ES&S Voting System 5.2.0.3

System Overview

Revision 1.1

Department Author: Certification

Released by: Director, Certification

Election Systems & Software

MAINTAINING VOTER CONFIDENCE.
ENHANCING THE VOTING EXPERIENCE.

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Table of Changes

Revision	Date	Notes
0.1	*06.23.2015*	*Initial draft – CC*
0.2	*06.24.2015*	*Management review and updates – SP, GW, SM, PR, CC*
1.0	*06.26.2015*	*Release for publication with TDP Rev01. – CC*
1.1	*06.30.2015*	*Attachment 2: Changed "Windows Server EMS Network with landline network reporting" to "EMS Client Server" on the Voting System Summary Overview. Updated associated description. – JT*

Contents

I. INTRODUCTION

The *System Overview* details the configuration and high-level operation of ES&S Voting System 5.2.0.3 (EVS5203). Contents include a description of the functional and physical system and subsystems that make up the voting system and a description of system performance characteristics.

I.1 PURPOSE

The *System Overview* enables the Voting System Test Lab (VSTL) or other accreditation agency to identify the functional and physical components of the system, determine how those components are structured and identify the interfaces between components.

I.1.1 SCOPE

This document describes subsystems and components included in EVS5203. Detailed technical information appears in product specific documentation included in the system Technical Data Package (TDP) documentation.

The *System Overview* reflects the system configuration and functional scope of the ES&S voting system presented for national and state certification testing. Individual components may exceed some documented system level capabilities, or support functions not tested for certification with this system, this document reflects only the capabilities of the system to be tested.

I.2 OVERVIEW SUMMARY

The *System Overview* compares the features and products included with the ES&S Voting System 5.2.0.3 (EVS5203) release to those provided with the previously certified ES&S Voting System 5.2.0.0 (EVS5200) release. EVS5203 is a modification to EVS5200. Like the system it is based on, EVS5203 fully complies with the EAC 2005 Voluntary Voting System Guidelines, Version 1.0.

ES&S Voting System 5.2.0.3 (EVS5203) presents a fully integrated suite of election management products. This release introduces a new version of RSACRYPTO to ElectionWare and ERM. It also presents resolutions to specific ERM reporting and file sharing issues and provides an update to the Electionware Admin Database specific to Maryland.

I.2.1 ES&S VOTING SYSTEM PRODUCT ENHANCEMENTS

In addition to optimization and performance improvements common to all ES&S voting system updates, this release provides the following notable enhancements. See the *System Change Notes* for a detailed list of changes.

I.2.1.1 ELECTIONWARE

ElectionWare is the election management software that provides end-to-end election management activities through a powerful and intuitive user interface. Its efficient and flexible design enables jurisdictions of all sizes to effectively manage their elections. ElectionWare delivers everything needed to run an election, from creating the ballots to reporting the voting results.

ENHANCEMENTS This release contains the following enhancements to ElectionWare:

- Include a new version of RSACRYPTO in the ElectionWare Install that now uses the PKCS1 padding scheme to ensure compatibility with the MS Crypto library used by the ExpressVote.
- Changed the Maryland state profile data element in the ElectionWare Admin Database to disable the default State Results Transfer menu items in ERM.

I.2.1.2 ELECTION REPORTING MANAGER (ERM)

Election Reporting Manager (ERM) is ES&S's election results reporting program. ERM is used to generate paper and electronic reports for poll workers, candidates, and the media. ERM is designed to display updated election totals on a monitor as ballot data is tabulated. Report editing features enable you to read data from a variety of ballot scanners, customize your report formats, and generate accurate election results.

ERM is designed to support a wide range of ES&S ballot scanning equipment and can produce reports for both central count systems and precinct count systems.

ENHANCEMENTS This release contains the following enhancements to ERM:

- Include a new version of RSACRYPTO in the ERM Install that now uses the PKCS1 padding scheme to ensure compatibility with the MS Crypto library used by the ExpressVote.
- Eliminate the check for and rebuild of old format results and counter files.
- Corrected the display of the District Control File name prompt in certain reporting options tabs.
- Resolved the COBOL error that occurs when creating a Results XML File on a hardened system.

I.2.1.3 EXPRESSVOTE

The ExpressVote is a universal vote capture device designed for all voters, with independent voter-verifiable paper record that is digitally scanned for tabulation. This system combines paper-based voting with touch screen technology. The ExpressVote includes a mandatory vote summary screen that requires voters to confirm or revise selections prior to printing the summary of ballot selections using the internal thermal printer. Once printed, ES&S ballot scanners process the vote summary card. The ExpressVote can serve all voters, including those with special needs, allowing voters to cast ballots autonomously. ES&S has fully integrated the ExpressVote with the existing suite of ES&S voting system products.

ENHANCEMENTS This release does not contain enhancements to the ExpressVote.

I.2.1.4 DS200

The DS200 is a high-resolution, paper-based precinct tabulator that scans voter selections from both sides of the ballot simultaneously. It has a large touch screen for voter communication, an integrated thermal printer for limitless Election Day printing, an easy-to-use interface and an internal battery pack for reliable power in the event of a power outage. The DS200 can scan a variety of ballot sizes. It uses Intelligent Mark Recognition technology to determine what constitutes as a mark for a candidate. Scanned voter selections are stored to a USB memory device. The USB memory device is removable from the system for transport to a central election location where vote totals are consolidated for reporting. The DS200 may be configured to drop the scanned ballot into an attached secure ballot box, which has an easy transport rolling case.

ENHANCEMENTS This release does not contain enhancements to the DS200.

I.2.1.5 DS850

The DS850 central scanner and tabulator provides high-speed digital processing. It scans and automatically sorts ballots, separating them into one of three discrete bins without interrupting scanning. The DS850 can read ballots in all four orientations. The DS850 is designed with a series of rollers so ballots that were originally folded may be tabulated at the same rate of speed as standard ballots. The DS850 uses Intelligent Mark Recognition technology to determine what constitutes as a mark for a candidate.

ENHANCEMENTS This release does not contain enhancements to the DS850.

I.2.1.6 AUTOMARK

The AutoMARK is an ADA-compliant ballot marking device. It provides autonomy and voting privacy to voters who are blind, visually impaired, or have a disability or condition that makes it difficult to traditionally mark a ballot. Voters navigate the ballot using the touch screen, physical keypad or an ADA support peripheral, such as a “sip and puff” device or two-position switch. The device visually guides the voter through the ballot-marking process with screen prompts and symbols. The AutoMARK includes a summary verification screen that requires voters to confirm or revise selections prior to printing their ballots. The AutoMARK can be configured with AutoCAST, a feature that allows the voter to independently cast a verified ballot into a secure ballot box.

ENHANCEMENTS This release does not contain enhancements to the AutoMARK.

I.3 TARGET AUDIENCE

The intended audience for the *System Overview* includes voting system evaluators, state election officials, ES&S voting system users and ES&S project team members.

I.4 USING THIS DOCUMENT

This document is organized to satisfy the requirements listed in the 2005 EAC Voluntary Voting System Guidelines (VVSG) and directly addresses the following requirements.

VVSG Requirements Addressed in this Document

VVSG Section	Title
V II, Section 2.2	System Overview

Other Requirements Addressed in this Document

Reference	Title
N/A	N/A

I.5 DOCUMENT CONVENTIONS

- Any references to additional books or documents are indicated by the document name in *italics*.
- External links to information, documents, or downloads are indicated as it the following example: www.essvote.com.
- Depending upon the delivery method of this document, some links may not be active links. In this case, copy the link manually to a web browser of your choosing to view the external documentation.
- All tables within this document use the term “N/A” to indicate the entry is “Not Applicable” to the software or hardware.

I.5.1 OTHER CONVENTIONS

- Capital Letters – Indicate the names of keys or key sequences (CTRL, SHIFT, F1, etc).
- Plus (+) Sign – A combination of keys means to hold down the first key while pressing the second key.
- Monospaced text – source code listing
- Vertical Separator Bars (|) – represent alternative elements
- Braces ({ }) – indicate a required choice
- Brackets ([ ]) – indicate a screen item or physical location on equipment
- Right Chevrons (>) – indicates the method of selecting of a sub menu or dialog item
  e.g.: Click File > Save… [Save Dialog] {file Name}

I.5.2 NOTES, CAUTIONS, AND WARNINGS

These typographic indicators alert the reader to special information.

Note Example

NOTE The reader should take note of these suggestions or additional information not covered in this manual.

Caution Example

CAUTION

A caution alert indicates that possible damage can occur to the software or hardware, or improper operation of the equipment or system if the recommendations are not followed. *ES&S shall not be responsible for any damages or injury associated with the failure to follow the recommended procedures.*

Warning Example

WARNING

This warning appears next to procedures that could cause damage to the product or injury to the operator if improperly executed. Carefully read all warnings and proceed with caution if you choose to carry out the related information. ES&S shall not be responsible for any damages or injury associated with the failure to follow the recommended procedures.

I.6 LOCALE-SPECIFIC TERMINOLOGY

References may be made to precincts in this document as the lowest level civil division. This naming convention differs from state to state and localities. The term “Precinct” is used in this document to denote this type of division, whether it is referred to locally as “ED” (Election District – New York), “Polling Station” (Canada), or others.

1. SYSTEM DESCRIPTION

ES&S Voting System 5.2.0.3 introduces the ExpressVote universal voting system. ES&S Voting System 5.2.0.3 provides end-to-end election support; from populating an election database to generating final results reports. The system includes the following ES&S products:

Product	Description
ElectionWare **Removable Media Service** **ExpressVote Previewer** **VAT Preview** **Event Log Service**	Election Management System (EMS) software used for defining contests, candidates and ballot formats and performing post-election results processing.
ExpressVote	Universal voting system that supports vote capture functions for all voters, with independent voter verifiable paper record which is digitally scanned for tabulation.
DS200	Precinct ballot tabulator for processing ballots at a polling place.
DS850	Central ballot scanner for high-speed tabulation of mail ballots, absentee ballots or Election Day ballots. Jurisdictions can network DS850 scanners to a central reporting PC for large central count operations.
AutoMARK	Accessible ballot marking system that supports audio ballot playback and ballot marking for voters with low vision or physical disabilities.
Election Reporting Manager (ERM)	Results consolidation and reporting software.

Table 1: ES&S Products

ES&S voting system equipment and software is divided into the following, functional groups:

Functional Group	Included Products	
Universal Voting System (UVS)	ExpressVote	ExpressPass
Election Management System (EMS)	ElectionWare Election Reporting Manager Removable Media Service	ExpressVote Previewer VAT Preview Event Log Service
Precinct Ballot Tabulators (PBT)	DS200	
Central Ballot Tabulators (CBT)	DS850	
Ballot Marking Devices (BMD)	AutoMARK	
Accessories, peripherals and third party equipment.	See Attachment 2, “Voting System Configuration”	

Table 2: Included Functional Groups

1.1 FUNCTIONAL OVERVIEW

Figure 1 illustrates end-to-end functionality of the ES&S Voting System. Functional descriptions appear in the sections that follow.

> **NOTE** High-resolution drawings are provided as an attachment to this document.

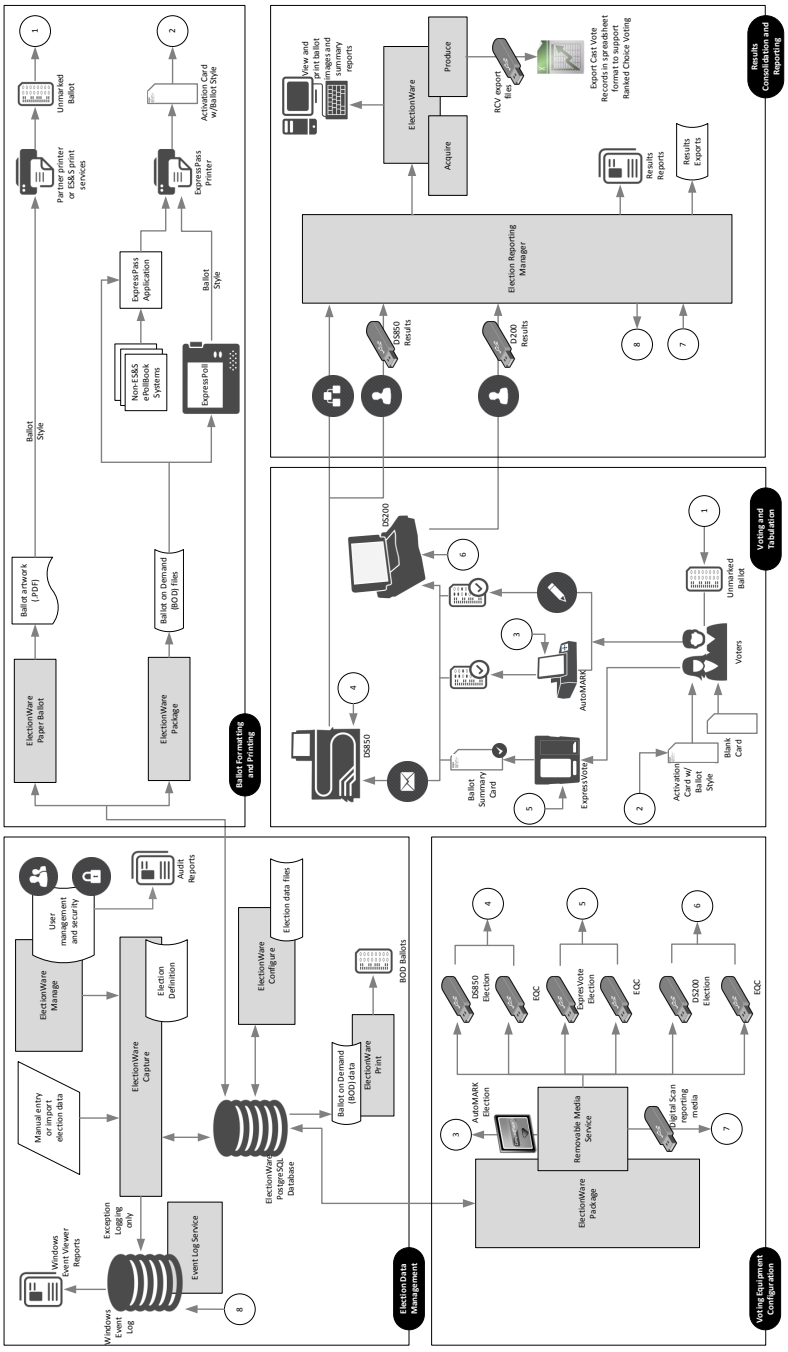

Figure 1: Voting System Overview

1.2 SUBSYSTEM DESCRIPTIONS

Table 2 lists the functional subsystems included with ES&S Voting System 5.2.0.3.

Subsystem Name	Description
1. Election Data Management	Managing election data supports all tasks related to the creation of the election database, precinct, office, and candidate information required to configure a jurisdiction's elections. Once an election database exists, ElectionWare can recall the same data for any following election. Event log management includes a series of programs that track user and equipment actions throughout the election process.
2. Ballot and Activation Card Formatting and Printing	Ballot formatting and printing includes activities required for defining the image of a paper ballot, populating that ballot with information imported from the election database, and printing the ballot with ballot style code. Activation card formatting and printing includes activities required for capturing the voter record, populating that activation card with information imported from the pollbook system, and printing the activation card with ballot style code.
3. Voting Equipment Configuration	Configuring voting equipment converts election database information into ballot definition parameters ES&S voting equipment. Within this functional subsystem, software users transfer the election rules specific to an election to the memory devices used to program voting equipment.
4. Voting and Tabulation	Voting and tabulation includes the following: • ExpressVote universal voting system • Accessible ballot marking includes all tasks related to preparing, testing and implementing assistive voting devices for use in a polling place environment. • Central ballot tabulation includes all tasks required to prepare, test and scan official ballots at a central count location. • Precinct ballot tabulation covers the activities required to prepare, test and implement ES&S precinct ballot tabulators within a polling place environment.
5. Results Consolidation and Reporting	Results consolidation and reporting encompasses the functions necessary to gather and combine results from ballot scanners and use that data to generate paper and electronic reports for election workers, candidates and the media.

Table 3: Functional Subsystems

Descriptions for each subsystem, including a list of functions performed by each subsystem and a discussion of how each function is achieved in design, appear in the following sections.

1.2.1 ELECTION DATA MANAGEMENT

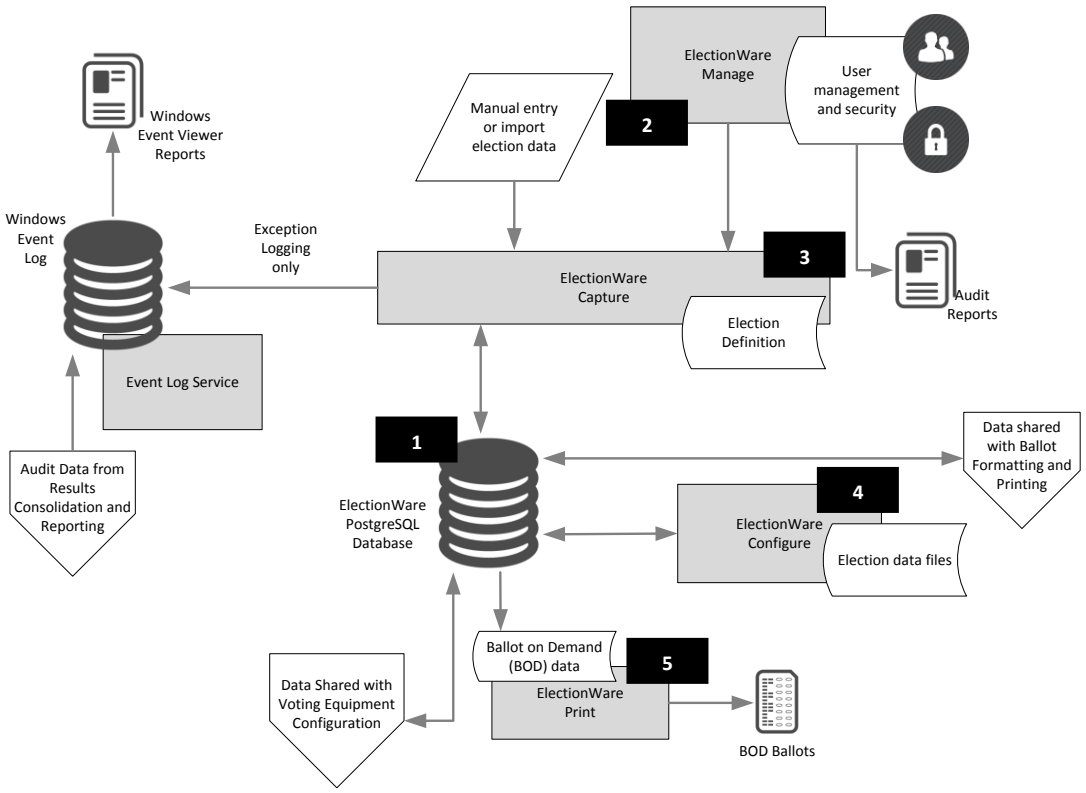

Figure 2: Election Data Management Subsystem

Function Name	Description
1. Event logging	The users' interactions with the Election Management System are primarily logged to the ElectionWare Postgres database. Events that happen when a connection to the database is not available are logged to the Windows Operating System log through the Event Log Service.
2. Configuring users and ElectionWare security	Administrators use ElectionWare Manage to configure user accounts and passwords, enter initial jurisdiction setup. Security settings for ElectionWare are entered here.
3. Configuring and editing election data	EMS programmers use ElectionWare Capture to configure ballot languages (including audio) and language groups; configure parties, precincts and registered voters; add district types and districts, assign precincts to districts; add headings, contests and poll places, assign precincts to polling places and generate ballot styles from the Manage menu bar. Capture's Tools menu bar imports election data, imports and export ballot translations, edits election options, sets user preferences and more.
4. Setting equipment security and configurations	This module configures settings and security for ES&S voting equipment. After finalizing equipment settings, election coders use commands from the Tools menu to create equipment configuration files.

Function Name	Description
5. Printing ballots on demand and printing activation cards	Jurisdictions use the Print module to produce extra paper ballots. The Print module retrieves ballot format information from Paper Ballot, created with the Generate BOD Data command.

Table 4: Election Data Management Subsystem

1.2.2 BALLOT FORMATTING AND PRINTING

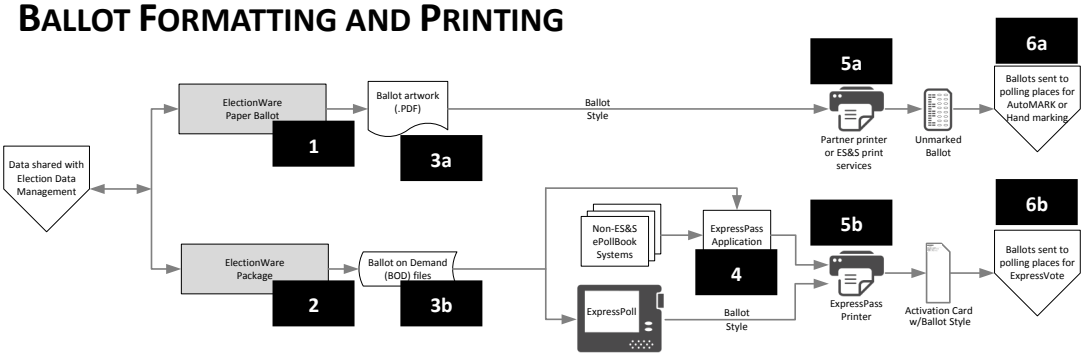

Figure 3: Ballot Formatting and Printing Subsystem

Function Name	Description
1. Designing paper ballot artwork	ElectionWare Paper Ballot uses information configured in a jurisdiction's election database (created in Capture) to format finished ballot layouts. Paper Ballot opens in an external window to enable the design and publishing of ES&S paper ballots for central count and precinct ballot scanners. ES&S print services, or third party ballot printers use generated ballot formats to print official ballots. ElectionWare Print uses the same ballot formats to generate extra Election Day ballots on demand.
2. Creating Ballot on Demand files	ElectionWare Package uses the Ballot On Demand data obtained from the jurisdiction's election database (created in Capture) to create Ballot On Demand files.
3. Ballot formatting transferred for printing	a. **Ballot Artwork:** PDF ballot files are sent to ES&S ballot services, or a third party ballot printer for production. b. **Ballot on Demand Files:** ElectionWare Package uses information configured in a jurisdiction's election database (created in Capture) to format Ballot on Demand files.
4. ExpressPass Application	ExpressPass receives Ballot on Demand files from ElectionWare Package and electronic Pollbook systems. ExpressPass uses this information to format the ballot style code for an ExpressVote activation card. This code on the activation card activates the correct ballot the voter is authorized to vote.
5. Ballot / Activation Card Printing	a. **Ballot Printing**: ES&S Print Services, or a certified partner printer, convert ballot artwork to paper ballots. b. **Activation Card Printing**: ExpressPass sends the ballot activation code information to the ExpressPass Printer. The ExpressPass Printer produces the ExpressVote activation card with ballot style.
6. Ballot / Activation Card distribution	a. **Ballot Distribution**: Ballots are distributed to live elections for AutoMARK or hand marking use. b. **Activation Card Distribution**: Activation cards with ballot styles are distributed to live elections for ExpressVote use.

Table 5: Ballot Formatting and Printing Subsystem

1.2.3 VOTING EQUIPMENT CONFIGURATION

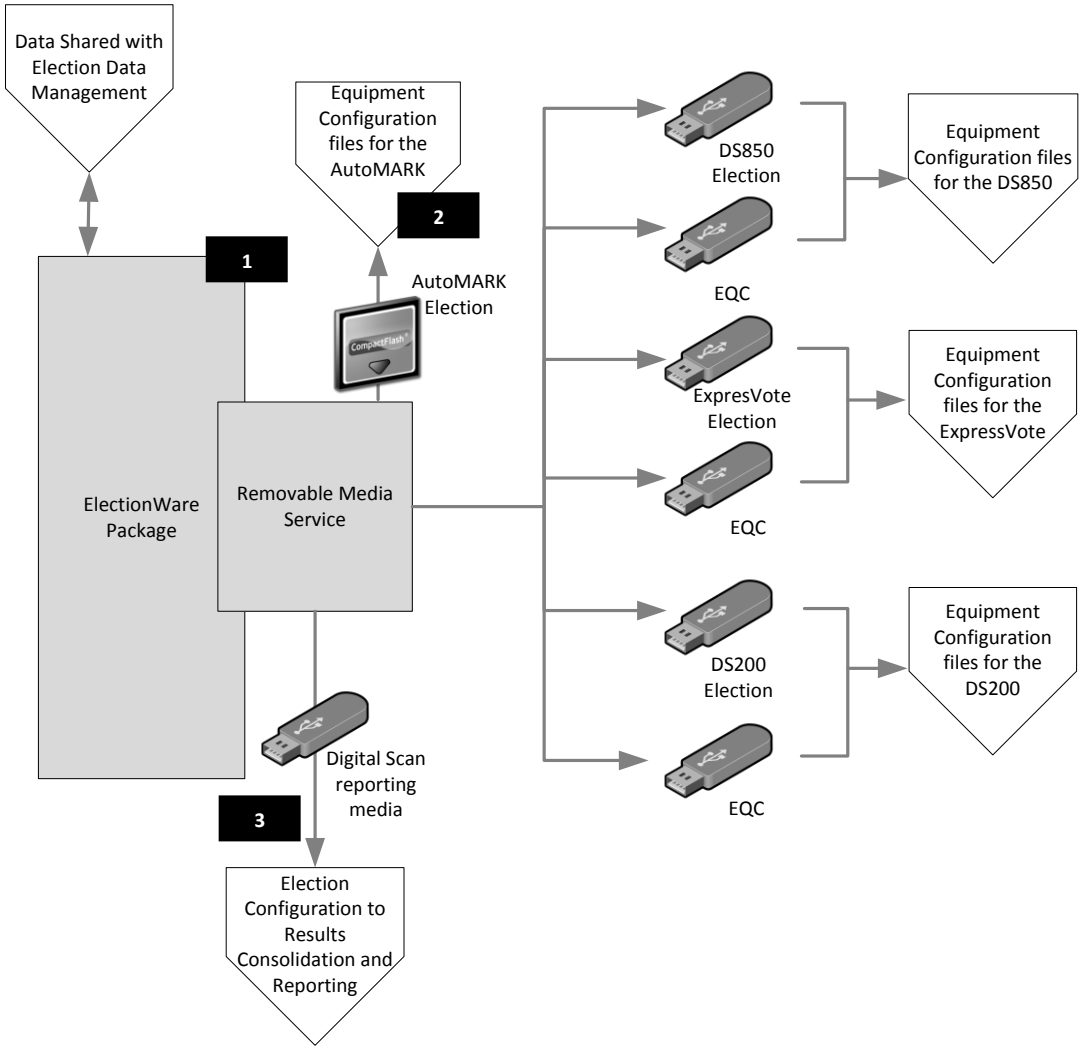

Figure 4: Voting Equipment Configuration Subsystem

Function Name	Description
1. **Create media files**	The ElectionWare Package module creates election media. Once created, ElectionWare Package can be used to test the generated election through logic and accuracy testing.
2. **Program equipment media**	Election configurations, including election, precinct and security information write to equipment media from ElectionWare Package.
3. **Program report subsystem configuration media**	ElectionWare Package writes configuration data for Election Reporting Manager.

Table 6: Voting Equipment Configuration Subsystem

1.2.4 VOTING AND TABULATION

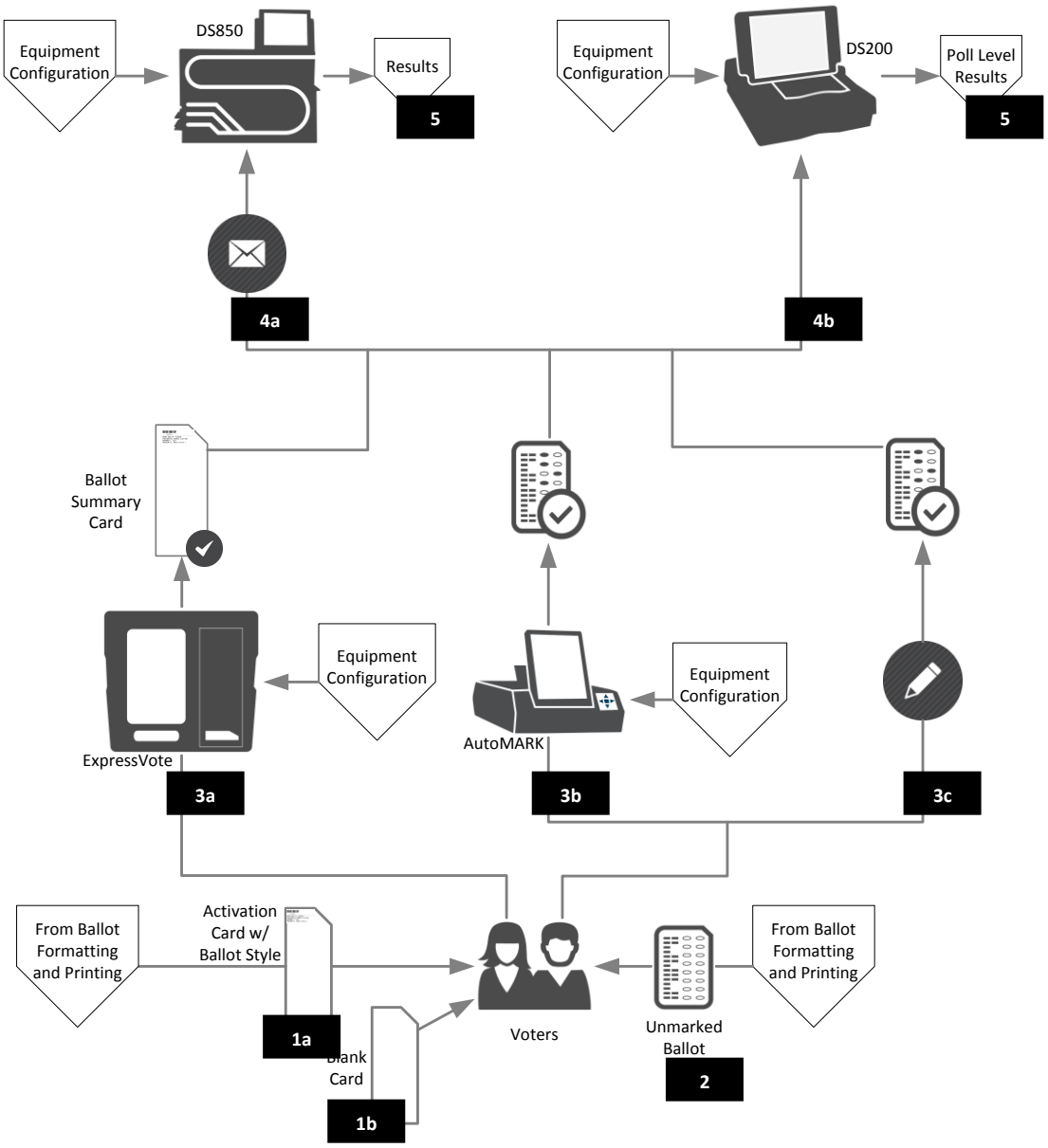

Figure 5: Voting and Tabulation Subsystem

Function Name	Description
1. Voter receives ExpressVote card	a. **Activation card with ballot style from ExpressPass:** ExpressPass captures the voter's correct ballot style from a supported electronic Pollbook and prints the correct ballot style code on the voter's card. This is similar to the code channel on a paper ballot. b. **Blank ExpressVote card:** The voter's ballot style is manually selected by a poll worker from the ExpressVote terminal.

Function Name	Description
2. Voter receives blank ballot	The jurisdiction distributes ballots for Election Day use.
3. Ballot Marking	a. **Universal Vote Capture:** Vote capture with the ExpressVote b. **Assisted Ballot Marking:** Ballot marking with the AutoMARK c. **Manual Marking:** Hand marking a paper ballot
4. Ballot scanning	a. **Absentee or Central Scanning:** The DS850 process absentee mail ballots or ballots manually transported from polling places. b. **Precinct Scanning:** Ballots are scanned at the polling place using the DS200.
5. Results collection	Scanners save poll level results to election media for consolidation and reporting. Poll workers can transfer results to the reporting subsystem using an optional dialup network with the DS850.

Table 7: Voting and Tabulation Subsystem

1.2.5 RESULTS CONSOLIDATION AND REPORTING

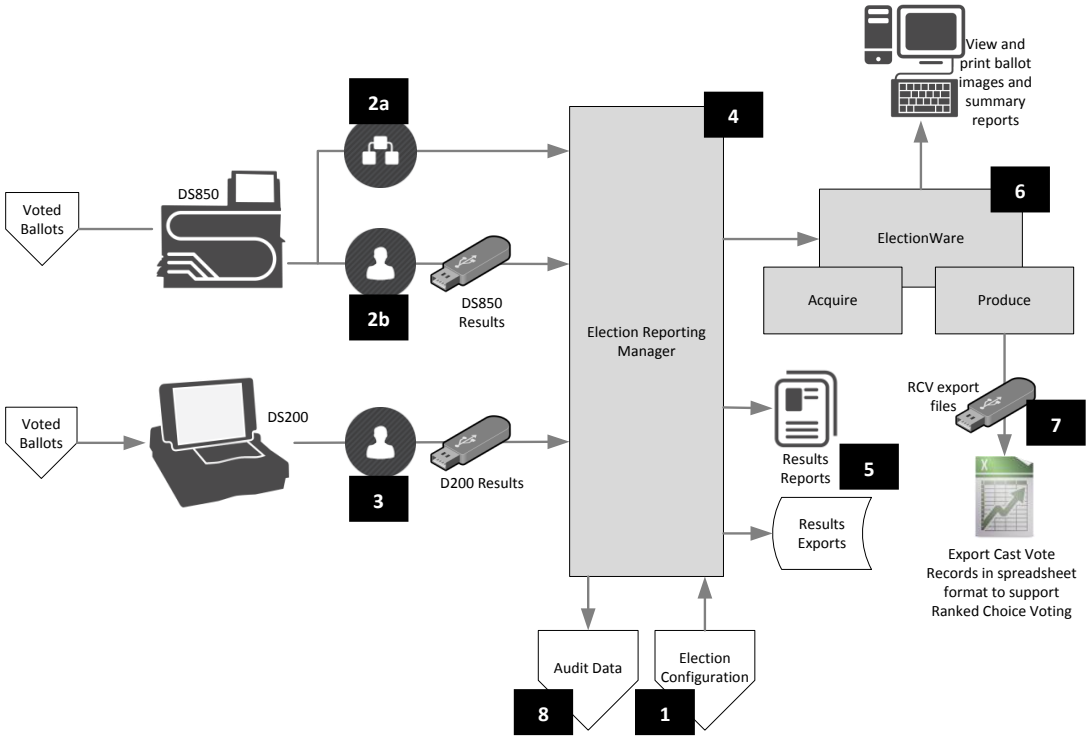

Figure 6: Results Consolidation and Reporting Subsystem

Function Name	Description
1. Election report configuration files	Election Reporting Manager (ERM) imports the election configuration from ElectionWare Package.
2. Results collection – DS850	**a. Local Network Transfer**: Results transfer to ERM over an optional DS850 local area network connection. **b. Manual Transfer**: Manual transfer of a USB memory stick containing election results from the DS850 to ERM.
3. Results collection – DS200	Manual transfer of a USB memory stick containing election results from the DS200 to ERM.
4. Results data consolidation	ERM consolidates vote totals by reading physical results media to generate consolidated election reports.
5. Results exports generation	ERM outputs reports in paper and electronic format for distribution to election workers, candidates and the media. Jurisdictions can configure a second ERM PC to display scrolling results, which automatically update as the ERM reporting PC reads media. ERM can also distribute reports directly to media outlets over a local network connection.

Function Name	Description
6. Results processing in ElectionWare	ElectionWare Acquire reads results and ballot images from a monitored data folder as ERM processes results media. ElectionWare Acquire can print machine and results media status reports. ElectionWare Produce can be used to: • View and filter the list of provisional and non-provisional ballots included in loaded results • View, save, and print HTML and XML versions of the Election Summary Results report
7. Export Cast Vote Record (CVR) data for Ranked Choice Voting (RCV) processing.	ElectionWare Produce generates and exports a Cast Vote Record data file as a spreadsheet formatted to match jurisdiction specifications. The jurisdiction can apply Ranked Choice Voting logic to the spreadsheet data, using a system developed independently, to determine Ranked Choice Voting results.
8. Audit Logging	All ERM audit log records and ElectionWare exception records are written to the Windows Event Log using the Event Log Service.

Table 8: Results Consolidation and Reporting

1.3 OPERATIONAL ENVIRONMENT

The following sections describe supported physical operating environments, list the components included in each environment and describe the interfaces between those components.

The voting system utilizes the following environments:

1. Election Central
2. Ballot Production
3. Polling Place

This section also includes a discussion of the system communications structure.

1.3.1 ELECTION CENTRAL

Election Central supports the following configurations:

1. Standalone EMS Workstation
2. Local Network EMS
3. DS850

1.3.1.1 STANDALONE EMS WORKSTATION

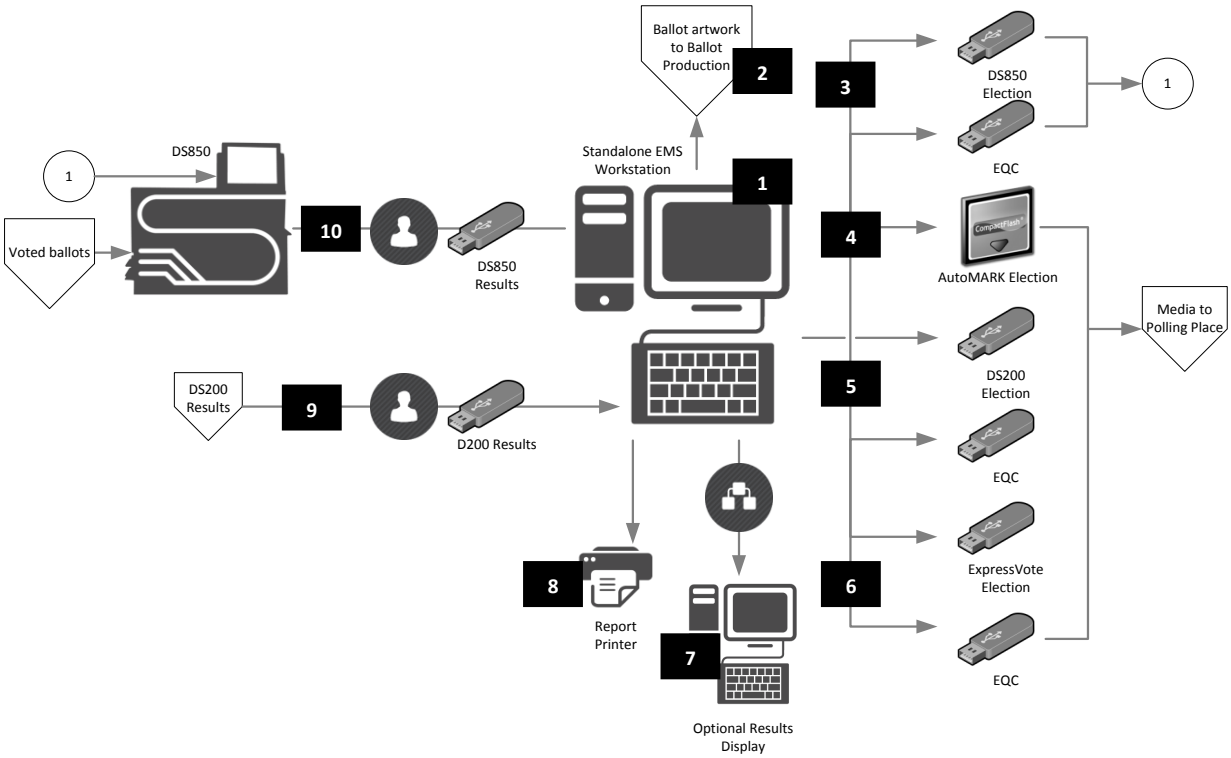

Figure 7: Standalone EMS Configuration

Component Name	Interfaces	Description
1. EMS Workstation	Human interface device (mouse and keyboard) Windows-based Graphical User Interface (GUI)	User interface for configuring ballot and election data and accessing EMS, audit and election results reports. See Attachment 2, "Voting System Configuration" for a list of installed applications and system requirements.
2. Ballot Artwork	PDF file	Output PDF files for paper ballot printing.
3. DS850 election media	Election configuration files • Encrypted XML • USB stick	Output files written to election media over a standard USB interface. See Attachment 2, "Voting System Configuration" for a description of supported media.
4. AutoMARK election media	Election configuration files • Encrypted XML • Compact Flash Card	Output files written to election media using a standard USB connected Flash Card Reader/Writer. See Attachment 2, "Voting System Configuration" for a description of supported media and card writer.
5. DS200 election media	Election configuration files • Encrypted XML • USB memory Stick	Output files written to election media over a standard USB interface. See Attachment 2, "Voting System Configuration" for a list of supported media."
6. ExpressVote election media	Election configuration files • Encrypted XML • USB memory Stick	Output files written to election media over a standard USB interface. See Attachment 2, "Voting System Configuration" for a list of supported media."
7. Optional ERM results Display	Local Ethernet or USB connection to EMS Workstation	Optional, "Display Only" workstation for publishing election results. See Attachment 2, "Voting System Configuration" for a list of installed software and system requirements.
8. Report Printer	Local Ethernet or USB connection to EMS Workstation	Standard laser printer for outputting EMS reports and election results. See Attachment 2, "Voting System Configuration" for a list of supported equipment.
9. DS200 results – physical transport	USB Memory Stick	Standard USB input for manually transported election results media. See Attachment 2, "Voting System Configuration" for a list of supported equipment.
10. DS850 results – physical transport	USB Memory Stick	Standard USB input for manually transported election results media. See Attachment 2, "Voting System Configuration" for a list of supported equipment.

Table 9: Standalone EMS – Components and Interfaces

1.3.1.2 LOCAL NETWORK EMS

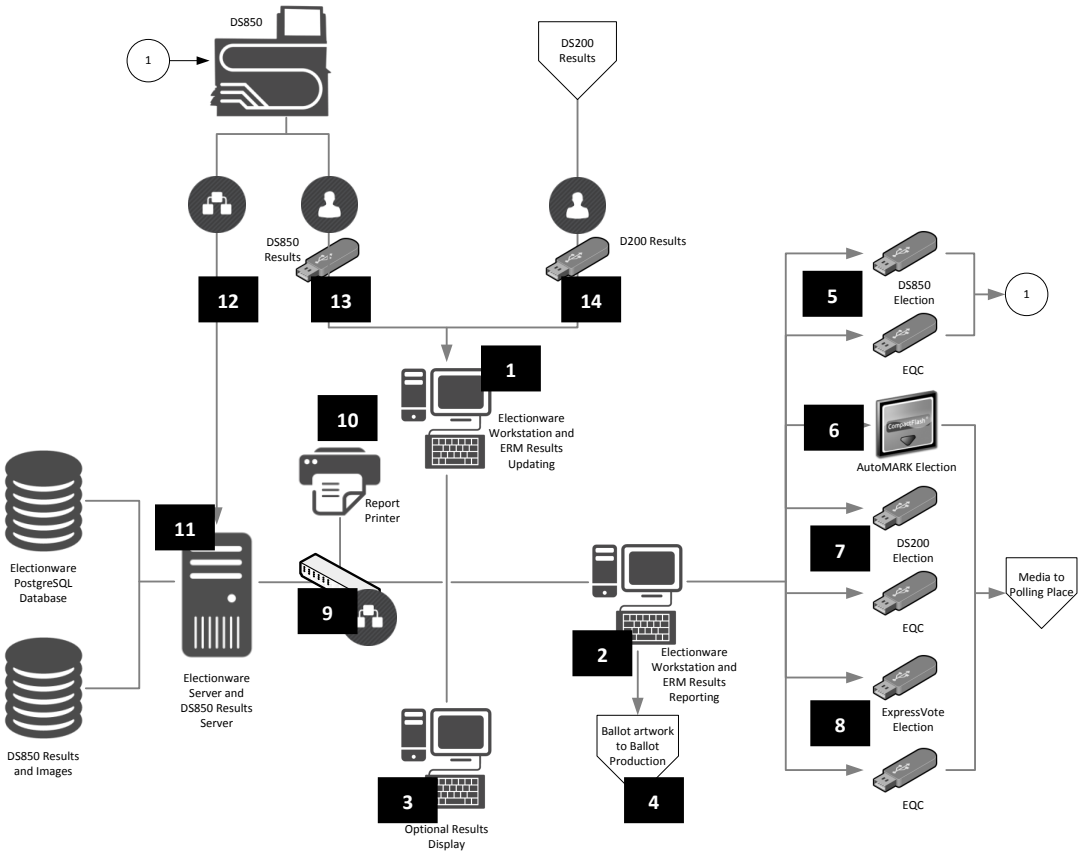

Figure 8: Local EMS Network with Multiple Workstations

Component Name	Interfaces	Description
1. ElectionWare Workstation and ERM Results Updating	Human interface device (mouse and keyboard) Windows-based Graphical User Interface (GUI) Local Area Network - Ethernet	User input for configuring ballot and election data and accessing EMS, audit and election results reports. Reporting subsystem configured for reading results from physical media. See Attachment 2, "Voting System Configuration" for a list of installed applications and system requirements.
2. ElectionWare Workstation and ERM Results Reporting	Human interface device (mouse and keyboard) Windows-based Graphical User Interface (GUI) Local Area Network - Standard Ethernet	User input for configuring ballot and election data and accessing EMS, audit and election results reports. Reporting subsystem configured for Results Report Generation. See Attachment 2, "Voting System Configuration" for a list of installed applications and system requirements.

Component Name	Interfaces	Description
3. ERM Results Display	Human interface device (mouse and keyboard) Windows-based Graphical User Interface (GUI) Local Area Network - Standard Ethernet	Optional, "Display Only" workstation for publishing election results. See Attachment 2, "Voting System Configuration" for a list of installed software and system requirements.
4. Ballot Artwork	PDF file	Output PDF files for paper ballot printing.
5. DS850 election media	Election configuration files • Encrypted XML • USB Memory stick	Output files written to election media over a standard USB interface. See Attachment 2, "Voting System Configuration" for a description of supported media.
6. AutoMARK election media	Election configuration files • Encrypted XML • Compact Flash	Output files written to election media using a standard USB connected Flash Card Reader/Writer. See Attachment 2, "Voting System Configuration" for a description of supported media and card writer.
7. DS200 election media	Election configuration files • Encrypted XML • USB Memory Stick	Output files written to election media over a standard USB interface. See Attachment 2, "Voting System Configuration" for a list of supported media.
8. ExpressVote election media	Election configuration files • Encrypted XML • USB Memory Stick	Output files written to election media over a standard USB interface. See Attachment 2, "Voting System Configuration" for a list of supported media.
9. Network Switch	Ethernet connection to EMS Workstations, ElectionWare and communications servers	Standard network switch. See Attachment 2, "Voting System Configuration" for supported models.
10. Report Printer	Ethernet connection to Network Switch	Office printer used to publish EMS reports and election results. See Attachment 2, "Voting System Configuration" for a list of supported equipment.
11. ElectionWare and DS850 Results Server	Ethernet connection to Network Switch	ElectionWare server that supports a local EMS network environment. See Attachment 2, "Voting System Configuration" for a list of supported equipment. DS850 results server for managing incoming network traffic.

Component Name	Interfaces	Description
12. DS850 results – local network	Ethernet	Secure client/server configuration for receiving election results over a local network. See Attachment 2, "Voting System Configuration" for a list of supported equipment.
13. DS850 results – physical transport	USB Memory Stick	Standard USB port for manually transported election results media. See Attachment 2, "Voting System Configuration" for a list of supported equipment.
14. DS200 results – physical transport	USB Memory Stick	Standard USB input for manually transported election results media. See Attachment 2, "Voting System Configuration" for a list of supported equipment.

Table 10: Local Network EMS – Components and Interfaces

1.3.1.3 DS850

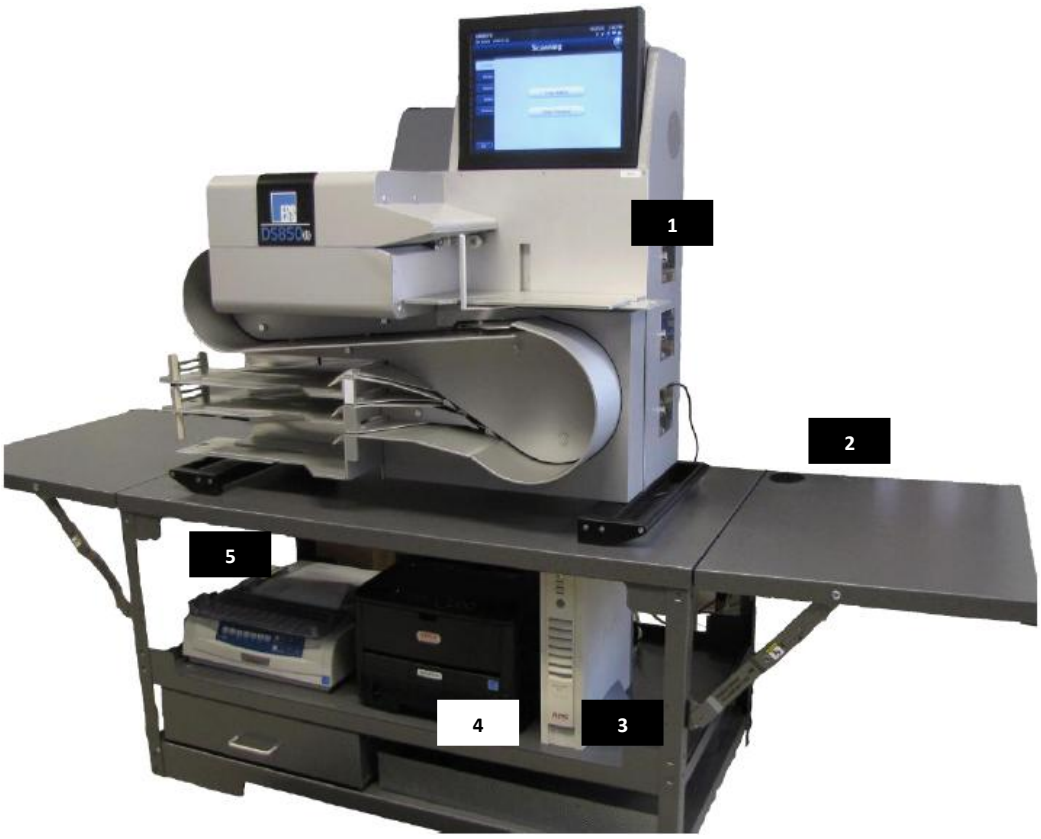

Figure 9: DS850

The DS850 central ballot scanner uses digital sensors to capture voter selections simultaneously from the front and back of a paper ballot. Imaging algorithms evaluate the results and sort ballots to discrete bins without interrupting scanning.

A dedicated dot matrix printer generates a continuous printed event log. Machine level results and status reports output from a second laser printer. The scanner saves voter selections and ballot images to an internal hard disk and exports results to a USB Memory stick or optional local network for processing with the EMS reporting subsystem.

The DS850 includes the following components:

1. DS850 Tabulator
2. DS850 Table
3. Uninterruptable Power Supply
4. Report Printer
5. Audit Printer

1.3.2 BALLOT PRODUCTION

The ballot production environment outputs all ballots used for evaluation, test and live elections. ES&S print services or an ES&S certified partner printer produces these ballots based on images formatted using ES&S election management software. The production environment itself includes all facilities and equipment required to convert ballot images supplied by EMS programmers into paper ballots that comply with the specifications of the jurisdiciton and the performance requirements for ES&S ballot marking and tabulation equipment.

While the ballot is a testable component of the voting system, the ballot production environment can vary widely. Any sufficeintly trained commercial printer with equipment capable of meeting ES&S defined ballot specifications can generate ballots that meet the test and performance specifications of for ES&S voting equipment. ES&S does not require that ballot printers use specific equipment or procedures, as long as the output ballots meet specifications.

> **NOTE** Printed ballots must meet the paper, ink and image specifications detailed in the *ES&S Ballot Production Guide*.

1.3.3 POLLING PLACE

Polling place configurations support the following utilities and equipment:

1. ExpressVote Activation Card Printing
2. ExpressVote
3. AutoMARK
4. DS200

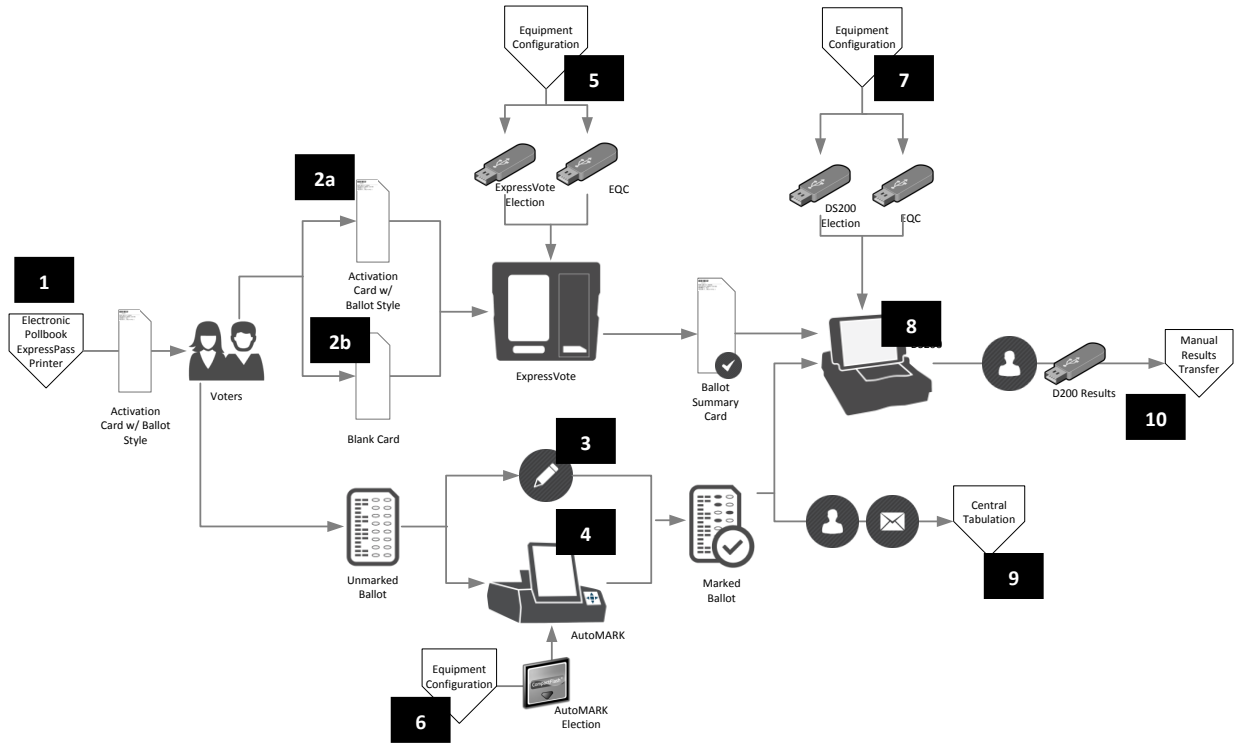

Figure 10: Polling Place Configuration

Component Name	Interfaces	Description
1. Electronic Pollbook ExpressPass Printer	Human interface device (mouse and keyboard) Windows-based Graphical User Interface (GUI) Voter configuration file generated by a supported electronic Pollbook. BOD Configuration files from Capture. Activation Card	The Polling Place Configuration includes an optional ancillary component that works in conjunction with electronic Pollbook systems (both the ES&S ExpressPoll and third party Pollbook systems.) The ancillary component includes the ExpressPass printer and the ExpressPass application. The ES&S ExpressPoll connects directly to the ExpressPass printer to generate ExpressVote activation cards with ballot styles containing configuration information. Third party Pollbook system outputs a voter's precinct information configured to ES&S specifications for interfacing with the ExpressPass application. The ExpressPass application transmits the information to the ExpressPass printer, which prints the voter's ballot style on the activation card header. Replaces manual selection of the voter's activation card format from the ExpressVote terminal.

Component Name	Interfaces	Description
2. Universal vote capture	User initiated by inserting an activation card into ExpressVote Touch screen, GUI Tactile keypad interfaces Audio and Accessible interface device ports	**a. ExpressVote (activation card):** The voter inserts an activation card formatted with ballot style codes printed by the ExpressPass. The voter uses the touch screen, keypad or accessible device to input selections. The system outputs a marked activation card. **b. ExpressVote (blank card):** The poll worker inserts a blank activation card and selects the voter's precinct, polling place and split configuration. The voter uses the touch screen, keypad or accessible device to input selections. The system outputs a ballot selection summary card including undervotes and write-ins.
3. Hand marking ballots	Pen and paper ballot marking	The voter hand marks a paper ballot and outputs a voted paper ballot.
4. Accessible ballot marking	User initiated by inserting a paper ballot into the AutoMARK Touch screen, GUI Tactile keypad interfaces Audio and Accessible interface device ports	The voter inserts an unmarked standard ballot to initiate voting. The voter uses the touch screen, keypad or compatible ATI device to input selections. The system outputs a marked paper ballot.
5. ExpressVote election media	Election configuration files • Encrypted XML • USB Memory stick	Includes encrypted election configuration files, audio and image files. See Attachment 2, "Voting System Configuration "for a description of supported media."
6. AutoMARK election media	Election configuration files • Encrypted XML • Compact Flash	Output files written to election media using a standard USB connected Flash Card Reader/Writer. See Attachment 2, "Voting System Configuration" for a description of supported media and card writer.
7. DS200 election media	Election configuration files • Encrypted XML • USB Memory stick	Includes election configuration files. See Attachment 2, "Voting System Configuration" for a description of supported media.
8. Ballot scanning: DS200	User initiated by inserting a paper ballot DS200 touch screen and GUI for administrative tasks	The DS200 scans and stores ballots to a secure bin. Results output to a USB stick for processing at election headquarters. See Attachment 2, "Voting System Configuration" for supported models.

Component Name	Interfaces	Description
9. Central Ballot scanning: absentee or Election Day	Ballots transferred for central scanning on the DS850.	Central scanning includes the collection of mail-in absentee ballots or Election Day ballots for scanning at election central.
10. DS200 results – physical transport	USB Memory Stick	Standard USB input for manually transported election results media. See Attachment 2, "Voting System Configuration" for a list of supported equipment.

Table 11: Polling Place Configuration

1.3.3.1 EXPRESSVOTE ACTIVATION CARD PRINTING

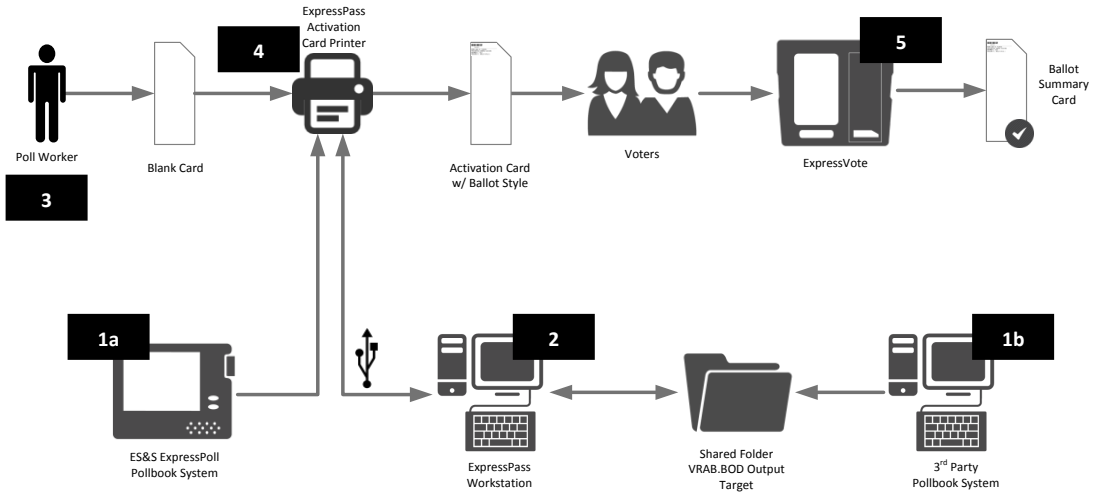

Figure 11: ExpressVote Activation Card Printing with ExpressPass

Component Name	Interfaces	Description
1. Supported Pollbook program outputs voter data	Voter configuration file generated by a supported electronic Pollbook.	The poll worker performs voter lookup on one of the following electronic Pollbook systems: **a. ES&S ExpressPoll Pollbook System:** Pollbook system designed to interface directly with the ExpressPass printer to generate activation cards with ballot style. **b. Third Party Pollbook System:** Non-ES&S Pollbook system outputs voter record file configured to ES&S specifications for interfacing with the ExpressPass application. This file is output to a folder monitored by the ExpressPass application. ExpressPass supports any Pollbook application that meets the data requirements of the system. The ExpressPass printer, ExpressPass application and Pollbook systems are not included in the certified system.
2. ExpressPass processes voter configuration information	Voter configuration file generated by a supported electronic Pollbook. BOD Configuration files from Capture.	The ExpressPass application recognizes a voter record in the monitored folder and generates a ballot configuration record based on the voter's precinct/poll/split configuration.
3. Poll worker inserts a blank card	Blank Activation Card	The poll worker inserts a blank activation card into the ExpressPass Activation Card Printer.
4. ExpressPass Activation Card Printer	Ballot on Demand File ES&S ExpressPoll	The ExpressPass Activation Card Printer prints the voter's precinct/polling place/split information in bar code format and plain text on the card header. User Interaction with the PC running the ExpressPass application is not required.

Component Name	Interfaces	Description
5. ExpressVote marks the activation card	Activation Card w/Ballot Style	Voter inserts the activation card with ballot style into the ExpressVote. The ExpressVote reads configuration information from the card header and provides corresponding voting selections. The ExpressVote marks the card based on voter selections and generates a voted ballot summary card.

Table 12: ExpressVote Activation Card Printing

1.3.3.2 EXPRESSVOTE

Figure 12: ExpressVote

The ExpressVote is a universal vote capture device designed for all voters, with independent voter-verifiable paper record that is digitally scanned for tabulation. This system combines paper-based voting with touch screen technology. The ExpressVote can serve all voters, including those with special needs, allowing voters to cast ballots autonomously. Voters navigate ballot selections using the touch screen, detachable keypad or ADA support peripheral such as a sip and puff device or two-position switch. ExpressVote guides voters through the ballot selection process with screen prompts, symbols and ballot audio. Screen controls meet all applicable guidelines for size and readability. The ExpressVote includes a mandatory vote summary screen that requires voters to confirm or revise selections prior to printing the summary of ballot selections using the internal thermal printer. Once printed, ES&S ballot scanners process the ballot summary card.

1. Touch screen
2. Activation card slot
3. Headphone jack
4. Accessible device port
5. Battery indicator

1.3.3.3 AUTOMARK

Figure 13: AutoMARK

The AutoMARK supports assistive ballot marking for voters with low vision, voters who are blind, voters with limited dexterity or physical disabilities, or voters who want to read or hear ballot content in an alternate language.

Voters navigate the ballot using the system touch screen, physical keypad or an ADA support peripheral such as a “sip and puff” device or two-position switch. The device visually guides the voter through the ballot marking process with screen prompts and symbols. Screen controls meet all applicable guidelines for size and readability. Physical keys are shaped and positioned to provide an intuitive voting session and labeled in both Braille and text to indicate function.

The system includes a mandatory vote summary screen that requires voters to confirm or revise selections prior to marking a paper ballot.

1. Touch screen
2. Physical control panel with Braille embossed keys.
3. Headphone and accessible device ports
4. Ballot input path
5. Control key port
6. Election programming

1.3.3.4 DS200

Figure 14: DS200

The DS200 polling place scanner scans voted ballots inserted in any orientation. Both sides of the ballot are processed simultaneously with high-resolution scanners and the resulting ballot images are decoded by a proprietary recognition engine. After processing voter selections, the DS200 drops the ballot into an attached, secure ballot box.

Product features include a 12-inch touch screen providing voters and poll worker feedback, an internal thermal printer for generating machine totals and log reports, and USB thumb drive for loading the election definition and storing results.

1. Touch screen
2. Ballot input
3. Thermal printer access
4. Election media storage compartment

1.3.4 COMMUNICATIONS STRUCTURE

All peripherals, such as printers, mice, card readers/writers and other devices - connect through standard communications ports such as USB or serial interfaces. System hardware specifications detail the locations for ports on ES&S tabulators and ballot marking equipment.

1.4 CONCEPT OF OPERATION

See the system diagram included under Section 1.1 and system/subsystem descriptions under section 1.2 for the voting system concept of operation.

The functional subsystem descriptions under Section 1.2 include a description of each system function and a discussion of how each function is achieved in the system design.

1.5 FUNCTIONAL AND PHYSICAL INTERFACES

The diagrams and subsystem descriptions under Section 1.2 illustrate the functional interactions between system components. Physical interfaces are illustrated and described under Section 0.

1.6 COTS HARDWARE, SOFTWARE AND COMMUNICATION SERVICES

A list of Consumer off the Shelf (COTS) products utilized in core system software and firmware appears in Attachment 2, "Voting System Configuration."

1.7 INTERFACES AMONG COMPONENTS

Interface/Means used for information exchange	Public Standard
Encrypted XML File (.EML)	Interface between ElectionWare and the ES&S DS850, ES&S DS200, ExpressVote and AutoMARK. ElectionWare encrypts XML files individually or as a package.
XML Files	Interface between ElectionWare and the SFTP Server.
XML Files	Interface between ElectionWare and ERM.
Poll Place Collection XML Files	Interface between the ES&S DS850/ES&S DS200 and ERM.

Table 13: Component Interfaces

1.8 BENCHMARK DIRECTORY LISTINGS

See Attachment 2, "Voting System Configuration," for default and recommended install locations for voting system software. Components are listed in the order they should be installed. Firmware for vote counting and ballot marking equipment is installed by ES&S and cannot be accessed, installed or modified by a voting system user.

2. SYSTEM PERFORMANCE

This section provides an overview of system performance characteristics for each system component. Detailed performance characteristics for each product in the system appear in Attachment 3, "Product Specification Sheets." System boundaries and limitations appear in Attachment 1, "Voting System Limitations."

2.1 PERFORMANCE CHARACTERISTICS

Performance characteristics including estimated maximum speed, volume and throughput capacity appear in Attachment 3, "Product Specification Sheets."

2.1.1 PAPER BALLOT AND EXPRESSVOTE ACTIVATION CARD LIMITATIONS

Limitations for paper ballots including ballot formats and target positions appear in Attachment 3, "Product Specification Sheets."

Selection limitations for ExpressVote activation cards appear in Attachment 3, "Product Specification Sheets."

2.2 QUALITY ATTRIBUTES

Voting system equipment is tested to meet VVSG required quality attributes during voting system certification. Based on design and component assessments, ES&S expects all voting equipment to meet the quality attributes listed below and in Attachment 3, "Product Specification Sheets."

2.2.1 RELIABILITY

Based on component selection and engineering assessments, ES&S expects voting equipment to meet the VVSG required Mean Time Before Failure (MTBF) rate of 163 hours.

2.2.2 MAINTAINABILITY

ES&S designs all voting system equipment for ease of preventative and corrective maintenance. All ES&S tabulators are expected to comply with the following EAC maintainability requirements.

- **Mean Time to Repair:** The Mean Time to Repair (MTTR) measures the average time required to perform a corrective maintenance task. Corrective maintenance task time measures only active repair time and excludes logistic or administrative delays. Corrective maintenance may require on site repair. ES&S expects the mean time to repair voting equipment, in combination with the Mean Time Before Failure (MTBF), to achieve the required availability.
- **Maximum Repair Time (MMAX):** Based on the modular designs of the systems, ES&S expects election equipment to provide a less than five percent probability that an unscheduled maintenance action will require more than 30 minutes to complete. If a technician cannot repair a component in less than 30 minutes, a replacement component is placed on standby during the equipment's operating period.
- **Maintenance Ratio (MR):** Maintenance Ratio is the ratio of total maintenance hours (MH) to total operating hours (OH). MH is equal to the sum of the scheduled and unscheduled maintenance

hours spent on all components that make up the system. OH includes the nominal time of system operation, including the time required to prepare the system for an election and the time required for post-election operations. Based on assessment of parts and components, ES&S expects the maintenance ratio for ES&S systems to comply with the required 0.25 MH/OH.

2.2.3 AVAILABILITY

ES&S expects voting equipment to achieve 99 percent availability during normal operation.

2.2.4 USABILITY

ES&S designs voting systems for a broad range of election jurisdictions. The system accounts for many variables to support a variety of local and State regulations and incorporates functionality built to specific customer requests and requirements. To ensure that users can maximize their understanding of the system, ES&S enhances usability and accessibility through Heuristic evaluation, intelligent system design, comprehensive training programs and administrative support services.

2.2.4.1 SYSTEM FEATURES AND DESIGN

ES&S develops systems to the design requirements of VVSG Volume I, Section 3 and VVSG Volume I, Appendix D. Product designs consider additional human factors, beyond the scope of VVSG requirements. Design considerations include maximizing usability in the selection of screen color and fonts, using familiar Windows conventions for menus and user interfaces, providing WYSIWIG ballot editing tools, determining the shape and color of tangible system controls and designing logical work flows for end-to-end election processing.

2.2.4.2 TRAINING

ES&S training services supplement user documentation and support services. Election Day and pre-election courses are available and training classes can be tailored to meet the unique needs of clients.

Classroom instruction includes audio, visual and hands-on demonstrations and exercises – specific to student responsibilities. Students receive training materials that feature visual and step-by-step instructions. Customized job aids and testing materials may be developed to meet the individualized needs of the students.

ES&S offers refresher training after first use, and always evaluates the effectiveness of every class in order to continually refine and improve a customized training program.

2.2.4.3 SUPPORT SERVICES

ES&S Account Managers, Customer Support Representatives, and Field Service Technicians provide implementation, service and support of election systems.

2.2.5 PORTABILITY

ES&S voting equipment is designed for its intended purpose. Equipment designed for use at polling places includes wheels and carrying cases that support mobility and protect equipment from drops and collisions. ES&S central tabulators are designed for speed and durability and not for high portability. See Attachment 3, “Product Specification Sheets,” for product dimensions and weight.

2.3 PROVISIONS FOR SAFETY, SECURITY, PRIVACY AND CONTINUITY OF OPERATION

The following sections include a discussion of ES&S design considerations for safety, security, privacy and continuity of operation. The voting system security specification, product user's/operator's manuals and maintenance manuals include expanded information.

2.3.1 SAFETY

See Attachment 3, "Product Specification Sheets," for product safety considerations.

2.3.2 SECURITY

Voting equipment is designed with specific security features and procedures that contribute to the overall security of the voting system. The following table includes general descriptions of the security features and procedures for each product. Product manuals and security specifications provide detailed security descriptions by product.

ES&S Product	Security Features/Description
ExpressVote	See Attachment 3, "Product Specification Sheets."
DS850	See Attachment 3, "Product Specification Sheets."
DS200	See Attachment 3, "Product Specification Sheets."
AutoMARK	See Attachment 3, "Product Specification Sheets."
ES&S Event Log Service	• ES&S Event Log Service logs user actions for election management applications. • ES&S Event Log Service runs in the background logging system events to the COTS Windows Event Viewer. • Election officials use ES&S Event Log Service to monitor ERM activity. • ES&S Event Log Service records all user actions in ERM as a continuous audit log. Election officials can format and print reports based on the log.
ElectionWare	• ElectionWare requires users to enter a valid username and password prior to gaining access to the application. The username and passwords are stored in an encrypted database. Strong password methodology is utilized which requires the password to be at least 8 characters long and include at least one number, one upper case letter, one lower case letter and contain no spaces. • Depending on a user's access rights, ElectionWare limits selections in the Manage module. Unavailable menu selections do not appear in the application interface. • ElectionWare saves a record of all user actions to the system audit log. The Username of the logged in user also appears in the log. • System security for ElectionWare limits casual access to system files but security also depends on sound practices at the election office. Officials are required to implement a strong physical and procedural security plan that limits access to ElectionWare to authorized personnel only. Election officials should also make sure that the PCs running ElectionWare remain secure before and after each election. • ElectionWare does not offer any data entry feature that can be used to alter application programming.

ES&S Product	Security Features/Description
Election Reporting Manager	• Election Reporting Manager saves a record of all significant user actions to the ERM system audit log and also writes all audit log entries to the secure Windows Event Log. • Access to the ERM application is controlled by the System Administrator assigned access rights as documented in the ES&S System Security and System Hardening documents. • System security for ERM limits access to system files and election results but system security also depends on sound practices at the election office. Officials should limit access to ERM and election results to authorized personnel only. Election officials should also make sure that the PC running ERM remains secure before and after each election. Access to election results generated in ERM should be regulated and officials should compare election reports generated in ERM to scanner totals in order to make sure that final results are consistent with the results from ballot scanning equipment. • Officials should retain all paper ballots and election results USB Memory Devices to ensure system security and provide an audit trail for forensic investigation.

Table 14: Product Security Features

2.3.3 PRIVACY

Voting System Hardware	See Attachment 3, "Product Specification Sheets," for privacy features of ES&S voting equipment.
Election Management System	No voter information is stored to voting system software; ensuring voter privacy and security.

Table 15: Product Privacy Features

2.3.4 CONTINUITY OF OPERATION

Voting System Hardware	See Attachment 3, "Product Specification Sheets," for battery specifications and backup features of ES&S voting equipment.
Election Management System	Frequent backups and the use of an uninterruptable power source ensure continuity of operation for EMS software.

Table 16: Product Continuity of Operation Features

2.4 DESIGN CONSTRAINTS, APPLICABLE STANDARDS AND COMPATIBILITY REQUIREMENTS

The following sections describe external factors affecting the system design.

2.4.1 DESIGN CONSTRAINTS

ES&S Product	Constraint
ExpressVote	ExpressVote meets all VVSG 1.0 requirements and human engineering considerations for all voters, including those with disabilities. The design includes audio output and a removable keypad with Braille embossed keys to accommodate voters who are blind or have low vision, and a touch pad and sip n puff input to accommodate voters with limited physical mobility.

ES&S Product	Constraint
DS850	• Support the VVSG version 1.0 • Support the same election rules and ballot formats as the DS200 precinct ballot tabulator • Share as much code as possible with the DS200 Precinct ballot tabulator application • Share as many operating system components as is possible with the DS200 precinct ballot tabulator. • Handle folded ballots with minimal jams. • Store ballot images for ballots that have completed processing.
DS200	• Support the VVSG version 1.0 • Support the ballot box designed for the Model 100, a legacy precinct scanner, which dictated the rail (feet) of the unit, diverter connector, overall width and length dimensions of the DS200 • Support the RoHS lead-free standards.
AutoMARK	In addition to supporting the VVSG 1.0 standard, the AutoMARK addresses human engineering considerations of disabled voters. The design includes audio output and a Braille keypad to accommodate voters who are blind or have low vision, and a touch pad and “sip and puff” input to accommodate voters with limited physical mobility.
Election Management System	ES&S Election Management System software is designed to support the election rules and standards of the 2005 VVSG.

Table 17: Design Constraints

2.4.2 APPLICABLE STANDARDS

ES&S Product	Constraint
ExpressVote	See Attachment 3, "Product Specification Sheets," for design standards used in the development of ES&S voting equipment.
DS850	See Attachment 3, "Product Specification Sheets," for design standards used in the development of ES&S voting equipment.
DS200	See Attachment 3, "Product Specification Sheets," for design standards used in the development of ES&S voting equipment.
AutoMARK	See Attachment 3, "Product Specification Sheets," for design standards used in the development of ES&S voting equipment.
ElectionWare	• EAC 2005 Voluntary Voting System Guidelines (VVSG 1.0) • *The Java Programming Language* by Ken Arnold, James Gosling, David Holmes • ES&S Java Coding Conventions. See ES&S document "*Development Practices and Coding Standards.*
Election Reporting Manager	• EAC 2005 Voluntary Voting System Guidelines (VVSG 1.0) • *RM/Cobol for Windows version 7.0* – Language Reference Manual • *CodeBridge for Windows version 7.0* – Calling Non-Cobol Subprograms

Table 18: Applicable Standards

2.4.3 COMPATIBILITY REQUIREMENTS

System requirements appear in Attachment 2, "Voting System Configuration."

A. ANCILLARY SYSTEMS

ELECTRONIC POLLBOOK – EXPRESSPASS

ES&S offers an ancillary electronic Pollbook system component called ExpressPass. This system is comprised of two components: the ExpressPass Application and the ExpressPass Printer.

EXPRESSPASS APPLICATION

ExpressPass is a standalone application that interfaces with Voter Registration (electronic Pollbook) systems and the ExpressPass printer to print the ballot activation code on an ExpressVote activation card. This code on the activation card activates the correct ballot the voter is authorized to vote.

EXPRESSPASS PRINTER

The ExpressPass Printer is a small, thermal, on demand printer used to print the ballot activation code on the ExpressVote activation card.

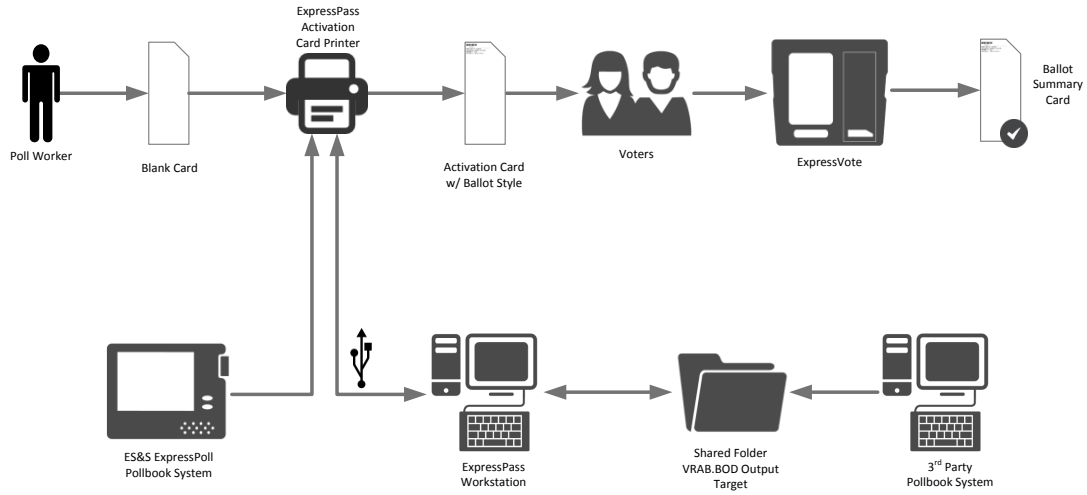

Figure 15: ExpressVote Activation Card Printing with ExpressPass

B. KEY TERMS

Terms used in this document conform to company standards set forth herein and to definitions included in the EAC 2005 *Voluntary Voting System Guidelines*. Other definitions are consistent with those found in *ANSI/IEEE Std 610.12-1990, IEEE Standard Glossary of Software Engineering Terminology*.

JURISDICTIONAL NOMENCLATURE

Terminology for the lowest-level common geopolitical civil division differs by state and country. In this manual and other ES&S documentation, the entity is referred to as a precinct.

As a company with accounts across the country and around the world, ES&S recognizes that certain jurisdictions use terms other than precinct. Some examples of the terms used by other jurisdictions are Election District (or ED), Borough, Province, Division, and District. These terms and others may be substituted for precinct depending upon the particular jurisdiction. However, for consistency, ES&S uses the term precinct throughout its documentation.

ACRONYMS AND DEFINITIONS

Term	Definition
BMD	Ballot Marking Device
BOD	Ballot on Demand
CBT	Central Ballot Tabulator
CDMA	Code Division Multiple Access
EMS	Election Management System
ERM	Election Reporting Manager
GSM	Global System for Mobile Communications
PBT	Precinct Ballot Tabulator
SFTP	Secure File Transfer Protocol
Universal design	The design of a product to be useable by all people, that takes into account the full range of human diversity, including physical, perceptual and cognitive abilities, as well as different body sizes and shapes; "ExpressVote was designed with universal design principles applied to be usable by all voters, with or without a disability, without discrimination."
UVS	Universal Voting System

C. REFERENCES

ES&S considered the following documents and resources in the design and application of this voting system. The latest revisions apply.

Document Title	Description
Voting System Overview- ES&S Voting System 5.2.0.0	System Overview from the reference project.

D. ATTACHMENTS

The following items are included as attachments to this document. Although the original source files are separate documents, the content has been incorporated into this deliverable. All original source files are stored in the ES&S technical documentation repository. Printed copies of these items are considered out of date.

Attachment	Document ID
1. Voting System Limitations	EVS5203_D_D_0050_SysLimits
2. Voting System Configuration	EVS5203_CM_D_0100_ProjectConfig
3. Product Specification Sheets	ESSSYS_M_PSS01_ExpressVote_HWv.1.0 ESSSYS_M_PSS02_DS850 ESSSYS_M_PSS03_DS200 ESSSYS_M_PSS04_AutoMARK_HWv.1.0
4. System Diagrams	EVS5203_C_F_1050_Sys-SubSysDescription EVS5203_C_F_1060_OperationalEnvironment

ATTACHMENT 1: VOTING SYSTEM LIMITATIONS

VOTING SYSTEM LIMITATIONS

System Name	ES&S Voting System v.5.2.0.3
Manufacturer	Election Systems & Software, LLC

System characteristc	Boundary or limitation	Limiting system component	Notes or conditions
Max. precincts allowed in an election	At least 9900	ERM	
Max. count for any precinct element	500,000 (99,990 from any tabulator media)	ERM report (ERM results import)	
Max. candidates allowed per election	Depends on election content (limited by 21,000 maximum counters)	ERM	Calculation of the number of counters must include a minimum of 4 counters for each contest, 3 overhead (overvote, undervote, precincts counted) and at least 1 candidate. Additional contest candidates each add a counter. If some precincts are defined as Absentee, a fourth overhead counter (absentee precincts counted) must be added to each contest. The number of statistical counters (Ballots Cast, Registered voters) must be added to the contest counters to determine the total counters.
Max. contests allowed in an election	Depends on election content (limited by 21,000 maximum counters)	ERM	Example of maximum contest calculation 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 (counter limit – statistics x 2)/number of counters/contest = number of contests.
Max. counters allowed per precinct	Limits candidates and contests assigned to a precinct to 1,000	ERM	Contest counters are calculated as indicated for "Max candidates allowed per eleciton," 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.”
Max. contests allowed per ballot style	200 or # of positions on ballot	N/A	
Max. candidates (ballot choices) allowed per contest	175	ERM (database create)	
Max. number of parties allowed	General election: 75 Primary election: 20 (including nonpartisan party)	ERM (database create)	
Max. ‘vote for’ per contest	98	ERM (database create)	
Ballot formats	All paper ballots used in an election must be the same size and contain the same number of response rows.	Ballot scanning equipment	
Max. Ballot Styles	9900	ERM	
Max. District Types/Groups	20	ERM	
Max. districts of a given type	40		Excludes the ElectionWide Group which contains all precincts.
Supported Languages	• English • Spanish • Chinese • Korean • Japanese	System configuration	

END

COMPONENT LIMITATIONS

System Name	ES&S Voting System v. 5.2.0.3
Manufacturer	Election Systems & Software, LLC

Item Number	Limit
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 LIMITATIONS	
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 LIMITATIONS	
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.
ExpressVote LIMITATIONS	
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.
ELECTIONWARE LIMITATIONS	
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 the ElectionWare system.
2	Limits were calculated using default text sizes for ballot and report elements. Some uses and conditions, such as magnified ballot views or combining elements on printed media or ballot displays, may result in limits lower than those listed. Check printed media and displays before finalizing the election.
ELECTION REPORTING MANAGER LIMITATIONS	
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 XML results file out of ERM.
7	ERM's maximum page size for reports is 5,000 pages.

END

ELECTIONWARE FIELD LIMIT SPECIFICATION

ELECTIONWARE FIELD LIMIT SPECIFICATION	ES&S Voting System v. 5.2.0.3
Manufacturer	Election Systems & Software, LLC

Electionware Element	Limiting Component	Entry Length Warning Level	Component Limit	Device Screen or Report Containing the Electionware Element
Precinct Name	DS200	30	30	Precinct Selection screen - Character wraps on reports
Precinct ID	DS850	4	4	Clear Precinct Results
			28	Clear Precinct Results screen
			28	Confirmation screen
			20	Print Results Reports Screen
			29	Scan Ballots screen
			30	Search Precinct screen
			28	Select Precinct screen
Precinct Long Name	DS850	24	24	Select reports screen
			36	Select Precinct screen
			34	Select Precinct search screen
			42	Not Processed/Processed Reports
Poll Place Name	DS200	25	25	DS200 Screens and reports (characters wrap on reports)
Poll Place Short Name	DS850	23	23	All screen headers
Contest Title	DS200	40	40	Voter Exception Screens
	ERM	40	47	Screens and reports
Contest Short Name	DS200	40	255	Reports - characters wrap on report tape
Contest Long Name	DS850	39	39	Not Processed Batch/Bin Report (Long)/Processed with Write-ins Batch/Bin Report (Short)/Preview Screen
				Precinct by Precinct Detail Results Report/Precinct by Precinct Public Results Report/Preview Screen
				Processed with Write-ins Batch/Bin Report (Long) /Preview Screen
				Zero Report/ Election Detail Results Report/Election Public Results Report and Preview Screens
Candidate Short Name	DS200	48	48	Reports - additional characters truncate
Candidate Long Name	DS850	45	45	Precinct by Precinct Detail Results Report/Precinct by Precinct Public Results Report/Preview Screen
				Zero Report/ Election Detail Results Report

ELECTIONWARE FIELD LIMIT SPECIFICATION

ELECTIONWARE FIELD LIMIT SPECIFICATION	ES&S Voting System v. 5.2.0.3
Manufacturer	Election Systems & Software, LLC

Electionware Element	Limiting Component	Entry Length Warning Level	Component Limit	Device Screen or Report Containing the Electionware Element
Precinct Label	DS200	20	20	DS200 screens - entry limited to 20 characters
				DS200 Reports - entry limited to 20 characters
	DS850	20	20	Precinct by Precinct Detail Results Report/Precinct by Precinct Public Results Report/Preview Screen - entry limited to 20 characters
				Processed with Write-ins Batch/Bin Report (Long) /Preview Screen - entry limited to 20 characters
Election Name	DS200	25	255	DS200
	DS850	25	32	850 Load election
			124	Not Processed Batch/Bin Report (Long)/Processed with Write-ins Batch/Bin Report (Short) /Preview screen
			124	Not Processed Batch/Bin Report (Short)/Processed with Write-ins Batch/Bin Report (Short)/Processed Batch/Bin Report (Short) /Preview screen
			124	Precincts by Precinct Detail Results Report/Precinct by Precinct Public Results Report/Preview Screen
			124	Precincts Processed Report/Not Processed/Preview Screen
			124	Processed Batch/Bin Report (Long)
			124	Processed with Write-ins Batch/Bin Report (Long)/Preview screen
			79	System Readiness Report
			42	Title Bar
			124	Zero Report/Election Detail Results Report/Election Public Results Report and Preview screens
Election Short Name	DS200	25	25	All screens

ELECTIONWARE FIELD LIMIT SPECIFICATION

ELECTIONWARE FIELD LIMIT SPECIFICATION	ES&S Voting System v. 5.2.0.3
Manufacturer	Election Systems & Software, LLC

Electionware Element	Limiting Component	Entry Length Warning Level	Component Limit	Device Screen or Report Containing the Electionware Element
Jurisdiction Name	DS200	25	25	All screens
	DS850	25	127	Not Processed Batch/Bin Report (Long)/Processed with Write-ins Batch/Bin Report (Short)/Preview Screen
			127	Not Processed Batch/Bin Report (Short)/Processed with Write-ins Batch/Bin Report (Short)/Processed Batch/Bin Report (Short)/Preview Screen
			127	Precinct by Precinct Detail Results Report/Precinct by Precinct Public Results Report/Preview Screen
			127	Precinct by Precinct Detail Results Report/Precinct by Precinct Public Results Report and preview screen
			127	Precincts Processed Report/Not Processed Preview Screen
			127	Processed Batch/Bin Report (Long)
			127	Processed with Write-ins Batch/Bin Report (Long)
			127	Zero Report/Election Detail Results Report/Election Public Results Report and Preview Screen
Sheet Name	Electionware - Paper Ballot	30	30	Physical paper ballot.
Ballot Title Custom Text	Electionware - Paper Ballot	255	255	Physical paper ballot.
Graphic Image Path	Electionware - Paper Ballot	255	255	Physical paper ballot.
Text Item Name	Electionware - Paper Ballot	255	255	Physical paper ballot.
Question Row Name	Electionware - Paper Ballot	100	100	Physical paper ballot.

END

ATTACHMENT 2: VOTING SYSTEM SUMMARY

VOTING SYSTEM CONFIGURATION

System Name	ES&S Voting System v. 5.2.0.3
Manufacturer	Election Systems & Software, LLC
Voting System Test Lab	National Technical Systems
Requested Certification Number	N/A
Nature of the System	Modification of a previously certified system.
Reference Project (if modification from a previous system)	ES&S Voting System v. 5.0.0.0
Applicable Standards	VVSG 1.0
Certification Application Submission Date	12/13/2013
Supported Election Management System (EMS) PC Configurations	
Standalone - full support workstation or EMS network client	Full Election Management System (EMS) installation on a single, isolated workstation or EMS client on a closed network.
Standalone - reporting workstation	Results processing and reporting on a single, isolated workstation.
EMS Client Server	Windows 2008 server configured to support one or more client workstations.
Supported Reporting Configurations	
Standalone	Standalone isolated PCs used for election preparation and reporting.
EMS Client Server	A server is configured with a shared drive that contains the elections which is then accessed by a client PC that does the election reporting.
Included Voting System Equipment	
ExpressVote	Universal Precinct Voting Device
DS850	Central Scanner
DS200	Precinct Scanner
AutoMARK Voting Assist Terminal	Assistive Ballot Marking Device
Included Utilities	
ExpressPass	Standalone ExpressVote activation card printing utility. Includes on demand printing software that interfaces with supported electronic pollbooks to determine voter requirements and a standalone printer to print activation card configuration data.

END

VOTING SYSTEM CONFIGURATION

System Name	ES&S Voting System v. 5.2.0.3
Manufacturer	Election Systems & Software, LLC

ELECTION MANAGEMENT SYSTEM

Item Name	Manufacturer or Vendor	Model Number	Software/Firmware Version	Hardware Version or Revision	Range, Capacity or Value	Notes	Supported Configurations			
Election Management System Software							Standalone - Full Support or EMS Client	Standalone or Network Reporting	EMS Server	Network Results COM Server
Windows 7 Professional	Microsoft Corporation	N/A	64-bit, SP-1	N/A	N/A	Operating System for standalone and client workstations	●			
Windows Server 2008 R2	Microsoft Corporation	N/A	SP-1	N/A	N/A	Operating System for EMS and results servers		●		
Microsoft Patches (WSUS Offline Utility)	Microsoft Corporation	N/A	8.8	N/A	N/A	Software updates (Update utility)	●	●		
RM/Cobol Runtime	Microfocus	N/A	12.06	N/A	N/A	COBOL runtime	●	●		
Symantec Endpoint Protection - Small Business Edition 2013	Symantec	N/A	12.1.4 (64-bit)	N/A	N/A	Anti-Virus	●	●		
Removable Media Service (RMS)	ES&S	N/A	1.4.5.0	N/A	N/A	Service supporting election media programming	●			
Event Log Service (ELS)	ES&S	N/A	1.5.5.0	N/A	N/A	Service supporting election media programming	●			
Electionware - Client	ES&S	N/A	4.6.1.0	N/A	N/A	Election database creation, media programming and ballot image management	●			
Electionware - Server	ES&S	N/A	4.6.1.0	N/A	N/A	EMS Server support	● (Standalone only)	●		
ExpressVote Previewer	ES&S	N/A	1.4.0.0	N/A	N/A	Ballot preview for accessible voting equipment.	●			
VAT Preview	ES&S	N/A	1.8.6.0	N/A	N/A	Ballot preview for accessible voting equipment.	●			
Adobe Acrobat Standard	Adobe	N/A	XI	N/A	N/A	Desktop publishing software	●			
Election Reporting Manager	ES&S	N/A	8.11.1.0	N/A	N/A	Election Reporting Software	●			
Cerberus FTP	Cerberus	N/A	6.0.7.1	N/A	N/A	File transfer server for or precinct results network.			●	●
Utilities							ExpressPass Activation Card Printing			
Windows 7 Professional	Microsoft Corporation	N/A	64-bit, SP-1	N/A	N/A	Operating System for standalone and client workstations.	●			
Microsoft Patches (WSUS Offline Utility)	Microsoft Corporation	N/A	8.8	N/A	N/A	Software updates (Update utility)	●			
ExpressPass	ES&S	N/A	1.1.0.0	N/A	N/A	ExpressVote card printing utility.	●			
ExpressPass Printer	ES&S	N/A	N/A	1.0	N/A	Supports on demand printing of ExpressVote Activation Cards				
Election Management System PC Workstation Requirements - Minimum Configuration							Standalone - Full Support or EMS Client	Standalone - Reporting		
Processor	N/A	N/A	N/A	N/A	Dual Core (min.)	N/A	●	●		
RAM	N/A	N/A	N/A	N/A	4 GB (min.), 8 GB recommended	N/A	●	●		
Hard Disk	N/A	N/A	N/A	N/A	150 GB (min.)	N/A	●	●		
Keyboard	N/A	N/A	N/A	N/A	N/A	N/A	●	●		
Mouse	N/A	N/A	N/A	N/A	N/A	N/A	●	●		
Monitor	N/A	N/A	N/A	N/A	1280x800 min. resolution (min.)	N/A	●	●		
CD/DVD reader	N/A	N/A	N/A	N/A	16x(min.)	N/A	●	●		
USB Ports	N/A	N/A	N/A	N/A	x2 USB 2.0 (min.)	N/A	●	●		

VOTING SYSTEM CONFIGURATION

System Name	ES&S Voting System v. 5.2.0.3
Manufacturer	Election Systems & Software, LLC

Item Name	Manufacturer or Vendor	Model Number	Software/Firmware Version	Hardware Version or Revision	Range, Capacity or Value	Notes	Supported Configurations	
Report Printer	N/A	N/A	N/A	N/A	Network Printer w/Printer Control Language (PCL) driver	N/A	●	●
Ethernet Port	N/A	N/A	N/A	N/A	Network port	N/A	●	●
Election Management System Server Requirements - Minimum Configuration							**EMS Server**	
Processor	N/A	N/A	N/A	N/A	Quad Core (min.)	N/A	●	
RAM	N/A	N/A	N/A	N/A	4 GB (min.)	N/A	●	
Hard Disk	N/A	N/A	N/A	N/A	320 GB (min.)	N/A	●	
Keyboard	N/A	N/A	N/A	N/A	N/A	N/A	●	
Mouse	N/A	N/A	N/A	N/A	N/A	N/A	●	
Monitor	N/A	N/A	N/A	N/A	1280x800 min. resolution (min.)	N/A	●	
CD/DVD reader	N/A	N/A	N/A	N/A	16x(min.)	N/A	●	
USB Ports	N/A	N/A	N/A	N/A	x2 USB 2.0 (min.)	N/A	●	
Report Printer	N/A	N/A	N/A	N/A	Network Printer w/Printer Control Language (PCL) driver	N/A	●	
Ethernet Port	N/A	N/A	N/A	N/A	Network port	N/A	●	
Back up power supply (Universal Power Supply)	N/A	N/A	N/A	N/A	865 Watts / 1500 VA output capacity	N/A	●	
Network Switch	N/A	N/A	N/A	N/A	1 GB throughput required	N/A	●	
System Utilities PC Requirements - Minimum Configuration							**ExpressPass Activation Card Printing**	
Processor	N/A	N/A	N/A	N/A	Dual Core (min.)	N/A	●	
RAM	N/A	N/A	N/A	N/A	4 GB (min.)	N/A	●	
Hard Disk	N/A	N/A	N/A	N/A	150 GB (min.)	N/A	●	
Keyboard	N/A	N/A	N/A	N/A	N/A	N/A	●	
Mouse	N/A	N/A	N/A	N/A	N/A	N/A	●	
Monitor	N/A	N/A	N/A	N/A	1280x800 min. resolution (min.)	N/A	●	
CD/DVD reader	N/A	N/A	N/A	N/A	16x(min.)	N/A	●	
USB Ports	N/A	N/A	N/A	N/A	x2 USB 2.0 (min.)	N/A	●	
Report Printer	N/A	N/A	N/A	N/A	Network Printer w/Printer Control Language (PCL) driver	N/A	●	
Ethernet Port	N/A	N/A	N/A	N/A	Network port	N/A	●	
VOTING SYSTEM EQUIPMENT								
ExpressVote							**All Configurations**	
System Firmware	ES&S	N/A	1.4.0.0	1.0	N/A	Operating firmware for voting equipment and as built hardware configuration	●	
DetachableKeyBoard.S19	ES&S	N/A	1.0.0.0	N/A	N/A	Board firmware for optional detachable keyboard	●	
InputOutputBoard.S19	ES&S	N/A	1.1.0.0	N/A	N/A	Board firmware for the input/output board	●	
ScannerPrinterEngine.S19	ES&S	N/A	1.1.0.0	N/A	N/A	Board firmware for Scanner/Printer board	●	
USB Memory Stick	Delkin	N/A	N/A	N/A	512 MB 1 GB 2 GB 4 GB 8 GB	Storage for election and ballot definition	●	
Headphones	AVID	86002	N/A	N/A	115dB, 200mW	Stock headphones	●	

VOTING SYSTEM CONFIGURATION

System Name	ES&S Voting System v. 5.2.0.3
Manufacturer	Election Systems & Software, LLC

Item Name	Manufacturer or Vendor	Model Number	Software/Firmware Version	Hardware Version or Revision	Range, Capacity or Value	Notes	Supported Configurations
DS200 Precinct Ballot Scanner							**All Configurations**
System Firmware	ES&S	N/A	2.12.0.0	1.2 1.2.3.0 1.3	N/A	Operating firmware for precinct ballot scanner and as built hardware configuration	●
Scanner Firmware (Scanner_C8051)	ES&S	N/A	3.1.0.0	N/A	N/A	Board level firmware for the DS200 scanner board.	●
Power Management Firmware	ES&S	N/A	1.2.14.0	N/A	N/A	Board level firmware for the DS200 power board.	●
Compact Flash Memory Card	Delkin	N/A	N/A	N/A	1 GB (max.)	Internal Flash Memory.	●
USB Memory Stick	Delkin	N/A	N/A	N/A	1 GB 2 GB 4 GB 8 GB	Election configuration and results storage.	●
Plastic ballot box	ES&S	N/A	N/A	1.2 1.3	N/A	Cast ballot container	●
Metal ballot box	ES&S	N/A	N/A	1.0 1.1 1.2	N/A	Cast ballot container	●
DS850 Central Ballot Scanner							**All Configurations**
System Firmware	ES&S	N/A	2.10.0.0	1.0	N/A	Operating firmware for ballot scanner and as built hardware configuration.	●
Compact Flash Memory Card	Delkin	N/A	N/A	N/A	1 GB (max.)	Internal Flash Memory.	●
USB Memory Stick	Delkin	N/A	N/A	N/A	512 MB 1 GB 2 GB 4 GB 8 GB	Election configuration and results storage.	●
Report Printer	OKI	430DN 431DN	N/A	N/A	N/A	Report printer - laser printer	●
Audit Printer	OKI	Microline 420	N/A	N/A	N/A	Dot matrix continuous audit printer	●
ES&S AutoMARK Voting Assist Terminal							**All Configurations**
System Firmware	ES&S	N/A	1.8.6.0	A100 A200 A300	N/A	Operating firmware for voting equipment and as built hardware configuration	●
Printer Engine Board (PEB)	ES&S	N/A	1.70	N/A	N/A	As built system hardware configuration.	●
Scanner Interface Board	ES&S	N/A	1.43	N/A	N/A	Board firmware for the AutoMARK scanner board	●
Ultra	ES&S	N/A	8.0.1	N/A	N/A	Board firmware for the AutoMARK Ultrasonic sheet detector	●
WinCE	Microsoft Corporation	N/A	5.00.20	N/A	N/A	Operating system	●
Compact Flash Memory Card	Toshiba	N/A	N/A	N/A	512 KB 1 GB 2 GB	Storage for election and ballot definition	●
Compact Flash Memory Card	SanDisk	N/A	N/A	N/A	512 KB 1 GB 2 GB	Storage for election and ballot definition	●
Headphones	AVID	86002	N/A	N/A	N/A	Stock headphones	●

END

BENCHMARK INSTALL LOCATIONS

System Name	ES&S Voting System v. 5.2.0.3
Manufacturer	Election Systems & Software, LLC

Install Order	Item Name	Benchmark Install Location	Notes	Supported Configurations		
ELECTION MANAGEMENT SYSTEM						
Election Management System Software				**Standalone - Full Support**	**EMS Client Workstation**	**EMS Server**
1	Windows 7 Professional, with SP1	Default		●	●	
2	Windows Server 2008 R2, with SP1	Default				●
3	Symantec Endpoint Protection - Small Business Edition 2013	C:\Program Files (x86)\Symantec\Symantec Endpoint Protection		●	●	●
4	Cerberus FTP	C:\Program Files\Cerberus LLC\Cerberus FTP Server\	(installed on the central count EMS server for the DS850 results network)			●
6	Adobe Acrobat Standard version 11.0	C:\Program Files (x86)\Adobe\Acrobat 11.0		●	●	
7	RM/Cobol 12.06	C:\Program Files (x86)\LIANT\RMCOBOLv12		●	●	●
8	ES&S Event Log Service	C:\Program Files (x86)\Election Systems And Software\Event Log Service		●	●	
9	Removable Media Service	C:\Program Files (x86)\Election Systems And Software\Removable Media Service		●	●	
10	Election Reporting Manager (ERM)	C:\apps\ess\urs		●	●	
11	VAT Preview	C:\Program Files (x86)\AutoMARK		●		
12	ExpressVote Previewer	C:\Program Files (x86)\Election Systems And Software\ExpressVotePreviewer		●		
13	Electionware – Server	C:\ Election Systems And Software\Electionware		●		●
14	Electionware - Client	C:\Program Files (x86)\Election Systems And Software\Electionware		●	●	
ExpressPass				**ExpressPass Activation Card Printing**		
1	Windows 7 Professional, with SP1	Default		●		
2	Symantec Endpoint Protection - Small Business Edition 2013	C:\Program Files (x86)\Symantec\Symantec Endpoint Protection		●		
3	ExpressPass	C:\Program Files (x86)\Election Systems And Software\Activation Card Printer		●		

END

ATTACHMENT 3: PRODUCT SPECIFICATION SHEETS

SPECIFICATIONS

Performance

- **System Activation Time:** approx. 4 seconds after card insertion.
- **Card Marking Speed:** approx. 8 seconds.
- **Estimated Time to Complete Voting:** between 1 to 3.5 minutes.
- **Election Media Capacity:** 512 KB standard, 8 GB maximum USB stick.
- **Maximum Ballot Styles:** 6,400

Target Capacity

Activation Card Length	Number of Selections
11”	34
14"	46
17"	58
19"	67

Quality Attributes

- **Reliability:** Mean time before failure (MTBF) exceeds 163 hours
- **Maintainability:** Likelihood unscheduled corrective action will require more than 30 minutes to complete: estimated <5%
- **Target Maintenance Ratio (MR):** Maintenance Hours/Operating Hours = estimated 0.25 MR

Safety

- Hardware design ensures that both operator and voter are protected from exposure to dangerous voltages, overheating and fire, sharp corners, and other possible hazards.
- System quality assurance procedures ensure that defects in design and construction that can result in personal injury or equipment damage are detected and corrected before voting systems and components are placed into service.
- Meets or exceeds applicable requirements of the Occupational Safety and Health Act, Code of Federal Regulations, Title 29, Part 1910.

Security

- Operating Software provides security access controls to limit or detect access to critical system components and to guard against loss of system integrity, availability, confidentiality, and accountability.
- System functions are only executable in the manner and order intended, and only under the intended conditions.
- Hardware is designed to protect against tampering during system repair, or interventions in system operations, in response to system failure.
- System access during equipment preparation, testing and operation is limited by physical locks and access code.
- Security safeguards cannot be bypassed or deactivated during system installation or operation.

Privacy

- Privacy shield protects the secrecy of voter selections.
- Screen can be deactivated while voting an audio election to protect the selections of voters with low or no vision.

Environmental

- **Unit Size – in use (WxDxH):** 19”x5.5”x17” (48.26 cm x14 cm x43 cm)
- **Unit Size – stowed for transport or storage (WxDxH):** 22.5”x17”x11” (57 cm x43 cm x28 cm)
- **Unit Weight:** <20 lbs (9 kg)

Backup

- **Battery Type:** Lithium-ion, 18 V, 4,300 mAh.
- **Backup Time:** More than 2 hours of standard use.[1]

Supplies

- **Memory Devices:** Delkin 512 MB, 1 GB, 2 GB, 4 GB, 8 GB
- **Headphones:** AVID 3.5mm headphones

Connectivity

- **Network Connection:** (1x) Ethernet for future expandability.
- **Local Ports:** (3x) USB, (1x) 3.5mm headphone jack, (1x) accessible device port.

Applicable Standards

- *EAC 2005 Voluntary Voting System Guidelines (VVSG 1.0)*
- *National Election Code Standards*
- *Americans with Disabilities Act*

Specifications are subject to change without notice.

[1] Estimated 8 voting sessions per hour

ELECTION SYSTEMS & SOFTWARE, LLC

USA
11208 John Galt Blvd
Omaha, NE 68137
Toll Free: 800.247.8683

CANADA
1200 West 73rd Ave
Suite 350
Vancouver, BC V6P 6G5
Phone: 604.261.6313, x129

VOTER REGISTRATION
11208 John Galt Blvd
Omaha, NE 68137
Toll Free: 800.247.8683
Phone: 402.970.1220

SPECIFICATIONS

Performance

- **Expected Speed:** 365 11-inch ballots per minute or 235 19-inch ballots per minute. Approx. 8640 11-inch ballots/hour or 7200 19-inch ballots per hour.[1]
- **Maximum Speed:** Optimal test speed is Approx. 11,500 11" ballots/hour or 8870 19" ballots per hour.[2]
- **Hopper Capacity:** Input Hopper: 480 standard sized ballots Output Hopper: 480 standard sized ballots, Outstack Hoppers: 150 standard size ballots.
- **Memory:** 1 TB HDD holds Approx. 5 million ballot images and related data.
- **Maximum Ballot Styles:** 9990 precincts, 40 ballot styles per precinct in a ballots by style election.
- **Processing Frequency:** Between 14 and 18 full size batches per hour for 19" and 11" ballots, respectively.

Ballot Target Capacity

Ballot Size	Targets Per Inch	Max Ballot Targets
8 1/2 X 11"	4	912/side
	5	1200/side
8 1/2 X 14"	3	984/side
	4	1200/side
	5	1560/side
8 1/2 X 17"	3	1200/side
	4	1488/side
	5	1944/side
8 1/2 x 19"	3	1344/side
	4	1680/side
	5	2184/side

Quality Attributes

- **Reliability:** Mean time before failure (MTBF) exceeds 163 hours
- **Maintainability:** Likelihood unscheduled corrective action will require more than 30 minutes to complete:<5%
- **Target Maintenance Ratio (MR):** Maintenance Hours/Operating Hours = 0.25 MR

Safety

- Protective guards around all rollers and diverters (flippers) to reduce pinch hazards.
- Safety Interlocks that disable the transport if either the camera or rear access panel are opened.
- Protective covers of the all power supplies.
- Lift assist cylinders on the camera lid and rear access panel to prevent these from dropping on the user.
- A stepper motor driven transport which more quickly detects jam situations and quickly brings the transport to a safe stop.
- Large carrying handles for lifting and positioning the machine.
- Skid-resistant pads to keep unit from moving during operation.

Security

- Lockable, sealable, clear-view access doors for all ports, as well as the power switch and cord connection.
- System functions will not execute if improperly configured.
- Pass code protection for all critical functions, including Election Administration, Processing Modes, System and Hardware Maintenance, and Results functions.
- Supervisor functions are limited to the controls provided in the system menus.
- Digital Signature and password security provides a high level of security on data transferred between Election Management Software and the DS850.
- The DS850 requires the retention of paper ballots and proper election procedures by election officials as a redundant means of providing system security.

Privacy

- N/A – Central Count

Environmental

- **Size (WxDxH):** 41"x18"x37"

(104 cm x46 cm x94 cm)

- **Weight:** Approx. 200 lbs (91 kg)

Backup

- **Battery Type:** N/A
- **Backup Time:** N/A
- Uninterruptable Power Supply (UPS) provides power to complete any interrupted run, save data, initiate a controlled shutdown, disposition the data on re-start. A backup generator is required for extended backup support.

Supplies

- **Memory Devices:** Delkin 512 MB, 1 GB, 2 GB, 4 GB, 8 GB
- **Report Printer:** OKI 431DN Laser Report Printer
- **Audit Printer:** OKI Microline 420 Dot Matrix Printer

Connectivity

- **Network Connection:** Local Ethernet for connection to a central reporting PC.
- **Local Ports:** (8x) High Speed USB 2.0.

Applicable Standards

- *EAC 2005 Voluntary Voting System Guidelines (VVSG 1.0)*
- *AIS Election Programming System Handbook*
- *AIS Ballot Production Manual*
- *AIS EPS file format documents*
- *Performance and Test Standards for Punch Card, Marksense and Direct Recording Electronic Systems*
- *Technical Support Inc. 'C' Programming Guidelines*
- *Linux System Architecture*

Specifications are subject to change without notice.

[1] Assuming 60 seconds for loading and unloading ballot batches.

[2] "Maximum Speed" based on a test environment with jogged, non-folded ballots in full-size batches and 3 users prepping, running and removing the ballots, as well as no jams or misfeeds.

ELECTION SYSTEMS & SOFTWARE, LLC

USA
11208 John Galt Blvd
Omaha, NE 68137
Toll Free: 800.247.8683

CANADA
1200 West 73rd Ave
Suite 350
Vancouver, BC V6P 6G5
Phone: 604.261.6313, x129

VOTER REGISTRATION
11208 John Galt Blvd
Omaha, NE 68137
Toll Free: 800.247.8683
Phone: 402.970.1220

Election Systems & Software
MAINTAINING VOTER CONFIDENCE. ENHANCING THE VOTING EXPERIENCE.

DS200

SPECIFICATIONS

Performance

- **Expected Speed:** 2 to 3 voters per minute. Approx. 2,300 ballots per terminal over the course of a 15-hour counting period.[1]
- **Maximum Speed:** 5 ballots per minute. 153 ballots per hour. Approx 2300 ballots for a 15-hour day.[2]
- **Ballot Box Capacity:** 2,800 14-inch paper ballots.
- **USB Memory Capacity:** 1 GB standard, 8 GB maximum. The number of ballot records within capacity depends on the size of the election.
- **Maximum Ballot Styles:** 9,990 precincts, 40 ballot styles per precinct in a ballot's by style election.
- **Processing Frequency:** Approx. 20 seconds per voter.

Ballot Target Capacity

Ballot Size	Targets Per Inch	Max Ballot Targets
8 1/2 X 11"	4	912/side
	5	1200/side
8 1/2 X 14"	3	984/side
	4	1200/side
	5	1560/side
8 1/2 X 17"	3	1200/side
	4	1488/side
	5	1944/side
8 1/2 x 19"	3	1344/side
	4	1680/side
	5	2184/side

Quality Attributes

- **Reliability:** Mean time before failure (MTBF) exceeds 163 hours
- **Maintainability:** Likelihood unscheduled corrective action will require more than 30 minutes to complete:<5%
- **Target Maintenance Ratio (MR):** Maintenance Hours/Operating Hours = 0.25 MR

Safety

- Rounded edges on all exposed plastic surfaces.
- No sharp edges or metal exposure.
- External power supply minimizes exposure to shock.
- Once secured to the ballot box, the DS200 cannot be moved.

Security

- Locking front panel prevents access to the scanner, ballot box and USB Flash Drive that contains election programming.
- System functions will not execute if improperly configured.
- Locked panel secures the operating mode controls during voting.
- The election definition or system firmware cannot be overwritten once a precinct official installs the election program.
- Supervisor functions limited to the controls provided in the system menus.
- Digital Signature and password security provides a high level of security on data transferred between Election Management Software and the DS200.
- The DS200 requires the retention of paper ballots and proper election procedures by election officials as a redundant means of providing system security.

Privacy

- Secure voting booths with privacy screens are available from ES&S.
- If a voter selects more than the allowed number of candidates in a contest, the DS200 returns the ballot to the voter for revision.
- Once a voter confirms selections, the DS200 deposits the counted ballot in a secure, locked ballot box.

Environmental

Component	Size (WxDxH)	Weight
DS200	14"x16"x5.5" (36 x41x14 cm)	23 lbs
Carrying Case	27"x24"x8" (57 x43 x28 cm)	29 lbs
Ballot Bin w/Plastic Doors and Base Plate	36 ¼"x24"x26" (92 x61x66 cm)	41 lbs.
Ballot Bin w/Metal Doors and Base Plate	36 ¼"x24"x26" (92 x61x66 cm)	45 lbs.

Backup

- **Battery Type:** Lithium-ion, 18 V, 4300mAh or 18.5 V, 4400 mAh
- **Backup Time:** More than 2 hours of continuous use on full charge.

Supplies

- **Memory Devices: USB:** Delkin 512 MB, 1 GB, 2 GB, 4 GB, and 8 GB. **Compact Flash Card:** Delkin, 1 GB
- **Marking Device:** BIC Grip Roller ball pen (.7mm) - **Part# 6100**
- **Integrated Printer:** Seiko Thermal Printer LTPV-345

Connectivity

- **Local Ports:** (5x) High Speed USB 2.0, (1x) RJ-11 network port

Applicable Standards

- *EAC 2005 Voluntary Voting System Guidelines (VVSG 1.0)*
- *AIS Election Programming System Handbook*
- *AIS Ballot Production Manual*
- *AIS EPS file format documents*
- *Performance and Test Standards for Punch Card, Marksense and Direct Recording Electronic Systems*
- *Technical Support Inc. 'C' Programming Guidelines*
- *Linux System Architecture*

Specifications are subject to change without notice.

[1] Estimated maximum throughput in a real world environment – where mismarked, torn or folded ballots are occasionally rejected.

[2] Maximum throughput in a test environment with a single user feeding ballots into the machine with no rejections.

ELECTION SYSTEMS & SOFTWARE, LLC

USA
11208 John Galt Blvd
Omaha, NE 68137
Toll Free: 800.247.8683

CANADA
1200 West 73rd Ave
Suite 350
Vancouver, BC V6P 6G5
Phone: 604.261.6313, x129

VOTER REGISTRATION
11208 John Galt Blvd
Omaha, NE 68137
Toll Free: 800.247.8683
Phone: 402.970.1220

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AutoMARK

SPECIFICATIONS

Performance

- **Expected Speed:** Estimated 1.5 minutes for a sighted voter or 2.5 minutes for a voter with low or no vision.
- **Maximum Ballot Marking Speed:** 2.5 minutes per ballot.[1]
- **Throughput Capacity:** N/A. The AutoMARK processes a single ballot at a time.
- **CF Card Memory Capacity:** 512 KB standard, 2 GB maximum.
- **Maximum Ballot Styles:** 6,400
- **Processing Frequency:** 1-20 minutes per voter. Estimated average is 8 ballots per hour.

Ballot Target Capacity

Ballot Size	Targets Per Inch	Max Ballot Targets
8 1/2 X 11"	4	912/side
	5	1200/side
8 1/2 X 14"	3	984/side
	4	1200/side
	5	1560/side
8 1/2 X 17"	3	1200/side
	4	1488/side
	5	1944/side
8 1/2 x 19"	3	1344/side
	4	1680/side
	5	2184/side

Quality Attributes

- **Reliability:** Mean time before failure (MTBF) exceeds 163 hours
- **Maintainability:** Likelihood unscheduled corrective action will require more than 30 minutes to complete:<5%
- **Target Maintenance Ratio (MR):** Maintenance Hours/Operating Hours = 0.25 MR

Safety

- Hardware design ensures that both operator and voter are protected from exposure to dangerous voltages, overheating and fire, sharp corners, and other possible hazards.
- System quality assurance procedures ensure that defects in design and construction that can result in personal injury or equipment damage are detected and corrected before voting systems and components are placed into service.
- Meets or exceeds applicable requirements of the Occupational Safety and Health Act, Code of Federal Regulations, Title 29, Part 1910.

Security

- Operating Software provides security access controls to limit or detect access to critical system components and to guard against loss of system integrity, availability, confidentiality, and accountability.
- System functions are only executable in the manner and order intended, and only under the intended conditions.
- Control logic prevents ballot marking if any preconditions to this function have not been met.
- Hardware is designed to protect against tampering during system repair, or interventions in system operations, in response to system failure.
- System access during equipment preparation, testing and operation is limited by access code.
- Security safeguards cannot be bypassed or deactivated during system installation or operation by the user.

Privacy

- Available privacy shield and AutoMARK table provides a private and secure voting environment.
- An optional ballot transport sleeve hides the ballot during transfer between the marking device and tabulator.

Environmental

- **Unit Size – in use (WxDxH):** 20.8”x26.0”x17.6” (36 cm x41 cm x13 cm)
- **Unit Size – configured for transport or storage (WxDxH):** 20.8”x26.0”x7.5” (36 cm x41 cm x13 cm)
- **Unit Weight:** 48 lbs (11 kg)

Backup

- **Battery Type:** Lithium-ion, 7.4 V, 11,000 mAh.
- **Backup Time:** More than 2 hours of standard use.[2]

Supplies

- **Memory Devices:** Compact Flash Card: Toshiba or Delkin, 1 GB
- **Headphones:** AVID 3.5mm headphones
- **Print Cartridge:** HP Inkjet **ES&S part #87002**

Connectivity

- **Network Connection:** N/A
- **Local Ports:** (1x) Standard Compact Flash Card, (1x) 3.5mm headphone port, (1x) ¼” headphone port, (1x) 3.5mm accessibility device port, (1x) 1-way USB port for hash validation (NY only).

Applicable Standards

- *EAC 2005 Voluntary Voting System Guidelines (VVSG 1.0)*
- *National Election Code Standards*
- *Americans with Disabilities Act*
- *AutoMARK Operating Manuals*
- *AutoMARK System Functionality Description*

Specifications are subject to change without notice.

[1] Filling all voting positions.

[2] 8 voting sessions per hour with the spit and wipe feature deactivated

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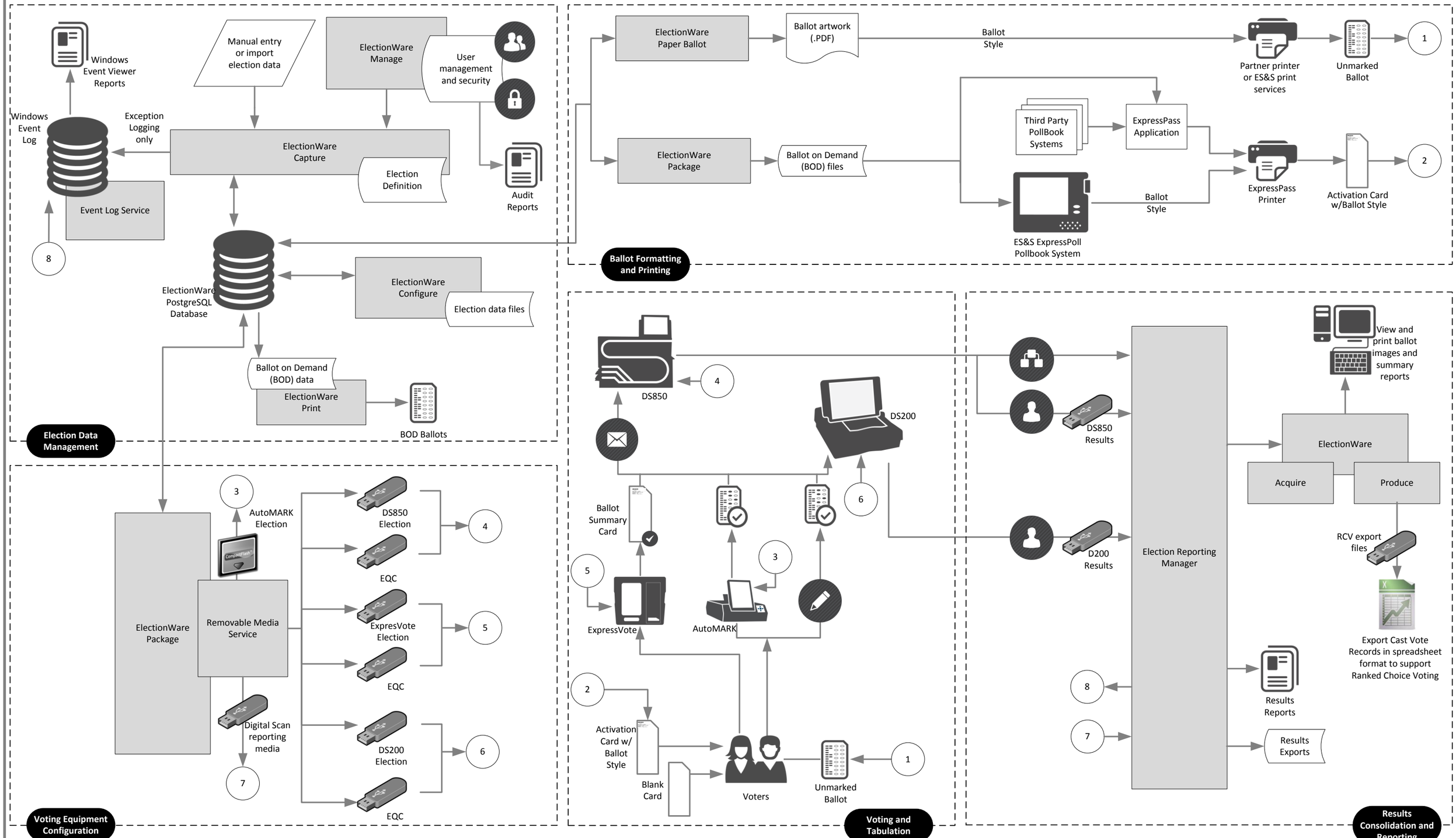
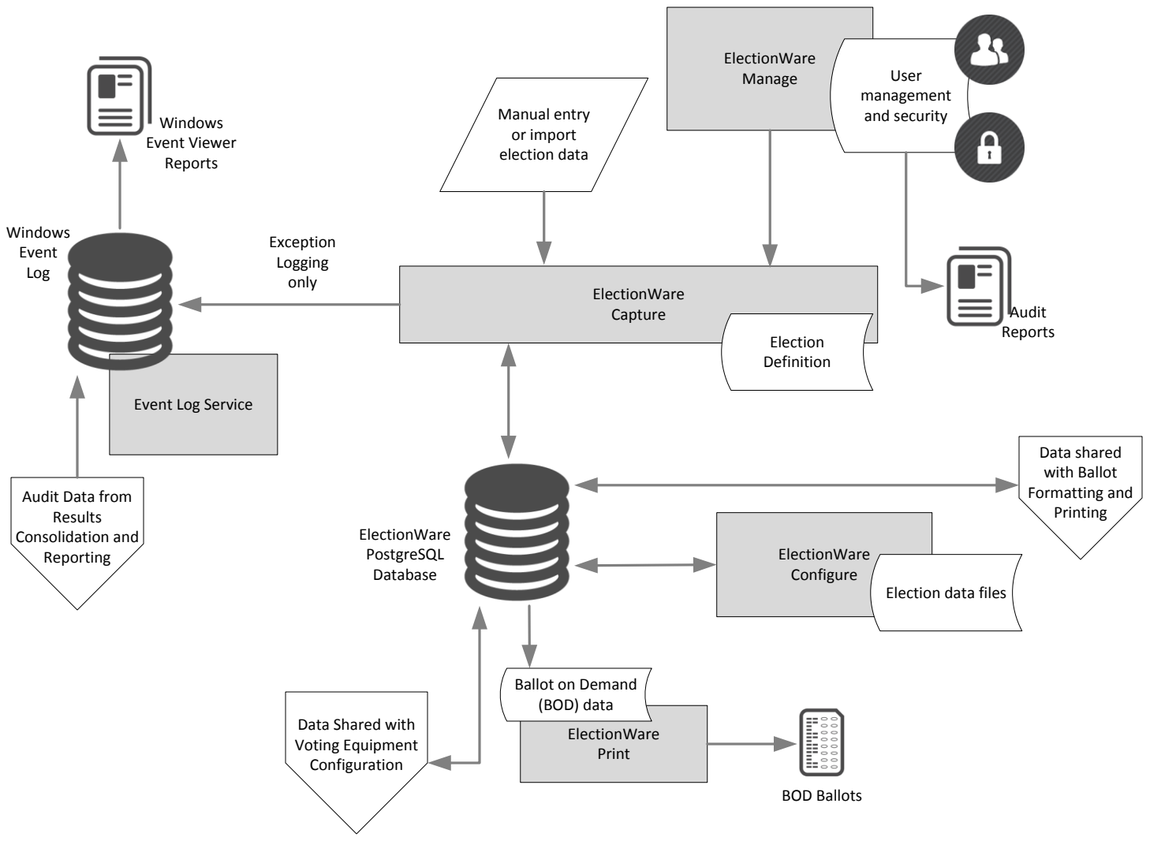
ATTACHMENT 4: SYSTEM DIAGRAMS

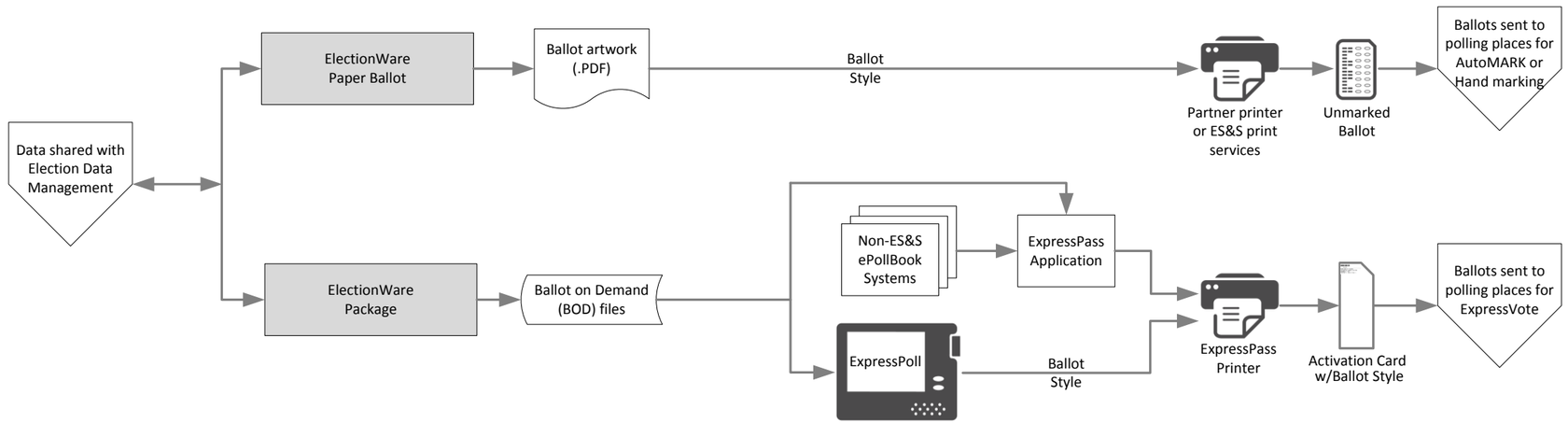
Election Systems & Software: EVS 5.2.0.3 - System Configuration

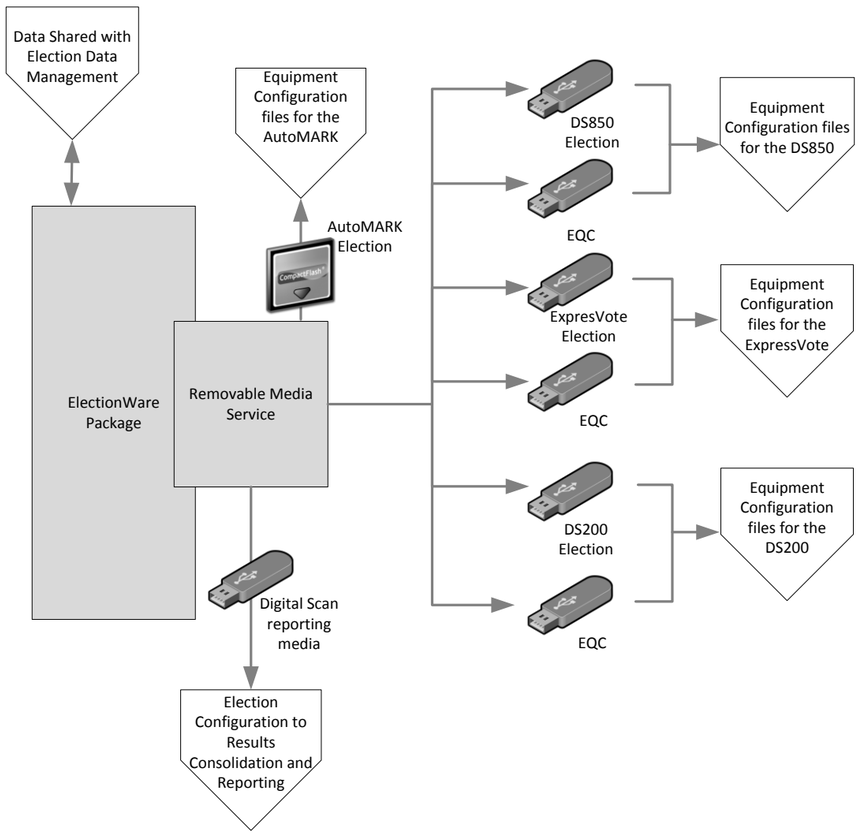
Rev. 1.0 | Dept. Certification | Date: 06.26.2015

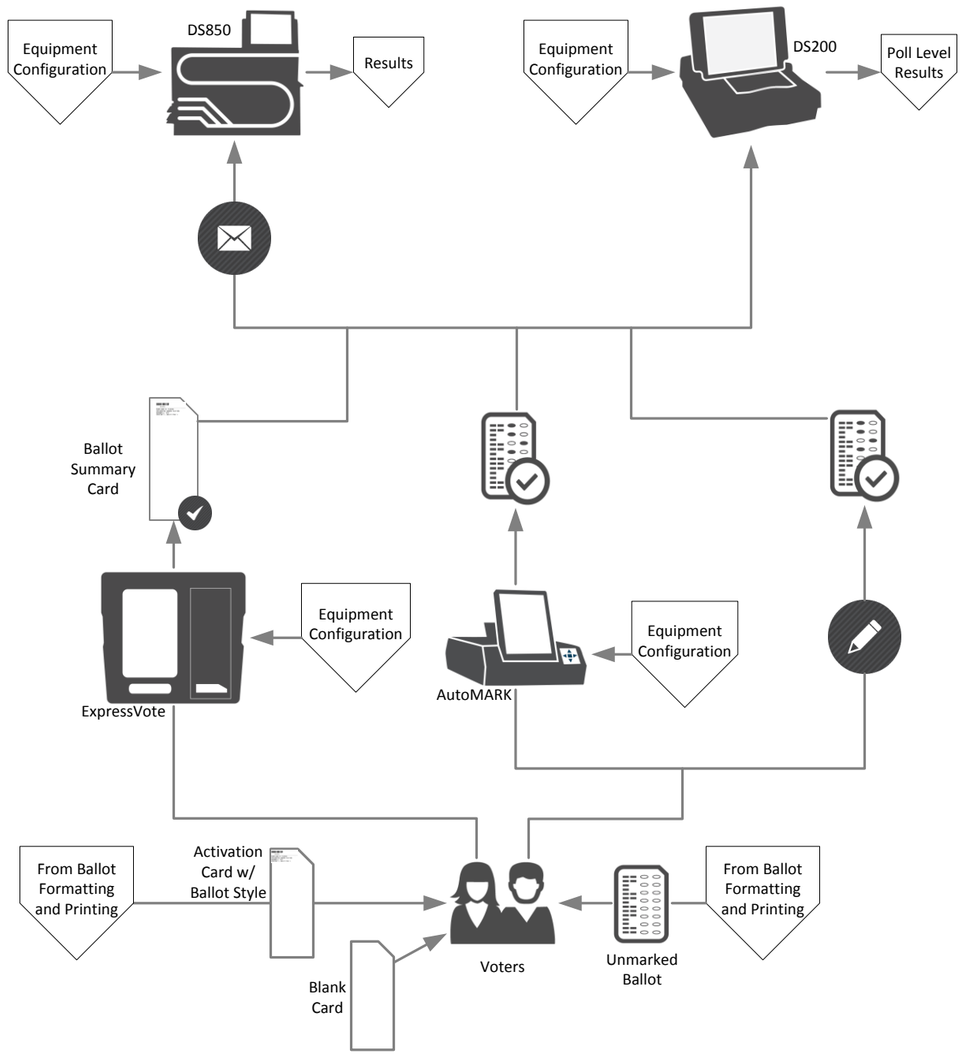


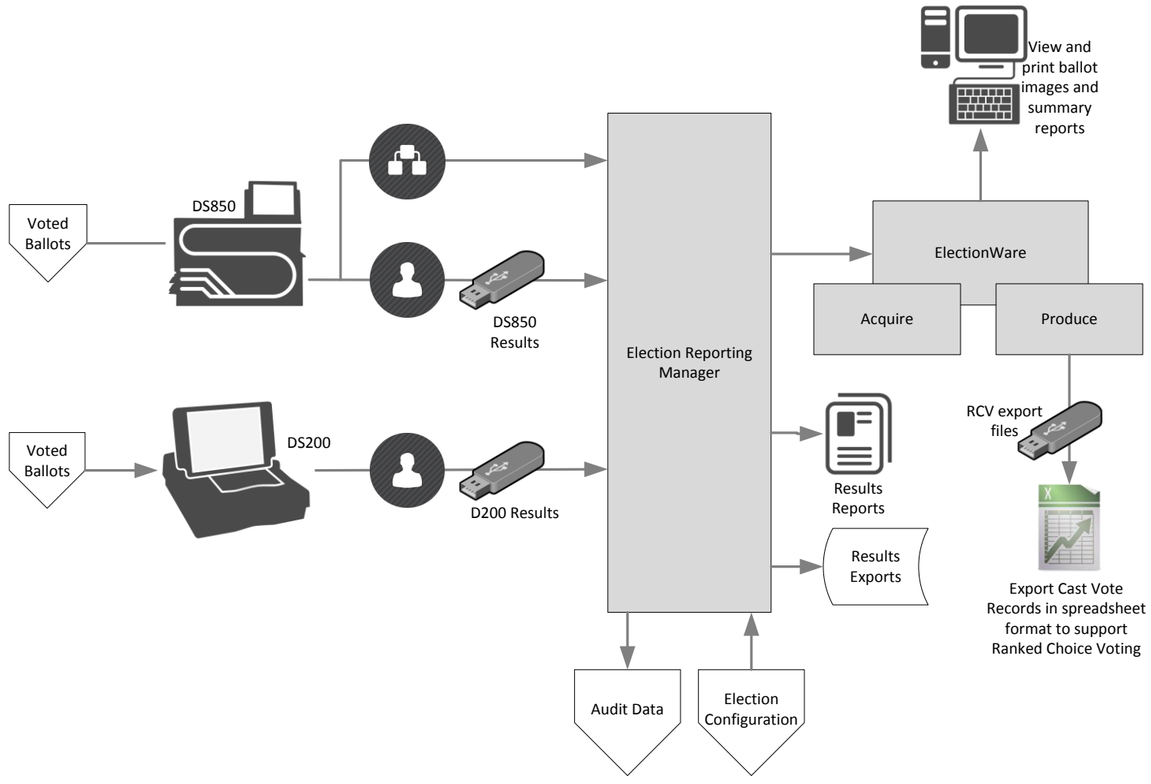
Attachment 4: EVS5203_C_F_1050_Sys-SubSysDescription


Windows Event Viewer Reports
Windows Event Log
Exception Logging only
Manual entry or import election data
ElectionWare Manage
User management and security
ElectionWare Capture
Election Definition
Audit Reports
Event Log Service
Audit Data from Results Consolidation and Reporting
ElectionWare PostgreSQL Database
Data shared with Ballot Formatting and Printing
ElectionWare Configure
Election data files
Ballot on Demand (BOD) data
Data Shared with Voting Equipment Configuration
ElectionWare Print
BOD Ballots


Data shared with Election Data Management
ElectionWare Paper Ballot
Ballot artwork (.PDF)
Ballot Style
Partner printer or ES&S print services
Unmarked Ballot
Ballots sent to polling places for AutoMARK or Hand marking
ElectionWare Package
Ballot on Demand (BOD) files
Non-ES&S ePollBook Systems
ExpressPass Application
ExpressPoll
Ballot Style
ExpressPass Printer
Activation Card w/Ballot Style
Ballots sent to polling places for ExpressVote


Data Shared with Election Data Management
Equipment Configuration files for the AutoMARK
AutoMARK Election
ElectionWare Package
Removable Media Service
Digital Scan reporting media
Election Configuration to Results Consolidation and Reporting
DS850 Election
EQC
Equipment Configuration files for the DS850
ExpresVote Election
EQC
Equipment Configuration files for the ExpressVote
DS200 Election
EQC
Equipment Configuration files for the DS200


Equipment Configuration
DS850
Results
Equipment Configuration
DS200
Poll Level Results
Ballot Summary Card
Equipment Configuration
ExpressVote
AutoMARK
Equipment Configuration
From Ballot Formatting and Printing
Activation Card w/ Ballot Style
Blank Card
Voters
Unmarked Ballot
From Ballot Formatting and Printing

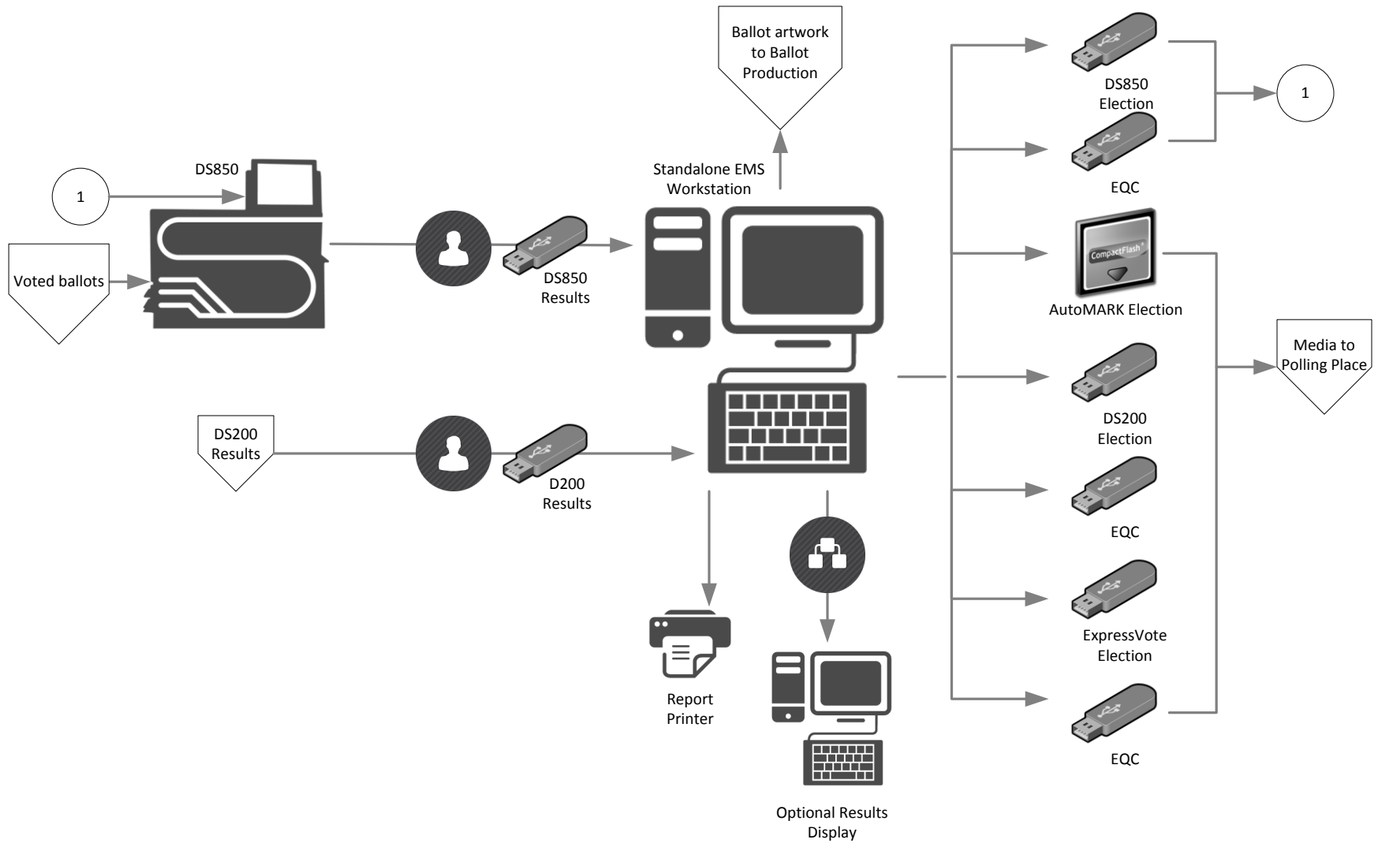

Voted Ballots
DS850
DS850 Results
Voted Ballots
DS200
D200 Results
Election Reporting Manager
Audit Data
Election Configuration
Results Reports
Results Exports
View and print ballot images and summary reports
ElectionWare
Acquire
Produce
RCV export files
Export Cast Vote Records in spreadsheet format to support Ranked Choice Voting

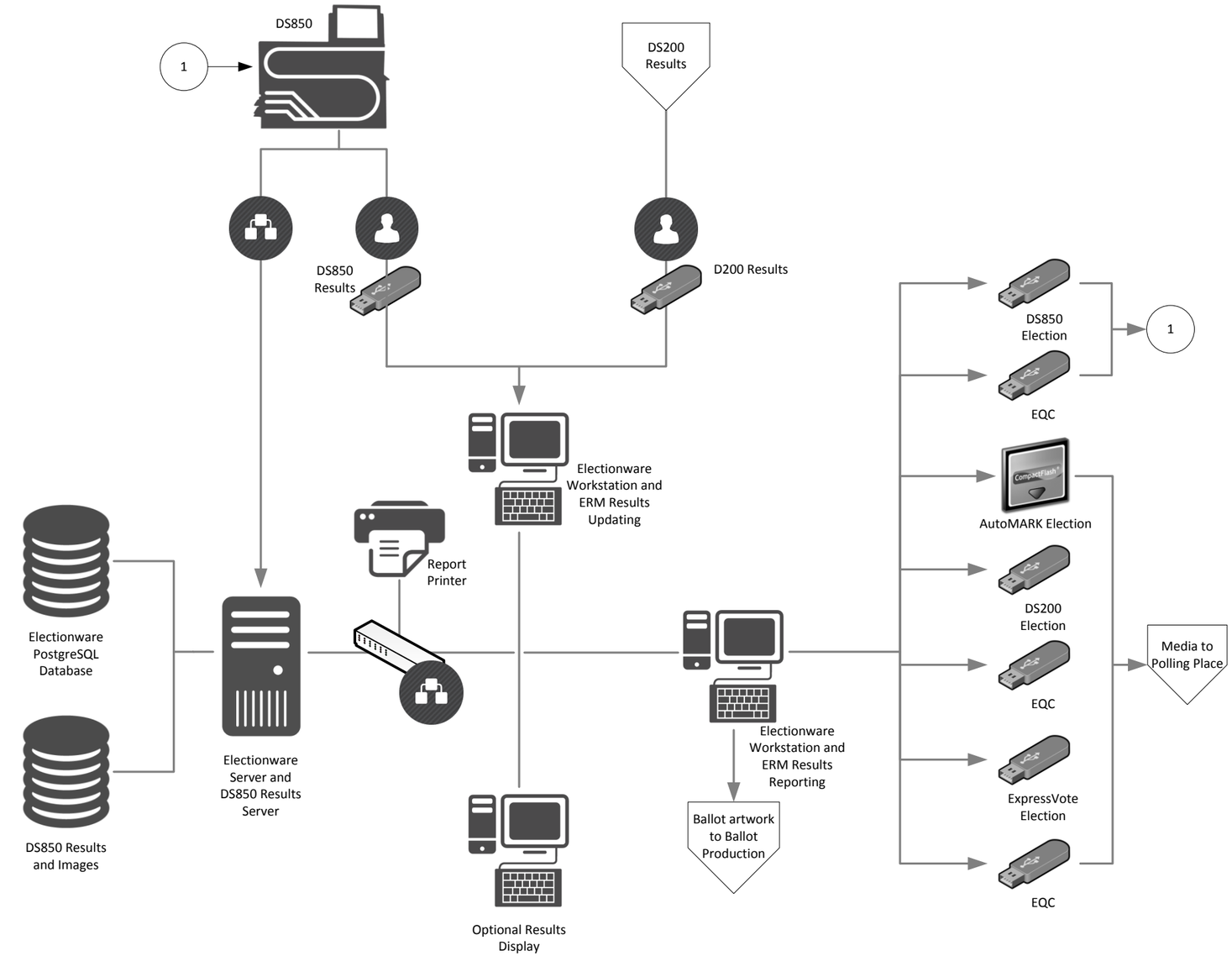
ExpressVote

DS850

DS200

AutoMARK

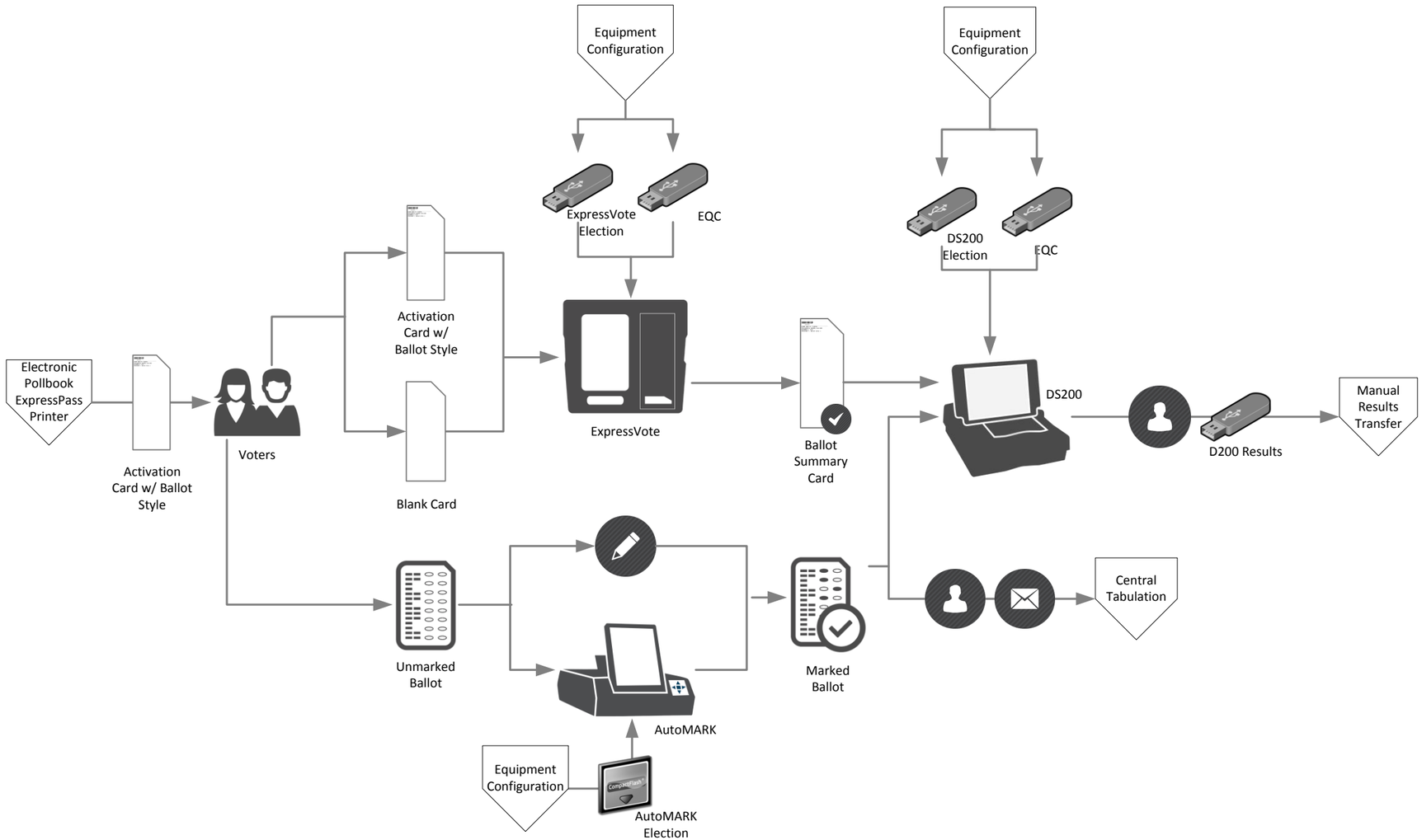

1
DS850
Voted ballots
DS850
Results
Ballot artwork
to Ballot
Production
Standalone EMS
Workstation
DS850
Election
1
EQC
AutoMARK Election
Media to
Polling Place
DS200
Election
EQC
ExpressVote
Election
EQC
DS200
Results
D200
Results
Report
Printer
Optional Results
Display



Attachment 4: EVS5203_C_F_1060_OperationalEnvironment

Election Systems & Software: EVS 5.2.0.3 – Polling Place

Rev. 1.0	Dept. Certification	Date: 06.26.2015



Election Systems & Software: EVS 5.2.0.3 – ExpressVote Activation Card Printing

Rev. 1.0	Dept. Certification	Date: 06.26.2015