2.03 - Democracy Suite® ImageCast® Central Functionality Description

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DOMINION VOTING

Our customers come first.

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CHAPTER 1: INTRODUCTION

1.1 Applicable TDP Requirement Section (VVSG 2.3)

Section 2.3 VVSG 1.0, Volume II *"The vendor shall declare the scope of the system's functional capabilities, thereby establishing the performance, design, test, manufacture and acceptance context for the system."*

This document serves this purpose for the ImageCast® Central Ballot Scanner.

Section 2.3 VVSG 1.0, Volume II *"The vendor shall provide a listing of the system's functional processing capabilities, encompassing capabilities required by the Guidelines and any additional capabilities provided by the system. This listing shall provide a simple description of each capability. Detailed specifications shall be provided in other documentation required for the TDP."*

For a full listing of every VVSG Volume 1 requirement and a corresponding simple description of the system's capability in regard to each requirement, please see the 2005 VVSG Vendor Testing and TDP Trace document.

1.2 Relevant Disclaimers

This document may make reference to certain Democracy Suite® functionalities that are not part of the current 5.13-A campaign and should be disregarded throughout the document.

For a full list of relevant disclaimers, please see the "Relevant Disclaimers" section in the *2.02 - Democracy Suite® System Overview* document.

1.3 Purpose

This document describes the functionality of the Dominion ImageCast® Central Optical Scan Ballot Tabulator System.

1.4 Design Responsibility

Dominion Voting is the design authority.

1.5 Patent Status

Certain system concepts, as well as many implementation and construction details are protected by a series of U.S. and foreign patents pending.

1.6 Glossary of Terms

Table 1-1 lists the definitions for terms used in this document.

Term	Definition
Commercial off-the-shelf (COTS)	An unmodified piece of equipment that is readily available in the public market
Device Configuration File (DCF)	File that holds the configuration parameters set by the EMS software and passed to the ImageCast® Central unit.
Election Counter	Number of ballots that have been scanned and processed since the beginning of the election.
EMS	Election Management System.
Hopper	Input tray that holds paper to be scanned. During scanning, one piece of paper is automatically fed into the machine at a time.
Invalid ballot	A ballot that was properly imaged and recognized, but that does not belong to the predefined set of ballots that the ImageCast has been programmed to accept.
Lifecycle Counter	Number of ballots that have been scanned and processed in a particular ImageCast unit since its manufacturing inception.
Misread paper	A piece of paper that generates an image that the image processing software cannot recognize as a ballot.

Table 1-1: Glossary of Terms

Term	Definition
Over-voted ballot	A marked ballot which contains more than the allowable number of selections in at least one contest.
Under-voted ballot:	A marked ballot which contains less than the allowable number of selections in at least one contest.
Voter Information Files (VIF)	File that holds part of the election specific information.

Table 1-1: Glossary of Terms (Continued)

CHAPTER 2: IMAGECAST CENTRAL SCANNING OVERVIEW

The ImageCast® Central is an optical scan ballot tabulator system used at centralized counting centers. The system scans marked paper ballots, interprets voter marks on the paper ballots, stores results, and tabulates each vote from each paper ballot.

The hardware consists of three elements:

- Scanner hardware
- PC workstation
- Gigabit Ethernet Network

The capacity of each counting center may differ, but the interconnection is identical, and allows for complete scalability. The central scanning centers include:

- Central scanning "farms" comprised of the ImageCast® Central optical tabulators with accompanying workstations. The number of scanners depends on the volume of the ballots to be scanned.
- Election Management System (EMS) Application Server and Database Servers (primary and secondary for complete contingency backup).
- EMS Network Attached Storage (NAS) for results and scanned ballot storage.
- EMS Election Event Designer workstation used for pre-voting activities such as defining political divisioning and ballot design and production.
- EMS Results Tally & Reporting workstation to manage the process, adjudicate, release results, and make declarations.
- Printers for production of results records and audit materials.
- Additional active and passive infrastructure equipment (racks, switches, routers/firewalls, UPS devices, cables, etc.) to ensure network security.

The system's functional processing capabilities are fixed. That is, no capability can be bypassed or deactivated during installation or operation by the user. There is no technical limit to the number of tabulators that can exist per central scanning center. ImageCast® Central Scanners are networked to Results Tally and Reporting with adjudication instances, see Figure 2-1.

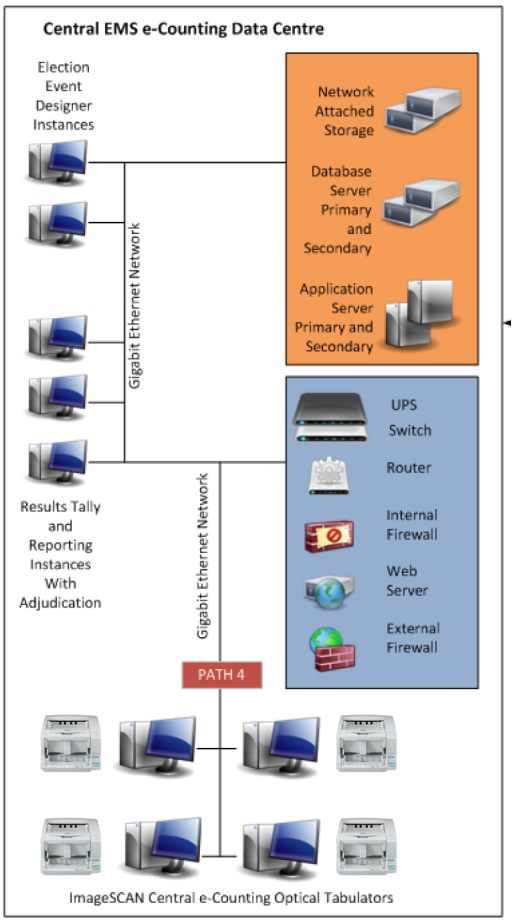


Figure 2-1: Structure of the Central Counting Center

2.1 Inventory List

Hardware:

- ImageCast® Central scanner
- ImageCast® Central workstation
- EMS Election Event Designer™ workstation
- EMS Results Tally and Reporting™ workstation
- EMS Data Center
- USB printer

Software:

- ImageCast® Central application
- EMS Results Tally and Reporting™ client application

- EMS Election Event Designer™ client application
- Adjudication client application (optional)
- EMS Application Server
- EMS Database Server

2.2 Operating Licenses

Equipment delivered as part of the election service requires operating licenses for 3rd-party software components including:

- Microsoft Windows 10 Professional

2.3 ImageCast® Central Scanner Hardware

ImageCast® Central scanning hardware consists of a feeding mechanism and an image capturing system. This basic system is controlled entirely by Democracy Suite software to ensure that the system performs required election functions.

For more information on scanning hardware specifications, please refer to the following vendor documents:

- Canon DR-X10C User Manual
- Canon DR-G1130 User Manual
- Canon DR-G2140 User Manual
- Canon DR-M160II User Manual
- Canon DR-M260 User Manual
- SCAMAX Document Scanner Type H12 User Manual

2.3.1 Voting Variations

Table 2-1 lists the voting variations supported by the ICC series of voting devices:

It is important to note that not all voting variations can be combined with every ballot template used, and some jurisdictions limit what voting variations can be utilized at the same time (e.g. for a single election event). As a result, the ICC platform and all other Democracy Suite system components, including the EMS software platform, support the voting variations listed in Table 2-1, but have to be used according to the jurisdiction, state, and federal election rules.

Primary presidential delegation nominations are implemented by placing the names of delegates in the same contest as the Presidential Candidate, or in a separate delegates contest.

Vote for N of M is implemented through logic in EMS that allows the jurisdiction to support multiple "Vote For" options, and for the voting machines to scan for and tabulate multiple "Vote For" options..

Voting Variation	Supported
Closed primaries	Yes
Partisan offices	Yes
Write-in voting	Yes
Ballot rotation	Yes
Cross-party endorsement	Yes
Vote for N of M	Yes
Provisional or challenged ballots	Yes
Open primaries	Yes
Non-partisan offices	Yes
Primary presidential delegation nominations	Yes
Straight party voting	Yes
Split precincts	Yes
Recall issues, with options	Yes
Ranked choice voting	Yes

Table 2-1: Voting Variations Supported by the ImageCast® Central

Provisional or challenged ballots are handled per jurisdiction law and processes.

Cross Party endorsement is made via jurisdiction process. When the jurisdiction defines the election, they can place the same individuals name under multiple political Parties. EMS does not know (and does not need to know) that the name represents the same individual. Upon tabulation, the jurisdiction can report the candidates totals by political Party through EMS and subsequently declare winners.

2.4 System Capabilities

Please refer to the following sections for descriptions on overall system capabilities, pre-voting, voting and post-voting capabilities and maintenance, transportation and storage capabilities.

Overall System Capabilities:

- Integrity: See “Count Integrity” on page 27.
- Accuracy: See “Tabulation Accuracy and Reliability” on page 27.
- Vote Tabulation: See “Tabulation Accuracy and Reliability” on page 27.
- Error Recovery: See “Error Recovery” on page 27.
- Ballot Counters: See “Ballot Counters” on page 30.
- Telecommunications: See “Telecommunications” on page 32.
- System Auditability: See “Audit Functionality” on page 33.
- Data Retention: See “Transparency and Accuracy” on page 33.
- Security: See “Security” on page 38.
- Election Management System: Please refer to *2.03 - Democracy Suite® EMS Functionality Description*

Pre-Voting Capabilities:

- Verification at the Polling Place: N/A
- Verification at the Central Location: See *2.08 - Democracy Suite® ImageCast® Central System Operation Procedures*
- Ballot Preparation, General Capabilities, Ballot Formatting, Ballot Production: See *Democracy Suite® EMS Election Event Designer User Guide*
- Readiness Testing: See “Scanner Equipment Readiness” on page 18. and *2.08 - Democracy Suite® ImageCast® Central System Operation Procedures*
- Ballot and Program Installation and Control: See *Democracy Suite® EMS Election Event Designer User Guide*
- Election Programming: See *Democracy Suite® EMS Election Event Designer User Guide*

Voting Capabilities:

- Opening the Polls, Precinct Count Systems, Paper-Based Systems, DRE System Requirements: See “Opening the Poll” on page 18.
- Activating the Ballot (DRE Systems): N/A
- Casting a Ballot, Common Requirements, Paper-based System Requirements, DRE Requirements: N/A

Post-Voting Capabilities:

- Broadcasting Results: See *Democracy Suite® EMS Results Tally & Reporting User Guide*
- Closing the Polls: See “Closing the Poll” on page 20.
- Producing Reports: Section 9.3 Permanent Printed Reports and *Democracy Suite® EMS Results Tally & Reporting User Guide*
- Consolidating Vote Data: *Democracy Suite® EMS Results Tally & Reporting User Guide*

Maintenance, Transportation, and Storage Capabilities:

- Maintenance, Transportation, and Storage: Please refer to the COTS vendor documentation.

CHAPTER 3: PHYSICAL AND ELECTROMECHANICAL DESCRIPTION

3.1 Physical Enclosure

The physical enclosures of the ImageCast® Central workstations and scanners are standard COTS.

The unit is stored and transported in a foam-padded cardboard crate to protect against vibrations and impacts, as well as to increase the ease of use and transportability. The base of the cardboard box is a wooden pallet that assists in the ease of lifting and storage.

3.2 Input/Output Port Locations

Connections are made at the rear of the unit.

All workstations connect to the network via a standard network cable (CAT5e or greater).

3.3 Transportability

All scanners are transportable. The largest component can be carried by two people, with the exception of the InterScan HiPro. For information on transporting the InterScan HiPro scanner, please contact your DVS Technician.

3.4 Scanner Dimensions and Weight

Table 3-1 provides the dimensions and weight of the ICC scanners.

Scanner	Size	Weight
Canon DR-G1130	18.9” x 21.1” x 12.4”	50 lbs
Canon DR-G2140	18.9” x 22.4” x 12.4”	55.1 lbs
Canon DR-M160II	9.09” x 11.02” x 9.76”	7.05 lbs
Canon DR-M260	9.09” x 11.22” x 10”	7.5 lbs
Canon DR-X10C	14.77” x 20.79” x 14.77”	86 lbs
InterScan HiPro	50.39” x 52.36” x 72.05”	530 lbs

Table 3-1: Dimensions and weights of ICC scanners

It is recommended that central scanning systems using Canon scanners be placed on a table that is 2 m (6 ft) in length. This allows for a pre-stacking surface and a packaging surface to be located on either side of the scanner.

3.5 Scanner Power Consumption

Table 3-2 documents the power consumption of the ICC scanners.

Scanner	Voltage	Maximum Power (Scanning)	Minimum Power (Idle)
Canon DR-G1130	120 V / 240 V	95 W	1.6 W
Canon DR-G2140	120 V / 240 V	66.5 W	3.5 W
Canon DR-M160II	120 V / 240 V	27 W	1.8 W
Canon DR-M260	100 V / 240 V	23 W	1.4 W
Canon DR-X10C	120 V / 240 V	125 W	1.2 W

Table 3-2: Power consumption of ICC scanners

Scanner	Voltage	Maximum Power (Scanning)	Minimum Power (Idle)
InterScan HiPro	115 V - 240 V	900 W	< 1 W

Table 3-2: Power consumption of ICC scanners (Continued)

3.6 Scanner Environmental Parameters

Table 3-3 provides the environmental parameters that the ICC scanners operate within.

Scanner	Operating Temperatures	Operating Relative Humidity (RH)	Sound Output
Canon DR-G1130	50˚F - 90.5˚F	20% to 80%	Does not exceed 72 dB
Canon DR-G2140	50˚F - 95˚F	20% to 80%	Does not exceed 54 dB
Canon DR-M160II	50˚F - 90.5˚F	20% to 80%	Does not exceed 63.5 dB
Canon DR-M260	50˚F - 95˚F	20% to 80%	Does not exceed 45 dB
Canon DR-X10C	50˚F - 90.5˚F	20% to 80%	Does not exceed 72 dB
InterScan HiPro	50˚F - 95˚F	30% to 80%	Does not exceed 74 dB

Table 3-3: Environmental parameters of ICC scanners

CHAPTER 4: OPTOMECHANICAL FUNCTIONALITY

4.1 Paper Feed Mechanism

Table 4-1 documents the capabilities of the ICC scanners' ballot feed mechanisms.

Scanner	Ballot Feed Mechanism Capability
Canon DR-G1130 and DR-X10C	Intended to handle paper up to a maximum size of 12.01" x 39.37"
Canon DR-G2140	Normally intended to handle paper up to a size of 12" x 17", but can be configured to a maximum of 12" x 220.1" (Long Document Mode)
Canon DR-M160II	Normally intended to handle paper up to a size of 8.5" x 14", but can be configured to a maximum of 8.5" x 118"
Canon DR-M260	Intended to handle paper up to a size of 8.5" x 14.02", but is configurable up to a maximum of 8.5" x 220".
InterScan HiPro	Intended to handle paper up to a maximum size of 12.5" x 81.69"

Table 4-1: Ballot Feed Mechanism Capability of the ICC scanners

The paper feed mechanism is physically capable of moving the ballot paper forward into the machine and across two image sensors (one on top, one on the bottom). These sensors provide image captures of both sides of the ballot.

The basic design of the scanners consists of separate upper and lower imaging surfaces (known as upper and lower units). These surfaces open up for convenient cleaning, maintenance and freeing of ballot jams. Pickup and drive rollers are located on the upper surface, and retard rollers are located on the lower surface. The continuous movement of the upper and lower surfaces minimize the number of ballot jams.

The stepper motor torque and the paper feed mechanism's forces of friction have been optimized so that over-torque (where the ballot can tear) or under-torque (where the ballot can become stuck in the machine) do not occur.

4.2 Ballot Insertion

An automatic document feeder is used to insert ballots. Table 4-2 provides the feeder capacity of the scanners:

Scanner	Feeder Capacity
Canon DR-G1130 and DR-X10C	250 sheets
Canon DR-G2140	500 sheets
Canon DR-M160II	40 sheets
Canon DR-M260	80 sheets
InterScan HiPro	300 sheets

Table 4-2: Feeder capacity for the ICC scanners

Each feeder can also be operated in manual mode where one sheet is fed at a time.

4.3 Paper Sensing

Paper sensors detect when paper is present in various parts of the machine, including:

- One sensor in the document feeder tray
- Three double-feed detection sensors in the upper unit
- One dust detection sensor
- Skew and staple detection sensors

4.4 Multiple Sheet Detector

The ultrasonic double-feed sheet detector monitors if more than one sheet of paper is in the transport at one time, and will prevent the unit from counting marking positions from two ballots at the same time. Detection is based on an ultrasonic probe that is immune to ink markings on the ballot, as well as the thickness of paper.

For procedures on how to enable this feature on Canon scanners, please refer to the applicable Canon scanner user manual. For more information regarding this setting on an InterScan scanner, please refer to *Democracy Suite® ImageCast® Central Installation and Configuration Procedures,* Section Confirming Scanner Configuration to Detect Double Feeds.

4.5 Processing Rate

The central scanning device's processing rate also depends on the handling and poll verification activities.

The number of ballots per minute depends on the width or length of the ballot. Table 4-3 documents the approximate scanning speed of the ICC scanners.

Scanner	Ballot Size	Pages per Minute (ppm) Scanned
Canon DR-G1130	8.5" x 11"	Approximately 100 ppm, as per Dominion Voting's Quality Assurance test results.
Canon DR-G2140	8.5" x 22"	Aproximately 70 ppm, as per Dominion Voting's Quality Assurance test results.
Canon DR-M160II	8.5" x 11"	Approximately 60 ppm, as per Dominion Voting's Quality Assurance test results.
Canon DR-M260	8.5" x 11"	Approximately 60 ppm, as per Dominion Voting's Quality Assurance test results.
Canon DR-X10C	8.5" x 11"	Approximately 111 ppm, as per Dominion Voting's Quality Assurance test results.
InterScan HiPro	8.5" x 11"	Approximately 235 ppm, as per Dominion Voting's Quality Assurance test results.

Table 4-3: Approximate scanning speed of the ICC scanners

The system is scalable, so decreasing or increasing any aspect is accomplished by changing the number of scanners and workstations as required.

CHAPTER 5: BALLOT FUNCTIONALITY

5.1 Size Information

The size of the ballot is fixed at 8.5” wide with possible lengths ranging from 11” to 22”.Voting areas can be located almost anywhere on the ballot so long as they do not interfere with the fiducial markings on the ballot.

5.2 Printing Specifications

Complete printing specifications with all critical specifications and processes (including paper weight, grain direction, opacity, acceptable stock colors, cutting tolerances, etc.) related to ballot printing shall be maintained.

For more information, please refer to *Democracy Suite® ImageCast® Printing and Finishing Specifications*.

CHAPTER 6: OPERATIONAL FUNCTIONALITY

6.1 Pre-Voting Capabilities

For details on such pre-voting capabilities of the Democracy Suite® System as ballot preparation, general capabilities, ballot formatting, and ballot production, please refer to *Democracy Suite® EMS Election Event Designer User Guide*.

6.2 Power On Sequence

Power on sequence procedures can be found in *2.08 - Democracy Suite® ImageCast® Central System Operation Procedures*.

6.3 Administrator Access

Administrator access is obtained through the use of a iButton security key and security key reader. Overall, this security key is used to:

- Provide access control to the unit
- Decrypt election files at the beginning of the election
- Encrypt results files at the end of the election

6.3.1 Diagnostics Test

An automated test that performs a diagnostic check and formal report on the system, including:

- Detecting and reporting the system's status and degree of operability
- Confirmation that there are no hardware or software failures
- Identification of the software release
- Status of all data paths and memory locations to be used in vote recording to protect against contamination of voting data
- Other information needed to confirm the readiness of the equipment and to accommodate administrative reporting requirements
- Confirmation that the device is ready for the poll to be opened

Upon conclusion of the tests, the software provides evidence in the audit record that the test data has been expunged.

6.4 Scanner Equipment Readiness

The central scanning devices perform a set of diagnostic tests after every power on/off cycle. Some of these tests require operator intervention and some are fully automated. At the end of the diagnostics process, the system generates a report with the system status information.

For network applications and user interfaces, Democracy Suite® EMS Results Tally & Reporting has the ability to generate a zero state report before the system is utilized. This report extracts all the relevant counters from the database which should be zero before the central scanning process is started. Electoral officers can use this report not only to check that all candidates have no votes, but also to check that the lists of elections and associated candidates are correct.

The EMS system also executes a security report which creates a list of all terminals, workstations, central scanning devices and all authenticated operators within the system.

For more information on EMS functionality, please refer to *2.03 - Democracy Suite® EMS Functionality Description*.

6.4.1 Opening the Poll

By default, all zeroed central tabulators start in Open status and are ready for scanning. In order for any of these tabulators to be turned on, however, a security key must be used in order for appropriate election files to be decrypted. Without the appropriate iButton security key, no access to the central tabulator is possible.

In addition, once a poll is placed in a 'closed' state, it can be re-opened through the combined use of the security key and the 're-open poll' option in the access-restricted Configuration Menu of the central scanning application.

6.5 Election Run Mode Functionality

During scanning, all ballot batches are placed on the ballot entry tray. Upon initiating a scan, the tabulator pickup roller grabs one ballot at a time and moves the paper over both scanning read heads (thus acquiring a complete image of both sides of the ballot). The ballot is then analyzed and defined as one or more of the following:

- Fully and properly marked ballot
- Misread ballot or invalid ballot
- Blank ballot
- Overvoted ballot
- Undervoted ballot

- Write-in ballot
- Ambiguous voting mark
- Ballot not linked to the current poll ID
- Ballot to which the write-in precedence rule was applied
- Overvoted party preference
- Unvoted party preference
- Cross-voted ballot
- Major overvote
- Major undervote
- Major overvoted rank
- Major inconsistent rank
- Major duplicate candidate rank
- Major skipped rank
- Major unvoted ranked contest
- Major unused rank
- Overvoted rank
- Inconsistent rank
- Duplicate candidate rank
- Skipped rank
- Unvoted ranked contest
- Unused rank

6.5.1 Inserting and Scanning Ballots

When the ballots to be scanned are placed on the hopper, a sensor will detect that there is paper ready to be scanned.

The operator initiates the scan using the ICC application. The scanner will then begin processing ballots automatically.

If there are no defective ballots, scanned images of all the processed ballots will have passed the quality checks and are ready for tabulation.

6.5.2 Ballot Scanning Errors

The following will halt the scanning process:

- Misread or Invalid ballot: A ballot that cannot be processed by the tabulator for whatever reason. This includes legitimate ballots that have been mis-scanned, foreign pieces of paper, or blank pages.
- Multiple sheet warning: If more than one (overlapping) ballot is fed into the scanner at the same time.

When the offending ballot has been located in the ballot exit tray, it is removed for resolution. In addition, the scanners may be configured to halt on additional error conditions (i.e. overvotes, undervotes, blank ballots, etc.)

6.5.3 Closing the Poll

To close a tabulator, a poll official must use the tabulator's iButton to access the Configuration Menu, and click on the 'Close Poll' option. This will prevent any further scanning from occurring on the tabulator.

6.5.4 Consolidating Vote Data

Election results from multiple polling places are consolidated using the EMS Results Tally & Reporting system, which is part of the EMS platform. Please refer to *2.03 - Democracy Suite® EMS Functionality Description*.

6.5.5 Re-Open Poll

To re-open a tabulator, a poll official must use the tabulator's iButton to access the Configuration Menu, and click on the 'Re-Open Poll' option. This will allow additional ballots to be processed by the tabulator

CHAPTER 7: BALLOT HANDLING

7.1 Organizing, Opening and Processing of Ballot Boxes

Ballot boxes are stored until counting begins. Ballot boxes should remain secured until they are ready for scanning. During the scanning process, one of the ballot handlers for a specific scanner will move the next set of polling location ballot boxes to a pre-scanning table. This person opens the ballot box(es) and begins preparing the ballots.

When the scanner count records are compared with the poll record and all totals balance, the ballot papers are ready to be returned to the boxes. The post-scanning ballot handler gets all the ballots from the scanner and packs them into boxes (either in smaller transfer cases, or back to the large ballot boxes). The ballots remain in their scanning order to more easily locate them if needed at a later time.

The poll record is also repacked. Before sealing the box, the handler completes a preprinted 'batch follower'. The batch follower details the scanning and accounting process (i.e. batch time/date, batch number and ballots in the batch), as well as indicates the location of blank ballots, etc. They then either place the batch follower inside the ballot box, or use a clear envelope to seal the box in such a way as to make it tamper proof and traceable.

The box is then placed on the shelves in a pre-specified location to ensure it can be easily located afterwards. The complete workflow of ballots and boxes is shown in the ballot paper workflow, see Figure 7-1.

7.2 Ballot Paper Workflow

Before the election, all relevant information is programmed into the system. This generates header and closer cards for each polling station and provides data for statistical report generation.

A diagrammatic representation of ballot workflow is shown in Figure 7-1. This workflow consists of the following steps:

1. A "zero check" is run on all databases from the central site immediately before scanning commences.
2. Ballot boxes are removed from racks, moved to an open pre-scan table, and extraneous pages are removed (non ballots).
3. Ballots are loosely stacked and tamped (support staff).
4. Ballot scanning commences for this location.

5. Remaining ballots are scanned and accounting is performed using batch followers. Scanner counts are matched to the poll records (Audit Trail 1). The image software counter is matched to the poll records (Audit Trail 2).
6. If reconciled, the polling station is closed. The ballots are repacked into boxes.
7. The sealed ballot box(es) is (are) moved to a secure storage area.
8. The box is placed in the appropriate spot on the shelf with its label showing.
9. The results of the voted ballots are sent for acceptance or adjudication.
10. A DRO performs adjudication, enters comments, objections, and selects the reason for the rejection.
11. If necessary, rejected ballots are passed on for more senior adjudication.
12. A supervisor DRO receives adjudication decisions and validates poll results.
13. Poll of ballots is now complete. The lead official receives a notice of completion and audits, rejects, and publishes results.

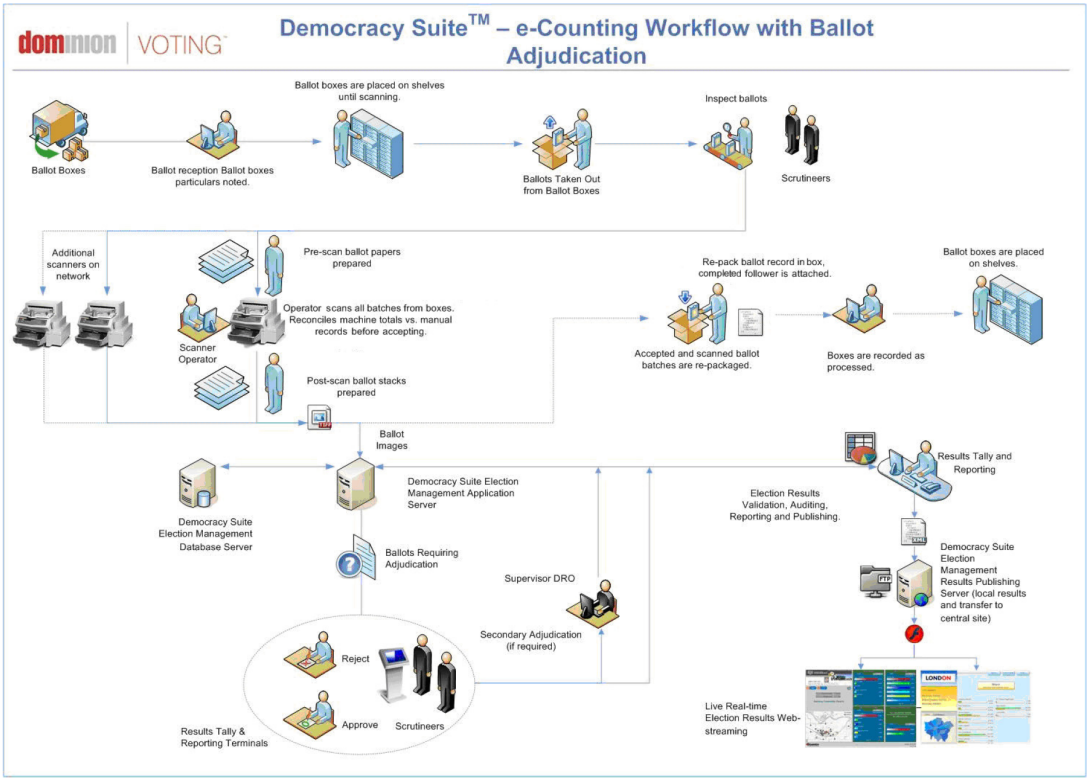


Figure 7-1: Ballot workflow

7.3 Scanner Counting Application Workflow

Each central scanning station consists of a scanning device and designated workstation.

The PC workstation:

- Controls the scanning hardware
- Performs ballot image acquisition and processing
- Ensures all ballots are properly read and interrogated as part of the image capture process

Acquired ballot images, raw results information, as well as Audit Trail information are sent to the EMS Application Server, which executes configurable election-related business logic. At this stage, the ballots are separated into two queues:

- Fully resolved ballots
- Ballots that require correction

The optical central scanning system captures and stores images of each and every ballot. The device also creates ballot and device AuditMark® information.

7.4 Tracking and Batch Control

The tabulation system has a full set of control and tracking procedures. To begin, the smallest segment of results is a single poll. Throughout the process, the ballot totals for every poll are maintained.

Control is performed using a batch follower page that tracks the tabulator number, batch number, time and date of scanning, poll ID (if applicable), as well as the scanning operator, scanning notes, etc. as shown in Figure 7-2.

Figure 7-2: Example of a batch traveler form

7.5 Handling Undervotes and Overvotes

The act of identifying overvotes and undervotes is configurable (the options for the central count system are identical to the precinct count system). Blank ballots can be identified at the time of scanning for instant inspection, or can be flagged for adjudication.

7.6 Detecting and Addressing Errors

The Audit Trail allows for the simple detection of errors. If an error is detected, it is apparent in the text interpretation at the bottom of the ballot (AuditMark®)

7.7 Spoiled Ballots

There are two types of spoiled ballots. The first type are damaged ballots, and they are handled using physical identification at the scanner. The second are ballots spoiled because of markings. In these cases, the ballots are identified and sent for adjudication.

7.8 Retrieving Ballots

All ballots scanned are stored and referenced according to the scanning sequence number. Ballot images are each identified by a distinct number. This number consists of the tabulator on which the ballot was scanned, the batch number, and the index of that ballot within the batch. As an example, for the second ballot scanned in batch 245 on Tabulator 4, the scanned image filename would be 0004 0245 0002.tif). If this ballot ever needs to be located in the storage racks, the official must find the transfer case for Tabulator 4, Batch 245, open the box, and locate the second form in the box, which will be the desired ballot.

7.9 Error Message Comprehension

The ImageCast® Central system is designed so that all error messages requiring intervention by an operator or election official are displayed or printed clearly in an easily understood language and text, or in the form of another suitable visual indicator. This approach to error message comprehension is illustrated by the text and visual indicators encountered during error notification.

A complete list of error messages can be found in “Error Messages” on page 45.

The ImageCast® Central unit meets VVSG Vol. 1 Section 2.1.5.1.b.iii, and as such, when the voting system uses numerical error codes for trained technician maintenance or repair, the text corresponding to the code is self-contained and displayed simultaneously. This is intended to reduce inappropriate reactions to error conditions, and to allow for ready and effective problem correction.

As per VVSG Vol. 1 requirements, the ImageCast® Central system has been designed to comply with the following:

- All error messages requiring corrections which will impact vote recording or vote processing are written in a manner that is understandable to an election official who possesses training on system use and operation, but does not possess technical training on system servicing and repair.
- The message cue for the ImageCast® Central system clearly states what action should be performed in the event that operator response is required.
- The ImageCast® Central system design ensures that erroneous responses will not lead to irreversible errors.

- Nested error conditions are corrected in a controlled sequence so that the voting system status will be restored to the initial state that existed before the first error occurred.
- The ImageCast® Central system displays and reports critical status messages using clear indicators or easily understandable English. The voting system need not display non-critical status messages at the time of occurrence. Voting systems may display non-critical status messages (i.e., those that do not require operator intervention) as numerical codes for subsequent interpretation and reporting as unambiguous text.

CHAPTER 8: COUNT INTEGRITY

8.1 Election Management System

For details on the Election Management System, please refer to *2.03 - Democracy Suite® EMS Functionality Description*.

8.2 Tabulation Accuracy and Reliability

The tabulator can be thought of as a sheet-fed scanner, meaning that a complete image is taken of the top and bottom of the ballot as the paper is pulled through the machine. The scanner then passes this image to a software program which looks for markings (black squares, often called 'fiducials') around the ballot. If the correct number of fiducials is found, and the ballot bar code passes checksum logic tests, the software then knows that it is looking at a valid ballot.

Once a ballot is verified, the system begins to interrogate the ballot markings. To begin, the machine sums every black pixel for each marking area corresponding to a position on the ballot. If the number of black pixels exceeds the threshold marking defined by the jurisdiction, the mark is considered a vote. For those cases where handwriting or write-in votes need to be adjudicated, subsequent image processing is performed to determine the format of the marking.

The machine is designed so that no ballot is allowed to pass the scanning stage unless the scanner:

- Verifies that the ballet is valid
- Reads all the fiducials around the ballot image

If, for whatever reason, the machine is unsure about the image, it will notify the operator with an appropriate error message (such as "Ballot misread").

In total, approximately 340 image checks are performed on each image. If any check fails, the software will report a misread.

8.3 Error Recovery

The ImageCast® Central uses a set of non-volatile memory components. These memory components, coupled with status and scanning counters, allow the election application to restore the system without losing or corrupting voting data that was stored in the previous operating conditions prior to failure. In the event that a component of the system fails, the ImageCast® Central will provide monitoring and notification mechanisms that force prompt reactions from administrative personnel. Please refer to Appendix A for these notifications. Instructions for error recovery procedures are contained in *2.08 - Democracy Suite® ImageCast® Central System Operation Procedures*.

8.4 Ensuring All Ballots are Read

The scanning process consists of real-time monitoring and interrogation of all ballot images before the batches are accepted. In essence, all ballots are scanned and then subjected to image processing, which determines if the ballot is valid and correctly scanned. If any scan fails this interrogation, the scanner ceases operation and notifies the operator. The defective page must be located, removed, and handled by an election official.

8.5 Verifying the Number of Votes at Each Polling Station

Two separate systems are used to verify the number of ballots. The first is the counting tally of the scanner mechanics. The scanner stores and displays an independent count of ballots. This is typically noted on the header page for the purpose of verifying the correct number of ballots present in the ballot box.

A second verification is provided by the imaging software. The software displays the total number of ballot images processed as part of the ballot counting operation. This total can be recorded and compared with the reception records and the scanner count. In summary, there are three independent counts:

- Poll record
- Scanner hardware paper count (mechanical count)
- Image processing paper count (software count)

All three totals should agree before a set of ballots for a poll is accepted at the scanning stage. If there is a problem, the set of ballots can be rejected before any of the ballots are tabulated.

8.6 Information Captured

The system captures all information on the ballot regardless of the nature of the marks. A compact image sensor provides full color scanning of the entire ballot to ensure that all voter marks are recorded.

The following information is captured on each scan:

- *Ballot information* - this information typically includes the ballot sequence number, the type of ballot, area ID, the poll ID (which could be generalized to ward but a smaller granularity is often preferred), and the constituency ID.
- *Scanning information* - the tabulator ID.
- *Ballot authentication data* - includes verification that this ballot is from the correct polling location.
- *Audit information* - time of scanning, scanner ID.
- *Interpretation of the ballot markings* (both as part of the audit trail and the results files).
- *In the case of violated contest business rules*, contests are marked with one of the following flags:
  - Undervote
  - Overvote
  - Blank
  - Write-In
  - Ambiguous Voting Mark

The approved marking tools to be used with ImageCast® tabulators are:

- **Sharpie Fine Point Black (part #: 30001)**.
  A pure black, quick-drying, alcohol-based ink. It dries the fastest with the lowest smudge risk.
- **Paper Mate Flair M Medium Point Black, (part #: 8430152)**.
  A pure black, water-based ink. It has minimal to no bleed through.

NOTE: The recommended ballot marking pens have been tested and verified for use in combination with approved paper stock used for ballot production. Although many pens are readily available, and advertised as quick drying and/or low bleed through, they should be sufficiently tested in a voting application scenario, which includes the use of approved ballot paper stock prior to use.

8.7 Failure to Identify Truly Blank Ballots

The threshold for identifying marks on a ballot is configurable. As such, even the smallest of marks on a ballot can be identified as possible voter selections, which greatly reduces the risk of failure to identify truly blank ballots. Blank ballots can then be sent for adjudication, which can therefore confirm that the ballot is truly blank.

8.8 Ballot Counters

The ImageCast® Central application contains the following counters on both the 'Scanning' and 'Status' menus:

- Total Ballots Accepted
- Total Batches Accepted
- Average Ballots/Batch

The counts are retained in the application until a new election is reprogrammed. It is only then that the counters will start back at zero.

8.9 Mail Ballot Tabulation

The actual tabulation of absentee mail ballots is performed without any additional considerations. The scanner hardware is designed to flatten the document and remove fold lines from the image. In general, the ImageCast® Central scanner has mainly been used for central tabulation.

The ballot AuditMark® is present on the ballot image and contains the following information:

- Ballot Face ID
- Ballot Sequence Number
- Tabulator ID
- Area ID (ward or poll)
- Authorized person flag (i.e. DRO signature or initials present or not for paper ballots only)
- Ballot image produced from the real ballot paper (for paper ballots only).
- List of contests and marked candidates For each marked candidate, the number of pixels are detected
- In the case of violated contest business rules, contests are marked with one of the following flags:

    - Undervote
    - Overvote
    - Major overvote
    - Major undervote
    - Blank (or unvoted)
    - Write-In
    - Write-in precedence rule applied
    - Inconsistent order
    - Duplicate candidate
    - Overvoted rank
    - Skipped rank
    - Unused rank
- Additional information may be recorded on the ballot:
    - Disabled contest
    - Disabled choice
    - Major contest
    - Blank ballot
    - Misread
    - Invalid ballot
    - Ambiguous voting mark

8.10 Outsorting/Outstacking Ballots

The system can be configured to stop the scanner on rejected ballots and either be flagged or removed.

8.11 Hardware and Software Security of Counting Equipment

The software system is tamper proof, and provisions ensure physical tampering is deterred. All access ports, connections, and equipment are secured using tamper-evident seals with bar codes.

8.12 Telecommunications

The ImageCast® Central platform has no outside communications outside of the LAN connection the EMS server.

8.13 Appearance of Damage

Physical damage will be apparent in all critical systems (scanners), and fault detection is in place to identify any equipment that has sustained damage.

All components are part of a larger network that does not require reconfiguration to change or replace items. Therefore, if a piece of equipment is damaged or exhibits unacceptable behaviour, the damaged component will be replaced with an identical unit.

8.14 Backup Power Provisions

The system utilizes APC (American Power Corporation) industrial strength UPS devices. Two high-grade devices are allocated for each data center. They are installed within an APC key-locked rack with other system and networking equipment. Under the full load, these devices allow up to fifteen minutes of operation for data center components.

CHAPTER 9: AUDIT FUNCTIONALITY

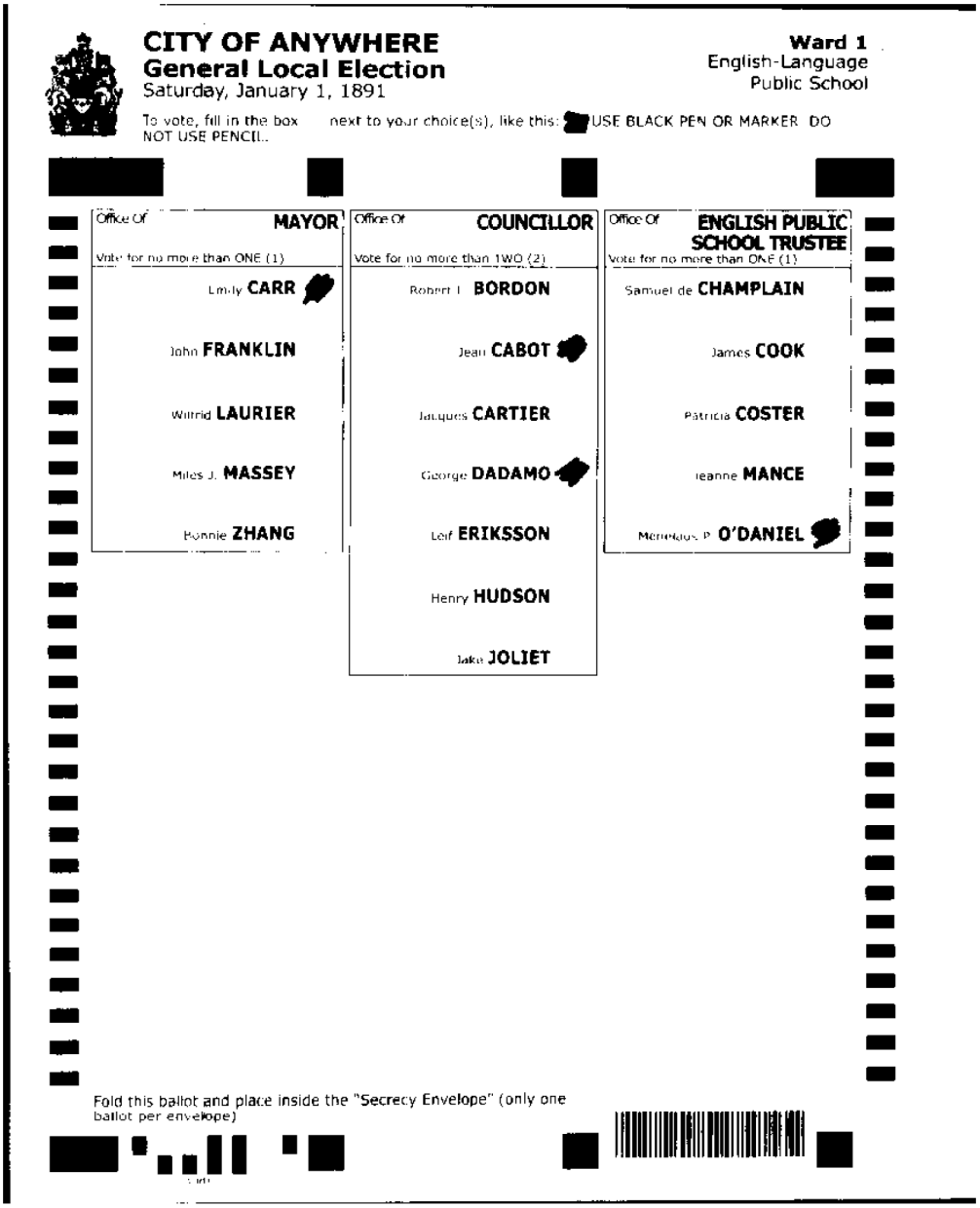
For full details on the ImageCast® system's audit functions, as required in VVSG Vol. 1 Section 2.1.5, please refer to the following user guides:

- *Democracy Suite® EMS Election Event Designer User Guide*
- *Democracy Suite® EMS Results Tally & Reporting User Guide*

9.1 Transparency and Accuracy

Transparency in tabulation methods (hardware, software) is a prerequisite for demonstrating accuracy. Hence, the AuditMark® feature, see Figure 9-1, clearly shows the accuracy of the system when compared to the intentions of the voter. The figure presents the ballot image recorded as a permanent audit record with appended ballot AuditMark® information, including the central scanning device and its software recognized and recorded from the ballot.

In the central scanning application, each ballot is stored electronically as an image and an interpretation of the ballot. These ballot image audit record entries include the time-and-date stamp. The generation of audit record entries is not terminated or altered by program control, or by the intervention of any person. The physical security and integrity of the record are maintained at all times. The accurate nature of the audit records is ensured by a signature on the audit record file. See *2.06 - Democracy Suite® System Security Specification* for more details on signature and encryption methods




```
BALLOT ID: 1001  BALLOT: 4  POLL ID: 65534
MAYOR :
VOTE FOR: EMILY CARR
COUNCILLOR WARD 1 :
VOTE FOR: JEAN CABOT, GEORGE DADAMO
ENGLISH PUBLIC SCHOOL TRUSTEE WARD 1 :
VOTE FOR: MENELAUS P. O DANIEL
```

Figure 9-1: Acquired ballot image with ballot AuditMark® (lower half)

Using EMS Results Tally & Reporting, ballot images can be inspected using different filtering mechanisms:

- Audit all ballots from the given poll/ward area.
- Audit all ballots which match certain criteria - blank, overvoted, undervoted, etc. These criteria attributes can be combined with poll/ward information.
- Audit ballots that require adjudication.
- Audit a random number of ballots.

These ballot image audit records can be printed using the ImageCast® EMS Results Tally & Reporting system. As per VVSG Vol. 1 requirements, this printing procedure meets the following:

- Generation of audit trail records does not interfere with the production of output reports.
- Entries can be identified so as to facilitate their recognition, segregation, and retention.
- Audit record entries are kept physically secure.

Scanning results are stored either locally or on the shared network drive, depending on the configuration of the system. In most cases, the default configuration will store results on the NAS network share directory. However, if results are stored locally, they can be found on the HDD, which is 500GB or larger. Results will be retained for a period of at least 22 months as per manufacturer specifications.

Using this approach, a complete process of image acquisition and recording of corresponding results (votes) can be verified.

9.2 Removable Memory

There are no removable memory devices deployed in the ImageCast® Central system.

9.3 Permanent Printed Reports

The following reports are printed via the network or attached printer.

9.3.1 Diagnostics Report

During diagnostics, the printer produces a record of each test performed by the user. It also provides the ability to produce multiple records.

9.3.2 Zero Report

The zero report is a results report that shows that there are no ballots yet cast in the election. The report lists:

- Name and details of the election
- Date and time of when the report was generated
- All candidates and the number of votes they each received by precinct.

NOTE: The order in which candidates appear is defined by the DCF options set in the EMS System.

Dominion recommends that these reports, once printed, be kept in a physically secure location for a period of at least 22 months.

9.4 Audit Log File

Every action, event, and operation that occurs on a ImageCast® Central is permanently logged to an audit file that exists on the host workstation and the host results server. This file can be found in C:/dvs/log/

All audit record entries include a time-and-date stamp. The generation of audit record entries is terminated or altered by program control, or by the intervention of any person. The physical security and integrity of the records are maintained at all times.

The Audit Log can be printed using the ImageCast® EMS Results Tally & Reporting system. Dominion recommends that this log, once printed, be kept in a physically secure location for a period of at least 22 months.

As per VVSG Vol. 1 requirements, this printing procedure meets the following:

- Generation of audit trail records does not interfere with the production of output reports.
- Entries can be identified to facilitate their recognition, segregation, and retention.
- Audit record entries are kept physically secure.

9.5 Post-Election Audit Functionality (AuditMark®)

For each ballot that is scanned, interpreted, and accepted into the unit, a corresponding AuditMark® image is created and stored for auditing purposes. The system uses these images to audit the unit's interpretation of each individual ballot.

The AuditMark® image consists of two parts:

- Top part of the image contains a scanned image of the ballot (the voter markings are of particular importance).
- Bottom portion consists of a machine-generated analysis summary showing each mark that the unit interpreted for that particular ballot. The analysis summary will also provide information on error conditions detected on the ballot and the interpretation of voter intent.

9.6 Maintaining Privacy

The system does not make any direct correlations between voters and ballots cast. In addition, the system filters out all ballots containing unusual voting marks and schedules such ballots for adjudication. This includes instances when voters sign the ballots or print their names on the ballots. Such actions may cause the ballots to be rejected from the ballot count.

CHAPTER 10: SECURITY

10.1 Software and Firmware Installation

ImageCast® Central software (programming code and data) is broken into the main components seen in Table 10-1.

Component	Location	Function	Specific To
BIOS Loader	HDD	Load Operating System	Generic
Operating System	HDD	Load and Run Application Loader. Supports the ImageCast application.	Generic
ImageCast program	HDD	Analyze ballots as specified by Election Definition files, output to Election Results files	Any election
Election Definition files	HDD	Defines layout of ballots, races, candidates, etc.	Election-specific
Election Results files	HDD	Holds the results of the election	Election-specific

Table 10-1: Main Components of the ImageCast® Central Software

The election files (both Definition and Results files) contain only data and no programming code. They are only "election specific" components and reside on a separate memory device from all other components.

Please refer to *Democracy Suite® ImageCast® Central Installation and Configuration Procedures* for details on software and firmware installation.

10.2 Software Validation

Before processing an election, the ImageCast® Central device must be validated to ensure that it only contains EAC-certified code.

This requirement is satisfied through the use of FIPS 140-2 algorithm. A hash code signature (SHA-256) is appended to each firmware file in the ImageCast® Central file system.

Note that if the ImageCast® Central application software needs to be modified, and the new version re-certified, this verification tool will also need to be updated to reflect the new state of the ImageCast® Central firmware.

10.3 Accessibility

The Administrator requires no pass codes but rather uses a iButton security key in order to perform administrative functions on the ImageCast® Central tabulator.

10.4 Election File Security

The iButton security key contains two encryption values to provide security for the ImageCast® Central election files. The first value is common to all keys distributed for a particular election. It is used to decrypt Election Definition files (DCF and VIFs) and to encrypt Election Results (RIFs) and Audit Trail files. The algorithm using the common value to encrypt election files is AES-128.

The second encryption value stored in the “administrative access key” is unique to the tabulator (i.e. this value will be the same on all keys destined for the same tabulator, but different for different tabulators). When generating the Election Definition files, EMS uses this unique value to create a digital signature of the files. Similarly, the ImageCast® Central uses this value to create signatures for the Election Results and Audit Trail files. The algorithm used for both is SHA-256.

10.5 Audit Trail Files

The Audit trail file is stored in memory and contains a chronological list of all messages generated by the ImageCast® Central software. This includes:

- System startup messages (recorded by the Application Loader)
- System self-diagnostic test messages (memory test, module initializations)
- All administrator operations (messages include the “access key” id number)
- Source and disposition of system interrupts resulting in entry into exception handling routines
- All messages generated by exception handlers’ notification of system login or access errors, file access errors, and physical violations of security as they occur, and a summary record of these events after processing
- Non-critical status messages that are generated by the machine’s data quality monitor or by software and hardware condition monitors
- All scanned ballots
- All system errors (paper jams, power failures, hardware failures, data errors etc.)

To ensure the integrity of the Audit log, all records added to the file are encrypted using AES-128 and the common key value and the entire file is signed using a SHA-256 hash and the tabulator’s unique key value.

10.6 Operational Protection

The Data Center has a redundant set of Democracy Suite® EMS application and database servers. These are in addition to internal RAID disks located within each of the servers and in addition to any NAS (network attached storage) device(s). This means that the system is designed for data backup, as well as overall system replacement if one server fails.

All servers are configured with application and server database level monitoring with log files in real-time. This identifies any unexpected system behavior.

10.7 Security Back-Ups of Data

The Democracy Suite® system includes four levels of backup:

- Each server has an integrated RAID disk array for replication of data (everything that is stored on one disk is replicated to the other disk in the RAID array within the same server).
- Each server has a backup server (redundant architecture). In turn, whatever is stored in one server is also replicated to the other server.
- Each data center has a 1TB NAS (network attached storage) for periodic backup of data (database files and scanned images of the ballots).
- Each server has a DVD-R/W drive which can be used to make additional back-ups if desired.

During system usage, active monitoring, event logging, and alarm event notification is enabled so that administrative personnel can analyze the system's back-up operation. For data integrity purposes, each stored and backed-up file or set of files is hashed and digested values can be compared.

CHAPTER 11: BUSINESS CONTINUITY

11.1 Minimization of and Prevention of Faults

Every central count location includes a Data Center system where scanned ballot images and results are stored. All server components have integrated RAID disks to allow for multiple copies of ballot images and result files. In addition, the Data Center system includes multiple UPS devices which provide up to fifteen minutes of reserve power in the case of main power failure. These 15 minutes can be used to prepare all system components for safe shut down procedures without losing any previously acquired sensitive data.

The system keeps progress counts as well as an image of each scanned ballot, which means that ballots do not need to be recounted in the event of a main power failure.

11.2 Dealing with Failures of Any Major Component

All major components are specified with spare capacity (scanners) or redundancies/backups/failovers (network equipment). A complete backup network can be provided if one entire system experiences catastrophic failure.

Scanner system: Each scanner is modular. If a scanner or workstation malfunctions, the hardware is replaced.

Site network and intra-communication: Each component in the server system has redundancy to ensure that in the unlikely event that an element malfunctions, the backup element will assume the full role without any service interruption.

A full contingency contains a completely configured server rack with all components. If a rack fails, the solution contingency is to transport the back-up rack to the location and re-configure it for the scanning system.

11.3 Times to Restore to Normal Service

A server failure that requires resumption of service by a redundant server experiences no service interruption. Scanner hardware can be replaced in less than twenty minutes. Replacing a complete server rack depends on planning arrangements to provide emergency transport. Once in place, the system must be reconfigured. This is done by copying configuration files to the correct directories from DVD storage devices. The estimated time for this activity is in the order of hours.

11.4 Relocating a Venue to an Alternate Site

System provisions allow for relocation. Any count center can be completely relocated by transferring all equipment to a new counting location. Conversely, any counting location can be used to count any set of ballots, therefore a counting center can be relocated by moving all ballots and personnel to a new site.

11.5 VVSG 1.0 Volume 1 Availability Standard

As discussed in relevant TDP documents, the ImageCast® Central system meets the VVSG Availability standard in the consolidation of vote selection data from multiple counting devices to generate jurisdiction-wide vote counts, including storage and reporting of the consolidated vote data.

Please refer to *2.03 - Democracy Suite® EMS Functionality Description.*

CHAPTER 12: RELEVANT REQUIREMENT REFERENCES

Below are relevant VVSG Vol. 1 requirements which are to be noted in this document, and the corresponding external TDP document which describes system compliance with each requirement:

VVSG Vol. 1, 2.1.1 Security

- System security is achieved through a combination of technical capabilities and sound administrative practices. To ensure security, all systems shall:
  - Provide documentation of mandatory administrative procedures for effective system security.
- Please refer to *2.06 - Democracy Suite® System Security Specification*.

APPENDIX A: ERROR MESSAGES

This Appendix lists all error messages requiring intervention by an operator or election official.

They are sorted below according to the phase or point of system operation in which they are most likely to be encountered.

A.1 Application Initialization

Only ONE INSTANCE of
\dvscentral may be running at
one time.

Please install Kofax ActiveX control!

Error loading the configuration ([ScanState |DebugCfg |])
Run \dvscentral with those settings defaulted?

Cancel will exit.\dvscentral

Poll State is inconsistent and must be reinitialized.
Proceed?

DCF File shows no Barcode!
Continue anyway?

No barcode support from [Scanner][or][ImgProc.dll]
Continue anyway?

[Initialization Failure|Tabulator Reset Failed] (<ERROR_NUMBER>).

<ERROR_DESCRIPTION>

ERROR_DESCRIPTION:

"Success",

"Error creating file",

"Error creating directory",

"File exists",

"No file",

"Configuration failure",

"DLL load failed",

"User option: delete",

"User option: rename",

"User option: exit",

"Full",

"No access",

"Could not Initialiaze OLE",

"Out of memory",

"Failed to create TIFF output file",

"Bitmap err",

"Bad ballot",

"Pages out of sequence (back-to-back)",

"Pages out of sequence (front-to-front)",

"No Barcode found",

"Unknown Barcode found",

"DCF failure",

"Application is incompatible with this version of Election Files",

"RIF failure",

"Front/Back barcodes mismatched",

"Unknown error",

"File Read error",

"File Write error",

"No barcode support",

"Scanner initialization error",

"Blank Page",

"Retrying",

"Ballot being flushed due to previous error.",

"Scanner parameter successfully adjusted.",

"Scanner does not support selected parameter.",

"Failed to adjust scanner papersize to legal.",

"Invalid dialog parameter.",

"Range values overlap.",

"Dialog parameter unspecified.",

"Page inverted.",

"ImgProc failed to complete.",

"Duplex scanner required for dual sided ballots.",

"Unable to spawn sub-process.",

"Exceptional code."

Cannot write to the 'Server Path'.

Please verify the path is correct.

Tabulator has been CLOSED by
the Administrator. To scan more
ballots, it must be re-opened.

Error: Timer failed to start!

Error loading Message Table.

Incompatible

version:

<DLL_FILE_PATH>

\dvscentral will

terminate. Failed to

load:

<DLL_FILE_PATH>

\dvscentral will

terminate.

Error creating Mutex <MUTEX_NAME> - Object already exists.

Error <ERROR_NUMBER> creating Mutex <MUTEX_NAME>

Enque on Mutex failure <ERROR_NUMBER>

[Failed to set scanner use to |Scanner does not support requirement of |Scanner settings readjusted to:][200 DPI][, and][[Maximum |Legal |New]Papersize][, and][Duplex.][, and][Portrait,Rotation=0.][, and][Non-Continuous]

A.2 Security Verification

Incorrect Password.

Please check that you are using the correct password.

Improper format for Admin key.

Password does not match Election database.

Incorrect Supervisor password. Attempt <ATTEMPT_NUMBER>

A.3 Scanner Initialization

Can’t load KScan OCX Control

Can’t load KIMGP.OCX,

image processing features will be disabled

Can’t connect KIMGP
OCX to KSCAN OCX,
image processing
features will be disabled

Could not save scanner configuration to <FILENAME>

*** Source not defined ***

<DEVICE_ALIAS> is already in use.

Would you like to select another source?

No Scanner available

Error <KOFAX_ERROR_NUMBER> - <KOFAX_ERROR_DESCRIPTION>

Unhandled Error in ’<FILENAME>’ at line <LINE_NUMBER>

Failed to initialize scanner (Error
<ERROR_NUMBER>). Continue anyway?

Image Resolution must be 200 DPI.

Front and Back Rotations do not match.

Rotation for Portrait scan must be 0 or 180 degrees.

Rotation for Landscape scan must be 90 or 270 degrees.

Image Rotation not supported on this scanner.

Landscape Rotation not supported on this scanner.

Continuous mode not supported for Landscape Rotation.

A.4 Application Configuration

Local Path has <LENGTH> characters. Maximum allowed is <MAX_LENGTH>.

'Local Path' does not exist.

Please verify the path is correct.

Cannot write to the 'Server Path'.

Please verify the path is correct.

You have changed the Server path.

No results will be lost since no batches have been accepted yet. Do you wish to proceed?

You have changed the local path. If you continue, the tabulator will be RESET and must be restarted. Any batches already saved in the NEW directory '<DIRECTORY>' will be lost. Do you wish to proceed?

[Failed to set scanner use to |Scanner does not support requirement of |Scanner settings readjusted to:][200 DPI][, and][[Maximum |Legal |New]Papersize][, and][Duplex.][, and][Portrait,Rotation=0.][, and][Non-Continuous]

You have chosen to use Image Files, but have not selected any.

Poll Id ranges overlap.

Please specify at least one valid Poll Id.

Please verify Poll Id ranges.

Please choose a Poll Id number from within the specified range.

Error setting Registry Entry.

The only batch that is available is Batch 1.

Please enter a batch number between 1 and <MAX_BATCH_NUMBER>.

Please enter a numeric batch number between 1 and <MAX_BATCH_NUMBER>.

This will reset the values in this dialog box to those defined in the DCF configuration. Okay to proceed?

Could not find (internal) ballot id = <BALLOT_ID>.

This will remove the messages from the log display on the screen only. It will not affect the messages stored in the log file.

Is this is what you wish to do?

%Misread or unknown ballots cannot be tallied.

%Please change your settings so that misread or unknown ballots are not sent to a bin that %is being tallied.

A.5 Batch Scanning

Error: Empty Images.

Maximum Batch number reached. You cannot close this batch!

Maximum Batch number reached.

You will not be able to close subsequent batches!

Unexpected files for <BATCH_NUMBER> found on server. They will be deleted

Failed to remove <BATCH_NUMBER> files from <SERVER_PATH>. Please check permisons and retry.

Then you agree to deleting <BATCH_NUMBER> files from the server?

Directory <RESULTS_DIRECTORY> does not contain consistent Results files

Directory <IMAGES_DIRECTORY> does not contain Images of <BATCH_COUNT> pages for batch <BATCH_NUMBER>. Retry or press Cancel to Exit.

Directory <RESULTS_DIRECTORY> does not contain consistent Results files for batch <BATCH_NUMBER>. Retry or press Cancel to Exit.

Directory <IMAGES_DIRECTORY> does not contain Images of <BATCH_COUNT> pages for batch <BATCH_NUMBER>.

Retry or press Cancel to Exit.

Failed to create Directory '<IMAGES_DIRECTORY>'. Retry or press Cancel to Exit \dvscentral.

DEBUG: Cannot delete from directory <DIRECTORY_PATH>

Error <ERROR_NUMBER>. Could not move to new Batch Directory

'<BATCH_DIRECTORY>'

Batch cannot be closed!

Could not rename <BATCH_DIRECTORY> back to <TEMP_DIRECTORY>.

Press 'Cancel' to terminate \dvscentral", Could not rename '<DIRECTORY>'.

'<OLD_DIRECTORY>' renamed to <NEW_DIRECTORY>.

Could not rename files in '<DIRECTORY>'.

Files in '<DIRECTORY>' renamed

Could not copy batch to server '<SERVER_PATH>'

Batch cannot be closed!

Please don't to that again.

Use the icon on the screen

Exception found on the <BALLOT_INSTANCE> ballot scanned:

[(Barcode = <BARCODE_STRING>) |]

[- Imprinted with '<ENDORSER>'|]

<ERROR_DESCRIPTION>

Last <ADDITIONAL_BALLOT_COUNT> ballots NOT counted.

ERROR_DESCRIPTION:

"Blank ballot detected.";

"Write-in. ";

"Overvoted. ";

"Undervoted. ";
"Ambiguous. ";
"Rank repeated. ";
"Multiple ranks assigned. ";
"Rank skipped. ";
"No rank assigned. ";
"Major contest Overvoted. ";
"Major contest Undervoted. ";
"Success",
"Error creating file",
"Error creating directory",
"File exists",
"No file",
"Configuration failure",
"DLL load failed",
"User option: delete",
"User option: rename",
"User option: exit",
"Full",
"No access",
"Could not Initialiaze OLE",
"Out of memory",
"Failed to create TIFF output file",
"Bitmap err",
"Bad ballot",
"Pages out of sequence (back-to-back)",
"Pages out of sequence (front-to-front)",
"No Barcode found",
"Unknown Barcode found",
"DCF failure",
"Application is incompatible with this version of Election Files",
"RIF failure",
"Front/Back barcodes mismatched",
"Unknown error",

"File Read error",
"File Write error",
"No barcode support",
"Scanner initialization error",
"Blank Page",
"Retrying",
"Ballot being flushed due to previous error.",
"Scanner parameter successfully adjusted.",
"Scanner does not support selected parameter.",
"Failed to adjust scanner papersize to legal.",
"Invalid dialog parameter.",
"Range values overlap.",
"Dialog parameter unspecified.",
"Page inverted.",
"ImgProc failed to complete.",
"Duplex scanner required for dual sided ballots.",
"Unable to spawn sub-process.",
"Exceptional code."
Exception found on the <BALLOT_INSTANCE> ballot scanned:
[(Barcode = <BARCODE_STRING>) |]
[- Imprinted with '<ENDORSER>'|]
<ERROR_DESCRIPTION>
Last ballot NOT counted.
ERROR_DESCRIPTION: see above
Exception found on the first ballot scanned:
[(Barcode = <BARCODE_STRING>) |]
[- Imprinted with '<ENDORSER>'|]
<ERROR_DESCRIPTION>
None of the <BALLOT_COUNT> ballots scanned were counted.
ERROR_DESCRIPTION: see above
Exception found on the first ballot scanned:
[(Barcode = <BARCODE_STRING>) |]
[- Imprinted with '<ENDORSER>'|]
<ERROR_DESCRIPTION>

Neither of the 2 ballots scanned were counted.

ERROR_DESCRIPTION:

see above

Exception found.

<ERROR_DESCRIPTION>

The one ballot scanned <BARCODE_DESCRIPTION> <ENDORSER_DESCRIPTION> was NOT counted.

ERROR_DESCRIPTION: see above

Please insert ballots into scanner and try again.

Paper jam on first page of scan.

Please clear scanner and retry.

[<BALLOT_COUNT> ballots already scanned in this batch.]

Paper jam after <BALLOT_COUNT> pages.

Please check the scanner before continuing with this batch.

Failed to write page <PAGE_NUMBER>. Please resubmit the batch.

Scanner Driver Error. Please check scanner.

Scanner not reserved.Cannot begin scan.

All Poll Ids are currently closed.

Before scanning more ballots, the Administrator must open new Poll Ids.

One ballot has already been scanned into this batch Are you certain that you wish to add to it?

<BALLOT_COUNT> ballots have already been scanned into this batch. Are you certain that you wish to add to it?

If you stop the scanner the entire batch must be resubmitted. Do you wish to do so?

Error <ERROR_NUMBER> creating Total Results for batch <BATCH_NUMBER>.

There is already one ballot scanned into this batch. Are you certain you wish to discard it?

There are already <BALLOT_COUNT> ballots scanned into this batch. Are you certain you wish to discard them?

Error: Empty Images.

Device not reserved

Error <KOFAX_ERROR_NUMBER> - <KOFAX_ERROR_DESCRIPTION>

Unhandled Error in '<FILENAME>' at line <LINE_NUMBER>

%Unable to set scanner online. Please do it manually, then click OK.

%Failed to put scanner in online state.

%Please check for errors on the scanner LCD, and try again.

%An attempt to scan the next ballot failed.

%Please check the scanner LCD for errors. %Then try your scan again.

%If there are any sheets currently in the scanning path, %please remove them and place them back in the input tray.

%(These sheets have NOT been processed or counted). %Then click OK to reset the scanner.

%An attempt to scan the first ballot failed.

%Please check the scanner LCD for errors. %If there are sheets in the paper tray, remove %them and place them back in the input tray. %(These sheets have NOT been processed or counted.) %Then try your scan again.

%An attempt to scan the first ballot failed. %Please check the input tray for paper, %and for possible paper jams.

%If there are sheets in the paper path, remove

%them and place them back in the input tray. %(These sheets have NOT been processed or counted.) %Then try your scan again.

%Please remove all sheets from the scanning path %and place them back in the input tray. %(These sheets have NOT been processed or counted.) %Then click OK to reset the scanner.

%A STOP CONDITION HAS BEEN ENCOUNTERED.

%Please remove the sheet in the output diversion area

%(or the ballot furthest along the paper path should %the output diversion area be free of ballots.) %Once the sheet has been removed, click OK.

%If there are sheets in the paper path, remove %them and place them back in the input tray. %(These sheets have NOT been processed or counted.) %Then click OK to reset the scanner.

%(To resume scanning, press the SCAN button

%once the scanner has reset.)

%Please remove all sheets from the scanning path %and place them back in the input tray. %(These sheets have NOT been processed or counted.) %Then click OK to reset the scanner and resume.

%If the last ballot was not delivered successfully into bin <BIN NUMBER>, %please remove it from the scanning path and place it there manually. %If the destination bin is full, please remove the ballots in that bin %and set them aside temporarily so that scanning may continue. %Then click OK.

A.6 Ballot Review and Results Reporting

I'd like to show you the file '<FILENAME>'" Failed to attach Viewer thread

Error <ERROR_NUMBER> creating report '<FILENAME>'

POLL CLOSURE, REOPENING, AND RESETTING

The configuration does not permit re-opening of the Tabulator.

Are you sure you want to re-open the tabulator?

A batch is still open.

Please close the batch before attempting to close tabulator.

Are you sure you want to close the tabulator?

No further ballots will be read [and the TABULATOR CANNOT BE RE-OPENED.|until it is re-opened.] Tabulator re-opened.

Tabulator is now closed.

A batch is still open.

Please close the batch before attempting to close the Poll Id.

Poll Id <POLL_ID> is the last open Poll Id.

If you close it, you will not be able to scan any more ballots!

Are you sure you wish to close this Poll Id?

Are you sure you wish to close Poll Id <POLL_ID>?

This action will remove data from all of the processed batches!

Are you SURE this is what you want to do?

Tabulator State Reset.

A.7 Application Termination

This will terminate the application

Are you sure this is what you want to do?

[

Scanning is still active.]

[

Poll results may be lost!]

A.8 Miscellaneous Errors

Out of memory. <EXECUTABLE_NAME>

invalid .exe file. <EXECUTABLE_NAME>

file not found.

<EXECUTABLE_NAME>

Unexpected error <ERROR_NUMBER>.

<EXECUTABLE_NAME>

*** Out of Memory! ***

REVISION HISTORY

Rev.	Date	Summary
3	12-13-2022	Removed section 1.5 Document Status
2	11-02-2022	Revised section 1.2 Relevant Disclaimers to correct D Suite version
1	04-28-2022	Branched for 5.13-A

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VVSG TRACE LIST

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End of Document

DOMINION
VOTING
Our customers come first.