Information and Communication Technology (ICT) Standards and Guidelines

Advance Notice of Proposed Rulemaking
December 2011

U.S. Access Board

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508 CHAPTER 1: APPLICATION AND ADMINISTRATION

E101 General

E101.1 Purpose. This document contains scoping and technical requirements for information and communication technology (ICT) that is accessible to and usable by individuals with disabilities. Compliance with these standards is mandatory for federal agencies pursuant to Section 508 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794d).

E101.2 Equivalent Facilitation. The use of an alternative design or technology that results in substantially equivalent or greater access to and use of data and information by individuals with disabilities than would be provided by conformance to a requirement in Chapters 4 through 6 of this document is permitted. The functional performance criteria in Chapter 3 shall be used to determine whether substantially equivalent or greater access to and use of data and information is provided to individuals with disabilities.

E101.3 Conventional Industry Tolerances. Dimensions are subject to conventional industry tolerances except where dimensions are stated as a range.

E101.4 Units of Measurement. Measurements are stated in metric and U.S. customary units. The values stated in each system (metric and U.S. customary units) may not be exact equivalents, and each system shall be used independently of the other.

E102 Referenced Standards

E102.1 Incorporation by Reference. The specific editions of the standards and guidelines listed in E102 are incorporated by reference in this document and are part of the requirements to the prescribed extent of each such reference. The Director of the Federal Register has approved the standards for incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the referenced standards may be inspected at the Access Board, 1331 F Street NW, Suite 1000, Washington, DC 20004; or at the National Archives and Records Administration (NARA). For information on the availability of the referenced standards at NARA, call (202) 741-6030, or go to:
http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html

E102.2 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).

A/53 Digital Television Standard, Part 5: 2010 AC-3 Audio System Characteristics (see 410.1.1).

E102.3 ANSI/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).

ANSI/IEEE C63.19-2011 American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids (see 408.4.1).

Advisory E102.3 ANSI/IEEE. ANSI/IEEE C63.19-2011 provides a uniform method of measurement for compatibility between hearing aids and wireless communications devices.

E102.4 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/ITU-T).

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E102.5 IETF. Copies of the referenced standard may be obtained from the Internet Engineering Task Force (http://www.ietf.org).

RFC 4103 RTP Payload for Text Conversation (2005), (see 408.6.3.2).

Advisory E102.5 IETF. This standard describes how to carry real time text conversation session contents in RTP packets. Real time text conversation is used alone or in connection with other conversational modalities to form multimedia conversation services. Examples of other conversational modalities are video and voice. Real time text in multimedia conversation sessions is sent character-by-character as soon as it is available, or with a small delay for buffering.

E102.6 TIA. Copies of the referenced standards, published by the Telecommunications Industry Association, may be obtained from IHS, 15 Inverness Way East, Englewood, CO 80112 (http://global.ihs.com).

TIA 825-A (2003) A Frequency Shift Keyed Modem for Use on the Public Switched Telephone Network (see 408.6.3.1).

TIA 1083 (2007) Telephone Terminal Equipment Handset Magnetic Measurement Procedures and Performance Requirements (see 408.4.2).

> **Advisory E102.6 TIA.** TIA 825-A is the standard for TTY signals on the public switched telephone network interface. TIA 1083 defines measurement procedures and performance requirements for the handset generated audio band magnetic noise of wire line telephones, including digital cordless telephones.

E102.7 W3C. Copies of the referenced guidelines 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/WCAG20).

Web Content Accessibility Guidelines (WCAG) 2.0, W3C Recommendation, 11 December 2008 (see E205.1, E207.2, 405.1 Exception, 501.1 Exception, 504.2, 504.3, 504.4, 602.3.1).

> **Advisory E102.7 W3C.** The Web Content Accessibility Guidelines (WCAG) offer a series of recommendations to make web content more accessible to all users, including persons with disabilities.

E103 Definitions

E103.1 Terms Defined in Referenced Standards. Terms defined in referenced standards and not defined in E103.4 shall have the meaning as defined in the referenced standards.

E103.2 Undefined Terms. The meaning of terms not defined in E103.4 or in referenced standards shall be as defined by collegiate dictionaries in the sense that the context implies.

E103.3 Interchangeability. Words, terms, and phrases used in the singular include the plural and those used in the plural include the singular.

E103.4 Defined Terms. For the purpose of this document, the terms defined in E103.4 have the indicated meaning.

Agencies. Agencies and departments of the United States Government as defined in 44 U.S.C. 3502 and the United States Postal Service.

Alternate Formats. Formats usable by individuals who are blind or have low vision.

Assistive Technology (AT). Any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.

Authoring Tool. Any application that can be used by authors (alone or collaboratively) to create or modify content for use by other authors or end users.

Closed Functionality. Characteristics that prevent a user from attaching or installing assistive technology. Examples of ICT with closed functionality are self-service

machines, information kiosks, set-top boxes, and devices like printers, copiers, fax machines, and calculators.

Content. Information or sensory experience communicated to the user by ICT. Content includes the encoding that defines its structure, presentation, and interactions.

Customer Premises Equipment (CPE). Equipment used on the premises of a person (other than a carrier) to originate, route, or terminate telecommunications or interconnected VoIP service. Examples of CPE are telephones, routers, switches, residential gateways, set-top boxes, fixed mobile convergence products, home networking adaptors and internet access gateways which enable consumers to access communications service providers' services and distribute them around their house via a Local Access Network (LAN).

Information and Communication Technology (ICT). Any information technology, equipment, or interconnected system or subsystem of equipment for which the principal function is the creation, conversion, duplication, automatic acquisition, storage, analysis, evaluation, manipulation, management, movement, control, display, switching, interchange, transmission, reception, or broadcast of data or information. Examples of ICT are electronic content, telecommunications products, computers and ancillary equipment, software, information kiosks and transaction machines, videos, IT services, and multifunction office machines which copy, scan, and fax documents.

Keyboard. A set of systematically arranged alphanumeric keys or a control that generates alphanumeric input by which a machine or device is operated. A keyboard includes tactilely discernible keys used in conjunction with the alphanumeric keys if their function maps to keys on the keyboard interfaces.

Label. Text or a component with a text alternative that is presented to a user to identify content. A label is presented to all users, whereas a name may be hidden and only exposed by assistive technology. In many cases, the name and the label are the same.

Menu. A set of selectable options.

Name. Text by which software can identify a component to the user. A name may be hidden and only exposed by assistive technology, whereas a label is presented to all users. In many cases, the label and the name are the same. Name is unrelated to the name attribute in HTML.

Operable Part. A component of ICT used to activate, deactivate, or adjust the ICT.

Platform Accessibility Services. Services provided by a platform enabling interoperability with assistive technology. Examples are Application Programming Interfaces (API) and the Document Object Model (DOM).

Platform Software. A collection of software components, that runs on an underlying software or hardware layer providing a set of software services to applications, that allows those applications to be isolated from the underlying software or hardware layer.

Programmatically Determinable. Ability to be determined by software from author-supplied data that is provided in a way that different user agents, including assistive technologies, can extract and present the information to users in different modalities.

Real Time Text. Communications using the transmission of text by which characters are transmitted by a terminal as they are typed. Real time text is used for conversational purposes. Real time text also may be used in voicemail, interactive voice response systems, and other similar applications.

Specialized Customer Premises Equipment. Assistive technology used by individuals with disabilities to originate, route, or terminate telecommunications or interconnected VoIP service. Examples are TTYs and amplified telephones.

Telecommunications. The signal transmission between or among points specified by the user of information and of the user's choosing without change in the form or content of the information as sent and received.

Terminal. Device or software with which the end user directly interacts and that provides the user interface. For some systems, the software that provides the user interface may reside on more than one device such as a telephone and a server.

Text. A sequence of characters that can be programmatically determined and that expresses something in human language.

TTY. Equipment that enables interactive text based communications through the transmission of frequency-shift-keying audio tones across the public switched telephone network. TTY includes devices for real time text communications and voice and text intermixed communications. Examples of intermixed communications are voice carry over and hearing carry over. One example of a TTY is a computer with TTY emulating software and modem.

Video Description. A means to inform individuals who are blind or who have low vision about visual content essential for comprehension. Video description provides audible descriptions of on-screen visuals. Video description supplements the regular audio track of a program. Video description is usually inserted between dialogue to provide information about actions, characters, and on-screen text.

Voice over Internet Protocol (VoIP). A technology which provides real time voice communications. VoIP requires a broadband connection from the user's location and customer premises equipment compatible with Internet protocol.

508 CHAPTER 2: SCOPING REQUIREMENTS

E201 Application

E201.1 Scope. ICT that is procured, developed, maintained, or used by agencies shall conform to these requirements.

> **Advisory E201.1 Scope.** Section 508 of the Rehabilitation Act (29 U.S.C. 794d) applies to federal departments and agencies, including the U.S. Postal Service.
>
> The term "agency" is defined in Section E103 to include the United States Postal Service and other federal agencies and departments as specified in 44 U.S.C. 3502. That section of the U.S.C. defines agency to mean any executive department, military department, Government corporation, Government controlled corporation, or other establishment in the executive branch of the Government (including the Executive Office of the President), or any independent regulatory agency, but does not include (a) the General Accounting Office; (b) Federal Election Commission; (c) the governments of the District of Columbia and of the territories and possessions of the United States, and their various subdivisions; or (d) Government-owned contractor-operated facilities, including laboratories engaged in national defense research and production activities.

E202 General Exceptions

E202.1 General. ICT shall be exempt from these requirements to the extent specified by E202.

E202.2 National Security Systems. This document does not apply to ICT operated by agencies as part of a national security system, as defined by 40 U.S.C. 11103(a).

> **Advisory E202.2 National Security Systems.** The term National Security System means any telecommunication, or information system operated by the United States government, the function, operation, or use of which involves:
> - Intelligence activities;
> - Cryptologic activities related to national security;
> - Command and control of military forces;
> - Equipment that is an integral part of a weapon or weapons system; or
> - Systems which are critical to the direct fulfillment of military or intelligence missions.
>
> Systems that are critical to the direct fulfillment of military or intelligence missions do not include systems that are used for routine administrative and business applications. Examples of routine administrative and business applications are payroll, finance, logistics, and personnel management applications. Routine administrative and business applications are covered by this document.

E202.3 Federal Contracts. ICT acquired by a contractor incidental to a contract shall not be required to conform to this document.

Advisory E202.3 Federal Contracts. ICT that is incidental to a contract includes materials which are, themselves, not deliverables under the contract. For example, if a contractor uses money from a contract to acquire a laptop which is used to help create the deliverable for the project, the laptop itself is considered incidental to the contract since it is not part of the deliverable.

E202.4 Functions Located in Maintenance or Monitoring Spaces. Where ICT functions are operable only from spaces occupied solely by service personnel for maintenance, repair, or occasional monitoring of equipment, such functions shall not be required to conform to the provisions of this document.

Advisory E202.4 Functions Located in Maintenance or Monitoring Spaces. Where a maintenance or monitoring space is occupied by persons other than service personnel whose job is to maintain, repair or occasionally monitor the ICT, the ICT functions located in that space must be accessible. A network operations center is an example of a space only for maintenance or monitoring and which is occupied by persons other than service personnel such as operations managers and programmers.

When controls or interfaces of ICT that is located in maintenance or monitoring spaces are operated remotely, they can be located almost anywhere. Consequently, the functions of ICT they control would not typically be eligible for the exception in E202.4.

E202.5 Undue Burden or Fundamental Alteration. Where an agency determines in accordance with E202.5 that conformance with the provisions of this document 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.

Advisory E202.5 Undue Burden or Fundamental Alteration. A determination by an agency that conformance to a particular provision would result in an undue burden or a fundamental alteration in the nature of the ICT does not exempt the ICT in its entirety from coverage under this document. The agency must conform to those provisions that do not result in an undue burden or a fundamental alteration in the nature of the ICT.

> **E202.5.1 Basis for a Determination of Undue Burden.** In determining whether conformance to the provisions of this document 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.
>
> **E202.5.2 Required Documentation.** The responsible agency official shall document in writing the basis for determining that conformance with provisions of this document 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 provisions would create an undue burden or a fundamental alteration in the nature of the ICT.

E202.5.3 Alternative Means. Where conformance to the provisions of this document 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.

E202.6 Best Meets. Where ICT conforming to one or more provisions of this document is not commercially available, the agency shall procure the product that best meets the provisions of this document consistent with the agency's business needs.

Advisory E202.6 Best Meets. Examples of procurements that must conform to the provisions of this document unless they are not commercially available include commercial off the shelf products and products developed in response to federal government procurements. However, this document does not require agencies to procure ICT that does not meet their business needs.

E202.6.1 Required Documentation. The responsible agency official shall document in writing the basis for determining that ICT that fully conforms to the provisions of this document is not commercially available. The documentation shall include an explanation of why and to what extent a product conforming to applicable provisions of this document is not commercially available and why the product that was procured best meets the provisions of this document consistent with the agency's business needs.

Advisory E202.6.1 Required Documentation. The Federal Acquisition Regulation (FAR) sets forth the documentation requirements for a determination of commercial non-availability by a federal agency.

E202.6.2 Alternative Means. Where ICT that fully conforms to the provisions of this document 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.

Advisory E202.6.2 Alternative Means. Nothing in this document obviates or limits the requirements of Sections 501 and 504 of the Rehabilitation Act of 1973, as amended. Some individuals may require accommodations even for ICT that fully conforms to the provisions of this document.

E203 Access to Functionality

E203.1 General. Agencies shall provide individuals with disabilities access to all functionality of ICT, either directly or by supporting the use of assistive technology, and shall comply with E203. In providing access to all functionality of ICT, agencies shall ensure the following:
1. That federal employees with disabilities have access to and use of information and data that is comparable to the access and use by federal employees who are not individuals with disabilities; and
2. That members of the public with disabilities who are seeking information or data from a federal agency have access to and use of information and data that is

comparable to that provided to the members of the public who are not individuals with disabilities.

E204 Functional Performance Criteria

E204.1 General. When agencies develop, procure, maintain, or use ICT, ICT shall conform to functional performance criteria specified in Chapter 3.

E205 Electronic Content

E205.1 Official Agency Communications. Regardless of the medium or the method of transmission and storage, electronic content that communicates official agency business, as determined by the agency mission, to a federal employee or a member of the public shall conform to Level A and Level AA Success Criteria and Conformance Requirements specified for web pages in WCAG 2.0 (incorporated by reference in Chapter 1) when the content of the communication includes one or more of the following:
1. Content that is public facing;
2. Content that is broadly disseminated throughout an agency, including templates;
3. Letters adjudicating any cause which is within the jurisdiction of the agency;
4. Internal and external program and policy announcements;
5. Notices of benefits, program eligibility, and employment opportunities and decisions;
6. Forms, questionnaires and surveys;
7. Emergency notifications;
8. Formal acknowledgements and receipts; or
9. Educational and training materials.

> **Advisory E205.1 Official Agency Communications.** WCAG is written to be technology neutral. While oriented towards web pages which are defined as being delivered using HTTP, it is straightforward to apply the WCAG 2.0 Success Criteria and Conformance Requirements to all electronic content.

EXCEPTIONS: 1. Electronic content of any of the above types of communications stored solely for archival purposes or retained solely to preserve the exact image of the original hard copy shall not be required to conform to the provisions of this document.

2. Works in progress and drafts that are not public facing and that are intended for limited internal distribution shall not be required to conform to the provisions of this document.

> **Advisory E205.1 Official Agency Communications Exceptions.** Nothing in this document, including the exceptions to E205.1, obviates or limits the requirements of Sections 501 and 504 of the Rehabilitation Act of 1973, as amended. In order to avoid discrimination on the basis of disability, an agency may be required to provide reasonable accommodations for federal employees who are individuals with disabilities, or to make reasonable modifications in policies, practices, or procedures in order to avoid discrimination on the basis of disability.

E206 Hardware

E206.1 General. Where components of ICT are hardware and transmit information or have a user interface, those components shall conform to the applicable provisions of Chapter 4.

E207 Platforms and Applications

E207.1 General. Where components of ICT are platforms or applications and transmit information or have a user interface, those components shall conform to E207 and the applicable provisions of Chapter 5.

E207.2 WCAG Conformance. User interface components and content of platforms and applications shall conform to Level A and Level AA Success Criteria and Conformance Requirements specified for web pages in WCAG 2.0 (incorporated by reference in Chapter 1).

> **Advisory E207.2 WCAG Conformance.** WCAG is written to be technology neutral. While oriented towards web pages which are defined as being delivered using HTTP, it is straightforward to apply the WCAG 2.0 Success Criteria and Conformance Requirements to user interface components and content of platforms and applications.

E208 Documentation and Support Services

E208.1 General. Where support services or documentation are provided, agencies shall provide support services and documentation in conformance with Chapter 6.

255 CHAPTER 1: APPLICATION AND ADMINISTRATION

C101 General

C101.1 Purpose. This document contains scoping and technical requirements for telecommunications equipment and customer premises equipment that are accessible to and usable by individuals with disabilities. Compliance with these standards is mandatory for telecommunications manufacturers pursuant to the Telecommunications Act of 1996 (47 U.S.C. 255).

C101.2 Equivalent Facilitation. The use of an alternative design or technology that results in substantially equivalent or greater access to and use of data and information by individuals with disabilities than would be provided by conformance to a requirement in Chapters 4 through 6 of this document is permitted. The functional performance criteria in Chapter 3 shall be used to determine whether substantially equivalent or greater access to and use of data and information is provided to individuals with disabilities.

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Programmatically Determinable. Ability to be determined by software from author-supplied data that is provided in a way that different user agents, including assistive technologies, can extract and present the information to users in different modalities.

Readily Achievable. Easily accomplishable and able to be carried out without much difficulty or expense.

Real Time Text. Communications using the transmission of text by which characters are transmitted by a terminal as they are typed. Real time text is used for conversational purposes. Real time text also may be used in voicemail, interactive voice response systems, and other similar applications.

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Telecommunications. The signal transmission between or among points specified by the user of information and of the user's choosing without change in the form or content of the information as sent and received.

Telecommunications Equipment. Equipment, other than customer premises equipment, used by a carrier to provide telecommunications services, including software and upgrades integral to such equipment.

Telecommunications Manufacturer. A fabricator or final assembler of telecommunications equipment, VoIP or customer premises equipment that sells to the public or to vendors.

Terminal. Device or software with which the end user directly interacts and that provides the user interface. For some systems, the software that provides the user interface may reside on more than one device. Examples of such devices are a telephone and a server.

Text. A sequence of characters that can be programmatically determined and that expresses something in human language.

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Voice over Internet Protocol (VoIP). A technology which provides real time voice communications. VoIP requires a broadband connection from the user's location and customer premises equipment compatible with Internet protocol.

255 CHAPTER 2: SCOPING REQUIREMENTS

C201 Application

C201.1 Scope. Where readily achievable, telecommunications manufacturers of ICT that is telecommunications equipment or customer premises equipment shall apply these requirements in the design, development, and fabrication of ICT that it is newly released, upgraded or is substantially changed from an earlier version or model.

Advisory C201.1 Scope. Existing ICT which undergoes minor or insubstantial changes that do not affect functionality shall not be required to conform to the provisions of this document.

C201.2 Access to Functionality. Telecommunications manufacturers shall provide individuals with disabilities direct access to all functionality of ICT. Where telecommunications manufacturers can demonstrate that it is not readily achievable for ICT to provide direct access to all functionality, ICT shall support the use of assistive technology and specialized customer premises equipment where readily achievable.

Advisory C201.2 Access to Functionality. A determination by a telecommunications manufacturer that it is not readily achievable for ICT to conform to a certain provision does not exempt the ICT in its entirety from coverage under this document. ICT must conform to those provisions that are readily achievable.

In determining whether compliance with the provisions of this document is readily achievable, telecommunications manufacturers should consider the following list of factors:
1. The nature and cost of the action needed to provide accessibility or compatibility.
2. The overall resources of the telecommunications manufacturer, including financial resources, technical expertise, component supply sources, equipment, or personnel.
3. The overall financial resources of any parent corporation or entity; only to the extent such resources are available to the telecommunications manufacturer.
4. Whether the accessibility solution results in a fundamental alteration in the nature of the product.

C202 Functional Performance Criteria

C202.1 General. ICT covered by C201.1 shall conform to the functional performance criteria specified in Chapter 3.

C203 Electronic Content

C203.1 General. Regardless of the medium or the method of transmission and storage, electronic content integral to the use of ICT covered by C201.1 shall conform to Level A and Level AA Success Criteria and Conformance Requirements specified for web pages in WCAG 2.0 (incorporated by reference in Chapter 1).

Advisory C203.1 General. WCAG is written to be technology neutral. While oriented towards web pages which are defined as being delivered using HTTP, it is straightforward to apply the WCAG 2.0 Success Criteria and Conformance Requirements to all electronic content.

C204 Hardware

C204.1 General. Where components of ICT covered by C201.1 are hardware and transmit information or have a user interface, those components shall conform to the applicable provisions of Chapter 4.

C205 Platforms and Applications

C205.1 General. Where components of ICT covered by C201.1 are platforms or applications and transmit information or have a user interface, those components shall conform to C206 and the applicable provisions of Chapter 5.

C205.2 WCAG Conformance. User interface components and content of platforms and applications shall conform to Level A and Level AA Success Criteria and Conformance Requirements specified for web pages in WCAG 2.0 (incorporated by reference in Chapter 1).

Advisory C205.2 WCAG Conformance. WCAG is written to be technology neutral. While oriented towards web pages which are defined as being delivered using HTTP, it is straightforward to apply the WCAG 2.0 Success Criteria and Conformance Requirements to user interface components and content of platforms and applications.

C206 Documentation and Support Services

C206.1 General. Where support services or documentation are provided, telecommunications manufacturers shall provide support services and documentation in conformance with Chapter 6, upon request and at no additional charge to those users.

C207 Product Design, Development, and Evaluation

C207.1 General. Telecommunications manufacturers shall include accessibility in product design, development, and fabrication.

C207.2 Inclusion of People with Disabilities. In developing an accessible product design and evaluation process, telecommunications manufacturers shall consider including individuals with disabilities and groups representing individuals with disabilities in all phases of product development, testing and marketing.

Advisory C207.2 Inclusion of People with Disabilities. When market research is undertaken, telecommunications manufacturers should include individuals with disabilities in target populations of such research.

When product design, testing, pilot demonstrations, and product trials are conducted, telecommunications manufacturers should include individuals with disabilities in such activities.

In determining how and whom to enlist in assisting with design, training, demonstrating, or participation in product trials, telecommunications manufacturers may consider advertising in advocacy organizations' periodic communication, with membership or demographically similar public or private groups, or other associated entities.

CHAPTER 3: FUNCTIONAL PERFORMANCE CRITERIA

301 General

301.1 Scope. The provisions of Chapter 3 shall apply where required by Chapter 2 or where referenced by a requirement in this document.

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 magnifies, one mode that reduces the field of vision required, and one mode that allows user control of contrast.

302.3 Without Perception of Color. Where a visual mode of operation is provided, ICT shall provide at least one mode of operation that does not require user perception of color.

302.4 Without Hearing. Where an auditory 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 auditory mode of operation is provided, ICT shall provide at least one mode of operation which improves clarity, one mode that reduces background noise, and one mode that allows user control of volume.

302.6 Without Speech. Where a spoken mode of operation is provided, 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 operation of more than one control at the same time.

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 Minimize Photosensitive Seizure Triggers. ICT shall provide at least one mode of operation that minimizes the potential for triggering photosensitive seizures.

CHAPTER 4: HARDWARE

401 General

401.1 Scope. The provisions of Chapter 4 shall apply where required by Chapter 2 or where referenced by a requirement in this document.

402 Closed Functionality

402.1 General. Except for personal headsets and audio loops, ICT with closed functionality shall be operable without requiring the user to attach assistive technology and shall conform to 402.

> **Advisory 402.1 General.** Self-service machines, information kiosks, set-top boxes, and devices like printers, copiers, fax machines, and calculators have closed functionality because their functionality is self-contained. Their design precludes the user from adding peripherals or software to them.
>
> ICT has closed functionality for many reasons. These reasons include design or policy. ICT may have closed functionality in practice even though the manufacturer did not design or develop ICT to be closed. Computers which are "locked down" to the extent that end users cannot adjust settings are functionally closed.

402.2 Speech Enabled. ICT shall be speech enabled. Operating instructions and orientation, visible transaction prompts, user input verification, error messages, and all displayed information for full use shall be accessible to and independently usable by individuals with vision impairments. Speech 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 shall be coordinated with information displayed on the screen.

> **EXCEPTIONS: 1.** Audible tones shall be permitted instead of speech for visible output that is not displayed for security purposes, including, but not limited to, asterisks representing personal identification numbers.
>
> **2.** Advertisements and other similar information shall not be required to be audible unless they convey information that can be used in the transaction being conducted.

402.2.1 User Control. Speech for any single function shall be automatically interrupted when a transaction is selected. Speech shall be capable of being repeated and paused.

402.3 Volume Control. ICT shall provide volume control complying with 402.3.

402.3.1 Private Listening. Where speech required by 402.2 is delivered through a mechanism for private listening, ICT shall provide a mode of operation for controlling the volume.

402.3.2 Speaker Volume. Where sound is delivered through speakers on ICT, incremental volume control shall be provided with output amplification up to a level of at least 65 dB. Where the ambient noise level of the environment is above 45 dB, a volume gain of at least 20 dB above the ambient level shall be user selectable. A function shall be provided to automatically reset the volume to the default level after every use.

402.4 Characters. Characters displayed on the screen shall be in a sans serif font. 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.

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.

Advisory 403.1 General Exception. Biometrics use biological characteristics for user identification or control. Examples of biometrics used for identification or control are fingerprints, retinal scans, iris patterns, voice prints, facial recognition, and veins in a hand.

Biometrics that are restricted to a single biological characteristic pose a significant barrier to individuals with disabilities who do not possess that specific biological characteristic.

Biometric methods based on dissimilar biological characteristics increase the likelihood that individuals with disabilities possess at least one of the specified biological characteristics. Examples of dissimilar biological characteristics are fingerprints, eye retinal patterns, voice, and face.

Examples of biometrics that rely upon dissimilar biological characteristics are voice recognition and face recognition. Examples of biometrics that rely upon similar biological characteristics are finger printing and thumb scans.

This provision requires ICT that uses biometrics to provide for two (or more) dissimilar biological characteristics.

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.

> **Advisory 404.1 General.** This provision applies to conversion techniques, such as encoding, signal compression, and format transformation. Examples of ICT that encode, compress, or transform include firewalls, routers, and gateways.
>
> One example of ICT preserving information provided for accessibility is a media player that displays embedded captions from a captioned video and does not strip out the captioning.
>
> Another example of ICT preserving information provided for accessibility is converting a document into a new format while retaining information about the identity, operation, and state of the interface elements.
>
> This provision does not require the addition or translation of information. For example, this is not a requirement to change voice mail to text or to vocalize captions.

405 Flashing

405.1 General. 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 2.0 (incorporated by reference in Chapter 1) are not required to conform to 405.

406 Standard Connections

406.1 General. Where connection points are provided, at least one of each type of connection shall conform to industry standard non-proprietary formats.

> **Advisory 406.1 General.** The intent of this provision is to ensure compatibility with assistive technologies by requiring the use of standard connections on ICT.
>
> Examples of connection points include expansion slots, ports, and connectors for cables.
>
> Industry standard non-proprietary formats include wireless connections to ICT, such as infrared (IR) and Bluetooth.

407 Operable Parts

407.1 General. Where provided, operable parts of ICT shall conform to 407.
> **EXCEPTION:** Operable parts of ICT that is portable shall not be required to conform to 407.13 through 407.16

407.2 Contrast. Where provided, keys and controls shall contrast visually from background surfaces. Characters and symbols shall contrast visually from background surfaces. Visual contrast shall be either light-on-dark or dark-on-light.

407.3 Tactilely Discernible. At least one tactilely discernible input control shall be provided for each function. Where provided, key surfaces not on active areas of display

screens shall be raised above surrounding surfaces. Where touch or membrane keys are the only method of input, each key shall be tactilely discernible from surrounding surfaces and adjacent keys.

407.3.1 Identification. Operable parts shall be tactilely discernible without activation.

407.4 Key Repeat. Where an alphabetic keyboard with key repeat is provided, the delay before the key repeat shall be adjustable to at least 2 seconds and the key repeat rate shall be adjustable to 2 seconds per character.

407.5 Numeric Keys. Where provided, numeric keys shall be arranged in a 12-key ascending or descending telephone keypad layout. The number five key shall be tactilely distinct from the other keys.

Advisory 407.5 Numeric Keys. A telephone keypad and a keypad on a computer keyboard differ in one significant feature, ascending versus descending numerical order of the layout. Both types of keypad layout conform to this provision.

407.6 Timed Response. Where a timed response is required, ICT shall alert the user by touch or sound and provide the user with the opportunity to indicate that more time is needed.

407.7 Status Indicators. Where provided, status indicators, including all locking or toggle controls or keys, shall be discernible either through touch or sound.

407.8 Color. ICT shall not use color coding as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.

Advisory 407.8 Color. This provision allows ICT to use color. One example is an electronic form with required and optional fields. Instructions at the beginning of this form state that required fields are labeled with an asterisk and appear in red text. In this example, the asterisk is the non-color dependent visual means of conveying information.

407.9 Operation. Operable parts 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.

407.10 Privacy. ICT shall provide the opportunity for the same degree of privacy of input and output to all individuals.

407.11 Receipts, Tickets, and Transactional Outputs. Where receipts, tickets, or other outputs are provided as a result of a transaction, speech output shall include all information necessary to complete or verify the transaction.

Advisory 407.11 Receipts, Tickets, and Transactional Outputs. The information necessary to complete or verify a transaction depends on the nature of the transaction and the type of machine.

Receipts, tickets, and similar transactional output usually are printed, but this is not always the case. For example, a theater ticket might be transferred to a smart phone or PDA. Regardless of the delivery method, the machine must convey audibly to the user the information provided in receipts, tickets and other similar transactional outputs that is necessary to complete and verify a transaction.

> EXCEPTIONS: **1.** Machine location, date and time of transaction, customer account number, and the machine identifier shall not be required to be audible.
> **2.** Information that duplicates information available on-screen and already presented audibly shall not be required to be repeated.
> **3.** For ticketing machines, printed copies of itineraries and maps shall not be required to be audible.

407.12 Keys, Tickets and Fare Cards. Where keys, tickets or fare cards are provided, keys, tickets and fare cards shall have an orientation that is tactilely discernible if orientation is important to further use of the key, ticket or fare card.

Advisory 407.12 Keys, Tickets and Fare Cards. Examples of keys include electronic pass cards and identification badges which are read by machines. Examples of ways to provide an orientation that is tactilely discernible include braille labels, off-center punch holes, and notching a corner.

407.13 Clear Floor Space. A clear floor or ground space conforming to 36 CFR Part 1191 Appendix D, Section 305 shall be provided.

407.14 Height. Operable parts of ICT shall be placed within one or more of the reach ranges conforming to 36 CFR Part 1191 Appendix D, Section 308.

Advisory 407.14 Height. This provision applies to reach ranges for either a forward or a side approach.

407.15 Visibility. Where a display screen is provided, it shall be visible from a point located 40 inches (1015 mm) above the center of the clear floor space in front of the ICT.

407.16 Braille Instructions. Where speech is required by 402.2, braille instructions for initiating the speech mode of operation shall be provided. Braille shall conform to 36 CFR Part 1191 Appendix D, Section 703.3.

408 ICT with Two Way Voice Communication

408.1 General. ICT that provides two way voice communication shall conform to 408.

408.2 Volume Gain. For transmitted voice signals, ICT shall provide a gain adjustable to a minimum of 18 dB. For incremental volume control, ICT shall provide at least one intermediate step of 12 dB gain.

408.3 Magnetic Coupling. Where ICT delivers output by an audio transducer which is typically held up to the ear, ICT shall provide a means for effective magnetic wireless coupling to hearing technologies.

408.4 Minimize Interference. Interference with hearing technologies (including hearing aids, cochlear implants, and assistive listening devices) shall be reduced to the lowest possible level and shall conform to 408.4.

408.4.1 Cellular and PCS Handsets. ICT in the form of cellular and Personal Communication Service (PCS) handsets shall conform to ANSI/IEEE C63.19-2011 (incorporated by reference in Chapter 1).

408.4.2 Digital Wireline. ICT in the form of digital wireline devices shall conform to TIA 1083, Telephone Terminal Equipment Handset Magnetic Measurement Procedures and Performance Requirements (incorporated by reference in Chapter 1).

408.5 ITU-T Recommendation G.722. ICT shall transmit and receive speech that is digitally encoded in the manner specified by ITU-T Recommendation G.722 for encoding and storing audio information (incorporated by reference in Chapter 1).

EXCEPTION: Where ICT is a closed system, conformance to standards other than ITU-T Recommendation G.722 shall be permitted where equivalent or better acoustic performance is provided and where conversion to ITU-T Recommendation G.722 at the borders of the closed system is supported.

Advisory 408.5 ITU-T Recommendation G.722 Exception. One example of a closed system is a telephone network in a federal multiple facility site which enables calls to be placed between buildings and departments within that site, but is not used to receive or make calls outside of that site.

408.6 Real Time Text Functionality. Where ICT provides real time voice communication, ICT shall provide real time text functionality and shall conform to 408.6.

408.6.1 Display of Real Time Text. Where provided, multi-line displays shall be compatible with real time text systems used on the network.

408.6.2 Text Generation. Where provided, features capable of text generation shall be compatible with real time text systems used on the network.

408.6.3 Interoperability. Where ICT interoperates outside of its closed system, or where ICT connects to other systems, ICT shall conform to 408.6.3.1 or 408.6.3.2.

408.6.3.1 PSTN. Where ICT interoperates with the PSTN (Public Switched Telephone Network), real time text shall conform to the TIA 825-A (incorporated

by reference in Chapter 1) Baudot standard for TTY signals at the PSTN interface.

408.6.3.2 VoIP Using SIP. Where ICT interoperates with Voice over Internet Protocol (VoIP) products or systems using Session Initiation Protocol (SIP), they shall support transmission of real time text that conforms to RFC 4103 (incorporated by reference in Chapter 1).

408.6.4 Real Time Text Compatibility. Voice mail, auto-attendant, and interactive voice response telecommunications systems shall be compatible with real time text that conforms to 408.6.3.

408.7 Caller ID. Where provided, caller identification and similar telecommunications functions shall be available as text or in an audio form.

408.8 Video Communication. Where ICT that provides two way voice communication includes real time video functionality, the quality of the video shall be sufficient to support communication using sign language.

409 Caption Processing Technology

409.1 General. Where ICT displays or processes video with synchronized audio, ICT shall conform to 409.1.1 or 409.1.2.

409.1.1 Decoding of Closed Captions to Open Captions. Where audio-visual players and displays process video with synchronized audio information, players and displays shall decode closed caption data and pass on an open-captioned signal to the video display.

409.1.2 Pass Through of Closed Caption Data. Where audio-visual players and displays process video with synchronized audio information, players and displays shall pass through closed caption data to the video display for decoding as displayed text. Cabling and ancillary equipment shall not block the pass through of closed caption data.

410 Video Description Processing Technology

410.1 General. Where ICT displays or processes video with synchronized audio information, ICT shall provide a mode of operation that plays audio information associated with video description.

410.1.1 Digital Television Tuners. Where video description is played through digital television tuners, the tuners shall conform to ATSC A/53 Digital Television Standard, Part 5 (2010) (incorporated by reference in Chapter 1). Digital television tuners shall provide processing of video description when encoded as a Visually Impaired (VI) associated audio service that is provided as a complete program mix containing video description according to the A/53 standard developed by the

Advanced Television Systems Committee (ATSC) (incorporated by reference in Chapter 1).

411 User Controls for Captions and Video Description

411.1 General. Where ICT displays video with synchronized audio content, ICT shall provide user controls for closed captions and video description conforming to 411.1.

411.1.1 Caption Controls. Where user controls are provided for the selection of volume, ICT shall provide user controls for the selection of captions in at least one location that is comparable in prominence to the location of the user controls for volume.

411.1.2 Video Description Controls. Where user controls are provided for the selection of channels, ICT shall provide user controls for the selection of video description in at least one location that is comparable in prominence to the location of the user controls for channels.

CHAPTER 5: PLATFORMS AND APPLICATIONS

501 General

501.1 Scope. The provisions of Chapter 5 shall apply where required by Chapter 1 or where referenced by a requirement in this document.

> **Advisory 501.1 Scope.** Examples of platforms are desktop, embedded operating systems (including mobile), web browsers, plug-ins to web browsers which render a particular media or format, and sets of components which allow other applications to execute.
>
> Applications may be web-based or client-side software. Examples of applications are email clients, word processors, help desk systems, content management systems, e-learning courseware, and terminal emulation.

> **EXCEPTION:** Web applications that conform to all Level A and Level AA Success Criteria and all Conformance Requirements in WCAG 2.0 (incorporated by reference in Chapter 1) shall not be required to conform to 502 and 503.

502 Interoperability with Assistive Technology

502.1 General. Platforms, platform software toolkits, and applications shall conform to 502.

> **EXCEPTION:** Platforms and applications that have closed functionality and that conform to 402 shall not be required to conform to 502.

502.2 Accessibility Services. Platforms and their software toolkits shall provide a documented set of accessibility services that support a mode of operation for applications running on the platform to interoperate with assistive technology and shall conform to 502.2. Applications that are also platforms shall expose the underlying platform accessibility services or implement other documented accessibility services.

502.2.1 Object Information. The object role, state(s), boundary, name, and description shall be programmatically determinable.

502.2.2 Row, Column, and Headers. The row and column an object is in, and the headers for the row and column for that component, if it is in a data table that has row or column headers, shall be programmatically determinable.

502.2.3 Values. The current value and any minimum or maximum values, if the component represents one of a range of values, shall be programmatically determinable.

502.2.4 Label Relationships. The relationship that a component has as a label for another component, or of being labeled by another component, shall be programmatically determinable.

502.2.5 Parent Child Relationships. The name of the object's parent or containing element and any children components shall be programmatically determinable.

502.2.6 Text. The text contents, text attributes, and the boundary of text rendered to the screen shall be programmatically determinable.

502.2.7 Actions. A list of actions that can be executed on an object shall be programmatically determinable. Applications shall allow assistive technology to programmatically execute available actions on objects.

502.2.8 Focus Cursor. Applications shall expose information and mechanisms necessary to track and modify focus, text insertion point, and selection attributes of user interface components.

502.2.9 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 technologies.

502.3 Documented Accessibility Usage. Where platform documentation is available to application developers, platforms and applications shall conform to 502.3.

502.3.1 User Control of Accessibility Features. Platforms shall provide a mode of operation for user control over platform features that are defined in the platform documentation as accessibility features.

502.3.2 No Disruption of Accessibility Features. Applications shall not disrupt platform features that are defined in the platform documentation as accessibility features.

503 Applications

503.1 General. Applications shall conform to 503.
EXCEPTION: Applications that are designed to be isolated from their underlying platforms, including web applications, shall not be required to conform to 503.2.

> **Advisory 503.1 General Exception.** One example of an application that is designed to be isolated from its underlying platform is a media player which is restricted from having access to the desktop operating system.

503.2 User Preferences. Applications shall provide a mode of operation that allows user preferences for platform settings for color, contrast, font type, font size, and focus cursor.

> **Advisory 503.2 User Preferences.** This provision also applies to applications that are platforms. One example of an application that is also a platform is a web browser.

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 to provide the alternate user interface.

503.4 User Controls for Captions and Video Description. Where ICT displays video with synchronized audio content, ICT shall provide user controls for closed captions and video description conforming to 503.4.

> **503.4.1 Caption Controls.** Where user controls are provided for the selection of volume, ICT shall provide user controls for the selection of captions in at least one location that is comparable in prominence to the location of the user controls for volume.

> **503.4.2 Video Description Controls.** Where user controls are provided for the selection of channels, ICT shall provide user controls for the selection of video description in at least one location that is comparable in prominence to the location of the user controls for channels.

> **503.4.3 On-screen Menus.** Where an on-screen menu is provided for the selection of volume or channels, ICT shall provide for the selection of captions and video description at the same menu level as that of volume and channel 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.

Advisory 504.1 General. Authoring tools are applications that are used to create and edit documents or electronic content.

One example of an authoring tool is a web application that allows users to create new web pages. Another example of an authoring tool is an application for editing video.

Authoring tools can also be used to create and publish content for use with telecommunications products or services. One example of a telecommunications authoring tool is an interactive voice response system (IVR) that includes software for the creation of content used to populate menu choices. These requirements for authoring tools enable this content to be accessible.

504.2 Content Creation or Editing. Authoring tools shall provide a mode of operation to create or edit content that conforms to all Level A and Level AA Success Criteria and all Conformance Requirements in WCAG 2.0 (incorporated by reference in Chapter 1) for all features and formats supported by the authoring tool. Authoring tools shall retain the option to override information required for accessibility.

Advisory 504.2 Content Creation or Editing. Content includes information and sensory experience communicated to the user and encoding that defines the structure, presentation, and interactions associated with those elements. Examples of content are text, images, sounds, videos, controls, and animations.

Content includes materials derived from programmatic sources.

Examples of content formats are word processing files, presentation files, spreadsheet files, text files, PDFs, and HTML files.

Authoring tools which remove information required for accessibility do not conform to this provision. For example, if a video editing tool is used to edit a captioned movie, the tool must not remove the captioning.

Authoring tools which automatically provide information required for accessibility can make mistakes. As with automated spelling and grammar checking, it is important for authors to retain control of the process with authoring tools.

EXCEPTION: Authoring tools shall not be required to conform to 504.2 when used to directly edit plain text source code.

Advisory 504.2 Exception. Examples of authoring tools that are only plain text editors include Emacs and Windows Notepad.

504.2.1 Preservation of Accessibility Information in Format Conversion. When converting from one format to another or saving content in multiple formats, authoring tools shall preserve the information required for accessibility to the extent that the information is supported by the destination format.

Advisory 504.2.1 Preservation of Accessibility Information in Format Conversion. One example of preservation of accessibility information in format conversion is exporting HTML from a word processor where alternative text associated with embedded images follows the native word processing format to the HTML source code.

When converting from one format to another, a best practice is for authors to have control over how information required for accessibility is handled in the destination format. This best practice allows the author to ensure consistent use of the information required for accessibility in both formats.

504.3 Prompts. Authoring tools shall provide a mode of operation that prompts authors to create content that conforms to all Level A and Level AA Success Criteria and all Conformance Requirements in WCAG 2.0 (incorporated by reference in Chapter 1). Authoring tools shall provide prompts during initial content creation or shall activate prompts when the content is near completion.

Advisory 504.3 Prompts. Prompts do not need to be provided for every element in the content. Intrusive or overused prompts can decrease usability. Examples of prompts that are activated when the content is near completion are a check or a "wizard".

504.4 Templates. At least one template for each template type provided within the authoring tool shall conform to all Level A and Level AA Success Criteria and all Conformance Requirements in WCAG 2.0 (incorporated by reference in Chapter 1).

Advisory 504.4 Templates. Not all authoring tools provide templates. Where templates are provided, this provision requires that templates support accessibility.

CHAPTER 6: DOCUMENTATION AND SUPPORT SERVICES

601 General

601.1 Scope. The technical requirements in Chapter 6 shall apply where required by Chapter 2 or where referenced by a requirement in this document.

602 Documentation

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

> **Advisory 602.1 General.** Examples of documentation that supports ICT are installation guides, user guides, and manuals that describe the features of a product and how it is used. Documentation may take the form of stand-alone documents or be integrated into products as on-line or context-sensitive help.

602.2 Accessibility and Compatibility Features. Documentation shall list and explain how to use the accessibility and compatibility features of the ICT that support the technical requirements of this document. Documentation shall include accessibility features that are built-in and accessibility features that provide compatibility with assistive technology.

> **Advisory 602.2 Accessibility and Compatibility Features.** One example of an accessibility feature is the ability to access commands and navigate using the keyboard. Voice recognition, screen readers, and alternative keyboards rely upon keyboard control of features for accessible and efficient operation. Keyboard navigation includes support for the following: cursor keys (up, down, left and right arrows), tab and shift-tab (to cycle through fields), enter or spacebar (to select or activate), hot keys, macros, and other keyboard acceleration mechanisms.
>
> Where ICT components are designed to be part of an integrated system, this provision requires that the documentation explains how to configure the system to support accessibility. For example, the documentation for a DVD player and multimedia projector is required to explain how to configure the DVD player and projector to support the display of closed captions.

602.3 Materials. When ICT support services provide documentation, documentation materials shall conform to 602.3.

602.3.1 WCAG Conformant. Documentation in electronic format shall conform to all Level A and Level AA Success Criteria and all Conformance Requirements in WCAG 2.0 (incorporated by reference in Chapter 1).

602.3.2 Alternate Formats. Alternate formats shall be provided upon request.

603 Support Services

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

603.2 Information on Accessibility and Compatibility Features. ICT support services and training shall include information on the accessibility and compatibility features required by 602.2 to be listed and explained in ICT documentation.

> **Advisory 603.2 Information on Accessibility and Compatibility Features.** A best practice is for ICT support services to provide training programs about the following topics: accessibility requirements for individuals with disabilities; methods of communication used by individuals with disabilities; assistive technology commonly used with ICT products; designing for accessibility; solutions for accessibility and compatibility of ICT with assistive technology; the use of people-first language; and sensitivity training concerning disability issues.

603.2.1 Method of Delivery. Support services shall be provided directly to the user or through a referral to a point of contact. Support services that are provided through a referral shall include a contact method conforming to 603.3.

> **Advisory 603.2.1 Method of Delivery.** The Federal Communications Commission maintains a list of contact information for telecommunications service providers and manufacturers of telecommunications products that can be useful when support services are provided through a referral.

603.3 Effective Communication. ICT support services shall accommodate the communication needs of individuals with disabilities.

> **Advisory 603.3 Effective Communication.** To be effective, communication with individuals with disabilities should include alternate methods of communication for both in-person and remote communication. Examples of alternative methods are sign language interpreters, assistive listening systems, TTYs, real time captioning, and telecommunications relay services. Examples of telecommunication relay services are TTY speech-to-speech and video relay.
>
> A best practice is for help desk and other ICT support services to use a variety of communication technologies. Examples of such communication technologies include Internet posting (such as message boards and website blogs), cellular telephones, two way radios, email, fax, postal mail, texting, and instant messaging.

603.3.1 Materials Provided. When support services provide documentation, the documentation materials shall conform to 602.