



Clear Ballot

ClearCount 1.4
Hardware Specification
(Vote-by-Mail Campaign 2)

ClearCount Hardware Specification (Vote-by-Mail Campaign 2)

Clear Ballot Part Number: 100022-10012

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Preface

This section defines the purpose of this document. It contains the following subsections.

- About this document
- Scope of this document
- Intended audience

About this document

This document provides information that responds to VVSG 2005, Volume 2, Section 4 and VVSG 1.1, Volume 2, Section 5 (Hardware Testing).



A ClearVote™ system can comprise the ClearAccess™, ClearAudit™, ClearCast™, ClearCount™, and ClearDesign™ products. Jurisdictions are not required to purchase all products. You can ignore references to any ClearVote components that are not part of your voting system. Also ignore implementation options that are not relevant to your policies and procedures.

Scope of this document

This document provides information about the following aspects of Clear Ballot products:

- [Hardware requirements](#)
- [Hardware characteristics](#)
- [Performance requirements](#)
- [Physical characteristics](#)
- [Environmental requirements](#)
- [Tabulation processing requirements](#)
- [Reporting requirements](#)
- [Vote data management requirements](#)
- [Accuracy requirements](#)
- [Design, construction, and maintenance characteristics](#)

Intended audience

This document is intended for state and federal election officials and their voting system test laboratories as part of the Technical Data Package (TDP) required to certify the ClearVote voting system for use. This document is also used by Clear Ballot personnel who support election officials and election staff.



Chapter 1. Hardware requirements

Responsive to VVSG 2005, Volume 1, Section 4.

This section contains the requirements for the machines and manufactured devices that are part of the ClearCount system. It specifies minimum values for certain performance characteristics; physical characteristics; and design, construction, and maintenance characteristics for the hardware and selected related components of all voting systems, such as:

- Ballot printers
- Ballot cards and sheets
- Ballot displays
- Voting devices, including ballot-marking devices and direct recording electronic (DRE) devices
- Voting booths and enclosures
- Ballot boxes and ballot transfer boxes
- Ballot readers
- Computers used to prepare ballots, program elections, consolidate and report votes, and perform other election management activities
- Electronic ballot recorders
- Electronic precinct vote control units
- Removable electronic data storage media
- Servers
- Printers

This section applies to the combination of software and hardware used to accomplish specific performance and system control requirements. Standards that are specific to software alone are provided in the software design specification for the product.

The requirements of this section apply generally to all hardware used in voting systems, including:

- Hardware provided by the voting system vendor and its suppliers
- Hardware furnished by an external provider (for example, providers of commercial off-the-shelf equipment) where the hardware may be used in any way during voting system operation
- Hardware provided by the voting jurisdiction

The requirements presented in this section are organized as follows:

- **Performance requirements:** These requirements address the combined operational capabilities of the voting system hardware and software across a broad range of parameters.
- **Physical requirements:** These requirements address the size, weight and transportability of the voting system.

- **Design, construction, and maintenance requirements:** These requirements address the reliability and durability of materials, product marking, quality of system workmanship, safety, and other attributes to ensure smooth system operation in the voting environment.

The ClearCount product is an optical-scan central-count system designed to work in concert with another election management system (EMS) that handles many of the aspects of an election. Therefore, the Clear Ballot is not seeking certification of any of the following hardware features:

- Ballot printers
- Ballot cards or sheets
- Ballot displays
- Voting devices, including ballot-marking devices and direct recording electronic (DRE) devices
- Voting booths and enclosures
- Ballot boxes and ballot transfer boxes
- Electronic precinct vote control units
- Removable electronic data storage media

Chapter 2. Hardware characteristics

ClearCount software runs on commercial off-the-shelf (COTS) computers and scanners, which are subject to rigorous manufacturer testing. Each piece of COTS hardware used in the ClearCount system has FCC Class B certification, a CE mark, and UL or other safety mark affixed to it. Some accessory items may carry only FCC Class A electromagnetic interference limits.

2.1 Physical requirements for workstations

The following table provides the physical requirements for components of workstations.

Table 2-1. Physical requirements for components of workstations

Component	Weight	Recommended surface dimensions
ScanStation	<p>A table or other surface must be capable of supporting the weight of the computer, scanner, and ballots. The heaviest component is typically the scanner.</p> <p>Laptop: 7–8 lb</p> <ul style="list-style-type: none"> Fujitsu fi-6400: 70.5 lb Fujitsu fi-6800: 70.5 lb Fujitsu fi-7180: 9.26 lb 	At least 6 feet long and 2.5 feet deep
ScanServer	<p>Desktop: 30 lb</p> <p>Laptop: 7–8 lb</p>	Sufficient for a desktop or large laptop computer
Election administration station	<p>Desktop: 30 lb</p> <p>Laptop: 7–8 lb</p>	Sufficient for a desktop or large laptop computer
Ballot preparation and jogging station	Jogger: 30 lb	Sufficient facilities for jogging and batch handling; sufficient space and power for the election as determined by the jurisdiction
Ballot-handling station	30 lb	At least 6 feet long and 2.5 feet deep



Chapter 3. Performance requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.

The performance requirements address a broad range of parameters, encompassing:

- Accuracy requirements, where requirements are specified for distinct processing functions of paper-based and DRE systems (4.1.1)
- Environmental requirements, where no distinction is made between requirements for paper-based and DRE systems, but requirements for precinct and central count are described (4.1.2)
- Vote recording requirements, where separate and distinct requirements are delineated for paper-based and DRE systems (4.1.4)
- Conversion requirements, which apply only to paper-based systems (4.1.5)
- Processing requirements, where separate and distinct requirements are delineated for paper-based and DRE systems (4.1.6)
- Reporting requirements, where no distinction is made between requirements for paper-based and DRE systems, but where differences between precinct and central-count systems are readily apparent based on differences of their reporting (4.1.7)
- Vote data management requirements, where no differentiation is made between requirements for paper-based and DRE systems (4.1.8)

The performance requirements include such attributes as ballot card reading and handling requirements, system accuracy, memory stability, and the ability to withstand specified environmental conditions.

These characteristics also encompass systemwide requirements for shelter, electrical supply, and compatibility with data networks.

Performance requirements for voting systems represent the combined operational capability of both system hardware and software. Accuracy, as measured by data error rate, and operational failure are treated as distinct attributes in performance testing. All systems must meet the performance requirements under operating conditions and after storage under nonoperating conditions.

The ClearCount system consists entirely of COTS hardware. The only equipment for which specific models from a specific manufacturer are specified is the scanners. All other equipment only needs to meet the minimum specifications. For details about the Fujitsu scanners used, see the Fujitsu documentation provided with the TDP. For information about additional product requirements, see the *ClearVote Approved Parts List*.

Chapter 4. Physical characteristics

Responsive to VVSG 2005, Volume 1, Section 4.2.

This section covers physical characteristics of all voting systems and components that affect their general utility and suitability for election operations.

4.1 Size

Responsive to VVSG 2005, Volume 1, Section 4.2.1.

There is no numerical limitation on the size of any voting equipment, but the size of each voting machine should be compatible with its intended use and the location where the equipment is to be used.

4.2 Weight

Responsive to VVSG 2005, Volume 1, Section 4.2.2.

There is no numerical limitation on the weight of any voting equipment, but the weight of each voting machine should be compatible with its intended use and the location where the equipment is to be used.

4.3 Physical characteristics of the ClearCount system

ClearCount provides a distributed, scalable solution that can be tailored to fit jurisdictions of different sizes.

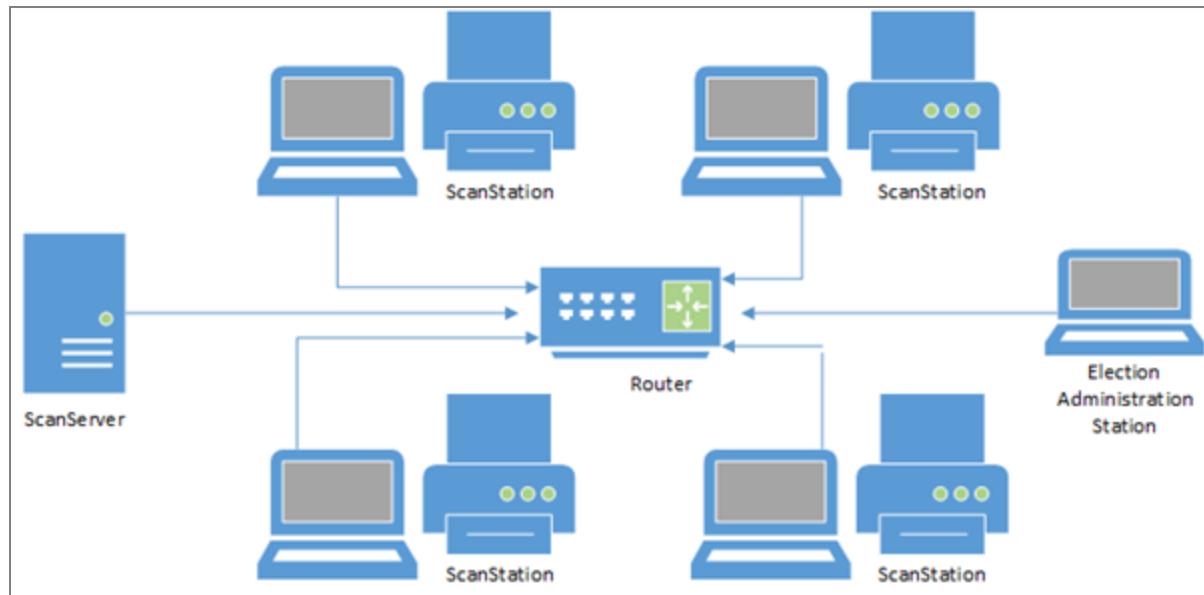


Figure 4-1. ClearCount hardware block diagram

A ClearCount system consists of a server, called the ScanServer, connected via wired Ethernet to a number of computer/scanner pairs called ScanStations, and one or more election administration stations. Any system can have between one and 10 ScanStations for each ScanServer.

4.3.1 Physical size and weight of hardware

The size of the hardware used by the ClearCount system varies, depending upon the model of scanner being used. Clear Ballot supports the following models of Fujitsu scanners:

Table 4-1. Supported scanner characteristics

Model	Weight	Dimensions
Fujitsu fi-6400	70.5 lb	18.1" by 16.9" by 12.2"
Fujitsu fi-6800	70.5 lb	18.1" by 16.9" by 12.2"
Fujitsu fi-7180	9.26 lb	11.8" by 6.4" by 6.2"

Each scanner is connected to a laptop computer. Although Clear Ballot does not mandate a specific make or model of laptop, the typical model weighs approximately 8 pounds.

The *ClearCount Election Preparation and Installation Guide* advises election officials to ensure the tables they select for scanning are strong enough to hold the equipment.

Chapter 5. Environmental requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.2.

In addition to the environmental testing requirements performed by the COTS manufacturers and referenced in their product documentation, each COTS hardware component of the ClearCount system undergoes certified environmental test procedures at Clear Ballot's voting system test laboratory, as required by the VVSG.

5.1 Electrical power disturbance

Responsive to VVSG 2005, Volume 1, Section 4.1.2.5.

Because ClearCount is a central-count system, it is not required to be able to operate in the event of total power failure.

The system operates using the electrical supply ordinarily found in central tabulation or computer room facilities. If the ScanServer, ScanStation, and election administration station computers are all laptops (which have an internal battery backup), the ClearCount system can handle electrical power disturbances gracefully. Short-term power interruptions do not adversely affect the memory of any of these machines. The internal batteries enable the system to complete the analysis of already scanned cards and shut down in the event of a longer term power failure.



It is advisable for each desktop computer to have an external uninterruptible power supply in case an electrical power disturbance occurs.

5.2 Data network requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.2.15.

For data network information, see *ClearCount Software Design and Specification* and *ClearCount Security Specification*.

5.3 Vote recording requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.4.

5.3.1 Common requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.4.1.

Because ClearCount is a central-count system, it does not provide mechanisms for poll sites.

5.3.2 Paper-based recording requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.4.2.

The vote recording requirements for an optical-scan ClearCount voting system involve:

- Scanner settings
- The ability to read unique ballot formats
- Ballot stock and marking devices used by voters to record intent
- Scanner hardware and software

Scanner settings—To ensure high-quality digital scans, the following settings are automatically established when the operator initiates the command *UpdateScannerModel* prior to invoking the Tabulator as described in the *ClearCount Election Preparation and Installation Guide*.

- Resolution: 200 dpi, 8-bit grayscale
- File format: JPEG

Paper stock (Responsive to Volume 1, Section 4.1.4.2.a.iii.)—To ensure the accurate interpretation of voter intent and to ensure the stock conforms to the physical characteristics of the scanners being certified, the following specifications are required:

- **Weight**—57-pound vellum to 110-pound index stock (This requirement also covers the requirement for 100% opaque. Paper stock that is too lightweight and not opaque allows light from the opposite side's scanning camera to bleed through, resulting in a darker image.)
- **Color**—White (Guarantees high contrast, enabling voter intent to be accurately assessed.)
- **Dimensions**—4 in by 12 in by 0.375 in

Scanner hardware and software must meet the requirements in the *ClearVote Approved Parts List*.

Fujitsu scanners (as defined in the Fujitsu product documentation for each specific scanner attached with this TDP) are capable of:

- Handling cards up to 12 inches wide and as long as 18 inches (22 inches with extenders)
- Running Fujitsu ScandAll Pro scanning software as defined

Table 5-1. Supported ballot dimensions

Maximum card width	Maximum card length	
	Without extenders	With extenders
12 in	18 in	22 in
8.5 in	14 in	22 in

Marking devices—In general, marking instruments that produce a high degree of contrast on white stock are preferred. All marks should fully cover the inside of the vote target and be as dark as possible. Marks that are not of sufficiently high contrast or do not completely fill the oval may be classified as an undervote. These marks are sorted near the top of the undervote section of the Vote Visualization report. When properly used to completely fill a vote target, the marking devices listed in the *ClearVote Approved Parts List* correctly classify the voter's intent as either a vote or an overvote. These marking devices can purchased at retail office supply stores.

5.3.3 DRE system recording requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.4.3.

The ClearCount system does not incorporate any DRE systems.

5.4 Paper-based conversion requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.5.

5.4.1 Ballot handling

Responsive to VVSG 2005, Volume 1, Section 4.1.5.1.

Ballot handling consists of a ballot card's acceptance, movement through the read station, and transfer into a collection station or receptacle.

The capacity of modern image scanners to convert the marks on individual ballots into signals is critical to voting systems. The method used to classify marks contained in vote targets (such as ovals) into a vote, overvote, undervote or nonvote is defined in "Evaluating marks on paper ballots" in the *ClearCount Functionality Description* and in "Recording votes and counting ballots" in the *ClearCount Software Design and Specification*.

Error handling—When ballots are unreadable or when a condition is detected that requires the cards to be segregated from normally processed ballots for human review, ClearCount performs the following digital operations:

Notification—The ClearCount Dashboard report provides a real-time link to all unreadable cards that cannot be fully adjudicated by the software. The link is updated by refreshing the browser window by pressing Ctrl+R on the keyboard of the election administration station while the Dashboard is displayed.

Adjudication—The result of following the link to unreadable cards depends upon the role of the user:

A user with modify access can, for each unreadable card, digitally vote the card so that its results are recorded in the election database. The credentials of the user are recorded as part of the ballot provenance and stored in the election database. The election log also records the unique card ID for all ballots that have been adjudicated manually.

All other users can see the card image and a report detailing the reason the card could not be automatically adjudicated.

Ballot examination—The ClearCount election database can be queried according to defined criteria. The results are card images that satisfy the query. Specifically, the following queries return card images for:

- **Overtaxed contest**—Shows the card images where the contest was overtaxed.
- **Overtaxed by choice/candidate**—Shows the card images for an overtaxed contest where a particular choice/candidate participated in the overtax.
- **Undertaxed contest by choice/candidate**—Shows the card images where the particular choice/candidate was not marked and the number of marks for other choices was less than the vote rule.
- **Blank voted ballots**—Shows ballots having no votes recorded for any contest.

In each case, users authorized to perform manual adjudication can correct the interpretation of voter intent. The credentials of the user are recorded as part of the ballot provenance and stored in the election database. The election activity log also records the unique card ID for all ballots that have been adjudicated manually.

Multifeed detection (*Responsive to Volume 1, Section 4.1.5.1.e.*)—Ultrasonic sensors in the supported Fujitsu scanners detect the presence of more than two ballots being pulled through the scanner. When a multifeed is detected, the scanner automatically stops to allow the operator to clear the multifeed and reinsert the unread card in the input tray. Very rarely does a multifeed go undetected. When the ultrasonic detectors fail to detect a multifeed situation, the paper-feeding mechanism design of the supported scanners has a brake roller whose purpose is to separate the sheets. This results in an image that is longer than expected. ClearCount reports ballots that are more than 0.25 inches longer than expected as possible multigrabs.

5.4.2 Ballot reading accuracy

Responsive to VVSG 2005, Volume 1, Section 4.1.5.2 a–c.

The paper-based system requirement governs the conversion of the physical ballot into electronic data. Reading accuracy for ballot conversion refers to the ability to locate a vote target, discriminate stray marks from voter intent, and correctly classify voter intent and nonintent, as follows.

Vote target location

Refers to the ability of the system to locate correctly the *sensitive* areas of the card image (that is, the vote targets) that are further analyzed. The information to locate vote targets for all possible selections across all ballot styles is derived from an analysis of the PDF files that are used to print the ballots. The information is stored in the ballotmapper.csv file within the zipped ballot definition files (BDFs). Mark recognition begins with ballot registration, the details of which are described in "Programming design" in the *ClearCount Software Design and Specification*.

Mark discrimination

Refers to the system's ability to classify marks inside vote targets that do not represent the voter's intent. Examples of such marks include extraneous perforations, smudges, fold marks or hesitation marks where the voter drops his or her marking device and makes a mark that is not representative of other marks present on the ballot. ClearCount employs a *discriminate function* to separate vote targets into two categories—those where voter intent is expressed and those where it is not.

Mark classification

Refers to the classification of voter intent or nonintent into four categories: votes, overvotes, undervotes and nonvotes.

See "Evaluating marks on paper ballots" in the *ClearCount Functionality Description* for the detailed description of accuracy considerations.

Chapter 6. Tabulation processing requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.6.

6.1 Paper-based system processing requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.6.1.

The quality of scanned images is provided by ensuring jurisdictions use appropriate maintenance procedures for scanners, use appropriate settings provided by Clear Ballot, and contract with Fujitsu's network of technical support personnel for preventive maintenance and support.

To compute the vote selection error rate in ClearCount, the following marking specifications must be met:

- The PDFs that are used to print the test ballots must be supplied to Clear Ballot prior to the test. Clear Ballot supplies the BDFs that are provided to the testers for import into ClearCount.
- Test ballots must be printed on white 90–110-pound index stock.
- Ballots must be scanned in accordance with Clear Ballot's required scanner settings using the profiles provided through the update process described in the *ClearCount Election Preparation and Installation Guide*.
- For the purpose of this test, there must be no marginal marks. Acceptable marks must be fully filled in with a black marking device.
- The testers must know in advance the maximum number of ballot-marking positions (the denominator) and the expected number of marks classified as votes, double votes, overvotes, undervotes and nonvotes.
- For ClearCount, the nominal or design rate of processing excludes the speed of the transport mechanism and variations due to operator experience. Accordingly, the ballots should be scanned to image files without the Tabulator running. After all ballots have been scanned, the Tabulator should be invoked and run to conclusion.
- The computation of the vote selection error rate is made by dividing the number of correctly classified marks by the total number of marking positions and subtracting that quotient from 1. Every marking position can be classified as filled or not filled. If the marking position is filled, it can be one of the following:
 - **A vote**—The marking position is filled and the number of filled marking positions in the contest for different candidates is less than or equal to the vote rule.
 - **An overvote**—The marking position is filled and the number of filled marking positions in the contest for different candidates is greater than the vote rule.
 - **A double vote**—The marking position is filled and the contest is not overvoted (voter gives two or more votes to the same candidate who has been endorsed by more than one political party).



If the marking position is not filled, it can be one of the following:

- **An undervote**—The marking position is not filled and the number of marks recorded for the contest is less than the vote rule.
- **A nonvote**—The marking position is not filled and the number of marks recorded for the contest is equal to the vote rule.

To assist in the calculation of the vote selection error rate, ClearCount has a built-in ability to visualize vote targets and their adjudication, which speeds the calculation of the vote selection error. See "Visually annotated card image requirements" in the *ClearCount Functionality Description* for more information.

6.2 DRE system processing requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.6.2.

The ClearCount system reads only paper ballots.

Chapter 7. Reporting requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.7.

7.1 Removable storage media

Responsive to VVSG 2005, Volume 1, Section 4.1.7.1.

ClearCount uses COTS removable storage media. Clear Ballot recommends the use of certified USB drives, as described in the *ClearVote Approved Parts List*, to support error-free retention for a minimum of 22 months, as required.

7.2 Printers

Responsive to VVSG 2005, Volume 1, Section 4.1.7.2.

The ClearCount system does not require any printers. All reports in the ClearCount system are available for export to writable media, which can then be transferred to a printer available to the jurisdiction.

Chapter 8. Vote data management requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.8.

The ClearCount system provides the capability for reporting by precinct and counter (voter) group. Information about the reports available in the ClearCount system is listed in the *ClearCount Reporting Guide*.

8.1 Data file management

Responsive to VVSG 2005, Volume 1, Section 4.1.8.1.

For a detailed description of the BDF, see the *ClearDesign Software Design and Specification*.

Chapter 9. Accuracy requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.1.

ClearCount accuracy has been tested in Colorado, Florida, Maryland, New York, Oregon, Vermont, and Washington. Additionally, Clear Ballot's voting system test laboratory, Pro V&V, conducts independent accuracy testing for state and EAC certifications.

For a description of the algorithm used to ensure accuracy in evaluating voting positions, see "Evaluating marks on paper ballots" in the *ClearCount Functionality Description*.

Chapter 10. Design, construction, and maintenance characteristics

Responsive to VVSG 2005, Volume 1, Section 4.3.

Characteristics of concern include:

- Materials, processes, and parts
- Durability
- Reliability
- Maintainability
- No-access ScanServer hardware
- Software whitelist of the ScanStation computer
- ScanStation redundancy
- Licensing
- Software and procedural design concepts
- Backup and restore procedures
- Rapid response support
- Software support
- Product marking
- Safety

For additional information about the ClearCount system configuration submitted for testing, see "Test environment" in the *ClearVote Test and Verification Specification*.

10.1 Materials, processes, and parts

Responsive to VVSG 2005, Volume 1, Section 4.3.1.

As described in "Availability" on page 25 and "Physical attributes" on page 24, the ClearCount system consists entirely of unmodified COTS hardware. The system was designed to enable jurisdictions to select preferred COTS vendors that meet the minimum standards specified in the *ClearVote Approved Parts List*.

Scanners are required to be specific tested models from the Fujitsu corporation, which provides stability and uniformity to the quality of the card images produced.

10.2 Durability

Responsive to VVSG 2005, Volume 1, Section 4.3.2.



For information about the durability of the Fujitsu scanners, see the accompanying Fujitsu documentation for each scanner.

Clear Ballot tested the components of the system in multiday scanning operations in multiple states and found that the system does not suffer degradation across the evaluation of up to one million ballots, as long as the appropriate maintenance steps, described in the *ClearCount Maintenance Guide*, are followed. Clear Ballot verifies that, if properly maintained, the ClearCount system can remain in operation for 10 years.

10.3 Reliability

Responsive to VVSG 2005, Volume 1, Section 4.3.3.

Fujitsu scanners are selected because Fujitsu is the largest supplier of scanners to the commercial market, providing over 60% of scanners in the United States.

The ClearCount system can run uninterrupted over several days of operation. (See [Durability](#).) Clear Ballot's testing in production environments confirms that mean time between failures (MTBF) is greater than 163 hours. If any individual components fail, the devices are easily replaced with backup devices.

10.4 Maintainability

Responsive to VVSG 2005, Volume 1, Section 4.3.4.

The ClearCount system was designed to provide ease of maintainability for nontechnical staff members. The *ClearCount Maintenance Guide* provides instructions for maintaining the system so that uninterrupted operations can occur during an election.

10.4.1 Physical attributes

Responsive to VVSG 2005, Volume 1, Section 4.3.4.1.

All equipment used in the ClearCount system—scanners, computers, and a router/switch—are standard, unmodified COTS components. As such, they adhere to their respective manufacturers' requirements for reliability and maintainability. In addition, each component can be purchased with a service contract directly from a manufacturer or through a variety of resellers.

Each of the components bears labels that allow a service technician to know the serial number and model number.

The database used is a COTS software database from Oracle and is not a service item. As new capabilities are introduced and are certified for use in elections, the database is replaced with a new installation disk in accordance with appropriate procedures.

10.4.2 Additional attributes

Responsive to VVSG 2005, Volume 1, Section 4.3.4.2.

Clear Ballot's specification of the attributes of the equipment takes into account the requirements for serviceability and built-in diagnostic capabilities. For example, upon startup, computers routinely perform a series of internal self-tests on the integrity of RAM, and fail to start up if the memory is corrupted. Similarly, the Fujitsu scanners perform a self-test when powering on to determine the readiness of the scanner to accept documents.

Additionally, the selected scanners all have easy-to-access and service consumables. Rollers can be replaced by nontechnical staff, and lenses can be cleaned by an individual who has been trained in the process.

10.5 Availability

Responsive to VVSG 2005, Volume 1, Section 4.3.5.

A typical system configuration is provided in the ClearCount hardware diagram in [Physical characteristics of the ClearCount system](#).

Following the ClearCount staffing rules, and appropriately calculating the required number of ScanStations, helps achieve the desired level of availability. The following tables outline the equipment and staffing requirements for ClearCount:

Table 10-1. Equipment (stored at scanning site)

Spare items	Number
ScanServer computer	1
4 TB external hard drive	1
ScanStations:	
Scanner	1
Computer	1
Locking case	1
Router	1
CAT-5 Ethernet cables (one each of 3-, 6- and 20-foot lengths)	3

Table 10-2. Central site support personnel staffing recommendations

Function	Staffing
Hardware support and troubleshooting (assist Fujitsu support)	1
Software support and troubleshooting (assist Clear Ballot Technical Support)	1

10.5.1 No-access ScanServer hardware

ClearCount follows industry practices for high-availability server architectures. This means that, once installed, election department staff should never log into the ScanServer and, therefore, configuration settings cannot be accidentally modified, which could introduce instability to the system. All transactions are performed between the clients (ScanStations and election administration stations) and the server (ScanServer) via HTTPS messages over a closed (no Internet access) wired (no Wi-Fi) local area network.

10.5.2 Software whitelist on the client computers

The ScanStations and election administration stations achieve high availability by enabling election department staff to restrict the software that can be installed to a small number of prespecified programs, thereby eliminating the possibility of noncertified software introducing instability.

10.5.3 ScanStation redundancy

ScanStations (scanner, Windows computer and the scanner manufacturer's image capture software) can be added by connecting ScanStations to the router's closed wired local area network. Instead of having a strictly redundant ScanStation (that is, one that is not used until a failure occurs), election departments typically treat redundancy as extra capacity. In this way, if a ScanStation failure does occur, it is simply removed from the standard configuration. If there is no failure, scanning completes sooner.

10.5.4 Licensing

To encourage election departments to add extra capacity/redundancy, Clear Ballot does not charge license fees for additional capacity.

10.5.5 Software and procedural design concepts

Considerations include:

- Scanning operations
- Continuous availability

10.5.5.1 Scanning operations

Scanning operations are simple enough so they can be performed with temporary staff. Training time is typically less than 30 minutes, which includes how to handle a misfeed. Exception handling procedures can only be performed by an administrator with the proper credentials. The operational simplicity of ClearCount ensures high availability by reducing or eliminating downtime due to operator confusion.

10.5.5.2 Continuous availability

ClearCount is designed for continuous availability. This means that as each ballot is processed and the ScanServer is updated, reports showing unreadable cards or ballot accounting are available in real time. In addition, personnel can be deployed to digitally duplicate unreadable cards while the scanning operation is underway. In this way, it is possible to significantly reduce or even eliminate the *unavailability* of the results during a post-scanning set of procedures as is common with other voting systems.

10.5.6 Backup and restore procedures

Backups of the database and the image files can be taken at the end of each day.

10.5.7 Rapid response support

10.5.7.1 Hardware support

Clear Ballot partners with Fujitsu Corporation of America due to the quality of their scanners and their nationwide support organization that provides:

- Scheduled on-site maintenance that includes routine cleaning and replacement of consumables
- 24-hour telephone support
- Next-day hardware swap
- On-site support within four hours

Clear Ballot requires that election departments obtain maintenance agreements with Fujitsu Corporation's nationwide network of hardware support personnel for each of its scanners. For nonscanner COTS hardware, jurisdictional rules govern the appropriate number of backups to be provided during an election.

10.5.7.2 Software support

Software support, including first-level support for Fujitsu's scanning software, is provided by Clear Ballot. During an election, Clear Ballot's team is available 24/7. On-site support is available under separate contract.

10.6 Product marking

Responsive to VVSG 2005, Volume 1, Section 4.3.6.

The original manufacturers of the COTS hardware used in the ClearCount system label their equipment in keeping with these requirements.

10.7 Workmanship

Responsive to VVSG 2005, Volume 1, Section 4.3.7.

The ClearCount system runs on 100% COTS hardware, each component of which contains CE, UL, or FCC labeling as applicable.

10.8 Safety

Responsive to VVSG 2005, Volume 1, Section 4.3.8.

Each piece of COTS hardware used in the ClearCount system has FCC Class B certification, a CE mark, and UL or other safety mark affixed to it. Some accessory items may carry only FCC Class A electromagnetic interference limits. All relevant safety information is provided with the system and included in the TDP.