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1 BRIEF DESCRIPTION

1.1 Verity Voting 1.0 - Abstract

The Verity Voting system includes software, hardware, device, and peripheral components that allow election professionals to accomplish the following high-level tasks:

Pre-voting tasks:
- Ballot definition and production
- Voting machine configuration and use

Voting tasks:
- Polling place ballot marking device
- Polling place digital scanning for paper ballots

Post-voting tasks:
- High-speed, large-volume ballot scanning
- Ballot adjudication
- Counting of votes
- Consolidation and reporting of results and audit logs

1.1.1 Verity Voting Configurations

The following image is a general workflow of all Verity Voting system components working together. Different system configurations are available depending on the size of voting centers, the expected support for the number of voters, and polling place needs.

![Figure 1 - Verity Voting System Abstract Diagram](image-url)
Overview of the diagram:

- The components are displayed as touch points of data access, transfers, and verification.
- Dotted lines show the flow of data and air gaps using vDrives.
- The Verity TouchWriter and Verity Scan components are part of the Polling Place setup.
- Verity Key (not shown) is required for user access into components to load election elections, use features, and generate reports. Feature access depends on the roles applied to user accounts.
- The diagram does not include the Election Management or User Management applications available through all Verity Voting systems.

The system in Figure 1 supports the following workflow:

Pre-voting

- Verity Build provides capabilities to define an election definition and ballot for an election, including all contests, parties, and options. Verity Touch Writer, Verity Scan, Verity Central, and Verity Count can all receive the election definition and ballots generated and locked for usage from Verity Build.

Voting

- Verity Touch Writer and Verity Scan receive accepted ballots, locked and ready for voting during open polls. Touch Writer provides digital voting through a touchscreen tablet system or accessibility interface (Verity Access using audio-tactile interface, jelly buttons, and sip-and-puff devices). Verity Scan scans completed printed ballots provided by voter marking ballot sheets manually or printed ballots generated from Touch Writer. Scanned ballots become Cast Vote Records (CVRs) on vDrives for transferring into the central voting office/center.

Post-voting

- Verity Central provides capabilities to scan ballot batches through a high volume scanner, review all ballots, and resolve any ballots marked as having an issue. These ballots may not have enough or too many marks for contest votes, write-in choices, or ranked choices.
- Verity Count provides final collection and tabulation of ballots into election and contest results. 
  Count also provides adjudication of Verity Scan Write-In votes, ranked choices, and mismarked ballots.

Additional configurations are possible with the Verity Voting system:

- Verity Build and Verity Count stand-alone components can be on the same workstation. Central must be on it's own workstation.
- Verity Build can include a client/server configuration with multiple Build workstations on a LAN. These workstations cannot have an installation of Verity Count sharing the same system. 
  A database should be installed on one of the LAN connected Build workstations as the “server”, accessed by all of the workstations. The LAN should not access other LANs of Verity Voting system workstations.
- Verity Count can include a client/server configuration with multiple Count workstations on a LAN. 
  These workstations cannot have an installation of Verity Build sharing the same system. A database should be installed on one of the LAN connected Count workstations as the “server”, accessed by all of the workstations. The LAN should not access other LANs of Verity Voting system workstations.
- The Verity Central workstation allows officials to scan large volumes of ballot batches and resolve ballots for write-ins, ranked choice, and ballots marked with issues such as too many marks, too few marks, or oddly placed marks. Once all ballots are resolved, they are converted into CVRs and transferable on vDrives to Count.
- Verity Central can include a client/server configuration with multiple Central workstations on a LAN. A database should be installed on one of the LAN connected Central workstations as the “server”, accessed by all of the workstations. The LAN should not access other LANs of Verity Voting system workstations.
- Additional components include Verity Key, Verity vDrive, and paper ballots.
Depending on the laws of a state, customers will be required to purchase both Touch Writer and Scan. Smaller jurisdictions (such as cities, towns, etc) may buy only Touch Writers or only Scan devices.

The Verity Voting system components can be purchased and installed in different configurations depending on the size of jurisdictions and voting needs. All installations do require Verity Build, Verity Scan, and Verity Count to create election definitions, print ballots, scan ballots into CVRs, resolve ballots, and tabulate votes.

The following images detail additional configuration options for the components. The flow of data simulates the workflow for an in-progress election.

1.2 Verity Voting Software Components

This section provides a high-level introduction to the components with the Verity Voting system components, including hardware and peripherals.

- Verity Build – Election and ballot definition software with options to configure contests, voting, and devices
- Verity Central – Ballot scanning and resolution software stations
- Verity Count – CVR tabulation software
- Verity User Management – User account and access management for all Verity Voting system applications
- Verity Election Management – Election definition and data loading and management for all Verity Voting system components

1.2.1 Verity Build - Election Definition and Device Settings

Verity Build is a required component of the Verity Voting system, used by officials to complete pre-voting tasks for creating and generating an election definition and ballots. Build provides a ballot layout proofing process. The process establishes relationships between election data, jurisdiction, and polling place data, for the shared election definition. Build will create the portable media, vDrives, to provide a method of transferring the shared election definition to Verity Voting devices and other Verity components. vDrive method of transfer uses an "air-gap", or non-networked, to provide more secure exchange of election data.

Verity Build can include a stand-alone workstation or have multiple workstations on a LAN in a client/server configuration. The system on a LAN cannot connect to other LANs or systems, ensuring the air gap remains for security of data.
Figure 2 - Verity Build Application

Verity Build election allows users to do the following tasks:

- Ballot definition
- Ballot proofing
- Setting voting device options
- Ballot production for paper and electronic media
- Creating portable media for purposes of election programming and vote recording
- Produce audit reports detailing the Build tasks for each election

Verity Build is used for these critical functions:

- Define political subdivision boundaries and multiple election districts
- Identify contests, candidates, and issues
- Define ballot formats and appropriate voting options
- Generate paper ballots and election-specific data for voting equipment
- Create vDrives and Verity Keys to program voting equipment
- Maintaining audit trail information

Verity Build optional COTS devices:

- High-speed printer
- Report printer
1.2.2 Verity Central - Central Ballot Scanning & Resolution Software

Verity Central is a required component of the Verity Voting system, used by officials to complete post-voting functionality for paper ballot scanning, contest resolution, and conversion of voter selection marks to electronic Cast Vote Records (CVRs) capabilities. CVRs and election data such as audit logs are transferred into Central via vDrives or CVRs may be created by scanning ballots directly into Central. Once the CVRs are written to vDrive(s) they can be transferred into Verity Count for vote tabulation and reporting of election results. Verity Central reads and records cast vote records only.

Verity Central can include a stand-alone workstation or have multiple workstations on a LAN in a client/server configuration. The system on a LAN cannot connect to other LANs or systems, ensuring the air gap remains for security of data.

Note: Verity Central does not tabulate votes.

![Figure 3 - Verity Central Application](image)

- Verity Central allows users to do the following tasks:
  - High-speed central scanning
  - Ballot resolution
  - Ballot audits
  - Conversion of paper ballot marks to electronically-stored cast vote records
  - Produce audit reports detailing the Central tasks for each election

- Verity Central is used for these critical functions:
  - Create vDrives for use with Verity Count
  - Maintain audit trail information

- Verity Central optional COTS devices:
  - High-speed scanner
  - Report printer
1.2.3 Verity Count - Tabulation Software

Verity Count is a required component of the Verity Voting system, used by officials to complete post-voting functionality to tabulate election results and generate reports. Count receives the CVRs from portable media devices (vDrives) used to record CVRs from Hart voting devices or Verity Central workstations. Verity Count can be used by officials to resolve Verity Scan write-in votes for paper ballots that were manually marked. Count can also be used to collect and store all election logs from every Verity component/device used in the election, allowing for complete election audit log reviews.

Verity Count can include a stand-alone workstation or have multiple workstations on a LAN in a client/server configuration. The system on a LAN cannot connect to other LANs or systems, ensuring the air gap remains for security of data.

![Figure 4 - Verity Count Application](image)

Verity Count is post-voting software used for:

- Vote tabulation
- Produce election results reports
- Produce election auditing reports from vDrive logs

Verity Count optional COTS devices:

- Report printer
1.2.4 Verity User Management – User Account Management

Every Verity component has access to the User Management application. This software enables users with the administrative role to create and manage user accounts within the Verity Voting system. Depending on the component, the user roles may include additional roles.

All user accounts are accessible through this feature in all system components. Depending on the role, each user has access to different features and data management, available through tabbed sections with a list of all permissions.

The application displays and opens for users with the specific administrative permissions.

![Figure 5 - Verity User Management Application](image)

Verity User Management is user access software used for:

- Create, delete, and update user accounts with role permissions per component
- Set user account rules for:
  - Locking accounts for login attempts
  - Password change occurrences
  - Password complexity rules
1.2.5 Verity Election Management – Election Data Loading and Archiving

Every Verity system has access to the Election Management application. This software enables users with the administrative role to import, export, archive, restore, and manage election definitions into the system. Once added, the election can be opened and handled per the features available within the Verity Voting system components installed on the workstation.

The interface provides features for importing, deleting, and performing archives of the election data and settings within the specific Verity component. Officials can load an election definition for an in-progress election or store an archive election.

This interface also allows officials to perform archives of the election definition as-is without changing the state. Once archived, the election can be restored in that same state at the time of archive. All restored election definitions display in the list of elections within the application.

The application displays and opens for users with the specific administrative permissions.

![Figure 6 - Verity Election Management Application](image)

Verity Election Management is election definition and data management software used for:

- Importing signed and unsigned election data into the application for access and usage
- Exporting election data
- Archiving election data and definitions
- Restoring an archived election
- Managing election definitions by adding, copying, renaming, and deleting
1.2.6 Verity Desktop – Workstation Management

**Verity Desktop** is a required component of the Verity Voting system, used by system administrators to manage a very limited set of operating system functions.

Verity Desktop is workstation management software used for:

- Setting the systems date and time
- Exporting Verity application (specific) file hashes to a portable media device
- Access the operating system for a limited time (less than 24-hours per access code). User access to the operating system’s functionality is restricted to software updates and database management

1.3 Verity Voting Hardware Devices

Verity Voting devices share a common platform for two voting mediums, paper and electronic. All hardware configurations are based on Verity Touch, a multi-configuration electronic platform, with the most significant variation in the hardware configuration being Verity Scan.

1.3.1 Verity Scan

**Verity Scan** is Verity’s polling place digital scanning solution for paper ballots. **Scan** is paired with a purpose-built ballot box to ensure accurate, secure, and private ballot scanning and vote casting for each voter.

Ballots can be scanned one at a time by a polling worker, or in large amounts, depending on the type of scanner purchased with the system.

When opening the polls, poll worker(s) activate the Verity Scan device to prepare it to receive marked paper ballots. Voters are simply required to insert their marked ballot when Scan indicates it is appropriate and wait for Scan to acknowledge a successful casting of votes.
Verity Scan records Cast Vote Records (CVRs) and audit log data in redundant, secure storage locations, including the Verity vDrive. vDrive storage is a portable harddrive and allows the CVRs to be transferred to the Verity Central ballot resolution system or Verity Count tabulation system.

Scan provides the following features:

- Verity Scan is a “standalone” digital paper scanner
- Provides second-chance voting with voter instructions
- Accessibility features:
  - Unique audible sounds
  - Controls within reach
- Attached to a secure ballot box with locks and seals to provide voter security and tampering awareness

Figure 7 - Verity Scan on Ballot Box
1.3.2 Verity Touch Writer

Verity Touch Writer is a polling place ballot marking device solution for paper ballots. Touch Writer is paired with a commercial off the shelf printer to allow the voter to mark then print their vote selections. Using Touch Writer in conjunction with Verity Scan provides the voter with a reviewable paper ballot that is accurately captured through scanning, reviewing, and acceptance for tabulation as a voter’s cast vote record (CVR).

When opening the polls, poll worker(s) activate the Verity Touch Writer device to prepare it to receive a voter’s activation code; this allows voters to activate their ballot session by entering an Access Code in private. Voters use the touch or ATI interface to privately and independently mark and review their ballot; on completion of marking their ballot the voter will print their ballot. Verity Touch Writer is capable of using Verity Access, an optional accessibility (ATI) component.

Audit logs have redundant, secure storage locations, including removable electronic media (vDrive). The removable Election Media on Verity Touch Writer allows for audit logs to be transferred to Verity Count.

Note: Touch Writer does not record electronic cast vote records.

- Verity Touch Writer is a “standalone” ballot marking device
- A touch-screen electronic voting device
- Can be used with Verity Access for accessibility capabilities

Figure 8 - Verity Touch Writer on Booth without Printer
Verity Access

Verity Access is an optional accessibility (ATI) module that can be connected to Verity Touch voting devices. **Access** has 3 tactile buttons, one audio port, one port for external tactile buttons or sip-n-puff devices and a custom USB cable. Jacks for headphones and adaptive devices are located on the top edge of the device, and the device has gripping surfaces on either side.

![Figure 9 - Verity Access](image)

1.3.3 vDrive – Electronic Media

**Verity vDrive** is a required Verity Voting component, used as a portable media device generated by Verity Build. **vDrive** allows election definitions to be moved from Verity Build to Verity Scan and Verity Touch Writer. **vDrive** supports the transfer of Cast Vote Records (CVRs) in Verity Scan, and Verity Central.

Once installed in Verity Scan, it remains installed and record CVRs and audit logs; after Polls are closed the vDrive can be removed from Scan to transfer the CVRs and audit logs to Verity Central or Count. Once installed in Verity Touch Writer it may remain installed to record audit logs. After Polls are closed, the vDrive can be removed from Touch Writer to transfer the audit logs to Central or Count.

CVRs are written to a vDrive in Scan and consolidated in Central and written to vDrives for transfer to Count for tabulation.

![Figure 10 - Verity vDrive](image)

1.3.4 Verity Key – Security Key

**Verity Key** is electronic media that is created by Verity Build for a specific election. **Key** is a required Verity component. Key is the electronic media that provides user authentication and configures election security throughout the Verity Voting system.

![Figure 11 - Verity Key](image)

The authentication is verified between the Verity Key, the user account, and the associated roles. Each component has a set of user roles, capable of being associated per user account in the system manageable through the Verity User Management component.
2 SYSTEM OVERVIEW

2.1 Overall System Capabilities

The Verity Voting system includes software and hardware components that allow election professionals to accomplish the following high-level tasks:

Pre-voting (Election Management): Verity Build
- Definition and maintenance of election databases
- Defining ballot styles
- Printing of ballots
- Setup and deployment of voting devices

Voting: Verity Touch Writer
- Polling place ballot marking device

Voting: Verity Scan
- Polling place digital scanning for paper ballots

Post-voting: Central
- High-speed, large-volume ballot scanning
- Ballot adjudication

Post-voting: Count
- Ballot adjudication
- Tabulation of votes
- Consolidation and reporting of results
- Management of audit trails
- Archiving of elections

2.1.1 System Performance

The Verity Voting system is designed and tested to perform effectively in all types of election scenarios including small municipal elections (such as, in the 100s of voters) and massive-scale (such as, greater than 1 million voters) county elections. Based on these figures, the voting system performance will vary depending on the specific parameters of the election. For example, a large county may have over 1000 precincts but may not require different ballot styles for each. On the other hand, another county with 1000 precincts may require a unique ballot style for each precinct, such as a specific “precinct contest” per precinct, which would require at least 6000 different ballot styles. If this county also presents ballots in multiple languages, the number of ballot styles will multiply by the number of languages presented (e.g., if the county supports five languages for 6000 ballots, the number of ballot styles would be 10,000).

Verity Voting supports a large number of ballot styles and 600 voteable positions with acceptable system performance depending on the size of the election.

2.2 Security Overview

Verity was designed for cost-effective and meaningful security solutions to protect data, election definitions, user accounts, and poll access across the entire system in various polling place configurations. Potential usage and data access is protected against users including a co-worker who wants to surf the Internet on a Verity workstation to hackers attempting to subvert elections. Verity security is always a balancing act between security and ease of use.

For each of Verity Voting’s software component systems and devices, this section provides an overview of the security elements implemented as required. Further information on security can be reviewed in later sections in the Security Description.
• Cross-functional principles
• Physical security
• Authentication
• Authorization
• Audits
• Key management
• Voting integrity
• Data protection
• Telecommunications security
• System Validation

For details on each section, see 3.2 Security Description on page 54.

2.2.1 Cross-functional Principles

Security for the Verity Voting system includes various levels and types of security that have cross-functional purposes. Actions and security features for one level may aid and support others, such as providing network security having set access restrictions and application security with user account and role validation.

2.2.2 Physical Security

All devices, hardware, and ballot boxes are required to have a level of physical security to ensure the components have not been tampered with and stored correctly. This security includes placing tamper-resistant labels and seals, locks, and safe locations with secured access. All labels and seals follow guidelines on internal and external seams, ports, and doors.

2.2.3 Authentication

The Verity Voting system provides authentication to ensure software and device components are protected and monitored for usage. Authentication provides security through user access control through unique accounts, associated permission roles, and features assigned specific roles for usage. All user account permissions and role association is managed through the Verity User Management application.

2.2.4 Authorization

Authorization determines if a user is allowed to access features and data, what level they can make modifications, and managing attempted commands with success or failure. Once a user is authenticated, the assigned role to their account enables specific access to features within the system. An account can have multiple roles associated, including modifying data and performing complex actions such as account management, election data updates, and ballot management. All user account permissions and role association is managed through the Verity User Management application.

2.2.5 Audit Logs

Audit logging is stored per application on every computer and device used within the Verity Voting system. Two logs for application and system level are created, written to, and maintained for production builds, installations, and environments by all applications. These logs provide detailed information into errors that occur, actions attempted and completed by users, and events automated by the software.

2.2.6 Key Management

Verity Key provides a level of security for accessing, using, and managing application s, data, and devices within the Verity Voting system. A user cannot access software, hardware, or devices without a Verity Key associated with the specific election and an authenticated user account. Verity Key supports NIST compliant key management, encryption and hashing (FIPS 140-2, level 1).

2.2.7 Voting Integrity

The Verity Voting system includes various options for ensuring cast vote integrity without bias of contest choices through randomized election data displays in ballots, physical and data protection of entered voter ballots, encryption of data, and air gaps without access by networks.
2.2.8 Data Protection

All data is protected within the Verity system through access and security protocols, managed through authentication and authorization procedures. Hardware and device security settings further protect data including election data/definitions, election settings, report results, and CVRs.

2.2.9 Telecommunications Security

Telecommunication security protects all access traffic, transfer of data, and usage of other LANs for Verity components on a network. Verity components that can use LAN networks include Build, Central, and Count.

2.2.10 Application Security

Applications on all Verity Voting system components include a set of security measures that restrict access, monitor action attempts, and authorization.

2.2.11 System Validation

System validation ensures the Verity Voting system is operating as intended for various aspects of functionality. Validation can be completed by voting officials within jurisdictions. The entire Verity Voting system engages in validation tests and results during application installation, component setup, dataset import/export/loading, and election data import/loading. Error handling messages respond along with audit log entries to aid in reviewing attempts, successes, and failures.
2.3 User Access Management

Verity includes a set of user access features for maintaining for the Verity Voting system. With proper permissions, a user can open the component on all Verity Voting system workstations to create accounts, update roles and permissions, and update passwords and active access as required by users.

The roles assigned per account define features available and options available through the Verity Voting system software also installed on the system.

User access management includes the following:

- Verity User Management

2.3.1 Verity User Management

Verity User Management is an application that provides user account creation, management, removal, and access requirements through roles and permissions across the Verity Voting system. Depending on the role of the user, the application displays as a tile on the Verity Election page on every Verity Voting system workstation. If the user does not have an assigned role that would allow for user management, the Users tile will not display.

User Management software allows users to perform the following tasks:

- Create/edit accounts
- Modify roles and permissions per component
- Remove accounts
- Unlock accounts locked due to failed login attempts
- Set the max number of failed login attempts to accept prior to locking
- Set the numbers of months to pass prior to requiring a password change
- Set options for password complexity

2.3.1.1 Verity User Management User Interfaces

2.3.1.1.1 Create/Edit Accounts and Roles

Users can create new accounts on any workstation for the Verity Voting system by adding the account to the grid. Once added, the account displays in the user list for selecting, editing, and further options including unlocking. Users can select and edit the account name and set permissions by selecting associated roles.

All created accounts are only accessible for the stand-alone workstation or for all workstations on a LAN switch. An account created on the multiple workstations connected via a LAN automatically displays the account. Editing an account on any workstation on that LAN is updated for all systems because they share the same database. Accounts on a stand-alone system are only available on that workstation.

Each account can have roles associated to it when edited. These roles are for the components on the local workstation. Displayed roles to select for an account depend on the auto-detected components on the workstation.
These user roles available display according to the installed application and include the following:

<table>
<thead>
<tr>
<th>Verity Component</th>
<th>Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Management</td>
<td>• <strong>UserManager Admin</strong>: Allows the assigned UserManager Admin to create, delete, modify, assign user roles, lock/unlock accounts, and reset accounts. The UserManager Admin may set global password rules for all users.</td>
</tr>
<tr>
<td>Election Manager</td>
<td>• <strong>ElectionManager Admin</strong>: Allows the assigned ElectionManager Admin to import, rename, archive, restore, export, delete elections.</td>
</tr>
<tr>
<td>Desktop</td>
<td>• <strong>Desktop Admin</strong>: Allows the assigned Desktop Admin to set system date and time, export hash codes for system validation, and access the system from kiosk mode.</td>
</tr>
</tbody>
</table>
| Verity Build     | • **Build Viewer**: Allows the user to open available elections, perform election validation, preview the election ballots, and print generated reports and ballot previews. Viewers cannot modify or update content, configurations or elections.  
• **Build Operator**: Allows the user full access to Verity Build. |
| Verity Central   | • **Central Viewer**: Allows the user to open available elections and print generated reports. Viewers cannot modify or update content, configurations or elections.  
• **Central Resolution Board**: Allows the user to open and review voter issue ballots to determine validity, resolve ballots, and run reports.  
• **Central Operator**: Allows the user full access to Verity Central, including the ability to review ballots with voter intent issues, changing election states to complete, restoring elections, performing all tasks for tabulation and generating reports.  
• **Central Admin**: Allows the user restricted access to the administrative setup and closing polls. |
| Verity Count     | • **Count Election Media Device Reader**: Allows the user to open elections and tasks and to read media associated with the elections. This role allows the user to read vDrives into the system.  
• **Count Operator**: Allows the user to open and manage elections and tasks, generate reports, update information for polling places, registered voters, and precincts. The role also includes the import and export of data, resolving ballots, and the auditing dashboard. The role does not allow the manual recording of votes and reading vDrives.  
• **Count Admin**: Allows the user unrestricted access to all aspects of Verity Count except reading vDrives. This role includes manually recording votes, access to all aspects of reports and the auditing dashboard, and importing and exporting data. |

### 2.3.1.1.2 Remove accounts
When removing an account, the user account is permanently deleted from the list. To restore the account, the user will need to recreate the account, setting the roles and permissions prior to usage.

### 2.3.1.1.3 Unlock accounts locked due to failed login attempts
Administrators can unlock an account through the grid list of accounts. If an account is locked, a toggle button is lit blue. When clicked, it clears to white and unlocks the account. When locked, the user cannot access any component on that workstation. An account will lock when a set number of login attempts fail due to incorrect password entered.

### 2.3.1.1.4 Set the max number of failed login attempts to accept prior to locking

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An optional setting is available to set a minimum amount of failed attempts to track before automatically locking an account. The system protects access by counting the number of failed attempts to access a Verity user account. If the password does not match a correct username, it is countered as a failed attempt. Once the minimum number is reached for a user account, it is locked and requires an administrator account to unlock.

2.3.1.1.5 Set the numbers of months to pass prior to requiring a password change

An optional setting is available to force password changes after a set amount of months passes. Once reached, the next time a user attempts to log in, the system automatically requires a new password. The entered password must match any complexity rules enabled on the system.

2.3.1.1.6 Set options for password complexity

Optional settings are available for enabling levels and options for password complexity. These rules require specific characters, numbers of characters, to accept strong passwords for protecting a user account's access. Every login attempt and password change will validate the entered password against these rules and the stored content for the account.

2.4 Election Management

Election management features allow the user to load and maintain election definitions and data for the Verity Voting system components on the workstation. With proper permissions, a user can import elections (signed and unsigned), restore, and manage elections or create archives. Users can also manage data by creating duplicates, renaming, and deleting elections.

Election management includes the following:

- Verity Election Management

2.4.1 Verity Election Management

Verity Election Management is an application that allows users with the proper role permissions to import and manage election definitions and data for the installed Verity Voting system component(s) on the workstation. If the user does not have an assigned role that would allow for election management, the Manage tile will not display. The available options may differ according to the auto-detected installed components on the system.

Election Management software allows users to perform the following tasks:

- Add elections.
- Create a duplicate copy of a selected election.
- Rename an election.
- Delete a listed election.
- Import an election definition.
- Import and export a signed election definition.
- Archive election data.
- Restore election data.

2.4.1.1 Verity Election Management User Interfaces

2.4.1.1.1 Add Election

The application supports creation of a new election. The added election is empty, with limited content included. All elections are configured through an election definition management application.

2.4.1.1.2 Create Copies

The user can create a duplicate copy of a selected election with a new revision number. The election must be loaded on the current workstation and displayed in the election list.
2.4.1.1.3 Rename an Election
The application allows users to rename a selected election. The election must be loaded on the current workstation and display in the election list.

2.4.1.1.4 Delete an Election
The user can select and delete an election from the list of available elections. This action removes the election and content for it from the stand-alone workstation or from all client/server workstations on a LAN.

2.4.1.1.5 Import an Election Definition
The application supports importing an unsigned election definition and data for use with the other installed components. This unsigned definition is typically imported into Verity Build. Any exported elections from Build are electronically signed.

2.4.1.1.6 Import and Export a Signed Election Definition
The application supports importing and exporting a signed election definition and data. These elections have generated signature files to detail the exact files and data for the election, verifying the signing of the content per the component. Importing and exporting can cause a change in election state, depending on the component exported from locally.

2.4.1.1.7 Archive Election Data
The application supports archiving of the selected election, creating a backup of data from the database without causing a change of election state. The archive takes a full snapshot of data associated to the election ID from the database into a zipped file. This zipped archive includes all data in specific formats with content “as is” at the time of archiving. The archived data is system-based, and only capable of being restored to that specific system. A system is all Verity components installed on the workstation.

2.4.1.1.8 Restore Election Data
The application allows the restoration of an archived election, without changing the state of the election at time of restoration. The restored archive must match the system; archived elections can only be restored on the system the files were archived on.

2.5 Desktop
Allows the Desktop Admin to perform system administrative operations
The Desktop application allows the user to perform the following types of administrative functions:

- set system date and time
- export hash codes for system validation
- access the system from kiosk mode

2.6 Pre-Voting Capabilities
Verity Voting pre-voting features allow users to create and configure an election definition, to proof ballots, and to prepare security measures and transfer media for continuing into voting procedures. Pre-voting options includes:

- Verity Build

2.6.1 Verity Build - Election Definition Capabilities
Verity Build is an application that provides pre-voting functionality, the Verity Build workstation should be located in a secure facility at the central administration location. The process establishes relationships between jurisdiction, election data, polling place data, and ballot layout previews through a shared library of election component objects.
**Build** election definition software allows users to do the following tasks:

- Election definition creation, importing, exporting, and management
- Ballot definition, proofing, and printing
- Setting voting device options
- Creating vDrives for purposes of election programming and vote recording
- Creating Verity Key for user authentication and security policies used throughout Verity Voting
- Lock election definition for voting
- Report printing for Verity Build activities

### 2.6.1.1 Verity Build User Interfaces

#### 2.6.1.1.1 Import Election Data

Import an entire election data set including audio and image files. Build can import a file based on a specified zip file format that contains XML data for election data. The import into the Build workstation can be done via Compact Disc or USB drive. The XML file is used to define ballot styles and other election variables.

#### 2.6.1.1.2 Validate Election Data

For imported and loaded elections, Build performs data validation against the election definition and requirements for accepting an election.

#### 2.6.1.1.3 Create Election Definition

Build is the EMS software application that defines, generates, and locks election data to create a signed Election Definition data file that can be deployed to other components of the voting system, such as voting devices, Central scanning workstations, and ballot-on-demand printing. Final election definition changes can be made through Build prior to locking.

The primary device used for distribution of the Election Definition is via physical vDrive devices, but shared system resources between Build and Count may also be used for the Count component.

#### 2.6.1.1.4 Proof Ballots

Build provides proofing and production of paper ballots for an election.

#### 2.6.1.1.5 Lock Elections

Election is allowed to be locked to allow Verity Count to tabulate results.

#### 2.6.1.1.6 Print Ballots

Build allows the user to print sample and official ballots.

**Create vDrive Devices**

Build creates vDrive devices to provide to transfer election definitions into Verity Scan and Verity TouchWriter. The vDrives also transfer CV Rs for Verity Scan, Verity Central, and Verity Count. See Figure 13 - Signed Election Definition Export.

#### 2.6.1.1.7 Create Verity Key Devices

Build creates Verity Key devices to provide user authentication and configures election security throughout Verity Voting system, including devices and applications.

#### 2.6.1.1.8 Export Election Definition

Build allows the user to accept a completed election definition. This election definition can be exported using the Election Management application on the Build system. The election is exported as **signed**, with
associated chain of custody files, to vDrives (for Verity Scan and TouchWriter) and to removable electric media (for Verity Central, and Verity Count).

2.6.1.1.9 Audit Reports

Printing of reports specifically detailing the Build processes for jurisdiction configurations, polling place lists, contests lists, proposition text, contest associations, ballot style associations, exceptions, ballots printed, and vDrives and Keys created.

2.7 Voting Device Capabilities

Voting devices include the following types of devices and peripherals devices that are deployed from the warehouse storage locations to the polling places for voting:

- Verity Scan – Scans paper ballots one at a time or in stacks, saving them into batches
- Verity Touch Writer – Provides digital and paper ballots for voters
- Verity Access – Adds interactive audio-tactile peripherals

2.7.1 Verity Scan – Paper Scanning Device Capabilities

Verity Scan records Cast Vote Records (CVRs) and audit log data in redundant, secure data storage locations. The data storage locations include the vDrive and the ballot box for scanned paper ballots. Paper ballots can be scanned and transferred into digital CVRs. vDrive storage allows for the CVRs and device logs to be transferred into the Verity Central ballot resolution system or the Verity Count tabulation system.

- Can be used in Early Voting and Election Day Voting
- Scans paper ballots and transfers them into digital CVRs
- Provides second-chance voting, with voter instructions for mismarked ballots
- Includes additional accessibility features, including unique audible sounds and interactive physical controls for marking ballots
- Attached to a secure ballot box for storing scanned paper ballots

2.7.1.1 Scan Interfaces

2.7.1.1.1 Distribution of Election Definition

Verity distributes the Election Definition for use in Verity Voting Devices via Verity vDrives. The vDrive is placed in a USB port on the hardware devices that is secured from unauthorized access.
2.7.1.1.2 Recording of Cast Vote Records (CVRs)
Voting Devices record signed CVRs on the vDrive and other redundant storage locations that are secured from unauthorized access. The voting devices vDrive containing the CVRs and logs may be removed by authorized election workers and taken to the central count facility, or taken directly to the Verity Central for vote resolution or Verity Count for tabulation.

2.7.1.1.3 Poll-worker action required
For occasions when the device configured to require poll-worker interaction to allow a voting task to completed

2.7.2 Verity Touch Writer – Accessible Electronic Device Capabilities
Verity Touch Writer is a polling place ballot marking device solution for paper ballots. Touch Writer is paired with a commercial off the shelf printer to allow the voter to mark then print their vote selections. Using Touch Writer in conjunction with Verity Scan will provide the voter with reviewable paper ballot and Verity Scan will securely and accurately record the voter’s cast vote record.

• Can be used in Early Voting and Election Day Voting
• A touch-screen electronic voting device that can also be configured for fully accessible voting
• Can be configured as a ballot marking device, to output a marked printed ballot based on entry of voter selections on electronic interface.
• Compatible with Verity Access, an optional ATI module (with tactile buttons, audio ballot voting, and compatibility with additional two-switch adaptive devices).
• Requires COTS printer
• Attached to a voting booth

2.7.2.1 Touch Writer Interfaces

2.7.2.1.1 Distribution of Election Definition
Verity distributes the Election Definition for use in Verity Voting Devices via Verity vDrives. The vDrive is placed in a USB port on the hardware devices that is secured from unauthorized access.

2.7.2.1.2 Tablet Interface
Tablet touch interface to allow the voter to interact and mark ballot positions.

2.7.2.1.3 Printing of voter ballots
COTS printer connected to Touch Writer via printer USB port

2.7.2.1.4 Verity Access – Audio-Tactile Interface Module
Verity Access is a set of peripherals providing an audio-tactile-interface. This component allows the voter to interact and mark ballot positions without touching the screen. It works strictly as a peripheral option for Verity Touch Writer.

2.7.2.1.5 Marking Ballots
Using jelly buttons, sip-and-puff, or a tactile interface, voters can move through ballot contest entries and voting options, make selections, and finalize ballots

2.7.2.1.6 Printing of Voter Ballots
COTS printer connected to Touch Writer via printer USB port

2.7.2.1.7 Poll-worker Action Required
Poll-worker action is required for occasions when the device configured to require poll-worker interaction to allow a voting task to completed
2.8 Post-Voting Capabilities

Post-voting features include the following:

- Verity Central – Ballot scanning and resolution system
- Verity Count – Ballot tabulation system

2.8.1 Verity Central – Central Scanning Capabilities

Verity Central is a required Verity application that provides post-voting functionality to scan paper ballots, resolve contests, and convert voter selection marks to electronic Cast Vote Records (CVRs) capabilities; Verity Central would be located at the central count facility. CVRs and election data such as audit logs are transferred into Central via vDrives. CVRs can also be created by scanning ballots directly into Central. Once the CVRs are written to vDrive(s) they can be transferred into Verity Count for vote tabulation and reporting of election results. Verity Central reads and records cast vote records only.

Note: Verity Central does not tabulate votes.

Verity Central is voting software used for these functions:

- High-speed central scanning
- Ballot resolution
- Ballot audits
- Conversion of paper ballot marks to electronically-stored cast vote records

2.8.1.1 Verity Central Interfaces

2.8.1.1.1 Election Definition

Verity distributes the Election Definition for use in Verity components via vDrive.

2.8.1.1.2 Scan paper ballots

Scan paper ballots and generating electronic CVRs. Ballots can be scanned in bulk amounts using high volume scanners. The application provides a preview tool for reviewing ballots as scanned for issues and resolutions, as well as a reviewing section for flagged ballots with mismarks, overvotes, undervotes, and write-in candidates.

2.8.1.1.3 Transfer CVRs to vDrives

Writing of the vDrives containing scanned CVRs to allow election results to be transferred in to Verity Count. Recovery vDrives are also available for previously loaded vDrive data.

2.8.1.1.4 Export for Data

Exporting data to a user specified location (device or workstation folder). The export data set shall include scanned ballot information.

2.8.1.1.5 Distributed CVR Reviews

Review CVRs through multiple Central workstations to distribute ballot resolutions for mismarked ballots, overvotes, undervotes, and write-in choices. With a centralized database, officials only review ballots once without reviewing the same ballots on each station.

2.8.1.1.6 Generate and Print Reports

Printing of reports detailing Central’s processes for configuration information, scanned batches information, batch summary information, batch detail information, election media information, precinct summary information, precinct detail information, detailed ballot information, and duplicate ballot information.
2.8.2 Verity Count – Tabulation Capabilities

Verity Count is a required Verity application that provides post-voting functionality to tabulate election results and generate reports, and review Verity Scan ballots for adjudication of voter marks and write-in candidates. Verity Central would be located at the central count facility. Count reads the CVRs from portable media devices used to record CVRs from Hart voting devices or Verity Central. Verity Count can also be used to collect and store all election logs from every Verity component/device used in the election, allowing for complete election audit log reviews.

Verity Count is used for:
- Vote tabulation
- Results reporting
- Election auditing

2.8.2.1 Verity Count Interfaces

2.8.2.1.1 Election Definition Distribution

Verity distributes the Election Definition for use in Verity components via vDrive or from the Build workstation.

2.8.2.1.2 Read vDrive Data

Reading of the vDrives’ CVRs and audit logs.

2.8.2.1.3 Import Data

Importing of data for registered voter information, provisional ballot status, and certified write-in candidates.

2.8.2.1.4 Export Election Data

Exporting data to a user specified location (device or workstation folder). The export data set shall include details vote totals, registered voter information, and provisional ballot status.

2.8.2.1.5 Generate and Print Reports


2.9 Verity Election Preparation

3 SYSTEM DESCRIPTION

3.1 System and Subsystem Descriptions

3.1.1 Verity Voting System Software and Hardware – General

This section details all usage, design, and content for an overall view of the Verity Voting system components. Further information per component is available in later sections.

3.1.1.1 Operating Environment

The Verity Voting system environment includes workstation computers, laptop workstations, internet accessible network, and removable media drives:

- Verity Voting is a system that was purpose-built and requires specific hardware and software for the voting machines and workstations to operate.
- All Verity Voting system components are tested and shipped from Hart to be ready to use for its intended purpose.
- Some Verity Voting system components employ commercial off the shelf (COTS) hardware such as printers or scanners.
- The environment transfers data on removable media drives called vDrives across systems.
- Verity Build, Central, and Count can use networks for transferring data.

3.1.1.2 Authentication and Authorization

Authentication verifies login account access against stored records in the Verity Voting system. If the settings match and security procedures clear, authorization is granted based on the associated user account and role(s).

- The election administrator is able to create, delete, and modify Verity user accounts.
- Verity authenticates users by their account ID and password before granting access to information or functionality.
- User authorization to access any Verity functionality is governed by the user role.

For full details on audit logs, see Authentication and Authorization on page 55.

3.1.1.3 Auditability

The Verity Voting system creates, maintains, and saves audit logs for events and exceptions in the components. These logs are available for tracking issues that occur.

- Verity supports enhanced auditing to verify system operation and accuracy, in a manner that is efficient and usable.
- Verity supports standardized, structured, documented, and open standards to facilitate data exchange and reporting.
- All Verity software and hardware components support a log of auditable events performed since the system’s installation.

For full details on audit logs, see Audit Logs on page 56.

3.1.1.4 General management

- Verity is capable of being installed on a “standalone” workstation.
- Verity is capable of being installed in a client-server format.
- Verity software installers and uninstallers require minimal configuration and are designed for ease of use.
- Verity supports a user’s ability to re-use data associated with prior elections managed in Verity, such as through copy, export/import and/or ID associations.
- Verity accommodates jurisdiction-specific settings to manage election data.

3.1.1.5 Shared Libraries

- Verity components use data from a common set of election data objects, to minimize a user’s need to reenter data whenever possible, and to ensure consistency and efficiency.
All shared libraries are located in the infrastructure layer, providing support for all aspects of the components including communication and persistence for business objects. The share libraries also provide support for the user interface, data for reporting purposes, and further implementation of repositories and factories.

3.1.1.6 Information Design

Verity interfaces, ballots, reports, and user documentation are designed in accordance with best practices for information design.

- Buttons in the interfaces for components have clear descriptions for the features.
- Tooltips in the interfaces for components provide information for the pages and feature options.
- Ballots include custom instructions for digital voting and marking paper ballots.
- Frequently Asked Questions (FAQs) are provided through an online help interface within the component.
- Technical Reference Manuals provide detailed explanations of intended features, user interfaces, exception messages, and glossary.
- Polling Place operations information provides detailed information for setting up the polling place voting booths, ballots for voting, and handling elections for early voting and election day voting.
- Service and Maintenance information provides thorough setup, maintenance, and troubleshooting instructions.

3.1.1.7 GUI and Visual Design

All graphical designs are displayed and interactive through Verity Voting system components:

- Verity graphic user interfaces are designed in accordance with style guides, AIGA Design for Democracy.
- Verity graphic user interfaces are appropriate for inexperienced workstation users.
- Interfaces use a distinct color scheme per component.
- Interfaces include a designed workflow to walk the user and voter through accessing the components, issuing commands, and interacting with features to task completion.
- Messages display in windows that pop up or open over the interface, requiring a response to close and continue.
- Air gaps exist between each station to ensure security of data, limiting access, and clearly defining usage.

3.1.1.8 Data Input

Interface elements and system messages define how to input data and what information is needed, required, or recommended for an election definition or voter response:

- Verity provides clear feedback to the user to indicate when data entry steps have been completed.
- Verity maximizes the use of graphic hierarchical status indicators, to indicate which elements in a specific workflow have been completed and which remain incomplete.
- Whenever data is imported or entered by a user, Verity components verify the correctness of the data.
- Interface elements mark required data input fields and selections for a specific feature, such as ballot design and contest entry creation.
- Verity is capable of validating election data sets for completeness and logic.
- Device interfaces include audio file cues to provide instruction for entering data selections.
- Multiple languages are supported for accepting and requesting data for multi-lingual voters.

3.1.1.9 Reports

The Verity Voting system provides support for generating standard and customized reports against each component.

- All Verity reports are capable of being exported in a format compatible with standard commercially available word processing tools, to offer users control over a range of customizable options.
- Reports include standard report options and customizable reports based on standard reports.
• Report settings save with exported and backed up elections and data.

3.1.1.10 Fault Tolerance and Error Recovery

• Verity notifies users of validation, application, and database errors.
• Detailed logging provides information regarding events captured through the system and via user interaction.
• System messages detail easy-to-read information and instructions in case of error or warning.

3.1.1.11 User Documentation

Documentation is provided to end users for all types of system users, including polling place workers and election officials. These documents are provided as PDFs and within the system components. Further content may be provided per client basis by the Hart Professional Services team.

• Verity user documentation is designed in accordance with style guides, to ensure consistency.
• Frequently Asked Questions (FAQs) are provided through an online help interface within the component.
• Technical Reference Manuals provide detailed explanations of intended features, user interfaces, exception messages, and glossary.
• Polling Place operations information provides detailed information for setting up the polling place voting booths, ballots for voting, and handling elections for early voting and election day voting.
• Service and Maintenance information provides thorough setup, maintenance, and troubleshooting instructions.

3.1.1.12 Usability

Verity’s operation is intuitive and aligned with users’ natural behaviors. Some features that support this objective include:

• Naming icons and buttons with terms based on everyday election terminology.
• Clearly establishing workflows that align with users’ everyday experience, rather than being driven by the needs of the technology solution.
• Providing access and content to aid with voter selections through Verity Access peripherals for users with disability challenges (headphones, jelly buttons, sip-and-puff, tactile interface components).
• Supporting multiple languages with text and audio translations for voters through digital and paper ballots.
• Verity maximizes opportunities for user-selectable options to be configured once and persist until changed by the user.

3.1.1.13 Efficiency/agility

Hart employs the use of stable programming procedures and designs, COTS options, and features to provide consistent results and efficient resource usage.

• Verity supports users’ ability to deploy elections with an absence of “bottlenecks”. This means, maintaining the severability of parallel but distinct data sets, such as printed ballot formats versus electronic ballot formats which require audio; or different language versions of the same election.
• Verity Voting system options include components for large to small scale polling places and elections, including high to low volume scanners for paper ballots.

3.1.1.14 Installation

Hart provides all installation, configuration, and initial testing for every Verity Voting system component in-house.

• Verity Voting is capable of being implemented in a standalone or client-server configuration.
• Verity Voting components are not customer-installable.
• Professional services options are available to further demonstrate the configured system per election day needs.
3.1.2 Verity User Management – User Account Access

Verity User Management enables users with proper roles to create and manage user accounts and account settings for the Verity Voting system. The component is included on every workstation with any Verity component installed. If a user does not have the appropriate administrator or operator role assigned to their account, the Users component icon will not display on the Verity Election Office screen.

All user accounts are created per workstation, as needed by officials and the polling place, depending on the component and usage. These accounts are available on a stand-alone workstation or for all workstations connected through a LAN switch.

The component includes options for creating and editing accounts, quickly reviewing assigned account roles and lock status, and options for account and password maintenance and rules for the system. These rules can differ workstation to workstation.

3.1.2.1 Creating and Managing Accounts

- Add Verity user accounts to the user grid list for the stand-alone workstation or LAN connected systems.
- Edit the account user name.
- Assign and modify assigned component user roles, providing permissions for features and access.
- Delete an account from the list.

3.1.2.2 Unlocking and Locking Accounts

- Configure an optional setting for the number of failed attempted logins to track prior to locking. If the amount of failed attempts is reached, the account is locked. Locked accounts require administrative unlocking.
- Check the lock status for an account.
- Unlock a locked account, due to locking by failed login attempts or administrator.
- Lock an account to restrict and block access, without deleting an account.

3.1.2.3 Password Settings

- Configure an optional setting for changing a password when a number of months is reached with the current password.
- Configure settings for password complexity:
  - Password must contain at least one upper-case character.
  - Password must contain at least one numeric digit.
  - Password must contain at least one special character.
  - Password must be at least 6 characters long.

3.1.3 Verity Election Management – Election Data Management

Verity Election Management enables users with proper roles to import, export, and manage election definitions and data for the Verity Voting system. The application is included on every workstation with any Verity component installed. If a user does not have the appropriate administrator or operator role assigned to their account, the Manage icon will not display on the Verity Election Office screen.

All elections are loaded into Election Management to be available within the installed Verity components. For on-going elections, it is imported as a signed or unsigned election. For restoring a past election, the user can create an archive and restore the archive back into the origin system. Additional features include removing the election from the system, renaming the election, and creating duplicates.

3.1.3.1 Adding Elections

- Creates a new election with a minimum of information for opening and creating through Verity Build.

3.1.3.2 Copying Elections

- Copies a selected election and saves it with a new election ID.
- Associates a new revision number to the election.
• Prompts the user for the revision and verification of actions.

3.1.3.3 Renaming Elections
• Renames a selected election, without changing the election ID.

3.1.3.4 Deleting Elections
• Removes an election from the grid list and from the database.
• Archiving an election prior to deletion is recommended.

3.1.3.5 Importing Elections
• Importing unsigned elections is only available on Verity Build.
• Verity allows a user to import data elements that have been properly formatted in accordance with standardized published specifications.
• Imported data is validated at loading, detailing if the loaded definition and customization settings properly match requirements for the component or device using the content.
• A customized setting is available for setting the default import file location on the system.
• Imports a unsigned zipped election based on data elements that have been properly formatted in accordance with standardized published specifications.
• The first folder accessed when importing is based on the default import folder location set in the preferences.

3.1.3.6 Importing Signed Elections
• Importing signed elections is only available on Verity Central and Verity Count.
• A customized setting is available for setting the default import file location on the system.
• Imports a signed zipped election based on data elements that have been properly formatted in accordance with standardized published specifications.
• The first folder accessed when importing is based on the default import folder location set in the preferences.
• The import validation process checks for a set of signature files to provide a clear chain of custody and ensure data integrity, every written file, folder, and the entire structure and content of the vDrive is digitally signed to provide tamper evidence.
• Any validation or data issues will prompt the user with updated messages and warnings, such as overwriting content.

3.1.3.7 Exporting Signed Elections
• Exporting signed elections is only allowed on Verity Build.
• Verity allows users to export election data in published formats for a variety of purposes.
• Verity supports the export of data according to standardized, structured, documented, and open standards.
• Data exporting includes all content, definitions, preference settings, and reports saved at the time of the export.
• A customized setting is available for setting the default export file location on the system.
• Exports a signed zipped election based on data elements that have been properly formatted in accordance with standardized published specifications.
• When exporting, the state may change depending on the locally installed Verity components. For example, Build will change the election state where another component will not.
• Exporting generates a set of specific files in folders, saved to the selected location. The files include a signature file to provide a clear chain of custody and ensure data integrity; every written file, folder, and the entire structure and content of the vDrive is digitally signed to provide tamper evidence.
• Any validation or data issues will prompt the user with updated messages and warnings, such as issues with a vDrive.

3.1.3.8 Archiving Election Data
• Creates an archive of an election definition and associated data with all settings and election state at the time of archive. The election state does not change the state of the election.
• The archive saving feature opens the export default folder location when selecting.
• The archive includes all database data for an election, including specific settings per the installed application.
• The archive can be restored on a system that matches the origin. If the system is a stand-alone workstation with a specific component such as Central installed, it must be restored to a similar system.
• Archives only restore to the same component they were created in. The user cannot load an archive from Build into Central, and so on.

3.1.3.9 Restoring Election Data
• Restoring an archive will reload an archive election definition and associated data with all settings and election state at the time of archive. The election state does not change the state of the election.
• The restore feature opens the import default folder location when selecting.
• The restore feature includes all settings and information from the archive into the system’s database, including specific settings per the installed component.
• The restored archive can only be restored on a system that matches the origin. If the archive was created on a system is a stand-alone workstation with a specific component such as Central installed, it must be restored to a similar system.
• Restoring an archive can only be completed in the same component it was created in. The user cannot restore an archive from Build into Central, and so on.

3.1.4 Verity Build – Pre-voting Functionality
Verity Build allows users to prepare an election by defining styles that can be transferred to portable flash media for purposes of voting and vote capture. Build can import ballot data in a specified format.

Verity Build includes a ballot layout viewer capable of producing printed outputs for purposes of proof-reading all ballot styles, as well as the capability to proof recorded audio strings. After users view ballot styles electronically or in hard copy format, users may accept the election, which “locks” the election (in preparation for producing election media). Locking the election keeps the user from editing the source data and definition.

3.1.4.1 Importing and Managing Election Data
• Access to the Election Management application to import and export election based on data elements that have been properly formatted in accordance with standardized published specifications through.
• Edit election data until it is exported for usage in voting. Any exporting of this data will change the state of the election definition (Locked for Export) and lock out further revisions.

3.1.4.2 Proofing Election Data
• Provides users methods to validate ballot data that has been entered.
• View ballot style previews through an embedded viewer.
• Print ballot style previews.
• Save ballot styles to image files.
• Proof recorded audio strings.
• Verity Build allows users to enter translation files and settings for supported languages.
• Verity Build supports the production of various reports that allow users to proof-read and validate ballot data entry.

3.1.4.3 Ballot Content – Supported Information
Verity Build software supports the following types of data:
• Ballot header information, includes the election type, ballot label, jurisdiction name, election title, election date
• Standard and customized ballot instructions
• Election types
• Voting patterns, including special cases of voting variations
• Party information and images
• Contest types and associated contest options, including contest-specific instruction text and/or proposition text
• Rotation types

Verity Build is capable of formatting ballots with the following information:
• Unique ballot identifying information (for example, serial number and unique election identifier)
• Page numbering
• Static text strings
• Ballot instructions with custom content
• Ballot images
• Multi-language data (including audio, text, and image files as appropriate)
• Election data per contest with fully detailed options/candidates and images according to the contest type. Contests include candidates and propositions.
• Voting logic per contest entry to set the voting and tabulation method per contest
• Write-in options as appropriate from a list of certified write-in candidates

3.1.4.4 Ballot Standards
• Produces ballot layouts that reflect best practices for information design.
• Produces ballot layouts that reflect Brennan Center best practices for "Better Ballots".
• Supports the following paper sizes:
  • 8.5" x 11"
  • 8.5" x 14"
  • 8.5" x 17"
  • 11" x 17"
• Supports ballot layouts in portrait orientation.
• Supports duplex ballot layouts.
• Supports the inclusion of ballot stubs on paper ballots.
• Supports layouts for a variety of ballot types, including non-provisional, provisional, Test mode, Official mode, and Sample ballots.
• Compatible with the production of ballots on standard, commercially available white paper stock.

3.1.4.5 Ballot Layout Features
• Includes ballot templates that allow users to manage text attributes and layout formats, such as font family, font size, rich text formatting, column layout, headers, footers, images, color, and additional attributes.
• Supports the layout of ballots in paper-based and electronic formats.
• Minimizes the likelihood that common folding patterns for specified paper sizes (e.g., tri-fold on letter-size paper) will result in fold lines passing through ballot selection fields.

3.1.4.6 Previewing Ballot Layouts
• Allows users to view on-screen graphic previews of exact facsimile ballot layouts.
• Allows users to specify which ballot types are previewed, according to a variety of user-defined attributes, including precinct, style, type, language, and party.
• Supports the production of various reports that allow users to proof-read and validate ballot layouts.
• Supports the production of audit logs for transparency.

3.1.4.7 Generating Election Media
• Allows users to accept rendered ballot styles.
• Allows users to generate portable flash media that includes election data and ballot style information that the user has accepted.
3.1.4.8 Ballot Production

- Supports ballot production in a variety of formats, including paper ballot printing, generation of electronic ballots, and production of ballot printing files in PDF format, for use by third-party commercial printers.

3.1.5 Verity Voting Devices - Common Functionality

Verity Voting device functionality is built on a baseline of two devices that share a common physical platform: a paper ballot scanning device and a multi-purpose accessible electronic device that can be configured in a variety of ways. These devices include Verity Touch Writer and Verity Scan.

3.1.5.1 General

- Used for different modes of voting (e.g., paper ballot scanning versus electronic voting) use a common platform, or “base station”.
- The common platform accommodates different non-user configurable combinations of device modules.
- Employ a common user interface theme, to facilitate training and operation by different types of authorized personnel.
- Employ common components to facilitate training, serviceability, setup, and operation.

3.1.5.2 Voting Device Security

- Verity Voting devices incorporate methods to prevent unauthorized persons from physically tampering with secure functions, or from performing acts that might interrupt a voting session.
- Verity Voting devices do not require connection to an external workstation for routine operations or regularly scheduled maintenance.
- Verity Voting devices incorporate physical access controls to ensure that there are no externally vulnerable open ports during normal storage and use.

3.1.5.3 Voting Device Authorization

- Verity Voting devices support specialized roles as deemed necessary by specific functions within the voting device suite.
- Verity Voting devices support the issuing and accepting of codes to associate ballots and entered votes per registered voter.

3.1.5.4 Voting Device Authentication

- Verity Voting devices employ passwords to restrict access to key functions.
- Verity Voting devices support the issuing and accepting of codes to associate ballots and entered votes per registered voter.

3.1.5.5 Voting Device Auditability

- Each device supports auditability for system level events and election results audits.
- All logs are saved with election data and CVRs.

3.1.5.6 Device Software Installation and Validation

- Verity Voting devices support methods to verify that only authorized software is present on the devices.
- All installation and configuration conducted in-house at Hart, tested prior to release, and provided to customers.
- Testing for all installations is performed through Hart to ensure software and devices work correctly.

3.1.5.7 Memory

- Verity Voting devices employ vDrive devices and harddrive locations for the storage of Cast Vote Records, audit log information, backup data, and other election data.
- Verity Voting devices store CVRs in randomized order, to protect voter privacy.
- Verity Voting devices compare redundant data, to ensure data integrity.
- Verity Voting devices support data backup.
• Verity Voting devices support recovery of data from non-volatile memory, for risk management purposes.

3.1.5.8 Power
• Verity Voting devices employ user-operated power switches to control power-on and power-off functions.
• If Verity Voting devices are power cycled, the devices transition back into the state before the power cycle.

3.1.5.9 Interactive Display
• Verity Voting devices employ an interactive display for the user interface.
• The interactive display is capable of being removed for service, replacement, or to support required voting functions.
• Verity Voting device interactive displays have touch-screen capability.
• Verity Voting device interactive displays have a diagonal size of 12 inches.

3.1.5.10 Report Printer
• For applicable configurations, Verity Voting devices support the use of a modular, integrated printer for purposes of printing reports.

3.1.5.11 Auditability
• Electronic device audit logs are capable of being filtered by device to indicate the number of ballots issued, voted, expired, and canceled.
• Logs are kept with all election data, ensuring associated content is kept together.

3.1.5.12 Device Error Handling
• Verity Voting devices display plain language warnings for system-level alerts and/or malfunctions.
• Verity Voting devices do not lose or corrupt any recorded data in the event of a sudden power failure.
• Verity Voting devices do not accept ballots for submission if the device is not within normal operating parameters.
• If applicable, Verity Voting devices display the action to take in response to an error condition.
• If the error caught by the device cannot be resolved by user interaction, a message displays to contact the customer support center or return the hardware for repair as applicable.

3.1.5.13 Warehouse Operations
Verity Voting devices permit a variety of warehouse functions, including the following:
• Validation of installed software.
• Functionality testing at installation, post installation, and setup in new facilities.
• Configuration of devices with appropriate security credentials.
• Set real-time clock, including Daylight Savings Time policies.
• Resetting of devices to factory defaults.
• Back up of CVRs and audit log data.
• Data recovery.
• Readiness testing post-installation and deployment.

3.1.5.14 Maintenance
• The tablet computer has a coin-battery that requires maintenance. The battery has a projected life-span of five years. Hart customer support is required for performing this maintenance.

3.1.5.15 Election Logic
• Verity Voting devices use Verity Build-generated vDrive as a means of installing and configuring any Verity-defined election on the devices.
• Verity Voting devices allow authorized personnel to assign multiple precinct ballot styles on the devices.
3.1.5.16 Operational States

Verity Voting devices accommodate the following operational states:

- Power-up
- Setup/configuration
- "Polling" mode
- Shutdown

Devices require passwords and pass codes to transition between modes.

3.1.5.17 Usable Ballot Design

- Verity Voting device interfaces follow best practices for usable ballot design.
- Voters can move forward and back on digital ballots, able to review and edit choices prior to final acceptance and submission of ballots.
- Write-in options have an on-screen keyboard for entering content.

3.1.5.18 Instruction Messages

- Verity Voting devices follow best practices for usable instructions (i.e., for poll workers and voters alike).
- Instructions include information for poll workers for managing polls and ballots as well as displaying instructions (standard and custom) to voters.
- Instructions may have associated audio files, per supported language.
- Instructions are provided per supported languages entered into the system. Voters and poll workers can change the language through the device interface, displaying those instructions.

3.1.5.19 User Documentation for Devices

- User documentation for Verity Voting devices is easily matched to the device.
- User documentation for Verity Voting devices organizes troubleshooting information in task-oriented fashion that matches the same terminology and use cases that are likely to be thought of by typical poll workers.
- User documentation for Verity Voting devices reduces the cognitive load on the user by making it easy for the documentation to match the user’s specific implementation variables.

3.1.5.20 Voter Effectiveness

- Verity Voting devices reduce undervotes and residual votes.
- Verity Voting devices reduce issues with reading write-in choices. Voters can type in choices with clearly read and identified lettering rather than attempting to review hand-written entries.
- Verity Voting devices refine vote processes by providing audio and multi-language support, giving clear indicators of available and chosen contest entries.

3.1.5.21 Voter Efficiency

- Verity Voting devices support a voter’s ability to cast a ballot quickly.
- Review and submission of ballots is quickly completed with validation against contest requirements.
- All ballot choices are printed and scanned clearly with a reduction of marking issues, reducing ballot issues and review when scanning ballots into digital CVRs.

3.1.5.22 Voter Satisfaction

- Verity Voting devices support a voting process that is easy and intuitive.
- Verity Voting devices make it clear to the voter how to begin the voting process.
- Verity Voting devices make it unequivocally clear to the voter whether a ballot has been successfully cast or not.
- Verity Voting provides multiple methods for reviewing contests and choices, including audio and multiple languages.
- Verity Voting provides multiple methods for entering votes, including Verity Access.

3.1.6 Common Workflow for Voting Devices

Verity Voting devices have several configurations. Common workflows for all systems are shown below:
3.1.7 Verity Scan – Ballot Scanning Voting Device Functionality

Verity Scan provides paper ballot scanning capabilities. When scanned, the system validates the ballot according to voter marks and the associated election contests. If issues are located, the system may provide a warning or flag the scanned ballot for review. The ballot is converted into a digital CVR, transferable on a vDrive to another Verity component for further review and tabulation.

3.1.7.1 General

Verity Scan devices support the following components:

- Scanning mechanism.
• Paper ballot transport path.
• Ballot box sub assembly.

3.1.7.2 Scanning
• Verity Scan devices include a bi-directional scanner.
• Verity Scan devices accommodate duplex scanning.
• Verity Scan devices scan ballots at approximately at a 1 ballot(sheet) per 30 seconds.
• Verity Scan devices support 9,999 ballots (single sheets) per vDrive.
• Verity Scan devices are capable of capturing and storing the ballot image on removable media.
• Verity Scan devices are capable of capturing and storing the digital image of a write-in vote.
• Verity Scan devices scan multi-sheet ballots.
• Verity Scan devices scan paper ballots in all portrait orientations (face up, face down, header first, footer first).

3.1.7.3 Paper Transport Mechanism
• The paper feed path includes uniquely colored prominent lights to indicate when the device is ready to accept a ballot for scanning.
• The paper feed path includes uniquely colored prominent lights to indicate when the device is unavailable for scanning.
• Verity Scan devices have an opening that allows the scanned ballot to pass through the paper transport sub-assembly directly into the secure ballot box, to which the scanning device is affixed.

3.1.7.4 Configurable Settings
• Verity Scan devices are configurable for the types of mismarked ballots that are rejected and returned to the voter for review, or always accepted.
• Verity Scan devices are configurable for whether a poll worker or a voter is able to independently cast a rejected, mismarked ballot “as-is”.

3.1.7.5 Audible Sound Features, for Enhanced Accessibility
• Verity Scan devices emit unique audible sounds for a variety of conditions, including success and failure.
• The audio volume is user-configurable.
• User-configurable audio settings are clearly displayed in the scanner interface.

3.1.7.6 Supported Ballot Types
• Verity Scan devices accept ballots with or without serial numbers.
• Verity Scan devices accept ballots printed in Test mode.
• Verity Scan devices accept ballots printed in Official mode.
• Verity Scan devices maintain public ballot counters that reflect the number of ballots cast or marked for the current election configuration and the total number of sheets processed.

3.1.7.7 Scanning Device Voting process
• Verity Scan devices display voter instruction messages for all valid operations.
• Verity Scan devices provide an opportunity for the voter to receive help messages directly from the system at any time during the voting session.
• Verity Scan devices display a plain language message that accurately and clearly describes any ballot mismarks that cause the ballot to be returned to the voter.
• Verity Scan devices report the contest(s) with mismarks.
• The scanning device provides instructions to the voter on how to resolve the mismarked ballot.

3.1.7.8 Scanning Device Error Handling
• When applicable, the scanner reports error conditions to the user.
• The scanning device displays all error messages accurately and clearly, in plain language.
• Error messages provide instructions on how issues may be resolved.
<table>
<thead>
<tr>
<th>Error Type</th>
<th>Error Occurring</th>
<th>Steps for Error and Messaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scanning Errors</td>
<td>Rejection of a scanned ballot by the ballot processing logic of the scanner</td>
<td>• Ejected ballots are returned to the paper feed tray.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A message displays with the reason for the scan issue encountered.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• An audio sound plays when it is rejected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The system will not allow scanning of additional ballots until the rejected ballot is removed.</td>
</tr>
<tr>
<td></td>
<td>Paper jam detected with the scanner</td>
<td>• A message displays about the paper jam.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• An audio sound plays when it is rejected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If the ballot has not been cast, the system attempts to clear the paper jam by pushing the sheet to the front of the scanner.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If the ballot has been cast, the system attempts to clear the paper jam by pushing the sheet to the back of the scanner.</td>
</tr>
<tr>
<td></td>
<td>Paper jam detected in the paper path on startup of the scanner</td>
<td>• The scanner attempts to eject the paper jam through the front of the device.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If unable to clear the paper path, a System Alert displays with information on the paper jam.</td>
</tr>
<tr>
<td></td>
<td>Cannot record the Cast Vote Record on the device through scanning</td>
<td>• The scanner attempts to scan the ballot, verifies the voter marks, and completes the scan.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If a Cast Vote Record cannot generate, provide a System Alert with detailed information</td>
</tr>
<tr>
<td></td>
<td>Cannot deposit the scanned ballot into the ballot box</td>
<td>• The scanner attempts to scan the ballot, verifies the voter marks, and completes the scan.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A Cast Vote Record is correctly generated.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The scanner attempts to deposit the scanned paper ballot into the ballot box.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If the ballot cannot be deposited, a system message displays describing how the poll worker can manually deposit the paper ballot.</td>
</tr>
<tr>
<td>CalibrationErrors</td>
<td>Calibration for any application fails</td>
<td>• The system attempts calibration of applications.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If the calibration does not complete or encounters errors, the system generates a message.</td>
</tr>
<tr>
<td>Thermal PrinterErrors</td>
<td>Out of paper</td>
<td>• When the thermal printer runs out of paper, a message displays to notify the user.</td>
</tr>
</tbody>
</table>

### 3.1.7.9 Maintenance

- The paper transport system is of substantial construction to ensure consistent paper path gap calibration.
- Gap calibration verification and adjustment procedure requires minimal steps and common tools.
- The paper transport mechanism is capable of being easily maintained and cleaned following standard Hart procedures as documented in the operations manual.
3.1.8 Verity Scan Workflows

Verity Scan workflows that are specific to the scanning device are shown below:

**Figure 14 – Scanning Device Polls Open Workflow**
3.1.9 Verity Touch Writer – Ballot Marking Voting Device Functionality

The Verity Touch Writer is a mix of voting device for voters to mark ballots, enter votes, with a printed ballot to scan. Poll workers open and manage polls, generate codes, and provide the device for completing ballots. Voters review the contest options, enter vote options, and complete their ballots for printing and scanning by poll workers.

3.1.9.1 General

- Verity Touch Writer devices support the following optional component:
  - Verity Access – An audio tactile interface (ATI) controller, which allows a voter to perform a voting session with tactile buttons and audio feedback.
- Verity Touch Writer devices support the following input methods:
  - Interactive touch screen display.
  - ATI controller buttons.
  - Dual-switch input controller with tactile input (e.g., “jelly buttons”).
  - Dual-switch input controller with non-manual input (e.g., “sip-and-puff”).
- All keys and controls for voter use on Verity Touch Writer devices are operable with one hand and do not require tight grasping, pinching or twisting of the wrist.
- The ballot activation method does not require each voter to have his/her own activation device (e.g., “smart cards”).
- Verity Touch Writer devices support voter-selectable ballot activation, with an Access Code.
- Verity Touch Writer devices allow users to perform functionality testing through an interactive “response test” screen for a variety of electronic device-specific parts, including ATI controller, BMD printer, dual-switch input, and audio in headphones.

3.1.9.2 Accessibility Considerations

- The height, position, and orientation of all labels, displays, controls, keys, audio jacks, and any other part of the accessible voting station does not interfere with wheelchair controls and armrests, whether the wheelchair approaches frontally or laterally.
- Verity Touch devices offer users a comprehensive interface to allow users to configure settings for audio volume, audio speech rate, visible magnification, contrast settings, language preference and audio or video ballot modes.
3.1.9.3 Audio Tactile Interface (ATI) Controller

- All modes supported by Verity Touch devices are capable of having an ATI attached to it, to easily make it an accessible device.
- The ATI controller is capable of being attached in the field, by authorized personnel.
- The ATI controller has buttons to support a variety of ballot navigation functions.
  - All ATI buttons shall have Braille labels, dishing for mouthsticks, and clear tactile edges.
  - ATI buttons are color-coded to enhance usability.
- The ATI provides a set of physical user interfaces including:
  - Move wheel to select through choices.
  - Select button to make a selection.
  - Help button to open instructions.
- The peripheral includes a 3.5mm jack for connecting headphones. This provides access for listening to the audio files while voting.
- The peripheral includes a 3.5mm jack for connecting standard two switch accessibility adaptive devices including jelly buttons and sip and puff devices.
- Verity Voting device provides messages when peripherals are inserted.

3.1.9.4 Provisional electronic ballots

- Verity Touch Writer devices support assignment of provisional ballots.

3.1.9.5 Audio ballot requirements

- The ATI provides audio feedback for every input function, even if input is not an allowed voter option at that point.
- Audio ballots minimize concatenation effects, so that different audio elements that are strung together do not sound disconnected.
- Static audio in the Verity system is recorded by professional voice talent.
- Static audio in the Verity system is produced in a professional sound studio, by a professional firm that specializes in the production of commercial audio.
- Audio instructions conform to best practices for blind or low-vision users.

3.1.9.6 Curbside voting

- Verity electronic voting devices in BMD voting mode support curbside voting.
- To support curbside voting, Verity Touch Writer devices are capable of having the interactive display undocked, for transport to the curb.

3.1.9.7 Equality of Access

- As a practical matter, there may be some number of voters whose disabilities are so severe that they will need personal assistance to cast a vote privately and independently. Nonetheless, Verity Touch devices are meant to make the voting system independently accessible to as many voters as possible.

3.1.9.8 COTS Printer

- The Verity Touch Writer includes a COTS printer for printing completed and submitted ballots.
- The COTS Printer connects to the system using a USB port.
- The ballots are printed through the printer, single or double-sided depending on the ballot.
- Print functions include the following:
  - Printer resolution at 600DPI.
  - Duplex printing available.
  - Page sizes include:
    - 8.5"x11"
    - 8.5"x14"
    - 8.5"x17"
3.1.10 Verity Touch Writer Workflows

Stand-Alone Verity Touch devices have specific workflows that are associated with this system configuration. These are shown below:

![Workflow Diagram]

Figure 16 – Touch Writer Polls Open Poll Workflow
3.1.11 Verity Central – Central Scanning and Ballot Resolution Functionality

Verity Central is an application that provides paper ballot scanning functionality (using high speed COTS document scanners), contest resolution, and conversion of voter selection marks to electronic Cast Vote Records (CVRs). Once the CVRs are stored they can be transferred into Verity Count software for vote tabulation and reporting of election results. Verity Central reads and records cast vote records only.

Note: Verity Central does not tabulate votes.

3.1.11.1 General

- Verity Central is capable of operating in server/client or stand-alone configurations.
- Verity Central displays a “public counter” and “private counter” in the user interface.
- Verity Central allows multiple client scanning workstations on a network to operate simultaneously. A network is not required for Central to scan or process ballots.
- The Central scanning solution allows no more than one COTS scanner per workstation, or one workstation per scanner.
3.1.11.2 Verity Central Workstations

- Verity Central is designed with a minimum of one default workstation, and supporting multiple workstations as needed. The database for all content is kept on the Central server to ensure ballot review and distribution without multiple access points. Warning messages display for duplicate scans and access.
- Verity Central allows a workstation to be configured for paper ballot scanning, contest resolution, or both. Each workstation is labeled with a unique identifier which will be carried forward to identify actions on that workstation.
- A workstation configured for ballot scanning provides a user access to configuration settings through the user interface.
- Verity Central includes an administrator interface for global ballot scanning preferences which apply to all workstations on a network in addition to a standalone workstation.
- An option is provided to allow or reject duplicate ballots. Central checks all ballots for duplicate serial numbers in a database.
- An option is provided to allow or reject incomplete multi-sheet ballots.
- An option is provided to allow or reject orphan ballot sheets for multi-sheet ballots.
- Verity Central enforces scanning preferences across all workstations in a network configuration (e.g., to ensure ballots are not scanned multiple times).
- An option is provided to allow a user to test or verify an attached COTS scanner to determine that the connection is viable.
- A workstation configured for contest resolution provides an interface to manage write-in contests in one of two possible ways:
  - An option is provided to manage write-in names by either resolving write-ins in the central solution.
  - An option to hold write-ins as “unresolved” and defer their resolution to Verity Count (where other write-ins are typically managed).

3.1.11.3 Verity Central Database

- A Verity Central database stores all electronic ballot images, including Cast Vote Records, validly produced.
- Verity Central is capable of supporting multiple databases at the same time.
- Verity Central allows a user to close the database, which disables additional processing (scanning, resolution, batch management, saving CVRs, etc.) and keeps review and reporting functions enabled.

3.1.11.4 Verity Central Network

- Verity Central workstations can be on a network to support only specific actions. Networks are not used for collection or tabulation of the system.
- Verity Central supports up to 15 simultaneous client workstations per installed server.
- Each connected workstation must have a unique workstation name.
- Functions supported for networks include:
  - Scanning to ensure ballots are not scanned multiple times across all Central workstations.
  - Resolution to ensure multiple poll workers and officials are not accessing the same ballot simultaneously.

3.1.11.5 Paper Ballot Scanning

- Verity Central supports COTS scanners.
- The scanning function scans paper ballots in all portrait orientations (face up, face down, header first, footer first).
- The scanning function is capable of reading hand-marked ballots in accordance with specified marking thresholds.
- Only blue or black ink may be used to produce a valid hand-marked ballot (i.e., ballots with marks that exceed the marginal-mark threshold).
- The scanning function is capable of reading machine-marked ballots.
- Scanning functionality is enabled only for workstations that are configured for scanning.
• Scanning functionality is enabled only for a workstation that is connected to a uniquely named scanning database available for scanning (i.e., with a status of Open or Ready).
• Verity Central manages ballot scanning in Scanned Batch units.
• The scanning operator defines the CVR source for each batch from a drop-down menu or selection area showing all sources defined in the EMS.
• Verity Central automatically sets (and displays on batch reports) the election name, date and time of the scan, the scan batch identification number, election source and scanned batch notes.
• When the scan function is initiated, Verity Central scans and processes all ballots until the hopper is empty (or an error condition exists - see multi-sheet feed in section above).
• Verity Central display allows a user to monitor all ballot images as they are scanned.
• When the scan is complete (or the scanner halts for any reason), a message is displayed reporting the scan batch action is complete with information on the total number of ballots scanned, images created, ballots accepted and ballots rejected.
• Verity Central includes the scan sequence of each ballot page (image) on all reports and images.
• Verity Central provides an option to save or cancel the scanned batch.
• If an image cannot be processed an error message displays alerting the operator to this condition providing enough information to locate the paper ballot for review.
• Verity Central provides a "dashboard" manage scanned batches, with the following features:
  * Access to a list of all scanned batches.
  * Access to a scanned batch report for each batch.
  * The ability to delete one or several batches (i.e. if not saved to portable media).
  * The ability to select one or more batches and change the CVR source (i.e. if not saved to portable media).
  * Correct information in the Notes field.
  * The ability to sort or group batches by column headings (batch number, source, status).
  * The ability to search for a ballot by one or more of the following criteria:
    * Precinct number
    * Serial number
    * Workstation/batch/sequence (particularly if serial numbers are not used)

### 3.1.11.6 Ballot Image Review and Contest Resolution

• Verity Central provides functionality to review ballot images and resolve contests with irregular marks or marks that cannot be identified as valid.
• Resolution functionality is enabled only for workstations configured for resolution.
• Resolution functionality is enabled only for workstations connected to a uniquely named scanning database available for resolution (i.e., with a status of Open or Ready). Verity Central allows users to resolve ballots manually.
• Verity Central allows users to confirm contest marks automatically (i.e., Autoresolve) based on the software’s definition of a valid mark on the scanned ballot image.
• Information on a contest manually selected clearly reports the detected contest status in plain language (e.g., Overvoted contest, Undervoted contest, etc.).
• All resolution changes are annotated on the contest image in plain language (e.g., "Overvote confirmed," “Auto resolved Undervote," “Option box unmarked," “Option mark added, etc.)
• All manual resolution actions are clear to the user (e.g., “Save change to contest,” “Move to next contest," “Move to next ballot," etc.)
• Verity Central provides a ballot review filter (e.g., in a dashboard) to group the display of ballot images for review and adjudication.
• Verity Central allows a user to enable Auto resolve based on existing filters.
• Verity Central provides for an option to perform ‘one-click resolution’ which allows advancing to the next unresolved contest when user resolution action results in a resolved contest.
• Verity Central allows a setting for one-click resolution to advance only within a batch or across batches.
• Filtered batches and ballot images displays in an easy-to-access format (e.g., thumbnail images in a selection tree) to allow a user to select a batch or ballot image to review.
• Verity Central designates a ballot or batch selected by a user as “checked out” to prevent resolution action by another user.
• Color coding is used to differentiate status changes on batches, ballots and contests. A different color is used on the ballot icon in the filter tree and on a contest for a variety of conditions.
• Verity Central allows a user to select a contest from within a ballot image display for display in a popup window for review and or resolution.
• Contest images clearly differentiate valid marks from unmarked option boxes with a shading overlay on the marked image.
• A user is able to zoom in and out on the ballot and contest image display.
• Verity Central allows a user to perform a variety of resolution actions by selecting the contest and / or an option box.
• The user is able to undo all changes made to a contest, restoring it to the state it was in since it was last saved.
• Verity Central allows the printing of a ballot image with and without resolution actions.
• Verity Central allows the printing of a contest image with and without resolution actions.
• Verity Central allows a user to view a ballot and then delete the image if the ballot has not been saved to portable media.

3.1.11.7 Saving CVRs to Portable Media
• Verity Central provides an interface to save ballots to portable media by batch.
  • CVRs can be saved only for ballots in completely resolved scanned batches.
  • If a batch contains ballots that are resolved but still checked out to a user, that batch is not be available to save ballots to CVRs.
  • A list of all batches available for saving CVRs to a vDrive portable election media device is available to the user, clearly identifying the source and number of ballots in the batch.
  • Users have the procedural option to save single or multiple CVR sources to the vDrive portable election media device.
  • All CVRs are also saved to the database and labeled with the portable election media ID.
  • All CVRs contain the following information to facilitate audits and recounts:
    • Election media device ID
    • Workstation name
    • CVR source
    • Batch ID
    • Scan sequence number
    • Precinct
    • Party, if applicable
    • Contest results
    • Undervotes created by processing orphan and incomplete ballots
    • Ballot language used shall not be recorded
  • Verity Central provides an option to Close Polls on the portable election media device, to prevent saving any additional CVRs. Once polls are closed, CVRs and the election can be moved to Verity Count for tabulation.

3.1.11.8 Transparency
• The central scanning solution allows users to audits efficiently.
• The central scanning solution allows users and interested stakeholders to easily compare scanned ballot images, with plain language resolution annotations, against reported CVR data.

3.1.11.9 Error Handling

<table>
<thead>
<tr>
<th>Error Type</th>
<th>Error Occurring</th>
<th>Steps for Error and Messaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>General issues within the application</td>
<td>• If any errors occur within the system, messages are displayed with full details.</td>
</tr>
<tr>
<td>Errors</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Error Type | Error Occurring | Steps for Error and Messaging
--- | --- | ---
Database Errors | Errors occurring with saving or retrieving content to and from the database | - If any errors occur with the database, the application provides detailed messages with full details.
- When errors occur, the application attempts to roll back the database to the state prior to the action that caused the error.
- If an error occurs during roll back attempts, messages are displayed to the user.

#### 3.1.12 Verity Count – Tabulation and Audit Report Functionality

Verity Count reads, stores, and tabulates electronic Cast Vote Records (CVRs). Verity Count reads the CVRs from portable media devices that have been removed from scanning and electronic voting machines, or from central scanning workstations. Portable media devices from voting machines and scanning workstations also contain audit log entries, as well as security features that allow Verity Count to authenticate media devices as they are read.

##### 3.1.12.1 General

- Verity Count runs in an environment that prevents users from accessing or using any other Verity components while Verity Count is active (i.e. a “secure desktop” environment).
- Verity Count is capable of tabulating and reporting results for any election that can be defined through Verity Build.
- Verity Count only accepts elections that have been locked for tabulation in Verity Build or Verity Central. Verity Count is capable of being installed on a “standalone” PC that is not networked to other Verity PCs.
  - If configured in a standalone configuration, the application is capable of reading an election definition from portable media that is inserted into the tabulation PC.
  - If on a standalone configuration, it can be installed and run on a Verity Build standalone configuration.
- Verity Count is capable of being installed on a networked workstation that is connected to other Verity Count workstations.
  - If configured in a networked configuration, Count is capable of navigating to the locked election definition file through file management paths.
- Verity Count is capable of supporting multiple elections at the same time.
  - Verity Count allows the user to manage different elections by selecting from a “pick list” of available tabulation databases in the interface.
- Verity Count supports the following user functions in appropriate sections of the user interface:
  - Tabulation database management
  - Reading and tabulating portable election media
  - Election progress dashboard
  - Managing provisional ballots
  - Managing write-in votes
  - Reporting (including standard reports, and customized reports)
  - Audits and recounts
- Verity Count allows users to create, open, and import databases. If this data will overwrite current content in the system, a message is displayed to the user.
- Verity Count allows users to simultaneously manage multiple tabulation tasks based on a single election definition for a variety of purposes, such as LAT testing and recounts, for example.
- Verity Count allows users to import data from external sources to facilitate tabulation database configuration.
• Import file formats are based on published specifications in Verity documentation.

3.1.12.2 Reading and Tabulating Data from Portable Media

• Verity Count restricts a user's ability to tabulate certain types of election media, based on the standard time and date supplied in the Wintel operating environment.
• Verity Count allows users to read portable media devices associated with the election definition on which tabulation is based.
• Verity Count validates portable media inserted into the tabulation PC before accepting data.
• Verity Count supports rapid reading of portable media devices.
• As portable media is read into Verity Count, the software is capable of “flagging” or filtering cast vote record (CVR) and audit log data according to a variety of detailed attributes.

3.1.12.3 Election Progress Dashboard

• Verity Count provides a “dashboard” to monitor polling places and precincts reporting, and progress in reading portable election media.
• Verity Count provides options for setting and accounting for all expected and scanned vDrives in the system.

3.1.12.4 Processing Write-In Votes

• Verity Count allows users to add certified write-in names to the tabulation database, for purposes of resolution.
• Verity Count provides a user interface for reviewing and resolving all write-in ballots. Count displays write-in ballots configured not to be resolved in Central or if the Verity Voting system installation did not include Central.

3.1.12.5 Processing Provisional Electronic Ballots

• Verity Count allows users to manage provisional ballots submitted through electronic voting devices.
• Verity Count provides a user interface for reviewing and resolving all provisional ballots. Count displays provisional ballots configured not to be resolved in Central or if the Verity Voting system installation did not include Central.

3.1.12.6 Merging Data from Different Tabulation Databases

• Verity Count allows users to merge results from different Verity tabulation databases in a single Verity tabulation database.
• Election results can be merged within a single report. These merges only combine results in reports from multiple elections without affecting or changing the data.

3.1.12.7 Reporting

• Verity Count offers methods to protect voter privacy in instances where reported results are based on small numbers of ballots cast.
• The default configuration of Verity Count provides users with a set of standard reports.
• Verity Count allows users to generate customized reports based on filtered data contained in the standard reports.
• Generated reports can be saved to various formats for review and usage in third party applications.
• Election results can be merged within a single report. These merges only combine results in reports from multiple elections without affecting or changing the data.

3.1.12.8 Auditing & Recount Features

• Verity Count provides a dedicated “dashboard” to facilitate a user’s ability to create customized data records for purposes of auditing results.
• The auditing dashboard is capable of accessing records for all portable media devices that have been tabulated.
• Verity Count employs guided prompts to assist users in creating customized data sets for purposes of auditing results.
3.2 Security Description

This section details Verity Voting system security for all software, device, hardware, and peripheral components.

Security applications include the following:

- Cross-functional principles
- Physical security
- Authentication
- Authorization
- Audits
- Key management
- Voting integrity
- Data protection
- Telecommunications security
- System Validation

3.2.1 Cross-functional Principles

Security for the Verity Voting system includes various levels and types of security that have cross-functional purposes. Actions and security features for one level may aid and support others, such as providing network security having set access restrictions and application security with user account and role validation.

- Physical security of both in-person voting devices and workstations
- Defense in-depth
- AAA (Authentication, Authorization and Audit) security framework
- Data security
- Networking security
- Application verification
- Documented security policies and procedures for jurisdictions

3.2.2 Physical Security

All devices, hardware, and ballot boxes are required to have a level of physical security to ensure the components have not been tampered with and stored correctly.

- Controlled access environments shall be maintained in warehouses, polling places, and central offices
- Secure equipment practices include:
  - Locking all equipment in controlled environment when not in use
  - Turning off the computer when not in use
- No public network access for Verity workstations
- All Verity devices include locations for seals:
  - Case
  - vDrive door
  - Tablet dock
  - Ballot Box main door
  - Emergency Ballot Box access door and slot
- All Verity devices include keyed locks:
  - Case
  - vDrive door
  - Tablet dock
  - Ballot Box main door
  - Emergency Ballot Box access door and slot
• All Verity devices include tamper-evident labels. These labels allow the customer to detect that the electronics compartment of the device has been opened.
  • Labels are located on the interior of the case
  • Labels are located on the Firmware access door
  • Labels are located on the Firmware media
• All Verity devices have access controlled with non-standard fasteners:
  • Fasteners on the Firmware door
  • Fasteners on the Tablet case
• All Verity devices use non-standard communication ports:
  • Non-standard connectors or wiring for external communication ports. These ports would include network communication ports, Access connectors, and COTS printer ports.
  • These ports are prohibited from damaging standard devices that are plugged in.

3.2.3 Authentication
The Verity Voting system provides authentication to ensure software and device components are protected and monitored for usage.
  • Individual users have their own account and password with unique login credentials, required to grant access to information and functionality
  • Verity users can set their own password, the values not saved or available for viewing by any user
  • Passwords are obscured when entered to ensure no one can read or view the content
  • Rules are enforced for minimal password complexity
  • Modern and flexible password management rules for strong passwords
  • Verity systems do not allow simultaneous access by the same user, only allowing one login per user, per component
  • Authentication of accounts is accessible by all components within the Verity Voting system

3.2.4 Authorization
Authorization determines if a user is allowed to access features and data, what level they can make modifications, and managing attempted commands with success or failure.
  • Role-based permissions to determine feature and data access per Verity component
  • Election data can be viewed or changed only by users with the proper privileges
  • All user roles are flexible:
    • Election management role is separated from administration role
    • Administrative roles provide configuration for user access
    • Officials for polling places and election offices can have different roles assigned to access different features within each component
    • A user account can have multiple roles associated and assigned to them
    • Role and user account settings are set across the entire Verity Voting system
  • Roles include:
    • Viewer with only the ability to view and print
    • Operator with the ability to use all functionality associated with the module except those assigned to the User Management and Supervisor roles
    • Supervisor with control over major process transitions such as approvals and use all other functionality associated with the module except those assigned to the User Management role
    • User Management with control over creating and managing user accounts, change roles for user accounts, reset passwords for accounts. If the system employs account lockouts, only these users can unlock locked accounts.
3.2.5 Audit Logs
Audit logging is stored per application on every computer and device used within the Verity Voting system. Two logs are created, written to, and maintained for production builds, installations, and environments by all components:

- **Application Log**: Election specific logging events including any changes to an election and any exceptions that occur during configuration and usage of election data.
- **System Log**: Event logging for system-wide actions including login of user accounts, password updates, and general system usage.

Users cannot modify any log content or disable logging for any aspect of the system. All logs are stored on the application server or the devices themselves.

Logs provide detailed information including the following across all Verity components:

- Comprehensive logging to detail features accessed with the following information:
  - All security, Authentication, and Authorization attempts are logged, such as access by users, Verity Key usage, and network connectivity and data transfer
  - All user account creation, information and password updates, and deletion events are logged
  - All data changes to user accounts, election definition, CVR records, media usage, and reporting are logged
  - All components start-up, shutdown, and interruptions in running
  - All election actions taken on Verity components, including loading elections, value of counters, the assigned polling place, user interactions with devices and ballots, and results of data integrity checks and diagnostic tests run
  - All errors are logged

- Uniform logging across the system components, PC applications, and voting devices for system, hardware, and application errors, access, and usage. All error handling will document the source and disposition of system interruptions and generated messages by exception handlers.

- Clear, complete and easy-to-understand audit records including pass, fail, and warning messages as appropriate per feature or command accessed and attempted

3.2.5.1 Log Format
Verity Voting system log files support standardized and structured standards. The log files contain the following information:

- Log entry number
- Date/time of the documented event
- Username of the user account logged in at the time of the event
- Application name and full version number tracking the event
- Device serial number or workstation ID
- Data class and associated ID
- Subclass and associated ID
- Log event ID
- Event name in plain text
- Event detail data in plain text

3.2.6 Key Management
Verity Key provides a level of security for accessing, using, and managing applications, data, and devices within the Verity Voting system. Verity Key supports the following:

- NIST compliant key management, encryption and hashing (FIPS 140-2, level 1)
  - 256-bit public/private key pairs exceed minimum VVSG 112-bit requirements
- Secure storage location when Key(s) are not in use
- Users and the Key must be authenticated
- Components read and validate the Key before allowing operations to occur, depending on the type of component accessed
- Each Key is valid for only one election
- User’s cannot attempt or complete actions within the system without an active Key

3.2.7 Voting Integrity

The Verity Voting system includes various options for ensuring cast vote integrity without bias of contest choices:

- Cast vote records have electronic backups
- Cast vote records are stored in randomized order
- Provides features for reviewing, managing, and resolving cast vote records with mark issues on scanned ballots, including not enough marks per contest, too many marks per contest, write-in contest candidates, and marks outside of required voting areas
- Scanned paper ballots are stored in locked cases for access only by certified voting officials
- Air gaps exist between each system, not allowing network access
- Software independence
  - Offers configurations where voters can verify both electronic and software independent records before they are cast and counted
  - Elections can be audited in a way independent of the software

3.2.8 Data Protection

All data is protected within the Verity system through access and security protocols:

- Data integrity and non-repudiation
- All data is signed
- All election definitions have a unique ID within the system
- Election data can only be modified when in a specific state and status, such as Accepted. If the state is Locked for Export or Locked for Tabulation refuse any modification regardless of user account role and permissions.
- Comprehensive and simple-to-use backup and archiving of election data and cast vote records
- Data access, modification, and transfer requires a specific user account with specific user role permissions, the Verity Key, and the correctly associated election with the data
- All software files have verifiable signatures reported through the verification external port

3.2.9 Telecommunications Security

Telecommunication security is the security used for Verity client-server (wired) networks:

- Data is encrypted to prevent unauthorized access (FIPS 140-2, level 1)
- Data is digitally signed for non-repudiation (FIPS 140-2, level 1)
- Security policy is applied message-by-message and in the transport

3.2.10 Component Security

Component security includes the following:

- Only authorized users with a specific user role can access and update the components
- Only verified components can be installed
- Only verified components can be executed
- Modern software techniques such as dependency injection are used to ensure that security policies are applied uniformly. These are used for uniform handling of:
  - Role-based authorization
  - Logging
  - Exception handling
3.2.11 System Validation

System validation ensures the Verity Voting system is operating as intended for various aspects of functionality. Validation can be completed by voting officials within jurisdictions.

3.2.11.1 Setup Validation

System validation during setup:

- Setup validation methods verify no unauthorized software is present on the voting equipment
- Verity supports using third party applications for system verification for all software and hardware, using reference information from the NSRL or from a State designated repository
- Verity provides a method to query the voting system to determine the values of all static and dynamic registers and variables including the values that jurisdictions are required to modify for conducting a specific election
- Verity provides documentation for values of all static registers and variables, and the initial starting values of all dynamic registers and variables listed for voting system software, except for the values set to conduct a specific election
- An external interface will be available outside of voting times to verify, test, and validate to ensure only required software is installed

3.2.11.2 Dataset Validation

Validation includes dataset validation:

- Verifies that only Translation data and/or Audio data has been updated since the election was created
- For each language, verifies the Audio Revision. This number should be larger than the election’s current Audio Revision value if updated recordings are in the import.
- For each language, verifies the Translation Revision. This number should be larger than the election’s current Translation Revision value if updated translations are in the import.
- If this fails, the user is notified with the reason for the failure.

3.2.11.3 Election Data Validation

Validation of the election data is handled through an interface for the currently loaded election. The following table details those tests and results.

<table>
<thead>
<tr>
<th>Validation Test</th>
<th>Pass Requirement and Return</th>
<th>Fail / Warning Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>At least one Contest is defined</td>
<td>Pass if one Contest has been defined</td>
<td>Error if no Contests have been defined</td>
</tr>
<tr>
<td>At least one Precinct is defined</td>
<td>Pass if at least one Precinct is defined</td>
<td>Error if no Precincts have been defined</td>
</tr>
<tr>
<td>At least one Polling Place is defined</td>
<td>Pass if at least one Polling Place is defined</td>
<td>Error if no Polling Place have been defined</td>
</tr>
<tr>
<td>Each Contest has at least one Precinct to Contest associated</td>
<td>Pass if at least one Precinct has an associated Contest</td>
<td>Error if no Precincts have been associated with a Contest. Lists the Contest Titles of Contests that do not have a Precinct to Contest association</td>
</tr>
<tr>
<td>Validation Test</td>
<td>Pass Requirement and Return</td>
<td>Fail / Warning Return</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Each existing District has at least one Precinct to District associated        | Pass if every District has at least one Precinct to District association | Error if Include Districts is false in Election Configuration  
|                                                                                |                                                                 | Error if any District has no Precinct to District Association                                                  |
| At least one Polling Place has at least one Polling Place to Precinct associated | Pass if all Polling Places has at least one Polling Place to Precinct association | Can return an Error and Warning:  
|                                                                                |                                                                 | Error if all Polling Places have no Polling Place to District association  
|                                                                                |                                                                 | Warning if some, but not all, Polling Places have at least one Polling Place to Precinct association          |
| All data elements included on the ballot have associated recorded audio        | Pass if all data elements included on ballots have associated recorded audio | Warning if any data element included on a ballot has no associated recorded audio                               |
| All data elements included on ballots have been translated into all selected languages. | Pass if all data elements included on ballots have an associated translation for every enabled language | Warning if any data element included on a ballot does not have an associated translation in any enabled language |
| Contests are set to Include in Straight Party                                  | Pass if all Office Contests are set to Include in Straight Party | Can return an Error and Warning:  
| Test Runs: If a Party Selector Contest exists in this election                 |                                                                 | Error if no Office Contest is set to Include in Straight Party  
<p>| Test Does Not Run: If the Election Type is Open or Closed Primary               |                                                                 | Warning if some, but not all, Office Contests are set to Include In Straight Party    |
| All Parties includes as Party Selection Options in a General Election have associated candidates on all ballots | Pass if all ballots include at least one Contest Option that is associated with each Party that is associated with a Party Selector Option | Warning if there are any ballots where a Party associated with a Party Selector Option has no associated Contest Options |
| Test Runs: Only if a Party Selector Contest in election                        |                                                                 |                                                                                                               |
| Test Does Not Run: If the Election Type is Open or Closed Primary               |                                                                 |                                                                                                               |</p>
<table>
<thead>
<tr>
<th>Validation Test</th>
<th>Pass Requirement and Return</th>
<th>Fail / Warning Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contests are associated with Parties</td>
<td>Pass if all Contests have a Contest to Party association</td>
<td>Can return an Error and Warning:</td>
</tr>
<tr>
<td>Test Runs: Only if the Election Type is Closed or Open Primary</td>
<td></td>
<td>• Error if a Party is not included in any Contest to Party association</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Warning if any Contest has no Contest to Party Association</td>
</tr>
<tr>
<td>Parties exist if Election Type is Closed or Open Primary</td>
<td>Pass if there is at least one Party defined</td>
<td>Error if there are no Parties defined</td>
</tr>
<tr>
<td>• Test Does Not Run: If the Election Type is General Election</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotation Indices are set</td>
<td>Pass if all Rotation indices have been changed from default values</td>
<td>Warning if any Rotation indices have not been changed from default values</td>
</tr>
<tr>
<td>Options are not associated with more than one Party when cross-filing is not allowed</td>
<td>Pass is no Contest Options have more than one Option Party Association</td>
<td>Error is a Contest Option has more than one Option Party association</td>
</tr>
<tr>
<td>• Test Does Not Run: If Allow Cross-Filing is true</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only one Option exists per party in a Contest that is set to Include in Straight Party</td>
<td>Pass if there are no contests that meet the Warning criteria</td>
<td>Warning if any Contest meets all of the following criteria:</td>
</tr>
<tr>
<td>• Test Does Not Run: If a Party Selector does not exist in this election</td>
<td></td>
<td>• Contest Type is Office</td>
</tr>
<tr>
<td>Rotation Groups or Districts exist when Rotation Type is set to Rotate by District</td>
<td>Pass if there is at least one Rotation Group and at least one Rotation District defined in the election</td>
<td>• Include in Straight Party is true</td>
</tr>
<tr>
<td>• Test Runs: Only if Rotation Type is set to Rotate by District</td>
<td></td>
<td>• There are multiple Options associated with a single Party</td>
</tr>
<tr>
<td>The election contains at least one Single Day and one Multiple Day Voting Type</td>
<td>Pass if a Voting Type exists whose Duration value is Single Day and a Voting Type exists with a Duration value of Multiple Day</td>
<td>Warning if the election does not contain at least one Voting Type with a Duration value of Single Day and at least one Voting Type with a Duration of Multiple Day</td>
</tr>
</tbody>
</table>
4 VERITY HARDWARE

4.1.1 Verity Voting Devices – Common Design

The Verity Voting device sub-system is configurable to accommodate a variety of use cases. Configurations are based on the paper scanning device or variations of the electronic device, both of which are built on a common platform.

The core components that are common to each configuration are:

- Verity Case
  - Same case used for all Verity Voting devices
  - Secure USB port inside case under lock and key
    - vDrive and (Verity) Key
    - External USB port for printer is keyed requiring purpose-built cable
- Verity Tablet
  - Touch Screen/Computer
  - Verity Access capable
  - 2-hour battery for t system (tablet and base station) power backup
- Booth and Ballot Box
  - Portable
  - Voter privacy screens

The configurable components are:

- ATI Module
- COTS Printer
- Duplex Ballot Scanner

All components meet or exceed Safety, Reliability, and EMC/EMI standards and are tested to ensure they will meet UL safety standards and that they do comply with IEC 61000-4 and FCC Part 15 Class B per ANSI C63.4

4.1.1.1 Computer Specifications

The Verity Voting system uses a single workstation configuration for all components and client/server modes of operation.

- CPU: Intel i7 Quad core
- Display Size: 19” or 23” flatscreen COTS (widescreen)
- Video: SVGA 1024x768 resolution or better
- Drive: 1 TB RAID 1 removable/lockable (2 1TB drive configuration)
- Keyboard: Standard USB
- Mouse: Standard optical USB
- Memory: 8GB RAM, expandable to 16GB
- Network: Ethernet (RJ-45) 10/100/1000 (1x)
- Wireless: Not Supported
- Operating System: Windows Embedded Standard 7 – 64Bit WES7/64Bit
- USB Ports: 1 USB 2.0+ front facing (archive media, Key), 1 USB 3.0 front facing, 4 YSB 2.0+ (keyboard, mouse, printer/scanner, +1 free)
- Audio: 2 RCA jacks (1 mic/1 headphone) front facing
- Case Form Factor: Must support lockable/removable hard drives
- Power: 120/240 VAC 50/60HZ
- On-board Speaker: Windows Sounds only

For workstations on a LAN, an unmanaged 8-port switch should be used.

4.1.1.1.1 Workstation Failover
Each workstation is equipped with a RAID-1 harddrive, which focuses on data protection with redundant hard drives more than performance enhancements. The drive is removable from the front and is key-locked into the drive bay. In case of failure, which could be workstation electronics/electrical components or one of the hard drives, the working drives can be moved into another “stand by” workstation. This configuration also allows for networked workstations to be replaced and functional within minutes of a failure.

4.1.1.2 Verity Case

The Verity Case is built to be portable, easily setup, and allow for convenient storage.

![Verity Case](image)

**Verity Case**

- **In Transit**
  - No external difference between scan and touch
  - Weight
    - Touch: 29lbs
    - Scan: 26lbs

**Deployed**

Figure 18 – Verity Case Specifications
4.1.1.3 Verity Tablet

The Verity Tablet is composed of the main processor board, a 12.1" display and touch panel units. Also included in the tablet is a backup battery, memory media (CFAST), a coin battery for the Real Time Clock, an external USB Port for Verity Access connections, and a docking connector to pass signals to and from the base station.
To support curbside voting, the tablet is designed to detach from an active base station and run independently on battery while undocked from the base station. Once the curbside voter marks their ballot the tablet is (re)docked in the basestation and the designee is allowed to print and cast the ballot for the voter.

4.1.1.4 Thermal Printer and Paper

**Printer**
- Type: Thermal Line Printer
- Print Width: 48 mm
- Print Rate: 62.5 mm/second
- Print Density: 384 dots/line

**Paper**
- Roll: Length 25 meters x Width 58 mm
4.1.1.5 Power

Battery Design
The battery is fully rechargeable with built-in test and protection circuitry built by ToTex. The battery supports 500+ charging cycles. Hart provides two options for the charging bay for the batteries, a one-to-one and a one-to-six battery bay.

- Li-ION Smart Battery Technology
  - Cell Chemistry: Li-ION
  - Standard Cell Design: NCR18650A (Panasonic)
  - Pack Configuration: 3 cells in Series 2 cells in parallel

- On-Board PCB
  - Passive Protection Devices:
  - Fuel Gauge and Primary Protection IC
  - Secondary Protection IC

- Normal Capacity: 6140 mAh
- Normal Voltage: 10800 mV
- Weight: Approx. 380g
- Backup Time: 2 hours minimum

Figure 22 – Battery Pack and 1-1 Charger for Devices
4.1.2 Verity Touch Writer Specifications
4.1.2.1 Ballot Printer
  • OKI B431d
4.1.2.2 UPS for Printer
  • Eaton 5P1500

4.1.3 Verity Build Printer Specifications
4.1.3.1 Ballot Production Printer
  • OKI C911dn
  • OKI C831dn
4.1.3.2 Report Printer
  • OKI B431d

4.1.4 Verity Central Scanner and Printer Specifications
4.1.4.1 Scanner
Supported scanners include the following:
  • Canon DR G1100
  • Canon DR G1130
  • Kodak i5600
4.1.4.2 Report Printer
  • OKI B431d

4.1.5 Verity Count Printer Specifications
4.1.5.1 Report Printer
  • OKI B431d
  • OKI ML-1121
4.1.6 Verity Voting Booth and Ballot Box

**Verity Voting Booth**
- Simple, lightweight design
- Easy setup for poll workers
- Durable, with convenient bag for warehousing & transport
- Ripstop nylon privacy panels
- Two versions
  - Standard
  - Accessible

![Verity Voting Booth](image1.png)

**Figure 24 - Verity Booth with carrying bag**

**Verity Ballot Box**
- Folding design
- Designed for security
- Light weight
- Folds to 5" thin
- Separate, secure compartments for scanned ballots and un-scanned (emergency) ballots

![Verity Ballot Box](image2.png)

**Figure 25 - Folding Verity Ballot Box**
4.1.7 **Product Regulatory Compliance and Environmental Specifications**

Verity components are designed and manufactured to meet or exceed the requirements prescribed in Sections 4.6 and 4.8 of the VVSG 2005 Volume II

### 4.1.7.1 Storage and Transportation Environmental Specifications

- The test for temperature per MIL-STD-810D Common Carrier
- The test for humidity per MIL-STD-810D Common Carrier
- The test for vibration and drop per MIL-STD-810D Common Carrier

### 4.1.7.2 Operating Environmental Specifications

- The test for temperature per MIL-STD-810D Common Carrier
- The test for humidity per MIL-STD-810D Common Carrier
- The test for power disturbance disruption shall be conducted in compliance with the test specified in IEC 61000-4-11 (1994-06)
- The test for electromagnetic radiation shall be conducted in compliance with the FCC Part 15 Class B requirements by testing per ANSI C63.4
- The test for electrostatic disruption shall be conducted in compliance with the test specified in IEC 61000-4-2 (1995-01)
- The test for electromagnetic susceptibility shall be conducted in compliance with the test specified in IEC 61000-4-3 (1995)
- The test for electrical fast transient protection shall be conducted in compliance with the test specified in IEC 61000-4-4 (1995-01)
- The test for lightning surge protection shall be conducted in compliance with the test specified in IEC 61000-4-5 (1995-02)
- The test for conducted RF immunity shall be conducted in compliance with the test specified in IEC 61000-4-6 (1996-04)
- The test for AC magnetic fields RF immunity shall be conducted in compliance with the test specified in IEC 61000-4-8 (1993-06)

### 4.1.7.3 Environmental Specifications

- **Operating Specifications**
  - Temperature: 40 to 100 °F (5 to 38 °C)
  - Humidity: 0 to 95% Relative Humidity, non-condensing
  - Vibration: Per MIL-STD-810D
  - Drop Height: Per MIL-STD-810D
  - Power Requirement: 24VDC, 2.5A; AC-DC Power Brick 120VAC, 60Hz, 6.0A
  - Max Power Consumption: 32W/hr at 24VDC
  - Typical Power Consumption: 32W/hr maximum for either Scan and Touch Writer

- **Transportation and Storage Specifications**
  - Temperature: -15 to 150 °F (-26 to 66 °C)
  - Humidity: Per MIL-STD-810D
  - Vibration: Per MIL-STD-810D
  - Drop Height: Per MIL-STD-810D