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STATE OF HAWAIʻI | *KA MOKUʻĀINA O HAWAIʻI*
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES | *KA ʻOIHANA LOIHELU A LAWELAWE LAULĀ*

OFFICE OF ENTERPRISE TECHNOLOGY SERVICES | *KEʻENA HOʻOLANA ʻENEHANA*

P.O. BOX 119, HONOLULU, HAWAII 96810-0119

January 22, 2025

The Honorable Governor Josh Green, M.D.

The Honorable Ronald D. Kouchi
President of the Senate
and Members of the Senate
Thirty-Third State Legislature
State Capitol, Room 409
Honolulu, Hawaiʻi 96813

The Honorable Nadine K. Nakamura
Speaker and Members of the
House of Representatives
Thirty-Third State Legislature
State Capitol, Room 431
Honolulu, Hawaiʻi 96813

Aloha Governor Green, Senate President Kouchi, Speaker Nakamura, and Members of the Legislature:

Pursuant to Senate Resolution 5 (2024) urging the prompt implementation of the Hawaiʻi Electronic Information Technology Disability Access Standards as required by Act 172 (2022), find the attached revised Hawaiʻi Electronic Information Technology Disability Access Standards developed and published by the Office of Enterprise Technology Services, in consultation with the Disability and Communication Access Board and a working group of stakeholders.

In accordance with HRS section 93-16, the report may be viewed electronically at http://ets.hawaii.gov (see "Reports").

Sincerely,

Keith A. Regan
Comptroller

Christine M. Sakuda
Chief Information Officer

Attachment

Hawaii Electronic Information Technology Disability Access Standards

Published By: The Department of Accounting and General Services, Office of Enterprise Technology Services, & the
Disability and Communication Access Board

Effective Date: January 1, 2025
Version 1.1

Revision History

Revision Number	Date	Revised By	Description of Changes
1.0	01/01/2025	ETS/DCAB	Initial release
1.1	01/22/2025	ETS/DCAB	Minor wording, diacritical mark, and formatting changes

Table of Contents

Purpose

The State of Hawai‘i is committed to providing individuals with disabilities access to electronic information technology (EIT) equivalent to access provided to individuals without disabilities.

The purpose of the Hawaii Electronic Information Technology Disability Access Standards, henceforth referred to as the Access Standards, is to establish minimum accessibility requirements to ensure that all electronic information technology developed, purchased, used, or provided by a state entity are made accessible to individuals with a disability.

Scope

These Access Standards apply to all state entities: the executive, legislative, and judicial branches of the State, including its departments, divisions, agencies, offices; public bodies; public elementary, secondary, and postsecondary schools; and the University of Hawai‘i. State entities that contract with other entities to provide public service have an obligation to ensure that their contractors comply with these Access Standards.

These Access Standards apply to all EIT developed, purchased, used, or provided by a state entity, and all substantial modifications made by a state entity to EIT. Electronic information technology means electronic information, software, systems, and equipment used in the creation, manipulation, storage, display, or transmission of data, including: (1) Internet and intranet systems; (2) Websites and interfaces; (3) Software applications; (4) Operating systems; (5) Video and multimedia; (6) Telecommunication products; (7) Electronic and digital kiosks; (8) Information transaction machines; (9) Copiers and printers; and (10) Desktop and portable computers.

Background

Section 504 of the Rehabilitation Act of 1973 is a United States federal law that prohibits discrimination on the basis of disability in programs and activities that receive federal financial assistance.

Section 508 of the Rehabilitation Act requires federal agencies to make their electronic and information technology (EIT), also referred to as information and communication technology (ICT), accessible to people with disabilities. The law (29 U.S.C. § 794 (d)) applies to all federal agencies when they develop, procure, maintain, or use EIT. Under Section 508, access must be comparable to that available to employees and members of the public without disabilities.

The federal Americans with Disabilities Act (ADA) of 1990 extended anti-discrimination protections to various sectors beyond those covered by federal funding, including state and local governments. ADA Title II covers public services and accommodations.

Regulations issued by the U.S. Department of Justice (DOJ) on April 24, 2024, revised the ADA Title II regulations to specify that the Web Content Accessibility Guidelines (WCAG) Version 2.1, Level AA is the technical standard for state and local governments’ web content and mobile apps.

In 2022, Hawai‘i State Senate Bill 2144 was passed into law as Act 172, requiring the Office of Enterprise Technology Services, in consultation with the Disability and Communication Access Board and a working group composed of stakeholders, to develop and publish electronic information technology (EIT) accessibility standards to be implemented by all state entities.

The accessibility standards, referred to as the Hawaii Electronic Information Technology Disability Access Standards, shall require that all electronic information technology developed, purchased, used, or provided by a state entity be made accessible to individuals with a disability, consistent with federal standards to implement section 508 of the Rehabilitation Act of 1973, as amended, and the web access standards issued by the World Wide Web Consortium Web Accessibility Initiative, including functional performance criteria and technical requirements for accessibility.

Authorities

A. Section 508 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794d)
B. Americans with Disabilities Act of 1990, As Amended (42 U.S.C. §§ 12101–12213)
C. Act 172, Session Laws of Hawai'i 2022 – Relating to Electronic Information Technology Accessibility for Persons with Disabilities
D. DOJ Rule, Nondiscrimination on the Basis of Disability; Accessibility of Web Information and Services of State and Local Government Entities (28 C.F.R. Part 35 Subpart H)

Dates

Effective Date of DOJ Rule: April 24, 2024.

Compliance Date: In accordance with 28 C.F.R. section 35.200 (DOJ Rule), a public entity with a total population of 50,000 or more shall ensure compliance with this DOJ Rule by April 24, 2026.

Roles and Responsibilities

A. The Office of Enterprise Technology Services (ETS) Chief Information Officer (CIO):
    a. Oversees development and publication of the Hawaii Electronic Information Technology Disability Access Standards.
    b. Provides vision and direction for ensuring that electronic information technology (EIT) developed, purchased, used, or provided by a state entity is accessible to individuals with a disability.
    c. Reviews the Access Standards every three years after the date of initial publication, or more frequently if deemed necessary by the ETS CIO, and amends the Access Standards to reflect advances or changes in electronic information technology.
B. The Disability and Communication Access Board (DCAB):
    a. Provides ETS CIO consultation to develop and publish the Access Standards.
    b. Provides ETS CIO consultation to carry out the triennial Access Standards review and amendments.
    c. Provides guidance to state agencies regarding the Access Standards.
C. Department/Agency Director (or equivalent or designee):
    a. No later than 6 months after publication of the Access Standards, review the Access Standards and revise their department's/agency's procurement and development rules, policies, and procedures to incorporate the Access Standards.
    b. No later than 6 months after the publication of any amendment, review the Access Standards and revise their department's/agency's procurement and development rules, policies, and procedures to incorporate the Access Standards.
    c. Ensure conformance to the Access Standards.

d. Ensure the relevant Access Standards compliance language is included in all contractual actions for electronic information technology items and services.

D. Department/Agency ADA Coordinators:
   a. Receive and process grievances alleging discrimination on the basis of disability.

E. Department/Agency EEO Officer (or equivalent):
   a. Receive and process employee grievances alleging discrimination on the basis of disability.

Functional Performance Criteria and Technical Requirements

Act 172, Session Laws of Hawai'i (SLH) 2022, requires the Access Standards to be consistent with (1) accessibility standards issued by the United States Access Board which implement Section 508 of the Rehabilitation Act of 1973, as amended, and (2) web access standards issued by the World Wide Web Consortium Web Accessibility Initiative.

All electronic information technology that is procured, developed, maintained, or used by state entities shall conform to the following:

A. Section 508 Standards (36 C.F.R. Part 1194)
   a. Appendix A to 36 C.F.R. Part 1194 – Section 508 of the Rehabilitation Act: Application and Scoping Requirements
   b. Appendix C to Part 1194 – Functional Performance Criteria and Technical Requirements

B. Web Content Accessibility Guidelines (WCAG) 2.1 Level A and AA, or a subsequent version as adopted by the United States Access Board or Department of Justice.

Section 508 Standards

Under Section 508 of the Rehabilitation Act of 1973, as amended, federal agencies must provide individuals with disabilities, including employees and members of the public, access to information comparable to access available to others.

The functional performance criteria under Section 508 are as follows:

- **Without Vision:** Where a visual mode of operation is provided, information and communication technology (ICT) shall provide at least one mode of operation that does not require user vision.
- **With Limited Vision:** Where a visual mode of operation is provided, ICT shall provide at least one mode of operation that enables users to make use of limited vision.
- **Without Perception of Color:** Where a visual mode of operation is provided, ICT shall provide at least one visual mode of operation that does not require user perception of color.
- **Without Hearing:** Where an audible mode of operation is provided, ICT shall provide at least one mode of operation that does not require user hearing.
- **With Limited Hearing:** Where an audible mode of operation is provided, ICT shall provide at least one mode of operation that enables users to make use of limited hearing.
- **Without Speech:** Where speech is used for input, control, or operation, ICT shall provide at least one mode of operation that does not require user speech.
- **With Limited Manipulation:** Where a manual mode of operation is provided, ICT shall provide at least one mode of operation that does not require fine motor control or simultaneous manual operations.

- **With Limited Reach and Strength:** Where a manual mode of operation is provided, ICT shall provide at least one mode of operation that is operable with limited reach and limited strength.
- **With Limited Language, Cognitive, and Learning Abilities:** ICT shall provide features making its use by individuals with limited cognitive, language, and learning abilities simpler and easier.

Please refer to the Appendix for a full extract of *Appendix C to Part 1194—Functional Performance Criteria and Technical Requirements* of the Section 508 of the Rehabilitation Act.

WCAG 2.1 Level A and AA

The WCAG 2.1 Level A and AA will make web content more accessible to people with disabilities, including people with visual, auditory, physical, speech, cognitive, language, learning, and neurological disabilities. Although WCAG 2.1 Level A and AA cover a wide range of issues, they are not able to address the needs of people with all types, degrees, and combinations of disability. WCAG 2.1 Level A and AA also make web content more usable by older individuals with changing abilities due to aging and often improve usability for users in general.

The basic principles that lay the foundation necessary for anyone to access and use web content are as follows:

1. **Perceivable** - Information and user interface components must be presentable to users in ways users can perceive.
    - This means that users must be able to perceive the information being presented (it cannot be invisible to all of their senses).

2. **Operable** - User interface components and navigation must be operable.
    - This means that users must be able to operate the interface (the interface cannot require interaction that a user cannot perform).

3. **Understandable** - Information and the operation of user interface must be understandable.
    - This means that users must be able to understand the information as well as the operation of the user interface (the content or operation cannot be beyond their understanding).

4. **Robust** - Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.
    - This means that users must be able to access the content as technologies advance (as technologies and user agents evolve, the content should remain accessible).

Exceptions

Electronic information technology (EIT) may be exempt from the Disability Access Standards as specified by the U.S. Access Board at the following website: https://www.access-board.gov/ict/#E202-general-exceptions. Exceptions applicable at the federal level apply to the state with the implementation of the Access Standards.

The Access Standards shall not require the installation of specific accessibility-related software or peripheral devices at the workstation of an employee who is not an individual with a disability; the

Access Standards require all workstation technology used by a state entity to be compatible with accessibility-related software and peripheral devices.

Section 508 E202 General Exceptions

- **E202.1 General** – Information and communication technology (ICT) shall be exempt from compliance with the Revised 508 Standards to the extent specified by E202.
- **E202.2 Legacy ICT** – Any component or portion of existing ICT that complies with an earlier standard issued pursuant to Section 508 of the Rehabilitation Act of 1973, as amended (as republished in Appendix D), and that has not been altered on or after January 18, 2018, shall not be required to be modified to conform to the Revised 508 Standards.
- **E202.3 National Security Systems** – The Revised 508 Standards do not apply to ICT operated by agencies as part of a national security system, as defined by 40 U.S.C. 11103(a).
- **E202.4 Federal Contracts** – ICT acquired by a contractor incidental to a contract shall not be required to conform to the Revised 508 Standards.
- **E202.5 ICT Functions Located in Maintenance or Monitoring Spaces** – Where status indicators and operable parts for ICT functions are located in spaces that are frequented only by service personnel for maintenance, repair, or occasional monitoring of equipment, such status indicators and operable parts shall not be required to conform to the Revised 508 Standards.
- **E202.6 Undue Burden or Fundamental Alteration** – Where an agency determines in accordance with E202.6 that conformance to requirements in the Revised 508 Standards would impose an undue burden or would result in a fundamental alteration in the nature of the ICT, conformance shall be required only to the extent that it does not impose an undue burden, or result in a fundamental alteration in the nature of the ICT.
- **E202.6.1 Basis for a Determination of Undue Burden** – In determining whether conformance to requirements in the Revised 508 Standards would impose an undue burden on the agency, the agency shall consider the extent to which conformance would impose significant difficulty or expense considering the agency resources available to the program or component for which the ICT is to be procured, developed, maintained, or used.
- **E202.6.2 Required Documentation** – The responsible agency official shall document in writing the basis for determining that conformance to requirements in the Revised 508 Standards constitute an undue burden on the agency, or would result in a fundamental alteration in the nature of the ICT. The documentation shall include an explanation of why and to what extent compliance with applicable requirements would create an undue burden or result in a fundamental alteration in the nature of the ICT.
- **E202.6.3 Alternative Means** – Where conformance to one or more requirements in the Revised 508 Standards imposes an undue burden or a fundamental alteration in the nature of the ICT, the agency shall provide individuals with disabilities access to and use of information and data by an alternative means that meets identified needs.
- **E202.7 Best Meets** – Where ICT conforming to one or more requirements in the Revised 508 Standards is not commercially available, the agency shall procure the ICT that best meets the Revised 508 Standards consistent with the agency's business needs.
- **E202.7.1 Required Documentation** – The responsible agency official shall document in writing: (a) the non-availability of conforming ICT, including a description of market research performed and which provisions cannot be met, and (b) the basis for determining that the ICT to be

procured best meets the requirements in the Revised 508 Standards consistent with the agency's business needs.

- **E202.7.2 Alternative Means** – Where ICT that fully conforms to the Revised 508 Standards is not commercially available, the agency shall provide individuals with disabilities access to and use of information and data by an alternative means that meets identified needs.

DOJ Rule Exceptions

The requirements of 28 C.F.R. § 35.200 do not apply to the following:

A. **Archived web content** - Archived web content as defined in 28 C.F.R. § 35.104.
B. **Preexisting conventional electronic documents** - Conventional electronic documents that are available as part of a public entity's web content or mobile apps before the date the public entity is required to comply with this subpart, unless such documents are currently used to apply for, gain access to, or participate in the public entity's services, programs, or activities.
C. **Content posted by a third party** - Content posted by a third party, unless the third party is posting due to contractual, licensing, or other arrangements with the public entity.
D. **Individualized, password-protected or otherwise secured conventional electronic documents**. Conventional electronic documents that are:
    1. About a specific individual, their property, or their account; and
    2. Password-protected or otherwise secured.
E. **Preexisting social media posts** - A public entity's social media posts that were posted before the date the public entity is required to comply with this subpart.

Accessibility Recommendations

The best strategy to address accessibility compliance involves a comprehensive and proactive approach, which includes planning and accessibility testing throughout the product lifecycle. To ensure that state entities implement the accessibility standards, the following recommendations for planning, reporting, monitoring, and enforcement should be considered.

Incorporate Accessibility Early in the IT Project Roadmapping and Planning Phases

State entities must consider the Access Standards in all IT project plans that include an investment in new or existing electronic information technology.

- Accessibility requirements must be included in the project specifications of new systems, especially in the modernization of major systems, and be evaluated throughout any major enhancements of existing systems during the design and development phases.
- Governing IT entities and/or IT management shall provide reference to the Access Standards to the state entities during IT governance roadmapping and planning phases for IT projects.

Incorporate Accessibility in the Procurement Phase

No later than six months after the publication of the Access Standards, each state entity shall review the standards and revise the entity's existing procurement rules, policies, and procedures to incorporate the standards.

- To ensure compliance, state entities shall include a requirement similar to the following whenever procuring information technology:

All electronic information technology developed or provided under this contract or procurement shall comply with the applicable requirements of the ***Hawaii*** *Electronic Information Technology Disability Access Standards (Access Standards).*

- State entities must clearly communicate the expectation that vendors and contractors are held to the Access Standards.
- State entities shall keep documentation of their accessibility evaluation and selection criteria for the evaluation of proposals.
- Where applicable, the vendor shall provide the state entity with its most recent Accessibility Conformance Report (ACR).

Voluntary Product Accessibility Template (VPAT®)

A Voluntary Product Accessibility Template (VPAT®) is a document that explains how information and communication technology (ICT) products such as software, hardware, electronic content, and support documentation meet (conform to) the Revised 508 Standards for IT accessibility. VPAT® helps Federal agency contracting officials and government buyers to assess ICT for accessibility when doing market research and evaluating proposals.

Government solicitations which include ICT will specify accessibility requirements, indicating which provisions are required to ensure the deliverable is accessible. A VPAT® is a good way to address the accessibility requirements defined in the solicitation.

Establish Monitoring and Reporting Mechanisms

Implement a system for ongoing monitoring of EIT accessibility and establish reporting mechanisms that can show conformance status over time.

- **Automated Accessibility Testing and Reporting:** Implement automated accessibility testing tools that can scan state websites, applications, and documents for common accessibility issues. These tools can help identify potential problems without requiring extensive manual effort.
    - Acquire access to the Siteimprove - https://siteimprove.com/en-us/content-accessibility/ automated evaluation tool via ETS. The state has a license to use Siteimprove for all Hawaii.gov websites.
- **Compliance Reporting:** Establish a system for agencies and departments to regularly report on their compliance with accessibility standards. This involves documenting efforts made, progress achieved, and any identified challenges or areas for improvement.
- **Complaint and Grievance Process:** Develop and publish grievance procedures to allow anyone who wishes to file a complaint alleging discrimination on the basis of disability in violation of the standards set forth in the Access Standards. Identify an entity resource, such as an agency ADA Coordinator or EEO Officer to manage the complaints and ensure fair and prompt resolution.

Conduct Periodic Accessibility Reviews

State entities shall perform regular accessibility audits and testing throughout the product lifecycle, identify issues for review and remediation, evaluate the impact and risk of each issue to appropriately prioritize remediation efforts, and to iteratively improve the conformance levels of the EIT.

- **Accessibility Audits:** Leverage automated testing tools to generate periodic accessibility reports.
    - To get started with website content accessibility evaluation, the departmental content creators can first use the W3C-provided Easy Checks preliminary evaluation procedure, explained at https://www.w3.org/WAI/test-evaluate/preliminary/. This preliminary procedure is particularly useful for content creators with no prior experience in authoring accessible web content.
    - Incorporating hands-on testing by individuals with disabilities into the digital accessibility process adds significant value by providing real-world insights that automated tools or theoretical reviews may overlook. This inclusive approach ensures that digital products are truly usable for all people, not just technically compliant. By involving individuals with diverse disabilities in testing, state entities can better understand the challenges they face and validate the compatibility of our products with various assistive technologies like screen readers or voice control systems. Ultimately, this leads to more user-centered designs, a stronger commitment to accessibility, and improved overall user experience for everyone.
- **Compliance Reviews:** State entities must report the level of conformance of EIT systems to their governing IT entities or IT management so that accessibility conformance can be tracked and analyzed.
- **Accessibility Remediation Plans:** Create a plan to address accessibility issues identified within audits, reviews, and reports and prioritize the high-risk issues.

Provide Training and Awareness

- Encourage accessibility training for acquisition professionals, IT project managers, communications staff, web managers, software developers, and authors of digital content.
- Accessibility statements adhering to the Access Standards shall be made available, where appropriate, on state entity websites. Each entity shall craft a message highlighting the agency's commitment to ensuring equivalent access to information for people with disabilities, and include a reference to the Access Standards, a program point of contact or a method to request assistance or provide feedback, and the date the statement was last updated.

Continuously Improve

- **Periodic review of the Access Standards:** ETS, in consultation with DCAB, shall review the accessibility standards every three years after the date of the initial publication, or more frequently if the Chief Information Officer deems it necessary, and amend the standards to reflect advances or changes in electronic information technology. Within six months of the publication of any amended accessibility standards, each state entity shall review the amended standards and shall revise the entity's existing procurement and development rules, policies, and procedures to incorporate the amended standards accordingly.
- **User Feedback Mechanisms:** Set up mechanisms for users, including individuals with disabilities, to provide feedback on the accessibility of state websites, applications, and services. This may involve implementing feedback forms, contact information, or dedicated accessibility service centers. Monitoring and responding to user feedback may require a moderate amount of labor, but is crucial for gathering valuable insights.
- **Engage with the Accessibility Community:** Involve individuals with disabilities, disability advocacy groups, and accessibility experts in the design, development, and testing phases. Their

insights and feedback are invaluable for identifying accessibility barriers, ensuring that the EIT is truly inclusive, and that the state's efforts are meeting the needs of the community.

Definitions

Accessibility - means the ability of an individual with a disability to receive, use, and manipulate data and operate controls included in electronic information technology in a manner equivalent to that of individuals who do not have disabilities.

Accessibility Conformance Report (ACR) - is a document that formally summarizes the extent to which an information and communications technology (ICT) product or service conforms to an agreed set of international accessibility guidelines and standards.

Electronic Information - is information that is created, stored, transmitted, or processed in an electronic format. This can include, but is not limited to:

(1) Electronic documents, files, and data;
(2) Emails, text messages, and faxes;
(3) Databases, spreadsheets, and programs;
(4) Image, sound, and video files; and
(5) Web pages and information submitted online.

Electronic Information Technology (EIT) - also referred to as information and communication technology (ICT) as defined by Section 508, means electronic information, software, systems, and equipment used in the creation, manipulation, storage, display, or transmission of data, including:

(1) Internet and intranet systems;
(2) Websites and interfaces;
(3) Software applications;
(4) Operating systems;
(5) Video and multimedia;
(6) Telecommunication products;
(7) Electronic and digital kiosks;
(8) Information transaction machines;
(9) Copiers and printers; and
(10) Desktop and portable computers.

Individual with a disability - means an individual with impairments that limit the individual's ability to access or use electronic information technology, including an individual who has:

(1) No or limited vision;
(2) No or limited hearing;
(3) Physical disabilities; or
(4) Cognitive impairment

State entity - means the executive, legislative, and judicial branches of the State, including its departments, divisions, agencies, offices; public bodies; public elementary, secondary, and postsecondary schools; and the University of Hawai'i.

References and Additional Resources

- U.S. General Services Administration (GSA) IT Accessibility Laws and Policies
- Accessibility of Web Content and Mobile Apps Provided by State and Local Government Entities: A Small Entity Compliance Guide
- PDFs Authoring Guides
- ICT Testing Baseline for Electronic Documents
- Create Accessible Meetings
- Mapping of WCAG 2.0 to Functional Performance Criteria
- What's New in WCAG 2.1
- Developing a Website Accessibility Statement

Appendix

Appendix C to Part 1194 – Functional Performance Criteria of Section 508 of the Rehabilitation Act

The functional performance criteria provided below are an extract from *Appendix C to Part 1194—Functional Performance Criteria and Technical Requirements* of Section 508 of the Rehabilitation Act.

Chapter 3: Functional Performance Criteria

301 General

- **301.1 *Scope.*** The requirements of Chapter 3 shall apply to ICT where required by Chapter 2 (Scoping Requirements) and where otherwise referenced in any other chapter of these Standards.

302 Functional Performance Criteria

- **302.1 *Without Vision.*** Where a visual mode of operation is provided, ICT shall provide at least one mode of operation that does not require user vision.
- **302.2 *With Limited Vision.*** Where a visual mode of operation is provided, ICT shall provide at least one mode of operation that enables users to make use of limited vision.
- **302.3 *Without Perception of Color.*** Where a visual mode of operation is provided, ICT shall provide at least one visual mode of operation that does not require user perception of color.
- **302.4 *Without Hearing.*** Where an audible mode of operation is provided, ICT shall provide at least one mode of operation that does not require user hearing.
- **302.5 *With Limited Hearing.*** Where an audible mode of operation is provided, ICT shall provide at least one mode of operation that enables users to make use of limited hearing.
- **302.6 *Without Speech.*** Where speech is used for input, control, or operation, ICT shall provide at least one mode of operation that does not require user speech.
- **302.7 *With Limited Manipulation.*** Where a manual mode of operation is provided, ICT shall provide at least one mode of operation that does not require fine motor control or simultaneous manual operations.
- **302.8 *With Limited Reach and Strength.*** Where a manual mode of operation is provided, ICT shall provide at least one mode of operation that is operable with limited reach and limited strength.
- **302.9 *With Limited Language, Cognitive, and Learning Abilities.*** ICT shall provide features making its use by individuals with limited cognitive, language, and learning abilities simpler and easier.

Chapter 4: Hardware

401 General

- **401.1 *Scope.*** The requirements of Chapter 4 shall apply to ICT that is hardware where required by Chapter 2 (Scoping Requirements) and where otherwise referenced in any other chapter of these Standards.

- ***EXCEPTION:*** Hardware that is assistive technology shall not be required to conform to the requirements of this chapter.

402 Closed Functionality

- **402.1 *General.*** ICT with closed functionality shall be operable without requiring the user to attach or install assistive technology other than personal headsets or other audio couplers, and shall conform to 402.
- **402.2 *Speech-Output Enabled.*** ICT with a display screen shall be speech-output enabled for full and independent use by individuals with vision impairments.
  - ***EXCEPTIONS:***
    1. Variable message signs conforming to 402.5 shall not be required to be speech-output enabled.
    2. Speech output shall not be required where ICT display screens only provide status indicators and those indicators conform to 409.
    3. Where speech output cannot be supported due to constraints in available memory or processor capability, ICT shall be permitted to conform to 409 in lieu of 402.2.
    4. Audible tones shall be permitted instead of speech output where the content of user input is not displayed as entered for security purposes, including, but not limited to, asterisks representing personal identification numbers.
    5. Speech output shall not be required for: The machine location; date and time of transaction; customer account number; and the machine identifier or label.
    6. Speech output shall not be required for advertisements and other similar information unless they convey information that can be used for the transaction being conducted.
  - **402.2.1 *Information Displayed On-Screen.*** Speech output shall be provided for all information displayed on-screen.
  - **402.2.2 *Transactional Outputs.*** Where transactional outputs are provided, the speech output shall audibly provide all information necessary to verify a transaction.
  - **402.2.3 *Speech Delivery Type and Coordination.*** Speech output shall be delivered through a mechanism that is readily available to all users, including, but not limited to, an industry standard connector or a telephone handset. Speech shall be recorded or digitized human, or synthesized. Speech output shall be coordinated with information displayed on the screen.
  - **402.2.4 *User Control.*** Speech output for any single function shall be automatically interrupted when a transaction is selected. Speech output shall be capable of being repeated and paused.

- **402.2.5 *Braille Instructions.*** Where speech output is required by 402.2, braille instructions for initiating the speech mode of operation shall be provided. Braille shall be contracted and shall conform to 36 CFR part 1191, Appendix D, Section 703.3.1.
    - ***EXCEPTION:*** Devices for personal use shall not be required to conform to 402.2.5.

- **402.3 *Volume.*** ICT that delivers sound, including speech output required by 402.2, shall provide volume control and output amplification conforming to 402.3.
    - ***EXCEPTION:*** ICT conforming to 412.2 shall not be required to conform to 402.3.
    - **402.3.1 *Private Listening.*** Where ICT provides private listening, it shall provide a mode of operation for controlling the volume. Where ICT delivers output by an audio transducer typically held up to the ear, a means for effective magnetic wireless coupling to hearing technologies shall be provided.
    - **402.3.2 *Non-private Listening.*** Where ICT provides non-private listening, incremental volume control shall be provided with output amplification up to a level of at least 65 dB. A function shall be provided to automatically reset the volume to the default level after every use.
- **402.4 *Characters on Display Screens.*** At least one mode of characters displayed on the screen shall be in a sans serif font. Where ICT does not provide a screen enlargement feature, characters shall be 3/16 inch (4.8 mm) high minimum based on the uppercase letter "I". Characters shall contrast with their background with either light characters on a dark background or dark characters on a light background.
- **402.5 *Characters on Variable Message Signs.*** Characters on variable message signs shall conform to section 703.7 Variable Message Signs of ICC A117.1-2009 (incorporated by reference, *see* 702.6.1).

403 Biometrics

- **403.1 *General.*** Where provided, biometrics shall not be the only means for user identification or control.
    - ***EXCEPTION:*** Where at least two biometric options that use different biological characteristics are provided, ICT shall be permitted to use biometrics as the only means for user identification or control.

404 Preservation of Information Provided for Accessibility

- **404.1 *General.*** ICT that transmits or converts information or communication shall not remove non-proprietary information provided for accessibility or shall restore it upon delivery.

405 Privacy

- **405.1 *General.*** The same degree of privacy of input and output shall be provided to all individuals. When speech output required by 402.2 is enabled, the screen shall not blank automatically.

406 Standard Connections

- **406.1 *General.*** Where data connections used for input and output are provided, at least one of each type of connection shall conform to industry standard non-proprietary formats.

407 Operable Parts

- **407.1 *General.*** Where provided, operable parts used in the normal operation of ICT shall conform to 407.

- **407.2 *Contrast.*** Where provided, keys and controls shall contrast visually from background surfaces. Characters and symbols shall contrast visually from background surfaces with either light characters or symbols on a dark background or dark characters or symbols on a light background.

- **407.3 *Input Controls.*** At least one input control conforming to 407.3 shall be provided for each function.

    - ***EXCEPTION:*** Devices for personal use with input controls that are audibly discernible without activation and operable by touch shall not be required to conform to 407.3.

    - **407.3.1 *Tactilely Discernible.*** Input controls shall be operable by touch and tactilely discernible without activation.

    - **407.3.2 *Alphabetic Keys.*** Where provided, individual alphabetic keys shall be arranged in a QWERTY-based keyboard layout and the "F" and "J" keys shall be tactilely distinct from the other keys.

    - **407.3.3 *Numeric Keys.*** Where provided, numeric keys shall be arranged in a 12-key ascending or descending keypad layout. The number five key shall be tactilely distinct from the other keys. Where the ICT provides an alphabetic overlay on numeric keys, the relationships between letters and digits shall conform to ITU-T Recommendation E.161 (incorporated by reference, *see* 702.7.1).

- **407.4 *Key Repeat.*** Where a keyboard with key repeat is provided, the delay before the key repeat feature is activated shall be fixed at, or adjustable to, 2 seconds minimum.

- **407.5 *Timed Response.*** Where a timed response is required, the user shall be alerted visually, as well as by touch or sound, and shall be given the opportunity to indicate that more time is needed.

- **407.6 *Operation.*** At least one mode of operation shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 pounds (22.2 N) maximum.

- **407.7 *Tickets, Fare Cards, and Keycards.*** Where tickets, fare cards, or keycards are provided, they shall have an orientation that is tactilely discernible if orientation is important to further use of the ticket, fare card, or keycard.

- **407.8 *Reach Height and Depth.*** At least one of each type of operable part of stationary ICT shall be at a height conforming to 407.8.2 or 407.8.3 according to its position established by the vertical reference plane specified in 407.8.1 for a side reach or a forward reach. Operable parts

used with speech output required by 402.2 shall not be the only type of operable part complying with 407.8 unless that part is the only operable part of its type.

- **407.8.1** ***Vertical Reference Plane.*** Operable parts shall be positioned for a side reach or a forward reach determined with respect to a vertical reference plane. The vertical reference plane shall be located in conformance to 407.8.2 or 407.8.3.
    - **407.8.1.1** ***Vertical Plane for Side Reach.*** Where a side reach is provided, the vertical reference plane shall be 48 inches (1220 mm) long minimum.
    - **407.8.1.2** ***Vertical Plane for Forward Reach.*** Where a forward reach is provided, the vertical reference plane shall be 30 inches (760 mm) long minimum.
- **407.8.2** ***Side Reach.*** Operable parts of ICT providing a side reach shall conform to 407.8.2.1 or 407.8.2.2. The vertical reference plane shall be centered on the operable part and placed at the leading edge of the maximum protrusion of the ICT within the length of the vertical reference plane. Where a side reach requires a reach over a portion of the ICT, the height of that portion of the ICT shall be 34 inches (865 mm) maximum.
    - **407.8.2.1** ***Unobstructed Side Reach.*** Where the operable part is located 10 inches (255 mm) or less beyond the vertical reference plane, the operable part shall be 48 inches (1220 mm) high maximum and 15 inches (380 mm) high minimum above the floor.
    - **407.8.2.2** ***Obstructed Side Reach.*** Where the operable part is located more than 10 inches (255 mm), but not more than 24 inches (610 mm), beyond the vertical reference plane, the height of the operable part shall be 46 inches (1170 mm) high maximum and 15 inches (380 mm) high minimum above the floor. The operable part shall not be located more than 24 inches (610 mm) beyond the vertical reference plane.
- **407.8.3** ***Forward Reach.*** Operable parts of ICT providing a forward reach shall conform to 407.8.3.1 or 407.8.3.2. The vertical reference plane shall be centered, and intersect with, the operable part. Where a forward reach allows a reach over a portion of the ICT, the height of that portion of the ICT shall be 34 inches (865 mm) maximum.
    - **407.8.3.1** ***Unobstructed Forward Reach.*** Where the operable part is located at the leading edge of the maximum protrusion within the length of the vertical reference plane of the ICT, the operable part shall be 48 inches (1220 mm) high maximum and 15 inches (380 mm) high minimum above the floor.
    - **407.8.3.2** ***Obstructed Forward Reach.*** Where the operable part is located beyond the leading edge of the maximum protrusion within the length of the vertical reference plane, the operable part shall conform to 407.8.3.2. The maximum allowable forward reach to an operable part shall be 25 inches (635 mm).

- **407.8.3.2.1** ***Operable Part Height for ICT with Obstructed Forward Reach.*** The height of the operable part shall conform to Table 407.8.3.2.1.

  Table 407.8.3.2.1 - Operable Part Height for ICT With Obstructed Forward Reach

Reach depth	**Operable part height**
Less than 20 inches (510 mm)	48 inches (1220 mm) maximum.
20 inches (510 mm) to 25 inches (635 mm)	44 inches (1120 mm) maximum.

- **407.8.3.2.2** ***Knee and Toe Space under ICT with Obstructed Forward Reach.*** Knee and toe space under ICT shall be 27 inches (685 mm) high minimum, 25 inches (635 mm) deep maximum, and 30 inches (760 mm) wide minimum and shall be clear of obstructions.
  - ***EXCEPTIONS:***
    1. Toe space shall be permitted to provide a clear height of 9 inches (230 mm) minimum above the floor and a clear depth of 6 inches (150 mm) maximum from the vertical reference plane toward the leading edge of the ICT.
    2. At a depth of 6 inches (150 mm) maximum from the vertical reference plane toward the leading edge of the ICT, space between 9 inches (230 mm) and 27 inches (685 mm) minimum above the floor shall be permitted to reduce at a rate of 1 inch (25 mm) in depth for every 6 inches (150 mm) in height.

408 Display Screens

- **408.1** ***General.*** Where provided, display screens shall conform to 408.
- **408.2** ***Visibility.*** Where stationary ICT provides one or more display screens, at least one of each type of display screen shall be visible from a point located 40 inches (1015 mm) above the floor space where the display screen is viewed.
- **408.3** ***Flashing.*** Where ICT emits lights in flashes, there shall be no more than three flashes in any one-second period.
  - ***EXCEPTION:*** Flashes that do not exceed the general flash and red flash thresholds defined in WCAG 2.1 (incorporated by reference, *see* 702.10.1) are not required to conform to 408.3.

409 Status Indicators

- **409.1 *General.*** Where provided, status indicators shall be discernible visually and by touch or sound.

410 Color Coding

- **410.1 *General.*** Where provided, color coding shall not be used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.

411 Audible Signals

- **411.1 *General.*** Where provided, audible signals or cues shall not be used as the only means of conveying information, indicating an action, or prompting a response.

412 ICT With Two-Way Voice Communication

- **412.1 *General.*** ICT that provides two-way voice communication shall conform to 412.
- **412.2 *Volume Gain.*** ICT that provides two-way voice communication shall conform to 412.2.1 or 412.2.2.
    - **412.2.1 *Volume Gain for Wireline Telephones.*** Volume gain conforming to 47 CFR 68.317 shall be provided on analog and digital wireline telephones.
    - **412.2.2 *Volume Gain for Non-Wireline ICT.*** A method for increasing volume shall be provided for non-wireline ICT.
- **412.3 *Interference Reduction and Magnetic Coupling.*** Where ICT delivers output by a handset or other type of audio transducer that is typically held up to the ear, ICT shall reduce interference with hearing technologies and provide a means for effective magnetic wireless coupling in conformance with 412.3.1 or 412.3.2.
    - **412.3.1 *Wireless Handsets.*** ICT in the form of wireless handsets shall conform to ANSI/IEEE C63.19-2011 (incorporated by reference, *see* 702.5.1).
    - **412.3.2 *Wireline Handsets.*** ICT in the form of wireline handsets, including cordless handsets, shall conform to TIA-1083-B (incorporated by reference, *see* 702.9.1).
- **412.4 *Digital Encoding of Speech.*** ICT in IP-based networks shall transmit and receive speech that is digitally encoded in the manner specified by ITU-T Recommendation G.722.2 (incorporated by reference, *see* 702.7.2) or IETF RFC 6716 (incorporated by reference, *see* 702.8.1).
- **412.5 *Real-Time Text Functionality.*** [Reserved].
- **412.6 *Caller ID.*** Where provided, caller identification and similar telecommunications functions shall be visible and audible.
- **412.7 *Video Communication.*** Where ICT provides real-time video functionality, the quality of the video shall be sufficient to support communication using sign language.

413 Closed Caption Processing Technologies

- **413.1 *General.*** Where ICT displays or processes video with synchronized audio, ICT shall provide closed caption processing technology that conforms to 413.1.1 or 413.1.2.

- **413.1.1 *Decoding and Display of Closed Captions.*** Players and displays shall decode closed caption data and support display of captions.
- **413.1.2 *Pass-Through of Closed Caption Data.*** Cabling and ancillary equipment shall pass through caption data.

414 Audio Description Processing Technologies

- **414.1 *General.*** Where ICT displays or processes video with synchronized audio, ICT shall provide audio description processing technology conforming to 414.1.1 or 414.1.2.
  - **414.1.1 *Digital Television Tuners.*** Digital television tuners shall provide audio description processing that conforms to ATSC A/53 Digital Television Standard, Part 5 (2014) (incorporated by reference, *see* 702.2.1). Digital television tuners shall provide processing of audio description when encoded as a Visually Impaired (VI) associated audio service that is provided as a complete program mix containing audio description according to the ATSC A/53 standard.
  - **414.1.2 *Other ICT.*** ICT other than digital television tuners shall provide audio description processing.

415 User Controls for Captions and Audio Descriptions

- **415.1 *General.*** Where ICT displays video with synchronized audio, ICT shall provide user controls for closed captions and audio descriptions conforming to 415.1.
  - ***EXCEPTION:*** Devices for personal use shall not be required to conform to 415.1 provided that captions and audio descriptions can be enabled through system-wide platform settings.
  - **415.1.1 *Caption Controls.*** Where ICT provides operable parts for volume control, ICT shall also provide operable parts for caption selection.
  - **415.1.2 *Audio Description Controls.*** Where ICT provides operable parts for program selection, ICT shall also provide operable parts for the selection of audio description.

Chapter 5: Software

501 General

- **501.1 *Scope.*** The requirements of Chapter 5 shall apply to software where required by Chapter 2 (Scoping Requirements) and where otherwise referenced in any other chapter of these Standards.
  - ***EXCEPTION:*** Where Web applications do not have access to platform accessibility services and do not include components that have access to platform accessibility services, they shall not be required to conform to 502 or 503 provided that they conform to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.1 (incorporated by reference, *see* 702.10.1).

502 Interoperability With Assistive Technology

- **502.1 *General.*** Software shall interoperate with assistive technology and shall conform to 502.

- ***EXCEPTION:*** ICT conforming to 402 shall not be required to conform to 502.

- **502.2** ***Documented Accessibility Features.*** Software with platform features defined in platform documentation as accessibility features shall conform to 502.2.
  - **502.2.1** ***User Control of Accessibility Features.*** Platform software shall provide user control over platform features that are defined in the platform documentation as accessibility features.
  - **502.2.2** ***No Disruption of Accessibility Features.*** Software shall not disrupt platform features that are defined in the platform documentation as accessibility features.

- **502.3** ***Accessibility Services.*** Platform software and software tools that are provided by the platform developer shall provide a documented set of accessibility services that support applications running on the platform to interoperate with assistive technology and shall conform to 502.3. Applications that are also platforms shall expose the underlying platform accessibility services or implement other documented accessibility services.
  - **502.3.1** ***Object Information.*** The object role, state(s), properties, boundary, name, and description shall be programmatically determinable.
  - **502.3.2** ***Modification of Object Information.*** States and properties that can be set by the user shall be capable of being set programmatically, including through assistive technology.
  - **502.3.3** ***Row, Column, and Headers.*** If an object is in a data table, the occupied rows and columns, and any headers associated with those rows or columns, shall be programmatically determinable.
  - **502.3.4** ***Values.*** Any current value(s), and any set or range of allowable values associated with an object, shall be programmatically determinable.
  - **502.3.5** ***Modification of Values.*** Values that can be set by the user shall be capable of being set programmatically, including through assistive technology.
  - **502.3.6** ***Label Relationships.*** Any relationship that a component has as a label for another component, or of being labeled by another component, shall be programmatically determinable.
  - **502.3.7** ***Hierarchical Relationships.*** Any hierarchical (parent-child) relationship that a component has as a container for, or being contained by, another component shall be programmatically determinable.
  - **502.3.8** ***Text.*** The content of text objects, text attributes, and the boundary of text rendered to the screen, shall be programmatically determinable.
  - **502.3.9** ***Modification of Text.*** Text that can be set by the user shall be capable of being set programmatically, including through assistive technology.
  - **502.3.10** ***List of Actions.*** A list of all actions that can be executed on an object shall be programmatically determinable.

- **502.3.11 *Actions on Objects.*** Applications shall allow assistive technology to programmatically execute available actions on objects.
- **502.3.12 *Focus Cursor.*** Applications shall expose information and mechanisms necessary to track focus, text insertion point, and selection attributes of user interface components.
- **502.3.13 *Modification of Focus Cursor.*** Focus, text insertion point, and selection attributes that can be set by the user shall be capable of being set programmatically, including through the use of assistive technology.
- **502.3.14 *Event Notification.*** Notification of events relevant to user interactions, including but not limited to, changes in the component's state(s), value, name, description, or boundary, shall be available to assistive technology.

- **502.4 *Platform Accessibility Features.*** Platforms and platform software shall conform to the requirements in ANSI/HFES 200.2, Human Factors Engineering of Software User Interfaces-Part 2: Accessibility (2008) (incorporated by reference, *see* 702.4.1) listed below:
    1. Section 9.3.3 Enable sequential entry of multiple (chorded) keystrokes;
    2. Section 9.3.4 Provide adjustment of delay before key acceptance;
    3. Section 9.3.5 Provide adjustment of same-key double-strike acceptance;
    4. Section 10.6.7 Allow users to choose visual alternative for audio output;
    5. Section 10.6.8 Synchronize audio equivalents for visual events;
    6. Section 10.6.9 Provide speech output services; and
    7. Section 10.7.1 Display any captions provided.

503 Applications

- **503.1 *General.*** Applications shall conform to 503.
- **503.2 *User Preferences.*** Applications shall permit user preferences from platform settings for color, contrast, font type, font size, and focus cursor.
    - ***EXCEPTION:*** Applications that are designed to be isolated from their underlying platform software, including Web applications, shall not be required to conform to 503.2.
- **503.3 *Alternative User Interfaces.*** Where an application provides an alternative user interface that functions as assistive technology, the application shall use platform and other industry standard accessibility services.
- **503.4 *User Controls for Captions and Audio Description.*** Where ICT displays video with synchronized audio, ICT shall provide user controls for closed captions and audio descriptions conforming to 503.4.

- **503.4.1 *Caption Controls.*** Where user controls are provided for volume adjustment, ICT shall provide user controls for the selection of captions at the same menu level as the user controls for volume or program selection.
- **503.4.2 *Audio Description Controls.*** Where user controls are provided for program selection, ICT shall provide user controls for the selection of audio descriptions at the same menu level as the user controls for volume or program selection.

504 Authoring Tools

- **504.1 *General.*** Where an application is an authoring tool, the application shall conform to 504 to the extent that information required for accessibility is supported by the destination format.
- **504.2 *Content Creation or Editing.*** Authoring tools shall provide a mode of operation to create or edit content that conforms to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.1 (incorporated by reference, *see* 702.10.1) for all supported features and, as applicable, to file formats supported by the authoring tool. Authoring tools shall permit authors the option of overriding information required for accessibility.
  - ***EXCEPTION:*** Authoring tools shall not be required to conform to 504.2 when used to directly edit plain text source code.
  - **504.2.1 *Preservation of Information Provided for Accessibility in Format Conversion.*** Authoring tools shall, when converting content from one format to another or saving content in multiple formats, preserve the information required for accessibility to the extent that the information is supported by the destination format.
  - **504.2.2 *PDF Export.*** Authoring tools capable of exporting PDF files that conform to ISO 32000-1:2008 (PDF 1.7) shall also be capable of exporting PDF files that conform to ANSI/AIIM/ISO 14289-1:2016 (PDF/UA-1) (incorporated by reference, *see* 702.3.1).
- **504.3 *Prompts.*** Authoring tools shall provide a mode of operation that prompts authors to create content that conforms to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.1 (incorporated by reference, *see* 702.10.1) for supported features and, as applicable, to file formats supported by the authoring tool.
- **504.4 *Templates.*** Where templates are provided, templates allowing content creation that conforms to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.1 (incorporated by reference, *see* 702.10.1) shall be provided for a range of template uses for supported features and, as applicable, to file formats supported by the authoring tool.

Chapter 6: Support Documentation and Services

601 General

- **601.1 *Scope.*** The technical requirements in Chapter 6 shall apply to ICT support documentation and services where required by Chapter 2 (Scoping Requirements) and where otherwise referenced in any other chapter of these Standards.

602 Support Documentation

- **602.1 *General.*** Documentation that supports the use of ICT shall conform to 602.

- **602.2 *Accessibility and Compatibility Features.*** Documentation shall list and explain how to use the accessibility and compatibility features required by Chapters 4 and 5. Documentation shall include accessibility features that are built-in and accessibility features that provide compatibility with assistive technology.

- **602.3 *Electronic Support Documentation.*** Documentation in electronic format, including Web-based self-service support, shall conform to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.1 (incorporated by reference, *see* 702.10.1).

- **602.4 *Alternate Formats for Non-Electronic Support Documentation.*** Where support documentation is only provided in non-electronic formats, alternate formats usable by individuals with disabilities shall be provided upon request.

603 Support Services

- **603.1 *General.*** ICT support services including, but not limited to, help desks, call centers, training services, and automated self-service technical support, shall conform to 603.

- **603.2 *Information on Accessibility and Compatibility Features.*** ICT support services shall include information on the accessibility and compatibility features required by 602.2.

- **603.3 *Accommodation of Communication Needs.*** Support services shall be provided directly to the user or through a referral to a point of contact. Such ICT support services shall accommodate the communication needs of individuals with disabilities.

Chapter 7: Referenced Standards

701 General

- **701.1 *Scope.*** The standards referenced in Chapter 7 shall apply to ICT where required by Chapter 2 (Scoping Requirements) and where referenced in any other chapter of these Standards.

702 Incorporation by Reference

- **702.1 *Approved IBR Standards*.** The following standards are incorporated by reference (IBR):

- **702.2 *Advanced Television Systems Committee (ATSC).*** Copies of the referenced standard may be obtained from the Advanced Television Systems Committee, 1776 K Street NW., Suite 200, Washington, DC 20006-2304 (http://www.atsc.org).

    - **702.2.1 *ATSC A/53 Part 5:2014, Digital Television Standard, Part 5-AC-3 Audio System Characteristics***, August 28, 2014, IBR for 414.1.1.

- **702.3 *Association for Information and Image Management (AIIM)***. Copies of the referenced standard may be obtained from AIIM,1100 Wayne Ave., Ste. 1100, Silver Spring, Maryland 20910 (http://www.aiim.org/Resources/Standards/AIIM_ISO_14289-1).

    - **702.3.1 *ANSI/AIIM/ISO 14289-1-2016, Document Management Applications-Electronic Document File Format Enhancement for Accessibility-Part 1: Use of ISO 32000-1 (PDF/UA-1)***, ANSI-approved February 8, 2016, IBR for 504.2.2.

- **702.4** ***Human Factors and Ergonomics Society (HFES)****.* Copies of the referenced standard may be obtained from the Human Factors and Ergonomics Society, P.O. Box 1369, Santa Monica, CA 90406-1369 (http://www.hfes.org/Publications/ProductDetail.aspx?Id=76).

    - **702.4.1** ***ANSI/HFES 200.2, Human Factors Engineering of Software User Interfaces-Part 2: Accessibility***, copyright 2008, IBR for 502.4.

- **702.5** ***Institute of Electrical and Electronics Engineers (IEEE).*** Copies of the referenced standard may be obtained from the Institute of Electrical and Electronics Engineers, 10662 Los Vaqueros Circle, P.O. Box 3014, Los Alamitos, CA 90720-1264 (http://www.ieee.org).

    - **702.5.1** ***ANSI/IEEE C63.19-2011, American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids***, May 27, 2011, IBR for 412.3.1.

- **702.6** ***International Code Council (ICC).*** Copies of the referenced standard may be obtained from ICC Publications, 4051 W. Flossmoor Road, Country Club Hills, IL 60478-5795 (http://www.iccsafe.org).

    - **702.6.1** ***ICC A117.1-2009, Accessible and Usable Buildings and Facilities***, approved October 20, 2010, IBR for 402.5.

- **702.7** ***International Telecommunications Union Telecommunications Standardization Sector (ITU-T)*****.** Copies of the referenced standards may be obtained from the International Telecommunication Union, Telecommunications Standardization Sector, Place des Nations CH-1211, Geneva 20, Switzerland (http://www.itu.int/en/ITU-T).

    - **702.7.1** ***ITU-T Recommendation E.161, Series E. Overall Network Operation, Telephone Service, Service Operation and Human Factors-International operation-Numbering plan of the international telephone service, Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network***, February 2001, IBR for 407.3.3.

    - **702.7.2** ***ITU-T Recommendation G.722.2, Series G. Transmission Systems and Media, Digital Systems and Networks-Digital terminal equipment-Coding of analogue signals by methods other than PCM, Wideband coding of speech at around 16 kbit/s using Adaptive Multi-Rate Wideband (AMR-WB)*****,** July 2003, IBR for 412.4.

- **702.8** ***Internet Engineering Task Force (IETF)*****.** Copies of the referenced standard may be obtained from the Internet Engineering Task Force (http://www.ietf.org).

    - **702.8.1** ***IETF RFC 6716, Definition of the Opus Codec***, September 2012, J.M. Valin, Mozilla Corporation, K. Vos, Skype Technologies S.A., T. Terriberry, Mozilla Corporation, IBR for 412.4.

- **702.9** ***Telecommunications Industry Association (TIA)*****.** Copies of the referenced standard, published by the Telecommunications Industry Association, may be obtained from IHS Markit, 15 Inverness Way East, Englewood, CO 80112 (http://global.ihs.com).

- **702.9.1** ***TIA-1083-B, Telecommunications-Communications Products-Handset Magnetic Measurement Procedures and Performance Requirements***, October 2015, IBR for 412.3.2.

- **702.10** ***Worldwide Web Consortium (W3C)*****.** Copies of the referenced standard may be obtained from the W3C Web Accessibility Initiative, Massachusetts Institute of Technology, 32 Vassar Street, Room 32-G515, Cambridge, MA 02139 (http://www.w3.org/TR/WCAG21).

    - **702.10.1** ***WCAG 2.1, Web Content Accessibility Guidelines***, W3C Recommendation, September 21, 2023, IBR for: E205.4, E205.4 Exception, E205.4.1, E207.2, E207.2 Exception 2, E207.2 Exception 3, E207.2.1, E207.3, 408.3 Exception, 501.1 Exception, 504.2, 504.3, 504.4, and 602.3.