

ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD

36 CFR Part 1193

[Docket No. 97-1]

RIN 3014-AA19

Telecommunications Act Accessibility Guidelines

AGENCY: Architectural and
Transportation Barriers Compliance
Board.

ACTION: Final rule.

SUMMARY: The Architectural and Transportation Barriers Compliance Board (Access Board or Board) is issuing final guidelines for accessibility, usability, and compatibility of telecommunications equipment and customer premises equipment covered by section 255 of the Telecommunications Act of 1996. The Act requires manufacturers of telecommunications equipment and customer premises equipment to ensure that the equipment is designed, developed, and fabricated to be accessible to and usable by individuals with disabilities, if readily achievable. When it is not readily achievable to make the equipment accessible, the Act requires manufacturers to ensure that the equipment is compatible with existing peripheral devices or specialized customer premises equipment commonly used by individuals with disabilities to achieve access, if readily achievable.

DATES: *Effective date:* March 5, 1998.

FOR FURTHER INFORMATION CONTACT: Dennis Cannon, Office of Technical and Information Services, Architectural and Transportation Barriers Compliance Board, 1331 F Street, NW., suite 1000, Washington, DC 20004-1111. Telephone number (202) 272-5434 extension 35 (voice); (202) 272-5449 (TTY). Electronic mail address: cannon@access-board.gov.

SUPPLEMENTARY INFORMATION:

Availability of Copies and Electronic Access

Single copies of this publication may be obtained at no cost by calling the Access Board's automated publications order line (202) 272-5434, by pressing 1 on the telephone keypad, then 1 again, and requesting publication S-34 (Telecommunications Act Accessibility Guidelines Final Rule). Persons using a TTY should call (202) 272-5449. Please record a name, address, telephone number and request publication S-34. This document is available in alternate

formats upon request. Persons who want a copy in an alternate format should specify the type of format (cassette tape, Braille, large print, or computer disk). This document is also available on the Board's Internet site (<http://www.access-board.gov/rules/telfinal.htm>).

This rule is based on recommendations of the Board's Telecommunications Access Advisory Committee (TAAC or Committee). The Committee's report can be obtained by contacting the Access Board and requesting publication S-32 (Telecommunications Access Advisory Committee final report). The report is also available on the Board's Internet site (<http://www.access-board.gov/pubs/taacprt.htm>).

Background

On February 8, 1996, the President signed the Telecommunications Act of 1996. The Access Board is responsible for developing accessibility guidelines in conjunction with the Federal Communications Commission (FCC) under section 255(e) of the Act for telecommunications equipment and customer premises equipment. The guidelines are required to principally address the access needs of individuals with disabilities affecting hearing, vision, movement, manipulation, speech, and interpretation of information.

Section 255 provides that a manufacturer of telecommunications equipment or customer premises equipment shall ensure that the equipment is designed, developed, and fabricated to be accessible to and usable by individuals with disabilities, if readily achievable. A provider of telecommunications services shall ensure that the service is accessible to and usable by individuals with disabilities, if readily achievable. Whenever either of these is not readily achievable, a manufacturer or provider shall ensure that the equipment or service is compatible with existing peripheral devices or specialized customer premises equipment commonly used by individuals with disabilities to achieve access, if readily achievable. Section 255(f) provides that the FCC shall have exclusive jurisdiction in any enforcement action under section 255. It also precludes an individual's private right of action to enforce any requirement of section 255 or any regulation issued pursuant to section 255.

On April 18, 1997, the Access Board issued a notice of proposed rulemaking (NPRM) in the **Federal Register** (62 FR 19178) for accessibility, usability, and

compatibility of telecommunications equipment and customer premises equipment covered by the Telecommunications Act of 1996. In addition to proposing specific guidelines, the NPRM asked questions about some of the proposed provisions. The proposed rule was based on recommendations of the Board's Telecommunications Access Advisory Committee.

The Committee was convened by the Access Board in June 1996 to assist the Board in fulfilling its mandate to issue guidelines under the Telecommunications Act. The Committee was composed of representatives of manufacturers of telecommunications equipment and customer premises equipment; manufacturers of specialized customer premises equipment and peripheral devices; manufacturers of software; organizations representing the access needs of individuals with disabilities; telecommunications providers and carriers; and other persons affected by the guidelines.

The Board received 159 comments in response to the NPRM. Comments were received from 109 individuals who identified themselves as being hard of hearing. Also, comments were received from 19 members of the telecommunications industry and industry associations. Some of these comments were received from manufacturers of specialized customer premises equipment and peripheral devices, service providers and telecommunications equipment and customer premises equipment. Additionally, 31 comments were received from organizations representing persons with disabilities. Comments came from state organizations representing individuals with disabilities, advocacy organizations, independent consultants and academic organizations. Some of the comments received were from members of the TAAC.

The majority of TAAC members supported the proposed rule but had recommendations for changes to specific provisions. The majority of comments received from individuals who identified themselves as being hard of hearing supported the rule and specifically supported increasing volume controls on customer premises equipment. A few comments raised by these individuals included some issues that were not covered in the proposed rule. For example, some of these comments recommended providing enhanced radio volume, providing a device that displays through text what is being said on radio stations,

providing car radios equipped with headphone jacks and providing closed captioning for television programs and motion pictures. Other comments included recommendations for more efficient and effective telecommunications relay service operations, designing accessible roadside emergency call boxes which ensure two-way communications by people with hearing or speech disabilities and designing homes with acoustically absorbent materials. These issues are not covered by section 255 of the Telecommunications Act and are outside of the Board's jurisdiction in this rulemaking.

General Issues

This section of the rule addresses general issues raised by comments filed in response to the NPRM. Individual provisions addressed in this rule are discussed in detail under the Section-by-Section Analysis below.

Rulemaking Authority of the Board and Effect of the Guidelines

Section 255(e) of the Telecommunications Act provides that the Access Board shall develop guidelines for accessibility of telecommunications equipment and customer premises equipment in conjunction with the Federal Communications Commission. The Board is also required to review and update the guidelines periodically.

Comment. Several comments from the telecommunications industry raised questions about the relationship between the Board's guidelines and areas within the FCC's jurisdiction. The commenters noted that the FCC has exclusive jurisdiction with respect to any complaint under section 255 and that the Senate report envisioned that the guidelines would "serve as the starting point for regulatory action by the Commission." Some of the commenters suggested that, absent rulemaking by the FCC, the guidelines are not binding.

Response. The Telecommunications Act of 1996 is the result of a conference committee which combined elements of the House and Senate bills. Section 255 is based on section 262 of the Senate bill (S. 652) which provided first for the Board to develop accessibility guidelines for telecommunications equipment and customer premises equipment, and then for the FCC to issue regulations consistent with the guidelines developed by the Board. This framework is similar to that established by Congress for implementing the accessibility requirements under the Architectural Barriers Act (ABA) and

the Americans with Disabilities Act (ADA). The Board issues accessibility guidelines based on its expertise and experience which serve as the basis for further regulatory action by other agencies (General Services Administration, Housing and Urban Development, Department of Defense, and the U.S. Postal Service for the ABA; DOJ and the Department of Transportation for the ADA). The conference committee bill dropped the provision requiring the FCC to issue rules under section 255, which has resulted in questions raised by the comments. Both the Senate bill and conference committee bill gave the FCC exclusive jurisdiction with respect to complaints under section 255.

The FCC issued a notice of inquiry (NOI) on September 19, 1996, seeking public comment regarding its responsibilities under section 255. The FCC noted that it may select from a variety of approaches for enforcing section 255, including acting on a "complaint-by-complaint basis, without issuing any rules or other guidance, beyond the guidelines issued by the Access Board" or "adopt[ing] the Board's guidelines, either as adopted by the Board or with revisions, as Commission rules after the appropriate Commission proceedings." The FCC ultimately will decide which approach to take. However, regardless whether the FCC proceeds with case-by-case determinations or rulemaking, Congress clearly intended that the FCC's actions be consistent with the Board's guidelines.

Declaration of Conformity

Comment. A few commenters from the telecommunications industry and disability organizations urged the Board to adopt the Declaration of Conformity as recommended by the TAAC. In the NPRM, the Board stated that "since enforcement for section 255 is under the exclusive jurisdiction of the FCC, this rule does not address the Declaration of Conformity". The United States Telephone Association (USTA) believed that the Board should require a Declaration of Conformity and that it would be wrong to merely regard the Declaration of Conformity as a complaint resolution tool. USTA states that a "Declaration of Conformity assures the purchaser of the telecommunications equipment and/or customer premises equipment that the manufacturer has complied with section 255. It can also serve to educate the customer about what to do to communicate with the manufacturer, how to request alternate forms of user information, etc. Without a Declaration

of Conformity, a customer may not be able to determine if the product to be purchased has been reviewed for accessibility." The United Cerebral Palsy Associations (UCPA) recommended that the final rule include a requirement for a Declaration of Conformity and that it should be on a separate piece of paper to make it more visible.

Response. The Access Board recognizes that there is a need to have an effective and efficient enforcement process for section 255, including the possible need for a Declaration of Conformity, as recommended by the TAAC. However, it is the FCC, and not the Access Board, which is responsible for enforcing section 255 through a complaint process. The Access Board has not addressed issues in this final rule that are clearly within the FCC's jurisdiction. The information not related to compliance that was recommended to be included in a Declaration of Conformity, primarily the requirement to supply a point of contact, is required by section 1193.33 of this rule.

Accessibility Engineering Specialists

Comment. The NPRM referred to the establishment of an Association of Accessibility Engineering Specialists under the National Association of Radio and Telecommunications Engineers. In its comments, USTA suggested that groups such as this should more appropriately be structured under an organization such as the American National Standards Institute (ANSI).

Response. As stated in the NPRM, the TAAC "report also recommends the creation of a technical subgroup of a professional society which could train and eventually certify 'accessibility specialists' or engineers. As a result of work by several Committee members, such a group has already been created. The National Association of Radio and Telecommunications Engineers (NARTE), a private professional association, recently formed the Association of Accessibility Engineering Specialists. This association is expected to sponsor conferences and workshops, disseminate information, and suggest course curricula for future training and certification." The Board appreciates the fact that NARTE established the Association of Accessibility Engineering Specialists and believes that this group will contribute to advances in the field of accessible telecommunications equipment and customer premises equipment and assist in maintaining a cooperative dialogue among manufacturers, product developers, engineers, academicians, individuals with disabilities, and others involved in

the telecommunications equipment design and development process. Commenters who wish to have an association created under the auspices of ANSI, or any similar organization, should approach that organization. The Board encourages any efforts to move accessibility design into the mainstream of telecommunications and will work cooperatively with any established group to further those ends.

Market Monitoring Report

Comment. The NPRM discussed that the Board intends to compile a market monitoring report on a regular basis and make it available to the public. USTA commented that the Board did not offer what type of information it will specifically monitor, how often, and to what end. UCPA supported a market monitoring report and suggested that the Board specify an annual report. UCPA recommended that the report should be structured for rapid turnaround after the close of the monitoring period and that successful access solutions be highlighted.

Response. The Board intends to compile a market monitoring report after the guidelines are published and make it available to the public. At this point, the Board does not have a schedule for when the first report will begin or when it will be issued, since it must be incorporated into the Board's on-going research and technical assistance program. The report will address the state of the art of customer premises equipment and telecommunications equipment and the progress of making this equipment accessible and identify successful access solutions. Since the Board is required to review and update these guidelines periodically, information from this report will assist the Board in determining what provisions of the guidelines may need to be revised or whether new provisions need to be added. In particular, some issues will be targeted for examination, such as redundancy and selectability, the effect of hearing aid interference on bystanders, and whether persons with hearing impairments continue to report having trouble using public pay telephones. These issues are discussed further in the section-by-section analysis.

In addition, the Board intends to investigate whether the report might be compiled in cooperation with another government entity or private sector organization. For example, the National Institute on Disability and Rehabilitation Research (NIDRR) funds a variety of research projects and centers, including a research center devoted to

telecommunications. Also, some private sector organizations have begun highlighting accessible products in reports and trade shows. The Board intends to explore whether it would be appropriate to produce the market monitoring report in conjunction with one of those groups or companies.

Section-by-Section Analysis

This section of the preamble summarizes each of the provisions of the final rule and the comments received in response to the proposed rule. Where the provision in the final rule differs from that of the proposed rule, an explanation of the modification is provided. The text of the final rule follows this section. An appendix provides examples of non-mandatory strategies for addressing these guidelines.

Subpart A—General

Section 1193.1 Purpose

This section describes the purpose of the guidelines which is to provide specific direction for the accessibility, usability, and compatibility of telecommunications equipment and customer premises equipment covered by the Telecommunications Act of 1996. Section 255(b) of the Act requires that manufacturers of telecommunications equipment or customer premises equipment shall ensure that the equipment is designed, developed, and fabricated to be accessible to and usable by individuals with disabilities, if readily achievable. Section 255(d) of the Act requires that whenever it is not readily achievable to make a product accessible, a manufacturer shall ensure that the equipment is compatible with existing peripheral devices or specialized customer premises equipment commonly used by individuals with disabilities to achieve access, if readily achievable. The requirement for the Board to issue accessibility guidelines is contained in section 255(e).

No substantive comments were received and no changes have been made to this section in the final rule.

Section 1193.2 Scoping

The NPRM stated that section 255 is intended to apply to all equipment since the Board "finds no evidence in the statute or its legislative history that Congress intended individuals with disabilities to have fewer choices in selecting products than the general public" and concluded that all products are subject to the guidelines.

Comment. The majority of comments, including the majority of those from TAAC members, supported the position

that all products are subject to the guidelines. Individuals with disabilities and advocacy groups generally said they wanted the opportunity to choose among the features of various products offered to the general public, not to be forced to settle for the features a manufacturer decided to offer on the "accessible" product. "Having all the models of equipment carry accessibility features is a must for me," said one. "My needs are not necessarily the same as another hearing-impaired person's. Among the products that must have accessibility features are pagers, which must have vibrating mode or else they are useless. I want to have the choice to pick the right kind of vibrating pager based on my needs." The Massachusetts Assistive Technology Partnership supported the Board's finding that section 255 applies on a product-by-product basis. It said "[w]ithout a clear requirement that accessibility be provided at the individual product level, customers with disabilities risk being caught forever in the same unacceptable circumstance we have experienced to date: a telecommunications marketplace which segregates accessible products from mainstream products, with all the concomitant problems which "special" production entails—lesser availability, greater cost, poorer quality and lack of full compatibility. While there will surely be instances where a manufacturer will choose to offer additional accessibility features in one or two products in a product line where it was not readily achievable to offer those features in every product in a product line, the proposed rule in no way prevents a manufacturer from making such an offering. The essential consideration is that accessibility, usability and compatibility must be properly considered at the individual product level * * * ."

USTA, the principal trade association of the local exchange carrier industry, and a TAAC member, agreed that all telecommunications products and customer premises equipment should be subject to the guidelines. It stated that "[t]he issue of accessibility must relate to the whole universe of technology. To do otherwise will create a hierarchy of opportunities for customers—a hierarchy that could seriously jeopardize telecommunications service delivery." Bell Atlantic and NYNEX also supported a product-by-product approach to encourage manufacturers of telecommunications equipment and customer premises equipment to make accessible the widest array of

functionally different products. Bell Atlantic and NYNEX were concerned that appropriately equipped telecommunications equipment and customer premises equipment should be available to implement or complement their services and that without needed network equipment, service providers could be unable to meet the telecommunications needs of people with disabilities in an efficient manner. Bell Atlantic and NYNEX also made the point that accessibility can often be achieved only through compatible customer premises equipment, operating with network services. They stated that "[u]nless manufacturers are obligated to make a variety of products with different functions accessible, assuming such accessibility is readily achievable, the accessibility options available to service providers and their customers could be severely limited." Bell Atlantic and NYNEX added that even without a legal mandate, adding readily achievable accessibility features to products and services is simply good business.

On the other hand, manufacturers and the Telecommunications Industry Association (TIA) uniformly said the guidelines should be applied to product "lines" or "families" and the Consumer Electronics Manufacturers Association (CEMA) said compliance should take into account the "market as a whole" with respect to accessibility. In particular, Ericsson, questioned the NPRM interpretation by saying "while there is no language in the statute which specifically provides guidance on whether all equipment or some equipment must be made accessible or compatible, there is similarly no language in the legislative history which supports the Board's conclusion". Some manufacturers read the word "equipment" in the statute as plural, which they felt supported their claim for coverage of groups of products rather than individual products.

Several manufacturers drew analogies to portions of facilities covered by the Americans with Disabilities Act (ADA), such as stadium seats, hotel rooms, and telephones in a bank as giving weight that only some telecommunications equipment and customer premises equipment needs to be accessible. The commenters said that the ADA has recognized that proper application of the readily achievable definition, which defines the scope of the obligations under the ADA, will, in some circumstances, result in people with disabilities having accessibility but fewer choices than the general public. The commenters concluded that all products should not be required to be

accessible if other models of a similar product with comparable features and at comparable cost are available.

These commenters also added that with a broad range of accessibility needs to be met, it is unrealistic to expect that a manufacturer could provide this range of products within the limits of the readily achievable limitation. These commenters further said that varying and occasionally conflicting accessibility needs of persons with different disabilities virtually dictate a product family approach. The Information Technology Industries Council commented that accessibility issues raised by section 255 require the Board to consider cost impact issues of far greater scope and complexity, involving the recurring costs of designing and manufacturing complex products sold in a highly competitive marketplace characterized by rapid technological innovation. Because competitive profit margins are thin, company survival and continuing research and innovation are extremely sensitive to cost increases. Many telecommunications industry commenters expressed concern that the guidelines will have an inhibiting effect if they discourage equipment manufacturers from developing specialized products targeted to the differing, and sometimes mutually inconsistent, needs of individuals with differing disabilities.

Response. Section 255 requires manufacturers to ensure that telecommunications equipment and customer premises equipment are designed, developed and fabricated to be accessible. Manufacturers seem to argue that the statute can be read as having a second qualifier, in addition to readily achievable. That is, manufacturers argue that some telecommunications equipment and some customer premises equipment should be designed developed and fabricated to be accessible if readily achievable, unless comparable equipment is available.

Manufacturers claim the statute should be read as applying to product "lines" or "families" rather than individual products as long as accessible products with comparable, substantially comparable, or similar features are available at a comparable cost. These commenters did not provide a definition of a product line or family. It is not clear whether all cellular telephones are to be regarded as part of the same product line, so that only one needs to be accessible to a person with a disability, even if it were readily achievable to make others accessible. The comment from CEMA goes further

by suggesting that, if one manufacturer makes a cellular phone accessible to blind persons, another manufacturer would not need to even consider whether it were readily achievable to do so.

Aside from the fact that such an interpretation is not supported by the plain statutory language, it does not answer the question of what is comparable. Suppose a person with a disability wants the features on product A, but product B has the accessibility features. For example, product A is a pager with a lighted display which can be seen in dim light, and product B is a pager without the lighted display but with a vibrator to alert a deaf person. It is not clear what "comparable" feature is the substitute for not having the lighted display. If the deaf person works in a low-light environment, the lighted display may be needed. Moreover, if the deaf person also has a visual impairment, a situation common among older persons, the lighted display may be part of the accessibility that person needs. Similarly, a modem manufacturer might offer V.18 compatibility only on its 9600 bps model, not its 56k bps model. Conversely, it may provide V.18 capability only on its fast modem, but some service providers do not support high speed modems. Furthermore, commenters provided no indication of how much of a price difference is to be considered as comparable. The statute provides only one reason for not making telecommunications equipment and customer premises equipment accessible, usable, or compatible and that is that it is not readily achievable. The clear meaning of the statute is, if it is readily achievable to put a vibrator in product A and product B, and V.18 capability in more than one modem, a manufacturer is required to do so.

The Board has acknowledged that it may not be readily achievable to make every product accessible or compatible. Depending on the design, technology, or several other factors, it may be determined that providing accessibility to all products in a product line is not readily achievable. The guidelines do not require accessibility or compatibility when that determination has been made, and it is up to the manufacturer to make it. However, the assessment as to whether it is or is not readily achievable cannot be bypassed simply because another product is already accessible. For this purpose, two products are considered to be different if they have different functions or features. Products which differ only cosmetically, where such differences do not affect functionality, are not

considered separate products. An appendix note has been added to clarify this point.

In drawing analogies from the ADA, the correct connection is between telecommunications equipment and customer premises equipment and the facility, not individual elements within the facility. For example, all theaters in a multi-theater complex must be accessible so that persons with disabilities can choose which films to see, not only a few theaters with "comparable" movies; all stadiums must be accessible, not just one for baseball, one for football, and one for soccer. Disabled persons' seat choices are limited but not whether they can see movie A or movie B. Also, within a phone bank, the one accessible phone is simply at a lower position but it is not merely "comparable" to the other phones in the bank, it is identical.

Finally, many of the commenters contend that certain requirements are not readily achievable if applied across all products. Several mentioned the incompatibility or conflict between solutions for different disabilities, though no examples of such conflicts were provided. If such designs are truly not readily achievable, the guidelines do not require accessibility or compatibility. Thus, the guidelines would be satisfied.

Comment. CEMA wanted the Board to take into account that the cost of retooling an assembly line is prohibitively expensive if done before the production cycle lifespan of a product has come to an end. CEMA recommended that the guidelines should be modified to recognize the need for manufacturers to complete production runs prior to making design changes and asked for a "grace period" after having complied with current guidelines before having to retool their assembly lines and update to any new guidelines.

Response. No explicit "grace period" is needed since it is built into the determination of readily achievable.

Comment. The majority of comments praised the Board for adhering to the recommendations of the TAAC report. However, several comments said the NPRM had converted numerous TAAC voluntary recommendations into mandatory obligations.

Response. The Board's guidelines are rules under the meaning of the Administrative Procedures Act¹ and are appropriately written in mandatory language. Nevertheless, the guidelines maintain the TAAC recommendations insofar as they were written as "shall"

or "should." Some of the TAAC recommendations which used "should" were placed in the appendix, such as the recommendation that manufacturers encourage distributors to adopt information dissemination programs similar to theirs, or to incorporate redundancy and selectability in products. Where the Board felt the provision was important enough that it belonged in the text, it was converted to a requirement. How each requirement is implemented will be determined as each manufacturer deems appropriate for its own operation, such as the requirement to consider including persons with disabilities in product trials.

Comment. One commenter recommended that the guidelines be clarified to explain that they apply solely to equipment used primarily for access to telecommunications services. The commenter pointed out that the Senate report exempted equipment used to access "information services". The commenter indicated that the Senate's definition of telecommunications, as set forth in the report "excludes those services, such as interactive games or shopping services or other services involving interaction with stored information, that are defined as information services."

Response. Information services are not covered by these guidelines. The Act defines what is telecommunications equipment and customer premises equipment. If a product "originates, routes or terminates telecommunications" it is covered whether the product does that most of the time or only a small portion of the time. Of course, only the functions directly related to a product's operation as telecommunications equipment or customer premises equipment are covered by the guidelines. A set-top-box which converts a television so that it can send e-mail or engage in Internet telephony, for example, is customer premises equipment when performing those functions. The Senate report only excludes those services described as "information services". It does not mean any equipment which receives such services is excluded if the product is also customer premises equipment.

Comment. One comment objected to the Board's exclusion of existing products for coverage by the guidelines, noting that the word "new" does not appear in the statute. Many current products will be on the market for some time and should be required to be retrofitted to be accessible or compatible, if readily achievable.

Response. While it is true that the word "new" does not occur in the

statute, the Senate report clearly says that the Board's guidelines should be "prospective in nature", intended to apply to future products. In addition, the statute applies to equipment designed, developed and fabricated which the Board interprets to mean that the Act applies to equipment for which all three events occurred after enactment of the Act. There is no requirement to retrofit existing equipment.

Section 1193.3 Definitions

With a few exceptions discussed below, the definitions in this section are the same as the definitions used in the Telecommunications Act of 1996.

Accessible. Subpart C contains the minimum requirements for accessibility. Therefore, the term accessible is defined as meeting the provisions of Subpart C.

Comment. A few commenters suggested making the definition more general by using a definition which did not refer to Subpart C.

Response. Using a more general definition would make the term "accessible" subjective and potentially allow the term to be used to describe products which do not comply with these guidelines. Therefore, the definition has not been changed.

Alternate Formats. Certain product information must be made available in alternate formats for the product to be usable by individuals with disabilities. Common forms of alternate formats are Braille, large print, ASCII text, and audio cassettes. Further discussion of alternate formats is provided in section 1193.33 and in the appendix.

No substantive comments were received and no changes have been made to this definition.

Alternate Modes. Alternate modes are different means of providing information to users of products including product documentation and information about the status or operation of controls. For example, if a manufacturer provides product instructions on a video cassette, captioning or video description would be required. Further discussion of alternate modes is provided in section 1193.33 and in the appendix.

Comment. Some commenters noted that the proposed definition did not actually define alternate modes, but simply gave a listing of examples. Also, several commenters, including the American Council of the Blind and the American Foundation for the Blind recommended that the term "audio description" be changed to "video description" because the term "video" more accurately describes the means of providing the information.

¹ See 5 U.S.C. 551 (4).

Response. A definition is provided for the term "alternate modes" in the final rule. In addition, the term "audio description" has been changed to "video description."

Compatible. Subpart D contains the minimum requirements for compatibility with existing peripheral devices or specialized customer premises equipment commonly used by individuals with disabilities to achieve access. Therefore, the term compatible is defined as meeting the provisions of Subpart D.

Comment. One commenter noted that the term "compatible" is too nebulous and broad and recommended substituting the word interoperable for compatible.

Response. The term "compatible" is taken directly from the statute. Therefore, the term has been retained in the final rule.

Customer Premises Equipment. This definition is taken from the Telecommunications Act. Equipment employed on the premises of a person, which can originate, route or terminate telecommunications, is customer premises equipment. "Person" is a common legal term meaning an individual, firm, partnership, corporation, or organization.

Customer premises equipment can also include certain specialized customer premises equipment which are directly connected to the telecommunications network and which can originate, route, or terminate telecommunications. Equipment with such capabilities is covered by section 255 and is required to meet the accessibility requirements of Subpart C, if readily achievable, or to be compatible with specialized customer premises equipment and peripheral devices according to Subpart D, if readily achievable.

Comment. The proposed rule asked for comments on the definition of customer premises equipment. Some commenters stated that it was unclear whether software was included in the definition. Also, it was suggested by one commenter that the definition include "wireless systems". Some comments from industry, including Matsushita Electric Corporation of America suggested that the definition of customer premises equipment be changed "to confine the applicability of the guidelines . . . to equipment the primary use of which is telecommunications, thus exclud[ing] such products as television receivers, VCRs, set-top boxes, computers without modems, and other consumer products the primary purpose of which is other than for telecommunications." Self Help

for Hard of Hearing People (SHHH) and many individuals who are hard of hearing suggested clarifying the definition to include public pay telephones as examples of customer premises equipment.

Response. If a product "originates, routes or terminates telecommunications" it is customer premises equipment and thus covered by the Act whether the product does that most of the time or only a small portion of the time. Only the functions directly related to the product's operation as customer premises equipment are covered. For example, the buttons, prompts, displays, or output and input needed to send and receive e-mail or an Internet telephone call are covered. Other functions not related to telecommunications, such as starting a program on a computer or changing channels on a combination television-Internet device would not be covered. The term "customer premises equipment" is defined in the Telecommunications Act and the definition in the NPRM was taken directly from the Act. The definition has been retained in the final rule without change.

The guidelines do not differentiate between hardware, firmware or software implementations of a product's functions or features, nor do they differentiate between functions and features built into the product and those that may be provided from a remote server over the network. The functions are covered by these guidelines whether the functions are provided by software, hardware, or firmware. As the NPRM indicated, customer premises equipment may also include wireless sets.² Finally, public pay telephones are considered customer premises equipment.³

Manufacturer. This definition is provided as a shorthand reference for a manufacturer of telecommunications equipment and customer premises equipment.

Comment. Several commenters recommended that the definition be modified to include subcomponent manufacturers, manufacturers of component parts which can convert a piece of equipment into customer premises equipment, and software

² See Declaratory Ruling, DA 93-122, 8 FCC Rcd 6171, 6174 (Com. Car. Bur. 1993) (*TOCSIA Declaratory Ruling*), recon. pending (finding that definition of "premises" includes "locations" such as airplanes, trains and rental cars, despite the fact that they are mobile).

³ See, Implementation of the Pay Telephone Reclassification and Compensation Provisions of the Telecommunications Act of 1996, 96-128, November 8, 1996.

manufacturers that design software to be used in telecommunications or customer premises equipment. The National Association of the Deaf recommended that the definition of manufacturer be flexible so that it does not unduly restrict the type of entity that is covered by section 255. Another commenter recommended that the term manufacturer be defined to include those who assemble the component parts into a final product.

Response. For the purposes of these guidelines, a manufacturer is the entity which makes a product for sale to a user or to a vendor who sells to a user. This would generally be the final assembler of separate subcomponents; that is, the entity whose brand name appears on the product. Acme Computers, for example, would be responsible for ensuring accessibility to any of its computers which can originate, route or terminate telecommunications. Such a computer might include a General Products modem which is itself a manufacturer because it sells General Products modems directly to the public. Acme Computers would be responsible for ensuring that it obtained the accessible General Products modem for inclusion in its computers. Also, Acme would ensure, through contractual provisions, purchase order stipulations, or any other method it chooses, that subcomponent suppliers who were not themselves manufacturers, provided accessible subcomponents where available. Thus, Acme can share or distribute responsibility for design, development and fabrication of accessible products. The definition has been clarified in the final rule.

Peripheral Devices. Section 255 (d) of the Act provides that when it is not readily achievable to make telecommunications equipment or customer premises equipment accessible, manufacturers shall ensure that the equipment is compatible with existing peripheral devices or specialized customer premises equipment commonly used by individuals with disabilities to achieve access, if readily achievable. No definition is provided in the Act but the term peripheral devices commonly refers to audio amplifiers, ring signal lights, some TTYs, refreshable Braille translators, text-to-speech synthesizers and similar devices. These devices must be connected to a telephone or other customer premises equipment to enable an individual with a disability to originate, route, or terminate telecommunications. Peripheral devices cannot perform these functions on their own.

No substantive comments were received and no changes have been made to this definition.

Product. This definition is provided as a shorthand reference for telecommunications equipment and customer premises equipment.

No substantive comments were received and no changes have been made to this definition.

Readily Achievable. Comment. Many comments from persons with disabilities and their organizations wanted the Board to apply stricter criteria, such as "undue burden," rather than readily achievable. The National Association of the Deaf (NAD) said it is critical that the readily achievable analysis under section 255 be performed on a case-by-case basis, rather than through a numerical or other standard formula for all telecommunications equipment. NAD also supported the NPRM proposal to consider design expertise, knowledge of specific manufacturing techniques, or the availability of certain kinds of technological solutions among a company's available resources. Further, a readily achievable determination made under section 255 should parallel a readily achievable analysis under the Americans with Disabilities Act (ADA) in that it should consider the entire operations and resources of a parent corporation and its subsidiaries in determining the manufacturer's resources.

Manufacturers, on the other hand, did not feel the resources of a parent company should be taken into account. They pointed out the unique financial configurations of telecommunications companies as being divided into separate design units, each with its own budgetary resources and fiscal responsibilities.

Response. The use of the term readily achievable rather than undue burden is a statutory requirement. The Board cannot change the term. What the guidelines can do is provide some guidance to manufacturers as to how to relate the readily achievable factors from the ADA to the telecommunications industry.

Both the statutory definition of readily achievable and the Department of Justice (DOJ) regulations include the resources of a parent company as a factor. However, such resources are considered only to the extent those resources are available to the subsidiary. If, for example, the subsidiary is responsible for product design but the parent company is responsible for overall marketing, it may be appropriate to expect the parent company to address some of the marketing goals. If, on the

other hand, the resources of a parent company are not available to the subsidiary, they may not be relevant. This determination would be made on a case-by-case basis.

Comment. Manufacturers were split on the issue of factors to be considered, some saying the ADA factors should be applied without amplification and others saying the unique character of telecommunications required a tailored set of criteria. Ericsson supported the NPRM adoption of the formal definition of readily achievable as "easily accomplishable and able to be carried out without much difficulty or expense." However, Ericsson recommended that any additional language which explains the factors to be considered in determining whether it is readily achievable for a manufacturer to make its equipment accessible or compatible, should be deleted. Ericsson commented that the FCC, pursuant to its complaint jurisdiction, is in a better position than the Access Board to determine what factors in the telecommunications context are relevant to the term readily achievable.

Response. The final rule includes an appendix note that discusses factors to be considered in making a determination whether an action is readily achievable or not. The factors are provided for guidance only and are neither presented in any particular order or given any particular weight. The Board expects that the FCC will set forth the factors which it will use to judge compliance. Once that occurs the Board will revise the appendix to these guidelines, as appropriate. However, in the absence of specific criteria issued by the FCC, the Board believes it is desirable to provide interim guidance.

Comment. Several manufacturers suggested adding readily achievable factors such as weighing the removal of one barrier against another, whether the solution would limit mass market appeal, "user-friendliness," and that one barrier should not be viewed in isolation to the availability of a comparable product that was accessible.

Several also said the removal of a barrier should not result in a fundamental alteration of the product. Motorola cited the DOJ ADA regulation as support that "accessibility or compatibility features that would fundamentally alter the nature of the telecommunications equipment at issue do not fall within the definition of readily achievable and therefore are not required." Motorola said that DOJ reached the conclusion that "fundamental alteration" is a component of "readily achievable" by drawing a comparison to the "undue

burden" standard, which defines the scope of a public accommodation's duty to provide auxiliary aids and services. The undue burden and readily achievable determinations depend upon the same factors. The undue burden standard, however, requires a higher level of effort to achieve compliance than the readily achievable limitation does. Since the undue burden standard excuses actions that would fundamentally modify goods and services, Motorola concludes that the readily achievable limitation would excuse such actions as well, even though this is not specifically stated in the regulations. Compactness and portability, Motorola continues, are fundamental characteristics of wireless customer premises equipment and that these attributes are responsible for their popularity. Incorporating accessibility features could, in some cases, result in a significant increase in the size of the customer premises equipment, thus fundamentally altering the nature of the product at issue.

Response. The appendix includes factors derived from the ADA and the DOJ regulations. Several commenters suggested adding additional factors. The Board was not persuaded that the additional factors suggested, such as mass market appeal or "user-friendliness," were consistent with those from the ADA or the DOJ regulations. However, the Board does acknowledge that readily achievable is intended to be a lower standard than "undue burden" and that the latter includes the concept of fundamental alteration. Therefore, consistent with the DOJ interpretation, fundamental alteration is listed as a factor in the appendix.

Comment. Some commenters said that since what is readily achievable will change over time, disability access requirements should be gradually phased-in.

Response. Since the determination whether an action is readily achievable will automatically change over time, with new technology or new understanding, no explicit phase-in is needed. Obviously, knowing about an accessibility solution, even in detail, does not mean it is readily achievable for a specific manufacturer to implement it immediately. Even if it only requires substituting a different, compatible part, the new part must be ordered and integrated into the manufacturing process. A more extreme implementation might require re-tooling or redesign. On the other hand, a given solution might be so similar to the current design, development and fabrication process that it is readily

achievable to implement it quickly. To incorporate a specific phase-in period would delay implementation of such a readily achievable solution. Each manufacturer would make its own determination as to what is now readily achievable and proceed according to its own schedule.

Comment. The NPRM asked (Question 2 (e)) whether resources other than monetary should be considered in determining whether an action is readily achievable. Motorola said that "the relative technological expertise of telecommunications manufacturers should not be a factor defining what is readily achievable." Motorola was concerned that measuring technological expertise would be too subjective and that criteria for measuring expertise may not be fairly and consistently applied. On the other hand, TIA said that resources other than monetary should be considered in determining whether an action is readily achievable. TIA suggested that the process of technological innovation is only feasible when the appropriate resources in the appropriate quantities are applied at the appropriate time.

Response. Some commenters seemed to think that the inclusion of technical expertise was to be used in place of financial resources or as a reason for requiring one company to do more than another. This was not the intent but, rather the reverse. That is, a company might have ample financial resources and, at first glance, appear to have no defense for not having included a particular accessibility feature in a given product. However, it might be that the company lacks personnel with experience in software development, for example, needed to implement the design solution. One might reason that, if the financial resources are available, the company should hire the appropriate personnel, but, if it does, it may no longer have the financial resources to implement the design solution. One would expect that the company would develop the technical expertise over time and that eventually the access solution might become readily achievable. The Board has never proposed to make any determinations of whether any activity was readily achievable, only to set forth a series of factors that a manufacturer would consider in making its own determination.

Comment. Motorola felt that it would be inappropriate for a government entity to "certify" the competence of any manufacturer or its personnel.

Response. There was never any suggestion that any government entity would "certify" any personnel or that

any determination would be made by anyone but the manufacturer itself. The question was designed to raise the issue that whether something was readily achievable could be related to more than monetary resources.

Comment. Some commenters said that proprietary accessibility features will frequently have additional costs associated with licensing fees. If rights to use those technologies can be obtained, which is not at all certain, the right to use proprietary technology to provide accessibility will be expensive. In some cases, such proprietary access technologies would not be available for a reasonable price and therefore could not be required.

Response. This cost would be included as part of an assessment of what is readily achievable.

Comment. One commenter stated that a manufacturer could hesitate before introducing a potentially valuable technical innovation if doing so would cause section 255 compliance costs to immediately skyrocket.

Response. Compliance costs would not "skyrocket" since cost is explicit in determining what is readily achievable. If the cost goes over what the manufacturer considers to be readily achievable, the compliance cost drops to zero because the new product is no longer required to be accessible or compatible.

Comment. The NPRM asked (Question 2 (b)) whether large and small manufacturers would be treated differently under the readily achievable limitation and whether this would confer a market advantage on small companies (Question 2 (c)) because they would have fewer resources and, therefore, be expected to do less. Comments uniformly supported the idea that the readily achievable criteria should be applied equally. Several comments pointed out that any advantage a small manufacturer derived would be temporary. A company with few resources, they argued, might be able to claim that providing accessibility was not readily achievable and could manufacture cheaper products. However, any competitive advantage it gained would result in higher sales, increasing its resources, until it could no longer claim access was not readily achievable.

Response. The NPRM question was confusing and apparently gave the impression that the Board was considering developing different criteria for large and small companies. The Board did not intend to suggest that different criteria would be applied to different sized manufacturers.

Comment. The NPRM asked (Question 2 (d)) whether "technological feasibility" should be an explicit factor in determining whether an action is readily achievable. Most comments agreed this is an important factor and said it needed to be included. However, some comments pointed out that if an action were not technologically feasible, it would not be accomplishable at all, let alone "easily accomplishable, without much difficulty or expense." NAD said that, where a manufacturer alleges that providing accessibility for a particular telecommunications product will not be technologically feasible, the manufacturer should be required to demonstrate that it has engaged in comprehensive efforts to overcome the technological problems at hand.

Response. The Board agrees that technological feasibility is inherent in the determination of what is readily achievable and does not need to be explicitly stated. The issue of what a manufacturer must demonstrate is a matter for the FCC to decide in an enforcement proceeding.

Specialized Customer Premises Equipment. Section 255(d) of the Telecommunications Act requires that whenever it is not readily achievable to make a product accessible, a manufacturer shall ensure that the equipment is compatible with existing peripheral devices or specialized customer premises equipment commonly used by individuals with disabilities to achieve access, if readily achievable. The Telecommunications Act does not define specialized customer premises equipment. As discussed above, the Act defines customer premises equipment as "equipment employed on the premises of a person (other than a carrier) to originate, route, or terminate telecommunications".

The Board noted in the NPRM that the Act and its legislative history do not make clear whether Congress intended to treat specialized customer premises equipment differently from peripheral devices. The NPRM also pointed out that certain specialized equipment, such as direct-connect TTYs, can originate, route, or terminate telecommunications without connection to other equipment. The NPRM concluded that if specialized customer premises equipment can originate, route, or terminate telecommunications, it appears that the equipment should be treated the same as customer premises equipment and asked (Question 3) if this should be the case.

Comment. The overwhelming majority of comments including those from the telecommunications industry

and disability organizations responded that if specialized customer premises equipment can originate, route, or terminate telecommunications, the equipment should be treated the same as customer premises equipment. The Trace Center commented that TTYs are made primarily for individuals who are deaf and requiring that TTYs provide voice output for all of the information displayed on the screen seems counter productive. One commenter suggested that the term "limited customer premises equipment" replace the term specialized customer premises equipment because it would more accurately describe a device that serves a certain population. Ultratec, a manufacturer of TTYs, commented that the majority of the output criteria, and all of the compatibility criteria, are not applicable to TTYs. Therefore, TTYs should not be considered customer premises equipment.

Response. The statute, not the guidelines, defines customer premises equipment. If specialized customer premises equipment can originate, route, or terminate telecommunications, it is customer premises equipment according to the statutory definition. Therefore, the term "specialized customer premises equipment" is defined in the final rule as "equipment employed on the premises of a person (other than a carrier) to originate, route, or terminate telecommunications, which is commonly used by individuals with disabilities to achieve access." If specialized customer premises equipment manufacturers are not required to follow the guidelines where readily achievable, then individuals with multiple disabilities, or individuals with disabilities other than deafness who want to communicate with individuals who are deaf may find it difficult or impossible to find specialized customer premises equipment that they can use. For example, even though it may seem "counter-productive," a person who is blind may need to communicate with a TTY user directly, without going through a relay service, and would need auditory output. Whether it is readily achievable to provide auditory output is for the manufacturer to decide. The fact that individuals with multiple disabilities are not the primary market for the specialized customer premises equipment is not persuasive, since this is equally true of all mass market manufacturers.

The provisions for accessibility and compatibility are required only when the feature or function is provided. For example, the requirement to provide a visual output applies only where an

auditory output is provided. Thus, if a product provides no auditory output for its operation, a corresponding visual output is not required. Therefore, a TTY should be able to meet the provisions for output and compatibility the same as any other telecommunications equipment or customer premises equipment. A particular manufacturer must make the determination of what is readily achievable on a case-by-case basis.

On balance, the Board concludes that specialized customer premises equipment should be considered a subset of customer premises equipment, and that manufacturers of specialized customer premises equipment should make their products accessible to all individuals with disabilities, including the disability represented by their target market, where readily achievable.

Comment. Ultratec pointed out that, currently, TTYs with direct connect capabilities are analog only units and that consumers cannot use the full capabilities of direct connect TTYs (i.e. auto answer capabilities), unless they install a separate analog port within their digital PBX system. This, Ultratec adds, is a compatibility issue and as a specialized customer premises equipment manufacturer cannot do anything to bring about access at this time in a digital environment.

Response. The Board understands that some manufacturers are working to solve the non-compatibility between analog and digital signals, but that a solution may not be readily achievable at this time. A note has been added to the appendix regarding strategies that can be used to improve the compatibility between TTYs and the telecommunications network in the interim until industry standards are in place.

Telecommunications. This is the same definition from the Telecommunications Act.

No substantive comments were received regarding this definition and no changes have been made in the final rule.

Telecommunications Equipment. This is the same definition from the Telecommunications Act.

No substantive comments were received regarding this definition and no changes have been made in the final rule.

Telecommunications Service. This is the same definition from the Telecommunications Act.

No substantive comments were received regarding this definition and no changes have been made in the final rule.

TTY. This definition is taken from the ADA Accessibility Guidelines, primarily for consistency with the Board's other guidelines.

No substantive comments were received regarding this definition and no changes have been made in the final rule.

Usable. This definition is included to convey the important point that products which have been designed to be accessible are usable only if an individual has adequate information on how to operate the product. Further discussion of usability is provided in § 1193.33.

Comment. Ericsson points out that neither the Act, nor its legislative history defines "usable" as meaning access to instructions, product information and documentation relative to products. Ericsson suggests that the term "usable" be stricken from the definitions section. The Trace Center recommended some minor editorial changes to the definition as proposed.

Response. The term "usable" in the Act does not stand alone, but, rather is part of a term of art, "accessible to and usable by" persons with disabilities, which is a standard phrase in disability law and regulation. The term generally means more than "convenient and practicable for use" as Ericsson suggested in its comments. Typically, "accessible" means an element complies with a specific technical specification whereas "usable" means a person with a disability can use the element effectively. Something can be accessible but not usable: a door can be built to correct specifications, with proper maneuvering space, but space can be blocked by furniture or otherwise be made unusable. Conversely, something can be usable but not accessible: a door which does not meet maneuvering space requirements (i.e., is not accessible) can be made usable by adding a power operator.

Telecommunications equipment or customer premises equipment is made usable to a purchaser by having instructions; except for the simplest device, it would not be usable by anyone without instructions. If instructions are not provided for any user, instructions in alternate formats would not be required. Accessible features can be provided, but without instructions, the product could not be used.

Where information or documentation is provided for a product, the information or documentation must be provided in an accessible format that is usable by a person with a disability. Clearly, to be usable by persons with disabilities instructions must be in a

form they can use: print information is not very helpful to a person who is blind and auditory information is useless to a person who is deaf. A slight editorial change has been made in response to the comment from the Trace Center.

Subpart B—General Requirements

Section 1193.21 Accessibility, Usability and Compatibility

This section provides that where readily achievable, telecommunications equipment and customer premises equipment shall comply with the specific technical provisions of Subpart C. Where it is not readily achievable to comply with Subpart C, telecommunications equipment and customer premises equipment shall comply with the provisions of Subpart D, if readily achievable. This is a restatement of the Act and sets forth the readily achievable limitation which applies to all subsequent sections of these guidelines.

Comment. Several comments pointed out that the NPRM applied the readily achievable limitation only to the provisions of Subparts C and D but not to the other provisions in the rule. They correctly noted that the statutory requirements for usability are also subject to the readily achievable limitation. As proposed, the obligations to provide usable documentation seemed to be absolute. Additionally, the Trace Center pointed out that the NPRM was unclear whether the requirements of Subpart D (Requirements for Compatibility With Peripheral Devices and Specialized Customer Premises Equipment) must be met if a product fully complies with the requirements in Subpart C (Requirements for Accessibility and Usability).

Response. The Board agrees that the statute applies the readily achievable limitation to usability as well as accessibility and compatibility. Therefore, the title of this section has been changed and the proposed §§ 1193.25, 1193.27 and 1193.29 have been moved to Subpart C and renumbered accordingly. Section 255 does not require telecommunications equipment and customer premises equipment to be both accessible and compatible. Therefore, telecommunications equipment and customer premises equipment are not required to be compatible with peripheral devices or specialized customer premises equipment if they comply with the requirements in subpart C.

Section 1193.23 Product Design, Development and Evaluation

This section requires manufacturers to evaluate the accessibility, usability, and compatibility of telecommunications equipment and customer premises equipment and incorporate such evaluation throughout product design, development, and fabrication, as early and consistently as possible. Manufacturers must develop a process to ensure that products are designed, developed and fabricated to be accessible whenever it is readily achievable. Since what is readily achievable will vary according to the stage of development (i.e., some things will be readily achievable in the design phase which are not in later phases), barriers to accessibility, usability, and compatibility must be identified throughout product design and development, from conceptualization to production. Moreover, usability can be seriously affected even after production, if information is not provided in an effective manner.

The details of such a process will vary from one company to the next, so this section does not specify the structure or specific content of a process. Instead, this section sets forth a series of factors that a manufacturer must consider in developing such a process. How, and to what extent, each of the factors is incorporated in a specific process is up to the manufacturer.

Comment. The majority of comments supported the provision as proposed but manufacturers generally objected to intrusions into their proprietary or discretionary activities. They also viewed this provision as creating paperwork burdens and criticized the Board for not using the TAAC recommendation which used the word "should" rather than mandatory language for this section.

Response. The provision, as proposed, consisted of a set of factors which the Board considers critical to the development of any plan which seeks to ensure that products will be designed, developed and fabricated to be accessible. As such, they are more than suggestions. On the other hand, the Board is fully aware that different manufacturers, or even the same manufacturer at different times, must be given the flexibility to tailor any such plan to its own particular needs. Therefore, while this section sets forth the factors which must be considered in approaching how accessibility will be provided, it does not prescribe any particular plan or content. It does not require that such a process be submitted to any entity or that it even be in

writing. The requirement is outcome-oriented, and a process could range from purely conceptual to formally documented, as suits the manufacturer. With respect to the "mandatory" nature of the provision, as explained elsewhere, the Board does not construe its statutory mandate as merely providing hortatory technical assistance. However, the Board did not ignore the TAAC recommendation, it merely approached it from a different direction.

Comment. Commenters almost uniformly misconstrued the provision as requiring extensive activities and documentation, which it does not. One manufacturer interpreted the section as requiring a "checklist" which would need to be completed for each product.

Response. While there is nothing to prevent a manufacturer from using extensive activities and documentation, this approach is neither required nor suggested. A "checklist" seems to envision an after-the-fact evaluation activity which is certainly not the best way to achieve access. It also seems to assume that such evaluation is to be applied to existing products. As explained in section 1193.2, these guidelines apply to products designed, developed and fabricated after the effective date of this rule. Of course, in the beginning, before designers and developers are knowledgeable and familiar with access, some checklist procedure may be useful. Ultimately, however, the goal is for designers to be aware of access and incorporate such considerations in the conceptualization of new products. When an idea is just beginning to take shape, a designer would ask, "How would a blind person use this product? How would a deaf person use it?" The sooner a manufacturer makes its design team cognizant of design issues for achieving accessibility and proven solutions for accessibility and compatibility, the easier this process will be. But, again, how this is done is up to the manufacturer.

Comment. Manufacturers also believed the provision required extensive marketing and testing programs, well beyond what they might currently provide.

Response. The guidelines do not require market research, testing or consultation, only that they be considered and incorporated to the extent deemed appropriate for a given manufacturer. If a manufacturer has a large marketing effort, involving surveys and focus groups, it may be appropriate to include persons with disabilities in such groups. On the other hand, some small companies do not do any real marketing, per se, but may just notice

that a product made by XYZ Corporation is selling well and, based on this "marketing survey" it decides it can make a cheaper one. Clearly, "involvement" of persons with disabilities is not appropriate in this case. The final provision, therefore, has been revised to make it clear that these activities are not expected to be created where none existed before.

Comment. TIA noted that the NPRM discussion assumes the impact will be low because manufacturers are only required to achieve what can be accomplished easily, without much difficulty or expense. "This appears," says TIA, "to omit consideration of the costs of making readily achievable determinations in the first place, prior to any expenditures on design, development and fabrication."

Response. As stated above, in the beginning manufacturers may spend some time evaluating products and the difficulty and expense of doing so may contribute to a finding that accessibility is not readily achievable. These costs have not been omitted, they are explicitly included in deciding whether an action is readily achievable, a determination which is to be made by the manufacturer not the Board. Moreover, as designers become more familiar with access and as technological solutions are found, the process should become more and more automatic. The Board has a positive regard for manufacturers of telecommunications equipment and customer premises equipment as enterprising innovators who desire to provide access because they view it as the right thing to do, and because it is good business, not just because there is a Federal requirement. Indeed, recent announcements by telecommunications companies suggests this is true.⁴

Comment. SBC Communications commented that the complex interrelationship between equipment and services in providing accessibility to telecommunications suggests that coordination and cooperation between manufacturers and service providers will be beneficial. SBC agreed that involving individuals with disabilities in the product development process will encourage appropriate design solutions to accessibility barriers and permit the exchange of relevant information. It believed that the same benefits would flow from interchanges with service providers.

Response. The Board agrees that it would be desirable for manufacturers to

consult with service providers during the design phase. As SBC points out, the solution to a particular barrier might be better addressed by the service or might involve a combination of service and equipment designs. Accordingly, the recommendation has been added to the appendix to include service providers in any consultation process.

Comment. The American Council of the Blind (ACB) strongly supported the provision that manufacturers include individuals with disabilities in market research, product design, and testing. ACB felt that including individuals with disabilities is important but that manufacturers should consult with representatives from a cross-section of disability groups, particularly individuals whose disabilities affect hearing, vision, movement, manipulation, speech, and interpretation of information. ACB believed that it was important to remind manufacturers that they should work with a broad cross-section of disability groups and not just some.

Response. The Board agrees that a cross-section of disability groups should be included in an evaluation of the accessibility and usability of telecommunications equipment and customer premises equipment. However, since the provision is meant to be general, no change has been made in the final rule.

Subpart C—Requirements for Accessibility and Usability

Section 1193.31 Accessibility and Usability

This section provides that, subject to section 1193.21, manufacturers must design, develop and fabricate their products to meet the specific requirements of sections 1193.33 through 1193.43. As discussed under section 1193.21, some sections related to usability have been moved to this subpart to reflect that they are subject to the readily achievable limitation. The title has been changed and the sections renumbered accordingly.

Comment. Several manufacturers suggested replacing "shall" with "should" throughout and placing all the requirements in an appendix, not in the guidelines.

Response. As discussed previously, the guidelines are not merely advisory technical assistance.

Section 1193.33 Information, Documentation and Training [1193.25 in the NPRM]

Paragraph (a) of this section requires that manufacturers provide access to information and documentation. This

information and documentation includes user guides, installation guides, and product support communications, regarding both the product in general and the accessibility features of the product. Information and documentation are what make a product usable by anyone and, if such information is provided to the public at no charge, it must be provided to people with disabilities at no additional charge. Alternate formats or alternate modes of this information are also required to be available, upon request. Manufacturers are also required to ensure usable customer support and technical support in the call centers and service centers, which support their products.

Comment. The American Council of the Blind (ACB) commented that the provision as proposed was unclear if alternate formats must be available at no additional charge. They also added that the alternate format provided should be of the customer's choosing, that alternate formats are not interchangeable, and that a manufacturer cannot determine which format is appropriate for any particular customer.

Response. The Board agrees that the provision may have been unclear in the NPRM. The final rule has been revised to clarify that additional charges may not be required for the description of accessibility and compatibility features of the product, end-user product documentation, and usable customer support and technical support. There is nothing prohibiting a manufacturer from charging everyone for these services. However, people with disabilities may not be charged an additional fee above the fee charged to everyone.

The specific alternate format or mode to be provided is that which is usable by the customer. Obviously, it does no good to provide documentation in Braille to someone who does not read it. While the user's preference is first priority, manufacturers are not expected to stock copies of all materials in all possible alternate formats and may negotiate with users to supply information in other formats. For example, Braille is extremely bulky and can only be read by a minority of individuals who are blind. Audio cassettes are usable by more people but are difficult for users to find a specific section or to skip from one section to the next. Documentation provided on disk in ASCII format can often be accessed by computers with appropriate software, but is worthless if the information sought is how to set up the computer in the first place. Of course, if instructions are provided by videotape, appropriate video

⁴ "Bell Atlantic, NYNEX Announce Plans To Make Services, Products More Accessible," press release, February 3, 1997.

description would be needed for persons who are blind and captions would be needed for persons who are deaf or hard of hearing.

Comment. Some commenters said customer support lines should be made accessible to people with hearing loss. Specifically, they pointed out that automated voice response systems go too fast, are not clear and do not allow for repeats making them inaccessible for most people with hearing loss. They recommended that menus should be set up to allow someone to escape early on by dialing a standard number such as "0" to talk to a person.

Response. Providing a quick means to "opt out" of a voice mail menu system is a useful feature to make such systems more usable by people who are hard of hearing. In addition, ensuring usable customer support may mean providing a TTY number, since the current automated voice response systems cannot be used by individuals who are deaf either. Such systems cannot be accessed by TTY relay services since there is generally insufficient time for the operator to type the choices and the deaf caller must wait until the end before responding. Also, if such menu systems require quick responses, they may not be usable by persons with other disabilities. An appendix note has been added recommending that automated voice response systems should be set up to allow someone to escape early on. The appendix also provides guidance on how to provide information in alternate formats and modes.

Paragraph (b) requires manufacturers to include in general product information the name and contact means for obtaining the information required by paragraph (a).

Comment. The NPRM specified a telephone number but some commenters pointed out that e-mail and Internet methods might be equally valid methods of contacting a manufacturer for information.

Response. More and more companies have access to e-mail but all companies do not. The final rule has generalized this requirement to allow for different ways other than just a telephone number to contact a manufacturer. However, a phone number is the preferred method of contact since many more people have telephones than have access to e-mail or the Internet. Additional ways of contacting a manufacturer are encouraged but are not required. The name of the contact point can be an office of the manufacturer rather than an individual.

Paragraph (c) requires manufacturers to provide employee training appropriate to an employee's function.

In developing, or incorporating information into existing training programs, consideration must be given to the following factors: accessibility requirements of individuals with disabilities; means of communicating with individuals with disabilities; commonly used adaptive technology used with the manufacturer's products; designing for accessibility; and solutions for accessibility and compatibility.

Comment. Several manufacturers claimed the guidelines contemplate costly training of manufacturers' employees. Several comments pointed out that the NPRM applied the readily achievable limitation only to the provisions of subparts C and D but not to the other requirements of this rule.

Response. The key to usability is information and the manufacturer's employees must know how to provide it in an effective manner. This is especially true for good technical support, if persons with disabilities are to receive adequate information on how to use the new accessibility features of telecommunications equipment and customer premises equipment. The guidelines, however, do not require a specific training program, only that certain factors be considered and incorporated to the extent deemed appropriate by a given manufacturer.

Obviously, not every employee needs training in all factors. Designers and developers need to know about barriers and solutions. Technical support and sales personnel need to know how to communicate with individuals with disabilities and what common peripheral devices may be compatible with the manufacturer's products. Other employees may need a combination of this training. No specific program is required and the manufacturer is free to address the needs in whatever way it sees fit, as long as effective information is provided.

The Board agrees that the statute applies the readily achievable limitation to usability as well as accessibility and compatibility. As noted in the discussion in section 1193.21 above, the title of this section has been changed and the proposed section has been moved to Subpart C and renumbered accordingly.

Section 1193.35 Redundancy and Selectability [1193.33 in the NPRM]

This section proposed that products incorporate multiple modes for input and output functions and that the user be able to select the desired mode.

Comment. Manufacturers objected to this provision on the basis that it added unnecessary and potentially unwanted

functions to a product which could affect its marketability and even result in a "fundamental alteration" of the product. It would also, in their view, cause the product to be too complicated.

Response. Although this provision was supported by persons with disabilities, it may run contrary to section 1193.41 (i), which intends to make products accessible to persons with limited cognitive skills. As a result, the provision is being reserved at this time, with a recommendation for redundancy and selectability placed in the appendix. The Board intends to consider this provision further and highlight it for evaluation in its market monitoring report. If the Board's market monitoring report shows that redundancy and selectability can be provided without unnecessary complexity, it will re-evaluate the "reserved" status of this provision.

Section 1193.37 Information Pass-through [1193.27 in the NPRM]

This section requires telecommunications equipment and customer premises equipment to pass through codes, translation protocols, formats or other information necessary to provide telecommunications in an accessible format.

Comment. Most manufacturers pointed out that the provision as proposed could require manufacturers to anticipate any possible code or protocol another party might devise and to pass it through. Moreover, some technologies operate through "compression" of one sort or another and cannot be turned on or off, as suggested by the NPRM preamble. In addition, manufacturers objected to the one-sided nature of the requirement and wanted manufacturers of peripheral devices and specialized customer premises equipment to be held accountable, as well. Finally, CEMA objected to the example of closed captioning cited in the NPRM as implying that televisions were covered by the guidelines.

Response. The provision in the final rule has been modified by language suggested by the Trace Center to specify that the information to be passed through must be standardized and non-proprietary. Also, this provision is subject to the readily achievable criteria so that the obligation is not absolute.

The Board agrees that manufacturers of other types of equipment need to be cognizant of the capabilities of telecommunications equipment and customer premises equipment, as was strongly recommended by the TAAC. However, the statute places the responsibility for compatibility on the

telecommunications equipment and customer premises equipment manufacturer and neither the Telecommunications Act nor any other statute gives the Board authority to regulate manufacturers of peripheral devices. Specialized customer premises equipment, on the other hand, is regarded as a subset of customer premises equipment and, therefore, subject to these guidelines.

Finally, the example of closed captions cited in the NPRM was merely to illustrate the principle of information pass-through. Closed captioning is covered by other rules and regulations issued by the FCC and is not a subject of this proceeding.

Section 1193.39 Prohibited Reduction of Accessibility, Usability and Compatibility [1193.29 in the NPRM]

This section provides that no change shall be undertaken which decreases or has the effect of decreasing the net accessibility, usability, and compatibility of telecommunications equipment or customer premises equipment.

Comment. This provision was uniformly supported by disability groups, many of whom cited examples of an accessible feature or design which was later defeated by an alteration. Manufacturers, on the other hand, uniformly objected to it. Several pointed out that it was not a part of the TAAC recommendations and that it unnecessarily restricted design and innovation. For example, it seemed to prevent a manufacturer from even discontinuing an obsolete product if it had an accessibility feature unless the same feature were incorporated in its replacement. This was unreasonable, they claimed, because a newer technology might be better and more efficient but it might not be readily achievable to incorporate the same accessibility feature. Products are discontinued from time to time because they do not sell, but this provision as proposed may have required any product with an accessibility feature to be continued in perpetuity.

Response. Providing that no change shall be undertaken which decreases or has the effect of decreasing accessibility is a common principle in disability access codes and standards and was borrowed from both the ADA Accessibility Guidelines (ADAAG) and the Uniform Federal Accessibility Standards (UFAS). Both of these prohibit alterations which reduce or have the effect of reducing accessibility below the requirements for new construction. Those provisions were intended to apply to alterations to

buildings and facilities which have a relatively static base. However, where technology is constantly changing, the principle in this rule, which is analogous to the alterations provisions of ADAAG and UFAS, may need adjusting. TIA suggested adding language that would refer to the "net" accessibility, usability and compatibility of products. As previously discussed, the statute does not require that a new product be both accessible and compatible, and establishes accessibility as the first priority. Since an alteration never establishes a requirement which is greater than for new construction, the same concept holds true for section 1193.39. For example, it might not be readily achievable to provide accessibility in the first iteration of a particular product, but compatibility is readily achievable. However, in an upgrade, technology or other factors may have changed so that accessibility is now readily achievable. Since the statute does not require a new product to be both accessible and compatible, a change which increased accessibility but decreased compatibility would not be prohibited. The provision has been modified accordingly.

The Board agrees that it would be unreasonable to require obsolete or unmarketable products to be maintained beyond their useful life. Since any new product introduced to replace another would be subject to the statutory requirement to provide accessibility or compatibility if readily achievable, a specific exception has been added to allow for product discontinuation. The Board does not believe this change will significantly affect the availability of accessible products. The Board intends to highlight this item for attention in its market monitoring report to determine if this provision needs to be modified in the future.

Section 1193.41 Input, Control, and Mechanical Functions [1193.35 in the NPRM]

This section requires product input, control and mechanical functions to be locatable, identifiable, and operable through at least one mode which meets each of the following paragraphs. This means, each of the product's input, control and mechanical functions must be evaluated against each of paragraphs (a) through (i) to ensure that there is at least one mode that meets each of those requirements. Of course, there may be one mode which meets more than one of the specific provisions. This section does not specify how the requirement is to be met but only specifies the outcome. The appendix to this rule contains a set of strategies which may

help in developing solutions. In some cases, a particular strategy may be directly applicable while a different strategy may be a useful starting point for further exploration.

Comment. A few commenters said that it was not clear whether a single mode was to meet all of the paragraphs in this section or whether one mode was to meet paragraph (a), one mode was to meet paragraph (b), and so forth.

Response. In an effort to reduce the redundant language in the TAAC report, confusion may have been created in the NPRM. Therefore, the phrase "at least one mode" has been removed from the overall charging statement and instead repeated in the individual paragraphs. Some additional language has also been provided to clarify that each of the paragraphs (a) through (i) are to be satisfied independently. That is, it may be readily achievable to satisfy (a), (c), and (g), for example, but none of the others. Again, one mode may be able to satisfy more than one paragraph.

Paragraph (a) Operable without vision. No substantive comments were received on this paragraph and no changes were made, other than the editorial changes mentioned in the opening paragraph of this section.

Paragraph (b) Operable with low vision and limited or no hearing.

Comment. The Trace Center suggested that both the upper and lower limits for low vision be included and that the paragraph title be amended to include the restriction on audio output.

Response. The provision has been modified accordingly.

Paragraph (c) Operable with little or no color perception. No substantive comments were received on this paragraph and no changes were made, other than the editorial changes mentioned in the opening paragraph of this section.

Paragraph (d) Operable without hearing. No substantive comments were received on this paragraph and no changes were made, other than the editorial changes mentioned in the opening paragraph of this section.

Paragraph (e) Operable with limited manual dexterity. No substantive comments were received on this paragraph and no changes were made, other than the editorial changes mentioned in the opening paragraph of this section.

Paragraph (f) Operable with limited reach and strength. *Comment.* In the NPRM the Board had asked (Question 6) whether the ADAAG provisions for controls and operating mechanisms and reach ranges should be included here. The few comments on this issue felt

those provisions might be too specific for these guidelines.

Response. The ADAAG provisions have not been added to these paragraphs but have been included in the appendix for reference, with the notation that some customer premises equipment might be covered by the ADA and required to comply with ADAAG.

Paragraph (g) Operable without time-dependent controls. Comment. The NPRM had proposed a three-second time limit. A few comments suggested a single number was not appropriate for different actions and that more research is needed before applying a specific time limit.

Response. The specific time limit has been removed and the more general performance language from the TAAC report substituted. Some of the discussion on this subject provided by the Trace Center has been included in the appendix.

Paragraph (h) Operable without speech. No substantive comments were received on this paragraph and no changes were made, other than the editorial changes mentioned in the opening paragraph of this section.

Paragraph (i) Operable with limited cognitive skills. No substantive comments were received on this paragraph and no changes were made, other than the editorial changes mentioned in the opening paragraph of this section.

Section 1193.43 Output, Display, and Control Functions [1193.37 in the NPRM]

Section 1193.43 applies to output, display, and control functions which are necessary to operate products. This includes lights and other visual displays and prompts, control labels, alphanumeric characters and text, static and dynamic images, icons, screen dialog boxes, and tones and beeps which provide operating cues or control status. Since functions requiring voice communication are more specific than the general output functions covered by this section, the Board sought comment (Question 10) on whether moving the requirements of paragraphs (b)(9) and (b)(10) to a different section would be less confusing to designers and manufacturers.

Comment. The Trace Center pointed out that control labels had been omitted, as well as sounds, from the list of examples. Also, Trace noted that it appeared that voice communication did not need to comply with any of the paragraphs in the NPRM except (9) and (10) and questioned whether voice communication should be treated separately. Trace speculated that this

may have been done to avoid any requirement for speech-to-text translation. While this may currently not be readily achievable, recent technological advances are approaching practical translation and Trace saw no reason why such translation should not be required when it becomes readily achievable.

Response. The phrase "incidental operating cues" was intended to include sounds but "sounds" has been added, along with "labels," and the phrase "but not limited to" to clarify that the list of examples is not exhaustive. In the NPRM, this section was divided into subsections (a) and (b) because the requirements for voice communication did not seem to fit with the rest of the section. Since this organization caused some confusion, the NPRM division into subsections (a) and (b) has been eliminated. Former paragraph (b)(10) has been incorporated into paragraph (e), and the paragraphs renumbered accordingly. Also, as with section 1193.41, the phrase "at least one mode" has been removed from the general paragraph and repeated in subsequent paragraphs to clarify that each of the paragraphs (a) through (i) are to be satisfied independently. That is, it may be readily achievable to meet the requirements of (b), (d), and (g), for example, but none of the others. Again, one mode may be able to satisfy more than one paragraph.

Paragraph (a) Availability of visual information. No substantive comments were received on this paragraph and no changes were made, other than the editorial changes mentioned in the opening paragraph.

Paragraph (b) Availability of visual information for low vision users.

Comment. As discussed under section 1193.41 (b), a range has been included for low vision.

Paragraph (c) Access to moving text.

Comment. The NPRM provision exempted TTYs from this provision because it assumed a person who needed static text could ask the TTY sender to pause or type slowly. The Trace Center pointed out that there are many automatic TTY messages for which this option is not possible. Also, the message recipient could not communicate the request to the sender until the sender had completed typing and transmitted "GA." Trace further noted that many TTYs have a means to save text or are equipped with a printer.

Response. The Board agrees that automatic messages could be a problem and that one may not be able to communicate with the sender until the message has gone by. In addition, this provision applies to

telecommunications equipment and customer premises equipment, not peripheral devices. Since the majority of TTYs to which this provision would apply would usually have a printer or a feature to save the message to memory for playback line by line, the Board has removed the exception.

Paragraph (d) Availability of auditory information. Comment. TTY to TTY long distance and message unit calls from pay telephones are often not possible because an operator says how much money must be deposited. Technology exists to have this information displayed on the telephone and an installation is currently operating at the Butler plaza on the Pennsylvania Turnpike.

Response. This is a good example and has been placed in the appendix. No changes have been made to this provision, other than the editorial changes mentioned in the opening paragraph.

Paragraph (e) Availability of auditory information for people who are hard of hearing. Comment. The majority of comments from persons who are hard of hearing reported having trouble using public pay telephones because of inadequate receiver amplification levels. These commenters supported the proposed provision that products be equipped with volume control that provides an adjustable amplification ranging from 18–25 dB of gain.

However, TIA and several manufacturers cited the National Technology Transfer and Advancement Act of 1996, which requires the Federal government to make use of technical specifications and practices established by private, voluntary standards-setting bodies wherever possible. Furthermore, TIA claimed that the higher range will result in signals encroaching on the acoustic shock limits of telephone receiver output. TIA recommended that this section be revised to reflect a general performance standard, similar to the recommendation in the TAAC report. Some comments pointed out that there was no baseline signal against which the gain is to be measured. That is, for a weak signal even 18–25 dB of gain may be ineffective, while for a strong signal, the present ADAAG and FCC requirement of 12–18 dB may be sufficient. Also, industry commenters said that increasing gain may not be the only, or even the best way to provide better access since amplifying a noisy signal also amplifies the noise.

Response. Information submitted by SHHH indicates that the proposed gain of 25 dB is not a problem for current telephone technology. The information was based on testing conducted by two

independent laboratories (Harry Teder Ph.D., Consulting in Hearing Technology and Harry Levitt, Ph.D., Director, Rehabilitation Engineering and Research Center on Hearing Enhancement and Assistive Devices, Lexington Center). High gain phones without special circuitry currently on the market were tested which put out 90 dB and 105 dB at maximum volume setting. This is a 20 dB gain over the standard 85 dB. The sound was clear with no distortion. SHHH said that this shows that a 90 dB and 105 dB clean speech level is achieved with phones commercially available with no worse distortion levels than on public phones at normal levels. With special circuits and transducers, telephones could generate even higher amplification levels, above 25 dB, without distortion.

The current FCC standard for 12–18 dB of gain was adopted from ADAAG which requires certain public pay telephones to provide a gain of 12–18 dB. However, this provision is frequently incorrectly applied so that the gain only falls somewhere within this range but does not reach the 18 dB level. In fact, the requirement is to provide gain for the entire range of 12–18 dB.

The Board is currently reviewing all of its ADAAG provisions and will be issuing a NPRM in 1998 which will propose a new ADAAG. The changes to ADAAG will be based on recommendations of the Board's ADAAG Review Advisory Committee. That Committee recommended increasing the gain for public pay telephones from 12–18 dB to 12–20 dB. Recently, the ANSI A117.1 Committee released its 1997 "Accessible and Usable Buildings and Facilities" standard. This voluntary standard-setting body issues accessibility standards used by the nations model building codes. The ANSI standard requires certain public pay telephones to provide 12 dB of gain minimum and up to 20 dB maximum and that an automatic reset be provided. The 1997 ANSI A117.1 document and the Board's new ADAAG are being harmonized to minimize differences between the two documents.

Therefore, in accordance with the National Technology Transfer and Advancement Act, the final rule has been changed to adopt the provision as currently specified in the private, voluntary ANSI standard, with wording to clarify its meaning. For example, the ANSI provision was written under the assumption of an incremental, stepped volume control. If a volume adjustment is provided that allows a user to set the level anywhere from 0 to the upper

requirement of 20 dB, there is no need to specify a lower limit. If a stepped volume control is provided, one of the intermediate levels must provide 12 dB of gain. Although the final rule does not provide the higher 25 dB level as proposed in the NPRM, the Board intends to highlight this provision for evaluation in its market monitoring report. If the Board's market monitoring report shows that persons with hearing impairments continue to report having trouble using telephones because the level of amplification is not high enough, the Board will re-evaluate this provision.

Recently, the FCC issued an order⁵ postponing until January 1, 2000, the date by which all telephones covered by Part 68 must be equipped with a volume control. This order was issued as a response to a request for reconsideration asking that the requirement only be applied to new equipment. That request was denied but the time for compliance was extended to take into account its application to telephones already registered under Part 68.

The guidelines only apply to telecommunications equipment and customer premises equipment designed, developed and fabricated after March 5, 1998. Therefore, the guideline provision does not conflict with the FCC order. New telephones will be covered by these guidelines and existing telephones will have until January 1, 2000, to comply with the FCC Order.

Paragraph (f) Prevention of visually induced seizures. Comment. The NPRM suggested that the flash rate for visual indicators be set at or below 3 Hz, based on research for visual fire alarms, and asked (Question 8) whether this value was appropriate. The Epilepsy Foundation of America suggested that the value be reduced to a maximum 2 Hz, based on recent suggested changes to ADAAG and the ANSI A117.1 accessibility standard. The Trace Center also suggested the 2 Hz lower end but pointed out that some visual characteristics of video screens, for example, could not achieve that level. Trace presented data to indicate that a range of frequencies should be excluded between 2 Hz and 70 Hz.

Response. The provision has been revised according to the suggestion from Trace.

The NPRM also asked (Question 9) whether a similar provision should be included for seizures induced by auditory stimuli.

Comment. Those comments which addressed this issue said that the data are limited and that the responses seem

to be very individual. At this time, there appears to be no good information on whether there are frequencies which should be avoided. The Massachusetts Assistive Technology Partnership encouraged the Board to conduct research on this issue. Trace Center noted that the provision for audio cutoff would help alleviate the problem by allowing a person with such a disability to insert a plug and cut off any external auditory cues. Since another provision of the guidelines would require the information to be conveyed visually, the person should be able to operate the product.

Response. The Board has not added a provision at this time but will seek further information on seizures induced by auditory stimuli.

Paragraph (g) Availability of audio cutoff. Comment. Comments from persons with hearing impairments supported this provision. However, some comments from both people with disabilities and manufacturers misunderstood this requirement. These comments thought the audio cutoff applied to the input rather than the output of the product, such as the input through a telephone handset.

Response. The provision has been reworded to clarify its application.

Paragraph (h) Non-interference with hearing technologies. Comment. Persons with hearing impairments uniformly supported this provision. Manufacturers, however, said it posed problems with respect to wireless telephones. They pointed out that the provision as written specified zero interference whereas, that was not physically possible. Interference could only be reduced so far, they said, and both the telephone and the hearing aid played a role. They urged the Board to defer any such requirement until the ANSI C63 Committee had finished its work. Some manufacturers also objected to the requirement's coverage of bystanders as outside the Act's jurisdiction. Also, the Trace Center viewed interference as a compatibility issue which should be addressed in Subpart D where it is repeated.

Response. The Board agrees that interference levels are a complex issue and cited the work of the ANSI C63 Committee in the NPRM. Interference is a function of both the hearing aid and telephone, and the C63 Committee is seeking to define "acceptable" levels of interference with respect to types of hearing aids and classes of telephones. The standard would also prescribe testing protocols. The Board does not believe, however, that it should defer a requirement until the ANSI Committee has finished its work, but it does expect

⁵ FCC 97-242, July 17, 1997.

the Committee's work to help clarify what is readily achievable. Therefore, the provision has been modified slightly in the final rule to emphasize that products are to produce the least interference possible. In subsequent revisions to these guidelines the Board will propose standards for RF emissions and will consider the results of the ANSI C63 Committee, if they are available, in developing such standards.

For now, the reference to bystanders has been removed because a device which has reduced the interference to a level which is acceptable to the user is likely to have reduced it for a bystander as well. However, what is not known at this time is the effect another nearby wireless telephone might have on a person's ability to use a properly designed wireless telephone. That is, a person with a hearing impairment may have purchased a telephone which produces minimal interference with his or her hearing aid but finds that telephone cannot be used when in the vicinity of another wireless telephone user. The Board intends to specifically address this issue in the market monitoring report to see whether the prohibition of bystander interference should be reinstated.

Finally, this provision appears to be a compatibility issue, but it is really an accessibility one. If a hearing aid user experiences unacceptable levels of interference, the telephone is inaccessible to that person. The provision correctly belongs in Subpart C because the statute does not require telecommunications equipment and customer premises equipment to be both accessible and compatible. That is, if the provisions of Subpart C are met, the manufacturer does not need to consider the provisions of Subpart D. Furthermore, since the provisions of Subpart C are applied first, if it is not readily achievable for a manufacturer to meet this provision here, it would not be readily achievable in Subpart D either. Therefore, the provision has been removed from Subpart D.

Paragraph (i) Hearing aid coupling. No substantive comments were received on this provision and no changes were made, other than the editorial revisions discussed in the general section.

Subpart D—Requirements for Compatibility With Peripheral Devices and Specialized Customer Premises Equipment

Section 1193.51 Compatibility [1193.41 in the NPRM]

Section 1193.51 requires that when it is not readily achievable to make a product accessible, the product must be

compatible with existing peripheral devices or specialized customer premises equipment commonly used by individuals with disabilities to achieve access, if readily achievable.

Comment. Several commenters expressed concern that the NPRM failed to reflect adequately the shared responsibility of manufacturers of telecommunications equipment and customer premises equipment with manufacturers of peripheral devices. Nortel gave the example that electromagnetic compatibility requires both the use of proper hearing aid shielding and prevention of unwanted emissions from the customer premises equipment. Siemens pointed out that it is unrealistic, and often impossible to make equipment compatible with all potential forms of peripheral devices, unless the manufacturer controls all aspects of the affected equipment. The commenters recommended that the Board encourage peripheral device manufacturers to adhere to compatibility standards where they exist, and to develop corresponding standards for customer premises equipment and peripheral devices where they are needed but do not yet exist.

Response. The statute places the responsibility for compatibility on the telecommunications equipment and customer premises equipment manufacturer and neither the Telecommunications Act nor any other statute gives the Board authority to regulate manufacturers of peripheral devices. However, specialized customer premises equipment is regarded as a subset of customer premises equipment and, therefore, subject to these guidelines. As discussed earlier, the Board agrees that manufacturers of peripheral devices and other types of equipment need to be cognizant of the capabilities of telecommunications equipment and customer premises equipment.

Comment. The Information Technology Industry Council recommended that the compatibility requirements should recognize the differences between traditional telephony products and information technology products. Unlike traditional telephony customer premises equipment, information technology products are invariably associated with software. It is typically software, in conjunction with hardware, that enables compatibility between an information technology appliance and peripheral devices. Thus, the guidelines should acknowledge that when information technology hardware products are compatible with software that enables

accessibility options and satisfies the compatibility requirements, the hardware is consistent with the compatibility guidelines.

Response. As the Board noted in the NPRM, "evolving telecommunications technologies often make it difficult to distinguish whether a product's functions and interfaces are the result of the design of the product itself, or are the result of a service provider's software or even an information service format." These guidelines do not differentiate between hardware and software implementations of a product's functions or features, nor is any distinction made between functions and features built into the product and those that may be provided from a remote server over the network.

Paragraph (a) of the proposed rule required that information needed for the operation of a product (including output, alerts, icons, on-line help, and documentation) be available in a standard electronic text format on a cross-industry standard port. It also required that all input to and control of a product shall allow for real time operation by electronic text input into a cross-industry standard external port and in cross-industry standard format which do not require manipulation of a connector by the user. The proposed rule also provided that products shall have a cross-industry standard connector which may require manipulation.

Comment. The Trace Center strongly endorsed the inclusion of this provision in the final rule. In many cases, Trace said, a cross-industry standard external port, such as an infrared link, will be the only mechanism that will allow access to systems by individuals with multiple and more severe disabilities. An infrared link can also provide a mechanism for providing access to the smaller, more advanced telecommunication devices and provide a safety net for products which are unable to incorporate other technologies. Trace noted that there is a joint international effort to develop a Universal Remote Console Communication (URCC) protocol which would achieve this functionality and that existence of a standard protocol is essential to the practical implementation of this provision. Unless a standard approach is developed that both the standard product and peripheral device manufacturers can build to, it would be difficult to meaningfully comply with this provision.

Trace also noted that the NPRM would require that all products have both a wireless and a hard-wire

connection. Requiring that products have a standard physical connector is expensive. The only ports currently supported by most assistive technologies are RS232 serial ports. An infrared connector could be fitted to these serial ports on the peripheral devices to add an infrared capability to the peripheral devices. However, the opposite is not true for customer premises equipment. It is not easy to add a physical port to customer premises equipment. Trace recommended that the requirement for a physical connection point be removed.

Response. The Board agrees that requiring a standard physical connector on customer premises equipment may be an expensive strategy. Because an infrared connector can be inexpensively added to the serial ports on peripheral devices to add an infrared capability, the Board is deleting the requirement for a physical connection point on products covered by section 255. An appendix note has been added to alert readers that a standard has been proposed that will empower wireless communication devices, such as cellular phones, pagers and personal computers to transfer useful information over short distances using IrDA infrared data communication ports.

Paragraph (b) of the proposed rule provided that products providing auditory output must provide the auditory signal through an industry standard connector at a standard signal level.

Comment. The Trace Center commented that some type of a standard approach for providing audio output should be provided and that industry standard connectors already exist. Trace recommended that miniature and sub-miniature stereo jacks could meet this performance requirement. Another commenter pointed out that this requirement is particularly important for telephones that are not under the direct control of the user, such as public pay telephones and business telephones. The commenter recommended that the connector should be capable of both input and output or two connectors should be provided.

Response. An appendix note recommends the use of a standard 9 mm miniature plug-in jack, common to virtually every personal tape player or radio, and for small products, a subminiature phone jack could be used. No changes have been made to this provision in the final rule.

Paragraph (c) of the proposed rule provided that products shall not cause interference to hearing technologies (including hearing aids, cochlear

implants, and assistive listening devices) of a product user or bystander.

Comment. CTIA commented that the ANSI C63 Committee recognizes that the electromagnetic interaction between wireless telephones and hearing aids is an interference management issue that can be best resolved through the cooperative and joint efforts of the affected parties. Mitigation of electromagnetic interference requires an examination of both devices, i.e., the wireless telephone and the hearing aid, together, rather than in isolation.

TIA recommended that products should meet the relevant standards concerning electromagnetic compatibility, so as to function without significant interference with hearing technologies (including hearing aids, cochlear implants, and assistive listening devices) that meet the corresponding standards for such technologies. The Trace Center pointed out that this section was repeated in Subpart C and Subpart D and that the repetition was unnecessary.

Response. As noted in the discussion to section 1193.43 (h), this section has been removed from Subpart D and subsequent paragraphs have been redesignated accordingly. If it is not readily achievable to manufacture a product under Subpart C that minimizes interference to hearing technologies it follows that it is also not readily achievable to make the wireless telephones and other customer premises equipment compatible with hearing technologies to minimize interference under subpart D.

Paragraph (d) of the proposed rule provided that touchscreen and touch-operated controls shall be operable without requiring body contact or close body proximity.

No substantive comments were received regarding this section and no changes have been made in the final rule other than to redesignate this provision as paragraph (c).

Paragraph (e) of the proposed rule provided that products 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. The proposed rule also provided that it shall also be possible for the user to easily turn any microphone on the product on and off to enable the user who can talk to intermix speech with TTY use.

Comment. Nortel recommended that standards are needed for TTYs. Absent the development of industry-wide standards for TTY data formats, it will be very difficult for customer premises equipment manufacturers to assure

compliance with TTYs and that the establishment of interworking standards among various makers of TTYs will facilitate compatibility with telecommunications devices. Nortel also noted that compatibility does not ensure that usable communications will be provided, because other factors in the environment can affect the reliability of the transmissions. For example, the work that hearing aid manufacturers and handset manufacturers have jointly undertaken has greatly improved the compatibility of hearing aids with fluxcoils, but interference from outside sources (such as computers) can disrupt the usability of the handset by the hearing aid wearer.

The Trace Center strongly supported this provision. It pointed out that to meet this requirement an RJ11 plug or adaptor on a phone could be installed. Trace suggested that it now appears that a simple audio connector that could be compatible with standard headset jacks on cellular phones could be established as a standard mechanism. Such a standard could evolve that would allow TTYs to be easily connected to a wide range of phones, including miniature and subminiature phones using a simple cable.

Response. If a TTY is specialized customer premises equipment, it is a subset of customer premises equipment and, therefore, subject to these guidelines. The Board agrees that manufacturers of other types of equipment need to be cognizant of the capabilities of telecommunications equipment and customer premises equipment. However, as is pointed out earlier, the statute places the responsibility for compatibility on the telecommunications equipment and customer premises equipment manufacturer and neither the Telecommunications Act or any other statute gives the Board authority to regulate manufacturers of peripheral devices. No changes have been made in the final rule other than to redesignate this provision as paragraph (d).

Paragraph (f) of the proposed rule provided that products providing voice communication functionality must be able to support use of all cross-manufacturer non-proprietary standard signals used by TTYs. In addition, this paragraph would require computer modems to support protocols which are compatible with TTYs.

Comment. CTIA has urged the FCC to initiate a separate proceeding to revise its minimum technical standards and consider the suitability of the ITU's V.18 standard and other functional equivalents in providing reliable TTY communications through digital

wireless systems. CTIA noted that the ITU has published its draft recommendation for the V.18 standard.⁶ Commenters also noted that as proposed, the provision suggested that TTY signal compatibility applied only to products which provided voice communication functionality, apparently excluding communication through a modem.

Response. An appendix note has been added which encourages the use of the V.18 standard. The provision has been reworded in the final rule to clarify that it applies to more than voice communication and has been redesignated as paragraph (e).

Regulatory Process Matters

Executive Order 12866

The Board has determined that this final rule is a significant regulatory action for purposes of Executive Order 12866 since it raises novel legal or policy issues arising out of legal mandates. The Board has analyzed the benefits and costs of the rule and has determined that it is not likely to have an annual effect on the economy of \$100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities. Although the benefits and costs are difficult to quantify, the rule is expected to have a positive economic impact. The Board has adhered to the principles of Executive Order 12866 in developing the rule and it represents a balanced and reasonable means of achieving the objectives of section 255 of the Telecommunications Act.

Regulatory Flexibility Act

The Regulatory Flexibility Act of 1980, 5 U.S.C. Section 601, *et seq.*, (RFA) was enacted to ensure that small entities are not unnecessarily burdened by government regulations. The RFA requires agencies to review rules that may have a "significant economic impact on a substantial number of small entities."

The Notice of Proposed Rulemaking (NPRM) issued in connection with this rulemaking contained a certification that the rule, as proposed, would not have a significant impact on a substantial number of small entities and an initial regulatory flexibility analysis was not prepared. In particular, the certification noted that manufacturers of telecommunications equipment and

customer premises equipment are required to comply with section 255 of the Telecommunications Act of 1996 to the extent that it is "readily achievable," which means that it is "easily accomplishable and able to be carried out without much difficulty or expense." Questions were included in the notice of proposed rulemaking to elicit information on how the size of an entity should affect what is readily achievable. The notice further provided that the Board would analyze comments received to determine if a final regulatory flexibility analysis would be prepared. Though the Board did not receive comments objecting to the certification, upon review of comments received in response to the proposed rule and the questions contained in the NPRM, the Board has determined that the preparation of a Final Regulatory Flexibility Analysis (FRFA) is appropriate. Accordingly, pursuant to the RFA, the Board's FRFA is as follows:

I. Need For and Final Objectives of the Guidelines

The Access Board is responsible for developing accessibility guidelines in conjunction with the Federal Communications Commission (FCC) under section 255(e) of the Telecommunications Act of 1996 for telecommunications equipment and customer premises equipment. Telecommunications equipment is equipment, other than customer premises equipment, used by a carrier to provide telecommunications services, and includes software integral to such equipment (including upgrades). Customer premises equipment is equipment employed on the premises of a person (other than a carrier) to originate, route, or terminate telecommunications. This includes specialized customer premises equipment as a subset. The guidelines address the access needs of individuals with disabilities affecting hearing, vision, movement, manipulation, speech, and interpretation of information while balancing the resources of manufacturers of telecommunications equipment to provide accessibility features.

The guidelines do not require retrofitting of existing equipment or retooling. These guidelines are applicable only to the extent that it is readily achievable to do so. Manufacturers may consider costs and available resources when determining whether and the extent to which compliance is required.

Implementation of Section 255 of the Telecommunications Act will bring the benefits of telecommunications to

potentially 48.9 million Americans with disabilities. It is anticipated that increased access to telecommunications will positively impact employment, education and the quality of life for individuals with disabilities.

II. Summary of Significant Issues Raised by the Public Comments in Response to the Initial Regulatory Flexibility Certification

The Board received a number of comments regarding the application of the term "readily achievable". The majority of those comments addressed the application of factors to be considered in determining whether compliance with the act was "readily achievable". In particular, questions were raised regarding the resources of a parent company, comparable products, fundamental alteration of a product, monetary resources, and technological expertise. The comments received by the Board in relation to the application of the term "readily achievable" are discussed in further detail in the Supplementary Information section above. (See 1193.3 Definitions.)

Section 255 of the Telecommunications Act defines "readily achievable" as having the same meaning as in the ADA. In the guidelines, "readily achievable" is further defined in Section 1193.3 (Definitions) as "easily accomplishable and able to be carried out without much difficulty or expense." The Board expects that the FCC will ultimately set forth factors that it will use to judge compliance under the readily achievable provisions of the Telecommunications Act. In the interim, the Board has provided a list of factors derived from the ADA as advisory guidance to assist manufacturers in making readily achievable assessments. Those factors include: (a) the nature and cost of the action needed to provide accessibility or compatibility; (b) the overall resources of the manufacturer, including financial resources, technical expertise, component supply sources, equipment, or personnel; (c) the overall financial resources of any parent corporation or entity, to the extent such resources are available to the manufacturer; and (d) whether the accessibility solution results in a fundamental alteration of the product. This latter factor, derived by extension from the "undue burden" criteria of the ADA, takes into consideration the effect adding an accessibility feature might have on a given product.

Inherent in the concept of "readily achievable" is a recognition of the differences in the size and resources of

⁶ITU has published its draft recommendation for the V.18 standard. It can be accessed through the Internet at: <http://tap.gallaudet.edu/V-18.htm>.

manufacturers and readily achievable assessments will necessarily require a case by case determination of the impact of the regulations on small businesses.

III. Description and Estimate of the Number of Small Businesses to Which These Guidelines Will Apply

Covered Entities: Manufacturers of telecommunications equipment and customer premises equipment are required by § 255 of the Telecommunications Act of 1966 to "ensure that the equipment is designed, developed and fabricated to be accessible to and usable by individuals with disabilities, if readily achievable." Section 1193.3 of the guidelines defines a manufacturer covered by § 255 as "a manufacturer of telecommunications equipment or customer premises equipment that sells to the public or to vendors that sell to the public; a final assembler." The definitions of customer premises equipment and telecommunications equipment help to further define which manufacturers are covered by § 255:

The term "customer premises equipment" means equipment employed on the premises of a person (other than a carrier) to originate, route, or terminate telecommunications. (See § 1193.3 Definitions)

The term "telecommunications equipment" means equipment, other than customer premises equipment, used by a carrier to provide telecommunications services, and includes software integral to such equipment (including upgrades). (See § 1193.3 Definitions)

The Access Board guidelines cover those manufacturers of equipment that function as customer premises equipment and telecommunications equipment. Examples of customer premises equipment may include but are not limited to: wireline and wireless telephones, computers when employed on the premises of a person to originate, route or terminate telecommunications (i.e., Internet telephony or computer telephone calls with TTY software), or direct dial TTYs which "originate, route or terminate telecommunications." The definition of telecommunications equipment includes switches used to direct telecommunications network services.

This rule pertains only to functions directly related to telecommunications. For example, only a computer with a modem can function as telecommunications equipment or customer premises equipment and only the modem functions are associated with telecommunications. Therefore, the requirements of this rule apply only to the modem functions (hardware and software operation), and incidental

functions required for initialization (turning the computer on and launching the telecommunications program), necessary to engage in telecommunications. All other functions of the computer not related to telecommunications are not covered, such as word processing, file searching, operating system commands, and directory manipulation.

Small Businesses: The term "small business" is defined by the RFA as having the same meaning as the term "small business concern" under section 632 of the Small Business Act, 15 U.S.C. Sec. 632. A "small business concern" under Section 632 is defined as "one which is independently owned and operated and which is not dominant in its field of operation." Further, Section 632(a)(2)(A) provides that the Administrator of the Small Business Administration may provide additional criteria by which a concern "may be determined to be a small business concern."

There are three industry categories established by the Small Business Administration which are applicable to these guidelines:

(1) Establishments primarily engaged in manufacturing wire telephone and telegraph equipment.⁷ Included are establishments manufacturing modems and other telephone and telegraph communications interface equipment. Firms primarily engaged in the manufacturing of wire telephone and telegraph equipment are considered to be small businesses if they employ 1,000 or fewer employees. (See 13 CFR 121.201.) Census data indicates that there are 471 such establishments, of which 92% or 432 are small business concerns.⁸

(2) Establishments primarily engaged in manufacturing electronic computers.⁹ As determined by the Small Business Administration, a manufacturer of electronic computers is considered to be a small business entity for purposes of the RFA if it has 1,000 or fewer employees. (See 13 CFR 121.201.) According to the U.S. Bureau of the Census data, there are approximately 632 such firms, of which approximately 594 or 94% percent qualify as small businesses.¹⁰ However, not all of the

⁷ Executive Office of the President, Office of Management and Budget, Standard Industrial Classification Manual (1987) (SIC 3561).

⁸ U.S. Small Business Administration, Industry and Employment Size of Enterprise for 1994, Table 7, SIC 3561 (U.S. Bureau of the Census data under contract to the SBA).

⁹ Executive Office of the President, Office of Management and Budget, Standard Industrial Classification Manual (1987) (SIC 3571).

¹⁰ U.S. Small Business Administration, Industry and Employment Size of Enterprise for 1994, Table

entities which are engaged in manufacturing electronic computers identified in the Census data are covered entities under the Telecommunications Act. For example, a computer which does not have a modem would not be a product which is subject to the requirements of the Telecommunications Act and therefore, the manufacturing of that computer would not be a function covered by this rule.

(3) Establishments primarily engaged in manufacturing radio and television broadcasting and communications equipment.¹¹ These establishments are considered to be small business concerns if they employ 750 or fewer employees. (See 13 CFR 121.201.) Census data indicates that there are 826 establishments engaged in the manufacturing of radio and television broadcasting and communications equipment, of which ninety-one percent or 755 of those firms are considered small business concerns.¹² Not all of these businesses would be subject to the requirements of these guidelines. The Telecommunications Act addresses the transmittal of information between or among points specified by the user, of information of the user's choosing, without change in the form or content of the information as sent and received. (See Section 1193.3 Definitions). To the extent that the radio, broadcasting or computer equipment does not meet the definition of "telecommunications", the manufacturing of that equipment is not a covered function subject to the Telecommunications Act or these guidelines.

IV. Description of Reporting, Recordkeeping and Other Compliance Requirements

Manufacturers of telecommunications equipment and customer premises equipment are required by Section 255 to "ensure that the equipment is designed, developed and fabricated to be accessible to and usable by individuals with disabilities, if readily achievable." And when it is not "readily achievable" to make products accessible to and usable by individuals with disabilities, the manufacturer shall ensure that the equipment "is compatible with existing peripheral devices or specialized customer

⁷ SIC 3571 (U.S. Bureau of the Census data under contract to the SBA).

¹¹ Executive Office of the President, Office of Management and Budget, Standard Industrial Classification Manual (1987) (SIC 3563).

¹² U.S. Small Business Administration, Industry and Employment Size of Enterprise for 1994, Table 7, SIC 3563 (U.S. Bureau of the Census data under contract to the SBA).

premises equipment commonly used by individuals with disabilities to achieve access, if readily achievable." [47 U.S.C. 255(b)(d)] Section 255 also places requirements on telecommunications service providers. Telecommunications service providers requirements are however under the jurisdiction of the FCC and therefore are not addressed in the Access Board guidelines.

Section 1193.23 Product design, development and evaluation. This section requires that, where readily achievable, manufacturers must evaluate the accessibility, usability, and compatibility of telecommunications equipment and customer premises equipment and incorporate such evaluation throughout product design, development, and fabrication, as early and consistently as possible. Manufacturers must develop a process to ensure that products are designed, developed and fabricated to be accessible whenever it is readily achievable. Since what is readily achievable will vary according to the stage of development (i.e., some things will be readily achievable in the design phase which are not in later phases), barriers to accessibility, usability, and compatibility must be identified throughout product design and development, from conceptualization to production. The details of such a process will vary from one company to the next, and this section does not specify the structure or specific content of a process. Instead, this section sets forth a series of factors that a manufacturer must consider in developing such a process. How, and to what extent, each of the factors is incorporated in a specific process is up to the manufacturer. As the capability to evaluate the accessibility, usability, and compatibility of telecommunications equipment and customer premises equipment is already available in-house, this provision will not require additional professional skills. Under these guidelines, there are no recordkeeping requirements for this provision.

There are many products for which evaluations can be relatively cursory as long as the company is confident that it is aware of all relevant access issues. At this end of the evaluation spectrum, only one hour of professional time is projected to be required, for an estimated cost of \$80. At the other end of this spectrum, if there is a highly complex, convergent, or revolutionary new product this may require as much as 37.5 hours of professional evaluation throughout the product's development cycle, for an estimated cost of \$3,000.

Section 1193.33 Accessibility and usability. Section 1193.33 requires that, where readily achievable, manufacturers must (1) provide a description of the accessibility and compatibility features of the product upon request, including, as needed, in alternate formats or alternate modes at no additional charge; (2) provide end-user documentation in alternate format or alternate modes upon request at no additional charge where end-user documentation is provided; (3) ensure usable customer support and technical support in the call centers and service centers which support their products at no additional charge; and (4) include in general product information, the contact method for obtaining the information required in (1) and (2) above.

In addition, where manufacturers provide employee training, they are required to provide training appropriate to an employee's function, where readily achievable. In developing, or incorporating information into existing training programs, consideration must be given to the following factors: accessibility requirements of individuals with disabilities; means of communicating with individuals with disabilities; commonly used adaptive technology used with the manufacturer's products; designing for accessibility; and solutions for accessibility and compatibility.

The greatest cost involved with compliance with this provision is in the production of alternate formats. For persons with a visual impairment, four alternate formats exist: Braille, large print, electronic text, and audio cassette. It is estimated that, where it is readily achievable to do so, the cost of alternate formats for a 10 page user's manual will involve the following:

- Braille: If the production of Braille documents is outsourced, costs range from \$.25 to \$2 per page, depending on the complexity of material (technical material is more expensive than literature) and the format in which the raw text arrives (print is more expensive than computer files). A reasonable estimate for producing 100 copies of a 10 page user's manual (30 bound pages of Braille) would be \$1800. The cost per brailled document is estimated at \$18. If Braille is produced in-house, it can be produced by clerical staff, using a standard computer, Braille translation software, and a Braille printer. It is estimated that the cost to produce a ten page document in-house would be \$10. Editing a 10 page document will require approximately 15 hours of editorial time by clerical staff.

- Large Print: One hundred copies of a 10 page document would cost

approximately \$2.50 each to produce. The production of large print documents can be handled with clerical assistance and will involve approximately 15 hours of editorial work for a 10 page document.

- Electronic Text: Providing the information on computer disk will require an average of 15 hours of editorial work per product by clerical staff. The estimated cost of the disk, shipping and handling, is approximately \$2.25 each.

- Audio Cassette: Producing the information in an audio cassette format will require approximately 15 hours of editorial work and recording time per product by clerical staff. The estimated cost of the cassette, shipping and handling is approximately \$2.90 each.

Section 1193.39 Prohibited reduction of accessibility, usability and compatibility. Section 1193.39 provides that no change shall be undertaken which decreases or has the effect of decreasing the net accessibility, usability, and compatibility of telecommunications equipment or customer premises equipment. An exception provides that discontinuation of a product is not prohibited.

The costs for this review, would be absorbed in the analysis for the replacement or upgraded product required under 1193.23 and manufacturers should not incur additional costs under this provision.

V. Description of Steps Taken To Minimize the Significant Economic Impact Consistent With the Stated Objectives and Significant Alternatives Considered and Rejected

In June 1996, the Access Board convened the Telecommunications Access Advisory Committee (TAAC) to assist the Board in fulfilling its mandate under section 255 of the Telecommunications Act. The members of the TAAC included representatives of small and large manufacturers of telecommunications equipment, customer premises equipment, specialized customer premises equipment, peripheral devices, and software; organizations representing the access needs of individuals with disabilities; telecommunication providers and carriers; and other persons affected by the guidelines. In addition, entities and individuals who were not members of the TAAC were invited to participate in several subcommittees and task groups. Once the TAAC had prepared a working draft of its recommendations, that draft was posted on the Internet for interested businesses and individuals to comment on. Subsequent revisions to the draft

were also posted on the Internet. The Board established a "listserve" on the Internet for the TAAC to conduct business between its meetings. The listserve was opened to the public to follow and many of the discussion points received from outside parties were also posted on the listserve. The result of the Committee's work was a final report containing recommendations to the Access Board for implementing section 255 of the Telecommunications Act. The Board then issued an NPRM which was based on those recommendations. In addition to a large distribution of the NPRM and the TAAC final report, the NPRM was posted on the Board's Internet page. Comments received in electronic format in response to the NPRM were also posted on the Internet for interested parties to review.

The Board received 159 comments in response to the NPRM. A further discussion of the types of comments received may be found in the Background section of this rule. The Board has addressed the majority of the comments received in General Issues and Section-by-Section Analysis above.

Efforts to minimize impact. (1) In implementing Section 255 of the Telecommunications Act, the Board has sought to minimize any disproportionate burdens imposed on small businesses. As previously discussed, inherent in the concept of "readily achievable" is a recognition of the differences in the size and resources of manufacturers. Assessments of what is readily achievable for a manufacturer to accomplish under the Telecommunications Act will necessarily require a case by case determination. In addition, where possible, the guidelines developed by the Board are written as performance standards rather than prescriptive requirements. The guidelines require an outcome, but do not prescribe in detail the process each entity must follow to achieve that outcome. As a result, small businesses will have more latitude and choice in how they comply with the requirements of the guidelines. For example, Section 1193.23 (Product design, development and evaluation) requires manufacturers to evaluate the accessibility, usability, and compatibility of telecommunications equipment and customer premises equipment and incorporate such evaluation throughout the product design, development, and fabrication, as early and consistently as possible. The Board is fully aware that different size manufacturers, or even the same manufacturer at different times, must be given the flexibility to tailor any such

plan to its own particular needs. Therefore, while this section sets forth the factors which must be considered in approaching how accessibility will be provided, it does not prescribe any particular plan or content. It does not require that such a process be submitted to any entity or that it even be in writing. The requirement is outcome-oriented, and a process could range from purely conceptual to formally documented, as suits the manufacturer.

(2) The Board has included an Appendix with a list of strategies to make telecommunications equipment accessible. This list is advisory, not mandatory, and provides potential solutions for small manufacturers that do not have the resources to research and develop solutions for accessible products.

(3) Several changes were made to the final rule to reduce the impact of the rule on all manufacturers in general, and small manufacturers in particular. Those modifications include the following:

(a) The final guidelines do not require market research, testing or consultation, only that they be considered and incorporated to the extent deemed appropriate for a given manufacturer. If a large manufacturer has an extensive marketing effort, involving surveys and focus groups, it may be appropriate to include persons with disabilities in such groups. On the other hand, some small companies do not do any real marketing, per se, but may just notice that a product made by XYZ Corporation is selling well and, based on this "marketing survey" it decides it can make a cheaper one. Clearly, "involvement" of persons with disabilities is not appropriate in this case. The final provision, therefore, has been revised to make it clear that these activities are not expected to be created where none existed before. (See 1193.23 Product design, development and evaluation.)

(b) Section 1193.35 (Redundancy and selectability) has been reserved in the final rule in recognition of the complexity such a requirement might add to the design process, as well as the equipment itself. While this provision was highly supported by the disability community, the Board felt it may be premature to impose the requirement in the early stages of this regulation. Initially, manufacturers will have enough difficulty finding a single readily achievable solution to many accessibility problems. In particular, small businesses with limited resources and design staff would be hard pressed to develop multiple solutions. Instead, the Board is planning to focus its first

market monitoring report on this issue and then decide whether a requirement is needed.

(c) Section 1193.37 was modified in the final rule to reduce the obligation for equipment to be designed to pass through all information for access. As proposed, the provision might have required manufacturers to constantly monitor information characteristics of all types of peripheral equipment. The final rule only requires the pass through of information presented in standard industry formats.

(d) Section 1193.39 provides that no change shall be undertaken which decreases or has the effect of decreasing the net accessibility, usability, and compatibility of telecommunications equipment or customer premises equipment. In response to concerns raised by manufacturers that this provision might prevent a manufacturer from discontinuing an obsolete product if it had an accessibility feature unless the same feature were incorporated in its replacement, an exception was added to allow for product discontinuation. In addition, the language as proposed was modified to reference the "net" accessibility, usability and compatibility of products.

(e) Finally, section 1193.43(e) of the final rule adopts the private sector ANSI standard for the volume level to be achieved, rather than the higher level proposed in the NPRM.

Efforts to maximize benefits. Both large and small manufacturers will be among the beneficiaries of the Telecommunications Act and these guidelines by virtue of the expanding market for accessible telecommunication products. The Electronic Industries Foundation, in its "Resource Guide for Accessible Design of Consumer Electronics", 1996, notes "Today, one factor contributing to market share is the increasing number of potential customers who experience functional limitations as a result of aging or disabling conditions.... While no product can be readily used by everyone, accessible design can impact market size and market share through consideration of the functional needs of all consumers, including those who experience functional limitations as a result of aging or disabling conditions." A National Center for Health Statistics (NCHS) survey also indicates that people with disabilities are potentially an untapped market for the telecommunications industry. As accessibility is incorporated into new products they will be easier to use by the broadest audience possible.

Significant alternatives that were rejected. Based on the comments

received in response to the NPRM, the Board considered the application of the guidelines to product "lines" or "families" rather than individual products as long as accessible products with comparable, substantially comparable, or similar features are available at a comparable cost. However, the statutory language of the Telecommunications Act requires that all covered products must be made accessible unless it is not readily achievable to do so. As the Telecommunications Act did not provide a qualifier other than readily achievable, the guidelines developed by the Board apply to all covered products, as opposed to product lines or families. (See Section 1193.2 Scoping above for further discussion.)

VI. Report to Congress

The Access Board will forward a copy of this Final Regulatory Flexibility Analysis along with this Final Rule in a report to Congress pursuant to Section 251 of the Small Business Regulatory Enforcement Fairness Act. (5 U.S.C. 801(a)(1)(A)). A copy of this FRFA is also published in this final rule. (5 U.S.C. 604(b)).

Unfunded Mandates Reform Act

This final rule does not include any Federal mandate that may result in the expenditure by state, local, and tribal governments, in the aggregate, or by the private sector, of \$100 million or more in any one year.

Paperwork Reduction Act, Collection of Information: Telecommunications Act Accessibility Guidelines

Section 1193.33 contains information collection requirements. As required by the Paperwork Reduction Act of 1995, the Board submitted a copy of this section (previously identified as section 1193.25 in the NPRM) to the Office of Management and Budget (OMB) for its review. In addition, the Board's NPRM solicited comments on any potential paperwork burden associated with these guidelines. As noted in the NPRM, the Board would consider comments received (1) in evaluating whether the proposed collection of information is necessary for the proper implementation of Section 255 of the Telecommunications Act of 1996, including whether the information will have a practical use; (2) in evaluating the accuracy of the Board's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used; (3) to enhance the quality, usefulness, and clarity of the information to be collected; and (4) to minimize the

burden of collection of information on those who are to respond. The Board received 24 comments which addressed the appropriateness of the requirements of section 1193.33. The major issues raised in those comments and the Board's responses are discussed in the Section-by-Section analysis above. (See Section 1193.33). Comments which specifically addressed the costs associated with section 1193.33 and the application of the Paperwork Reduction Act are discussed below.

Summary of Significant Issues Raised by Public Comments in Response to the NPRM Paperwork Reduction Act Analysis and Annual Reporting Burden Estimate.

Comment. The Telecommunications Industry Association (TIA) commented that the Paperwork Reduction Act would also apply to the provision of information in alternate formats or alternate modes. The calculations provided in the Board's NPRM did not address the annual reporting burden for such costs. TIA also suggested that the costs associated with training the "call-takers and information providers" should be included in the public reporting and record-keeping burden estimates under the Paperwork Reduction Act.

Response. The Board agrees that the costs associated with providing information in alternate formats should be included in assessing the annual reporting burden associated with this section. The Board has revised its assessment to include such costs. However, to the extent that the costs of training are associated with the dispensing of technical assistance, the Board does not agree that those training costs should be included in the annual reporting burden assessments. Section 1193.33 requires that manufacturers (1) provide a description of the accessibility and compatibility features of the product upon request (including, as needed, alternate formats or alternate modes) and (2) provide end-user product documentation in alternate formats or alternate modes upon request. With respect to the reporting requirements of the Paperwork Reduction Act, only the training costs associated with responding to these requests are appropriate for inclusion in the annual reporting burden assessments.

Comment. TIA noted that the burdens associated with the application of this section will "vary widely with companies and the types of equipment they manufacture." While TIA did not provide final data concerning the estimated annual burdens, it suggested

that, based on a fragmentary sampling, the Board's estimates of the number of respondents and the accessibility/compatibility feature description and caller referral were too low. TIA agreed that the Board's estimate of five minutes for average response time was appropriate, but commented that communicating with persons with disabilities, particularly in such alternate media as TTY, may require a longer call duration. TIA questioned the Board's estimates with respect to a contact point, citing the disparity between the Board's estimates for requests for a description of the accessibility and compatibility features of the product and the provision of a name and phone number for a contact point to request additional information. TIA also questioned the Board's estimate for the burden associated with providing the contact information noting that five seconds is barely sufficient to complete the mutual introduction of consumer caller and manufacturing employee responder.

Response. The Board agrees that the burdens associated with the application of section 1193.33 will vary with companies and types of equipment. This is true not only because of the varying complexity of the products covered by these guidelines, but also because of the application of the concept of readily achievable. As more fully discussed in the Section-by-Section analysis above, manufacturers of telecommunications equipment and customer premises equipment are required to comply with section 255 of the Telecommunications Act of 1996 to the extent that it is "readily achievable," which means that it is "easily accomplishable and able to be carried out without much difficulty or expense." Readily achievable assessments will necessarily require a case by case determination based on the size and resources of manufacturers. Because actual data concerning manufacturers' future costs and resources is not available at this time, the figures provided in the annual reporting burden estimates may be high depending on the readily achievable determinations made by each manufacturer. The Board has revised its estimates of the manufacturers of telecommunication products covered by these guidelines to reflect the estimated number of manufacturers assessed in the 1992 U.S. Census; Survey of Manufacturers. That number totals 479 manufacturers.

With respect to the issue of the difference between the Board's initial assessment of the anticipated number of calls requesting a description of accessibility and compatibility features

and the anticipated number of responses per manufacturer to provide a contact point, the disparity is attributable to the fact that not all purchasers of products will request the description of features, whereas all products must contain contact point information. The estimate of five seconds is based on the Board's assessment that it will only take a negligible amount of time to include the contact information in its product literature. The annual reporting requirements do not apply to the technical assistance rendered in contacting the manufacturer at the number or address provided.

Collection of Information: Telecommunications Act Accessibility Guidelines; Annual Reporting Burden

These regulations establish guidelines for accessibility, usability, and compatibility of telecommunications equipment and customer premises equipment covered by the Telecommunications Act of 1996. Based on the comments received in response to the NPRM, the Board has revised its estimates of the public reporting and recordkeeping burden for this collection of information. As revised, the burden is estimated to be 107,982 hours in order for manufacturers of telecommunications equipment and customer premises equipment to provide (1) a description of the accessibility and compatibility features of the equipment on request; (2) the contact method for obtaining information concerning the accessibility and compatibility description of the equipment, alternate formats and customer and technical support for the equipment; and (3) end-user product documentation in alternate formats or alternate modes upon request. Assuming there are 479 manufacturers of telecommunications equipment covered by these guidelines, the annual hour burden averages 225 hours per manufacturer.

The revised estimated burden for manufacturers to incorporate the requested information was calculated as follows:

(1) The annual hour burden associated with providing a description of the accessibility and compatibility features of the equipment on request was calculated to be 29,979 hours as follows:

Responding to requests for information:	
Respondents	479.
Average responses ...	×191.
Hours per response ..	×.08 (5 minutes).

Annual reporting burden. 7,319 hours.

Alternate formats:

Editorial (reformatting, reading for audio cassette, etc.): 22,500 hours (assuming 5,000 new products are manufactured each year and that the description of accessibility and compatibility features will average three pages that will require an average of 1.5 hours per page of editorial work).

Assuming that an average of 50% of the Braille production is performed in-house and 50% is outsourced, the impact would be 160 hours annually.

(2) The annual hour burden associated with providing the contact method to obtain information concerning the accessibility and compatibility features of the equipment, alternate formats and customer and technical support for the equipment was calculated to be 2,500 hours and was based on the following information: There are approximately 5,000 types of new telecommunications products manufactured each year or 10.44 per manufacturer. The burden in providing a contact method is in the identification of the contact method for each type of product. Once the contact method is established, the time involved in including the contact method in the existing product literature is inconsequential. The burden associated with identifying a contact method for each of the 5,000 types of new products manufactured each year is as follows:

Respondents	479.
Average responses ...	×10.44.
Hours per response ..	×.5 (30 minutes).

Annual reporting burden. 2,500 hours.

(3) The annual hour burden associated with providing end-user documentation in accessible formats on request was calculated to be 75,503 hours as follows:

Responding to requests for information: 0 hours. (Callers requesting alternate format will request a description of accessibility features and end-user documentation in a single call; or, the documentation will be combined in a single document. The hour burden for the request for alternate format is addressed in (1) above.

Alternate formats:

Editorial (reformatting, reading for audio cassette, etc.): 75,000 hours (assuming 5,000 new products are manufactured each year and that the end-user documentation will average ten pages)

Assuming that an average of 50% of the Braille production is performed in-

house and 50% is outsourced, the impact would be 503 hours annually.

The information collection requirements contained in § 1193.33 of this final rule have been approved by the Office of Management and Budget (OMB) in accordance with the Paperwork Reduction Act of 1995 (42 U.S.C. 3501—3530), and assigned OMB control number 3014-0010. *An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless the collection displays a valid control number.*

Submission to Congress and the General Accounting Office

The Board has submitted a report containing this final rule to Congress and the Comptroller General of the General Accounting Office prior to publication in the **Federal Register** as required by the Small Business Regulatory Enforcement Fairness Act of 1996. The rule is not a "major rule" under 5 U.S.C. 804 (2).

List of Subjects in 36 CFR Part 1193

Communications, Communications equipment, Individuals with disabilities, Reporting and recordkeeping requirements, Telecommunications.

Authorized by vote of the Access Board on September 10, 1997.

Patrick D. Cannon,
Chair, Architectural and Transportation Barriers Compliance Board.

For the reasons set forth in the preamble, the Board adds part 1193 to Chapter XI of title 36 of the Code of Federal Regulations to read as follows:

PART 1193—TELECOMMUNICATIONS ACT ACCESSIBILITY GUIDELINES

Subpart A—General

- Sec.
- 1193.1 Purpose.
- 1193.2 Scoping.
- 1193.3 Definitions.

Subpart B—General Requirements

- 1193.21 Accessibility, usability, and compatibility.
- 1193.23 Product design, development, and evaluation.

Subpart C—Requirements for Accessibility and Usability

- 1193.31 Accessibility and usability.
- 1193.33 Information, documentation, and training.
- 1193.35 Redundancy and selectability. [Reserved]
- 1193.37 Information pass through.
- 1193.39 Prohibited reduction of accessibility, usability, and compatibility.

1193.41 Input, control, and mechanical functions.

1193.43 Output, display, and control functions.

Subpart D—Requirements for Compatibility With Peripheral Devices and Specialized Customer Premises Equipment

1193.51 Compatibility.

Appendix to Part 1193—Advisory Guidance

Authority: 47 U.S.C. 255(e).

Subpart A—General

§ 1193.1 Purpose.

This part provides requirements for accessibility, usability, and compatibility of telecommunications equipment and customer premises equipment covered by the Telecommunications Act of 1996 (47 U.S.C. 255).

§ 1193.2 Scoping.

This part provides requirements for accessibility, usability, and compatibility of new products and existing products which undergo substantial change or upgrade, or for which new releases are distributed. This part does not apply to minor or insubstantial changes to existing products that do not affect functionality.

§ 1193.3 Definitions.

Terms used in this part shall have the specified meaning unless otherwise stated. Words, terms and phrases used in the singular include the plural, and use of the plural includes the singular.

Accessible. Telecommunications equipment or customer premises equipment which comply with the requirements of subpart C of this part.

Alternate formats. Alternate formats may include, but are not limited to, Braille, 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.

Compatible. Telecommunications equipment or customer premises equipment which comply with the requirements of subpart D of this part.

Customer premises equipment. Equipment employed on the premises of a person (other than a carrier) to originate, route, or terminate telecommunications.

Manufacturer. A manufacturer of telecommunications equipment or customer premises equipment that sells

to the public or to vendors that sell to the public; a final assembler.

Peripheral devices. Devices employed in connection with telecommunications equipment or customer premises equipment to translate, enhance, or otherwise transform telecommunications into a form accessible to individuals with disabilities.

Product. Telecommunications equipment or customer premises equipment.

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

Specialized customer premises equipment. Equipment, employed on the premises of a person (other than a carrier) to originate, route, or terminate telecommunications, which is commonly used by individuals with disabilities to achieve access.

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

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

Telecommunications service. The offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available directly to the public, regardless of the facilities used.

TTY. An abbreviation for teletypewriter. Machinery or equipment that employs interactive text based communications through the transmission of coded signals across the standard telephone network. TTYS can include, for example, devices known as TDDs (telecommunication display devices for deaf persons) or computers with special modems. TTYS are also called text telephones.

Usable. Means that individuals with disabilities have access to the full functionality and documentation for the product, including instructions, product information (including accessible feature information), documentation, and technical support functionally equivalent to that provided to individuals without disabilities.

Subpart B—General Requirements

§ 1193.21 Accessibility, usability, and compatibility.

Where readily achievable, telecommunications equipment and

customer premises equipment shall comply with the requirements of subpart C of this part. Where it is not readily achievable to comply with subpart C of this part, telecommunications equipment and customer premises equipment shall comply with the requirements of subpart D of this part, if readily achievable.

§ 1193.23 Product design, development, and evaluation.

(a) Manufacturers shall evaluate the accessibility, usability, and compatibility of telecommunications equipment and customer premises equipment and shall incorporate such evaluation throughout product design, development, and fabrication, as early and consistently as possible. Manufacturers shall identify barriers to accessibility and usability as part of such a product design and development process.

(b) In developing such a process, manufacturers shall consider the following factors, as the manufacturer deems appropriate:

(1) Where market research is undertaken, including individuals with disabilities in target populations of such research;

(2) Where product design, testing, pilot demonstrations, and product trials are conducted, including individuals with disabilities in such activities;

(3) Working cooperatively with appropriate disability-related organizations; and

(4) Making reasonable efforts to validate any unproven access solutions through testing with individuals with disabilities or with appropriate disability-related organizations that have established expertise with individuals with disabilities.

Subpart C—Requirements for Accessibility and Usability

§ 1193.31 Accessibility and usability.

When required by § 1193.21, telecommunications equipment and customer premises equipment shall be accessible to and usable by individuals with disabilities and shall comply with §§ 1193.33 through 1193.43 as applicable.

§ 1193.33 Information, documentation, and training.

(a) Manufacturers shall ensure access to information and documentation it provides to its customers. Such information and documentation includes user guides, installation guides for end-user installable devices, and product support communications, regarding both the product in general

and the accessibility features of the product. Manufacturers shall take such other steps as necessary including:

- (1) Providing a description of the accessibility and compatibility features of the product upon request, including, as needed, in alternate formats or alternate modes at no additional charge;
 - (2) Providing end-user product documentation in alternate formats or alternate modes upon request at no additional charge; and
 - (3) Ensuring usable customer support and technical support in the call centers and service centers which support their products at no additional charge.
- (b) Manufacturers shall include in general product information the contact method for obtaining the information required by paragraph (a) of this section.
- (c) Where manufacturers provide employee training, they shall ensure it is appropriate to an employee's function. In developing, or incorporating existing training programs, consideration shall be given to the following factors:
- (1) Accessibility requirements of individuals with disabilities;
 - (2) Means of communicating with individuals with disabilities;
 - (3) Commonly used adaptive technology used with the manufacturer's products;
 - (4) Designing for accessibility; and
 - (5) Solutions for accessibility and compatibility.

§ 1193.35 Redundancy and selectability.
[Reserved]

§ 1193.37 Information pass through.

Telecommunications equipment and customer premises equipment shall pass through cross-manufacturer, non-proprietary, industry-standard codes, translation protocols, formats or other information necessary to provide telecommunications in an accessible format. In particular, signal compression technologies shall not remove information needed for access or shall restore it upon decompression.

§ 1193.39 Prohibited reduction of accessibility, usability, and compatibility.

- (a) No change shall be undertaken which decreases or has the effect of decreasing the net accessibility, usability, or compatibility of telecommunications equipment or customer premises equipment.
- (b) Exception: Discontinuation of a product shall not be prohibited.

§ 1193.41 Input, control, and mechanical functions.

Input, control, and mechanical functions shall be locatable, identifiable, and operable in accordance with each of the following, assessed independently:

(a) *Operable without vision.* Provide at least one mode that does not require user vision.

(b) *Operable with low vision and limited or no hearing.* Provide at least one mode that permits operation by users with visual acuity between 20/70 and 20/200, without relying on audio output.

(c) *Operable with little or no color perception.* Provide at least one mode that does not require user color perception.

(d) *Operable without hearing.* Provide at least one mode that does not require user auditory perception.

(e) *Operable with limited manual dexterity.* Provide at least one mode that does not require user fine motor control or simultaneous actions.

(f) *Operable with limited reach and strength.* Provide at least one mode that is operable with user limited reach and strength.

(g) *Operable without time-dependent controls.* Provide at least one mode that does not require a response time. Alternatively, a response time may be required if it can be by-passed or adjusted by the user over a wide range.

(h) *Operable without speech.* Provide at least one mode that does not require user speech.

(i) *Operable with limited cognitive skills.* Provide at least one mode that minimizes the cognitive, memory, language, and learning skills required of the user.

§ 1193.43 Output, display, and control functions.

All information necessary to operate and use the product, including but not limited to, text, static or dynamic images, icons, labels, sounds, or incidental operating cues, shall comply with each of the following, assessed independently:

(a) *Availability of visual information.* Provide visual information through at least one mode in auditory form.

(b) *Availability of visual information for low vision users.* Provide visual information through at least one mode to users with visual acuity between 20/70 and 20/200 without relying on audio.

(c) *Access to moving text.* Provide moving text in at least one static presentation mode at the option of the user.

(d) *Availability of auditory information.* Provide auditory information through at least one mode in visual form and, where appropriate, in tactile form.

(e) *Availability of auditory information for people who are hard of hearing.* Provide audio or acoustic 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, increased signal-to-noise ratio, or combination). For 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.

(f) *Prevention of visually-induced seizures.* Visual displays and indicators shall minimize visual flicker that might induce seizures in people with photosensitive epilepsy.

(g) *Availability of audio cutoff.* Where a product delivers audio output through an external speaker, provide an industry standard connector for headphones or personal listening devices (e.g., phone-like handset or earcup) which cuts off the speaker(s) when used.

(h) *Non-interference with hearing technologies.* Reduce interference to hearing technologies (including hearing aids, cochlear implants, and assistive listening devices) to the lowest possible level that allows a user to utilize the product.

(i) *Hearing aid coupling.* Where a product delivers output by an audio transducer which is normally held up to the ear, provide a means for effective wireless coupling to hearing aids.

Subpart D—Requirements for Compatibility With Peripheral Devices and Specialized Customer Premises Equipment

§ 1193.51 Compatibility.

When required by subpart B of this part, telecommunications equipment and customer premises equipment shall be compatible with peripheral devices and specialized customer premises equipment commonly used by individuals with disabilities to achieve accessibility, and shall comply with the following provisions, as applicable:

(a) *External electronic access to all information and control mechanisms.* Information needed for the operation of products (including output, alerts, icons, on-line help, and documentation) shall be available in a standard electronic text format on a cross-industry standard port and all input to and control of a product shall allow for real time operation by electronic text input into a cross-industry standard external port and in cross-industry standard format. The cross-industry standard port shall not require manipulation of a connector by the user.

(b) *Connection point for external audio processing devices.* Products providing auditory output shall provide the auditory signal at a standard signal

level through an industry standard connector.

(c) *Compatibility of controls with prosthetics.* Touchscreen and touch-operated controls shall be operable without requiring body contact or close body proximity.

(d) *TTY connectability.* Products 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.

(e) *TTY signal compatibility.* Products, including those providing voice communication functionality, shall support use of all cross-manufacturer non-proprietary standard signals used by TTYs.

Appendix to Part 1193—Advisory Guidance

Introduction

1. This appendix provides examples of strategies and notes to assist in understanding the guidelines and are a source of ideas for alternate strategies for achieving accessibility. These strategies and notes are not mandatory. A manufacturer is not required to incorporate all of these examples or any specific example. Manufacturers are free to use these or other strategies in addressing the guidelines. The examples listed here are not comprehensive, nor does adopting or incorporating them guarantee an accessible product. They are meant to provide a useful starting point for evaluating the accessibility of a product or conceptual design and are not intended to inhibit innovation. For a more complete list of all of the published strategies to date, as well as for further information and links to on-going discussions, the reader is referred to the National Institute on Disability and Rehabilitation Research's Rehabilitation Engineering Center on Access to Telecommunications System's strategies Web site (<http://trace.wisc.edu/world/telecomm/>).

2. This appendix is organized to correspond to the sections and paragraphs of the guidelines in this part to which the explanatory material relates. This appendix does not contain explanatory material for every section and paragraph of the guidelines in this part.

Subpart A—General

Section 1193.3 Definitions

Readily Achievable

1. Section 255 defines "readily achievable" as having the same meaning as in the Americans with Disabilities Act (ADA). However, the ADA applies the term to the removal of barriers in existing public accommodations. Not all of the factors cited in the ADA or the Department of Justice (DOJ) implementing regulations (July 26, 1991) are easy to translate to the telecommunications context where the term

applies to telecommunications equipment and customer premises equipment which is designed, developed and fabricated after February 8, 1996, the effective date of the Telecommunications Act of 1996.

2. It may not be readily achievable to make every product accessible or compatible. Depending on the design, technology, or several other factors, it may be determined that providing accessibility to all products in a product line is not readily achievable. The guidelines do not require accessibility or compatibility when that determination has been made, and it is up to the manufacturer to make it. However, the assessment as to whether it is or is not readily achievable cannot be bypassed simply because another product is already accessible. For this purpose, two products are considered to be different if they have different functions or features. Products which differ only cosmetically, where such differences do not affect functionality, are not considered separate products.

3. Below is a list of factors provided as interim guidance to manufacturers to assist them in making readily achievable assessments. The factors are derived from the ADA itself and the DOJ regulations and are presented in the order in which they appear in those sources. Ultimately, the priority or weight of these factors is a compliance issue, under the jurisdiction of the Federal Communications Commission (FCC). Factors applicable to a determination of whether an action is readily achievable include: the nature and cost of the action needed to provide accessibility or compatibility; the overall resources of the manufacturer, including financial resources, technical expertise, component supply sources, equipment, or personnel; the overall financial resources of any parent corporation or entity, only to the extent such resources are available to the manufacturer; and whether the accessibility solution results in a fundamental alteration of the product.

a. One factor in making readily achievable assessments is the nature and cost of the action needed to provide accessibility or compatibility. The term readily achievable means that an action is "easily accomplishable and able to be carried out without much difficulty or expense." The nature of the action or solution involves how easy it is to accomplish, including the availability of technology and expertise, and the ability to incorporate the solution into the production process. Obviously, knowing about an accessibility solution, even in detail, does not mean it is readily achievable for a specific manufacturer to implement it immediately. Even if it only requires substituting a different, compatible part, the new part must be ordered and integrated into the manufacturing process. A more extreme implementation might require re-tooling or redesign. On the other hand, a given solution might be so similar to the current design, development and fabrication process that it is readily achievable to implement it virtually overnight.

b. Another factor in making readily achievable assessments is the overall resources of the manufacturer, including financial resources, technical expertise,

component supply sources, equipment, or personnel. The monetary resources of a manufacturer are obviously a factor in determining whether an action is readily achievable, but it may be appropriate to consider other resources, as well. For example, a company might have ample financial resources and, at first glance, appear to have no reason for not including a particular accessibility feature in a given product. However, it might be that the company lacks personnel with experience in software development, for example, needed to implement the design solution. One might reason that, if the financial resources are available, the company should hire the appropriate personnel, but, if it does, it may no longer have the financial resources to implement the design solution. One would expect that the company would develop the technical expertise over time and that eventually the access solution might become readily achievable.

c. Another factor in making readily achievable assessments is the overall financial resources of any parent corporation or entity, only to the extent such resources are available to the manufacturer. Both the ADA statutory definition of readily achievable and the DOJ regulations define the resources of a parent company as a factor. However, such resources are considered only to the extent those resources are available to the subsidiary. If, for example, the subsidiary is responsible for product design but the parent company is responsible for overall marketing, it may be appropriate to expect the parent company to address some of the marketing goals. If, on the other hand, the resources of a parent company are not available to the subsidiary, they may not be relevant. This determination would be made on a case-by-case basis.

d. A fourth factor in making readily achievable assessments is whether the accessibility solution results in a fundamental alteration of the product. This factor, derived by extension from the "undue burden" criteria of the ADA, takes into consideration the effect adding an accessibility feature might have on a given product. For example, it may not be readily achievable to add a large display for low vision users to a small pager designed to fit in a pocket, because making the device significantly larger would be a fundamental alteration of the device. On the other hand, adding a voice output may not involve a fundamental alteration and would serve both blind and low vision users. In addition, adding an infrared port might be readily achievable and would allow a large-display peripheral device to be coupled to it. Of course fundamental alteration means a change in the fundamental characteristic of the product, not merely a cosmetic or esthetic change.

Subpart B—General Requirements

Section 1193.23 Product Design, Development and Evaluation

Paragraph (a)

1. This section requires manufacturers to evaluate the accessibility, usability, and compatibility of telecommunications

equipment and customer premises equipment and incorporate such evaluation throughout product design, development, and fabrication, as early and consistently as possible. Manufacturers must develop a process to ensure that products are designed, developed and fabricated to be accessible whenever it is readily achievable. Since what is readily achievable will vary according to the stage of development (i.e., some things will be readily achievable in the design phase which may not be in later phases), barriers to accessibility and usability must be identified throughout product design and development, from conceptualization to production. Moreover, usability can be seriously affected even after production, if information is not provided in an effective manner.

2. The details of such an evaluation process will vary from one company to the next, so this section does not specify its structure or specific content. Instead, this section sets forth a series of factors that a manufacturer must consider in developing such a process. How, and to what extent, each of the factors is incorporated in a specific process is up to the manufacturer.

3. Different manufacturers, or even the same manufacturer at different times, have the flexibility to tailor any such plan to its own particular needs. This section does not prescribe any particular plan or content. It does not require that such a process be submitted to any entity or that it even be in writing. The requirement is outcome-oriented, and a process could range from purely conceptual to formally documented, as suits the manufacturer.

4. The goal is for designers to be aware of access and incorporate such considerations in the conceptualization of new products. When an idea is just beginning to take shape, a designer would ask, "How would a blind person use this product? How would a deaf person use it?" The sooner a manufacturer makes its design team cognizant of design issues for achieving accessibility; and proven solutions for accessibility and compatibility, the easier this process will be.

Paragraph (b)(1)

Market Research

1. The guidelines do not require market research, testing or consultation, only that they be considered and incorporated to the extent deemed appropriate for a given manufacturer. If a manufacturer has a large marketing effort, involving surveys and focus groups, it may be appropriate to include persons with disabilities in such groups. On the other hand, some small companies do not do any real marketing, per se, but may just notice that a product made by XYZ Corporation is selling well and, based on this "marketing survey" it decides it can make a cheaper one. Clearly, "involvement" of persons with disabilities is not appropriate in this case.

2. A manufacturer must consider how it could include individuals with disabilities in target populations of market research. It is important to realize that any target population for which a manufacturer might wish to focus a product contains individuals with disabilities, whether it is teenagers,

single parents, women between the ages of 25 and 40, or any other subgroup, no matter how narrowly defined. Any market research which excludes individuals with disabilities will be deficient.

Paragraph (b)(2)

Product Design, Testing, Pilot Demonstrations, and Product Trials

1. Including individuals with disabilities in product design, testing, pilot demonstrations, and product trials will encourage appropriate design solutions to accessibility barriers. In addition, such involvement may result in designs which have an appeal to a broader market.

Paragraph (b)(3)

Working Cooperatively With Appropriate Disability-Related Organizations

1. Working cooperatively with appropriate disability-related organizations is one of the factors that manufacturers must consider in their product design and development process. The primary reason for working cooperatively is to exchange relevant information. This is a two-way process since the manufacturer will get information on barriers to the use of its products, and may also be alerted to possible sources for solutions. The process will also serve to inform individuals with disabilities about what is readily achievable. In addition, manufacturers will have a conduit to a source of subjects for market research and product trials.

2. Manufacturers should consult with representatives from a cross-section of disability groups, particularly individuals whose disabilities affect hearing, vision, movement, manipulation, speech, and interpretation of information.

3. Because of the complex interrelationship between equipment and services in providing accessibility to telecommunications products, coordination and cooperation between manufacturers and service providers will be beneficial. Involving service providers in the product development process will encourage appropriate design solutions to accessibility barriers and permit the exchange of relevant information.

Paragraph (b)(4)

Making Reasonable Efforts to Validate Unproven Access Solutions

1. Manufacturers must consider how they can make reasonable efforts to validate any unproven access solutions through testing with individuals with disabilities or with appropriate disability-related organizations that have established expertise with individuals with disabilities. It is important to obtain input from persons or organizations with established expertise to ensure that input is not based merely on individual preferences or limited experience.

2. This input should be sought from representatives from a cross-section of disability groups, particularly individuals whose disabilities affect hearing, vision, movement, manipulation, speech, and interpretation of information.

Subpart C—Requirements for Accessibility and Usability

Section 1193.33 Information, Documentation, and Training Paragraph (a)

1. This section requires that manufacturers provide access to information and documentation. The information and documentation includes user guides, installation guides, and product support communications, regarding both the product in general and the accessibility features of the product. Information and documentation should be provided to people with disabilities at no additional charge. Alternate formats or alternate modes of this information is also required to be available. Manufacturers should also encourage distributors of their products to establish information dissemination and technical support programs similar to those established by the manufacturer.

Alternate Formats and Alternate Modes

1. Alternate formats may include, but are not limited to, Braille, ASCII text, large print, and audio cassette recording. Alternate modes may include, but are not limited to, voice, fax, relay service, TTY, Internet posting, captioning, text-to-speech synthesis, and video description.

2. In considering how to best provide product information to people with disabilities, it is essential that information be provided in an alternate format or mode that is usable by the person needing the information. For example, some individuals who are blind might require a manual in Braille to understand and use the product effectively. Other persons who are blind may prefer this information on a computer disk. Persons with limited reading skills may need this information recorded on audio cassette tape so they can listen to the manual. Still other persons with low vision may be able to read the text version of the manual if it is provided in a larger font. Likewise, if a tutorial video is provided, persons who are deaf may require a captioned version so that they will understand how to use the product effectively. Finally, individuals who rely on TTYs will need direct TTY access to a customer service line so they can ask questions about a product like everyone else.

3. This portion of the appendix explains how to provide information in alternate formats (Braille, ASCII text, large print, audio cassette) to persons with disabilities.¹

Braille

4. Some persons who are blind rely on the use of Braille in order to obtain information that is typically provided in print. These persons may need Braille because of the nature of their disability (such as persons who are deaf-blind) or because of the complexity of the material. Most large urban areas have companies or organizations which can translate printed material to Braille. On the other hand, manufacturers may wish to consider producing Braille documents "in house" using a personal computer, Braille translation software, and a Braille printer.

¹ This information was provided by the American Foundation for the Blind.

The disadvantage is the difficulty in ensuring quality control and accuracy. Software programs exist which can translate common word processing formats directly into Braille, but they are not always error free, especially if the document contains special characters, jargon, graphics, or charts. Since the typical office worker will not be able to proofread a Braille document, the initial apparent cost saving may be quickly lost by having to redo documents. The Braille translation software costs approximately \$500 and most Braille printers sold range from \$2,000 to \$5,000, however some Braille printers, depending on the speed and other features, do cost more. Depending on the quality of Braille to be generated, a Braille printer in the \$4,000 range should be adequate for most users. By using automatic translation software, individuals who do not have knowledge of Braille or who have limited computer skills may be able to produce simple Braille documents without much trouble. If the document is of a complex format, however, such as a text box over multiple columns, a sophisticated knowledge of Braille translation software and formatting will be required.

Electronic Text

5. People who are blind or have low vision and who have access to computers may be able to use documents in electronic form. Electronic text must be provided in ASCII or a properly formatted word processor file. Using electronic text allows this information to be transmitted through e-mail or other on-line telecommunications. Blind or low vision persons who have access to a personal computer can then read the document using synthetic speech, an electronic Braille display, a large print computer monitor, or they can produce a hard copy in large print or Braille.

6. Documents prepared for electronic transmission should be in ASCII. Documents supplied on disk should also be provided in either ASCII or a word processor format usable by the customer. Word processing documents should be properly formatted before distribution or conversion to ASCII. To be correctly formatted, the document should be in Courier 10 point size and formatted for an 80 character line. Tables should be converted to plain text. Graphics or text boxes should be deleted and explained or described in text format. This will allow the reader to understand all of the documentation being presented. Replace bullets (•) with "*" or "." and convert other extended ASCII characters into text. When converting a document into ASCII or word processor formats, it is important to utilize the appropriate "tab key" and "centering key" rather than using the space bar. This is necessary because Braille translation software relies on the proper use of commands to automate the formatting of a Braille document.

Large Print

7. Persons with low vision may require documentation to be provided in large print. Large print documents can easily be produced using a scalable font from any good word processing program and a standard laser printer. Using the document

enlargement option on a photocopier will usually yield unsatisfactory results.

8. To obtain the best results follow these guidelines:

a. It is preferable to use paper that is standard 8½ x 11 inches. Larger paper may be used, but care should be taken that a document does not become too bulky, thus making it difficult to read. Always use 1 inch margins. Lines longer than 6⅓ inches will not track well for individuals who must use a magnifier.

b. The best contrast with the least glare is achieved on very pale yellow or cream-colored non-glossy paper, such as paper that is used for photocopying purposes. To produce a more aesthetic looking document, an off-white paper may be used and will still give good contrast while producing less glare than white. Do not use dark colors and shades of red. Double-sided copying (if print does not bleed through) will produce a less bulky document.

c. Remove formatting codes that can make reading more difficult. For example, centered or indented text could be difficult to track because only a few words will fit on a line. All text should begin at the left margin. Use only left margin justification to maintain uniform spacing across lines. Right margin justification can produce uneven spacing between letters and words. Use 1¼ (1.25) line spacing; do not double space. Replace tabs with two spaces. Page numbering should be at the top or bottom left. Avoid columns. If columns are absolutely necessary, use minimum space between columns. Use dot leaders for tabular material. For those individuals who are able to read graphics (via the use of a magnifier or other assistive device) graphics should be included, but placed on a separate page from the text. For those individuals with low vision who are unable to read graphics, tables, and charts this material must be removed from the document and an accurate description of this material should be included in a text format.

d. There is no standard typeface or point size. For more universal access, use 18 point type; anything larger could make text too choppy to read comfortably. Use a good strong bold typeface. Do not use italics, fine, or fancy typefaces. Do not use compressed typefaces; there should be normal "white space" between characters.

e. Use upper and lowercase letters.
f. Using these instructions, one page of print (11–12 point type) will equal approximately three pages of large print (14–18 point) depending on the density of the text.

Cassette Recordings

9. Some persons who are blind or who have learning disabilities may require documentation on audio cassettes. Audio materials can be produced commercially or in-house. Agencies sometimes record material in-house and purchase a high speed tape duplicator (\$1,000–2,000) which is used to make cassette copies from the master. The cost of a duplicator can be higher depending upon the number of copies produced on a single run, and whether the duplicator can produce standard speed two-sided copies or half-speed four-sided copies. Although unit costs can be reduced by using the four-track,

half-speed format, this will require the reader to use a specially designed playback machine. Tapes should be produced with "tone indexing" to allow a user to skip back and forth from one section to another. By following a few simple guidelines for selecting readers and creating recordings, most organizations will be able to successfully record most simple documents.

10. Further guidance in making cassette recordings includes:

a. The reader should be proficient in the language being recorded.

b. The reader should be familiar with the subject. Someone who is somewhat familiar with the technical aspects of a product but who can explain functions in ordinary language would be a logical person to record an audio cassette.

c. The reader should have good diction. Recording should be done in a conversational tone and at a conversational pace; neither too slow nor too fast.

d. The reader should be familiar with the material to minimize stumbling and hesitation.

e. The reader should not editorialize. When recording a document, it should be read in full. Graphic and pictorial information available to sighted readers should be described in the narrated text. Tables and charts whose contents are not already contained in text should be converted into text and included in the recording.

f. The reader should spell difficult or unusual words and words of foreign origin.

g. At the beginning of the tape, identify the reader, i.e., "This document is being read by John Smith."

h. On each side of the tape, identify the document and the page number where the reader is continuing, i.e., "tape 2, side 1, Guide to Barrier Free Meetings, continuing on page 75."

i. For blind users, all cassettes should be labeled in Braille so that they can easily be referenced in the appropriate order.

Alternate Modes

11. Information is provided increasingly through a variety of means including television advertisements, Internet postings, information seminars, and telephone. This portion of the appendix explains how to provide information in some alternate modes (captioning, video description, Internet postings, relay service, and TTY).

Captioning

12. When manufacturers of telecommunications equipment or customer premises equipment provide videos with their products (such as tutorials or information explaining various components of a product) the video should be available with captioning. Closed captioning refers to assistive technology designed to provide access to television for persons with hearing disabilities that is visible only through the use of a decoder. Open captions are visible at all times. Captioning is similar to subtitles in that the audio portion of a television program is displayed as printed words on the television screen. Captions should be carefully placed to identify speakers, on-and-off-screen sound effects, music and laughter. Increased captioning was made possible

because of the Television Decoder Circuitry Act which requires all television sets sold in the United States with screens 13 inches or larger to have built-in decoder circuitry.

13. Although captioning technology was developed specifically to make television and video presentations accessible to deaf and hard of hearing people, there has been widespread interest in using this technology to provide similar access to meetings, classroom teaching, and conferences. For meetings, video-conferences, information seminars, and the like, real-time captioning is sometimes provided. Real-time captioning uses a stenographic machine connected to a computer with translation software. The output is then displayed on a monitor or projected on a screen.

Video Description

14. Just as manufacturers of telecommunications equipment and customer premises equipment need to make their videos accessible to persons who are deaf or hard of hearing, they must also be accessible to persons who are blind or have low vision. This process is known as video description. Video description may either be a separate audio track that can be played simultaneously with the regular audio portion of the video material (adding description during pauses in the regular audio), or it can be added to (or "mixed" with) an existing soundtrack. The latter is the technique used for videotapes.

Internet Postings

15. The fastest growing way to obtain information about a product is through use of the Internet, and specifically the World Wide Web. However, many Internet users with disabilities have difficulty obtaining this information if it is not correctly formatted. This section provides information on how to make a World Wide Web site more accessible to persons with disabilities². Because of its structure, the Web provides tremendous power and flexibility in presenting information in multiple formats (text, audio, video, and graphic). However, the features that provide power and elegance for some users present potential barriers for people with sensory disabilities. The indiscriminate use of graphic images and video restrict access for people who are blind or have low vision. Use of audio and non-captioned video restrict access for people who are deaf or hard of hearing.

16. The level of accessibility of the information on the Web is dependent on the format of the information, the transmission media, and the display system. Many of the issues related to the transmission media and the display system cannot be affected by the general user. On the other hand, anyone creating information for a Web server has control of the accessibility of the information. Careful design and coding of information will provide access to all people without

² This information is based on the document "Writing HTML Documents and Implementing Accessibility for the World Wide Web" by Paul Fountaine, Center for Information Technology Accommodation, General Services Administration. For further information, see <http://www.gsa.gov/coca>.

compromising the power and elegance of the Web site.

17. A few suggestions are:

a. Every graphic image should have associated text. This will enable a person using a character-based program, such as Lynx, to understand the material being presented in the graphical format. It also allows anyone who does not want to wait for graphics to load to have quick access to the information on the site.

b. Provide text transcriptions or descriptions for all audio output. This will enable people who are deaf or hard of hearing to have access to this information, as well as individuals who do not have sound cards.

c. Make any link text descriptive, but not verbose. For example, words like "this", "here", and "click" do not convey enough information about the nature of the link, especially to people who are blind. Link text should consist of substantive, descriptive words which can be quickly reviewed by the user. Conversely, link text which is too long bogs down efficient browsing.

d. Provide alternate mechanisms for on-line forms. Forms are not supported by all browsers. Therefore, it is important to provide the user with an opportunity to select alternate methods to access such forms.

e. All Web pages should be tested using multiple viewers. At a minimum, pages should be tested with the latest version of Lynx to ensure that they can be used with screen reader software.

Telecommunications Relay Services (TRS)

18. By using telecommunications relay services (TRS), it has now become easier for persons with hearing and speech disabilities to communicate by the telephone. TRS links TTY users with those who do not have a TTY and use standard telephones. With TRS, a TTY user communicates with another person with the help of a communications assistant who is able to talk on the telephone and then communicate by typing the message verbatim, to the TTY user. The communications assistant also reads the message typed by the TTY user, or the TTY user may speak for him or herself using voice carry over.

19. There are now TRS programs in every state. Although TRS is very valuable, it does have limitations. For example, relay calls take longer, since they always involve a third party, and typing words takes longer than speaking words.

Text Telephones (TTYs)

20. A TTY also provides direct two-way typed conversations. The cost of these devices begins at approximately \$200 and they can be operated by anyone who can type.

21. The following information is excerpted from the brochure "Using a TTY" which is available free of charge from the Access Board:

a. If the TTY line is also used for incoming voice calls, be sure the person who answers the phone knows how to recognize and answer a TTY call. You will usually hear silence, a high-pitched, electronic beeping sound, or a pre-recorded voice message when

it is a TTY call. If there is silence, assume it is a TTY call.

b. TTYs should be placed near a standard telephone so there is minimal delay in answering incoming TTY calls.

c. To initiate a TTY call, place the telephone headset in the acoustic cups of the TTY adapter. If the TTY unit is directly connected to the phone line, there is no need to put the telephone headset in the acoustic cups. Turn the TTY on. Make sure there is a dial tone by checking for a steady light on the TTY status indicator.

d. Dial the number and watch the status indicator light to see if the dialed number is ringing. The ring will make a long slow flash or two short flashes with a pause in between. If the line is busy, you will see short, continuous flashes on the indicator light. When the phone is answered, you will see an irregular light signal as the phone is picked up and placed in the cradle. If you are calling a combination TTY and voice number, tap the space bar several times to help the person on the other end identify this as a TTY call.

e. The person who answers the call is the first to type. Answer the phone as you would by voice, then type "GA".

f. "GA" means "I'm done, go ahead and type". "HD" means hold. "GA or SK" means "Is there anything more, I'm done". "SK" means stop keying. This is how you show that the conversation is ended and that you will hang up. It is polite to type good-bye, thank you for calling, or some other closing remark before you type "SK". Stay on the line until both parties type SKSK.

22. Because of the amount of time it takes to send and receive messages, it is important to remember that short words and sentences are desired by both parties. With some TTY calls it is often not possible to interrupt when the other person is typing. If you get a garbled message in all numbers or mixed numbers and letters, tap the space bar and see if the message clears up. If not, when the person stops typing, you should type, "Message garbled, please repeat." If the garbled messages continue, this may mean that one of the TTYs is not working properly, there is background noise causing interference, or that you may have a bad connection. In this case you should say something like, "Let's hang up and I'll call you back."

23. The typical TTY message will include many abbreviations and jargon. The message may also include misspelled words because, if the meaning is clear, many callers will not bother to correct spelling since it takes more time. Also, some TTY users communicate in American sign language, a language with its own grammar and syntax. English may be a second language. Extend the same patience and courtesy to TTY callers as you do to all others.

Paragraph (b)

1. This paragraph requires manufacturers to supply a point of contact for obtaining information about accessibility features of the product and how to obtain documents in alternate formats. This could be the name of a specific person, a department or an office. Supplying a telephone number, and preferably a separate TTY number, is the most universal method. Web site and e-mail

addresses are also desirable, but should not substitute for a telephone number since many more people have access to a telephone than have e-mail or Internet access. Of course, the means for requesting additional accessibility information must, itself, be accessible.

2. Automated voice response systems are not usable by deaf and hard of hearing persons. An approach to consider is to augment an automated voice response system with an automated TTY response system that also detects whether a caller is using voice or TTY.

3. The phone number should be prominently displayed in product literature. Ideally, it should be displayed on the outside of the package so that a potential buyer can obtain information about the accessibility before purchase. In addition, manufacturers should acquaint their distributors with this information so that they can assist customers with disabilities, such as a blind person unable to read the package information.

Paragraph (c)

1. This paragraph requires manufacturers to consider including information on accessibility in training a manufacturer provides to its staff. For example, if technical support staff are trained on how to provide good technical support, such a program should be expanded to include information on accessibility features of the manufacturer's products and peripheral devices that are compatible with them. Such staff should also have basic information on how to handle TTY and relay calls. Personnel who deal directly with the public, including market researchers, should be trained in basic disability "etiquette."

Section 1193.35 Redundancy and Selectability [Reserved]

1. Although this section is reserved, manufacturers of telecommunications equipment and customer premises equipment are encouraged to provide redundancy such that input and output functions are available in more than one mode.

2. Alternate input and output modes should be selectable by the user.

3. Products should incorporate multiple modes for input and output functions so the user is able to select the desired mode.

a. Since there is no single interface design that accommodates all disabilities, accessibility is likely to be accomplished through various product designs which emphasize interface flexibility to maximize user configurability and multiple, alternative and redundant modalities of input and output.

b. Selectability is especially important where an accessibility feature for one group of individuals with disabilities may conflict with an accessibility feature for another. This potential problem could be solved by allowing the user to switch one of the features on and off. For example, a conflict may arise between captioning (provided for persons who are deaf or hard of hearing) and a large font size (provided for persons with low vision). The resulting caption would either be so large that it obscures the screen or need to be scrolled or displayed in segments for a very short period of time.

c. It may not be readily achievable to provide all input and output functions in a single product or to permit all functions to be selectable. For example, switching requires control mechanisms which must be accessible and it may be more practical to have multiple modes running simultaneously. Whenever possible, it is preferable for the user to be able to turn on or off a particular mode.

4. Some experiments with smart cards are showing promise for enhancing accessibility. Instead of providing additional buttons or menu items to select appropriate input and output modes, basic user information can be stored on a smart card that triggers a custom configuration. For example, insertion of a particular card can cause a device to increase the font size on a display screen or activate speech output. Another might activate a feature to increase volume output, lengthen the response time between sequential operations, or allow two keys to be pressed sequentially instead of simultaneously. This technology, which depends on the issuance of a customized card to a particular individual, would allow redundancy and selectability without adding additional controls which would complicate the operation. As more and more functions are provided by software rather than hardware, this option may be more readily achievable.

5. The increasing use of "plug-ins" allow a product to be customized to the user's needs. Plug-ins function somewhat like peripheral devices to provide accessibility and there is no fundamental problem in using plug-ins to provide access, as long as the accessibility plug-ins are provided with the product. For example, at least one computer operating system comes packaged with accessibility enhancements which a user can install if wanted. In addition, modems are typically sold with bundled software that provides the customer premises equipment functionality. A compatible screen reader program, for example, could be bundled with it. At least one software company has developed a generalized set of accessibility tools designed to be bundled with a variety of software products to provide access. As yet, such developments are not fully mature; most products are still installed by providing on-screen visual prompts, not accompanied by meaningful sounds.

Section 1193.41 Input, Controls, and Mechanical Functions

Paragraph (a)

Operable Without Vision

1. Individuals who are blind or have low vision cannot locate or identify controls, latches, or input slits by sight or operate controls that require sight. Products should be manufactured to be usable independently by these individuals. For example, individuals who cannot see must use either touch or sound to locate and identify controls. If a product uses a flat, smooth touch screen or touch membrane, the user without vision will not be able to locate the controls without auditory or tactile cues.

2. Once the controls have been located, the user must be able to identify the various functions of the controls. Having located and

identified the controls, individuals must be able to operate them.

3. Below are some examples of ways to make products accessible to persons with visual disabilities:

a. If buttons are used on a product, make them discrete buttons which can be felt and located by touch. If a flat membrane is used for a keyboard, provide a raised edge around the control areas or buttons to make it possible to locate the keys by touch. Once an individual locates the different controls, he or she needs to identify what the keys are. If there is a standard number pad arrangement, putting a nib on the "5" key may be all that is necessary for identifying the numbers. On a QWERTY keyboard, putting a tactile nib on the "F" and "J" keys allows touch typists to easily locate their hands on the key.

b. Provide distinct shapes for keys to indicate their function or make it easy to tell them apart. Provide Braille labels for keys and controls for those who read Braille to determine the function and use of controls.

c. Provide large raised letters for short labels on large objects. Where it is not possible to use raised large letters, a voice mode selection could be incorporated that announces keys when pressed, but does not activate them. This would allow people to turn on the voice mode long enough to explore and locate the item they are interested in, then release the voice mode and press the control. If it is an adjustable control, voice confirmation of the status may also be important.

d. Provide tactile indication on a plug which is not a self-orienting plug. Wireless connections, which eliminate the need to orient or insert connectors, also solve the problem.

e. Avoid buttons that are activated when touched to allow an individual to explore the controls to find the desired button. If touch-activated controls cannot be avoided (for example, on a touch screen), provide an alternate mode where a confirm button is used to confirm selections (for example, items are read when touched, and activated when the confirm button is pressed). All actions should be reversible, or require confirmation before executing non-reversible actions.

f. Once controls have been located and users know what the functions are, they must be operable. Some types of controls, including mouse devices, track balls, dials without markings or stops, and push-button controls with only one state, where the position or setting is indicated only by a visual cue, will not be usable by persons who are blind or have low vision. Providing a rotational or linear stop and tactile or audio detents is a useful strategy. Another is to provide keyboard or push-button access to the functions. If the product has an audio system and microprocessor, use audio feedback of the setting. For simple products, tactile markings may be sufficient.

g. Controls may also be shaped so that they can easily be read by touch (e.g., a twist knob

shaped like a pie wedge). For keys which do not have any physical travel, some type of audio or tactile feedback should be provided so that the individual knows when the key has been activated. A two-state key (on/off) should be physically different in each position (e.g., a toggle switch or a push-in/pop-out switch), so the person can tell what state the key is in by feeling it.

h. If an optional voice mode is provided for operating a product, a simple "query" mode can also be provided, which allows an individual to find out the function and state of a switch without actually activating it. In some cases, there may be design considerations which make the optimal mode for a sighted person inaccessible to someone without vision (e.g., use of a touch screen or mouse). In these cases, a primary strategy may be to provide a closely linked parallel method for efficiently achieving the same results (e.g., keyboard access) if there is a keyboard, or "SpeedList" access for touch screens.

Paragraph (b)

Operable With Low Vision and Limited or No Hearing

1. Individuals with low vision often also have hearing disabilities, especially older individuals. These persons cannot rely solely on audio access modes commonly used by people who are blind. Tactile strategies are still quite useful, although many older persons may not be familiar with Braille. The objective, therefore, is to maximize the number of people who can use their residual vision, combined with tactile senses, to operate a product.

2. Strategies for addressing this provision may include the following: a. Make the information on the product easier to see. Use high-contrast print symbols and visual indicators, minimize glare on the display and control surfaces, provide adequate lighting, position controls near the items they control to make them easy to find, and use Arabic instead of Roman numerals.

b. The type-face and type-spacing used can greatly affect legibility. The spacing between letters should be approximately 1/16 the height of uppercase letters and the spacing should be uniform from one label to the next. Also, symbols can sometimes be used which are much more legible and understandable than fine print.

c. Where the display is dynamic, provide a means for the user to enlarge the display and to "freeze" it. In addition to making it easier to see, there are strategies which can be used to reduce the need to see things clearly in order to operate them.

d. A judicious use of color-coding, always redundant with other cues, is extremely helpful to persons with low vision. These cues should follow standard conventions, and can be used to reduce the need to read labels (or read labels more than the first time). In addition, all of the tactile strategies discussed under section 1193.41 (a) can also be used here.

Paragraph (c)

Operable With Little or No Color Perception

1. Many people are unable to distinguish between certain color combinations. Others are unable to see color at all.

2. Strategies for addressing this provision include:

a. Eliminate the need for a person see color to operate the product. This does not eliminate the use of color completely but rather requires that any information essential to the operation of a product also be conveyed in some other fashion.

b. Avoid color pairs such as red/green and blue/yellow, that are indistinguishable by people with limited color perception.

c. Provide colors with different hues and intensity so that colored objects can be distinguished even on a black and white screen by their different appearance. Depending upon the product, the manufacturer may also be able to allow users to adjust colors to match their preferences and visual abilities.

d. Avoid colors with a low luminance.

Paragraph (d)

Operable Without Hearing

1. Individuals who are deaf or hard of hearing cannot locate or identify controls that require hearing. Products that provide only audio prompts cannot be used by individuals who are deaf or hard of hearing. For example, a voice-based interactive product that can be controlled only by listening to menu items and then pressing buttons is not accessible. By addressing the output issues under section 1193.43(d) many accessibility problems that affect input under this section can be solved.

2. Some strategies include:

a. Text versions of audio prompts could be provided which are synchronized with the audio so that the timing is the same.

b. If prompts are provided visually and no speech or vocalization is required, most problems associated with locating, identifying, and operating controls without hearing will be solved.

Paragraph (e)

Operable With Limited Manual Dexterity

1. Individuals may have difficulty manipulating controls on products for any number of reasons. Though these disabilities may vary widely, these persons have difficulty grasping, pinching, or twisting objects and often have difficulty with finer motor coordination. Some persons may use a headstick, mouthstick, or artificial limb.

2. Below are some strategies which will assist in designing products which will meet the needs of these persons:

a. Provide larger buttons and controls, or buttons which are more widely spaced, to reduce the likelihood that a user will accidentally activate an adjacent control.

b. Provide guard bars between the buttons or near the buttons so that accidental movements would hit the guard bars rather than accidentally bumping switches.

c. Provide an optional mode where buttons must be depressed for a longer period of time (e.g., SlowKeys) before they would accept input to help separate between inadvertent motions or bumps and desired activation.

d. Where two buttons must be depressed simultaneously, provide an option to allow them to be activated sequentially (e.g., StickiKeys).

e. Avoid buttons which are activated merely by touch, such as capacitance switches. Where that is difficult to do (e.g., with touchscreens), provide a "confirm" button which an individual can use to confirm that the item touched is the desired one. Also, make all actions reversible, or request confirmation before initiating non-reversible actions.

f. Avoid latches, controls, or key combinations which require simultaneous activation of two or more buttons, or latches. Also, avoid very small controls or controls which require rotation of the wrist or pinching and twisting. Where this is not possible, provide alternate means for achieving the same functions.

g. Controls which have non-slip surfaces and those that can be operated with the side of the hand, elbow or pencil can be used to minimize physical activity required. In some cases, rotary controls can be used if they can be operated without grasping and twisting (e.g., a thin pie slice shape control or an edge control). Providing a concave top on buttons makes them easier to use.

h. Make it easier to insert cards or connectors by providing a bevel around the slot or connector, or use cards or connectors which can be inserted in any orientation or which self-center or self-align. Placing the slot or connector on the front and near a ledge or open space allows individuals to brace their hands or arms to make use of the slot or connector easier.

i. For some designs, controls which pose problems for individuals with disabilities may be the most efficient, logical or effective mechanism for a majority of users. In these cases, provide alternate strategies for achieving the same functions, but which do not require fine manipulation. Speech input or voice recognition could be provided as an alternate input, although it should not be the only input technique.

Paragraph (f)

Operable With Limited Reach and Strength

1. Some individuals may have difficulty operating systems which require reach or strength. The most straight-forward solution to this problem is to place the controls where they can be easily reached with minimal changes to body position. Many products also have controls located on different parts of the product.

2. When this is the case, the following strategies may be used:

a. Allow the functions to be controlled from the keyboard, which is located directly in front of the user.

b. Allow voice recognition to be used as an option. This provides input flexibility, but should never be the only means for achieving a function.

c. Provide a remote control option that moves all of the controls for the product together on a unit that can be positioned optimally for the individual. This allows the individual to operate the product without having to move to it. If this strategy is used, a standard communication format would be

important to allow the use of alternate remote controls for those who cannot use the standard remote control.

d. Reduce the force needed to operate controls or latches and avoid the need for sustained pressure or activity (e.g., use guards rather than increased strength requirements to avoid accidental activation of crucial switches).

e. Provide arm or wrist rests or supports, create short cuts that reduce the number of actions needed, or completely eliminate the need to operate controls wherever possible by having automatic adjustments.

f. Section 4.34.3 of the Americans with Disabilities Act Accessibility Guidelines (ADAAG) also contains specific information concerning reach ranges. ADAAG gives specific guidance concerning access to the built environment. Section 4.34.3 indicates the reach ranges for a front or parallel approach to equipment for individuals using a wheelchair. This information may prove useful for those telecommunications manufacturers whose equipment is stationary, such as an information kiosk.

Paragraph (g)

Operable Without Time-Dependent Controls

1. Many persons find it very difficult to operate time-dependent controls.

2. Some strategies which address this problem include:

a. Avoid any timed-out situations or provide instances where the user must respond to a question or moving display in a set amount of time or at a specific time (e.g., a rotating display).

b. Where timed responses are required or appropriate, allow the user to adjust them or set the amount of time allotted to complete a given task. Warn users that time is running out and allow them to secure extended time.

c. If the standard mode of operation would be awkward or inefficient, then provide an alternate mode of operation that offers the same functions.

Paragraph (h)

Operable Without Speech

1. Many individuals cannot speak or speak clearly. Products which require speech in order to operate them should also provide an alternate way to achieve the same function.

2. Some strategies to achieve this include:

a. Provide an alternate mechanism for achieving all of the functions which are controlled by speech. If a product includes speech identification or verification, provide an alternate mechanism for this function as well.

b. Include individuals who are deaf or who have speech disabilities in the subject populations that are used to develop voice recognition algorithms, so that the algorithms will better accommodate a wider range of speech patterns.

Paragraph (i)

Operable With Limited Cognitive Skills

1. Many individuals have reduced cognitive abilities, including reduced memory, sequence tracking, and reading skills. This does not necessarily prevent these persons from using a telecommunications product or feature.

2. The following strategies are extensions of techniques for making products easier for everyone to learn and use:

a. Use standard colors and shapes and group similar functions together. On products which have some controls that are used by everyone and other controls which would only be used by advanced users, it is generally good practice to separate the two, putting the more advanced features behind a door or under a separate menu item.

b. Products which read the contents of the display aloud, or controls which announce their settings, are easier for individuals who have difficulty reading.

c. Design products that are self-adjusting to eliminate additional controls which must be learned, and reduce the visual clutter.

d. On products which have sign-in procedures, allow user settings to be associated with them when they sign in or insert their identification card. The system can then autoconfigure to them. Some new "smart cards" are being designed with user preferences encoded on the card.

e. Where a complex series of steps is required, provide cuing to help lead the person through the process. It is also helpful to provide an "undo" or back up function, so that any mistakes can be easily corrected. Most people will find this function helpful.

f. Where functions are not reversible, request some type of confirmation from the user before proceeding. On labels and instructions, it is helpful to use short and simple phrases or sentences. Avoid abbreviations wherever possible. Eliminate the need to respond within a certain time or to read text within a certain time.

Section 1193.43 Output, Displays, and Control Functions

Paragraph (a)

Availability of Visual Information

1. Just as persons with visual or cognitive disabilities need to be able to operate the input, controls, and mechanical functions of a product, they must also have access to the output functions.

2. The following are strategies for addressing this provision:

a. Provide speech output of all displayed text and labels. For information which is presented in non-text form (e.g., a picture or graphic), provide a verbal description unless the graphic is just decorative. When speech output is provided, allow for the spoken message to be repeated if the message is very long. Also, if the information being provided is personal in nature, it is recommended that headphones be provided in order to assure privacy. A message for stepping through menus is also helpful.

b. Providing Braille labels for controls is an extremely effective mechanism for those individuals who read Braille.

c. Large raised print can also be used but is generally restricted to rather large objects due to the size of the letters.

Paragraph (b)

Availability of Visual Information for Low Vision Users

1. Individuals with low vision often also have hearing disabilities, especially older

individuals. These persons cannot rely solely on audio access modes commonly used by people who are blind. Tactile strategies are still quite useful. Many people who have low vision can use their vision to access visually presented information on a product.

2. Strategies for meeting this provision involve:

a. Provide larger, higher contrast text and graphics. Individuals with 20/200 vision can see lettering if they get close to it, unless it is very small or has very poor contrast. Although 14 or 18 point type is recommended for visual displays, it is usually not possible to put this size text on small products.

b. Make the lettering as large and high contrast as possible to maximize the number of people who can use the product.

c. On displays where the font size can be varied, allow the user to increase the font size, even if it means that the user must pan or move in order to see the full display.

Paragraph (c)

Access to Moving Text

1. Moving text can be an access problem because individuals with low vision, or other disabilities may find it difficult or impossible to track moving text with their eyes.

2. Strategies to address this requirement may include the following:

a. Provide a mechanism for freezing the text. Thus, persons could read the stationary text and obtain the same information.

b. Provide scrolling to display one full line at a time, with a pause before the next line replaces it.

c. Provide the same information in another type of display which does not move. The right-to-left scrolling text on a TTY does not usually present a problem because it can be controlled by asking the sender to type slower or pause at specified intervals.

Paragraph (d)

Availability of Auditory Information

1. Individuals who have hearing disabilities are unable to receive auditory output, or mechanical and other sounds that are emitted by a product. These sounds are often important for the safe or effective operation of the product. Therefore, information which is presented auditorially should be available to all users.

2. Some strategies to achieve this include the following:

a. Provide a visual or tactile signal that will attract the person's attention and alert the user to a call, page, or other message, or to warn the user of significant mechanical difficulties in the product.

b. In portable products, a tactile signal such as vibration is often more effective than a visual signal because a visual signal may be missed. An auxiliary vibrating signaler might be effective if it is not readily achievable or effective to build vibration into a portable product.

c. For stationary products, a prominent visual indicator in the field of vision (e.g., a screen flash for a computer, or a flashing light for a telephone) is effective. To inform the user of the status of a process (e.g., line status on a telephone call, power on, saving to disk, or disconnected), text messages may

be used. It is also desirable to have an image or light that is activated whenever acoustic energy is present on a telephone line.

d. Speech messages should be portrayed simultaneously in text form and displayed where easily seen by the user. Such captions should usually be verbatim and displayed long enough to be easily read. If the product provides speech messages and the user must respond to those messages (e.g., interactive voice response and voice mail), a TTY accessible method of accessing the product could be provided.

e. TTY to TTY long distance and message unit calls from pay telephones are often not possible because an operator says how much money must be deposited. Technology exists to have this information displayed on the telephone and a test installation is currently operating at the Butler plaza on the Pennsylvania Turnpike. In addition, if the product provides interactive communication using speech and video, it would be helpful to provide a method and channel for allowing non-speech communication (e.g., text conversation) in parallel with the video.

f. Certain operations of products make sounds that give status information, although these sounds are not programmed signals. Examples include the whir of an operating disk drive and the click of a key being pushed. Where sounds of this type provide information important for operating the product, such as a "beep" when a key is activated, provide a light or other visual confirmation of activation.

Paragraph (e)

Availability of Auditory Information for People Who Are Hard of Hearing

1. People who are hard of hearing but not deaf can often use their hearing to access auditory information on a product.

2. Strategies for addressing this requirement may include the following:

a. Improve the signal to noise ratio by making the volume adjustable, between 18–25 dB, increasing the maximum undistorted volume, and minimizing background noise by such methods as better coupling between the signal source and the user.

b. Alerting tones are most likely to be heard if they involve multiple tones, separated in frequency, which contrast with the environment.

c. Occasionally, varying tones may be preferred for attracting attention. If speech is used, it is best to test its intelligibility with individuals who are hard of hearing to maximize its clarity and ease of understanding. Provide the ability for the user to have any messages repeated or to repeat the message if no response is received from the user.

d. For essential auditory information, the information might be repeated and an acknowledgment from the user requested.

e. The intelligibility of the output can also be maximized by the location of the speakers and by keeping the speakers away from noise sources. However, visual displays are often more desirable than loud prompts or alerts, because the latter reduce privacy and can annoy others unless the amplified signal is isolated by means of a headphone, induction coupling, direct plug-in to a hearing aid, or other methods.

f. The use of a telephone handset or earcup which can be held up to the ear can improve intelligibility without disturbing others in the area. If a handset or earcup is used, making it compatible with a hearing aid allows users to directly couple the auditory signal to their hearing aids. If the microphone in the handset is not being used, turning it off will also reduce the amount of background noise which the person hears in the earpiece. Providing a headphone jack also allows individuals to plug in headphones, induction loops, or amplifiers which they may use to hear better.

Paragraph (f)

Prevention of Visually-Induced Seizures

1. Individuals with photo-sensitive epilepsy can have a seizure triggered by displays which flicker or flash, particularly if the flash has a high intensity and within certain frequency ranges.

2. Strategies to address this requirement involve reducing or eliminating screen flicker or image flashing to the extent possible. In particular, the rates of 2 Hz or lower or 70 Hz or higher are recommended. This recommendation reflects current research data on people with photosensitive epilepsy which indicates that the peak sensitivity for these individuals is 20 Hz and that the sensitivity then drops off in both directions.

3. The chance of triggering seizures can also be reduced by avoiding very bright flashes which occupy a large part of the visual field (particularly in the center of the visual field) in order to minimize the impact on the visual cortex.

Paragraph (g)

Availability of Audio Cutoff

1. Individuals using the audio access mode, as well as those using a product with the volume turned up, need a way to limit the range of audio broadcast.

2. If an audio headphone jack is provided, a cut-off switch can be included in the jack so that insertion of the jack would cut off the speaker. If a telephone-like handset is used, the external speakers can be turned off when the handset is removed from the cradle.

Paragraph (h)

Non-Interference With Hearing Technologies

1. Individuals who are hard of hearing use hearing aids and other assistive listening devices but these devices cannot be used if a telecommunications product introduces noise into the listening aids because of stray electromagnetic interference.

2. Strategies for reducing this interference (as well as improving hearing aid immunity) are being researched. The most desirable strategy is to avoid the root causes of interference when a product is initially designed. If the root sources of interference cannot be removed, then shielding, placement of components to avoid hearing aid interference, and field-canceling techniques may be effective. Standards are being developed to limit interference to acceptable levels, but complete elimination for some technologies may not yet be practical.

3. In April 1996, the American National Standards Institute (ANSI) established a task

group (ANSI C63) under its subcommittee on medical devices to develop standards to measure hearing aid compatibility and accessibility to digital wireless telecommunications. The C63.19 task group is continuing to develop its standard, C63.19–199X, American National Standard for Methods of Measurement for Hearing Aid Compatibility with Wireless Communications Devices. When the standard is completed, the Board intends to reference it in this appendix.

Paragraph (i)

Hearing Aid Coupling

1. Many individuals who are hard of hearing use hearing aids with a T-coil (or telecoil) feature to allow them to listen to audio output of products without picking up background noise and to avoid problems with feedback, signal attenuation or degradation.

2. The Hearing Aid Compatibility (HAC) Act defines a telephone as hearing aid compatible if it provides internal means for effective use with hearing aids and meets established technical standards for hearing aid compatibility.

3. The technical standards for HAC telephones are specified in ANSI/EIA–504–1989, "Magnetic Field Intensity Criteria for Telephone Compatibility with Hearing Aids," ANSI/TIA/EIA–504–1–1994, "An Addendum to EIA–504," which adds the HAC requirements, and the FCC regulations at 47 CFR 68.317 (a).

4. A good strategy for addressing this requirement for any product held up to the ear would be to meet these same technical requirements. If not readily achievable to provide built-in telecoil compatibility, other means of providing the electro-magnetic signal is the next strategy to be considered.

Subpart D "Requirements for Compatibility With Peripheral Devices and Specialized Customer Premises Equipment"

Section 1193.51 Compatibility

Paragraph (a)

External Electronic Access to All Information and Control Mechanisms

1. Some individuals with severe or multiple disabilities are unable to use the built-in displays and control mechanisms on a product.

2. The two most common forms of manipulation-free connections are an infrared connection or a radio frequency connection point. Currently, the Infrared Data Association (IrDA) infrared connection point is the most universally used approach.

3. The Infrared Data Association together with dominant market players in the cellular and paging industries, Ericsson, Matsushita/Panasonic, Motorola, NEC, Nokia, NTT DoCoMo, Puma, and TU–KA Phone Kansai, announced on April 25, 1997 a proposed set of standards that will empower wireless communication devices, such as cellular phones, pagers and personal computers to transfer useful information over short distances using IrDA infrared data communication ports. Because the proposed standard is designed to be scalable, it is easy-to-adopt by a wide range of wireless devices

from pagers to more enhanced communications tools such as smart phones. (See <http://www.irda.org>).

4. Adding an infrared connector to the serial port of a peripheral device or specialized customer premises equipment will make these products more compatible with each other and with customer premises equipment.

5. An infrared link can provide a mechanism for providing access to smaller, more advanced telecommunication devices and provide a safety net for products which are unable to incorporate other technologies. There is a joint international effort to develop a Universal Remote Console Communication (URCC) protocol which would achieve this functionality. (See <http://trace.wisc.edu/world/urc/>).

Paragraph (b)

Connection Point for External Audio Processing Devices

1. Individuals using audio peripheral devices such as amplifiers, telecoil adapters, or direct-connection into a hearing aid need a standard, noise free way to tap into the audio generated by a product.

2. Individuals who cannot hear well can often use products if they can isolate and enhance the audio output. For example, they could plug in a headphone which makes the audio louder and helps shut out background noise; they might feed the signal through an amplifier to make it louder, or through filters or frequency shifters to make it better fit their audio profile. If they are wearing a hearing aid, they may directly connect their hearing aid to the audio signal or plug in a small audio loop which allows them to couple the audio signal through their hearing aid's built-in T-coil.

3. Devices which can process the information and provide visual and/or tactile output are also possible. The most common strategy for achieving this requirement is the use of a standard 9 mm miniature plug-in jack, common to virtually every personal tape player or radio. For small products, a subminiature phone jack could be used.

Paragraph (c)

Compatibility of Controls With Prosthetics

1. Individuals who have artificial hands or use headsticks or mouthsticks to operate products have difficulty with capacitive or heat-operated controls which require contact with a person's body rather than a tool. Individuals who wear prosthetics are unable to operate some types of products because they either require motions that cannot easily be made with a prosthetic hand, or because products are designed which require touch of the human skin to operate them (e.g., capacitive touchscreen kiosks), making it impossible for individuals with artificial arms or hands to operate, except perhaps with their nose or chin. Some individuals who do not have the use of their arms use either a headstick or a mouthstick to operate products. Controls and mechanisms which require a grasping and twisting motion should be avoided.

Paragraph (d)

TTY Connectability

1. Acoustic coupling is subject to interference from ambient noise, as many handsets do not provide an adequate seal with TTYs. Therefore, alternate (non-acoustic) connections are needed. Control of the microphone is needed for situations such as pay-phone usage, where ambient noise picked up by the mouthpiece often garbles the signal. For the use of voice carry-over, where the person can speak but not hear, the user needs to be able to turn the microphone on to speak and off to allow them to receive the TTY text replies.

2. A TTY can be connected to and used with any telecommunications product supporting speech communication without requiring purchase of a special adapter, and the user is able to intermix speech and clear TTY communication. The most common approach today is to provide an RJ-11 jack. On very small products, where there may not be room for this large jack, a miniature or subminiature phone-jack wired as a "headset" jack (with both speaker and

microphone connections) could be used as an alternate approach. In either case, a mechanism for turning the phone mouthpiece (microphone) on and off would reduce garbling in noisy environments, while allowing the user to speak into the microphone when desired (to conduct conversations with mixed voice and TTY). For equipment that combines voice communications, displays, keyboards and data communication functions, it is desirable to build in direct TTY capability.

Paragraph (e)

TTY Signal Compatibility

1. Some telecommunications systems compress the audio signal in such a manner that standard signals used by a TTY is distorted or attenuated preventing successful TTY communication over the system. A TTY can be used with any product providing voice communication function.

2. The de facto standard of domestic TTYs is Baudot which has been defined in ITU-T Recommendation V.18. Although the V.18 standard has been adopted, products are not yet available which meet its requirements.

3. This provision can be addressed by ensuring that the tones used can travel through the phones compression circuits undistorted. It is even more desirable to provide undistorted connectivity to the telephone line in the frequency range of 390 Hz to 2300 Hz (ITU-T Recommendation V.18), as this range covers all of the TTY protocols known throughout the world. Although it may not be achievable with current technology, an alternate strategy might be to recognize the tones, transmit them as codes, and resynthesize them at the other end. In addition, it should be possible for individuals using TTYs to conduct conversations with mixed voice and TTY, and to control all aspects of the product and receive any messages generated by the product.

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