EITAAC Report
5/26/99

Executive Summary

The Workforce Investment Act of 1998, signed into law on August 7, 1998, contains amendments to the Rehabilitation Act of 1973. The changes to Section 508 of the 1998 amendments to the Rehabilitation Act were designed to strengthen current law to ensure that people with disabilities will have equity in the use of electronic and information technology (E&IT). When Federal departments or agencies develop, procure, maintain, or use electronic and information technology, they shall ensure that the electronic and information technology allows Federal employees with disabilities to have access to and use of information and data that is comparable to the access to and use of information and data by Federal employees who are not individuals with disabilities, unless an undue burden would be imposed on the department or agency. Section 508 also requires that "individuals with disabilities, who are members of the public seeking information or services from a Federal department or agency, have access to and use of information and data that is comparable to that provided to the public who are not individuals with disabilities." The legislation exempts only national security systems from coverage of Section 508.

The 1998 Amendments to Section 508 directed the Architectural and Transportation Barriers Compliance Board (Access Board) to develop and publish standards by February 7, 2000 setting forth a definition of electronic and information technology and the technical and functional performance criteria necessary for achieving accessibility to such technology and information by individuals with disabilities. The definition of electronic and information technology is required to be consistent with the definition of information technology contained in the Clinger-Cohen Act of 1996. The new legislation also instructed the Access Board and GSA to provide technical assistance to Federal agencies and consumers once the standards are implemented on August 7, 2000.

In developing its standards, the Access Board was directed to consult with various Federal agencies, the electronic and information technology industry, and appropriate public or nonprofit agencies or organizations, including organizations representing individuals with disabilities. In response to these requirements, the Access Board established the Electronic and Information Technology Access Advisory Committee (EITAAC) comprised of 26 organizations representing the various sectors identified in the legislation. This report reflects the deliberations and recommendations of EITAAC.

The purpose of this report is to provide a set of recommended standards for Federal procurement officers and commercial suppliers of electronic and information technology and services that will result in access to and use of the technology and information by individuals with disabilities. This report represents minimally acceptable standards. All entities involved in the design, production, and procurement process of relevant electronic and information technology are strongly encouraged to go beyond these standards to maximize the accessibility and usability of products by all individuals.

Section 508 is designed to be implemented through the Federal procurement process. In addition to the obligation to create standards which describe and define accessibility with sufficient clarity for effective enforcement, the EITAAC recommendations have also attempted to address the implementation of these standards through Federal procurement.

Manufacturers and providers of Electronic and Information Technology (E&IT) products need to be able to make design choices and R&D investments with a clear understanding of the criteria Federal procurement officials will use. Federal procurement officials in turn need to acquire E&IT based on verifiable accessibility. Federal enforcement officials need to be able to measure improvements in accessibility, in order to report progress to Congress, as required by law, and to take enforcement action where appropriate. People with disabilities, whether Federal employees or the general public, need to be able to rely on the Federal procurement system to promptly and effectively deliver accessible E&IT incorporating current technologies, including advances in accessibility.

Agencies shall procure E&IT in a manner as to meet the requirements of Section 508. Agencies are responsible for evaluating the compliance of the E&IT they procure with the relevant accessibility standards. Agencies need to make this evaluation without respect to the method of procurement, so that the same standards apply to procurement of complete systems from single vendors, procuring systems integrated by a Seat Management contractor or other integrator, or procuring products from different vendors and assembling these products into systems.

The EITAAC recommends a written questionnaire approach which permits suppliers to indicate the technical approaches and features in their products and services that are applicable to the adopted standards.

The EITAAC recognizes the need of Federal agencies and people with disabilities to benefit from advances in technology and understanding of human factors. The pace of technology advancements in E&IT is rapid and the level of innovation is high. In this environment, a static standard consisting of design specification and fixed checklists would tend to stifle innovation and to delay the availability of technology advancements to people with disabilities. At the same time, clear and specific standards are necessary in order to ensure compliance. To balance these needs, the EITAAC recommended standards that explicitly address alternative technical approaches. These technical standards describe the required level of accessibility and the relevant accessibility features which are either available or under development at the time of publication. Manufacturers and providers should be encouraged to exceed these minimum requirements, and the procurement process should reward them for doing so. This will foster innovation and improvement in accessibility.

To ensure the goals of Section 508 are achieved fully, effectively, and efficiently, agencies must exercise judgment in applying the recommended accessibility standards to each application of E&IT. The EITAAC recommends a set of guiding principles for agencies to take into account in making these judgments. These principles, defined in Section 4, include: user access and efficiency; technical feasibility; proportionality between requirements and the benefits they achieve; flexibility for individuals to operate in the way they prefer; and compatibility and adaptability of E&IT.

Summary of Recommended Standards:

Electronic and Information technology (E&IT) procured by the Federal government shall be accessible to and usable by individuals with disabilities. Being accessible and usable by people with disabilities includes being able to perform all the regular operating functions of the E&IT including input and control functions, operation of any mechanical mechanisms, and access to information displayed in visual and auditory form. It also includes the ability to work with the assistive technologies used to access E&IT and should not interfere with the assistive technologies used on a daily basis by people with disabilities. Documentation and services associated with E&IT shall also be accessible and usable.

These standards apply to a full range of E&IT including those used for communication, duplication, computing, storage, presentation, control, transport and production.

These must be accessible and usable by as wide a range of people with disabilities as possible including people with :

- visual disabilities (e.g., blindness, low vision and lack of color perception),
- hearing disabilities (e.g., hard of hearing, deafness),
- people with physical disabilities (e.g., limited strength, reach or manipulation, tremor, lack of sensation),
- people with speech disabilities,
- people with language, learning or cognitive disabilities (e.g., reading disabilities, thinking, remembering, sequencing disabilities),
- other disabilities (e.g., epilepsy, short stature), and
- individuals with any combination of these disabling conditions (e.g., deaf-blindness).

The recommended access standards are arranged in two sections, generic standards and technology specific standards.

The generic requirements are the highest level of requirements and apply to all E&ITs. These requirements are performance standards in nature and are written based upon the varieties of human needs for access found in the population. Being based upon human needs, these requirements do not mandate specific technical implementations, which may be used to address these needs.

The technology specific standards apply only to E&IT which includes the specified feature or function cited. These requirements are more limited in scope. These requirements provide standards for the specific access attributes required in the specified class of E&IT.

These standards are not written to reflect the status or limitations of current technologies. Thus, not all standards may be technically/commercially feasible for all technologies today. The rapid development of technology however is creating new opportunities for adding flexibility and capabilities to products over time. But changes in technology do not always benefit accessibility. In the past, new technologies have resulted in significant temporary setbacks to access. The best example of this is the transition from character based computing to pixel based computing (the graphical user interface). Therefore, in considering innovative new E&IT, Federal agencies must be especially diligent in applying the standards in Section 5 of these standards.

Generic Standards

The generic standards are organized into three major areas. The first area sets forth standards for *accessibility of operation and information*. The second area requires *compatibility with the peripheral devices* often used by people with disabilities. The third area covers *documentation and services* associated with E&IT. Together, they establish performance-based standards for accessibility. These conditions should be applied individually and in combination.

The recommended standards for the *accessibility of operations and information* state that E&IT shall be accessible when it can meet specified physical, sensory and cognitive needs of various disabilities to ensure that E&IT is usable by people with disabilities and the information presented via E&IT is accessible to them. Accessibility of the product includes being able to locate, identify, and operate all of the input, control and mechanical functions, as well as being able to access the information provided by or through it. Accessibility of information includes the ability to access text, static or dynamic images, icons, labels, sounds or incidental operating cues.

The recommended standards for *compatibility with peripheral devices* are intended to ensure that E&IT will be able to work with the adaptive technology utilized by persons with disabilities. E&IT needs to maintain accessibility information that is present in media, and allow for the physical or wireless connection of adaptive technology.

The standards for access to *information, documentation, labeling, and support* ensure that people with disabilities can take advantage of the information and services that are connected to E&IT. Such information and documentation includes user guides, installation guides for end-user installable devices, and E&IT support communications, regarding both the E&IT and its accessibility features. This shall include provision of documentation in alternate formats or alternate modes and ensuring accessible and usable customer support and technical support. Customer training shall be made available in an accessible form to users

with disabilities.

Technology Specific Standards

The technology specific standards which build on the generic standards provide detailed guidance on how to achieve accessibility for many common cases. The technology specific standards are to be considered in addition to the generic standards and cover the following classes of E&IT:

- Keyboards
- Software
- Web-based information and applications
- Telecommunications
- Multimedia
- Information Transaction Machines
- PDAs
- Cabling

The EITAAC identified these areas as being critical to accessibility, but not encompassing all of the issues involved in the generic standards. The EITAAC expects that standards in other specific areas will need to be developed. Ongoing review of these standards in light of technology advancements is critically important to ensuring that the standards are current and achieve the desired objectives.

Other Components of the EITAAC Report

In addition to developing proposed standards, the EITAAC made a set of recommendations for the implementation of the Section 508 provisions. As charged by Congress, the EITAAC developed a definition of Electronic & Information Technology, to interpret the language of the statute. Recommendations were made in the areas of procurement process, standards refreshment, principles for determining accessibility, and technical guidance. Together, the EITAAC feels these recommendations and standards are key to the successful implementation of Section 508.

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1. Legislative Authority/Background

1.1 A *Error! Bookmark not defined.story of Section 508*

Section 508 dates back to 1986, when Congress added this section to the Rehabilitation Act of 1973. The Rehabilitation Act contains comprehensive prohibitions against employment discrimination by the Federal government, 29 U.S.C. §791, by contractors for the Federal government, 29 U.S.C. §793, and by programs and activities receiving Federal financial assistance. 29 U.S.C. §794. In the 1980's Federal agencies significantly increased their dependency on electronic office technologies. Section 508 was added to ensure that such E&IT would be accessible to individuals with disabilities. Pub. L. 99-506, Title VI, §603(a); Title I §103(d)(2)(A), (C), as amended, Pub. L 100-630, Title II, §206(f); Pub. L. 102-569, Title V §509(a), codified at 29 U.S.C. §794d.

Although Congress adopted the mandates of Section 508 in 1986, efforts to ensure access to electronic technologies procured by Federal agencies actually began a few years earlier. Specifically, in 1984, the National Institute on Disability and Rehabilitation Research (NIDRR), in conjunction with the Department of Education's Office of Special Education and Rehabilitative Services and the White House, established a Government-Industry Task Force which brought together representatives from the computer industry and consumers with disabilities on computer access issues. That same year, the General Services Administration (GSA) established the Interagency Committee for Computer Support of Handicapped Employees and the Clearinghouse on Computer Accommodation. Both groups were designed to promote the use of information technology in a manner that would enhance the productivity of Federal employees with disabilities.

Section 508 directed the Secretary of Education to work with NIDRR and the GSA on the development of agency procurement guidelines for the purchase and lease of accessible electronic office equipment.   The legislation required the release of these guidelines by October of 1987, and set a target date of September, 1988, for their adoption by GSA.   In October, 1987, after consultation with an advisory committee and with guidance from the electronics industry and persons with disabilities, the Department of Education and GSA issued Section 508 guidelines which addressed management responsibilities and functional performance specifications for input, output, and documentation access to electronic equipment.   On January 1, 1991, after receiving further comment from agencies, vendors, and individuals with disabilities, GSA published Bulletin C-8 containing these guidelines as amended, in the Federal Information Resources Management System (FIRMR). In a related matter, in April of 1987, the GSA had published Bulletin 48 in the FIRMR. Bulletin 48 sets forth requirements for agencies to provide accommodations designed to meet the needs of employees with disabilities when replacing the agencies' computer systems.

Section 508 directed Federal agencies to comply with the electronic equipment accessibility guidelines issued by the GSA. Although a few Federal agencies did initiate efforts to comply with the mandates of Section 508, the decade following the passage of this legislation showed little consistency amongst these agencies, with the vast majority all but ignoring its directives. A significant problem seemed to be the lack of an enforcement mechanism in Section 508. Without any teeth, the very existence of Section 508 went virtually unnoticed by many segments of the Federal government. In 1997, the uneven application of Section 508 prompted the introduction of new legislation designed to strengthen and enforce its objectives.

The Federal Electronic and Information Technology Accessibility Compliance Act was introduced in 1997. With some revision, the language contained in this proposed legislation was ultimately inserted into the Workforce Investment Act of 1998 and added as a new Section 508 into the Rehabilitation Act Amendments of 1998. Pub. L. 105-220, Title IV, §408(b), codified at 29 U.S.C. §794d. Exempting only national security systems in its revised form, Section 508 contains a strict mandate for Federal agencies to ensure that the electronic and information technology which they develop, procure, maintain, or use is accessible to both Federal employees with disabilities and individuals with disabilities outside the government who need government information, unless doing so would impose an undue burden. The new law, which applies to electronic and information technology that is procured after August 7, 2000, specifically directs Federal agencies to provide access to information and data that is comparable to the access available to individuals without disabilities. Where providing access would result in an undue burden, agencies are directed to (1) provide documentation on why compliance will create an undue burden and (2) provide the information and data through an alternative means of access.

The amended version of Section 508 directs the Access Board to publish standards by February 7, 2000, setting forth (1) a definition of electronic and information technology, and (2) technical and functional performance criteria necessary to achieve electronic and information access. The definition of electronic and information technology established by the Access Board must be consistent with the definition of information technology contained in the Clinger-Cohen Act. 40 U.S.C. §1401(3). Congress enacted the Clinger-Cohen Act in 1996 for the purpose of creating consistency across Federal agencies in the acquisition, use, and disposal of information technology. Pub. L. 104-106, as amended Pub. L. 104-208, codified at 40 U.S.C. §1401 et. seq. That Act defines information technology as "any equipment or interconnected system or subsystem of equipment, that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the executive agency." Among other things, Clinger-Cohen states that the term "information technology" includes computers, ancillary equipment, software, firmware, support services, and related resources.

Section 508 also directs the Access Board to consult with representatives of Federal agencies, the electronic and information technology industry, and organizations representing individuals with disabilities in the course of developing the new Section 508 standards. The Access Board has fulfilled this obligation through EITAAC. The new legislation also instructs the Access Board and GSA to provide technical assistance to Federal agencies and consumers once these standards have been finalized.

The revised provisions of Section 508 contain a number of safeguards to finally ensure Federal compliance with Section 508. Already, by February 1, 1999, each Federal agency had an obligation to evaluate, and submit a report to the Attorney General on the extent to which electronic and information technology within its agency was accessible and usable by individuals with disabilities. By February 1, 2000, the Attorney General, with information provided from each of the Federal agencies, is directed to prepare a report to the President on the extent to which technology available in these agencies is accessible and usable by individuals with disabilities. This report is to be followed by similar, biennial reports from the Attorney General to the President.

In addition to the above reporting requirements, within six months after the Access Board publishes its Section 508 standards, the Federal Acquisition Regulatory Council must revise the Federal Acquisition Regulation; each Federal agency must then revise its own Federal procurement policies and directives to incorporate the new Section 508 standards. Finally, unlike its predecessor, beginning August 7, 2000, the amended Section 508 allows individuals to file complaints against Federal agencies alleging noncompliance with Section 508. Agencies receiving such complaints are directed to utilize their existing complaint procedures for Section 504 of the Rehabilitation Act.

A separate law - the Technology-Related Assistance for Individuals with Disabilities Act of 1988, later replaced by the Assistive Technology Act of 1998, and now known as the AT Act, – has required states to provide assurances of their compliance with Section 508 as a condition to receiving Federal funds for their technology assistance programs. Although all of the states have submitted such assurances, the lack of Federal efforts to enforce Section 508's provisions has put the value of these assurances into question. The new Section 508 standards will provide much needed guidance to ensure compliance with these assurances.

2. Related Federal Legislation Protecting the Rights of Individuals with Disabilities

Section 508 does not stand alone in its objective to ensure access by individuals with disabilities. A number of Federal laws preceded this legislation, setting the stage for a barrier-free information age. Indeed, the new language of Section 508 plainly states that this section shall not be construed to limit the rights, remedies or procedures available under other Federal laws that may provide greater or equal protections for individuals with disabilities. Thus, even where there is overlap with Section 508, other Federal legislation establishing disability protections remain in full force.

- **Rehabilitation Act of 1973** - The Rehabilitation Act of 1973, discussed briefly above, was the first piece of legislation designed to ensure that Federal agencies, its contractors, and its financially assisted programs and activities would provide access to their employees and beneficiaries. Section 501, for example, requires Federal employers to carry out the functions of their jobs, unless providing those accommodations would impose an undue hardship. Section 501 focuses on the responsibility of these agencies to accommodate the individual access needs

of their employees. Section 508's requirements for accessible electronic and information technology will facilitate compliance with the mandates of Section 501 by providing employers with some of the tools needed to provide these accommodations. Section 508 goes further, however, requiring Federal departments or agencies that develop, procure, maintain, or use electronic and information technology to make sure that all such technology is accessible, whether or not needed or requested by a specific employee. Similarly, the availability of accessible information and data required under section 508 will assist Federal agencies charged with providing information to the public under Section 504 of the Rehabilitation Act.

- **Telecommunications for the Disabled Act** - Perhaps the first Federal law to directly address the need for access to new technologies by individuals with disabilities was the Telecommunications for the Disabled Act of 1982 (TDA). Pub. L. No. 97-410, codified as amended at 47 U.S.C. §610 (1988). TDA was designed to expand the number of hearing aid compatible telephones both inside and outside the Federal government, and to ensure the availability of specialized customer premises equipment to all individuals with disabilities at reasonable prices. In TDA, Congress, already envisioning the dawn of major technological changes, established a new national policy to ensure disability access as these changes occurred. This policy was announced in the House Report accompanying the bill: "[M]aking the benefits of the technological revolution in telecommunications available to all Americans, including those with disabilities, should be a priority of our national telecommunications policy." H. Rep. No. 888, 97th Cong., 2d Sess. 5 (1982). Setting the stage for Section 508 as well as other pieces of Federal legislation, the legislative history of TDA revealed a new understanding by Congress that the costs to society of denying such access, by "depriv[ing] many individuals of the opportunity to have gainful employment" and "impair[ing] . . . the quality of life for disabled Americans" far exceeded the costs of ensuring such access. Id. at 4.

- **Hearing Aid Compatibility Act** - The Telecommunications Act of 1982 was followed by two pieces of legislation in 1988 that again addressed the telecommunications access needs of individuals who are deaf and hard of hearing. The first of these, the Hearing Aid Compatibility Act, Pub. L. No. 100-394, codified at 47 U.S.C. §610 (1988), created a mandate for nearly all telephones made or imported into the United States after August 16, 1989, to be hearing aid compatible. Various FCC proceedings that followed produced rules which will assure nearly ubiquitous access to wireline telephones by hearing aid wearers early in the twenty-first century.

- **Telecommunications Accessibility Enhancement Act** - The second law enacted in 1988 was the Telecommunications Accessibility Enhancement Act (TAEA), Pub. L. No. 100-542, codified at 40 U.S.C. §762 (1988). TAEA created a Federal relay system for calls to, from, and within the Federal government. It also directed Congressional members to acquire TTYs for their offices, created a Federal directory of TTY numbers, and directed the Federal Communications Commission (FCC) to complete an inquiry into the establishment of a nationwide interstate telecommunications relay system. TAEA's provisions bear a relationship to the present Section 508 in that it was designed to specifically reduce technological barriers for Federal employees. Toward this end, the Senate's Report on TAEA explained "[i]t has long been recognized that all employers should take whatever steps possible to fully integrate persons with physical impairments into the work force." S. Rep. No. 464, 100th Cong., 2d Sess. 2 (1988). Again, Congress concluded that the costs of installing accessible equipment and providing accessible telecommunications services were outweighed by the overriding benefits that such access created.

- **Americans with Disabilities Act** - In 1990, our nation witnessed the passage of the Americans with Disabilities Act (ADA), Pub. L. No. 101-336, codified at 42 U.S.C. §12101, et. seq., landmark legislation that created new and comprehensive civil right protections for individuals with disabilities in the private sector. The ADA is far reaching – its provisions prohibit discrimination by most private employers (Title I), all state and local government agencies (Title II), and places of public accommodation, such as museums, banks, restaurants, and theaters (Title III). Its provisions under Title IV mandate the provision of round-the-clock nationwide telecommunications relay services, designed to make our nation's telecommunications networks more accessible to people who are deaf, hard of hearing, or speech impaired.   Finally, the ADA contains provisions for structural access to new and altered commercial facilities and places of public accommodation. These have been implemented through a series of detailed rules, known as the ADA Accessibility Guidelines, or ADAAG. 28 C.F.R. Part 1191 et. seq. ADAAG's specifications require the elimination of nearly all physical barriers in these new and renovated buildings. Among other things, these guidelines contain requirements for certain forms of telecommunications access, including requirements for hearing aid compatibility, volume control, and TTYs. They also provide standards on reach ranges, for access to fixed equipment control consoles and operable parts. While providing useful guidance for the development of the EITAAC standards, the ADA focuses on private entities; neither the ADAAG nor the ADA specifically covers access to electronic equipment procured or used by Federal agencies.

The ADA's provisions have made a considerable impact on our society, opening many doors to employment, educational, and recreational opportunities that had previously been closed. But a few years after passage of the ADA, it became clear that the provisions of the ADA had not contemplated the huge technological revolution that was enveloping our country. Although individuals with disabilities were finally gaining some physical and communications access to government and business employment and services, access to burgeoning telecommunications and information technologies remained elusive.   When, in the early 1990's, Congress began considering sweeping changes to our nation's telecommunications policies, disability advocates saw a ripe opportunity to have this need addressed. As a consequence, passage of the Telecommunications Act of 1996 brought with it the arrival of a new civil rights law for individuals with disabilities: Section 255.

•   **Telecommunications Act of 1996** - Section 255 of the Telecommunications Act of 1996, Pub. L. 104-104, codified at 47 U.S.C. §255, requires telecommunications services and equipment to be accessible, where readily achievable. Where not readily achievable, such services and equipment must nevertheless be compatible with existing peripheral devices or specialized customer premises equipment used to achieve access, again where this is readily achievable. Readily achievable is defined as "easily accomplishable and able to be carried out without much difficulty or expense." The legislation contemplates that manufacturers and service providers will consider access needs during the design, development and fabrication of their offerings, so that expensive and burdensome retrofitting for access will not be necessary.

Section 255 directed the Access Board to develop guidelines to achieve access to telecommunications equipment and customer premises equipment (CPE) within eighteen months after the legislation's enactment. In order to accomplish this task, the Access Board created a body similar to EITAAC – called the Telecommunications Access Advisory Committee, or TAAC. After meeting over a period of seven months, TAAC presented its proposed guidelines to the Access Board in January of 1997. The contents of these proposals formed the basis for the Access Board's Section 255 guidelines, released to the public on February 3, 1998, 63 Fed. Reg. 5608 (Feb. 3, 1998), codified at 36 C.F.R. Part 1193, and effective as of March 5, 1998. The FCC will soon release rules to implement Section 255's mandates for telecommunications service providers. Those rules will also create procedures to enforce Section 255's provisions with respect to telecommunications services, telecommunications equipment, and CPE. The Access Board's guidelines on Section 255 create detailed requirements for the accessibility, usability, and compatibility of telecommunications equipment and CPE. 36 C.F.R. §1193 et. seq. Among other things, the guidelines contain requirements for input, output, display, control, and mechanical functions to be accessible by individuals with varying disabilities and functional limitations. The compatibility requirements focus on the need for standard connectors, compatibility of controls with prosthetics, and TTY compatibility. In order to identify access needs and solutions, the guidelines direct manufacturers to consider consulting with individuals with disabilities, and suggest including individuals with disabilities in market research and the validation of access solutions. The new rules define "usability" as access to information about the product, and direct that "instructions, product information . . . , documentation, and technical support" be functionally equivalent to that which is provided to individuals without disabilities. In order to monitor the industry's progress in making telecommunications equipment accessible, the Access Board will compile periodic "market monitoring reports," that will identify the state of the art of CPE and telecommunications equipment, as well as problem areas and solutions that have been used to achieve access to these products. The first of these reports is well under way.

Section 508 of the Rehabilitation Act is the next logical step in the progression of these various Federal civil rights laws. Much of the earlier legislation focused on access to what has traditionally fallen into the field of "telecommunications." But our nation is now witnessing a rapid convergence of these traditionally telecommunications technologies with new and advanced electronic and information technologies. As our Federal government becomes increasingly reliant on these convergent technologies, Section 508 will ensure that individuals with disabilities will be able to reap their many benefits.

3. Definitions

3.1. Electronic and Information Technology

3.1.1 Preamble to the E&IT Definition:

It is understood that Electronic and Information Technology addresses a broader spectrum than Information Technology alone, and includes the full breadth of the information environment of the future. It is understood that the intent of Section 508 is to ensure that government employees and the public have access to the government's information environment as it evolves.

It is understood that the information environment that is evolving is something that we only imperfectly understand today but that it will include (but not be restricted to) the acquisition, creation, translation, duplication, manipulation, storage, management, movement, control, display, switching, interchange, transmission, or reception of information in a broad range of forms including voice, graphics, text, and data structures of all types both on a real time basis (e.g., conversation, communication, interaction) and delayed presentation basis (e.g. information serving, publishing etc.). It is understood that the definition of "Electronic and Information Technology" in Section 508 was meant to address the future and be broader than but consistent with (completely include) the definition of "Information Technology" put forth by the Clinger Cohen Act of 1996 including the exclusion for national security equipment.

3.1.2 Body of the E&IT Definition:

The term "Electronic and Information Technology" (E&IT) shall mean electronic technology that is used in carrying out information activities, involving any form of information, where:

a) "Electronic Technology" includes but is not limited to equipment, hardware, computers, software, firmware and similar procedures, systems, ancillary technologies, technologies which cause content to be active in any way, documentation, services (including support services) and related resources. It includes subsystems, interconnections, and interconnected systems.

b) "Information Activities" include, but are not limited to, the creation, translation, duplication, serving, acquisition, manipulation, storage, management, movement, control, display, switching, interchange, transmission, or reception of data or information. Information activities include delayed presentation activities such as information servers and messaging systems as well as synchronous, real-time communication activities.

c) "Any Form of Information" includes, but is not limited to, voice, graphics, text, dynamic content, and data structures of all types whether they are in electronic, visual, auditory, optical or any other form.

3.2. Disability.

As used in this document, disability has the same definition as it does under the Rehabilitation Act of 1973 as amended.

3.3. Undue burden.

Undue Burden means significant difficulty or expense. In determining whether an action would impose an undue burden on the operation of the agency in question, factors to be considered include:

  3.3.1. The nature and cost of the action needed under this section;
  3.3.2. The overall size of the agency's program and resources, including the number of employees, number and type of facilities, and the size of the agency's budget;
  3.3.3. The type of the agency's operation, including the composition and structure of the agency's work force; and
  3.3.4. The impact of such action upon the resources and operation of the agency.

4.   Section 508 Implementation

Section 508 is designed to be implemented through the Federal procurement process. In addition to the obligation to create standards which describe and define accessibility with sufficient clarity for effective enforcement, the Electronic Information Technology Access Advisory Committee (EITAAC) recommendations must also address the implementation of these standards through Federal procurement. The EITAAC's recommendations are intended to address the needs of all parties involved in the procurement process.

Manufacturers and providers of E&IT products need to be able to make design choices and R&D investments with a clear understanding of the criteria Federal procurement officials will use. Federal procurement officials in turn need to acquire E&IT based on verifiable accessibility.   Federal enforcement officials need to be able to measure improvements in accessibility, in order to report progress to Congress, as required by law, and to take enforcement action where appropriate. People with disabilities, whether Federal employees or the general public, need to be able to rely on the Federal procurement system to promptly and effectively deliver accessible E&IT incorporating current technologies, including advances in accessibility.

Addressing these needs will foster the successful, effective implementation of Section 508. All of these requirements need to be met within the statutory definitions and the Undue Burden standard imposed by Section 508.   The EITAAC has been very mindful of the additional complexities and responsibilities associated with the need for effective procurement under the FAR and has incorporated these factors in its deliberations. The major implementation factors affecting accessibility are described below.

4.1   Procurement Process

In its deliberations, the EITAAC was mindful that the ultimate application of accessibility will be in the purchase of goods and services in Federal procurements. Within the procurement regulations structure, compliance with Section 508 may be addressed by a combination of two approaches:

1. A Representations requirement which compels vendors to declare as a condition of the contract, that the products and services comply with all statutory procurement requirements, including Section 508.   Such declarations would be subject to applicable administrative and statutory penalties.

2. An Evaluation approach, which incorporates accessibility as one of the attributes examined and evaluated by the Government as a part of the source selection decision.

The EITAAC report is structured to address both approaches by both defining the minimal acceptable accessibility requirements and also encouraging alternate technical approaches which incorporate technology advancements and innovations in accessibility.

4.1.1 Compliance with standards

Agencies will procure E&IT in such a way as to meet the requirements of Section 508. The standards of evaluation are in Section 5.2 of this report. In addition, E&IT that fits the conditions in Section 5.3 shall meet or exceed the standards in Section 5.3.   The procurement agency is responsible for evaluating the E&IT against these standards. Agencies shall carry out this evaluation whether:

1. Procuring complete systems from single vendors,
2. Buying systems integrated by a Seat Management contractor or other integrator, or
3. Buying products from different vendors and assembling these products into accessible systems.

In every case, the Agency is responsible for compliance with Section 508. To meet this obligation, Agencies should address accessibility in determinations of need and include accessibility within the scope of market research as defined in the Federal Acquisition Regulations (FAR). The EITAAC recommends a written questionnaire format which permits suppliers to indicate the technical approaches and features in their products and services that are applicable to the adopted standards.

4.1.2 Alternative technical approaches and technological change

The EITAAC recognizes the need of Federal agencies and people with disabilities to benefit from technological advances. The pace of technology advancements in E&IT is rapid and the level of innovation is high. In this environment, a static standard consisting of design specification and fixed checklists would tend to stifle innovation and to delay the availability of technology advancements to people with disabilities. At the same time, clear and specific standards are necessary in order to ensure compliance. To balance these needs, the EITAAC standards explicitly address alternative technical approaches. The technical standards describe the minimum acceptable level of accessibility and the relevant accessibility features which are either available or under development at the time of publication.

Therefore, the accessibility requirements in this report are intended as a baseline, the minimum to which additional improvements and enhancements will be added. Manufacturers and providers should be encouraged to exceed these requirements, and the procurement process should reward them for doing so. This will foster innovation and improvement in accessibility.

4.2   Standards Refreshment

Over, time, improvements in technical approaches to accessibility of Federal E&IT will come from three primary sources. One source will be the continuing development of technical standards for accessibility. A second source is advances in scientific understanding of human factors. These developments will be incorporated by the periodic Standards Refreshment by the Access Board. Thus, the accessibility standards and the detailed technical assistance the Access Board provides to agencies will be evaluated and updated over time. The third source will be producers of E&IT products and of assistive technologies, who will progressively introduce new inventions, new innovations, and new products into the marketplace (see Section 4.1.2 above). As with the evaluation of accessibility compliance, the responsibility for evaluating these alternative technical approaches rests with the Federal agencies. The intent of section 508 is to encourage the introduction of new E&IT products and approaches which progressively enhance and improve the accessibility of E&IT to Federal employees and to the General Public. In turn, the EITAAC standards are designed to encourage Agencies to consider these improved alternatives as they are introduced.

Concurrent with the development of the EITAAC standards, multiple national and international standards have been developed and are continuing to emerge. The EITAAC has referred to some of these standards in section 5.3. Others are expected to be cited by the Access Board in technical assistance to Federal Agencies. These standards and standard setting committees include, among others:

- World Wide Web Consortium Web Accessibility Initiative Guidelines   (Web Content, User Agent, & Authoring Tool)
- ISO TC 159: Software Accessibility.
- ISO TC 173: Technical systems and aids for people with disabilities.
- ANSI C63.19: Wireless Hearing Aid Compatibility
- IEC TC 100: Ease-of-use of appliance controllers, to meet the needs of people with disabilities (Japan).
- SOGITS N 1032 - EN for DG XIII: (European Standards)
- Nordic Standards for Accessibility

These examples demonstrate the degree to which accessibility is receiving increasing attention and priority throughout the world. This heightened interest suggests further investments and advancements in accessibility technologies in many countries and across multiple scientific disciplines. As these advancements progress, the Access Board (or other appropriate body) should review and update the Federal accessibility standards to reflect the advancing State of the Art. Because E&IT is a global market, the use of international standards where appropriate will also benefit Agencies and people with disabilities by reducing costs that would be

associated with designing and developing different products to meet conflicting requirements in different markets.

4.3   *Principles for Implementation*

In implementing the Section 508 requirements, Federal Agencies are responsible for ensuring that Federal E&IT provides Federal employees and members of the public who have disabilities access to data and information that is comparable to that of employees and members of the public who do not have disabilities, except where this requirement would create an undue burden on the agency. Section 5 presents the EITAAC's recommended standards for identifying whether E&IT provides this comparable access. Agencies should take the principles set forth in this section into account in implementing these requirements. These are necessary in order to ensure that the requirements of Section 508 are met fully, effectively, and efficiently--both now and in the future as the technological capability of E&IT evolves. The Access Board will provide ongoing technical assistance to Agencies in applying these principles.

4.3.1   Principle of User Access and Efficiency

Accessibility is measured for each individual in their interaction with specific E&IT. Relevant issues are whether the individual with a disability can use the E&IT to perform the same tasks, access the same information, with the same approximate ease and in the same approximate time and at the same cost as a person without a disability using the E&IT. For this evaluation, cost is to the individual Federal employee or member of the public, not to the procuring agency. For example, if the information is available to the general public for free, the accessible version of that information shall also be free.

This principle focuses on the user's ability to independently perform tasks to the best of their abilities. Accessibility provisions should not only permit basic access, they should also allow people with disabilities to maximize the use of the abilities they have. People with disabilities need efficient access to be comparably productive with their colleagues.

4.3.2   Principle of technical feasibility.

The standards in Section 5 were written to allow for evolution in the technical feasibility of these requirements. The rapid development of technology makes any determination of current technical feasibility extremely short lived. Hence, at the highest level of this standard the document attempts to set forth the generic requirements based on human need.   Section 5.3 identifies with greater specificity the current, technologically feasible approaches for making certain classes and features of E&IT accessible. Full compliance with a particular standard in Section 5.2 may not currently be technically feasible with current technology for some particular applications. Technical feasibility must therefore be evaluated within the procurement process.   However, as technology advances, the Agencies must exercise judgment, with technical assistance from the Access Board, industry, and consumers, to determine when a requirement has become technically feasible for a particular application or environment. This judgment must then be incorporated into the Agencies' procurement processes to ensure continuing compliance with Section 508.

4.3.3   Principle of proportionality.

 In implementing the standards, Agencies must ensure that no standard is applied so as to go beyond what is necessary to achieve its objective. This principle is intended to assure that requirements do not create unforeseen inefficiencies and create cost without significant benefit.

4.3.4   Principle of flexibility.

Agencies should apply this principle to reflect the fact that different users have preferences or necessities to operate E&IT in different ways. Just as it is common to be able to achieve a given operation in any of several ways (for example by a mouse or keyboard commands), where available, more than one accessibility option should be provided. For example, telling a person with low vision that the only accessibility accommodation was speech output rather than providing screen magnification is not a reasonable position.

4.3.5 Principle of compatibility and adaptability.

 The E&IT products, services, and systems that Federal Agencies procure for use by their employees and the public as well as the technologies (including Assistive Technologies) whose purpose is to provide accessibility that are purchased by Federal Agencies must be compatible.

In procuring E&IT and Assistive Technologies, to comply with Section 508, Agencies have a responsibility to do more than merely verify that the E&IT works in one application with one particular Assistive Technology product. At the same time, it is unreasonable to expect that Agencies and vendors of E&IT can ensure that the E&IT will be directly compatible with (or adaptable to work with) every current or prospective accessibility technology. Nevertheless, agencies have a responsibility to ensure that E&IT and accessibility technologies are as broadly compatible as possible without creating an undue burden. In making this determination, agencies should consider the use of government, or industry standards for hardware and software interfaces as positive, but not definitive, indicators that E&IT and accessibility technologies that are being considered for procurement will be compatible.

4.4 Technical Guidance

The Access Board must be able to provide coherent technical guidance to Federal agencies seeking to comply with Section 508. Because Section 508 addresses E&IT, the standards for accessibility will change rapidly with time. Issues will become better understood, and best practices will evolve. The Access Board needs to be funded to deliver this technical guidance, or the ability of Federal agencies to implement Section 508 will be impaired.

5.0 Proposed Standards

5.1 Introduction

Electronic and Information technology (E&IT) procured by the Federal government shall be accessible to and usable by individuals with disabilities. Being accessible and usable by people with disabilities includes being able to perform all the regular operating functions of the E&IT including input and control functions, operation of any mechanical mechanisms, and access to information displayed in visual and auditory form.   It also includes the ability to work with the assistive technologies used to access E&IT and should not interfere with the assistive technologies used on a daily basis by people with disabilities. Documentation and services associated with E&IT shall also be accessible and usable.

These standards apply to a full range of E&IT as defined in 3.1.2 including those used for communication, duplication, computing, storage, presentation, control, transport and production.

These must be accessible and usable by as wide a range of people with disabilities as possible including people with :
  - visual disabilities (e.g., blindness, low vision and lack of color perception),
  - hearing disabilities (e.g., hard of hearing, deafness),
  - people with physical disabilities (e.g., limited strength, reach or manipulation, tremor, lack of sensation),
  - people with speech disabilities,
  - people with language, learning or cognitive disabilities (e.g., reading disabilities, thinking, remembering, sequencing disabilities),
  - other disabilities (e.g., epilepsy, short stature), and
  - individuals with any combination of these disabling conditions (e.g., deaf-blindness).

These access standards are arranged in two sections
  - Generic Standards - Apply to all E&IT (5.2)
  - Technology Specific Standards - that only apply to E&ITs which have a particular characteristic or function. (5.3)

The generic requirements are the highest level of requirements and apply to all E&ITs. These requirements are performance standards in nature and are written based upon the varieties of human needs for access found in the population. Being based upon human needs, these requirements do not mandate specific technical implementations, which may be used to address these needs. Further, they are not written to reflect the status or limitations of current technologies.   Hence, at the highest level of this standard the document attempts to set forth the need, allowing technical feasibility to be determined within the procurement process.

The technology specific standards apply only to E&IT which includes the specified feature or function cited. These requirements are more limited in scope. These requirements provide standards for the specific access attributes required in the specified class of E&IT.

These standards are not written to reflect the status or limitations of current technologies. Thus, not all standards may be technically/commercially feasible for all technologies today. The rapid development of technology however is creating new opportunities for adding flexibility and capabilities to products over time. But changes in technology do not always benefit accessibility. In the past, new technologies have resulted in significant temporary setbacks to access. The best example of this is the transition from character based computing to pixel based computing (the graphical user interface). Therefore, in considering innovative new E&IT, Federal agencies must be especially diligent in applying the standards in Section 5 of these standards.

E&IT shall be able to satisfy each of the following conditions to ensure that E&IT is usable by people with disabilities and the information presented via E&IT is accessible to them.   These conditions shall be applied individually and in combination.   All those that are possible (without undue burden) for any E&IT should be applied.

5.2 Generic Standards for Accessibility

5.2.1 Accessibility of operation and Information

Accessibility of the product includes being able to locate, identify, and operate all of the input, control and mechanical functions, as well as being able to access the information provided by or through it.   Accessibility of information includes the ability to access text, static or dynamic images, icons, labels, sounds or incidental operating cues.

Accessibility also includes being able to accommodate the physical characteristics of individuals with disabilities as well as personal assistive technologies which are used to extend or enhance their personal abilities such as hearing aids, cochlear implants, prosthetics and wheelchairs, etc.
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5.2.1.1. Usable without vision.

5.2.1.1.1. Provide at least one mode that does not require user vision. [TAAG]
5.2.1.1.2. Provide visual information through at least one mode in auditory form. [TAAG]

5.2.1.2. Usable with low vision without relying on audio.

5.2.1.2.1. Provide at least one mode that permits operation of controls and mechanical functions by users with visual acuity between 20/70 and 20/200, without relying on audio output. [TAAG]
5.2.1.2.2. Provide visual information through at least one mode to users with visual acuity between 20/70 and 20/200 without relying on audio. [TAAG]
5.2.1.2.3. If audio and non-audio access approaches are provided they shall be able to work both separately or simultaneously.
5.2.1.2.4. The contrast between the text and the background behind the text at its worst location shall be greater than 70% or it shall be able to adjust the text or background to meet this specification.

5.2.1.3. Usable with little or no color perception.

5.2.1.3.1. Provide at least one mode that does not require user color perception. [TAAG]
5.2.1.3.2. Information presented shall not require color perception.

5.2.1.4. Usable without hearing.

5.2.1.4.1. Provide at least one mode that does not require user auditory perception. [TAAG]

5.2.1.4.2. Provide auditory information through at least one mode in visual form and, where appropriate, in tactile form. [TAAG] For multimedia material or where user interaction is required, display of the visual/tactile form shall be in synchrony with the audio presentation.

5.2.1.5. Usable with limited hearing

5.2.1.5.1. Provide audio information, including any auditory feedback tones that are important for the use of the product, through at least one mode in enhanced auditory fashion (i.e., increased amplification).

5.2.1.5.2. For voice output from devices, provide incremental volume control with output amplification up to a level of at least 97 dB SPL with at least one intermediate step of 89 dB SPL.

5.2.1.5.3For transmitted voice signals, provide a gain adjustable up to a minimum of 20 dB. For incremental volume control, provide at least one intermediate step of 12 dB of gain.

5.2.1.5.4. For the safety of other users, if the E&IT has the possibility of exceeding 120 dB SPL then a mechanism shall be included to automatically reset the volume to a safe level after every use (e.g. when handset is replaced) but not before.

    5.2.1.5.4.1. If there is an automatic volume reset then there shall be an override for non-public, non-shared E&ITs or a means to easily reset to the user's volume setting.

    5.2.1.5.4.2 Where there is an override there shall be a way to visually determine the current volume setting.

5.2.1.6. Usable with limited manual dexterity, reach and / or strength.

5.2.1.6.1. Provide at least one mode that does not require fine motor control or simultaneous actions. [TAAG]

5.2.1.6.2. Provide at least one mode that is operable with limited reach and strength. [TAAG]

5.2.1.6.3. The E&IT shall comply with the following section of the ADAAG 1998: Section 4.27.4 Controls and Operating Mechanisms

5.2.1.7. Usable without time-dependent controls or displays.

5.2.1.7.1. Provide at least one mode that does not require a response time. Alternatively, a response time may be required if the response time may be by-passed or adjusted by the user over a range equal to at least 5 times the average user setting with a value of at least 5 seconds.

5.2.1.7.2. Provide moving text in at least one static presentation mode at the option of the user. [TAAG]

5.2.1.8. Usable without speech.

5.2.1.8.1. Provide at least one mode that does not require user speech. [TAAG]

5.2.1.9. Usable with limited cognitive or memory abilities.

5.2.1.9.1. Provide at least one mode that minimizes the cognitive, and memory ability required of the user.

5.2.1.10. Usable with language or learning disabilities.

5.2.1.10.1. Provide at least one mode that accommodates people with learning disabilities.

5.2.1.11. Availability of audio cutoff.

5.2.1.11.1. Where E&IT access features deliver speech output, provide a mechanism for private listening.

5.2.1.11.2. Where E&IT access features deliver speech output, provide a mechanism for interuptability.

5.2.1.12. Prevention of visually-induced seizures.

5.2.1.12.1. Visual displays and indicators shall minimize visual flicker that might induce seizures in people with photosensitive epilepsy. [TAAG]   Rates of 3 Hz or lower, or 60 Hz or higher are recommended.

5.2.1.13. Biometric identification / activation bypassing

5.2.1.13.1. Where biometric forms of user identification or activation are used (retinal scanning, iris scanning, voiceprint identification, fingerprint scanning etc.), an alternative form of identification or activation which does not require the user to possess particular biological characteristics, shall be provided.

5.2.1.14. Usable with upper extremity prosthetics

5.2.1.14.1 Touchscreens or touch-operated controls shall be usable without requiring body contact or close human body proximity. [TAAG]

5.2.1.15. Hearing aid compatibility

5.2.1.15.1 Where an E&IT delivers output by an audio transducer which is normally held up to the ear, provide a means for effective magnetic wireless coupling to hearing aids. If the E&IT communicates by RF, electromagnetic compatibility with hearing aids shall be addressed. EIA RS-504 defines the signal level requirements for this section. ANSI C63.19 (draft)provides the tests and parameters for compatibility between hearing aids and wireless communications devices including magnetic (t-coil) and electromagnetic compatibility.

[NOTE: ANSI C63.19 (draft) applies and extends the requirements of EIA RS-504 for use with wireless communications devices. It provides more specific guidance for cases where an RF transmission field is also involved.]

5.2.1.16 Usable from a wheelchair or similar mobility device

5.2.1.17.1. E&IT shall be usable from a wheelchair or similar mobility device. For this reason the E&IT shall comply with the following provisions of the ADAAG 1998: Section 4.2 Space Allowance and Reach Ranges; Section 4.3 Accessible Route; Section 4.5 Ground and Floor Surfaces.

5.2.2 Compatibility With Devices used for Access

5.2.2.1. Information Pass Through.

5.2.2.1.1. All E&IT that acts as a transport or conduit for information/communication shall pass through cross-manufacturer, non-proprietary, industry-standard codes, translation protocols, formats or other information necessary to provide the information/communication in an accessible format. In particular, technologies which use encoding, signal compression, format transformation, or similar techniques shall not remove information needed for access or shall restore it upon delivery.

5.2.2.2. External electronic access to all information and control mechanisms.

5.2.2.2.1 Information and control needed for the real time operation of an E&IT (including equivalent access to control, output, alerts, icons, on-line help, and on-line documentation) shall be available to an external device in a cross-industry standard form that is easily and completely translatable into text. This form shall be available via a cross-industry standard port that does not require manipulation of a connector by the user.

5.2.2.3. Connection point for external audio processing devices.

       5.2.2.3.1. E&ITs providing auditory output shall provide the auditory signal at a standard signal level through an industry standard connector. [TAAG] An exception is E&ITs that only provide simple auditory information that is also provided visually by the E&IT.

5.2.3. Information, Documentation, Labeling & Support

Information, documentation, labeling, and support provided to customers shall be accessible. Such information and documentation includes user guides, installation guides for end-user installable devices, and E&IT support communications, regarding both the E&IT in general and the accessibility features of the E&IT. This includes (but is not limited to):

       5.2.3.1. Providing a description of the accessibility and compatibility features of the E&IT upon request, including, as needed, in alternate formats or alternate modes at no additional charge.

       5.2.3.2. Providing end-user E&IT documentation in alternate formats or alternate modes upon request at no additional charge.

       5.2.3.3. Ensuring accessible and usable customer support and technical support in the call centers and service centers (including TTY and training in the use of telecommunications relay services) which support their E&ITs at no additional charge beyond that which is charged to non-disabled users (including allowances for extra communication time).

       5.2.3.4. Making electronic versions of the documents available on the Internet in accessible form on an accessible site.   It shall also be available on request via mail.

       5.2.3.5. Including the contact method for obtaining the information required by this section, in general E&IT information.

       5.2.3.6. Ensuring that any training provided (by manufacturers, providers or other parties) accommodates the functional capabilities of all participants. In developing, or incorporating existing training programs, consideration shall be given to the following factors: Accessibility needs of individuals with disabilities (as participants or trainers); Means of communicating with individuals with disabilities before and after training; Commonly used adaptive technology used with the manufacturers and provider's E&ITs; Solutions for accessibility and compatibility.

5.3. Technology specific Standards.

In addition to the requirements above, the following standards apply to E&IT with the following functions:

5.3.1. If the E&IT has a physical keyboard...

In addition to the requirements in Section 5.2 and applicable portions of Section 5.3, it shall meet the following requirements:

       5.3.1.1.   Keys shall be tactilely discernable without actuating the keys.

       5.3.1.2.   The keyboard delay before repeat, if keyboard repeat is supported, shall be adjustable to at least 2 seconds. Key repeat rate shall be adjustable to 2 seconds per character.

       5.3.1.3.   All actions available or required by the E&IT shall be available from the keyboard (i.e., keyboard equivalents for all non-keyboard actions or commands).

       5.3.1.4. E&IT (including software applications and electronic forms) shall provide logical navigation among interface elements (e.g. fields, buttons and controls) such as by tabbing or use of cursor keys.

       5.3.1.5.   Assigned keyboard access (e.g., Ctrl+P for Print, Escape for cancel) shall be provided for commonly used functions or commands.

       5.3.1.6.   All keyboard access functionality shall be documented with the E&IT and/or follow documented operating system conventions.

       5.3.1.7.   The software intended to be installed on an E&IT shall not interfere with existing accessibility features built into the E&IT or its operating system (e.g., Sticky Keys, Slow Keys, Repeat Keys).

       5.3.1.8.   The status of all locking or latching keys shall be discernable either through touch or sound, in addition to being visually discernable.

5.3.1.9.   The keyboard map shall not change except under user control, so that a user memorizing key locations shall be able to rely on those locations.

5.3.2. If the E&IT is software in nature and runs on a platform that has an operating system.

In addition to the requirements in Section 5.2 and applicable portions of Section 5.3, it shall meet the following requirements:

5.3.2.1. It shall support Keyboard Access as described in Section 5.3.1, if the E&IT has a keyboard.

5.3.2.2. Provide a well-defined visual focus indicator that moves among interactive interface elements as the input focus changes. The focus shall be programmatically exposed (read and set) so that assistive technology can track focus and focus changes.

5.3.2.3. Sufficient information about a user interface element shall be available to assistive technology to enable the AT to understand the identity, operation and state of the element (e.g., element is a text box with label "enter password," or a check box which is checked).

5.3.2.4. Where an image represents an interface element or the state of an interface element, there must be a way for assistive technology to associate meaningful text with the image. Examples include providing text labels for desktop icons, or making text available as a pop-up, tool-tip, or bubble help to concisely indicate state, or the result of acting on the element. Such text shall be programmatically accessible to assistive technology.

5.3.2.5. The use of images shall be consistent throughout the application (e.g., use the same folder icon or the same icon to indicate 'selected' if such is used in several places in the application).

5.3.2.6. Provide text through an Application Programming Interface (API)supporting interaction with assistive technology or use system text writing tools. The minimum information that shall be available to an assistive technology is text content, text input caret location, and text attributes.

5.3.2.7. Provide a wide variety of color and font settings to allow for high contrast color schemes, large fonts and different font styles, including serif and sans-serif. Inherit and respect system-wide color settings.

5.3.2.8. Do not use color coding as the only means of conveying information or indicating an action. The software must provide an alternative or parallel method of displaying information that can be used by individuals who do not possess the ability to identify colors.

5.3.2.9. System startup and restart shall be accessible.

5.3.2.10 Electronic forms shall be accessible in a manner, which allows full access to the information, field elements, and functionality required for completion of the form including all directions and cues.

5.3.2.11.   Software packages which install applications and operating system components shall conform to provisions in Sec. 5.3.1 and 5.3.2, or be fully accessible through an industry standard port as provided in Sec. 5.2.2.2.

5.3.3. If the E&IT utilizes Web based information or applications...

In addition to the requirements in Section 5.2 and applicable portions of Section 5.3, if the E&IT utilizes Web-based information or formats, including intranet information, HyperText Markup Language (HTML), Extensible Markup Language (XML)and similar formats, it shall meet the following requirements:

5.3.3.1. Web content shall conform with level 'Double-A', satisfying all Priority 1 and 2 checkpoints, of the World Wide Web Consortium (W3C) 'Web Content Accessibility Guidelines 1.0" available at http://www.w3.org/TR/WAI-WEBCONTENT

5.3.3.2. Tools for authoring Web page and sites (What-You-See-Is-What-I-Get (WYSIWIG)editors, conversion tools, image editors, site management tools) shall comply with Priorities 1 and 2 of the [latest version at time Access Board does its regulations] of the W3C 'Authoring Tool Accessibility Guidelines' available at http://www.w3.org/TR.

5.3.3.3. User agents shall comply with Priorities 1 and 2 of the [latest version at time Access Board does its regulations] of the W3C 'User Agent Accessibility Guidelines' available at http://www.w3.org/TR.

5.3.3.4 If there are navigation links or tool bars at the top and left side of your page, provide a link at the top of the page (a text link or as alt-text on an image) that says "skip over navigation links," and takes the user to the main content, starting point, or headline of the page.

5.3.3.5. If extensive ASCII art is used, then a link shall be provided to allow a user to jump to the end of the ASCII art.

5.3.4. If the E&IT provides Telecommunications functions...

In addition to the requirements in Section 5.2 and applicable portions of Section 5.3, it shall meet the following requirements:

5.3.4.1. Telecommunications E&IT and customer premises E&IT shall be compatible with peripheral devices and specialized customer premises E&IT commonly used by individuals with disabilities to achieve accessibility, and shall comply with the following provisions, as applicable:

    5.3.4.1.1. **TTY connectability:**

        E&ITs which provide a function allowing voice communication and which do not themselves provide a TTY functionality shall provide a standard non-acoustic connection point for TTYs. It shall also be possible for the user to easily turn any microphone on and off to allow the user to intermix speech with TTY use.

    5.3.4.1.2. **TTY signal compatibility:**

        E&ITs which include voice communication functionality, shall support use of all cross-manufacturer non-proprietary standard signals used by TTYs.

5.3.4.2. TTY users shall be able to utilize voice mail, auto-attendant, and interactive voice response systems directly with their TTY.

5.3.4.3 Voice mail, auto-attendant, and interactive voice response systems shall provide at least one mode which does not require users to respond within a timed interval or allows users to adjust the timing and repetition of those intervals so that the systems can be used both by people with slower response times and by Telecommunication Relay Services or other situations where a person is interpreting for or assisting a user.

5.3.4.4. If messaging is supported for voice calls, it shall be supported for TTY.

5.3.4.5 Special services such as ANI (Automatic Number Identification) and ALI (Automatic Location Identification), if provided for voice telephony users, shall also be provided for users of a TTY and for users who cannot see displays.

5.3.5. If the E&IT utilizes Video or Multimedia...

In addition to the requirements in Section 5.2 and applicable portions of Section 5.3, it shall meet the following requirements:

5.3.5.1 Regardless of format, all video that contains speech or other audio necessary for comprehension of the content shall be either open- or closed-captioned. Closed captioned video must not require separate hardware, circuitry, or software to open the captions, except as noted in Section 5.3.5.5.

    5.3.5.1.1. Analog video media shall use the "EIA-608 specification" for line-21 closed caption data.

    5.3.5.1.2. Digital video formats that are defined by the Advanced Television Systems Commmittee (ATSC) shall use the specification EIA-708-A for closed captioning.

        (NOTE: By July 1, 1999 the FCC will initiate an NPRM on characteristics of Advanced Television Closed Captioning. The resulting rule may or may not be identical to EIA-708-A, and when issued should be incorporated into the E&IT guidelines.)

    5.3.5.1.3 Digital video disk (DVD) stored video shall use the EIA-608 specification.

5.3.5.2. When a piece of media, including analog and digital video, contains visual information essential to understanding its content, the media shall also be available with narrative descriptions of visual displays. Digital video formats, including digital broadcast formats defined by the Advanced Television Systems Committee (ATSC) shall use the ancillary audio channels as defined in ATSC ancillary audio technical specifications, unless the narrative description is in the primary audio channel.

5.3.5.3. Display or presentation of alternate text presentation or narrative descriptions shall be user-selectable unless permanent.

5.3.5.4. All television displays 13 inches and larger, and computer equipment that includes tv receiver circuitry (TV E&IT) shall be equipped with caption decoder circuitry which receives and properly decodes and displays closed captions from broadcast, cable, videotape, and DVD signals. Analog displays and receivers in computer components shall comply with the Federal Communications Commission part 15 rules which govern the specifications for television receivers. Digital television displays shall contain decoder circuitry as defined in EIA-708 and shall receive and properly decode closed captions from digital television and from compatible auxiliary video sources. TV E&IT not

governed by these rules (e.g., monitors less than 13 inches, or monitors not equipped with built-in tuners and therefore not considered television displays), shall be equipped with separate closed caption decoders that comply with EIA-608.

5.3.5.5. Digital television displays shall be equipped with caption decoder circuitry which receives and properly decodes and displays closed captions according to the "EIA-708-A" specification.

5.3.5.6. Analog television displays shall be equipped with Secondary Audio Program playback circuitry as defined by the Multi-channel Television Sound specification.

5.3.5.7. Digital television displays shall be equipped with ancillary audio playback capabilities as defined by the Advanced Television Systems Committee.

5.3.5.8. Embedded or encoded alternate text presentations (closed captions) and narrative descriptions shall be preserved intact when a piece of media is copied, transmitted, reformatted (edited), or transformed for display on subsequent platforms (particularly when digitized from an original analog format). "Preserved intact" includes maintaining all styles and exact timing and synchronization commands and zero introduction of errors or garbling of data.

5.3.6. If the E&IT is an Information Transaction Machine (ITM)...

In addition to the requirements in Section 5.2 and applicable portions of Section 5.3, Information Transaction Machines, including, but not limited to, Automated Teller Machines (ATMs), Electronic kiosks and Point-of-Sale (POS) terminals, shall meet the following:

5.3.6.1. The establishing of a person's identity and user interface (UI) display and interaction preferences shall be possible and of equivalent ease for people with and without disabilities. Examples of identification methods include cards, smart cards and biometrics. Examples of UI display preferences include magnified content, voice output, and remote access.

5.3.6.2. The ITM shall be useable without the need of attaching a device to it or copying an assistive technology from a user device onto it. For purposes of this provision, a 2.5 mm. headphone jack that supports the use of headphones shall not be considered an external device.

5.3.6.3. The ITM shall support full access to the functionality of the ITM in a secure manner via an external personal device connected to the ITM through wireless means, based on cross industry, community developed standards, per 5.2.2.2.1

5.3.7. If the E&IT is a PDA

In addition to the requirements in Section 5.2 and applicable portions of Section 5.3, it shall meet the following requirements:

5.3.7.1 If it is not currently technically feasible to make a PDA accessible for a segment of disabled users, the host functions that support that PDA shall be made available to personal devices, such as laptop computers or dedicated notetakers, to achieve equivalent functionality

5.3.8. If the E&IT provides an interface over a network

In addition to the requirements in Section 5.2 and applicable portions of Section 5.3, it shall meet the following requirements:

5.3.8.1. The user interface it provides over the network must meet the applicable requirements of section 5.3.2.

5.3.9. If the E&IT has cabling and /or other connections...

In addition to the requirements in Section 5.2 and applicable portions of Section 5.3, it shall meet the following requirements:

5.3.9.1. Connection of appropriate cables, mounting and attaching external elements of the E&IT (e.g. connecting an external monitor or accessory), the force required to make connections shall be no greater than 5 lbf (22.2 N).

5.3.9.2. Cables shall be tactilely differentiable or keyed for corresponding connections (which are also tactilely differentiable).

5.3.10. If the E&IT is used to produce information...

In addition to the requirements in Section 5.2 and applicable portions of Section 5.3, it shall meet the following requirements:

5.3.10.1. Technologies used for production of information (i.e.., documents, multimedia, etc.) shall allow for and facilitate the creation of alternative modality formats (visual, audible, tactile and text) if the basic format is not modality independent (e.g., text). Document formats that are primarily designed to recreate images of documents that contain text (except hand-written text) shall not be used unless the text is fully accessible.

6. Appendices

6.1 References

IEEE Std 100-1997, The New IEEE Standard Dictionary of Electrical and Electronics Terms 5th ed.

6.2. Glossary

American Sign Language

A language using a communication system of gestures, handshapes, body movements, and facial expressions to represent words and concepts. ASL has a syntax, grammatical structure, and idioms that are distinct from spoken English.

Alternate formats

Alternate formats may include, but are not limited to, Braille, W3C-WCAG 1.0 compliant HTML, ASCII text, large print, and audio cassette recording.

Alternate modes

Different means of providing information to users of products including product documentation and information about the status or operation of controls. Examples of alternate modes may include, but are not limited to, voice, fax, relay service, TTY, Internet posting, captioning, text-to-speech synthesis, and video description.

Assistive Technologies

Any piece of equipment, product system, or other technology, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.

Compatible

Compatible generally means the E&IT can be used with, does not interfere with, and where applicable, can be connected to assistive technology products (hardware and/or software) used by individuals with disabilities to achieve access.

TTY

Originally an abbreviation for teletypewriter, TTYs are text telephone devices which provide real-time, two-way text-based communications over telephone networks. All TTYs support communication using Baudot encoding at 45.45 baud although they may also support other speeds or standards as well.

6.3 Acronyms

ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Architectural Guidelines
API	Application Programming Interface
ASL	American Sign Language
AT	Assistive Technology
ATM	Automated Teller Machines
ATSC	Advanced Television Systems Committee
E&IT	Electronic and Information Technology
EITAAC	Electronic Information Technology Access Advisory Committee
FAR	Federal Acquisition Regulations
HTML	HyperText Markup Language
ITM	Information Transaction Machines
LD	Learning Disability
PDA	Personal Digital Assistant
POS	Point-of-Sale
RF	Radio Frequency
SPL	Sound Pressure Level
TAAG	Telecommunications Act Accessibility Guidelines
TTY	See Definitions
UI	User Interface
WYSIWYG	What-You-See-Is-What-You-Get
W3C	WorldWide Web Consortium
XML	Extensible Markup Language

6.4 Examples and Background Information

Introduction.

This appendix expands on the material presented in Section 5 of the report. It provides supporting material and suggestions for accessibility solutions for some of the standards in Section 5. Since the proposed standards in Section 5 stand alone, this material is not intended by the Committee to limit the proposed standards in any way. Instead, we think of this as being part of the building of the technical guidance and material that the Access Board will need to develop.   This is only a preliminary list of notes and ideas to support the guidelines.   For additional information and pointers to other support sources the reader is referred to the Access Boards Website at www.access-board.gov .

Information Regarding 5.2.1.1 Usable without vision.

Solutions: Simple controls can be made accessible by tactile means when coupled with good (accessible) instructions. Braille is a good mechanism for providing accessible text to those who know braille (though not all people who are blind know braille - especially people who lose their sight when they are older). Voice output is rapidly becoming a viable approach due to continually dropping electronic costs and provides the most widely accessible method for providing access to both displays and controls. (Voice is also helpful to people with learning and cognitive disabilities - See 5.2.1.9 and 5.2.1.10.)

Information Regarding 5.2.1.2 Usable with low vision without relying on audio.

Background: Low vision is sometimes accompanied by hearing loss. This is especially common in older people. Audio alone as an accessibility strategy will fail to meet the needs of this group.

Information Regarding 5.2.1.3 Usable with little or no color perception.

Background: This guideline should in no way suggest that color should be avoided. Color is good and very helpful for many disabilities. Information that is conveyed by color however should also be conveyed in other ways as well.

Information Regarding 5.2.1.5 Usable with limited hearing

Background: People with limited hearing often cannot see well either, especially people who are older. Allowing them to use their residual hearing is therefore important rather than having to rely on sight (e.g. relying on access techniques that would be used by people who are deaf). The 97dB SPL requirement for the minimum level for the maximum volume setting (into a sealed ear coupler) comes from the original AMPS standard TIA/EIA IS-19B and has propagated through the newer cellular phone standards as well.

Information Regarding 5.2.1.7 Usable without time-dependent controls or displays.

Background: This is an important issue for many disabilities. For people who are blind - additional time is often necessary to find and have text read before they can respond. For people with low vision, it often takes them longer to both locate and examine text to read it. For people who are using a Telecommunication Relay service, there are often translation delays that greatly slow people down. People with physical disabilities often are slower and need additional time. Many also find their physical control degrades rapidly when put under timed pressure.   People whose native language is different often need longer to read and respond - including some people who are deaf and whose native language is ASL.   People with learning disabilities as well as people with cognitive disabilities also often need a longer period to either read or respond.

Information Regarding 5.2.1.8 Usable without Speech

Background: This applies to some people who are deaf, who have physical disabilities and who have cognitive-language disabilities.

Information Regarding 5.2.1.10 Usable with Learning Disabilities

Background: People with learning disabilities have an average or better intelligence with neurological disorders that affect reading, writing, listening, speaking, performing mathematics, reasoning or handling distractions. Many of the same solutions that assist people with other disabilities are also helpful to people with learning disabilities ("LD"). For example, multiple modes of information presentation are often quite helpful to people with LD, i.e., seeing and hearing information at the same time and enlarging the text. Persons with Attention Deficit Disorder can benefit from less complex user interfaces, fewer distractions and clear instructions. Ready access to human technical support is an important accommodation issue for people with LD.

Information Regarding 5.2.1.11.1 Availability of audio cutoff. - Private Listening

Background: This applies only to audio output which is provided as an access feature although it should also be provided where the audio can be turned up and would be a significant annoyance if it were used at higher volume levels.   A headphone jack is considered private listening.

Information Regarding 5.2.1.11.2 Availability of audio cutoff. -Interruptability

Background: If speech output is used as an alternative to a visual display, it is often desirable to be able to have speech interrupted whenever the user invokes a control to execute the next function. This feature, often referred to as "interruptability," enables the user to move quickly from one task to the next without wasting time listening to unnecessary or unwanted verbal information.
Solutions: Provide a mode which silences any ongoing speech whenever the user invokes a function or makes a selection. For example, suppose an ATM is asking the user to select a transaction. Upon pressing a transaction selection, the verbal menu being spoken is halted immediately and the verbal prompts for the transaction selected are spoken.
Another possible solution is to provide a button which, when pressed, stops the outgoing speech.

Information Regarding 5.2.1.12 Prevention of visually-induced seizures

Background: 20hz is the peak for photosensitive epilepsy. Sensitivity is also enhanced by bright flashes and flashes that occupy large areas of the visual field.

Information Regarding 5.2.1.15 Hearing aid compatibility

Background: A hearing aid compatible telephone emits magnetic impulses that can be picked up by telecoils in certain hearing aids. The hearing aid user activates the telecoil with a switch on the hearing aid. This enables the user to maximize the hearing aid's volume without feedback and background noise.

Information Regarding 5.2.1.14 Usable with upper extremity prosthetics

Background: Having a device that requires body touch to be activated (e.g. temperature or capacitance sensitive) creates problems for people using prosthetics.
Solutions: Avoid such designs, by making controls pressure rather than capacitance or heat activated.

Information Regarding 5.2.2.1 Information Pass Through.

Background: Some compression schemes assume there is no data in certain portions of a certain type of signal. However, these historically unused signal areas are often used to pass along additional accessibility information. For example, some video compression technologies effectively stripped captions from video. Some wireless telecommunication devices would not pass TTY signals without unacceptable distortion.

Information Regarding 5.2.2.2 External electronic access to all information and control mechanisms.

Background: Some individuals cannot access traditional input controls and/or output mechanisms. External access would permit the accessibility of these devices to these individuals.
Solutions: To provide external access to the full functionality of the device's interface (including controls and displays) the data interface to the target device and should be in a format that allows the external device to determine at least the following:

1. The name of each component that the user must interact with (e.g. volume control, directions)
2. The purpose or role of each component that the user must interact with (e.g. button, rotary dial, text region)
3. The contents of any text which is part of the interface or displays
4. The state of any other display elements or indicators
5. The state of each control that the user must interact with (e.g. checked, unchecked, on, off)
6. The programmatic command for activating each control action (one control may have more than one action)
7. The current setting of any adjustable controls that the user must interact with
8. The setting range of the adjustable controls that the user must interact with

The phrase "does not require manipulation of a connector by the user " refers to techniques such as infrared or RF which allow use by people who cannot operate connectors due to physical or other limitations.   Accessible control over a wired network also meets the "no connector manipulation required" clause if presence at the E&IT is not required simultaneously.

Information Regarding 5.2.2.3 Connection point for external audio processing devices.

Solutions: A standard headphone or headset jack with standard signal levels would be a solution to this.

Information Regarding 5.2.3 Information, Documentation, Labeling & Support

Background: Information, Documentation, Labeling & Support should be available to and usable by persons with disabilities in the same timeframes as it is to users without disabilities. Documentation should be available in alternate format to printed text; phone support services available through text telephone support; technician support will have a working knowledge of the integration of assistive technology into the automated office electronic systems.
When non-visual labeling is not possible on internal or external components with which the user must interact, the accessible documentation should contain a detailed verbal description of the layout to identify connectors, switches, switch settings, etc. by their physical shape, texture or proximity and orientation to recognizable tactile landmarks.

Information Regarding 5.3.1 If the E&IT has a physical keyboard...

Background: Touchscreens and other keypads that are featureless tactilely, and rely on visual indications of where to press are impossible for blind people to use without some alternative technique that makes it possible for blind people

to know where to press. This Section is intended to present the accessibility requirements for keypads, keyboards and other similar controls.

Solutions: If the device does not have tactile cues then a tactile overlay which provides tactile cues to key locations can be used.   Voice output can be used to identify keys and other controls. For touchscreens, access can be provided via a list of all the items on the screen which can be navigated with voice output by touching the screen and by using arrow keys. (See also Information Regarding 5.2.1.1. Usable without vision.)

Information Regarding 5.3.2 If the E&IT is software in nature and runs on a platform that has a operating system...

These standards apply to accessibility for operating systems and application software. This includes software used as a client for cross-platform access to an E&IT which is also software in nature and executing on an operating system different or separate from the client. Typical software includes but is not limited to: browsers, calendars, banking and financial transaction systems, database management systems, electronic data interchange, email, external file transfer protocols, group ware, order entry, project management, scheduling, spread sheet programs, terminal emulation, and word processing.

Information Regarding 5.3.2.2 and 5.3.2.3 Visual focus and objects.

Programmers who write software may not have been aware of the effects their design decisions have on the use of their products by people with disabilities. As a result, design decisions are often made that make it difficult or impossible for some people to use that software. One typical problem is caused when the developer chooses non-standard objects so as to enhance appearance, to provide differentiation, or to simplify cross-platform development. The problems that these non-standard controls present are primarily in the inability of screen reading and screen magnifying software to track the active point, the visual focus, on the display. As the visual focus changes with keyboard input, the assistive technology won't know that anything has happened, or it may not be able to tell that anything has happened.

Even such a simple software application as terminal emulation, presenting interaction with the text screen of a main-frame computer, can be made inaccessible to a blind or visually impaired user when the developer tries to use a special text cursor which may not be followed (or tracked) by screen reading or screen magnifying software.

Software development does not have to be reduced to all software using the same set of standard objects. Instead, different platforms provide their own solutions of accessibility application programming interfaces (API's) so that programmers can use non-standard controls while providing the accessibility information to the assistive technology. The terminal emulation example above is solved when the programmer uses a standard text cursor, has the standard text cursor as an option, lets the standard cursor also track the editing point, or uses an accessibility API to inform the assistive technology of changes in the caret location

The inaccessibility of non-standard controls effects other disabled users than those with visual impairments. Voice navigation is much more difficult (or impossible) when programs use non-standard controls and do not employ the accessibility API's.   Similarly for on-screen keyboards.

Information Regarding 5.3.2.1 Keyboard access.

Keyboard access is central for access to software by people with disabilities. If developers would require that their applications and systems be fully functional and tested by users without a mouse, a large number access issues would be resolved for a number of disabilities groups.

Information Regarding 5.3.2.4 and 5.3.2.5 Images and icons.

The first requirement for access to E&IT which is Web-based information says that accessible text shall be associated with images that provide information. For a Web page, that text equivalent can be provided with what is called "alt-text." The same requirement holds for software. If images (i.e. icons) are used to identify objects or the states of objects, then assistive technologies need to be able to get hold of a text description of the image. This can be accomplished using an accessibility API or some platform specific standard method such as text pop-ups.

The text associated with the image must be meaningful.   For example, consider a text equivalent for a photographic image of the Earth as seen from outer space. If the purpose of the image is mostly that of decoration, then the text "Photograph of the Earth as seen from outer space" might fulfill the necessary function. If the purpose of the photograph is to illustrate specific information about world geography, then the text equivalent should convey that information. If the photograph has been designed to tell the user to select the image (e.g., by clicking on it) for information about the earth, equivalent text would be "Information about the Earth". Thus, if the text conveys the same function or purpose for the user with a disability as the image does for other users, then it can be considered a text equivalent.

Since a screen reader may programmatically identify an image with some text in an operation taken by the user, if the same icon is used for the same purpose throughout an application, that identification process is simplified and the application more accessible by a person using a screen reader.

Information Regarding 5.3.2.6 Accessible text.

A screen reader has to be able to speak, using synthesized speech, or display in refreshable braille, the text that appears on the display. The problem is, how does the screen reader know what text is there. For character based platforms, like DOS, all the text on the screen is available from video memory. For graphical systems, it is more difficult. The screen reader can figure out what text has been written to the display by "hooking" standard operating system calls and recording that text in a so-called off-screen model. For standard controls, the screen reader can query the operating system to know what text is displayed. Finally the screen reader may use an application programming interface provided by the software. Besides knowing the text, the assistive technology needs to know the text attributes, like color, font and style.

Information Regarding 5.3.2.7 and 5.3.2.8 Colors and fonts.

Software should provide for a wide variety of color and font settings. By being able to choose different foreground and background colors a large group of people with visual impairments will be able to use software that would otherwise (with default colors) be inaccessible. Being able to switch to yellow characters on a green background can make a screen readable for some. Some platforms provide a high-contrast setting. Software should support that high contrast setting. In addition, large character fonts are very useful to an even larger population. Add a display (view) option that uses large fonts and fonts without serifs. Do not require that the larger fonts be those saved with the document or sent to co-worker.

Information Regarding 5.3.2.8 System Startup and shutdown

System Startup and shutdown are often areas of significant difficulty for people with disabilities, especially people who depend on assistive technology for access since assistive technology is itself often a software application which cannot function until sufficient operating system services have initialized. For instance, the BIOS and CMOS settings on most PCs are inaccessible. System and network login and shutdown procedures are often inaccessible as well. It is recognized that more than one solution strategy may be required to provide access to all portions of the startup or shutdown process.

Available solutions may include the following:
  - Provide an accessible application to read and modify basic system settings such as BIOS or CMOS settings;
  - Provide support for industry standard dumb terminal access over an industry standard port to system startup messages and command prompts, so that assistive technologies may be used to access the more primitive system startup and shutdown routines. Such access can also provide access for software and operating system installations;
  - Provide rudimentary built-in assistive technologies to support access to basic system initialization and shutdown procedures, especially to system login and restart.

Information Regarding 5.3.2.10 Electronic Forms
  1. Electronic forms should allow the accessibility of each field or element on the form to be at the same accessible level available to the non-disabled user. (e.g. capable of reading subtotals, totals, state of check boxes and radio gangs, etc.)

2. An Electronic form should maintain its structural integrity as it is accessed by various adaptive technologies. (Because forms are the most basic medium for transferring information, the form should be able to maintain its universal appearance for all users to access)
3. Electronic forms, regardless of the type of assistive technology being used, should possess the ability to generate comments relative to the field or form being used. (Forms contain information beyond the entry of "name" or "address" this factual information should be available)
4. Navigation through an electronic form should comply with keyboard standards specified elsewhere in this document. Comparable keystrokes should be available for each mouse action.
5. Electronic forms software should be compatible with assistive technology commonly used by persons with disabilities.

Information Regarding 5.3.3 If the E&IT utilizes Web based information or applications...

Background: Unless access is carefully considered in creating web applications, many people with disabilities will not have the mandated access to information, documents and forms. For example, if an agency takes a printed form and places that on the Web as a TIFF image this form will almost certainly be inaccessible as are most PDF documents that are not created in a very particular way. If relevant information is only communicated in a graphic, or only in audio, then entire groups of people with disabilities will be unable to access that information.
Solutions: Use the W3C Accessibility Guidelines. Avoid image-based formats for information including text.

Information Regarding 5.3.4 If the E&IT is Telecommunications products...

Information on TTY Functionality
To provide TTY functionality, a device or system should meet the following description:
1. It should be interoperable with legacy TTY equipment including support for 45.45 baud Baudot. The solution need not support little-used or obsolete TTY models, but in general should support the installed base of TTYs sold over the previous ten years. Compliance with ITU V.18 is one way of demonstrating interoperability with legacy TTY equipment. ITU Recommendation V.18 specifies interworking with the following TTY protocols:
   - Baudot @ 45.45 baud (U.S. TTYs)
   - Baudot @ 50 baud (used in New Zealand, Australia, South Africa and some other countries; also known as "international" Baudot)
   - V.21/text telephone version (used in Sweden, Norway, and Finland).
   - DTMF (used in Denmark, Holland, and some other countries)
   - EDT ("European Deaf Telephone," used in Germany, Austria, Switzerland, and several other countries)
2. The transmission rate should be no slower than the defacto Baudot rate of 45.45 baud.
3. The character error rate should be under 1%.
4. The caller should be able to visually monitor all aspects of call progress (ring, busy, answered-in-voice, etc.) that is provided in auditory form.
5. There should also be a provision for non-auditory alerting. [Built in or via connection]   A portable vibrating device or built-in vibrator may be used to provide ring signaling on a wireless or cordless phone. If an RJ-11 connection is used to provide non-auditory alerting connection, then a minimum ring equivalent of 2 should be provided.
6. The caller should be able to transmit TTY signals independent of the condition of the receiving modem. (This allows the TTY user to signal to the answering party or TTY detector circuitry that the call is in TTY mode.)
7. VCO (Voice Carry Over) and HCO (Hearing Carry Over) should be supported.
8. It should provide an alphanumeric keyboard with one key for each letter of the alphabet.

Products which are themselves TTYs or provide full TTY Functionality do not need to make provision for TTY connector.

Information Regarding 5.3.5 If the E&IT utilizes Multimedia...

In addressing presentation issues for multimedia, we use a broad definition: video, audio, animation, graphics and text combined in numerous ways and delivered via a variety of platforms: video and audiotape, CD- and DVD-ROM, Internet-based, broadcast, narrowcast, and satellite-delivered.

The multimedia standards is also focused as narrowly as possible on CONTENT issues and not command and control of the delivery device, which are covered in other areas. When a piece of media contains audio information essential to understanding its content, the media should also be capable of creating a user-selectable visual display in text format of that audio. The types of audio that should have an alternate text presentation include narration, dialog, speech and vocal music and essential non-speech sounds such as sound effects needed for comprehension of content and identification of speakers and sound sources. Examples of audio NOT requiring alternate text presentation include incidental background music and ambient sounds unimportant to understanding of the content.

In the case of audio tracks provided as part of software-based multimedia, interactive or otherwise, alternate text presentation may be achieved through the use of various multimedia authoring tools (such as Adobe premiere or Macromedia Director) or may employ such formats as the W3C's Synchronized Media Interchange Language (SMIL) or Microsoft's Synchronized Accessible Multimedia Interchange format (SAMI). Regardless of authoring technology, the following guidelines will enhance comprehension via alternate text presentation:

- text should be user-selectable
- text should be displayed on the screen or other display device in a manner so as not to obscure other essential on-screen information
- text should be clearly legible and distinguishable from background visuals o text should be fully synchronized with the audio it is reflecting
- if the media is being presented in a computer operating system that offers a "ShowSounds" preference (such as Microsoft Windows), the alternate text presentation should automatically be displayed if the user selects this preference.
- triggering display of alternate text presentation should not automatically mute the audio portion of the program
- the user should be able to disable or adjust sound volume

Information Regarding 5.3.6 If the E&IT is an Information Transaction Machine (ITM)...

The ITM should provide a way to receive and transmit information to an external device. The protocol, or combined protocols, used to convey a UIs content and support interaction with an ITM by an external device should be based on industry accepted and community developed standards. For example, a handset may be used to transmit UI information and short range RF or directional IR could be used to transmit UI information to and support interaction by an external device. See Information Regarding 5.2.2.2 above.

NOTE: For other approaches and examples see http://www.access-board.gov/xxx/yyy/exampleslist.html

6.5 Prototype Disability Access Compliance Form

The following is an example of one way that procurement officers could request information on the accessibility features of E&IT products being submitted under bid.

Disability Access Compliance Form (Instructions)
This form is provided as a means of summarizing a product's accessibility. It should be completed and submitted with the bid package.

The form is to be completed based on an analysis of operational chains for each product. This is done by performing the following analysis:
- a. A list of all operations required to operate the product is made. Care should be taken to include the activities required to learn how to operate the product and provide regular maintenance.
- b. For each operation construct operational chains of the steps required to perform each operation.
- c. Analyze each operational chain for each of the areas of limitation.
- d. If in a given category all of the operational steps can be accomplished then the product may be listed as accessible for that category. If it is not then the box should not be checked.

Illustration

For a desktop business telephone a list of operations is made. A list of steps is then made for each of these operations. As one example, if the user documentation can be accessed by someone without vision then that operation is accessible. As another example, to make a call the phone must be taken off hook, the dialtone sensed, the number dialed, the call conducted, the call terminated and the phone placed back on-hook. For the no vision category, if all of these steps can be accomplished without vision then that operation is accessible. If not all operations are accessible without vision then the Partially Accessible box should be checked and details provided. The process then repeats itself for the other categories listed.

1. A claim of new or superior accessibility should only be made if the product offers something unique or demonstrably superior for a given class of accessibility, as compared to what is generally available in comparable product offerings on the market. Details and supporting evidence may be provided to amplify such claims.

2. If industry standards that apply to the product type and can be used to objectively substantiate the claim of accessibility exist, these should be cited and used as the basis for the claim. Where they exist, the use of industry standards, which provide an objective basis for making a claim of accessibility, is preferred.

Prototype/Example Disability Access Compliance Form

This form is designed to summarize the 508 compliance of a product or contract offering. The contractor should complete the form and present it with the bid package. Additional information on access features that are believed to be new or exemplary may be attached. Supporting documentation for the items summarized on this form should not be submitted with the form, but made available, if requested by the contracting officer.

1. Name and Model of Product : _____

2. Features and functions of the product   _____

   _____

3. Describe any new or special accessibility features of this product: _____

   _____

4. For each area below, state whether all of this product's FUNCTIONS (as described above) are accessible or if it is partially accessible. Provide any notes applicable to each area in the space provided to the right of the area checkboxes.

No Vision
   [checkbox]   Entire functionality is accessible.
   [checkbox]   Partial functionality is accessible. (specify)

Low Vision (no audio)
   [checkbox]   Entire functionality is accessible.
   [checkbox]   Partial functionality is accessible. (specify)

No Color Vision
   [checkbox]   Entire functionality is accessible.
   [checkbox]   Partial functionality is accessible. (specify)

No Hearing
   [checkbox]   Entire functionality is accessible.

[checkbox]   Partial functionality is accessible. (specify)

Hard of Hearing
[checkbox]   Entire functionality is accessible.
[checkbox]   Partial functionality is accessible. (specify)

Limited Manual Dexterity, Reach or Strength
[checkbox]   Entire functionality is accessible.
[checkbox]   Partial functionality is accessible. (specify)

No Time Dependence
[checkbox]   Entire functionality is accessible.
[checkbox]   Partial functionality is accessible. (specify)

No Speech
[checkbox]   Entire functionality is accessible.
[checkbox]   Partial functionality is accessible. (specify)

Cognitive and Learning
[checkbox]   Entire functionality is accessible.
[checkbox]   Partial functionality is accessible. (specify)

No Specific Biometrics Required
[checkbox]   Entire functionality is accessible.
[checkbox]   Partial functionality is accessible. (specify)

Minimizes Seizure Induction
[checkbox]   Entire functionality is accessible.
[checkbox]   Partial functionality is accessible. (specify)

Compatibility
[checkbox]   Product is compatible with hearing aids
[checkbox]   Product is not held up to the ear for listening or it provides hearing aid coupling.
[checkbox]   Product is compatible with upper limb prosthetics
[checkbox]   Product is compatible with wheelchair use
[checkbox]   Accessibility Information Pass Through is provided
[checkbox]   Standard external electronic access is provided for all info and control
[checkbox]   Standard audio connection point standard is met.

Other
[checkbox]   If access features provide speech output - private listening is available.
[checkbox]   Product meets Documentation, Labeling and Support Standards.

Technology specific standards
[checkbox]   Product meets technology specific standards for Physical Keyboards.
[checkbox]   Product meets technology specific standards for Cabling and connections.
[checkbox]   Product meets technology specific standards for Software.
[checkbox]   Product meets technology specific standards for Web Based Applications.
[checkbox]   Product meets technology specific standards for Telecommunications.
[checkbox]   Product meets technology specific standards for Multimedia.
[checkbox]   Product meets technology specific standards for ITMs.
[checkbox]   Product meets technology specific standards for PDAs / Thin Clients.

5. Describe the processes and procedures used to verify the information above:

_____

_____

_____