	ERM
9	Parties in a Primary Election	20	20	20	ERM
10	Choices in a Contest	98	98	98	ERM
11	Ballot Formats	All paper ballots must be the same size and contain the number of	All paper ballots must be the same size and contain the number of response rows.	All paper ballots must be the same size and contain the number of	Scanner

² EAC Scope of Certification for the ESS EVS 5.2.1.0 Voting System.

³ The number of contests allowed in an election depends on the election content. The maximum number of counters is 21,000. An example of a maximum contest calculation is: if all contests had 2 candidates (5 counters each, 3 overhead counters + 2 candidates) and there were 10 statistical counters (i.e. Ballots Cast - Total, Republican, Democratic, Libertarian, Nonpartisan and Registered Voters - Total, Republican, Democratic, Libertarian, Nonpartisan. $(21000 - 20)/5 = 4196$ or $(\text{counter limit} - \text{statistics} \times 2)/\text{number of counters/contest} = \text{number of contests}$.

⁴ Contest counters are calculated as indicated in footnote 3, but two counters must be added for each statistical counter defined for the precinct. There are a minimum of 3 statistic counters assigned to each precinct (six added counters), “Ballots Cast,” “Registered Voters” and “Ballots Cast Blank.”

Evaluation Report of the ESS EVM 5.4.0.0

System Limits					
#	System Variable	System Limit			Limiting Component
		Unity 3.4.1.0	EVS 5.2.1.0	EVS 5.4.0.0	
		response rows.		response rows.	
12	Ballot styles	9,900		9,900	ERM
13	District types/groups	20		20	ERM
14	Districts of a given type	40 ⁵		40 ⁵	ERM
15	Languages supported	<ul style="list-style-type: none"> • English • Spanish • Chinese • Korean • Bengali 	<ul style="list-style-type: none"> • English • Spanish • Chinese • Korean • Bengali 	<ul style="list-style-type: none"> • English • Spanish • Chinese • Korean • Bengali 	System Configuration

Component Limitations

Paper Ballot Limitations

1. The paper ballot code channel, which is the series of black boxes that appear between the timing track and ballot contents, limits the number of available ballot variations depending on how a jurisdiction uses this code to differentiate ballots. The code can be used to differentiate ballots using three different fields defined as: Sequence (available codes 1 - 26,839), Type (available codes 1 - 30) or Split (available codes 1 - 40).
2. If Sequence is used as a ballot style ID, it must be unique election - wide and the Split code will always be 1. In this case the practical style limit would be 26,000.

DS200

1. The ES&S DS200 configured for an early vote station does not support precinct level results reporting. An election summary report of tabulated vote totals is supported.

AUTOMARK Voter Assist Terminal

1. ES&S AutoMARK capacities exceed all documented limitations for the ES&S election management, vote tabulation and reporting system. For this reason, Election Management System and ballot tabulator limitations define the boundaries and capabilities of the AutoMARK system as the maximum capacities of the ES&S AutoMARK are never approached during testing .

ElectionWare

1. ElectionWare capacities exceed the boundaries and limitations documented for ES&S voting equipment and election reporting software. For this reason, ERM and ballot tabulator limitations define the boundaries and capabilities of ElectionWare system.

⁵ Excludes the Precinct Group which contains all precincts.

Evaluation Report of the ESS EVM 5.4.0.0

ExpressVote

1. ExpressVote capacities exceed all documented limitations for the ES&S election management, vote tabulation and reporting system. For this reason, Election Management System and ballot tabulator limitations define the boundaries and capabilities of the ExpressVote system as the maximum capacities of the ES&S ExpressVote are never approached during testing.

Election Reporting Manager (ERM)

1. Election Reporting Manager requires a minimum monitor screen resolution of 800x600.
2. ERM Database Create allows 1600 Precincts per Ballot Style.
3. There is a limit of 3510 precincts in the precincts counted/not counted display.
4. There is a limit of 3000 precincts in the precincts counted/not counted scrolling display.
5. Contest/Precinct selection pop up display limited to 3000 contests/precincts.
6. Non-English characters are not supported in ERM. This has to do with the creation of the
2. XML results file out of ERM.
7. ERM's maximum page size for reports is 5,000 pages.

Evaluation Report of the ESS EVM 5.4.0.0

Use in other States

The ESS EVS 5.4.0.0 or very closely related versions of the system has been deployed and are being used successfully in other states.

The EAC maintains an interactive map identifying jurisdictions that are using EAC certified systems, Table 4. They also maintain a report database of problems reported by election officials with certified systems. These resources were consulted and are the basis for this statement.

Table 4 – EAC list of jurisdictions using closely related versions of the EVS 5.4.0.0 system⁶

County	State	EAC Certified	
		Voting System	System Components
Pinal	AZ	ES&S EVS 5.0.0.0	
Canyon	ID	ES&S EVS 5.0.0.0	
Virgin Islands	VI	ES&S EVS 5.0.0.0	
Lewis	WV	ES&S EVS 5.0.0.0	
Pima	AZ	ES&S EVS 5.2.0.0 Mod	
Cassia	ID	ES&S EVS 5.2.0.0 Mod	
GEM	ID	ES&S EVS 5.2.0.0 Mod	
Madison	ID	ES&S EVS 5.2.0.0 Mod	
Hinds	MS	ES&S EVS 5.2.0.0 Mod	
Cuyahoga	OH	ES&S EVS 5.2.0.0 Mod	
Lane	OR	ES&S EVS 5.2.0.0 Mod	
Tillamook	OR	ES&S EVS 5.2.0.0 Mod	
Harrison	WV	ES&S EVS 5.2.0.0 Mod	
Allegany	MD	ES&S EVS 5.2.0.3 Mod	
Anne Arundel	MD	ES&S EVS 5.2.0.3 Mod	
Baltimore	MD	ES&S EVS 5.2.0.3 Mod	
Baltimore (city)	MD	ES&S EVS 5.2.0.3 Mod	
Calvert	MD	ES&S EVS 5.2.0.3 Mod	
Caroline	MD	ES&S EVS 5.2.0.3 Mod	
Carroll	MD	ES&S EVS 5.2.0.3 Mod	
Cecil	MD	ES&S EVS 5.2.0.3 Mod	

⁶ The EAC maintains a list of jurisdictions using EAC certified systems. This data was Dated March 25, 2017 and is the source of the data in this table. The URL for the complete list is:

https://www.eac.gov/assets/1/6/Voting_System_Map_Locations-03-25-17.pdf

Evaluation Report of the ESS EVM 5.4.0.0

County	State	EAC Certified	
		Voting System	System Components
Charles	MD	ES&S EVS 5.2.0.3 Mod	
Dorchester	MD	ES&S EVS 5.2.0.3 Mod	
Frederick	MD	ES&S EVS 5.2.0.3 Mod	
Garrett	MD	ES&S EVS 5.2.0.3 Mod	
Harford	MD	ES&S EVS 5.2.0.3 Mod	
Howard	MD	ES&S EVS 5.2.0.3 Mod	
Kent	MD	ES&S EVS 5.2.0.3 Mod	
Montgomery	MD	ES&S EVS 5.2.0.3 Mod	
Prince Georges	MD	ES&S EVS 5.2.0.3 Mod	
Queen Annes	MD	ES&S EVS 5.2.0.3 Mod	
Somerset	MD	ES&S EVS 5.2.0.3 Mod	
St. Marys	MD	ES&S EVS 5.2.0.3 Mod	
Talbot	MD	ES&S EVS 5.2.0.3 Mod	
Washington	MD	ES&S EVS 5.2.0.3 Mod	
Wicomico	MD	ES&S EVS 5.2.0.3 Mod	
Worcester	MD	ES&S EVS 5.2.0.3 Mod	
Arkansas	AR	ES&S EVS 5.2.1.0 Mod	
Boone	AR	ES&S EVS 5.2.1.0 Mod	
Chicot	AR	ES&S EVS 5.2.1.0 Mod	
Cleveland	AR	ES&S EVS 5.2.1.0 Mod	
Columbia	AR	ES&S EVS 5.2.1.0 Mod	
Garland	AR	ES&S EVS 5.2.1.0 Mod	
Jackson	AR	ES&S EVS 5.2.1.0 Mod	
Sebastian	AR	ES&S EVS 5.2.1.0 Mod	
Yell	AR	ES&S EVS 5.2.1.0 Mod	
Apache	AZ	ES&S EVS 5.2.1.0 Mod	
Gila	AZ	ES&S EVS 5.2.1.0 Mod	
Graham	AZ	ES&S EVS 5.2.1.0 Mod	
Brown	KS	ES&S EVS 5.2.1.0 Mod	
Finney	KS	ES&S EVS 5.2.1.0 Mod	
Leavenworth	KS	ES&S EVS 5.2.1.0 Mod	
Norton	KS	ES&S EVS 5.2.1.0 Mod	

Evaluation Report of the ESS EVM 5.4.0.0

County	State	EAC Certified	
		Voting System	System Components
Shawnee	KS	ES&S EVS 5.2.1.0 Mod	
Wichita	KS	ES&S EVS 5.2.1.0 Mod	

Examination Report

Description of the Examination

The examination occurred on April 18-20, 2017. 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, Tom Watson 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. SHA-1 digital signatures were recorded of the software provided by NTS and the software and firmware was installed onto the system. 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.

A Secretary of State Staff Attorney tested the the AUTOMARK Voter Assist Terminal ("AutoMARK") for compliance with state and federal accessibility guidelines.

On the second day ESS staff reviewed the Unity 5.2.1.0, including its configuration and the function and role of the various components in the voting system. An overview was provided of the changes from the last version certified in Texas, the Unity 3.4.1.0.

The examiners tested each piece of equipment using a pre-marked "test deck" of ballots. The test deck had been hand tallied by staff from the Secretary of State's office on ballots provided by the vendor. Voted ballots were tabulated through the DS200 (precinct ballot counter) and DS850 (central tabulator). The tabulation reports from the DS200 and DS850 all matched and were correct.

Observations & Findings

System Verification

The process for verifying the system is time consuming, complex and required partially disassembling some units. Further information and discussion is provided in Appendix B - Digital Signatures of Software Examined. It does not appear to be reasonable to expect these checks to be performed routinely. This is unfortunate as one purpose of the software verification is to document that the software and firmware used in an election is unchanged from that which was certified

Evaluation Report of the ESS EVM 5.4.0.0

Audit Logs

Because the audits logs are critical records for evidence based elections, their thoroughness and clarity continue to be topics of importance.

The audit logs continue to develop and improve, which is appreciated. However, as will be commented, further improvement, particularly in the documentation of how to gather logs and evaluate them is needed. In the audit logs gathered during the exam, in the DS200 log there were 8 instances of error 6001033, “Cannot un-mount ESS Memory Device”. The explanation of this error gives not further information and the remedy recommended is “Contact ES&S for technical support.” If an election official were to see this error in the record of an actual election it would be impossible to tell if a serious irregularity had occurred or not. It is less than satisfying that the only entity in a position to decide if an election was properly run is the vendor.

The system logs continue to change and develop. There is a very significant increase in the number of events identified and recorded, as seen in Table 5.

Table 5 – DS200 Log Messages

DS200 Defined Log Messages									
Unity Systems						EVS System			
3.0.1.1 Amd A	3.2.0.0 Rev. 1	3.2.0.0 Rev. 2	3.4.0.0	3.4.1.0	3.4.1.4	5.0.0.0	5.2.1.0	5.2.2.0	5.4.0.0
155	155	125	257	250	255	449	485	907	914

The increase in the detail recorded in the logs is positive because it means that more information about equipment errors or misuse will be recorded and available when needed. The growth has primarily been in the number of errors that have defined messages, Table 6. For example, the Unity 3.4.0.0 system defined messages for 114 events and 143 errors. In contrast to that the EVS 5.2.1.0 system added only 2 event messages but 227 error message. With the EVS 5.2.2.0 system 84 new event messages were defined but 337 new error messages were added. The EVS 5.4.0.0 system had the same 200 event messages as the EVs 5.2.2.0 system but added another 7 error messages.

Table 6 – DS200 Event & Error Messages

DS200 Event & Error Messages				
	Unity 3.4.0.0	EVS 5.2.1.0	EVS 5.2.2.0	EVS 5.4.0.0
Events	114	116	200	200
Errors	143	370	707	714
Total	257	486	907	914

As seen in Table 5, the number of messages has grown from 155 to 486 messages for the current version. In the Unity 3.4.1.0 version errors and events are differentiated. In that version of the DS200 114 of the 276 log messages were error messages and 162 were event messages that were

Evaluation Report of the ESS EVM 5.4.0.0

logged. The EVS 5.2.2.0 version does not differentiate events from errors, listing them together. However, the action for 116 messages is given as "No action necessary" or "No action is needed.". Presumably those would be event and not error message, but there may be some others as well. In the EVS 5.4.0.0 the corrective action for 422 of the errors is given as: "Contact ES&S technical support.". Thus, for a surprisingly high 48.2% of errors the only corrective action suggested is to contact technical support.

A further problem is that in contrast to the treatment of the iVotronic DRE in Unity 3.0.1.1 the Unity 5.2.2.0 makes analysis of the audit logs so labor intensive as to be prohibitive. In the Unity 3.0.1.1 system all iVotronic logs are gathered along with their vote tallies and a composite output of all the logs can be provided. This allows for quick and automatic scanning of the full set of audit log files to see if any of the units reported errors or abnormal events. In contrast the DS200 only provide a printout of their logs. These units are used in large numbers in some jurisdictions. Like any mechanical or electrical device, some units will have problems. The inability to have the logs electronically for timely review and appropriate remediation of problems is a major deficiency to election administration.

```
, 04/18/2017, 16:54:52, , , P_LOG, OS update started
, 04/18/2017, 16:59:51, , , P_LOG, Ancillary device firmware update was successful
, 04/18/2017, 16:59:51, , , P_LOG, OS update successful, version: 2.14.0.0
6004021, 04/18/2017, 12:03:38, , , P_LOG, Business process ready for machine 0316370458.
3004015, 04/18/2017, 12:03:38, , , P_LOG, Paper processor ready.
1004075, 04/18/2017, 12:03:38, , , P_LOG, Voting machine initialized
1004326, 04/18/2017, 12:03:40, U, , P_LOG, All data paths and memory locations OK
6001033, 04/18/2017, 12:03:40, U, , P_LOG, Cannot un-mount ESS Memory Device.
1004143, 04/18/2017, 12:03:40, U, , P_LOG, Printing 1 copy of Configuration Report
1004202, 04/18/2017, 12:03:40, U, , P_LOG, Started on AC
1004011, 04/18/2017, 12:03:42, U, , P_LOG, Audio state changed AUDIO_SESSION_DISABLED
1004128, 04/18/2017, 12:03:51, U, , P_LOG, Completed printing Configuration Report
1004326, 04/18/2017, 12:04:11, U, 0802061416163953, P_LOG, All data paths and memory locations OK
1004143, 04/18/2017, 12:04:11, U, 0802061416163953, P_LOG, Printing 1 copy of Configuration Report
1004128, 04/18/2017, 12:04:23, U, 0802061416163953, P_LOG, Completed printing Configuration Report
1004402, 04/18/2017, 12:04:23, U, 0802061416163953, P_LOG, EQC media inserted
1004156, 04/18/2017, 12:04:53, U, 0802061416163953, P_LOG, Invalid code entered
1004139, 04/18/2017, 12:05:03, U, 0802061416163953, P_LOG, Access Code Authenticated
1004400, 04/18/2017, 12:05:07, U, 0802061416163953, P_LOG, EQC process succeeded
1004403, 04/18/2017, 12:05:18, U, 0802061416163953, P_LOG, EQC media removed
1004139, 04/18/2017, 12:05:49, E, AA04012700025795, P_LOG, Access Code Authenticated
1004404, 04/18/2017, 12:05:49, E, AA04012700025795, P_LOG, Election media inserted
6004021, 04/19/2017, 17:51:38, , , P_LOG, Business process ready for machine 0316370458.
3004015, 04/19/2017, 17:51:38, , , P_LOG, Paper processor ready.
1004075, 04/19/2017, 17:51:39, , , P_LOG, Voting machine initialized
1004202, 04/19/2017, 17:51:39, E, AA04012700025795, P_LOG, Started on AC
1004011, 04/19/2017, 17:51:43, E, AA04012700025795, P_LOG, Audio state changed AUDIO_SESSION_DISABLED
1004139, 04/19/2017, 17:51:51, E, AA04012700025795, P_LOG, Access Code Authenticated
1004404, 04/19/2017, 17:51:51, E, AA04012700025795, P_LOG, Election media inserted
```

Figure 3 – Sample from a DS200 event log

Evaluation Report of the ESS EVM 5.4.0.0

```

17:33:57 Wed Apr 19 2017 Machine clearing and initializing
17:33:57 Wed Apr 19 2017 Cleared the Election access code
17:33:57 Wed Apr 19 2017 Unit Serial Number: 8509420008
17:33:57 Wed Apr 19 2017 Temporary storage areas initialized
17:33:58 Wed Apr 19 2017 Selected: Clear and Initialize done
17:33:59 Wed Apr 19 2017 Navigated to: Setup Menu
17:34:01 Wed Apr 19 2017 EQC Memory stick removed
17:34:07 Wed Apr 19 2017 Selected: Load Election
17:34:12 Wed Apr 19 2017 DS850 memory stick inserted 0802061416163990
17:34:13 Wed Apr 19 2017 Successfully copied election definition to storage
17:34:18 Wed Apr 19 2017 Selected: Accept Election Access Code
17:34:18 Wed Apr 19 2017 Election Name: Texas Certification
17:34:18 Wed Apr 19 2017 Election access code accepted
17:34:18 Wed Apr 19 2017 Selected: Load Election
17:34:19 Wed Apr 19 2017 Public Count: 0
17:34:19 Wed Apr 19 2017 Ballot Spec ID: DSIM_355.600_215.900_41_24_PP
17:34:19 Wed Apr 19 2017 Load election definition OK
17:34:19 Wed Apr 19 2017 Audit log printer is ready
17:34:21 Wed Apr 19 2017 Selected: Load Election done
17:34:22 Wed Apr 19 2017 Navigated to: Setup Menu
17:34:23 Wed Apr 19 2017 DS850 Memory stick removed
17:34:44 Wed Apr 19 2017 Navigated to: Election Menu
17:34:45 Wed Apr 19 2017 Navigated to: Hardware Menu
17:34:51 Wed Apr 19 2017 Selected: Accept Admin Access Code
17:34:51 Wed Apr 19 2017 Admin access code accepted
17:34:51 Wed Apr 19 2017 Navigated to: Camera Menu
17:34:55 Wed Apr 19 2017 Selected: Calibrate Cameras
17:36:17 Wed Apr 19 2017 Camera calibration successful
17:36:19 Wed Apr 19 2017 Selected: Shutdown
17:36:19 Wed Apr 19 2017 Shutdown initiated
    
```

Figure 4 – Sample from a DS850 event log

DATE	TIME	SYSTEM ACTION OR ERROR INFORMATION	COUNTED INFORMATION
2016-06-08	11:46:59	DATABASE CREATED (06-08-16)	
2016-06-08	11:46:59	ENTERED ELECTION IN ELECTION REPORTING MANAGER (06-08-16)	
2016-06-08	12:42:44	Import & process Key Memory Device files failed - Media is NOT for collection preparation	
2016-06-08	12:43:20	Import & process Key Memory Device files failed - Media is NOT for collection preparation	
2016-06-08	12:43:30	Import & process Key Memory Device files failed - Media is NOT for collection preparation	
2016-06-08	12:43:44	Imported & processed Key Memory Device files	
2016-06-08	12:44:34	Election Day GROUP 01 SELECTED FOR UPDATE EQUIPMENT TYPE DS2 - UPDATE PRECINCTS COUNTED:N	
2016-06-08	12:44:38	START PACK READING (06-08-16) - Read media and update results only	
2016-06-08	12:44:42	[AA04012700010774] Process memory device successful (06-08-16)	
2016-06-08	12:44:42		PRC 0001 (EV) PACK RECEIVED DS2 (BALS=27 TOT=27)
2016-06-08	12:44:42	[AA04012700010774] Process memory device successful (06-08-16)	
2016-06-08	12:44:42		PRC 0002 (EV) PACK RECEIVED DS2 (BALS=16 TOT=16)
2016-06-08	12:44:42	[AA04012700010774] Process memory device successful (06-08-16)	
2016-06-08	12:44:42		PRC 0003 (EV) PACK RECEIVED DS2 (BALS=11 TOT=11)
2016-06-08	12:44:44	STOP PACK READING (06-08-16)	
2016-06-08	12:44:55	LOG LISTING - ENTIRE LOG WAS PRINTED TO EL68A.LST	

Figure 5 – Sample from an EVS 5.2.1.0 system log

Figure 3 is an image of a section of a DS200 log. Figure 4 is an image of a section of a DS850 log. Figure 5 is an image of a system log. As can be seen, entirely different messaging and arrangements are used even within the same system. To effectively use the logs an election

Evaluation Report of the ESS EVM 5.4.0.0

official would first need to learn how to obtain the different kinds of logs. The DS200 has 2 different logs, a system log and an event log. The DS850 has more logs than that. The system adds further to the number and variation in the logs. How clear and usable these logs are to the typical election official is a significant question.

The lack of clear documentation and guidance on how to use the logs or the meaning of their messages creates a serious question about their utility. In a contested election, the ability of the average election official to understand the logs and use them as evidence is suspect.

The company does offer an extra service of analyzing logs for election officials. While often helpful there is an inherent conflict of interest in the company reporting on the performance of its own equipment. A further negative to analysis of logs as an extra service is that it closes off one of the most useful applications, which is to get early notice of events from the logs, in time for corrective action to be taken, in some cases before the election is completed. Some events should trigger alerts, so that election officials can correct a condition rather than try and reconstruct the situation after the fact.

Evaluation Report of the ESS EVM 5.4.0.0

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.

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 <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
	122.001(a)(2)	Must be suitable for the purpose for which it is intended	General Review	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
	122.001(a)(3)	Operates safely, efficiently, and accurately and complies with the voting system standards adopted by the EAC.	EAC Certification #	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	EAC Certification Number: ESSEVS5400
	122.001(a)(4)	Is safe from fraudulent or unauthorized manipulation	General Review	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
	122.001(a)(5)	Permits voting on all offices and measures to be voted on at the election.	L&A test	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
	122.001(a)(6)	Prevents counting votes on offices and measures on which the voter is not entitled to vote	L&A Test	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
	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 <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
	122.001(a)(8)	Prevents counting a vote on the same office or measure more than once	L&A Test	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
	122.001(a)(9)	Permits write-in voting	L&A Test	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
	122.001(a)(10)	Is capable of permitting straight-party voting	L&A Test	Yes	No	

Evaluation Report of the ESS EVM 5.4.0.0

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
		(See also, Straight Party Voting in checklist)		<input checked="" type="checkbox"/> <input type="checkbox"/>	
	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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	122.033(1)	Must be equipped with a security system capable of preventing operation of the machine	General Review	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	122.033(2)	Must be equipped with registering counter that can be secured against access	General Review	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	122.033(3)	Must be equipped with a public counter	General Review	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	122.033(4)	Voting system must be equipped with a protective counter.	General Review	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	122.001(d)(2)	Must not use a punch-card ballot or similar form of tabulating	General Review	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	122.001(d)1)	Must not be a mechanical voting machine	General Review	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

Evaluation Report of the ESS EVM 5.4.0.0

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
	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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	127.1231	No modem access to the tabulating equipment is available during the tabulation	General Review	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	129.054	A voting system may not be connected to any external communications network, including the internet.	General Review	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
		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 external infrared transmission and the system can only accept transmissions generated by the system.	General Review	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	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 can 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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	

Evaluation Report of the ESS EVM 5.4.0.0

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
	272.005	Ballots must be printed with all ballot instructions, office titles, column headings, proposition heading, and propositions appearing in English and Spanish.	Review Ballot	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	11.054, Education Code	Must allow for cumulative voting.	General Review	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Ballot Requirements	43.007	DRE's only authorized for CWPP --- must have the capability of more than 1 ballot style.		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	124.001	In an election in which voters are entitled to cast straight-party votes, the voting system ballot shall be arranged to permit the voters to do so.	Review of Ballot	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

Evaluation Report of the ESS EVM 5.4.0.0

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
	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 (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.	Review of Ballot	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	124.063	Certain Instructions Required on Electronic Voting System Ballot -- "Vote for the candidates of your choice in	Review of Ballot	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

Evaluation Report of the ESS EVM 5.4.0.0

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
		<p>each race by making a mark in the space provided adjacent to the name of that candidate”</p> <p>“Make a mark in the space provided beside the statement indicating the way you desire to vote”</p> <p>(b) Instructions can be changed in certain circumstances</p> <p>(c) Must contain instructions for casting a write-in vote. SOS will prescribe wording.</p> <p>(d) Must contain instruction under Section 52.071(b) of the code for straight party voting.</p> <p>(Vendor must show that instructions are customizable to fit appropriate ballot)</p>			
	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 <input type="checkbox"/> No <input type="checkbox"/>	N/A – System does not have a DRE.
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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	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	Review Provisional Ballot	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

Evaluation Report of the ESS EVM 5.4.0.0

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
		a voter who executed an affidavit in accordance with Section 63.011 of the Code. <u>(NOTE: Need to show SOS how provisional ballot works)</u>			
	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 (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.	Review Provisional Ballot	Yes <input type="checkbox"/> No <input type="checkbox"/>	N/A – System does not have a DRE.
	127.063	Sealed ballot box must be: <ol style="list-style-type: none"> 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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Optical scan Systems	81.43, TAC	<ol style="list-style-type: none"> 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 	Review of Ballot	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

Evaluation Report of the ESS EVM 5.4.0.0

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
		<p>must be printed out the head of the ballot so the voter may cast a straight ticket by making a single mark on the first page.</p> <p>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).</p> <p>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 ballots.</p> <p>5. Each page shall bear the same ballot number.</p>			
	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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	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 <input checked="" type="checkbox"/> No <input type="checkbox"/>	
	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	General Review	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

Evaluation Report of the ESS EVM 5.4.0.0

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
	81.62, TAC	<p>throughout the early voting period</p> <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> a. error and/or warning messages and operator response to those messages; b. number of ballots read for a given 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. 	Review of Audit Logs	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	<p>VVSG 2005:</p> <p>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."</p> <p>2.2.5.2.1.g: "The system shall be capable of printing a copy of the audit record."</p> <p>Also VVSG 2005 Section 2.2.5.2.2.a, 4.4 & 6.5.5</p>
Accessibility for Disabled Voters	81.57, TAC	See checklist for details of requirement.	Checklist for Voting System Accessibility for more details.	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

Evaluation Report of the ESS EVM 5.4.0.0

Category	Source of Law	Requirement	Assessment Method	Compliant	Notes
	64.009, TEC	<p>If a voter is physically unable to enter the polling place without personal assistance or likelihood of 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.</p> <p>NOTE: "Curbside voting"</p>	General Review	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	

Evaluation Report of the ESS EVM 5.4.0.0

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: ESS	Voting System: EVS 5.4.0.0	
General Requirements		
• Is Form 100 complete and satisfactory?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Review Form 100 - Schedule A - Have recommendations/issues made from previous exams been corrected or addressed?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Review Form 101 - Are responses satisfactory?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Review change logs and provide information for testing or questioning vendor	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Training manuals appear complete?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Training manuals appear to be easy to use?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Check with other jurisdictions where system is in use and ask questions regarding system, support and training.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Did the system receive favorable reviews?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• 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 <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• 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 <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Vendor's system shall support automated application password expiration at intervals specified by a central system administrator.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• 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 <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• 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 <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Verify Installation		
• Verify/List all hardware	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Verify/List all COTS hardware/software versions	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Is the COTS hardware being demonstrated the same version as what was tested at the VSTL?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Evaluation Report of the ESS EVM 5.4.0.0

Vendor: ESS	Voting System: EVS 5.4.0.0	
• Is the COTS software being demonstrated the same version as what was tested at the VSTL?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Witness or actual install the software and firmware with the SOS CDs received from VSTL.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
System Review		
• Warns of Undervote	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Is it easy to choose the appropriate ballot style?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Is the number of ballot styles available on a unit limited?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Can you cancel the marking of a ballot after starting? Explain how.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Is there a way to properly secure all ports on the system?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Are instructions provided in the documentation for securing the system?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Usable for curbside voting?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• How to setup or modify audio files	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• How to adjust volume	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Test both early voting and election day - all functions opening/closing	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Does system include sip 'n puff for accessibility	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
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 <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Print starting the tally software (e.g. from the operating system) or exiting the tally software, or any access to the operating system.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
• Record if a printer is paused, turned off, turned on, disconnected, and when reconnected.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Evaluation Report of the ESS EVM 5.4.0.0

Appendix A - EAC Certificate of Certification

	<p>United States Election Assistance Commission</p>	
<p>Certificate of Conformance</p>		
<p>ES&S EVS 5.4.0.0</p>		
<p>The voting system identified on this certificate has been evaluated at an accredited voting system testing laboratory for conformance to the 2005 <i>Voluntary Voting System Guidelines (2005 VVSG)</i>. 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 <i>EAC Voting System Testing and Certification Program Manual</i> 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.</p>		
<p>Product Name: <u>EVS</u></p>		
<p>Model or Version: <u>5.4.0.0</u></p>	<hr/>	
<p>Name of VSTL: <u>NTS Huntsville</u></p>	<p>Executive Director U.S. Election Assistance Commission</p>	
<p>EAC Certification Number: <u>ESSEVS5400</u></p>	<p>Scope of Certification Attached</p>	
<p>Date Issued: <u>February 24, 2017</u></p>		

Evaluation Report of the ESS EVM 5.4.0.0

Appendix B - Digital Signatures of Software Examined

The installation media was provided by NTS for this exam. Digital signatures were taken of both the composite directories, containing all files and directories, and of the individual files, after they were unpacked. Digital signatures of those directories files were recorded to confirm continuity of the software certified in this exam with that tested by NTS and certified by the EAC.

The composite digital signatures are reported in this report. The digital signatures of the individual files, after unpacking, were retained in the records of this exam.

These signatures can be used to verify that the software used in the future is identical to that examined during this exam.

Signature of Directory

The digital signatures of the total directory delivered by NTS for this exam, containing 66 files and folders, were:

SHA-1 Hash: 0907E0578BFB9C28D8E65E3688A77C040E771FED

SHA-256 Hash: 24E324770A5571D56223BD766257317D44B0628E501B53BD3092BD6FFC1DEDA1

Directory Structure

```
+---EVS_5400
| +---Installs
| | +---AutoMARK 2016-10-28
| | | \---EVS 5.4.0.0
| | | | \---ProductInstalls
| | | | | +---CustomerInstalls
| | | | | | +---Hardware
| | | | | | | \---AutoMARK 1.8.7.0
| | | | | | | | \---firmware
| | | | | | | | | AutoMARK.THUMB.CAB
| | | | | | | | | automark.thumb.lst
| | | | | | | | | VALID.CDE
```

Evaluation Report of the ESS EVM 5.4.0.0

```

| | | \---VAT Preview 1.8.7.0
| | |   \---disk1Preview
| | |
| | |     data1.cab
| | |     data1.hdr
| | |   Autorun\data2.cab
| | |
| | |     layout.bin
| | |     setup.exe
| | |   engine32\setup.ibt
| | |     setup.ini
| | |     setup.inx
| | |
| | | \---ManufacturingInstalls
| | |   \---VAT
| | |
| | |   +---AutoMARK 8.7.0
| | |     AutoMARKProduction.THUMB.CAB
| | |     AutoMARKService.THUMB.CAB
| | |
| | |   +---PrinterEngineBoard 1.70
| | |     PEB.hex
| | |
| | |   +---SwitchInterfaceBoard 1.43
| | |     SIB.hex
| | |
| | |   |
| | |   | \---UltrasonicSheetDetector 8.0.1
| | |   |   ultra.s19
| | |
| | | +---DS200 2016-10-26
| | |
| | |   \---EVS 5.4.0.0
| | |     \---ProductInstalls
| | |       +---CustomerInstalls
  
```

Evaluation Report of the ESS EVM 5.4.0.0

```
| | | \---Hardware
| | | | \---Ds200(i) 2.14.0.0
| | | | | update.img
| | | | \---ManufacturingInstalls
| | | | | \---Ds200(i) 2.14.0.0
| | | | | | prod_release.img
| | | +---DS850 2016-10-26
| | | | \---EVS 5.4.0.0
| | | | | \---ProductInstalls
| | | | | | \---ManufacturingInstalls
| | | | | | | \---Ds850(i) 2.11.0.0
| | | | | | | | prod_release.img
| | | +---EMS 2016-10-27
| | | | \---EVS 5.4.0.0
| | | | | \---ProductInstalls
| | | | | | \---CustomerInstalls
| | | | | | | +---Electionware 4.8.0.0
| | | | | | | | ElectionWareInstaller.exe
| | | | | | | +---ERM 8.13.0.0
| | | | | | | | Setup.exe
| | | | | | | +---EventLog 1.5.6.0
| | | | | | | | EventLog Setup.exe
| | | | | | | \---Removable Media Service 1.4.6.0
| | | | | | | | RMU Setup.exe
| | | +---ExpressLink 2016-01-04
| | | | \---EVS 5.4.0.0
```

Evaluation Report of the ESS EVM 5.4.0.0

```
| | | \---ProductInstalls
| | |   \---CustomerInstalls
| | |     \---ExpressLink 1.2.0.0
| | |       ExpressLinkInstaller.exe
| | |
| | | \---ExpressVote 2016-10-28
| | |   \---EVS 5.4.0.0
| | |     \---ProductInstalls
| | |       +---CustomerInstalls
| | |         | +---ExpressVotePreviewer 2.1.0.0
| | |           | ExpressVotePreviewerInstaller.exe
| | |           |
| | |           | \---Hardware
| | |             \---ExpressVote 2.1.0.0
| | |               update.img
| | |
| | |   \---ManufacturingInstalls
| | |     \---ExpressVote
| | |       +---DetachableKeyBoard 1.0.0.0
| | |         | detachableKeyboard.S19
| | |         |
| | |         | +---ExpressVote 2.1.0.0
| | |           | prod_release.zip
| | |           |
| | |           | +---InputOutputBoard 2.1.0.0
| | |             | InputOutputBoard.S19
| | |             |
| | |             | \---ScannerPrinterEngine 2.1.0.0
| | |               ScannerPrinterEngine.S19
| | |
| | | \---SourceCode
| | |   +---AutoMARK 2016-10-28
| | |     | PrinterEngineBoard_1.70_Source.zip
```

Evaluation Report of the ESS EVM 5.4.0.0

SwitchInterfaceBoard_1.43_Source.zip
UltrasonicSheetDetector_8.0.1_Source.zip
VAT_1.8.7.0d_Source.zip

+---DS200 2016-10-26

| \---DS200 - 2.14.0.0zze
| source.iso

+---DS200 Ancillary Devices 2014-04-14

| PowerManagementMsp430_1.2.14.0b_Source.zip
| ScannerC8051_3.1.0.0a_Source.zip

+---DS850 2016-10-26

| \---DS850 - 2.11.0.0zm
| source.iso

+---EMS 2016-10-27

| CB_Evt_2.7.0.0a_Source.zip
| CB_XMLConv_2.7.0.0b_Source.zip
| CB_XML_2.7.0.0a_Source.zip
| CreateLog_1.5.6.0a_Source.zip
| ElectionwarePaperBallot_4.7.0.0z_Source.zip
| electionware_4.8.0.0zzzn_DataSchemaPkg.zip
| electionware_4.8.0.0zzzn_DataSprocsPkg.zip
| electionware_4.8.0.0zzzn_SourcePkg.zip
| ERMXMLConvDLL_3.7.0.0j_Source.zip
| ERMXMLDATA_2.7.0.0e_Source.zip
| ERM_8.13.0.0ze_Source.zip
| EssEvtA_1.5.6.0b_Source.zip
| EssEvtMsg_1.5.6.0c_Source.zip
| EssEvt_1.5.6.0a_Source.zip
| ESSXML_4.7.0.0a_Source.zip
| EvtSvc_1.5.6.0a_Source.zip

Evaluation Report of the ESS EVM 5.4.0.0

- | | ExitWin_2.7.0.0a_Source.zip
- | | LogEvent_1.5.6.0a_Source.zip
- | | MYDLL_2.7.0.0a_Source.zip
- | | REGUTIL_2.7.0.0a_Source.zip
- | | RmuCli_1.4.6.0a_Source.zip
- | | RmuDll_1.4.6.0a_Source.zip
- | | RmuSvc_1.4.6.0a_Source.zip
- | | RSACryptoDLL_1.1.0.0c_Source.zip
- | | RSACrypto_3.7.0.0f_Source.zip
- | | ShellSetup_2.7.0.0a_Source.zip
- | | Shell_2.7.0.0a_Source.zip

| \---ExpressVote 2016-10-28

- | | DetachableKeyboard_1.0.0.0d_Source.zip
- | | ExpressVote_2.1.0.0zzzzk_Source.zip
- | | InputOutputBoard_2.1.0.0n_Source.zip
- | | libCoNG_2.0.0.0zr_Source.zip
- | | ScannerPrinterEngine_2.1.0.0zb_Source.zip