Clear Ballot

ClearDesign 1.4

Hardware Specification
(Vote-by-Mail Campaign 2)

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Document history

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07/12/2017	Inserted a sentence in the section "Electrical power disturbance" to indicate that Clear Ballot recommends charging laptops overnight. Removed the phrase "and voter-assistive devices" from "Hardware description." In the section "Reporting requirements," added a cross-reference."	1.0.4	Joe Srednicki
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Table of contents

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 about the hardware for ClearDesign.

This document corresponds to *VVSG 1.0 (2005), Volume I, section 4 and Volume II, sections 2.4 and 4*.

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

The document provides information about the following requirements for ClearDesign:

- Hardware
- Performance
- Physical
- Environmental
- Tabulation processing
- Reporting
- Vote data management
- Accuracy
- Design, construction, and maintenance

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.

1. Introduction

This document describes the hardware for ClearDesign. ClearDesign is a client-server based software system for ballot layout, proofing, and subsequent voting machine programming.

2. Hardware requirements

This section contains the requirements for the machines and manufactured devices that are part of a voting system. This document provides the requirements found in the *Voluntary Voting System Guidelines* (VVSG) for voting system hardware and describes how ClearDesign hardware complies with those requirements. The VVSG 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 in ClearDesign to accomplish specific performance and system control requirements. Standards that are specific to software alone are provided in the *ClearDesign Software Design and Specification*.

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

- Hardware provided by Clear Ballot 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

3. Performance requirements

These requirements address the combined operational capabilities of the voting system hardware and software across 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 data management requirements, where no differentiation is made between requirements for paper-based and DRE systems (4.1.8)
- 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).

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 system-wide 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.

Each ClearDesign system consists of a ClearDesign server running Ubuntu Linux and a ClearDesign workstation running Windows 10.

For information about specific ClearDesign hardware models, see the *ClearVote Approved Parts List*.

4. Hardware description

ClearDesign runs on commercial off-the-shelf (COTS) hardware that is subject to rigorous manufacturer testing. An FCC Class B mark and CE mark is affixed to each piece of COTS hardware used in a ClearDesign system.

A table or other surface must be capable of supporting the computer, printer, accessories, and peripherals, such as a mouse. The ClearDesign system requires at least 4.5 feet by 2.5 feet of space to accommodate the client computer, the printer, the peripherals. Clear Ballot recommends placing the UPS (uninterruptable power supply) on the floor behind the primary system components.

5. Physical characteristics

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

ClearDesign uses a server-router-workstation configuration. See the *ClearVote Approved Parts List* for tested computer models. Your State election authority may allow other models, especially if larger capacity computers are needed.

6. Environmental requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.2.

The ClearDesign system is exempt from VVSG environmental testing requirements because it uses only COTS hardware products. ClearDesign is designed to withstand the environmental conditions contained in the test procedures of the VVSG. The system operates using the electrical supply ordinarily found in precinct voting facilities. ClearDesign Field Operations staff selects hardware for use with ClearDesign that is designed to meet VVSG requirements and jurisdiction needs, such as operating and storage temperature ranges, resistance to shock and vibration, and electromagnetic compatibility.

For information on the COTS hardware used in the ClearDesign system, contact the manufacturer or your Clear Ballot representative to obtain the manufacturer's specification sheets.

6.1 Electrical power disturbance

Responsive to VVSG 2005, Volume 1, Section 4.1.2.5.

To ensure two hours of continuous operation in the event of a power interruption, connect the electronic components of the ClearDesign to an uninterruptible power supply (UPS), with the exception of laptop computers, which contain their own backup power supply.

Charge all units to 100% capacity before Election Day to provide for full battery support. Six hours should be enough to get to this level of charge, but each piece of hardware indicates when the device is fully charged. Clear Ballot recommends charging all laptops overnight.

Jurisdictions should monitor laptops and replace the laptop battery if they notice that it shows three hours or less of run time after a full charge.

Printers should use one of the UPS models listed in the *ClearDesign Approved Parts List*.

If a printer is attached to ClearDesign and battery backup is desired, a laser printer needs the 2200 VA capacity models listed in the *ClearVote Approved Parts List*. An inkjet printer can use the 1500 VA models listed.

6.2 Data network requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.2.15.

For data network information, see the ClearDesign Software Design and Specification and the ClearDesign Security Specification. ClearDesign uses Ethernet connections and encrypted communications from the server to the workstation.

6.3 Election management system (EMS) requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.3.

See the *ClearVote Approved Parts List*.

6.4 Vote recording requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.4.

Not applicable. ClearDesign does not record vote tabulations.

7. Tabulation processing requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.6.

Tabulation processing is performed by ClearCast or ClearCount. For information, see the ClearCast or the ClearCount TDP.

7.1 Paper-based system processing requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.6.1.

The USB memory sticks for ADF and BDF transfer and external hard drives used for back-up are purchased from reputable suppliers. These devices have a well-known technology that has demonstrated retention times in excess of the 22 month federal retention requirement. Product data sheets indicate five to ten year retention time.

8. Reporting requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.7.

ClearDesign produces ballot proofing reports, but no results reports. See "Ballot proofing reports" in the *ClearDesign User Guide*.

8.1 Removable storage media

Responsive to VVSG 2005, Volume 1, Section 4.1.7.1.

ClearDesign uses COTS removable storage media. Laptop and desktop computers are allowed. Laptops are easily moved from place to place and support error-free retention for 22 months minimum.

8.2 Printers

Responsive to VVSG 2005, Volume 1, Section 4.1.7.1.

ClearDesign has been tested with the Brother HL-L2340D laser printer. However, any commercial inkjet or laser printer should be compatible for printing ballot proofing reports.

9. Vote data management requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.8.

The ClearCast and ClearCount systems tabulate votes. See the TDPs for these products for this information.

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

10. Accuracy requirements

Responsive to VVSG 2005, Volume 1, Section 4.1.1.

The ClearCount system tabulates votes. The ClearCount system successfully meets the requirements for accuracy specified in the VVSG.

11. Design, construction, and maintenance characteristics

Responsive to VVSG 2005, Volume 1, Section 4.3.

These requirements address the reliability and durability of materials, product marking, quality of system workmanship, safety, and other attributes to ensure reliable system operation in the voting environment. Characteristics of concern include:

- Materials, processes, and parts
- Durability
- Reliability
- Maintainability
- Portability
- Licensing
- Rapid response support
- Software support
- Product marking
- Safety

11.1 Materials, processes, and parts

Responsive to VVSG 2005, Volume 1, Section 4.3.1.

As described below in the Availability section and in the Physical Attributes section, the ClearDesign system consists entirely of unmodified COTS hardware. The system was designed to enable jurisdictions to select among preferred COTS vendors that meet the minimum standards specified in the *ClearVote Approved Parts List*.

11.2 Durability

Responsive to VVSG 2005, Volume 1, Section 4.3.2.

For information about the durability of the COTS hardware, contact your Clear Ballot representative to obtain manufacturer's specification sheets for the component in question. Clear Ballot verifies that, if properly maintained, the ClearDesign system can remain in operation for 10 years. For appropriate maintenance steps, see the *ClearDesign Maintenance Guide*.

11.3 Reliability

Responsive to VVSG 2005, Volume 1, Section 4.3.3.

The ClearDesign system can operate uninterrupted over several days of voting sessions. (See Durability.) Testing by Clear Ballot in production environments confirms that mean time between failures (MTBF) is well over the VVSG required 163 hours. If any individual components fail, the devices are easily replaced with backup devices.

11.4 Maintainability

Responsive to VVSG 2005, Volume 1, Section 4.3.4.

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

11.4.1 Physical attributes

Responsive to VVSG 2005, Volume 1, Section 4.3.4.1.

All user-serviceable equipment used in ClearDesign consists of 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.

11.4.2 Additional attributes

Responsive to VVSG 2005, Volume 1, Section 4.3.4.2.

The Clear Ballot specification of equipment attributes takes into account the requirements for serviceability and built-in diagnostic capabilities. For example, upon boot, computers routinely perform a series of internal self-tests on the integrity of RAM and fail to boot if the memory is corrupted.

11.4.3 Availability

Responsive to VVSG 2005, Volume 1, Section 4.3.5.

One server-workstation provides availability for the election cycle. Back up devices can be purchased if desired.

11.5 Portability

Responsive to VVSG 2005, Volume 2, Section 2.2.2.

The ClearDesign system is designed for ease of portability. ClearDesign uses COTS hardware items that are easily packaged and transported. On request, Clear Ballot can suggest designs for carrying cases that jurisdictions can use to transport and store their equipment.

11.6 Rapid response support

Clear Ballot offers a range of service response channels. Contact your Clear Ballot representative for details.

11.7 Product marking

Responsive to VVSG 2005, Volume 1, Section 4.3.6.

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

11.8 Safety

Responsive to VVSG 2005, Volume 1, Section 4.3.8.

The ClearDesign system runs solely on COTS hardware. Therefore, CE, UL, or FCC labeling is affixed to each component. All relevant safety information is provided with the system component as part of the manufacturer's documentation and can also be obtained from your Clear Ballot representative.

11.9 Testing

For information on the system configuration submitted for testing ClearDesign, see "Testing environment" in the *ClearVote Test and Verification Specification.*