

2.03 - Democracy Suite[®] ImageCast[®] X System Functionality Description

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CHAPTER 1: INTRODUCTION

This document describes the functionalities of the Dominion Voting ImageCast[®] X Ballot Marking Device and ImageCast[®] X Direct-Recording Electronic with the Voter Verified Paper Audit Trail, VVPAT, printer.

The ImageCast[®] X consists exclusively of COTS available hardware and operating system, while the application installed on top customizes its behavior and turns it into a Ballot Marking Device or a Direct-Recording Electronic voting device.

The section labels are based on Section 2 of the VVSG 1.0 Volume I document.

1.1 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.

1.2 Document Use

This document is intended for use with the Democracy Suite[®] 5.13-A platform.

1.3 Purpose and Scope

This document contains the ImageCast[®] X functionality specifications and it covers a variety of system security mechanisms integrated within the system.

1.4 Document Organization

This document is organized as follows:

Introduction - Provides introductory information about the system.

Overall System Capabilities - Provides an overview of the required functional capabilities that are system wide and not unique to pre-voting, voting or post-voting operations.

Pre-Voting Capabilities - Provides a description of the ImageCast[®] X tabulator's pre-voting capabilities.

Voting Capabilities - Provides a description of the ImageCast[®] X tabulator's voting capabilities. Post-Voting Capabilities - Provides a description of the ImageCast[®] X tabulator's post-voting capabilities.

Maintenance, Transportation and Storage - Provides details on, and/or references to other documents containing maintenance, storage and transportation information.

Relevant Requirement References - Provides a list of relevant requirement references.

Error and Status Messages List - List of all error and status messages for the ImageCast[®] X tabulator.

Verification at the Polling Place - Verification procedures at the polling place.

1.5 Design Responsibility

Dominion Voting is the design authority.

1.6 Design Authorities and Allowed Authors

Noted above.

1.7 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.

CHAPTER 2: OVERALL SYSTEM CAPABILITIES

This section provides an overview of the required functional capabilities.

These capabilities are system wide in nature and are not unique to pre-voting, voting or post-voting operations.

2.1 Security

The ImageCast[®] X 5.13-A platform provides the following security controls that increase the system's overall protection:

- Access control mechanisms with security credentials that are used to authenticate and authorize users.
- Data integrity security mechanisms that use NIST approved algorithms for the signing of data.
- Data confidentiality security mechanisms that use NIST approved algorithms for software-based encryption and decryption of data.
- Non-repudiation security mechanisms with real-time audit logs.

For a complete description of Democracy Suite's security controls, please see 2.06 - Democracy Suite[®] System Security Specification, as referenced in 2.03 - Democracy Suite[®] EMS Functionality Description.

2.2 Accuracy

The ImageCast[®] X election software application is designed to utilize logical level mechanisms to ensure overall system accuracy.

This is achieved by using NIST approved integrity check mechanisms (HMAC and SHA256).

The ImageCast[®] X can operate in one of two modes:

2.2.1 BMD - Ballot Marking Device mode

The ImageCast[®] X can be configured to produce two types of ballots.

The ICX can either produce a:

- Completely human-readable marked ballot that can be scanned on an ImageCast[®] Precinct, ImageCast[®] Evolution or ImageCast[®] Central tabulator.

or:

- A ballot known as an Electronic Mobile Ballot (EMB), which consists of a 2D barcode and a human readable voter intent. The EMBs can be scanned on ImageCast[®] Precinct, ImageCast[®] Evolution or ImageCast[®] Central. Using our patented technology, AuditMark (voter intent integrated with the scanned image), any authorized election official can perform an audit by comparing the information on the EMB with the AuditMark.

2.2.2 DRE - Direct-Recording Electronic mode

ImageCast[®] X stores the votes electronically, in an encrypted container, on as many or as few locations as defined in the configuration file, so multiple copies of result files are present on the system at all times.

The results can be loaded and processed in the Democracy Suite[®] EMS Results Tally and Reporting application.

2.3 Error Recovery

The ImageCast[®] X utilizes the operating system and third-party software (Android) provided mechanisms for error recovery.

In case of a component failure, depending on the mode of operation, the following steps can be taken to ensure continuous operation:

2.3.1 BMD

Device failure - In case of a device failure, the ImageCast[®] X device can be safely replaced with another ImageCast[®] X device or simply removed from the polling place as no data is ever kept on the ImageCast[®] X device itself (applies to both the ICX device and printer).

Printer failure - Same as for ImageCast[®] X device, the ImageCast[®] X printer can be simply replaced or, if no replacement is available, the voting terminal (ImageCast[®] X device and printer) can be disabled/removed without any impact on the voting process.

2.3.2 DRE

Device failure - The results are kept on the ImageCast® X device and a removable device (USB). While the removable device (USB) can be extracted from the failed ImageCast® X device in order to access the results, it cannot be used on the new ImageCast® X device that is put in place of the failed one.

Removable device (USB) failure or results lost - If configured as such, a copy of the results is kept on the device's internal memory, and in case of a removable device (USB) failure, the stored results can be exported to a new removable device (USB).

NOTE: VVPAT printer failure - The VVPAT printer can simply be disconnected and a new printer connected, without affecting the voting process more than the time necessary to replace the failed device.

NOTE: Please refer to the Voter-verified paper audit trail (VVPAT) Model: VRP3 User Guide for any additional maintenance information.

2.4 Integrity

The ImageCast® X device and its election software integrate numerous integrity mechanisms:

- Voting in the polling place can continue using regular paper ballots as a fallback option (BMD operating mode).
- Results are kept in multiple locations and are in constant sync. This process and storage location is separate from vote detection, interpretation, and reporting (DRE operating mode).
- The device is equipped with a backup battery as well as a UPS that protects the system against the interruption of electrical power.
- Hardware testing of the device was performed, and the device complies with FCC Class A device requirements.
- Temperature sensors monitor the system continuously and prevent the system from overheating.
- Cryptographic measures are used against failure of any data input or storage device.
- Cryptographic measures are used against attempt at improper data entry or retrieval.
- A log is used to track all events, both normal and abnormal. A permanent record is kept in the log. It cannot be modified or overridden, but it can be audited by designated authorized officials.
- The log contains every event and error condition that occurred in the system.

- The system performs the Power-on self-test (POST) and ensures the system is operational. Additionally, if a system detects a problem with a piece of hardware connected to it, it will not allow the voting to continue until the poll worker resolves the issue.
- Retrieval of results is an integral part of the Results, Tally, and Reporting application.

2.5 System Audit

This section describes the context and purpose of voting system audits and related, specific, functionality requirements.

Election audit trails provide the supporting documentation for verifying the accuracy of reported election results.

They present a concrete archival record of all system activity that is related to the vote tally.

As such, election audit trails are essential records that provide public confidence in the accuracy of the tally, information in the event of a recount, and evidence in the event of criminal or civil litigation.

2.5.1 Operational Requirements

The ImageCast[®] X maintains a real-time log of its operation, including error and audit log events.

The election software application has an integrated logging service, meaning it is active from the moment the device becomes operational.

The audit log file contains information about the event and its source, such as its time/date stamp, etc.

The log is stored on the ImageCast[®] X and can be exported to a USB flash drive on-demand by an authorized person.

Visual and audio based notifications are additionally employed for greater usability.

2.5.2 Use of Shared Computing Platforms

The ImageCast[®] X device is an application running on a COTS-based component, which, when properly configured, is in complete lock-down preventing access to other users and cannot be used as a general- purpose computing device.

2.6 Election Management System

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

2.7 Vote Tabulating Program

2.7.1 Functions

The Democracy Suite ImageCast® X platform includes the resident election application which performs a variety of functions, including:

- System initialization, configuration, and control - From the moment the device is powered on, it handles the processes of system initialization and configuration based on configuration provided by the EED (Election Event Designer) system installed and configured on the EMS Server.
- Error, exception and audit log reporting - Each action on the ImageCast® X Device is logged into the audit log. Additionally, each error or exception is logged and an appropriate message is displayed.
- System administration - Includes a role-based set of administrative functions, which allow administrative poll workers and technicians to perform a variety of administrative activities using the integrated touch-screen user interface on the ImageCast® X Device.
- Poll state administration - Manages the poll's life cycle from the moment the poll is opened until it's closed.
- Voting session administration - Depending on the status of the poll, the application manages voting session activation.
- Ballot printing - In BMD mode. Covers the process of printing a marked ballot from the perspective of ballot marking, printing, and scanning. This also includes controlling and monitoring the underlying hardware components, as well as interacting with the voters.
- Voting results reporting and maintenance:
 - In BMD mode, as no results are stored (ballots are only marked), voting reports can be generated using EMS RTR and ICP if it is used to verify and tally paper ballots marked using the ICX BMD.
 - In DRE mode, ICX can produce zero, result and status reports.

2.7.2 Voting Variations

Table 2-1 lists the voting variations supported by the ImageCast® X 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 which voting variations can be utilized at the same time (e.g. for a single election event).

As a result, the ImageCast[®] X 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 accordingly depending on the jurisdiction, state, and federal election rules.

- Closed primaries
- Open primaries
- Partisan offices
- Non-partisan offices
- Write-in voting
- Ballot rotation
- Straight party voting
- Split precincts
- Vote for N of M
- Ranked order voting
- Provisional or challenged ballots

2.8 Ballot Counter

The ImageCast[®] X application keeps track of the number of ballots printed or cast on a single device.

The ballot counter kept by the system per election event is kept from the the moment the application is installed.

The ballot counter increases with every ballot that is printed or cast successfully.

The ImageCast[®] X election application keeps track of the following counters:

- Private (Lifetime) counter - Total number of ballots cast using this device, cannot be reset.
- Public (Election) counter - Number of ballots cast in an election, can be reset by an authorized person before each subsequent election.

2.9 Telecommunications

The device is used in standalone mode with telecommunication features disabled.

However, if advanced Text to Speech capabilities are used, the device requires an Internet connection for a brief period during the installation and configuration phase, before any election information is stored on the device, in order to obtain Text to Speech files for a particular language.

In case static audio files are used, an internet connection is not required.

2.10 Data Retention

Results, election information, and the audit logs are stored in the ImageCast® X device's internal memory for as long as required.

To preserve system integrity, voting and audit data are kept on non-volatile data storage mediums.

In the case of ImageCast® X set of devices, the results and audit data are kept on the local, built-in eMMC storage device as well as a removable device (USB).

For instructions on how to export audit data to a removable media, such as USB stick, see ImageCast® X User Guide, Technician Section.

The storage media used in the system has demonstrated error-free data retention capabilities for at least 22 months, as per the manufacturer's specifications.

2.11 ImageCast® X Textual Resources

ImageCast® X Textual Resources are messages that appear on the screen for the voter. These messages can be customized to better suit the environment that is used or to resemble the messages that were used in the past. These messages are stored in a JSON file, one file per language used. The naming convention for the file is:

<language code>_<identifier>_localization.json Explanation:

- <language code> - Must match the language code used in the EED project (ISO 639 code)
- <identifier> - Unique number

The location of these files is the following:

\$NAS\Common\Resources\ImageCast_X\localizations.

Additionally, some of the textual resources need to be modified based on the operating mode of the device: Ballot Marking Device (BMD) or Direct Recorder Electronic (DRE).

The keys that need to be modified depending on the mode of operation are:

- confirm_dialog_cast_ballot_yes
 - Cast your ballot - DRE mode

- Print your ballot - BMD mode

After modifying the textual resources, election files must be re-generated. See Democracy Suite® EMS Election Event Designer User Guide for more details.

CHAPTER 3: PRE-VOTING CAPABILITIES

All pre-voting activities, including ballot preparation, general capabilities, ballot formatting, ballot production, election programming and ballot and program installation and control are part of the Democracy Suite® EMS Election Event Designer application.

For additional details on pre-voting capabilities, please refer to 2.03 - Democracy Suite® EMS Functionality Description.

3.1 Verification at the Polling Place

Verifying that the machine is ready for an election is an integral part of every election. As a result, the ImageCast® X unit has multiple procedures available for polling place verification:

- Available on screen at any time:
 - Election identification data
 - Software version number
 - Public ballot counter
- Available for authorized personnel:
 - Polling place identification
 - Identification of all ballot formats
 - The contents of each active candidate register by office and of each active measure register at all storage locations (zero report)
 - A list of all ballot fields that can be used to invoke special voting options
 - Hardware tests that can be used to confirm equipment is functioning as expected
 - Confirmation that the device is ready to be activated for accepting votes
- For additional verification procedure, please check Verification at the Polling Place

CHAPTER 4: VOTING CAPABILITIES

This chapter provides a description of the ImageCast[®] X ballot marking voting capabilities and functionalities that relate to opening the poll, printing marked ballots (BMD) or casting ballots (DRE) as well as closing the poll.

4.1 Opening the Polls

This section provides the description of the functional capabilities of the ImageCast[®] X as specified in the VVSG 1.0, Volume I, section 2.3.1.

4.1.1 Paper-based System

The ImageCast[®] X goes through several stages to verify that the system is functioning properly:

- When powering on, a set of internal diagnostics and software verification tests and procedures are performed.
- While in operation, the system monitors all connected USB devices (smart card reader, printer, accessibility device(s)) and batteries.

The device should be placed in a voting booth that provides voter privacy while marking the ballot.

After marking the ballot, the voter should cast the marked ballot directly into a secure ballot box (if a central count system is used), or feed it through the precinct optical scanner, before it is cast into a secure ballot box (if precinct count system is used).

The ballot counter is automatically activated after each ballot is cast/marked. The ICX Device contains a status bar with the following system status indicators:

- Device indicator
- Battery indicator
- Current date and time
- Number of ballots printed

The ImageCast[®] X system has been designed to comply with the following:

- All error messages requiring intervention by an operator or precinct official will be displayed or printed clearly in an easily understandable language and text, or in the form of a suitable visual indicator.

- All error messages that prompt corrections which will impact vote recording or vote processing are presented in a manner that is understandable to election officials. It is assumed that these election officials have been trained on system use and operation, but have not been formally trained on system servicing and repair.
- The message cue on the ImageCast® X system clearly states the actions that need to be performed in the event that voter or operator response is required.
- The design of the ImageCast® X system ensures that erroneous responses will not lead to irreversible errors.
- Nested error conditions are corrected in a controlled sequence so that the voting system is restored to its initial state that existed before the first error occurred.
- The ImageCast® X system displays and reports critical status messages using clear symbols or messages in easily understandable language (can be localized).
- Warnings and alerts issued by the voting system clearly state the nature of the problem and the set of responses available to the voter. The warning messages indicate the following:
 - If the voter has performed or attempted an invalid operation
 - If the voting equipment itself has malfunctioned in some way.

When battery status is below warning threshold then only a warning message is displayed to the voter every minute on login voter screen. For critical threshold, there is also a sound alert. If a voting session is started before battery status drops below a critical value, then no message will be displayed until the session is ended. If battery status is critical, the voter is not allowed to start a new voting session. Battery status is monitored only on devices equipped with an internal battery.

4.1.2 DRE System

Immediately after powering on, the unit becomes locked and will not function until the poll official accesses the system.

The ImageCast® X is unlocked using a valid access smart card and PIN combination, which is used to:

- Provide access control to the unit
- Copy and decrypt election definition files
- Open/close the poll
- Perform hardware testing

- View and export logs, reports, and results

Special care has been put into guiding the user to do the next appropriate step by disabling the actions that are not allowed or by providing a friendly message explaining what action needs to be performed in order to proceed further.

4.2 Activating the Ballot

Election officials are in full control over what ballot is presented to the voter. That is done by using either a voter card programmed just for the voter or by manually activating the voting session using the poll worker card.

Each eligible voter can cast a ballot.

The voter can only vote on the ballot defined for them in the system, hence preventing the voter from voting on any ballot they are not entitled to vote on.

The voter can not cast more than one ballot. The voter card is automatically marked as voted after every successful ballot cast. Also, in case of a manual session activation, the session is terminated after a ballot is successfully cast, and a poll worker card is required to start a new session.

A voter card can be activated in any election, including general elections.

The ballot the voter can see is linked to the appropriate party, in a primary election.

The ballot contains all of the portions that are defined for the voter. Similarly, all portions that are not defined will not be presented to the voter.

4.2.1 Marking of the ballot in BMD mode

Marking of the ballot in BMD mode consists of the following actions:

- The poll worker identifies the voter.
- The poll worker issues a Smart Card with the appropriate ballot style for the voter.
- The voter initiates his/her voting session by inserting the smart card into a smart card reader.
- The voter selects the language from the list of available languages.
- The ballot is presented to the voter.
- The voter makes his/her selections.
- The voter verifies the selections he/she made on the review screen.
- When satisfied, the voter can then print the ballot on the attached BMD printer.

- To finish the voting process, the voter has to perform one of the following actions:
 - Feed the ballot into a precinct scanner (ImageCast[®] Precinct or ImageCast[®] Evolution)
 - Place the ballot in the appropriate ballot box to be scanned later by a central scanner (ImageCast[®] Central)

When the voting process is finished, the Poll Worker needs to close the poll.

4.2.2 Marking of the ballot in DRE mode

Marking of the ballot in DRE mode consists of the following actions:

- Poll worker identifies the voter.
- Poll worker issues a Smart Card with the appropriate ballot style for the voter.
- Voter initiates his/her voting session by inserting the smart card into a smart card reader.
- Voter selects the language from the list of available languages.
- The ballot is presented to the voter.
- Voter makes his/her selections.
- Voter verifies the selections he/she made on the review screen.
- When satisfied, the voter can select to proceed to the next step, which can be one of the following:
 - DRE w/o VVPAT - The vote is stored onto a memory device - ballot is cast.
 - DRE w/ VVPAT - Voter must review the ballot once more on a VVPAT device before the vote is stored onto a memory device. In this mode, the voter has one more chance to change their mind and go back to the ballot, before the ballot is cast.
- The voting process is finished

When the voting process is finished, the poll worker needs to close the poll.

4.2.3 Conditional Voting

This section is a step-by-step guide on how to Manually activate a Provisional or Challenge voting session.

This can also be achieved by issuing the Voter a voter card (please refer to Democracy Suite[®] EMS ImageCast[®] Voter Activation User Guide for additional information).

4.2.3.1 Provisional Voting

In order to cast a provisional ballot on the ImageCast[®] X device follow the steps outlined below:

- Go to the Poll Administration screen
- Tap the Manual Session Activation checkbox.
- Tap on "Open Poll" button which redirects you to the Login Voter Screen
- Insert Poll Worker card again
- Choose "Activate Ballot" tab
- Enter ballot activation code and tap the Next button
- The dialog allows the Poll Worker to choose between a "Regular" and a "Provisional" voter.
- A dialog containing the Provisional code is generated and the user can write it down
- The Poll Worker will tap the Continue button and start the Provisional vote
- Cast ballot
- The provisional code will later be visible in the Result file.

4.2.3.2 Challenge Vote

In order to cast a Challenge ballot on the ImageCast[®] X device follow the steps outlined below:

- Go to the Poll Administration screen
- Tap the Manual Session Activation checkbox.
- Tap on "Open Poll" button which redirects you to the Login Voter Screen
- Insert Poll Worker card again
- Choose "Activate Ballot" tab
- Enter ballot activation code and tap the *Next* button
- A Challenge Code is generated which the user can write down
- The Poll Worker will tap the *Continue* button and start the Challenge vote
- Cast ballot

NOTE: Upon casting the ballot, the challenge code will later be visible in the Result file.

NOTE: When voting on the ImageCast[®] X, in BMD mode, the Provisional/Challenge voter's Voter Tag is found in the QR barcode and in the sub-header of the printed ballot.

NOTE: When setting the visibility of the Provisional/Challenge Voter Tag through the Machine Configuration File, the user can configure whether the code is shown in the sub-header of the BMD ballot, as well as the amount of details shown, by setting one of the following options:

NOT_VISIBLE (default) - Provisional data is not visible in the subheader.

SHOW_LABEL - Only the conditional label is shown in the subheader.

SHOW_LABEL_AND_CODE - The conditional mode and code are shown.

NOTE: If the font used for the sub-header text is too large, the Voter will be advised to contact the Poll Worker who can resolve the issue by resizing the text to a smaller font.

4.3 Casting a Ballot

This section provides a description of the functional capabilities of the ImageCast[®] X as specified in VVSG 1.0, Volume I, section 2.3.3.

4.3.1 Common

The ICX Device provides a font size equal to, or greater than, 3.0 mm (measured as the height of a capital letter) for all text, including the text for an accessible voting session (AVS).

The LCD screen is capable of showing all information in at least two font sizes:

- 3.0-4.0 mm
- 6.3-9.0 mm

All font sizes can be controlled by the voter.

There is no link between the vote and the voter, except when provisional or conditional voting is required. All choices the voter made are either printed (BMD) or recorded (DRE), for every contest or ballot measure. The voter is able to enter as many write-in votes as there are positions in the contest.

The device is equipped with a battery (ImageCast[®] X Prime device) or a UPS device (ImageCast[®] X Classic device).

In the event of main power supply failure, the voter is able to finish the voting session.

Afterward, the device can be either shut down gracefully or the voting can continue for as long as there is sufficient battery capacity.

Telecommunications are not used at the polling place.

NOTE: In the case of the ICX Advantage device, a static PNG image of a ballot is presented to the voter during the voting session. Since the static image does not allow for a change in font size, the ICX Advantage FullFace ballot allows the Voter to zoom in on a contest by tapping the screen for a better overview of the given choices.

4.3.2 BMD System

The voter can easily identify each candidate or a ballot measure on the printed paper, in the language they selected.

All marks the voter makes are registered.

The ballot is either placed in a secure ballot box (for central count operation) or fed through a ballot counting device (for precinct count operation).

Voter secrecy is preserved throughout the process by using voting booths, that allow for voter privacy.

Secrecy sleeves are used when placing a marked ballot into a secure receptacle (ballot box or precinct scanner).

During the voting session, the voter is constantly kept informed of the current state of the contest they are voting on, so they can see if there have made fewer selections than allowed (undervotes).

The system prohibits making more selections than the contest allows (overvotes).

The voter has one last chance to correct any mistakes or change their mind on the review screen that is presented before casting the ballot.

The review screen contains all of the selections the voter made.

4.3.3 DRE System

The system does not allow the presentation of any other information other than what was authorized by the election officials and preprogrammed into the system. No external information or link to any external information is possible.

All buttons, as well as the active area, are clearly marked and visible.

The voter can select to see the ballot in any of the preprogrammed languages.

There is a clear difference between selections that are marked and those that are not marked.

During the voting session, the voter is constantly kept informed of the current state of the contest they are voting on, so they can see if there were fewer selections made than is allowed by the system (undervotes).

The system prohibits making more selections than the contest allows (overvotes).

The voter has one last chance to correct any mistakes or change their mind on the review screen that is presented before casting the ballot. The review screen contains all of the selections the voter made. After selecting to cast the ballot, the voter is presented with one last confirmation dialog informing them that the action is irrevocable.

The voter is informed of the result of the vote storing process, be it successful or unsuccessful. In the case of the latter, the voter is presented with clear instructions on what to do next.

All computational actions related to voting do not last longer than 3 seconds.

The votes are stored in an encrypted CVR format and each CVR entry represents voter intent 100%. The stored votes are encrypted and are secure from tampering.

The votes can be converted to ballot images in a form readable by humans with help from additional software (part of EMS).

After each successful ballot is cast, the ballot counters are incremented.

By keeping all information encrypted and conforming to FIPS 140-2 norms, the secrecy of the vote is protected throughout the process.

The system allows the election officials to prohibit access to result storage by keeping the result storage behind a door secured with a security seal.

4.3.4 VVPAT Image Record

ImageCast[®] X has the ability to record the audit trail from the VVPAT and save it as *.tif* files. This is done by scanning the pages of each vote recorded using the VVPAT's internal scanner.

The scanned images are saved onto defined results locations in the following folder structure: **audit_trail > vvpap > regular / test.**

The **regular** folder refers to votes during a voting session and the **test** folder refers to votes created using the Vote Simulator.

For **regular** votes, the *.tif* files are named in the following pattern: *external tabulator number (5 digits) _ batch id (5 digits) _ record id (7 digits).* For example: *00005_00001_3506596.tif.*

For **test** votes created during vote simulation, the *.tif* files will have a TEST_ prefix to them. For example: *TEST_00005_00001_6924781.tif.*

The *.tif* file contains images of all the ballot pages for a single voting session, see Figure 4-1.

The AuditMark image is appended as the last image in the multi-page TIFF and contains information regarding all selected choices (and contests) from the printed ballot pages. This image contains a header with the following information:

- Scanned on: ICX
- TabulatorID: {TabulatorID}
- BallotSetID: {BallotSetID}
- BallotCards: {BallotCards}
- PrecinctID: {PrecinctID/PrecinctName}



Figure 4-1: Scanned VVPAT audit trail

Once the poll is closed, the result files along with the *.tif* files are imported into RTR, see Figure 4-2.

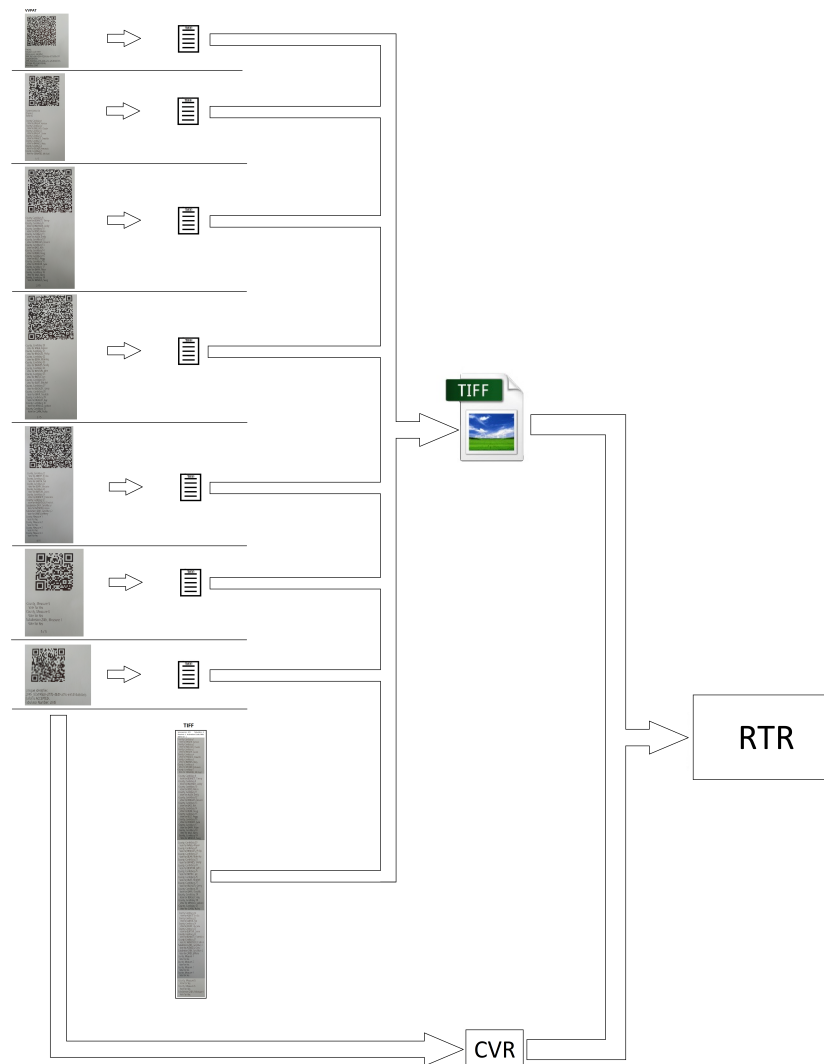


Figure 4-2: VVPAT

Using the **Re-Zero** button in the *Poll Administration* menu, will delete the *.tif* files only for the selected tabulator.

The **Clear All Election Data** button deletes all the *.tif* files from all the tabulators, including the *.tif* files, while the folder structure for the results remains.

For **Test** results and images, the **Clear test results** option, located in the Vote Sim screen, deletes the results and images only for the selected tabulator.

NOTE: To maintain optimum performance, the VVPAT should undergo a routine cleaning. This cleaning will remove any accumulated paper dust or other debris. If this causes any issues the quality of the scanned text, please perform a maintenance cleaning. For more information regarding the maintenance of the VVPAT, please see sections:

- “5.2 - CLEANING THE THERMAL HEAD” in the VVPAT User Manual.
- “VVPAT Preventive Maintenance Procedures” in 2.09 - Democracy Suite[®] ImageCast[®] X System Maintenance Manual.

CHAPTER 5: POST-VOTING CAPABILITIES

All voting systems shall provide capabilities to accumulate and report results for the jurisdiction and to generate audit trails.

In addition, precinct count voting systems must provide a means to close the polls including generating appropriate reports.

If the system provides the capability to broadcast results, additional standards apply.

5.1 Closing the Polls

The ImageCast[®] X allows for the poll to be closed if previously opened.

After the poll is closed, there is no option that would allow further casting of ballots.

The poll worker is presented with clear information pertaining to the poll closing procedure, and the current state of the poll is displayed on the screen.

Reopening the poll is not possible without removing the results and resetting the ballot counter (DRE) or resetting the ballot counter (BMD).

5.2 Consolidating Vote Data

Democracy Suite[®] EMS Results Tally and Reporting, or a compatible tool can be used to consolidate voting data.

Please see the corresponding 2.03 - Democracy Suite[®] EMS Functionality Description document.

5.3 Producing Reports

The ImageCast[®] X device can produce the following types of reports:

- Zero Report - Indicating that the results are zero and voting can begin. This report can only be generated when opening the poll.
- Status Report - Indicating the current status of the poll and counters
- Result Report - Similar to the zero report, a basic sum of votes for each of the candidates/measures. This report can only be generated when closing the poll.

All other report generation is performed using the EMS Results Tally and Reporting system, which is part of the EMS platform.

Please see the corresponding 2.03 - Democracy Suite[®] EMS Functionality Description document.

5.4 Broadcasting Results

Broadcasting of election results is performed using the EMS Results Tally and Reporting system, which is part of the EMS platform. Please see the corresponding 2.03 - Democracy Suite[®] EMS Functionality Description document.

CHAPTER 6: MAINTENANCE, TRANSPORTATION, AND STORAGE

The system is designed and manufactured to facilitate preventative and corrective maintenance, conforming to the hardware standards described in VVSG 1.0, Volume I, section 4.1.

For more details please refer to the 2.09 - Democracy Suite[®] ImageCast[®] X System Maintenance Manual.

All ballot marking, vote casting and tally equipment designated for storage between elections have been designed and manufactured to function without degradation in capabilities after transit to and from the place of use.

For more details please refer to the available proprietary manuals in accordance with the equipment being used.

CHAPTER 7: RELEVANT REQUIREMENT REFERENCES

For additional details please see the following documents:

VVSG 1.0 Vol. I - 2.1.1 Security

- See TDP Document 2.06 - Democracy Suite[®] System Security Specification

VVSG 1.0 Vol. I - 2.1.3 Error Recovery

- See Section 2.3 Error Recovery

VVSG 1.0 Vol. I - 2.1.5.2 Use of Shared Computing Platforms

- See TDP document 2.06 - Democracy Suite[®] System Security Specification, section 7.4 Shared Operating Environment and section C.1.3 Shared Operating Environment

VVSG 1.0 Vol. I - 3.2.3 Dexterity a, b, c

- AVS selections are made by applying pressure to assistive devices, such as the joystick, paddles or sip-and-puff unit (via the Tecla Shield or ATI device).
- The signal received from assistive devices connected to the Tecla Shield or ATI device do not require actual bodily contact, or for the body to be part of any electrical circuit.
- AVS voters can use methods other than their bodies to provide a signal from their assistive device to the Tecla Shield or ATI device (if available).

VVSG 1.0 Vol. I - 3.2.3 Dexterity d and e

- The signal received from Sip-and-Puff or Paddles connected to the Tecla Shield or ATI device does not require the use of hands, or for the body to be the part of any electrical circuit.
- AVS voters can use methods other than their hands to provide a signal using an assistive device connected to the Tecla Shield or ATI device.

CHAPTER 8: ERROR AND STATUS MESSAGES LIST

This section lists error and status messages that will be displayed to the user if any faults occur while performing tasks on the ImageCast[®] X device.

8.1 ImageCast[®] X Error and Status Messages

The following table (Table 8-1) contains a set of error messages associated with potential problems in the ImageCast[®] X system applicable across all of the units.

ICX Error Messages		
Error Message	Description	Action to overcome
Activation code on the card is not valid. Please remove your activation card and notify a poll worker for assistance.	The activation code on the smart card is not valid.	Write again smart card with the correct activation code.
Unable to read smart card data.	The data from the smart card cannot be read.	Write data to another smart card.
Cannot login, please call poll worker for assistance	The battery is below a critical threshold.	Explain to the voter why he cannot continue voting session on this unit, and offer him to vote on another with enough battery power.
Error connecting to the server. Please notify a poll worker for assistance	Generic error message.	Call poll worker for assistance.
Verification failed. Multiple ballot sizes detected. Multiple paper ballot sizes detected for the selected tabulator. Please adjust the project to have a single paper ballot size before continuing.	There are more than one paper ballot size selected for the project.	Select a single paper ballot size.

Table 8-1: ICX Error Messages

ICX Error Messages		
Error Message	Description	Action to overcome
Activation card is not valid. Please remove your activation card and notify a poll worker for assistance.	Activation card data is not correct.	Call poll worker for assistance.
There is already a vote recorded for this activation card. Please remove your activation card and notify a poll worker for assistance.	The system does not allow voting twice with the same activation card.	The certain activation code has already been used. Explain the voter why he is not allowed to vote twice.
The tablet is not connected to a printer. The ballot cannot be printed!	The system is checking if there is a printer connecting to the tablet when voter successfully logs in.	Call poll worker for assistance.
Smart card reader detached. To continue voting please attach the reader to the device.	The system detects if the smart card reader is detached or not. The voting session is automatically terminated.	Because voting session is ended when smart card reader is detached during voting, voter must start the voting session from the beginning when the smart card reader is reattached.
Smart card reader detached. To login as admin please attach the reader to the device.	The system detects if the smart card reader is detached or not.	Attach the smart card reader to the device and then log in as the admin.
An error occurred while printing ballot. Please remove your activation card and go to the election official for more info.	There are several errors that could happen during ballot printing (like paper jam, low ink, etc.).	Call poll worker for assistance.

Table 8-1: (Continued)ICX Error Messages

ICX Error Messages		
Error Message	Description	Action to overcome
<p>There are some warnings detected on your ballot. you can not make any more changes after printing the ballot.</p> <p>Please select the next action</p> <p>Your ballot will be printed on X sheets of paper. Make sure you collect all X sheets and scan them.</p>	<p>When a multiscard ballot is being printed, on the confirmation dialog, this message will display.</p>	<p>The ballot has some warnings. To correct them select Review your choices and once done then print your ballot.</p> <p>Press Print your ballot if there are no other changes needed.</p>
<p>Unable to read from the smart card. Please check if the smart card is valid and inserted correctly.</p>	<p>The smart card reader is not able to read data from the smart card.</p>	<p>Try to insert smart card into reader again, and if message shows again, call poll worker for assistance.</p>
<p>Error code 84 - Cast Ballot Error</p>	<p>Vote was not counted but the application has already changed the voter card status to "CAST" and an end voting time and tabulator number have been inserted.</p>	<p>A Poll Worker needs to be notified in order to resolve the lockout.</p>
<p>Voter card has been removed during casting Vote was not counted! The card is no longer usable! Please rewrite the voter smart card.</p>	<p>Message is shown after a Code 84 situation has been resolved by a Poll Worker.</p>	<p>If the voter leaves the voting place, the application needs to be unlocked by a Poll Worker.</p>
<p>Voter card has been removed. This ballot cannot be cast as it would violate a predefined rule (blank contest, blank ballot, overvote, undervote).</p>	<p>The voter card is removed while voting and the poll worker should unlock the unit. The poll worker's options are limited by the options selected in Voting rules.</p>	<p>Press Unlock the unit.</p>

Table 8-1: (Continued)ICX Error Messages

ICX Error Messages		
Error Message	Description	Action to overcome
There are corrupted result files on the machine. You need to perform ReZero to clear the results before you are able to continue.	There are already results with duplicate RecordIDs on the machine.	Perform a ReZero to clear the results before continuing.
All the found result files are deleted from the existing result locations. The result files from the missing storage path is not deleted. Storage paths that do not exist > /storage/... Export log to see detailed message.	The USB drive containing the result files is not attached when closing the poll.	Re-insert the USB drive and perform the ReZero again.
One or more unsupported USB mass storage devices are connected. Please detach all of them.	A non-certified USB mass storage device is inserted.	Remove the USB mass storage device and insert a certified USB mass storage device.
Selected file is not a valid ICX application. Please choose appropriate ICX application file and try again.	An invalid ICX apk file has been chosen and cannot be installed.	Select or import a valid ICX apk file and try installing it again.
Selected file is not a valid Google TTS application or is not compatible with this device. Please choose appropriate Google TTS application file and try again.	An invalid TTS apk file has been chosen and cannot be installed.	Select or import a valid TTS apk file and try installing it again.
Selected voice data file is not valid. Please select valid voice data file and try again.	An invalid Voice Data file has been chosen and cannot be installed.	Select or import a valid Voice Data file and try installing it again.

Table 8-1: (Continued)ICX Error Messages

ICX Error Messages		
Error Message	Description	Action to overcome
Election data contains a tabulator with HASH different from the one on the smart card.	If the list of tabulators is empty, that means that the HMAC key on the Poll Worker's smart card is different from the HMAC keys of the tabulators in the database.	Re-burn the Poll Worker smart card and check that the correct project has been loaded.
This card is for a Technician, insert the Poll Worker smart card.	An incorrect smart card has been inserted.	Remove the Technician smart card and insert the Poll Worker smart card.
Failed to install Google TTS apk. Please check the log for more details.	Google TTS did not install.	Check the developer logs for more information.
Failed to install the ICX apk. Please check the log for more details.	The ICX application did not install.	Check the developer logs for more information.
Only the 5.10 version of the ICX application or higher are compatible with 8.1 Android OS. Please choose an appropriate application version and try again.	An version of the ICX application older than V5.10 is selected.	Please select a version higher than 5.10.

Table 8-1: (Continued)ICX Error Messages

ICX Error Messages		
Error Message	Description	Action to overcome
The Administrative Menu is unavailable while the poll is open! Close the Poll in order to access the Technical Administration menu.	The poll is open so the majority of functions within the Technical Administration menu is unavailable until the poll is closed.	Close the poll and login to the Technical Administration menu again.
Sorry, something has gone wrong. Please ask an authorized person for assistance.	An error has occurred.	Insert a administrator smart card and view the logs for more information.
Toner/Fuser error	Error received when performing a Printer Test with the Avison printer and TN321 toner	Click OK to close the error message. Contact a Technician to check the toner or fuser

Table 8-1: (Continued)ICX Error Messages

The following table (Table 8-2) contains a set of status messages for ImageCast[®] X system applicable across all of the units.

ICX Status Messages		
Status Message	Description	Action to overcome
The contest is blank!	Voter has left the contest blank	Select at least one of the choices in the contest
The contest is under voted!	Voter has voted at least less one choice then it is allowed by the contest Vote for rule	Select choice(s) until the number of selected choices is reached the vote for number
The contest is over voted!	Voter has voted at least one more choice then it is allowed by the contest Vote for rule	Deselect choice(s) until the number of selected choices is reached the vote for number
No selection made	Neither of the choices has been selected in the contest.	Click on this title to go to the contest and select choices according to the voting rules.
Cancel Activation	Canceling the voting session.	Click on the button Cancel Activation
Thank you for voting! Your ballot is successfully printed. Please remove your activation card.	The ballot has been cast successfully	None
There are no candidates for this office	The contest has no candidates	Skip this contest

Table 8-2: ICX Status Messages

ICX Status Messages		
Status Message	Description	Action to overcome
Installation in progress, currently ignoring smart card removal.	This message displays at the bottom of the Technical Administration screen when the Technician smart card is removed during an update/installation of the ICX application.	The application updates/installs regularly without any interruptions.
Report printing in progress, no action is allowed for a Technician.	The Technician smart card is inserted while printing the status report.	Remove the Technician smart and insert the Poll Worker smart card.
Technician login. The report is successfully printed. Since the Poll Administration card has been removed, the election information on opening the poll was not printed. If you wish to proceed, you will be logged in and redirected to Technician menu.	This pop-up message displays if the Technician’s smart card is inserted after the report is printed.	Pressing “Proceed” continues to the Technical Administration menu. Pressing “Cancel” closes the windows and reverts to the Welcome screen.

Table 8-2: (Continued)ICX Status Messages

8.2 ImageCast[®] X Device related error and status messages

The table below contain the message, a specific unit to which it will only apply to, a brief description of the occurring fault and the necessary steps needed to resolve the issue.

The following table (Table 8-3) contains a list of status messages and are only associated to the units listed next to the message and do not apply to other devices since their functionalities, mode of operation and configurations differ from one another and therefore cannot be applied to all of the units.

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Activation code on the card is not valid. Please remove your activation card and notify a poll worker for assistance.	Prime	The activation code on the smart card is not valid. Failed to start new voting session.	Write again smart card with the correct activation code.
Incorrect activation code: #ActivationCode (ballot not found)	Adv	The activation code on the smart card is not valid. Failed to start new voting session.	Write again smart card with the correct activation code.
Incorrect activation code: #ActivationCode (not full face ballot)	Adv	The activation code is not valid. Error that occurs when starting AVS session from full face ballot.	Write again smart card with the correct activation code.
Unable to read from smart card. Please check if smart card is valid and inserted correctly.	Prime, Adv	The smart card reader is not able to read data from the smart card.	Try to insert smart card into reader couple of times again, and if message shows again, write admin card with valid data.

Table 8-3: ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Unable to read smart card data. Please insert valid card.	Adv	The smart card reader is not able to read data from the smart card.	Try to insert smart card into reader couple of times again, and if message shows again, write admin card with valid data.
Activation card is not valid. Please remove your activation card and notify a poll worker for assistance.	Prime	Activation card data is not correct.	Call poll worker for assistance.
There is already a vote recorded for this activation card. Please remove your activation card and notify a poll worker for assistance.	Prime, Adv	The system does not allow voting twice with the same activation card.	The certain activation code has already been used. Explain the voter why he is not allowed to vote twice.
Data on smart card is not valid. Please remove your activation card and notify a poll worker for assistance.	Prime, Adv	Written card data is not valid or the data can't be read.	Write the smart card again with the correct data.
The vote was not recorded and the voter's card was deactivated. Please rewrite the voter smart card.	Prime, Adv	this message is shown to the Poll Worker once their card is inserted when the voter card data is not valid or can't be read.	Write the smart card again with the correct data.
Election verification code is not valid.	Prime, Adv	The election signature from the smart card is not valid (appropriate) for the ongoing election process. Meaning the smart card is from some another election.	Write again smart card that is from the current election.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
You required an AVS session, but this tabulator doesn't support AVS controller. Please go to the election officer for more info.	Prime	Voting session requires AVS, but the AVS mode is not set in the election configuration.	Log in as Poll worker and check the check box 'AVS Controller'. Remove the poll worker smart card, and let the voter vote again.
Session id is not valid.	Prime	Session id that is written to the card is not valid, or doesn't exist.	Write again smart card with valid session id.
Incorrect PIN provided. Unable to proceed!	Prime, Adv	Incorrect pin is provided for the admin card.	Enter the correct pin.
You exceeded admin pin tries, please re-write smart card.	Prime, Adv	The user entered the wrong pin more times than it is allowed in the configuration, and locked the smart card.	Re-write the smart card.
This card is for technician, insert poll worker smart card.	Prime, Adv	Technician card is inserted when the poll worker card is expected.	Remove Technician card and insert the poll worker card.
Voter card detected. Please insert admin card.	Prime, Adv	Voter card is inserted when the admin card is expected.	Remove voter card and insert admin card.
Battery Critical. Cannot login, please call poll worker for assistance.	Prime, Adv	The battery is below a critical threshold.	Explain to the voter why he cannot continue voting session on this unit, and offer him to vote on another with enough battery power.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
UPS Battery Critical. Cannot login, please call poll worker for assistance.	Prime, Adv	The UPS battery is below a critical threshold.	Explain to the voter why he cannot continue voting session on this unit, and offer him to vote on another with enough battery power.
Storage error. Cannot login, call poll worker for assistance.	Adv	Result files are not valid. (Possible causes: Undefined result paths, some storage path doesn't exist, result files not identical...) Unable to start voting session.	Call poll worker for assistance to resolve the storage error. Error details are written to the log.
USB mass storage device detached, please notify a poll worker for assistance.	Prime, Adv	In configuration the operating mode is set to DRE, and the USB mass storage device is detached during the voting session. The voting session is automatically terminated.	Call poll worker for assistance in order to see more detailed message.
USB containing result files was detached.	Prime, Adv	In configuration the operating mode is set to DRE, and the USB mass storage device is detached during the voting session.	Try to reconnect the USB mass storage device.
USB device change is detected, please notify a poll worker for assistance.	Prime, Adv	There was a device change detection during voting session, meaning some USB device was either attached or detached. The voting session is automatically terminated.	Call poll worker for assistance in order to see more detailed message.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
USB device change detected error. New USB device is attached during the voting session. Device attached:	Prime, Adv	New device is attached to the machine during the voting session and can be possible security issue. Attached device name is written to the message.	Go to the poll worker menu and see if you wanted to attach the new device. If it's an unwanted device remove it and proceed with the voting. If you wanted the device, give it permission if it doesn't have it already and then proceed with the voting.
USB device change detected error. USB device is detached during the voting session. Device detached:	Prime, Adv	Some of the connected USB devices was detached during the voting session. Detached device name is written to the message.	Go to poll worker menu and try to reconnect the detached device, if that device is needed, if not proceed with the voting session.
Smart card reader detached. To continue voting please attach the reader to the device.	Prime, Adv	The system detects if the smart card reader is detached or not. The voting session is automatically terminated.	Because voting session is ended when smart card reader is detached during voting, voter must start the voting session from the beginning when the smart card reader is reattached.
Activation card removed. Please wait or press the Continue button.	Prime, Adv	Voter smart card is removed during the voting session. The voting session is automatically terminated.	Wait or press the 'Continue' button, and then if you want start new voting session with the same card.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Inactivity warning. Select OK to close this message and continue voting.	Prime, Adv	Warning that is being triggered when voter is inactive for amount of time that is specified in the configuration. If the voter doesn't react for the second amount of time that is configurable, the voting session will be terminated.	This is up to voter, if he/she reacts on time, this message will be closed.
Voter inactivity detected. Please notify a poll worker for assistance.	Prime, Adv	Voter was inactive for a period of time that is more that allowed in the configuration. The voting session is automatically terminated.	Call poll worker for assistance, but after that voter can start new voting session if wanted.
Voter inactivity response triggered. Please retrieve the voter smart card and continue to the login voter screen	Prime, Adv	This is shown to the poll worker indicating that the voting session is terminated due to voter inactivity.	Select 'Ok' button and start new voting session if needed.
VVPAT Printer not connected. Contact the poll worker for assistance.	Prime	In configuration report printer is set to be VVPAT but printer is not connected on starting new voting session.	Log in as poll worker and connect the VVPAT printer.
Printer not ready. Contact the poll worker for assistance.	Prime, Adv	The connected printer is not ready for some reason. If printer is needed, like specified in the configuration, the user can't proceed.	Log in as poll worker. See log or the error message if it appears for the details and then fix whatever is wrong with the printer.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Test poll is opened. Call technician.	Adv	When poll worker card is inserted, but the Test poll is opened this warning appears and the poll worker can't log in.	In order to log in as poll worker, go to Tech menu and close the Test poll.
Poll worker card is not allowed because machine is not selected yet.	Adv	Poll worker card is not allowed because machine is not selected yet.	First select machine and then log in as poll worker.
The application has encountered an unknown error.	Prime, Adv	Generic error.	Call poll worker for assistance. See log for detailed message.
The voter doesn't have a valid ballot. Please, go to the officer for more info.	Prime, Adv	Voter can't get a valid ballot, because some error occurred will getting the ballot.	Call poll worker for assistance. See log for detailed message.
There is an error on your ballot. Please remove your activation card and go to the officer for more info.	Prime, Adv	If the operating mode in configuration is set to BMD and the header png file is not present in election files.	The header .png file is missing from the election files, replace the election files.
There is an error on your ballot. Please go to the officer for more info.	Prime, Adv	If the operating mode in configuration is set to BMD and the header png file is not present in election files.	The header .png file is missing from the election files, replace the election files.
CAST VOTE ERRORS			
Error, unable to cast vote. Please remove your activation card and call poll worker for assistance.	Prime, Adv	Ballot cast failed, writing to path failed. Vote wasn't accepted.	Call poll worker for assistance. See log for detailed message.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Error, unable to cast vote. Please call poll worker for assistance.	Prime, Adv	Ballot cast failed, writing to path failed. Vote wasn't accepted.	Call poll worker for assistance. See log for detailed message.
Vote successfully cast. Please remove your activation card and call poll worker for assistance.	Prime, Adv	Ballot cast success, writing to path failed. Vote was accepted but something failed to be written to specific result path failed.	Call poll worker for assistance. See log for detailed message.
Vote successfully cast. Please call poll worker for assistance.	Prime, Adv	Ballot cast success, writing to path failed. Vote was accepted but something failed to be written to specific result path failed.	Call poll worker for assistance. See log for detailed message.
There was an error on your ballot casting. Please remove your activation card and go to the officer for more info.	Prime, Adv	Ballot not cast successfully. Vote wasn't accepted.	Call poll worker for assistance. See log for detailed message.
There was an error on your ballot casting. Please go to the officer for more info.	Prime, Adv	Ballot not cast successfully. Vote wasn't accepted.	Call poll worker for assistance. See log for detailed message.
There was an error on printing selections on VVPAT printer. Please go to the officer for more info.	Prime, Adv	There was a problem with scanning ballot on the VVPAT printer. The voting session is automatically terminated.	Call poll worker for assistance. See log for detailed message.
Error while printing selections on VVPAT printer. #Error	Prime, Adv	There was a problem while printing selections on the VVPAT printer. The voting session is automatically terminated. The cause is written to the poll worker.	Call poll worker for assistance. See log and shown message for detail.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Ballot cast error: #Error	Adv	There was a problem while casting the test ballot. Test vote wasn't accepted and the test voting session is automatically terminated.	See log for detailed message.
Storage location unavailable.	Adv	There was a storage problem while casting the ballot.	Call poll worker for assistance. See log for detailed message.
Ballot not cast. There was an issue updating the smart card. Ballot has not been cast.	Prime	Data cannot be written on the Voter card.	Press OK in the Warning dialog.
Ballot not printed. There was an issue updating the smart card. Ballot has not been printed	Prime	Data cannot be written on the Voter card.	Press OK in the Warning dialog.
STORAGE (RESULT) ERRORS			
Storage error. ResultContainer is empty for tabulatorId: #TabulatorId	Prime, Adv	Couldn't find the ResultContainer for the selected tabulator in the database, so the ballot can't be saved (printed).	Call poll worker for assistance. Replace the election files with valid ones.
Storage error. Error while creating result splitter, check developer log for more info.	Prime, Adv	Result splitter(s) doesn't exist so the ballot can't be saved (printed).	Call poll worker for assistance. See log for detailed message.
Storage error. No result storing locations defined.	Prime, Adv	Result path locations are not defined in the configuration.	Go to configuration and define the result path locations where the results will be stored.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Storage error. Write to specific result file failed. Vote was accepted. Issue must be resolved before voting can be continued.	Prime, Adv	Failed to save the vote on all result locations, but successfully saved it to some. The vote is accepted but the result files are not valid nor identical.	Call poll worker for assistance. See log for detailed message.
Write to specific result file failed. Vote was ignored. Issue must be resolved before voting can be continued.	Prime, Adv	Failed to save the vote on all result locations. The vote is not accepted.	Call poll worker for assistance. See log for detailed message.
Storage error. There is no log files on this device.	Prime, Adv	There are no audit logs present when saving the vote. The vote is accepted but the audit log will be missing.	Call poll worker for assistance. See developer log for detailed message.
Storage error. Write to specific audit log file failed. Vote was accepted. Issue must be resolved before voting can be continued.	Prime, Adv	Failed to save audit log while saving the vote. The vote is accepted but the audit log will be missing or not valid.	Call poll worker for assistance. See developer log for detailed message.
Storage error. Audit log files found, but are not identical. Please replace cards.	Prime, Adv	Audit log files are not identical, can't proceed.	Call poll worker for assistance. See developer log for detailed message.
Storage error. One or more log files have invalid HMAC.	Prime, Adv	Audit log file(s) election signature doesn't match election signature from the current election.	Call poll worker for assistance. See log for detailed message.
Storage error. Result files found, but are not identical. Please replace cards.	Prime, Adv	Result files are not identical, can't proceed.	Call poll worker for assistance. See log for detailed message.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Storage error. Storage path does not exist. Path: #Path	Prime, Adv	The path that is specified in the configuration file doesn't exist.	Check that all result paths specified in the configuration are present.
Storage error. Result file corrupted or empty, it cannot be used further. Please replace the cards.	Prime, Adv	The result file is corrupted due to some error, can't proceed.	Call poll worker for assistance. See log for detailed message.
Storage error. One or more result files have invalid HMAC.	Prime, Adv	Result file(s) election signature doesn't match election signature from the current election.	Call poll worker for assistance. See log for detailed message.
Storage error. Unable to unzip the result file.	Prime, Adv	Unable to unzip the result files due to some error.	Call poll worker for assistance. See log for detailed message.
Storage error. File #File-Name was found on some location, but not all.	Prime, Adv	The specified file was not found on all locations that it was expected to be, as configured in the configuration file.	Call poll worker for assistance. See log for detailed message.
Storage error. An error occurred, unable to proceed. Error details are written to the log. Please call the qualified technician.	Prime, Adv	There is some problem with the results validity.	See log for detailed message and resolve the error.
Error creating result file.	Prime, Adv	There was an error while creating initial empty result file, unable to proceed.	Call poll worker for assistance. See log for detailed message.
PRINTER ERRORS			
Error while printing selections on VVPAT printer. *Some unexpected exception message.*	Prime, Adv	Exception message that describes the error that happened while printing selections on the VVPAT printer.	Call poll worker for assistance. See log for detailed message.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Error while printing selections on VVPAT printer. Could not create QR code.	Prime, Adv	QR Code couldn't be created due to some error. Ballot can't be printed.	Call poll worker for assistance. See log for detailed message.
Error while printing selections on VVPAT printer. Input QR text is empty or null for print and scan on VVPAT printer.	Prime, Adv	Data for QR Code is invalid so the QR Code can't be created and ballot can't be printed.	Call poll worker for assistance. See log for detailed message.
Error while printing selections on VVPAT printer. Input text as page is empty or null for print and scan on VVPAT printer.	Prime, Adv	Data for text is invalid so the ballot can't be printed.	Call poll worker for assistance. See log for detailed message.
Error while printing selections on VVPAT printer. QR Code scan fail for 'x' times.	Prime, Adv	QR Code scan failed more time then it is allowed by the configuration setting. Voting session is terminated.	Call poll worker for assistance. See log for detailed message. Try to clean the VVPAT printer.
Error in preparing ballot for print: #Reason	Prime	Could not prepare ballot for printing on the BMD printer. Voting session is terminated.	Call poll worker for assistance. See log for detailed message.
Printer status message: #Status	Prime	There is some error with the printer (like paper jam, paper out, low ink, etc.). The status error is shown to the user.	Log in as poll worker. Resolve the error that happened with the printer and proceed.
Printer Status: #Status	Prime	There is some error with the printer (like paper jam, paper out, low ink, etc.). The status error is shown to the user.	Log in as poll worker. Resolve the error that happened with the printer and proceed.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Printer Error: #Error	Prime, Adv	There is some error with the printer (like paper jam, paper out, low ink, etc.). The status error is shown to the user.	Resolve the error that happened with the printer and proceed.
The printer is not connected!	Prime	The printer is not connected, can't proceed.	Log in as poll worker and connect the printer.
Error in determining printers status: #Error	Prime	Determining printer status failed due to some error.	Call poll worker for assistance. See log for detailed message.
Error printing: #Error	Prime	There was an error in sending PCL command to the printer.	Call poll worker for assistance. See log for detailed message.
Error, restart printer.	Prime	Runtime exception happened, printer restart is needed.	Call poll worker for assistance. See log for detailed message and restart printer.
Printer error: BMD printer is not connected.	Prime	BMD printer is not connected, can't open the poll.	Connect the BMD printer.
Printer error: BMD printer not ready. Detected status: #Status	Prime	There is some error with the BMD printer (like paper jam, paper out, low ink, etc.). The status error is shown to the user.	Resolve the error that happened with the printer and proceed.
Printer error: Report printer not connected.	Prime, Adv	The report printer is not connected, can't open the poll.	Connect the report printer and proceed.
Printer error: Report printer not ready. #Error	Prime, Adv	There is some error with the report printer (like paper jam, paper out, low ink, etc.). The status error is shown to the user.	Resolve the error that happened with the printer and proceed.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
There is more than one report printer attached.	Prime, Adv	Only one report printer is allowed to be attached to the ICX device.	Disconnect report printer(s), so that only one is left and then proceed.
Printer error: VVPAT printer cannot be used as a report printer. Check MCF configuration.	Adv	VVPAT cannot be used as a report printer, the configuration is not properly set.	Go to configuration and change the report printer type to be Thermal printer.
Printer error: VVPAT printer not connected.	Adv	VVPAT is set to be the printer type in the configuration but it is not connected.	Connect the VVPAT printer and then proceed.
MP tray size mismatch	Classic	Paper size loaded into tray differs from size indicated in Technician menu	Click OK to close error message. Ensure paper size being used matches paper size indicated in Technician menu.
OTHER ERRORS			
Failed to generate print preview!	Adv	Error while generating ballot preview on the Review page.	Call poll worker for assistance. See log for detailed message.
Text to speech engine missing, unable to proceed, please call the poll worker.	Prime	Text to speech missing, unable to proceed. Voting session is terminated.	Log in as poll worker. Install Text to speech engine, return to the application and proceed.
Text to speech voice data missing, unable to proceed, please call the poll worker.	Prime	There is no speech voice data for the TTS. Voting session is terminated.	Log in as poll worker. Exit application, go to settings and install voice data and then return to the application and proceed.

Table 8-3: (Continued) ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
There is one or more USB devices without USB permission, please reconnect them all.	Prime, Adv	One or more USB devices are connected to the ICX device but they don't have USB permission.	Reconnect the devices without the permission and give them permissions when system dialog appears.
No valid tabulators in the election definition.	Prime, Adv	There are no valid tabulators in the election files, can't proceed.	Replace the election files.
Please select a valid tabulator.	Prime, Adv	The tabulator is not selected, so the poll can't be open.	Select the tabulator from the drop down list.
Storage error. Not enough storage space. Path: #Path. At least #Space is required	Prime, Adv	There is not enough storage space for log files and result files on the specified path. The amount of space required is shown to the user.	Free the storage space that is required.
Storage error. Missing storage path definitions.	Prime, Adv	There are no storage paths defined in the configuration.	Go to configuration and define the result storage paths.
Storage mapping error. An error occurred, unable to proceed. Error details are written to the log. Please call the qualified technician.	Prime, Adv	There is a problem with result mapping, it is not done properly.	See log for detailed message. Go to Tech menu and correctly map the result locations.
Resume poll is not possible	Prime, Adv	The poll can't be resumed due to some error.	Call poll worker for assistance. See log for detailed message.
Election results are found on at least one of the result storing locations. In order to open the poll, please re-zero the results.	Prime, Adv	In order to open the poll, there can't be any results present on the result path locations.	See log for detailed message, then delete result files that exist on the defined result path locations and then proceed.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Write to all result files failed. #Error	Prime, Adv	Cannot change the poll status to close in result files due to some error.	Call poll worker for assistance. See log for detailed message.
ReZero Tabulator Results. Deleting result files failed. Export log to see detailed messages.	Prime	Result files are not deleted successfully due to some error.	See log for detailed message.
Clear voting data error.	Adv	Result files are not deleted successfully due to some error.	See log for detailed message.
Clear test voting data error.	Adv	Test result files are not deleted successfully due to some error.	See log for detailed message.
Cannot copy the file from the USB drive.	Prime, Adv	Cannot copy the file from USB drive due to some error.	See log for detailed message.
Cannot obtain information about connected devices. #Error	Prime, Adv	There was an error while getting the information about connected devices.	See log for detailed message.
There is no USB drive connected to the device	Prime, Adv	There is no USB drive connected while trying to export some files from ICX device.	Connect some USB drive to the ICX device and then try to export the files again.
The dynamic content data file is not found. Open the Technical Administration menu and copy a dynamic content file.	Prime, Adv	Decryption of election files failed because the file was not found.	Go to Technician menu and load election files.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Not enough space. Available space: #Space MB. To perform this operation you need additional #Space MB of free space.	Prime	There is not enough space for decrypted election files to be unpacked.	Free up the needed space for the election files.
Voting results found. Please clear voting results before opening poll.	Adv	Some voting results were found on the result location. In order to open the poll, there can't be any results present on the result path locations.	Delete result files that exist on the defined result path locations and then proceed.
Clear all election data errors: Deleting result files failed. Deleting audit log files failed. Deleting election data files failed. Deleting report file failed. Deleting test reports directory failed.	Prime	Errors that happen during the clearing of all election data.	See log for detailed message.
Clearing working directory failed.	Prime	Deleting of some files failed due to some error.	See log for detailed message.
Unknown result files found on at least one of the result locations. Recommended action is to review the results and remove them before continuing.	Prime	This is a warning message when some result files that are not from the selected tabulator are found on the result locations.	Either remove the unknown result files from result locations or ignore the message and proceed.
There is no USB storage attached. Please attach USB storage and try again.	Prime	USB drive is not connected to the ICX device when it is needed.	Attach the USB device and try the action again.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
ICX application file and Google TTS file were not found. For detailed message look in developer log.	Prime	Couldn't export the apps from ICX device due to some error.	See log for detailed message.
The report can't be printed due to printer error.	Prime, Adv	Can't print the report on the printer due to some error.	See log for detailed message. Resolve the printer error and then try to print the report again.
Report is not exported due to an error, for detailed message please check the developer log.	Prime	Can't export the report due to an error.	See the developer log for detailed a message.
Configuration settings changes failed.	Prime, Adv	Any changes made in the configuration are not saved and will not be applied.	See log for detailed message.
Text to speech missing, unable to proceed, please install Text to speech engine first.	Prime	Text to speech missing, unable to proceed.	Install Text to speech engine and then return to the application and proceed.
Failed to initialize Text-to-speech engine.	Prime	Failed to initialize TTS engine.	See log for detailed message.
Text to speech voice data missing.	Prime	There is no speech voice data for the TTS.	Go to settings and install voice data and then return to the application and proceed.
Thermal printer error occurred, please restart printer.	Prime	There was some error with the thermal printer, cannot proceed.	Restart the printer.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Database load error. Database is not compatible with the ICX application. Please update election files in EED application.	Prime	Cannot load the database because it is not compatible with ICX application.	Update the election files and then try again.
Database load error. ICX application is not compatible with the current election files. Please use higher version of ICX application.	Prime	Cannot load the database because the version of application and election files don't match.	Replace the version of application with the appropriate one.
Some of test results do not belong to the project. You need to run a test poll.	Adv	Cannot open the poll without the test results that belong the current tabulator present on all the result path locations.	Run a test poll.
Test results found on some, but not all locations. You need to run a test poll.	Adv	Cannot open the poll without the test results that belong the current tabulator present on all the result path locations.	Clear the found results from the result path locations and run a test poll.
Summary report error: #Error	Adv	There was an error during the print of summary report.	See log for detailed message. Resolve the error and print the report again.
Zero report error: #Error	Adv	There was an error during the print of zero report.	See log for detailed message. Resolve the error and print the report again.
Machine memory contains voting results. You need to clear data first.	Adv	There are some result files left on the machine.	Delete the result files.
Error on loading tabulators	Adv	Couldn't load tabulators from the database.	See log for detailed message. Change the election files.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Error during test poll open.	Adv	Cannot open the test poll due to some error.	See log for detailed message.
Technician smart card is not present.	Adv	Technician card is needed, can't proceed.	Insert Technician card.
Error while copying election files.	Adv	Election files are not copied due to some error.	See log for detailed message. Resolve the error and try again.
Files are not copied due to an error, for a detailed message please check the developer log.	Adv. Prime	The files are not copied because of an error.	See the developer logs for more information.
Ballot ID #Id does not exist.	Adv	The ballot with #Id doesn't exist in the election files.	See log for detailed message.
Machine ID #Id does not exist.	Adv	Tabulator with #Id doesn't exist in the election files.	See log for detailed message.
Voter card has been removed during cast Vote was not counted! The card is no longer usable! Please rewrite the voter smart card.	Prime	The voter card has been removed prior to the vote being cast however the voter card status is updated to Cast. Issue is to be resolved by the Poll worker.	In order to continue voting on a device that has been locked out the Poll worker needs to be notified.
Loading tabulator failed. Election data contains tabulator with HASH different from one on smart card data.	Adv, Prime	The HMAC key on the Poll Worker's smart card is different from the HMAC keys of the tabulators in the database.	Create the project again and burn the Poll Worker's smart card again.

Table 8-3: (Continued)ICX Device Related Error Messages List

ICX DEVICE RELATED ERROR MESSAGES			
Error Message	Unit	Description	Action to overcome
Only 5.10 version of the ICX application or higher are compatible with 8.1 Android OS. Please choose appropriate application version and try again.	Classic	An older version of the ICX application is being installed that is not supported by the ICX device that has Android 8.1 OS.	Install the ICX application version 5.10 or higher.
The left subheader text is too large! Reduce subheader font size to proceed.	Prime	The sub-header text size is too big for the allocated space. The error message is shown to the Poll Worker.	In order to continue the voting session, the Poll Worker needs to scale the sub-header text down to a size supported by the allocated space.
The center subheader text is too large! Reduce subheader font size to proceed.			
The right subheader text is too large! Reduce subheader font size to proceed.			

Table 8-3: (Continued)ICX Device Related Error Messages List

The following table (Table 8-4) contains a set of status messages for ImageCast® X system applicable only to the mentioned units.

ICX DEVICE RELATED STATUS MESSAGES			
Status Message	Unit	Description	Action to overcome
There are no candidates for this office	Prime	The contest has no candidates	Skip the contest
The contest is under voted!	Prime	Voter has voted at least less one choice then it is allowed by the contest Vote for rule	Select choice(s) until the number of selected choices is reached the vote for number
The contest is over voted!	Prime	Voter has voted at least one more choice then it is allowed by the contest Vote for rule	Deselect choice(s) until the number of selected choices is reached the vote for number
The contest is blank!	Prime	Voter has left the contest blank	Select at least one of the choices in the contest
This contest is blank! No ranked choices.	Prime	The RCV contest is left blank, without any ranked choices.	Select at least one of the choices in the contest.
There are unranked choices!	Prime	Voter has left at least one unranked choice than there are available ranks in the contest.	Select choice(s) until all available ranks are reached.
Too many ranks!	Prime	Voter has gave at least one rank more than there are available ranks in the contest.	Deselect choice(s) until the number of ranks has reached the number of available ranks in the contest.
Your ballot is valid.	Prime	Ballot is correctly filled. It is voted for every contest according to the voting rules.	None.

Table 8-4: ICX Device Related Status Messages

ICX DEVICE RELATED STATUS MESSAGES			
Status Message	Unit	Description	Action to overcome
Your ballot is not valid and cannot be cast.	Prime	Ballot is not filled according to the voting rules, so it's not valid.	Go to ballot and select choices according to the voting rules.
Your ballot is valid, but there are warnings.	Prime	Ballot is correctly filled, but there are contest that are not properly voted for.	Go to not voted contests and select choices according to the voting rules.
Your ballot is blank.	Prime	There are no selected candidates in the ballot.	Go to ballot and select choices according to the voting rules.
Unused rank	Prime	Neither rank was assigned.	Click on this title to go to the contest and select choices according to the voting rules.
No selection made	Prime	Neither of the choices has been selected in the contest.	Click on this title to go to the contest and select choices according to the voting rules.
No selection to be made	Prime	There are no candidates that can be selected in a contest. All candidates are "No Candidate".	None
Only the highest rank with the large check mark can be removed. Currently, it is: #Rank	Prime	You can't unrank any other choice but the one that has the highest rank.	Unrank the choice with the highest rank as it is specified in the message.
Deselecting this choice will deselect all candidates from the same party as this 'Straight Party' choice.	Prime	When you deselect the 'Straight party' choice, all the candidates from the same party as this choice will be deselected.	None.

Table 8-4: (Continued)ICX Device Related Status Messages

ICX DEVICE RELATED STATUS MESSAGES			
Status Message	Unit	Description	Action to overcome
You may deselect this choice, but that will be inconsistent with your previous straight party choice.	Prime	Notification when you want to deselect some choice that is in the same party group as the selected 'Straight Party' choice.	None.
This choice conflicts with your previous straight party selection.	Prime	Notification when you want to select a choice that is not from the same party group as the selected 'Straight Party' choice.	None.
You are attempting to make a straight party choice, but some of your previous choices conflict with this party selection. You must deselect those choices before you can make the straight party selection.	Prime	You cannot select a 'Straight Party' choice when you already have some choice selection that are not from the same party group as the Straight Party' choice you want to select.	Go to the contests that have already selected candidates from different party group then the 'Straight Party' choice and deselect them. Return to the 'Straight Party' contest and select the 'Straight Party' choice you wanted.
Maximum character length exceeded!	Prime, Adv	You can't enter more characters for the write-in that it is allowed. 30 characters is allowed.	Correct the write-in name to have maximum 30 characters.
The number of ballot rejections is limited. Ballot rejections remaining: #Rejections	Prime	Number of ballot rejections is limited and after this number is reached, the voter can't reject ballot anymore and must cast it.	Don't reject the ballot more times than allowed.

Table 8-4: (Continued)ICX Device Related Status Messages

ICX DEVICE RELATED STATUS MESSAGES			
Status Message	Unit	Description	Action to overcome
Vote Card removed. BALLOT WAS NOT CAST. Please re- insert Vote Card or call for immediate help.	Prime	The Voter card is removed and voter has some time to re-insert the card back and to get back its ballot. If the voter doesn't re- insert the card, the voting session will be terminated and the ballot data lost.	Re-insert the voter card in order to continue voting.
Thank you for voting! Your ballot is successfully cast.	Prime, Adv	The ballot is successfully cast.	None
Test ballot is successfully cast.	Adv	The test ballot is successfully cast.	None
Printing in progress. Wait until the print operation is completed, and then insert a voter card.	Prime, Classic	Removing the Voter card and re-inserting the card back while printing the ballot.	Wait until the ballot is printed and then insert the Voter card.

Table 8-4: (Continued)ICX Device Related Status Messages

CHAPTER 9: VERIFICATION AT POLLING PLACE

During the election, or during the polling place setup activities, the poll worker will need to record certain information about the election, such as the version of the ImageCast® X software and the application signature.

In addition to the above, serial numbers of the ImageCast® X and the anti-tampering seals should be recorded.

9.1 Identification of the ImageCast® X Software Version

The version number of the ImageCast® X application is shown in the **About** dialog, which appears when the device starts up (see Figure 9-1).

If the application is already running, the same dialog can also be seen by selecting More - About ICX. Explanation of the fields:

- <VERSION NUMBER> - Application version number, stored in the application.
- <APPLICATION SHA256 SIGNATURE> - SHA 256 signature of the application, calculated at the startup of the application.



Figure 9-1: Startup screen

REVISION HISTORY

Rev.	Date	Summary
4	12-13-2022	Deleted section 1.7 Document Status
3	12-01-2022	Revised section 2.2.2 DRE - Direct-Recording Electronic mode: EMS Results Tally and Reporting
2	10-12-2022	<ul style="list-style-type: none"> • Revised section 2.2.2 DRE - Direct-Recording Electronic mode to correct application name • Revised section 7 Relevant Requirement References to correct doc name
1	04-28-2022	Branched for 5.13-A.

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VVSG TRACE LIST

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VVSG 1.0 Vol I - 2.1.2	3
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VVSG 1.0 Vol I - 2.1.4	5
VVSG 1.0 Vol I - 2.1.5	6
VVSG 1.0 Vol I - 2.1.5.1	6
VVSG 1.0 Vol I - 2.1.5.2	6
VVSG 1.0 Vol I - 2.1.6	6
VVSG 1.0 Vol I - 2.1.7	7
VVSG 1.0 Vol I - 2.1.7.1	7
VVSG 1.0 Vol I - 2.1.7.2	7
VVSG 1.0 Vol I - 2.1.8	8
VVSG 1.0 Vol I - 2.1.9	8
VVSG 1.0 Vol I - 2.1.10	9
VVSG 1.0 Vol I - 2.2	11
VVSG 1.0 Vol I - 2.2.5	11
VVSG 1.0 Vol I - 2.3	12
VVSG 1.0 Vol I - 2.3.1	12
VVSG 1.0 Vol I - 2.3.1.1	12
VVSG 1.0 Vol I - 2.3.1.3	13
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