Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Closed Captioning Requirements for	)	
Digital Television Receivers	)	ET Docket No. 99-254
	)	
Closed Captioning and Video Description of	)	MM Docket No. 95-176
Video Programming, Implementation of Section	)	
305 of the Telecommunications Act of 1996,	)	
Video Programming Accessibility	)	

REPORT AND ORDER

Adopted: July 21, 2000 **Released: July 31, 2000**

By the Commission: Commissioner Furchtgott-Roth concurring in part, dissenting in part, and issuing a statement.

INTRODUCTION

1. By this action, we amend Part 15 of our rules to adopt technical standards for the display of closed captions on digital television (DTV) receivers. The Television Decoder Circuitry Act of 1990 ("TDCA") requires generally that television receivers contain circuitry to decode and display closed captioning.[1] The introduction of digital television requires the Commission to update its rules to fulfill its continuing obligations under the TDCA to ensure that closed captioning service continues to be available to consumers. We also clarify the compliance date for including closed captions in digital programming.

BACKGROUND

2. Closed captioning is an assistive technology designed to provide access to television for persons with hearing disabilities. Through captioning, the audio portion of the programming is displayed as text superimposed over the video. Closed captioning information is encoded and transmitted within the television signal. The closed captioning text is not ordinarily visible. In order to view closed captioning, viewers must use either a set-top decoder or a television receiver with integrated decoder circuitry.

3. The TDCA requires that "apparatus designed to receive television pictures broadcast simultaneously with sound be equipped with built-in decoder circuitry designed to display closed-captioned television transmissions when such apparatus is manufactured in the United States or imported for use in the United States, and its television picture screen is 13 inches or greater in size."[2] The TDCA

[1] Pub. L. No. 101-431, 104 Stat. 960 (1990) (codified at 47 U.S.C. §§ 303(u), 330(b)).

[2] Communications Act of 1934, as amended, 47 U.S.C. § 303(u).

further states that "[a]s new technology is developed, the Commission shall take such action as the Commission determines appropriate to ensure that closed-captioning service continues to be available to consumers."[3] The Commission adopted rules to implement the provisions of the TDCA in 1991. The rules, in Section 15.119, provide standards for the display of closed captioned text on analog television receivers, the only receivers in use at that time.[4] The introduction of digital broadcasting now requires the Commission to update its rules to fulfill its continuing obligations under the TDCA.

4. The Commission's DTV proceeding incorporated an industry approved transmission standard for DTV broadcasts into its rules.[5] The standard included a data stream reserved for closed captioning information, however, specific instructions for implementing closed captioning services for digital television were not included. The Electronics Industries Alliance (EIA)[6] has since adopted a standard, EIA-708, which provides guidelines for encoder and decoder manufacturers as well as caption providers to implement closed captioning services with digital television technology.[7] In the Notice of Proposed Rulemaking (NPRM) in this proceeding the Commission proposed to adopt a minimum set of technical standards for closed caption decoder circuitry for digital television receivers in accordance with Section 9 of EIA-708 and to require the inclusion of such decoder circuitry in digital television receivers.[8]

5. In response to the NPRM, sixteen parties filed comments. Thirty-four party filed reply comments. Commenters included advocacy groups, manufacturers of consumer electronic equipment, trade organizations representing broadcast and cable interests, private citizens, and caption service providers. A list of commenting parties is included as Appendix A.

[3] 47 U.S.C. § 330(b).

[4] *See* 47 C.F.R. § 15.119.

[5] *See Fourth Report and* Order in MM Docket 87-268, FCC 96-493, 62 Fed. Reg. 14006 (1997). In that proceeding, the Commission incorporated into its rules ATSC Doc. A/53 ("ATSC Digital Television Standard, 16 Sep 95"), with modifications. *See also* 47 C.F.R. § 73.682(d).

[6] The Electronics Industries Alliance is a trade organization representing the U.S. high technology community. Among other tasks, EIA develops performance standards for consumer electronics equipment. In the past we have relied upon EIA standards and recommendations for developing regulations covering television receivers. *See*, for example, Amendment of Part 15 of the Commission's Rules to Implement the Provisions of the Television Decoder Circuitry Act of 1990, General Docket 91-1, Report and Order, 6 FCC Rcd. 22419 (1991), 56 FR 27200 (1991).

[7] The NPRM referred to "EIA-708-A", which was the current version of the standard at the time. EIA-708-A has been superceded by EIA-708-B, which incorporates minor changes. Commenters unanimously request that we substitute EIA-708-B as the relevant standard. For ease of understanding, all references in this document will be to the generic term EIA-708.

[8] In the Matter of Closed Captioning Requirements for Digital Television Receivers, Notice of Proposed Rulemaking, ET Docket No. 99-254, FCC 99-180, 64 Fed. Reg. 41897 (1999).

SUMMARY OF REQUIREMENTS

Based on the comments received, in this Order we the following requirements:

Decoder Operation

The Order adopts the requirement of Section 9 of EIA-708, with the following modifications:

- Decoders must support the standard, large, and small caption sizes and must allow the caption provider to choose a size and allow the viewer to choose an alternative size.

- Decoders must support the eight fonts listed in EIA-708.[9] Caption providers may specify 1 of these 8 font styles to be used to write caption text. Decoders must include the ability for consumers to choose among the eight fonts. The decoder must display the font chosen by the caption provider unless the viewer chooses a different font.

- Decoders must implement the same 8 character background colors as those that Section 9 requires be implemented for character foreground (white, black, red, green, blue, yellow, magenta and cyan).

- Decoders must implement options for altering the appearance of caption character edges.

- Decoders must display the color chosen by the caption provider, and must allow viewers to override the foreground and/or background color chosen by the caption provider and select alternate colors.

- Decoders must be capable of decoding and processing data for the six standard services, but information from only one service need be displayed at a given time.

- Decoders must include an option that permits a viewer to choose a setting that will display captions as intended by the caption provider (a default). Decoders must also include an option that allows a viewer's chosen settings to remain until the viewer chooses to alter these settings, including during periods when the television is turned off.

- Cable providers and other multichannel video programming distributors must transmit captions in a format that will be understandable to this decoder circuitry in digital cable television sets when transmitting programming to digital television devices.

Covered Devices

- All digital television receivers with picture screens in the 4:3 aspect ratio measuring at least 13 inches diagonally, digital television receivers with picture screens in the 16:9 aspect ratio measuring 7.8 inches or larger vertically (this size corresponds to the vertical height of an analog receiver with a 13 inch diagonal), and all DTV tuners, shipped in interstate commerce or manufactured in the United States must comply with the minimum decoder requirements we are adopting here.

[9] The eight font styles are defined as follows: default (undefined), monospaced with serifs (similar to Courier), proportionally spaced with serifs (similar to Times New Roman), monospaced without serifs (similar to Helvetica Monospaced), proportionally spaced without serifs (similar to Arial and Swiss), casual font type (similar to Dom and Impress), cursive font type (similar to Coronet and Marigold), and small capitals (similar to Engravers Gothic). In parentheses following each font style is a reference to one or more fonts which are similar to the style.

- The rules apply to DTV tuners whether or not they are marketed with display screens.

- Converter boxes used to display digital programming on analog receivers must deliver the encoded "analog" caption information to the attached analog receiver.

Compliance Dates

- Manufacturers must begin to include DTV closed caption functionality in DTV devices in accordance with the rules adopted in the Order by July 1, 2002.

- As provided for in the Commission's rules establishing requirements for the closed captioning of video programming adopted in a 1997 Order, programming prepared or formatted for display on digital television receivers before the date that digital television decoders are required to be included in digital television devices is considered "pre-rule" programming. As stated above, this order establishes that date as July 1, 2002. Therefore, programming prepared or formatted for display on digital television after that date will be considered new programming. The existing rules require an increasing amount of captioned new programming over an eight-year transition period with 100% of all new nonexempt programming required to be captioned by January 1, 2006.

DISCUSSION

I. Minimum Decoder Requirements

A. General

6. As noted above, EIA-708 is an industry standard addressing closed captioning for digital television. It includes a description of the transport method for digital television closed captioning (DTVCC) data in the DTV signal; a description of DTV specific data packets and structures; a specification of how DTVCC information is to be processed; and, in Section 9, a set of recommended practices for DTV closed captioning decoder manufacturers. Section 9 of EIA-708 contains the industry's minimum recommendations regarding the functions that a DTV closed caption decoder should be capable of performing.[10] The other sections of EIA-708 explain how to support implementation of these minimum guidelines and how to implement optional additional capabilities. For example, Section 9 recommends that decoders support one font style, but the standard describes how a greater number of fonts may be supported.

7. The TDCA mandates that the Commission require televisions to have built-in decoder circuitry designed to display closed captioned television transmissions. It also instructs the Commission to provide performance and display standards for such decoder circuitry.[11] In the NPRM, the Commission proposed to require that closed caption decoders for digital television function pursuant to Section 9 of EIA-708 and proposed to transcribe these requirements into Part 15 of our rules. The Commission sought comment on this proposal and on whether there are more caption features contained in EIA-708 that should be required, beyond those recommended in Section 9. The Commission noted that EIA-708 supports user options which enable caption display to be customized for a particular viewer, enabling that viewer to change the size and appearance of captions to suit his or her needs. The

[10] EIA-708, Section 9, "DTVCC Decoder Manufacturer Recommendations."

[11] *See*, 47 U.S.C. § 330(b).

Commission noted that the standard may permit viewers to change various attributes of caption text such as its font, spacing, color, or screen positions and enables the distribution of caption text for a particular program at different reading levels or in alternate languages simultaneously (multiple caption services). The Commission noted that EIA-708 provides substantial benefits for consumers and substantial improvements over current captioning standards.[12]

8. Commenters representing the interests of persons with hearing disabilities overwhelmingly support the adoption of more than the minimum requirements of Section 9 of EIA-708.[13] They argue that only by requiring that decoders implement more than what is contained in Section 9 can the Commission achieve its goal of providing viewers with the customization, benefits and improvements that are available with digital closed captioning. These commenters recommend adoption of the entire EIA-708 standard, emphasizing the need to have more choice and control with respect to font, color, size, and location, and to have multiple streams of captions.[14] They argue that closed captions will remain inaccessible to many viewers with hearing disabilities if these features and capabilities are not included in closed caption decoders. They contend that Section 9 is a least common denominator approach which does not provide adequate closed captioning in the digital environment and which would not represent any significant improvement over the analog status quo.[15]

9. Television manufacturers contend that the Commission should mandate only what is in Section 9, arguing that this provides manufacturers with sufficient guidance for the successful implementation of closed captioning in digital television receivers and that manufacturers should implement additional features at their discretion. They assert that adopting more than Section 9 would be costly; would prevent market differentiation; would delay introduction of closed caption capable digital televisions; and would be beyond the Commission's statutory authority.[16]

10. As noted previously, the TDCA requires that the Commission ensure that closed captioning continues to be available as new technology is developed. In enacting the TDCA, Congress stated that "to the fullest extent made possible by technology," persons who are deaf and hard of hearing "should have equal access to the television medium."[17] Digital technology provides the ability to effectively reach a larger portion of the deaf and hard of hearing population. And to fulfill the objectives Congress stated in the TDCA. The capability to alter fonts, sizes, colors, backgrounds and more, can enable a greater number of persons who are deaf and hard of hearing to take advantage of closed captioning than can at present. As one commenter points out, "the current analog captioning system seriously under serves the deaf-low vision population and senior citizens in our country, with its one-size fits all approach to caption requirements. This proceeding provides the FCC with a valuable opportunity to ensure consumers who need captions with color contrast, larger character sizes, and fonts suitable to their

[12] NPRM at para 6.

[13] *See, e.g.,* ALDA Comments, NADCAN Comments at 4-7; SHHH Comments; TDI Comments; MATP Comments; TCDHH Comments; WGBH Comments at 4-5; Joan Cassidy Comments; Nancy Creighton Comments; NVU Comments; Cynthia Clark Comments; Charles Estes Comments; Lawrence J. Brick Comments; PPDHHC Comments; ASDC Reply Comments; COR Reply Comments at 3-6; NCOD Reply Comments.

[14] *Id.*

[15] *See, e.g.,* TDI Comments at 4.

[16] Thomson Comments at 6-8; Toshiba Comment at 1; CEA Comments at 5.

[17] TDCA Sec. 2(1).

vision impairments are finally afforded access to useful and effective captioning."[18]

11. Congress also noted in the TDCA that closed captions will benefit "older Americans who have some loss of hearing."[19] Digital captioning not only will benefit those older Americans who have some loss of hearing, but also those older Americans with hearing disabilities who also have a visual disability. The ability to alter colors, fonts, and sizes offered by digital closed captioning can benefit a person with both a hearing disability and a visual disability in a way not possible with the current analog captions.

12. Congress also stated that closed captioned television can assist both hearing and non-hearing children "with reading and other learning skills, and improve literacy skills among adults."[20] Altering closed captioning size can enable younger children to read the closed captions. Also, by providing an additional closed caption service which offers closed captions appropriate to the reading level of children, young children who are deaf or hard of hearing who may not be able to read verbatim captions are able to watch and understand the program.

13. These benefits of digital captioning technology will accrue only if the closed caption decoders have the capability to decode and display the features providing such benefits. Only by requiring decoders to respond to these various features can we ensure that closed captioning will be accessible for the greatest number of persons who are deaf and hard of hearing, and thereby achieve Congress' vision that to the fullest extent made possible by technology, people who are deaf or hard of hearing have equal access to the television medium. Accordingly, and for the reasons discussed below, we require that closed caption decoders for digital television must include certain additional capabilities provided for in EIA-708 in addition to those specified in Section 9. We do not, however, as requested by some commenters, require implementation of the entire EIA-708 standard.

14. Manufacturers provide a number of reasons why we should not require anything beyond what is in Section 9.[21] Thomson argues that any mandate beyond the core requirements in Section 9 would impose substantial additional costs on manufacturers, although Thomson does not provide any specific cost information nor do they refer to what specific modifications would increase the cost.[22] By requiring that all decoders support the modifications described below, we expect the costs of including closed caption decoder functionality in digital receivers to decline rapidly as the receivers are mass produced. According to Toshiba, in the long run, the per unit mass production cost will be less than a couple of dollars per DTV.[23] In passing the TDCA, Congress stated that technology was then available to be built into new television sets during manufacture at a nominal cost.[24] We believe that this is also the case for digital televisions today. We agree with WGBH that the requirements will not significantly impact costs to consumers for DTV devices.[25] We believe that the cost of including closed captioning

[18] Holmes Reply Comments at 5.

[19] TDCA Sec. 2(4).

[20] TDCA Sec. 2(5).

[21] *See, e.g.*, CEA Comments at 4-5;

[22] Thomson Comments at 7, 13.

[23] Toshiba comments at 3.

[24] TDCA Sec. 2(8).

[25] WGBH Comments at 9.

capability, compared to the overall costs of manufacturing DTV receivers, is relatively small, as was the case with analog caption decoders.

15. Toshiba argues that adoption of EIA-708 in full would delay the introduction of basic digital closed captioning because of the finite amount of engineering resources each manufacturer has and that each additional feature introduces combinations of complexities that must be developed and tested.[26] However, we are not requiring implementation of all of EIA-708, but rather additional capabilities of a few core features, as described below. As noted below, this Order extends the compliance date beyond what was proposed in the NPRM to provide sufficient time for a thorough product design and testing period.

16. Toshiba and Thomson also argue that requiring all of EIA-708 would prevent market differentiation of DTV receivers based on closed captioning capabilities.[27] We note that although manufacturers could have included captioning capabilities beyond what is required in analog television sets and marketed their sets based on the closed caption capabilities, very few have done so. Commenters have not shown that this would be different for digital television. Therefore, we find it necessary, in order to comply with the statutory intention to provide equal access to television for persons who are deaf and hard of hearing, to require that decoders contain the additional capabilities requested by commenters. If we did not include these additional requirements, we could not be certain that decoders would provide viewers who are deaf or hard of hearing with the capability to make use of the features necessary for them to have access to the captions. If there were not a significant majority of decoders with these capabilities, there would be insufficient incentive for caption providers to create captions that take advantage of certain features.[28] As a result, certain viewers would be left without accessible video programming. Finally, we are not requiring all of EIA-708, therefore manufacturers will have discretion to include features beyond those required by our rules in order to achieve market differentiation.

17. Finally, some commenters argue that the Commission does not have authority to require that decoders function any differently from the recommendations contained in Section 9.[29] We disagree. The TDCA discusses making television accessible to persons who are deaf and hard of hearing "to the fullest extent made possible by technology."[30] As we noted, there are many types of people with hearing disabilities, and digital technology makes it possible to make television programming accessible to more persons with hearing disabilities if decoders are capable of decoding a greater range of colors, fonts, sizes, and services. By mentioning technology, Congress recognized that technological advances could bring equal access to a greater number of viewers. The TDCA specifically states that the rules the Commission prescribes under 303(u) "shall provide performance and display standards for such built-in decoder circuitry."[31] Further, as television viewers will be taking advantage of digital technology,

[26] Toshiba Comments at 1.

[27] Thomson Comments at 4-5, Toshiba Comments at 1.

[28] WGBH Comments at 4.

[29] For example, CEA states that TDCA nor the legislative history requires that DTV receivers provide "enhanced" closed captioning features. CEA Reply Comments at 4. *See* also HBO Reply Comments at 6-7. HBO states that the Commission would be exceeding its statutory mandate if it adopted requirements beyond those minimally necessary to ensure accessibility, i.e., beyond Section 9 of EIA-708.

[30] TDCA Sec. 1.

[31] 47 U.S.C. Sec. 330(b).

whether for better picture quality or additional services, viewers with hearing disabilities should also receive the benefits, including the wide range of color, font, size and other options for closed captioning, that digital technology allows. We also note that the TDCA was intended to make a closed captioning decoder an integral feature of virtually every television receiver, no different from its video and audio functions. We believe that by adopting the requirements set forth in this Order we will accomplish this goal in the digital environment as we have done for analog television.

18. Therefore, as discussed below, we adopt the requirements of Section 9, as well as additional related requirements designed to respond to the concerns raised by commenters and to afford all consumers equal access to video programming. These additional requirements were specifically requested by commenters. Those parties that do not support adoption of requirements beyond those enumerated in Section 9 did not address the specific modifications suggested by other commenters, but instead expressed their general opposition to our requiring anything beyond Section 9.

19. In the NPRM, we sought comment on whether it is necessary to incorporate into our rules by reference the entire EIA-708 standard, regardless of whether we require decoders to function pursuant to only Section 9 or additional provisions.[32] Numerous commenters request that we incorporate all of EIA-708 into our rules. They note that Section 9 was not written to stand alone, that the other sections contain information and nomenclature that is unique to digital television, that compliance will be facilitated, as will implementation of optional features.[33] The other sections of EIA-708 provide instructions on how to implement various decoder features. We believe that referencing the remaining parts into our rules will provide helpful guidance to DTV manufacturers. For informational purposes, therefore, we are incorporating by reference the entire EIA-708 standard into our rules. We also authorize the Chief, Office of Engineering and Technology, to replace the reference to EIA-708 with the reference to subsequent revisions of the standard as long as no changes are made that would necessitate a further rulemaking before adoption.

B. Specific Modifications to Section 9

20. **Caption size.** Section 9.13 recommends that decoders support the standard caption pen size and says that implementation of large and small are optional. Commenters representing persons who are deaf and hard of hearing argue that we must require that decoders support standard, small, and large size captions and that the Commission's rules should allow viewers to change the size of their captions.[34] They argue that the ability to change the size of the captions is crucial to users of captioning who possess different degrees of visual acuity.[35] For example, they argue that standard size captions "unnecessarily exclude" individuals with low vision, including many senior citizens.[36] Some disabilities affect the central retina and impair the ability to see small print and to make eye movements that are crucial to

[32] NPRM at para 8.

[33] See, e.g., NADCAN Comments at 7; VITAC Comments at 4; WGBH Comments at 6-7.

[34] *See*, e.g., Stephanie Buell Comments, Patricia Dobosh Comments, Charles C. Estes Comments. Consumers liken the ability to control caption size to the ability to control the audio volume.

[35] NADCAN Comments at 4; TDI Comments at 4; NVU Comments; WGBH Comments at 5.

[36] See, e.g., TCDHH Comments.

reading.[37] One caption provider states that adding consumer control over caption size "would represent a major leap forward in the usability of the service without presenting insurmountable technological challenges to manufacturers" and that the "windowing" environment of EIA-708 was designed to allow caption providers to create a targeted safe area for caption display while allowing consumers to grow or shrink captions within that window.[38] We are persuaded by commenters that in order to make closed captions accessible to the greatest number of viewers with hearing disabilities, we must require that decoders support standard, small, and large caption pen size and support the ability of the viewer to choose size. We encourage decoder manufacturers to support word wrap[39] in their products. We are not requiring word wrap because of the additional processing resources that could be required beyond what may be contained in early DTV receivers. However, we encourage manufacturers to work towards developing cost effective methods of executing word wrap functions while preserving the integrity of the caption providers' work.

21. **Fonts**. Section 9.14 states that although a caption provider may specify any one of eight different font styles to be used to write caption text, decoders need only implement a single font for caption text display. Section 8.5.3 lists the 8 recommended font styles and states that their implementation is optional. As a result, if only the Section 9 recommendations were implemented, then regardless of the font chosen by the caption provider, the viewer would see closed captions only in the one font the decoder supports. Commenters representing persons with hearing disabilities argue that this is insufficient because some viewers who are deaf and hard of hearing have visual disabilities,[40] such as low vision, and so may be unable to read certain fonts.[41] These commenters argue that viewers should have the ability to choose from among the eight fonts.[42] WGBH notes that better and sharper fonts, selectable by the user, will take advantage of the inherent sophistication of the DTV system and help assure that the closed caption features are as advanced as the audio and video themselves.[43]

22. As noted earlier, Congress stated that "to the fullest extent made possible by technology," persons who are deaf and hard of hearing "should have equal access to the television medium."[44] The

[37] *See* Making Text Legible, Designing for People with Partial Sight, by Aries Arditi, PhD, Lighthouse International (Making Text Legible) or www.lighthouse.org. Lighthouse International is a leading resource on vision impairments and vision rehabilitation.

[38] WGBH Comments at 5.

[39] Word wrap refers to an automatic display reformatting which ensures that lines of text will be displayed uniformly in the caption window. Ordinarily, a receiver will render a carriage return as a line break. However, if the caption text display size is altered by the viewer, and if its window rows and/or columns are unlocked, the carriage return may need to be ignored so that the rows of text may become longer or shorter to fit within the caption window.

[40] NADCAN Comments at 5; COR Reply at 4.

[41] For example, NADCAN states that the ability to select fonts is of particular benefit to deaf or hard of hearing viewers who have low vision. NADCAN Comments at 5.

[42] According to Lighthouse International, complicated, decorative or cursive fonts should be avoided. It further states that standard serif or sans-serif fonts, with familiar, easily recognizable characters are best and that there is some evidence that sans-serif fonts are more legible when character size is small relative to the reader's visual acuity.

[43] WGBH Comments at 5.

[44] TDCA Sec. 2(1).

standard is written to support implementation of additional font styles in decoders, and we agree with commenters that a choice of fonts will increase accessibility for persons with hearing disabilities. We find therefore that the minimum decoder requirements must include the ability to display all of the eight fonts in EIA-708; that the decoder should display the font chosen by the caption provider; and that viewers should be able to override the caption provider's choice of font and select an alternate font from among the remaining seven.

23. **Color and Opacity**. Section 9.20 recommends that decoders support the following 8 colors: white, black, red, green, blue, yellow, magenta, and cyan. Opacity values permitted by EIA-708 include transparent (i.e., showing underlying video), translucent (i.e. showing a filtered level of underlying video), solid, and flashing. Section 9 states that decoders must implement the 8 colors specified above for character foreground (i.e., the caption text). However, Section 9 states that decoders need only implement solid black character backgrounds.[45] Section 9 also recommends solid and flashing character foreground opacity attributes, but does not include an opacity recommendation for character background. Finally, Section 9 recommends that decoders do not need to implement separate character edge color, opacity, or type attribute control. This means there is no separately controlled edge surrounding the body of characters.

24. Commenters request that more color options be provided permitting users to choose from a variety of colors so that viewers can create contrasts against various backgrounds.[46] They state that Section 9 would not provide sufficient accessibility for people who are deaf and hard of hearing because of this limitation[47] noting, for example, that individuals with low vision differ in their ability to see and use colors, and that a color that is readily seen by one person may present limitations to another.[48] A number of sources addressing color visibility support this point.[49] For example, one source states that color perception changes depending upon background and adjacent colors.[50] In addition, as a caption

[45] Each caption character is surrounded by a small rectangular box whose color and opacity values may be specified separately from the character foreground values.

[46] *See, e.g.,* Comments of TCDHH; Pamela Y. Holmes; and NVU. ALDA requests that the FCC require a palette of 16 colors to choose from for text color and background color. ALDA Comments at 2. MATP notes that the most basic graphic resolution of computers in use today provides a 16 color palette. MATP Comments at 3. *See* NADCAN Comments at 4-5.

[47] *Id.*

[48] TCDHH Comments.

[49] According to Lighthouse International, "[p]artial sight, aging and congenital color deficits all produce changes in perception that reduce the visual effectiveness of certain color combinations. Two colors that contrast sharply to someone with normal vision may be far less distinguishable to someone with a visual disorder." See Effective Color Contrast, Designing for People with Partial Sight and Color Deficiencies, by Aries Arditi, PhD, Lighthouse International or www.lighthouse.org. According to www.designmatrix.com, "using colors that are confused by the eyes of colorblind (color-deficient or dyschromatopic) people will exclude a significant percentage of the population . . . . [O]ne color-deficient person reports that an orange object may look orange in a beige field, but actually appear green in a red field!" http://www.designmatrix.com/pl/cyberpl/cftcb.html. According to IBM's instructions for web accessibility "[f]or many people color is a matter of preference, but it is critical for many users with visual impairments. Many people require a reasonably high contrast between text and the background to be able to read. They may even need a particular scheme . . . to prevent the background from 'bleeding' over and obscuring the foreground text." IBM www-3.ibm.com/able/accesssoftware.html.

[50] Design Matrix.

provider notes, "When the Commission required the solid black background for captions in line-21 analog television services, it ensured that consumers would be able to clearly discern captions in a crude, though effective display against any background image . . . . [B]etter-looking and even clearer display attributes are possible and should be included in minimum feature sets."[51] WGBH also notes that a translucent background has long been the preference for subtitles and is the type of improvement that should be ensured by the rules.[52]

25. We believe that in order to provide access to persons with hearing disabilities, we must ensure that multiple color and opacity choices are available. The ability to alter the color of the character background, in addition to the text, will make otherwise inaccessible closed captions accessible for certain viewers. We require, therefore, that decoders implement the same 8 character background colors as those implemented for character foreground;[53] that the decoder should display the color chosen by the caption provider; and that viewers should be able to override the foreground and or background color chosen by the caption provider and select alternate colors from among the remaining colors. We find that, with respect to foreground and background opacity, decoders must implement transparent, translucent, solid and flashing character type attributes. Decoders must implement the following types of character edge surrounding the body of the characters: none, raised, depressed, uniform, or drop shadowed. The color attributes of the edges of the character foregrounds may be specified separately from the character background foreground and background. Edge opacities have the same attribute as the character foreground opacities.

26. **Location of captions**. A number of commenters request the ability to determine the location of captions on their television screen. For example, NADCAN states that the "ability to control the location of captions is extremely desirable . . . . [A]s more programming networks use network logos, programming labeling and other types of on-screen information, it will become more and more necessary to have the ability to change the size, placement and colors of captions in order to make sure that those captions are clearly visible and are not obscuring other on-screen information."[54] TDI states that users of closed captioning require the flexibility to change the location of the caption block on the screen, noting that someone watching a sporting event may prefer a caption block arranged so that it would not obstruct a critical play.[55] TDI also notes that the ability to move the caption block so that it is not obstructed by a separate caption or an emergency weather announcement scrolling on the screen would ensure that viewers did not miss key information.[56]

27. Under EIA-708, closed captions are printed on screen in caption "windows." Caption providers are able to specify the placement of these windows. Caption providers may use window location to enhance the overall presentation of captioned programming. Therefore, we believe that providers should maintain creative control over caption window placement. For example, a provider may wish to use several windows in various locations on the screen to identify multiple speakers and

[51] WGBH Comments at 5.

[52] *Id.* Another commenter notes of having had the pleasure of viewing some captions with invisible backgrounds, allowing him to see the entire picture on the screen. *See* Littleton Comments.

[53] We decline to adopt the request to require 16 colors.

[54] NADCAN Comments at 3.

[55] TDI Comments at 5.

[56] TDI Comments at 5.

sound effects in a fast-paced action scene. With regard to caption text obstructing critical information such as emergency alerts, the Commission recently moved to ensure that emergency information provided by means other than closed captioning should not block any closed captioning, and vice versa.[57] We also emphasize that the caption control features we are adopting, such as changing caption size and opacity, will allow viewers to prevent captions from covering non-critical information or scenes.

28. **Multiple caption services.** Section 9.2 states that decoders "should be capable of decoding and processing data for at least one (1) service." Commenters representing persons who are deaf or hard of hearing support requiring that decoders be capable of decoding and processing the six standard services and up to 57 additional extended services defined in EIA-708.[58]

29. Commenters representing persons with hearing disabilities express concern that, under Section 9, they will not have available multiple choices of caption services. Some commenters ask us to clarify that Section 9 is not intended to mean that only Caption Service 1 must be decoded, but rather what is required is decoding of whatever one service the viewer chooses among the available caption services for a particular program. Sarnoff notes that the minimum requirements in Section 9 do not limit the services broadcast, they simply relate to the manner in which receivers would process and display the selected service.[59] We agree with Sarnoff. Users may select which service to decode, but only one of the services is decoded and displayed.

30. We find that it would be insufficient for decoders only to be able to respond to one closed captioning service. This approach is consistent with Congress' view that closed captions can assist children with reading and other learning skills. Uses for multiple caption services may include "easy reader" captions or alternate language captions. Easy reader captions enable young children who are deaf or hard of hearing who may not be able to read verbatim captions to watch the program with captions using words that match their reading level. This requirement also is consistent with Congress' intention that technology be used to provide equal access to television for persons who are deaf and hard of hearing.[60] For example, persons who speak languages other than English can receive closed captions in those languages. Even today, programs provide two caption services for a single program.[61] In addition, WGBH notes that if the decoding of multiple services is optional, implementation will be limited, and program providers are unlikely to expend the funds to provide these alternate services on their programs.[62]

31. We agree that decoders must be capable of decoding and processing data for the six standard services in EIA-708, Caption Service 1 through Caption Service 6, so that a consumer can choose among the available closed caption services provided by the programmer. Decoders should provide a means by which viewers may identify the caption services available for a given program. Decoders should then allow consumers to choose at least one of these services to display onscreen. Accordingly, it is not

[57] *See Second Report and Order* in MM Docket 95-176, Released April 14, 2000. *See also* 47 C.F.R. § 79.2(b)(3).

[58] NADCAN Comments at 6-7; Roger Kraft Comments; Mentkowski Family Comments.

[59] Sarnoff Reply Comments at 5.

[60] TDCA Sec. 2 (5) and Sec. 2(2).

[61] For example, CBS' 60 Minutes is closed captioned in both English and Spanish. *See* "60 Minutes Finds New Audience," Caption Center News, Issue Fifty. Published by the WGBH Education Foundation.

[62] WGBH Comments at 6.

necessary to display more than one caption service for a given program at the same time, though manufacturers are free to permit such operation.

32. Commenters argue that if a user chooses to display captions, caption display should remain as the default mode even after the television has been turned off and on again.[63] Roger Kraft states that, "The general community does not need to reset the volume on their TVs every time they turn them on or change a channel—nor should Deaf or hard of hearing people need to reset the captions each time they turn on their TVs or change a channel."[64] We agree with the commenters. Accordingly, we require that caption display options should be saved when the receiver is switched off. This will eliminate the need to specify caption display options each time the receiver is used. As requested by commenters, we also require that caption decoders include an option that permits a viewer to choose a setting that will display captions as intended by the caption provider. Once the viewer chooses a set of customized caption display features, such as font and/or color, the decoder should display all captions according to this setting until de-selected by the viewer.[65]

C. Other Issues

33. **Program and System Information Protocol.** NAB suggests that the Commission require DTV receivers to receive and process the Program and System Information Protocol ("PSIP") data stream contained in the ATSC DTV broadcast signal.[66] The Advanced Television Systems Committee (ATSC) developed the PSIP standard (A/65).[67] The standard provides a means for organizing video and audio information associated with digital television transmissions. The data contained in PSIP may include information identifying programming that contains closed captions. The PSIP data may also supply a description of the caption services available for the program, such as English, Spanish, or easy-reader. Using this data, decoders may provide an interactive graphic display that allows viewers to easily select the caption service they desire to view. Contrary to NAB's claim, Thomson states that it is not necessary for the Commission to require DTV receivers to process PSIP data. Thomson notes that its products are already designed to process all PSIP data.[68]

34. NAB also states that the Commission should require broadcasters to transmit PSIP data, arguing that the proper functioning of DTV closed captioning depends on these requirements.[69] While Thomson does not comment on whether broadcasters should be required to transmit PSIP data, they emphasize that cable systems and other multi-channel video distributors should be required to transmit any PSIP data contained in broadcasters' signals.[70]

---

[63] *See*, for example, Comments of NAD/COR, MATP, Roger Kraft, ALDA, Frank Bechter, Diana Dougan, and Patricia Dobosh.

[64] Kraft Comments.

[65] *See*, for example, NAD/COR Comments.

[66] NAB Comments at 6.

[67] ATSC Document A/65, "Program and System Information Protocol for Terrestrial Broadcast and Cable." This document is available for download at www.atsc.org.

[68] Thomson Reply Comments at 10.

[69] NAB Comments at 7.

[70] Thomson Reply Comments at Footnote 23.

35. The Commission has received comments in other proceedings requesting that it adopt the ATSC PSIP A/65 standard into its rules.[71] We find that a discussion regarding broadcasters' and multichannel distributors' responsibility to transmit PSIP data is beyond the scope of this proceeding. The debate concerning PSIP transmission by multichannel distributors is ongoing in another Commission proceeding.[72] We believe that it would be inappropriate, therefore, for us to address this issue here. We note that broadcasters have already voluntarily chosen to include PSIP data in their signals for a number of reasons other than closed captioning. For instance, the PSIP data stream is also used to transmit content advisory (program rating) v-chip information so that digital television viewers will be able to block the display of unwanted programming. Also, NCTA and CEA have drafted an agreement that ensures the carriage of PSIP data on cable systems.[73]

36. With regard to the functioning of DTV receivers, which is the emphasis of this proceeding, we find that it is not necessary to require receivers to rely on PSIP information to perform closed captioning functions. The standards that we adopt here will ensure that DTV receivers have consistently formatted caption data (pursuant to EIA-708) for which to search. Although the information contained in the PSIP data stream may provide consumers with an easier method for choosing a captioning service, we will give manufacturers latitude in determining the best method for accessing caption data. We believe that, as with Thomson, many manufacturers will choose to build their products to search for available PSIP data for captioning and other functions. However, we will not make that function a requirement.

37. **Cable Set-top Boxes.** Some commenters representing cable operators and cable equipment manufacturers are concerned that adoption of the proposals in the NPRM will render many cable boxes obsolete.[74] They state that the boxes that are used to receive digital cable programming are unable to process EIA-708 data. These boxes only read closed captioning data which has been delivered through a cable system pursuant to the Society of Cable Telecommunications Engineers (SCTE) standard DVS-157.[75] The captions are decoded by the EIA-608 compliant decoder in the analog television set. Many cable boxes that only receive caption data delivered via DVS-157 are already in customer's homes and are being used to view digital cable programming on analog televisions.

38. In accordance with the rules we adopt here, digital broadcast television programming containing caption data formatted pursuant to EIA-708 will be delivered to subscribers. Commenters state that existing cable boxes cannot be upgraded to facilitate the EIA-708 broadcast standard and therefore would not be able to display closed captions.[76] They expressed concern that the proposed rules

[71] *See*, for example, comments of the Advanced Television Systems Committee in *Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television*, MM Docket No. 00-39.

[72] *See*, for example, comments of the Consumer Electronics Manufacturers Association; NBC, Inc.; and Sony Electronic, Inc. in *Carriage of the Transmission of Digital Television Broadcast Stations*, CS Docket No. 98-120.

[73] *See* letter dated February 22, 2000 to William E. Kennard, Chairman, FCC.

[74] *See* GI Comments, NCTA Comments, and AT&T Comments.

[75] General Instruments developed DVS-157 in 1992-1993 as a means for delivering NTSC captioning data (formatted pursuant to industry standard EIA-608) within digital video signals. GI states that the DVS-157 technology was developed and implemented before the digital broadcast transmission standard was created. They assert that DVS-157 was established as a de facto cable industry standard and was formally adopted as an ANSI-approved standard before EIA-708-B was balloted.

[76] GI Comments at 5-7.

would leave millions of digital cable subscribers without closed captioning display capability. NCTA notes that, if the rules are adopted, cable programmers might be forced to transmit captioning for their digital networks in both DVS-157 and EIA-708 formats so that existing cable converter boxes as well as new digital televisions may recognize the data. Alternatively, NCTA states that cable operators may need to switch out their headend equipment which currently does not read EIA-708.[77] AT&T states that a requirement to carry captions only pursuant to EIA-708 would impose substantial costs on the cable industry, and estimates the costs to be over $25 million to modify its own encoding equipment.[78] Similarly, GI estimates expenditures of up to $50,000 per digital-capable headend for cable operators to purchase new encoding equipment.[79]

39. Cable commenters propose that the Commission adopt rules that would require that digital closed captioning information be delivered in the DVS-157 format and would require that DTVs contain decoder circuitry that responds to DVS-157. Alternatively, they state that the Commission could consider a "dual carriage" requirement wherein broadcasters would deliver captions in both the EIA-708 format and the DVS-157 format.[80] The third option they suggest is that the Commission detail which advanced features are required, such as support for multiple character colors, and let manufacturers design receivers to accomplish these features using the existing captioning standard, i.e., EIA-608, and the digital television's built-in graphic processing capabilities.[81]

40. We disagree with these suggested alternatives to the proposed rules. We note that the comments and replies in this proceeding express an overwhelming support for adoption of the EIA-708 standard.[82] Although commenters have raised some concerns regarding the amount of EIA-708 to include in our rules, most were in favor of adopting at least portions of the standard. As noted above, adoption of EIA-708 will supply manufacturers with a uniform set of rules to follow in providing closed captioning capability. Furthermore, EIA-708 is the logical choice for delivering closed caption information to digital television receivers because DTVs have been designed around the digital television transmission standard ATSC A/53 of which EIA-708 is a part. Accordingly, digital televisions will contain decoder circuitry in compliance with the rules we are adopting here. In order for cable providers and other MVPDs to meet their obligations to provide closed captioned programming to viewers, and to pass through closed captions they receive to digital television sets, they must transmit captions in a format that will be understandable to those decoders.[83]

---

[77] NCTA Comments at 6.

[78] AT&T Reply Comments at 4.

[79] GI Comments at 6.

[80] GI Comments at 7-8; ATT Reply Comments at 3-6.

[81] GI Comments at 8-12.

[82] *Supra* at paragraphs 18-31.

[83] We note that SCTE, which is currently drafting its Digital Cable Network Interface Standard, has delayed modifying the closed captioning requirements in that standard pending FCC action in this proceeding. SCTE notes that, "Some have proposed that the references to the current practice of using DVS-157 to transport captions be removed. They want to be able to build portable receiving devices compatible with these specifications without the support to decode captions carried in the DVS-157 format." SCTE DVS/335, "Report of DVS/313 Drafting Group on Outstanding Issues of DVS 313 Revision 1", April 27, 2000.

41. **Provider Requirements.** A few video industry commenters state that the Commission should leave decisions regarding the presentation of captions to the creative instincts of the caption provider and its market incentives to offer high quality programming service.[84] We agree. The requirements we are imposing here are not directed at the caption provider's presentation of closed captioning. In this Order, we do not require a programmer or a caption provider to present its closed captioning with particular features. We require only that decoders contain functionality so that viewers with hearing disabilities have the ability to alter the closed captions so that they can have access to the closed captions. We do not impinge upon the creative capabilities of caption providers. Instead, the decisions we make here enhance the ability of caption providers and programmers to provide creative, effective, and inclusive captioning services.

II. Covered Devices

42. The TDCA states that "apparatus designed to receive television pictures broadcast simultaneously with sound be equipped with built-in decoder circuitry designed to display closed-captioned television transmissions when . . . its television picture screen is 13 inches or greater in size." In the NPRM, we sought comment on which receivers and other devices would have to comply with our rules.

43. **Digital Television Sets.** In the NPRM, we proposed to require that all DTV sets with picture screens 13 inches or larger, measured in accordance with the Federal Trade Commission regulations, include closed caption decoder circuitry that functions in compliance with the rules we adopt here. As noted in the NPRM, the difference in the aspect ratios between analog display screens and digital or high definition displays may cause some confusion when determining screen size according to FTC regulations.[85] Specifically, because the displays are shaped differently, an analog television measuring 13 inches diagonally, in accordance with the regulations, will have a greater total picture area than a digital television measuring 13 inches diagonally. Some manufacturers argue that a minimum screen size requirement should be specified, but that it should be based on the vertical picture height of DTV sets rather than the diagonal measurement used for analog televisions.[86]

44. For the purposes of this Report and Order, we agree with manufacturers that the screen size of a digital television display in the 16:9 aspect ratio should be measured vertically. The 13 inch diagonal requirement for televisions with 4:3 aspect ratio screens was based on TV design conventions of the late 1980s and did not account for the changes that digital television would bring to receiver design. As CEA points out, if the 13 inch diagonal requirement is applied to DTV sets as with analog televisions, the shorter vertical height of the DTV set will cause the captions to either take up considerable vertical picture space or be displayed smaller than what was intended.[87] Accordingly, for the purpose of determining the viewable picture screen size of DTV receivers, we will use the vertical viewable picture height. Therefore, digital televisions with viewable picture screen heights that are at least 7.8 inches measured vertically will be required to have closed captioning display capability in accordance with the

[84] NCTA Comments at 2-3, HBO Comments at 3-5, NAB Comments at 2-4, NAB Reply Comments at 2-4.

[85] *See* NPRM at para 10. Whereas current analog receivers have a screen aspect ratio of 4:3, resulting in a relatively square picture screen, most digital receivers will have a ratio of 16:9, resulting in a more rectangular shape.

[86] *See* Thomson Comments at 13, CEMA Comments at 5.

[87] *See* CEMA comments at 6; Thomson comments at 13.

rules we are adopting here.[88] This size corresponds to the vertical height of an analog receiver with a 13 inch diagonal.

45. Although we did not raise the issue of eliminating the size limitation in the NPRM, commenters representing individuals who are deaf and hard of hearing requested that the Commission alter the 13 inch size limitation. They argue that Congress' decision to limit the application of its decoder circuitry mandate to devices that have screens thirteen inches or greater was based in large part on the existing technology at the time that the TDCA was enacted and that technological changes, such as the improved resolution of DTV and the ability to alter caption size, render the 13 inch limit obsolete. Because we did not raise this issue in the NPRM, we do not address these commenters' arguments.

46. **Component Parts.** As we pointed out in the NPRM, there are a number of likely ways that systems capable of receiving DTV signals will be sold. For example, the systems may be marketed as separate components. Consumers will be able to customize their systems by choosing a desired receiver/tuner ("DTV tuner") and a separate display screen. We also noted that we expect many consumers to purchase set-top converter boxes ("DTV converter boxes") that allow digitally transmitted television signals to be displayed on analog receivers. We proposed to require that separately sold DTV tuners and DTV converter boxes be subject to the provisions of the TDCA and provide for the display of closed captioning. Many commenters agree with our proposal to require DTV tuners and converter boxes to have the capability to respond to digitally encoded caption information.[89] For example, WGBH states that, "[W]e agree with the Commission that all set-top boxes sold with or without display devices and all separately sold DTV tuners . . . should provide for the display of closed captioning."[90] On the other hand, Thomson and CEA question the Commission's authority to apply the provisions of the TDCA to these devices, but state that if we do impose such requirements, they should apply only on those DTV tuners sold or designed to operate with display monitors which are 7.8 inches or larger in height.[91]

47. We adopt our tentative conclusion to require closed captioning capabilities in DTV converter boxes and in DTV tuners of whether or not they are marketed with display screens. In the NPRM, we stated that most such devices will be used with picture screens that are 13 inches or larger, thus justifying this requirement on all such devices.[92] We also note that with digital technology there is the capability of manipulating the size, font, and color of the closed captioning, thus making the captions readable even on a small television screen. As we stated in the NPRM, we believe that we have authority to apply the requirements to such devices,[93] and we disagree with those commenters who argue that we do not have such authority.[94] These devices qualify as "apparatus designed to receive television pictures broadcast

[88] Digital television receivers with conventional screen formats in the 4:3 ratio will be measured diagonally, in accordance with FTC regulations.

[89] *See, e.g.*, Kraft Comments, NCOD Comments, NAD/COR Comments, and Toshiba Comments at 2.

[90] WGBH Comments at paragraph 30.

[91] Thomson Comments at 8-10; CEA Reply Comments at 8.

[92] NPRM at paragraph 6.

[93] *Id.*

[94] *See* CEA comments at 10 (CEA states the Commission does not have authority to impose requirements on set-top DTV converter boxes and DTV tuners which do not have an integrated display screen. CEA endorses an interpretation of the law that would require DTV closed captioning capability on tuners and converter boxes that are designed to operate with monitor with displays measuring 7.8 inches or larger vertically.)

simultaneously with sound." As noted above, consumers will be able to customize their digital television systems by separately choosing a receiver and display screen. We would not provide equal access to the television medium for persons who are deaf and hard of hearing if we did not cover a common arrangement for the sale of digital television systems. As we have noted previously, Section 330(b) states that "[a]s new technology is developed, the Commission shall take such action as the Commission determines appropriate to ensure that closed-captioning service continues to be available to consumers."[95] Given the advances that digital technology brings, we believe that such a requirement is precisely the type of action that Congress had in mind when instructing the Commission to take actions to ensure that closed-captioning service continues to be available to consumers as new technology is developed.

48. In the NPRM we proposed to require that "DTV converter boxes used with analog receivers either decode any analog information that is transmitted with the DTV signal or pass this information directly to the receiver in a form recognizable by the receiver's built-in caption decoder."[96] We are persuaded by commenters that we should require DTV converter boxes to pass the encoded information to the attached analog receiver.[97] Commenters note that if the units are allowed to simply decode the analog captions contained in DTV signals, then the captions they produce on an attached analog receiver would be "open." That is, the captions would be displayed overlaid onto the video. If these open captions were then recorded by a VCR or other device, they would become a permanent part of the video. On the other hand, if the captions were not opened by the set-top box, and the EIA-608 (analog closed captioning) data not delivered to the box's NTSC output, then the captions would be lost.[98] A requirement to always deliver available EIA-608 data to the analog receiver will eliminate this possibility. Therefore, as stated above, converter boxes should always pass any transcoded EIA-608 captions to its NTSC output. Nonetheless, we realize that some converter box manufacturers may also wish to provide EIA-708 decoder capability in their boxes. Such an option would allow consumers with analog television receivers to enjoy the enhanced features of EIA-708 captions through the use of the converter's circuitry. We will allow this optional feature.

49. Sarnoff Corporation addresses two concerns with respect to the display of captions on analog receivers through the use of DTV converter boxes. Specifically, Sarnoff states that the display of color captions on analog receivers can be difficult because of the limited chrominance bandwidth of the analog television signal and receiver circuitry.[99] Furthermore, Sarnoff notes that an attempt to display smaller captions or small letter combinations may result in the receiver producing an illegible caption display or "sound buzz."[100] Accordingly, Sarnoff concludes that Section 9 appropriately describes the minimum requirements for DTV converters connected to analog television receivers.

50. We are aware of certain display limitations inherent in analog television receivers. The rules we are adopting have taken these limitations into account. We are not requiring that DTV converter boxes used with analog television receivers be capable of processing and displaying the

[95] Communications Act, 47 U.S.C. § 330(b).

[96] NPRM at para 12, emphasis added.

[97] *See* NAB Comments at 6; WGBH Comments at 9; COR Reply Comments at 9.

[98] *See* NAB Comments at 5; WGBH Comments at 9; COR Reply Comments at 9.

[99] Sarnoff Reply Comments at 5.

[100] *Id.*

advanced features of digital EIA-708 captions. Instead, as noted above these boxes are only required to deliver transcoded EIA-608 captions to the attached analog receiver. Therefore, the analog receiver will only encounter caption data that has been formatted specifically for the device, including all display characteristics now available. We believe that these rules will ensure that analog caption display is not degraded as we transition to digital television.

51. While we are not requiring that DTV converter boxes deliver enhanced caption information to analog receivers, we have permitted manufacturers to include options enabling their products to decode digital EIA-708 captions and overlay the text over the video display. Accordingly, we caution DTV converter manufacturers who choose to implement this option to be aware of display characteristics of analog television receivers so that the captions may be displayed as legibly and unobtrusively as possible.

52. **Dual Mode Receivers.** With respect to devices that receive and display both analog and digital programming (dual mode receivers), as we stated in the NPRM, it is crucial to ensure that closed captioning display capability is available in both analog and digital display modes of operation. There was widespread support for this proposal from industry and consumer groups. For example, both Toshiba and Thomson state that when a dual mode receiver is operating in the analog mode it should provide for caption display in accordance with our existing regulations for analog receivers. On the other hand, when the receiver is operating in the digital mode, it should decode and display captions which have been delivered via EIA-708.[101] Similarly, Media Captioning Services states that, throughout the digital-to-analog transition period, dual mode receivers should provide for captioning display in both modes of operation.[102] As we proposed in the NPRM, these receivers must contain closed captioning functionality pursuant to the Commission's existing rules, Section 15.119, such that the receiver can decode the captions when operating in the analog mode.[103] When operating in the digital mode, these receivers must display captions formatted pursuant to the rules we are adopting here.

53. **Other Devices.** Although we did not propose closed caption decoder requirements for television interface devices whose primary function is other than delivering television programming, such as VCRs, DVD players, or personal video recorders,[104] we know that these devices are used by consumers in connection with their television sets to view closed caption programming. In order for viewers to receive closed captions when using these devices, it is not necessary for these devices to have decoding capability. Rather, all that is required is for the device to pass through the closed caption information to the decoder in the television set. We expect that such devices, and any other similar new devices, will pass through closed captions unaltered and intact to the decoder in the attached digital television. Manufacturers of such devices should ensure that this continues to be the case as the transition to digital television progresses.

[101] *See*, Toshiba Comments at 2, Thomson Comments at 12.

[102] Media Captioning Service Comments at 2.

[103] NPRM at paragraph 11.

[104] Personal video recorders (PVRs) use a hard drive instead of videotape to record programming and are capable of sophisticated time shifting and operate as a kind of hybrid electronic program guide and videocassette recorder. PVRs also may be used in conjunction with subscription services to allow consumers to create personalized viewing menus.

III. Compliance Date

54. **Manufacturers.** In the NPRM we proposed that manufacturers must begin including FCC compliant DTV closed captioning decoder circuitry as of one year from adoption of the rules. We stated that a one year transition is reasonable given that the deadline is in reference to the date of manufacture, not the date of availability.[105] Industry commenters request two to six years before compliance with these rules is required.[106] Thomson explains that the steps in its development process last anywhere from 18 to 24 months. These steps include design and development of integrated circuit, user interface, and hardware/software; building and testing at least two generations of laboratory prototypes; factory retooling to construct production models; field testing; releasing final software; and final production.[107] CEA notes that software and interface designs are not complete.[108] Toshiba seeks sufficient time for testing and buildup of DTV closed captioning chips and software, noting that DTV closed captioning is a new and untested technology.[109]

55. Commenters representing persons with hearing disabilities support the proposal to make the rules governing DTV captions and receivers effective one year after adoption and urge that this proceeding be completed expeditiously so that the rules can become effective as soon as possible.[110] WGBH states that it anticipates that development of DTV closed captioning authoring and encoding tools will proceed rapidly once we adopt standards in this proceeding.[111]

56. We agree with commenters that sufficient time is needed to develop reliable products. We are persuaded by commenters that we should provide manufactures with an additional year beyond our proposal of one year to comply with this decoder requirement. In previous Commission decisions we have taken into account the complexities involved in redesigning television receivers and have stated that our rules should conform with television design cycles and provide a smooth transition for product introduction. We continue to believe that our rules must reflect manufacturing cycles.[112]

---

[105] NPRM at paragraph 14.

[106] Thomson urges the Commission to provide manufacturers with two years to begin implementation. Thomson Comments at 3. General Instruments and HBO also support a two-year deadline. *See* GI Comments at 14 and HBO Reply Comments at 2. CEA requests up to 3 years. *See* CEMA Comments at 13. AT&T requests 4 years. *See* AT&T Reply Comments at 8. Toshiba requests that the requirements be phased in over a six year period. Toshiba Comments at 3.

[107] Thomson Comments at 4.

[108] CEA Comments at 13.

[109] Toshiba Comments at 3.

[110] NAD Comments at 9; TDI Comments at 10-11. *See also* TDI Reply at 5-6 and COR Reply at 10-11 (noting that manufacturers and programmers have had significant notice on the need to incorporate captions in digital programming for some time under the mandate of TDCA).

[111] WGBH comments at 9.

[112] For example, in the proceeding requiring program blocking ("v-chip") functions in analog television receivers, we allowed a phase-in period wherein manufacturers were required to include v-chip functions on one-half of their covered new production models approximately 16 months after adoption of our rules. The remainder of the models were required to have the functionality included within 6 months thereafter. Report and Order in ET Docket 97-206, 13 FCC Rcd 11248, 63 Fed. Reg. 20131 (1998) at paras 21-24.

57. It would be counterproductive to our goal of ensuring accessibility to closed captioning if our compliance deadline did not allow for a thorough product design and testing period. The production steps outlined by Thomson are typical of many manufacturers. The duration of this process may be dependent upon various factors, not all directly related to the presentation of captions onscreen. For example, manufacturers must now begin redesigning television chassis and remote control units to accommodate new features. Production equipment must then be retooled or replaced in order to construct the new designs. We believe ample time is necessary to assure that efforts within the consumer electronics industry to develop a viable product continue in a well coordinated manner.

58. We recognize that product design cycles and equipment test periods must be taken into account when introducing new features, however, we do not believe that further delay beyond two years is necessary or appropriate. With the issuance of final rules, we remove uncertainty with respect to the method for delivering closed captioning services to digital television receivers. Decoder manufacturers now know how their products should function and may proceed immediately designing with these requirements in mind. We seek to ensure that captioning display capability for DTV receivers is available as soon as possible. As TDI points out, the compliance date refers to the date when television receivers must be manufactured with the decoder circuitry, not when televisions must be available for sale to consumers.[113] We believe that the approximately two year period we are granting will provide ample time for manufacturers to design and build a fully functional product. Manufacturers, therefore, must begin to include DTV closed captioning display functionality in their DTV devices in accordance with the rules adopted in this Order by July 1, 2002.

59. **Video Programming Distributors.** In the Order establishing closed captioning rules under section 713, we stated that, as final standards for digital television receivers did not yet exist, it would be difficult for entities preparing to broadcast or transmit to such receivers to format closed caption content for these uses.[114] We found it appropriate to define material prepared for such transmission as pre-rule until such time as the necessary decoder standard rules have been adopted by the Commission and are effective.[115] The rule stated that pre-rule programming includes video programming first published or exhibited for display on television receivers equipped for display of digital transmissions or formatted for such transmission and exhibition.[116] In the NPRM in this proceeding, we stated that we believed that the one year transition period would provide sufficient time for programmers to incorporate closed captioning consistent with these standards into the digital programming they distribute.[117]

60. We are not persuaded by the few commenters who argue that we should alter the rules adopted in the Closed Captioning Report and Order. As a result of those rules, programming prepared or formatted for display on television receivers equipped for display of digital transmissions, after the date on which such television receivers must, by Commission rule, be equipped with built-in decoder circuitry designed to display closed-captioned digital television transmission, falls under the established definition

[113] TDI Comments at 10.

[114] See Closed Captioning and Video Description of Video Programming, Implementation of Section 305 of the Telecommunications Act of 1996, Video Programming Accessibility, MM Docket No. 95-176, Report and Order, 13 FCC Rcd 3272, 3300-3301 ¶ 60 (1998); Order on Reconsideration, 13 FCC Rcd 19973, 19986-87 ¶ 27 (1998).

[115] *Id.* For pre-rule programming, we adopted a ten-year transition period and require that 75% of pre-rule nonexempt programming be captioned as of January 1, 2008. 47 C.F.R. § 79.1(b)(2),(4).

[116] See 47 C.F.R. § 79.1(a)(6)(iii).

[117] NPRM at ¶ 14.

of "new programming" and is subject to the transition schedule for the captioning of new programming. Programmers have been on notice of this requirement for more than one and one-half years, and they now have approximately two years to make necessary arrangements to comply with the new programming benchmarks.

61. As a result, as of the compliance date for DTV receivers to have built-in decoder circuitry in accordance with the rules we are adopting here, programming prepared or formatted for display on television receivers equipped for display of digital transmissions will fall under the established definition of "new programming" and be subject to the transition schedule for the captioning of new programming.[118] The captions for this programming must be able to be decoded by a closed caption decoder manufactured in accordance with the requirements adopted in this order. Under the standard, captions created for use in analog (pursuant to EIA-608) and "upconverted" to be transmitted in EIA-708 can be decoded by a receiver in compliance with the rules we are adopting here. Upconverted captions are created by using the original 608 data as source material and employing a limited set of EIA-708 features to present the captions to an EIA-708 decoder. These captions maintain the "look and feel" or traditional analog captions but are presented and decoded using the true digital construct. The upconversion occurs at the origination point of a video program's distribution (in the production process by the captioner or programmer). [119] Therefore, programs that have been created and captioned for display on analog television receivers may be upconverted for digital delivery without the need to create an new caption script. A separate transition period is therefore not necessary and will result in more captioning during the transition (as opposed to those commenters seeking a separate transition for digital programming[120]).

62. We expect, however, that EIA-708 captions will begin to be provided soon after the compliance date. Given the features that will be included in decoders as required by our rules, programmers and caption providers will have incentives to provide captioning that takes advantage of these features. We believe our approach here provides flexibility during the ongoing digital television transition period.

63. As noted above, there will be viewers who watch digital television programming on an analog television, by using a DTV converter. We clarify, therefore, that in order for programming distributors to count captioned digital television programming toward their closed captioning requirements in 47 C.F.R. Section 79.1, they also must transmit captions that can be decoded by the decoder in that analog set.

PROCEDURAL MATTERS

64. Final Regulatory Flexibility Analysis. A Final Regulatory Flexibility Analysis, required by Section 604 of the Regulatory Flexibility Act, as amended by the Contract with America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996), is contained in Appendix C.

---

[118] The rules require an increasing amount of captioned new programming over an eight-year transition period with 100% of all new nonexempt programming required to be captioned effective January 1, 2006. 47 C.F.R. § 79.1(b)(1),(3).

[119] WGBH Reply Comments at 5.

[120] *See, e.g.,* NCTA Comments at 4; HBO Comments at 6; AT&T Reply Comments at 608. HBO, the only commenter to propose a specific transition schedule for digital programming, alters its position in reply consistent with the requirements we adopt here. *See* HBO Reply Comments at 1-6.

65. This document is available to individuals with disabilities requiring accessible formats (electronic ASCII text, Braille, large print, and audiocassette) by contacting Brian Millin at (202) 418-7426 (Voice), (202) 418-7365 (TTY), or by sending an email to access@fcc.gov. It can also be downloaded from the FCC's Disabilities Rights Office website at http://www.fcc.gov/cib/dro/.

ORDERING CLAUSES

66. Accordingly, IT IS ORDERED that pursuant to the authority contained in Section 4(i), 303(r), 303(u), and 330(b) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 303(r), 303(u) and 330(b), the Commission's rules ARE AMENDED by revising the heading for Section 15.119, by adding a new Section 15.122, and by revising Sections 79.1(a)(4) and 79.1(c) as shown in Appendix B. The amendments set forth in Appendix B shall become effective upon approval from the Office of Management and Budget.

67. IT IS FURTHER ORDERED that the Commission's Consumer Information Bureau, Reference Information Center, SHALL SEND a copy of this Report and Order, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Magalie Roman Salas
Secretary

APPENDIX A

COMMENTS

1. Alexander Graham Bell Association for the Deaf and Hard of Hearing (AG Bell)
2. Association of Late Deafened Adults, Inc. (ALDA)
3. Consumer Electronics Manufacturers Association (CEA)
4. General Instrument Corporation (GI)
5. Home Box Office (HBO)
6. Massachusetts Assistance Technology Partnership (MATP)
7. Media Captioning Services (MCS)
8. National Association of Broadcasters (NAB)
9. National Association of the Deaf & The Consumer Action Network (NADCAN)
10. National Cable Television Association (NCTA)
11. Self Help for Hard of Hearing People, Inc. (SHHH)
12. Telecommunications for the Deaf, Inc. (TDI)
13. Thomson Consumer Electronics, Inc. (Thomson)
14. Toshiba America Consumer Production (Toshiba)
15. VITAC Corporation (Vitac)
16. WGBH Educational Foundation (WGBH)

REPLY COMMENTS

1. American Society for Deaf Children (ASDC)
2. AT&T
3. Khari Balogun
4. Frank Bechter
5. Lawrence Brick
6. Stephanie Buell
7. Joan Cassidy
8. Cynthia Clark
9. Consumer Electronics Association (CEA)
10. Council of Organizational Representatives (COR)
11. Nancy Creighton
12. Patricia Dobosh
13. Charles Estes
14. Michael Gallagher
15. General Instruments (GI)
16. Home Box Office (HBO)
17. Pamela Holmes (Consumer Advocate)
18. Roger Kraft
19. Larry Littleton
20. Ruben Martinez
21. Mentkowski Family
22. National Association of Broadcasters (NAB)
23. National Catholic Office for the Deaf (NCOD)
24. Northern Virginia Resource Center for Deaf and Hard Of Hearing (NVRC)
25. Northern Virginia United for Deaf and Hard of Hearing Children (NVU)

26. Pennsylvania Parents of Deaf and Hard of Hearing Children (PPDHHC)
27. Sarnoff Corporation (Sarnoff)
28. Kay Seib
29. Self Help for Hard of Hearing People (SHHH)
30. Telecommunications for the Deaf, Inc. (TDI)
31. Texas Commission for the Deaf & Hard of Hearing (TCDHH)
32. Thomson Consumer Electronics, Inc. (TCE)
33. VITAC Corporation (Vitac)
34. WGBH Educational Foundation (WGBH)

APPENDIX B - RULES

PART 15 – RADIO FREQUENCY DEVICES

The authority for Part 15 is amended to read as follows:

AUTHORITY: 47 U.S.C. 154, 302, 303, 304, 307, 330, and 544A.

Title 47 of the Code of Federal Regulations, Part 15 is amended as follows:

1. The heading of Section 15.119 is revised to read as follows:

Section 15.119 Closed caption decoder requirements for analog television receivers.

2. A new Section 15.122 is added to read as follows:

Section 15.122 Closed caption decoder requirements for digital television receivers and converter boxes.

(a) (1) Effective July 1, 2002, all digital television receivers with picture screens in the 4:3 aspect ratio with picture screens measuring 13 inches or larger diagonally, all digital television receivers with picture screens in the 16:9 aspect ratio measuring 7.8 inches or larger vertically and all separately sold DTV tuners shipped in interstate commerce or manufactured in the United States shall comply with the provisions of this section.

Note: This paragraph places no restrictions on the shipping or sale of digital television receivers that were manufactured before July 1, 2002.

(2) Effective July 1, 2002, DTV converter boxes that allow digitally transmitted television signals to be displayed on analog receivers shall pass available analog caption information to the attached receiver in a form recognizable by that receiver's built-in caption decoder circuitry.

Note: This paragraph places no restrictions on the shipping or sale of DTV converter boxes that were manufactured before July 1, 2002.

(b) Digital television receivers and tuners must be capable of decoding closed captioning information that is delivered pursuant to the industry standard EIA-708-B, "Digital Television (DTV) Closed Captioning," Electronics Industries Association (1999). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Digital television manufacturers may wish to view EIA-708-B in its entirety. Copies of EIA-708-B may be obtained from: Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112-5704, http://www.global.ihs.com/. Copies of EIA-708-B may be inspected during regular business hours at the following locations: Federal Communications Commission, 445 12th Street, S.W., Washington, D.C. 20554, or the Office of the Federal Register, 800 N. Capitol Street, N.W., Washington, D.C.

(c) *Services.* (1) Decoders must be capable of decoding and processing data for the six standard services, Caption Service #1 through Caption Service #6.

(2) Decoders that rely on Program and System Information Protocol data to implement closed captioning functions must be capable of decoding and processing the Caption Service Directory data. Such decoders must be capable of decoding all Caption Channel Block Headers consisting of Standard Service Headers, Extended Service Block Headers, and Null Block headers. However, decoding of the

data is required only for Standard Service Blocks (Service IDs <= 6), and then only if the characters for the corresponding language are supported. The decoders must be able to display the directory for services 1 through 6.

(d) *Code Space Organization.* (1) Decoders must support Code Space C0, G0, C1, and G1 in their entirety.

	C 0		G 0						C 1		G 1					
B7-b4	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
b3-b0 0	NUL	EXT1	SP	0	@	P	`	p	CW0	SPA	NBS	°	À	Đ	à	ð
1			!	1	A	Q	a	q	CW1	SPC	¡	±	Á	Ñ	á	ñ
2			"	2	B	R	b	r	CW2	SPL	¢	²	Â	Ò	â	ò
3	ETX		#	3	C	S	c	s	CW3		£	³	Ã	Ó	ã	ó
4			$	4	D	T	d	t	CW4		¤	´	Ä	Ô	ä	ô
5			%	5	E	U	e	u	CW5		¥	µ	Å	Õ	å	õ
6			&	6	F	V	f	v	CW6		¦	¶	Æ	Ö	æ	ö
7			'	7	G	W	g	w	CW7	SWA	§	·	Ç	×	ç	÷
8	BS	P16	(	8	H	X	h	x	CLW	DF0	¨	¸	È	Ø	è	ø
9			)	9	I	Y	i	y	DSW	DF1	©	¹	É	Ù	é	ù
A			*	:	J	Z	j	z	HDW	DF2	ª	º	Ê	Ú	ê	ú
B			+	;	K	[	k	{	TGW	DF3	«	»	Ë	Û	ë	û
C	FF		,	<	L	\	l	|	DLW	DF4	¬	¼	Ì	Ü	ì	ü
D	CR		-	=	M	]	m	}	DLY	DF5	-	½	Í	Ý	í	ý
E	HCR		.	>	N	^	n	~	DLC	DF6	®	¾	Î	Þ	î	þ
F			/	?	O	_	o	♪	RST	DF7	¯	¿	Ï	ß	ï	ÿ

	C 2		G 2						C 3		G 3					
0			TSP								CC					
1			NBTSP	‘												
2				’												
3				“												
4				”												
5			…													
6								⅛								
7								⅜								
8								⅝								
9				™				⅞								
A			Š	š				▕								
B								▕								
C			Œ	œ				▏								
D				SM				—								
E								▁								
F				Ÿ				▕								

Table 1 DTVCC Code Set Mapping

(2) The following characters within code space G2 must be supported:

- transparent space (TSP)
- non-breaking transparent space (NBTSP)
- solid block (▉)
- trademark symbol (™)
- Latin-1 characters (Š, Œ, š, œ, Ÿ)

(3) The substitutions in Table 2 are to be made if a decoder does not support the remaining G2 characters.

G2 Character	Substitute With
Open single quote (‘), G2 char code 0x31	G0 single quote (‘), char code 0x27
Close single quote(’), G2 char code 0x32	G0 single quote (‘), char code 0x27
Open double quote (“), G2 char code 0x33	G0 double quote (“), char code 0x22
Close double quote (”), G2 char code 0x34	G0 double quote (“), char code 0x22
Bold bullet (•), G2 char code 0x35	G1 bullet (·), char code 0xB7
Ellipsis(…), G2 char code 0x25	G0 underscore (_), char code 0x5F
One-eighth (1/8), G2 char code 0x76	G0 percent sign (%), char code 0x25
Three-eighths (3/8), G2 char code 0x77	G0 percent sign (%), char code 0x25
Five-eighths (5/8), G2 char code 0x78	G0 percent sign (%), char code 0x25
Seven-eighths (7/8), G2 char code 0x79	G0 percent sign (%), char code 0x25
Vertical border (▕), G2 char code 0x7A	G0 stroke (|), char code 0x7C
Upper-right border (▜), G2 char code 0x7B	G0 dash (-), char code 0x2D
Lower-left border (▙), G2 char code 0x7C	G0 dash (-), char code 0x2D
Horizontal border (▂), G2 char code 0x7D	G0 dash (-), char code 0x2D
Lower-right border (▟), G2 char code 0x7E	G0 dash (-), char code 0x2D
Upper-left border (▛), G2 char code 0x7F	G0 dash (-), char code 0x2D

Table 2 G2 Character Substitution Table

(4) Support for code spaces C2, C3, and G3 is optional. All unsupported graphic symbols in the G3 code space are to be substituted with the G0 underscore character (_), char code 0x5F.

(e) *Screen Coordinates*. Table 1 specifies the screen coordinate resolutions and limits for anchor point positioning in 4:3 and 16:9 display formats, and the number of characters per row.

Screen Aspect Ratio	Maximum Anchor Position Resolution	Minimum Anchor Position Resolution	Maximum Displayed Rows	Maximum Characters per Row
4:3	75v x 160h	15v x 32h	4	32
16:9	75v x 210h	15v x 42h	4	42
other	75v x (5 x H)	15v x H*	4	*

Table 1 Screen Coordinate Resolutions & Limits

*H = 32 x (the width of the screen in relation to a 4:3 display). For example, the 16:9 format is 1/3 wider than a 4:3 display; thus, H = 32 * 4/3 = 42.667, or 42.

This means that the minimum grid resolution for a 4:3 aspect ratio instrument is 15 vertical positions x 32 horizontal positions. This minimum grid resolution for 16:9 ratio instrument is 15 vertical positions x 42 horizontal positions. These minimum grid sizes are to cover the entire safe-title area of the corresponding screen.

The minimum coordinates equate to a 1/5 reduction in the maximum horizontal and vertical grid resolution coordinates. Caption providers are to use the maximum coordinate system values when specifying anchor point positions. Decoders using the minimum resolution are to divide the provided horizontal and vertical screen coordinates by 5 to derive the equivalent minimum coordinates.

Any caption targeted for both 4:3 and 16:9 instruments is limited to 32 contiguous characters per row. If a caption is received by a 4:3 instrument that is targeted for a 16:9 display only, or requires a window width greater than 32 characters, then the caption may be completely disregarded by the decoder. 16:9 instruments should be able to process and display captions intended for 4:3 displays, providing all other minimum recommendations are met.

If the resulting size of any window is larger than the safe title area for the corresponding display's aspect ratio, then this window will be completely disregarded.

(f) *Caption Windows.* (1) Decoders need to display no more than 4 rows of captions on the screen at any given time, regardless of the number of windows displayed. This implies that no more than 4 windows can be displayed at any given time (with each having only one caption row). However, decoders should maintain storage to support a minimum total of 8 rows of captions. This storage is needed for the worst-case support of a displayed window with 4 rows of captioning and a non-displayed window which is buffering the incoming rows for the next 4-row caption. As implied above, the maximum number of windows that may be displayed at any one time by a minimum decoder implementation is 4. If more than 4 windows are defined in the caption stream, the decoder may disregard the youngest and lowest priority window definition(s). Caption providers must be aware of this limitation, and either restrict the total number of windows used or accept that some windows will not be displayed.

(2) Decoders do not need to support overlapped windows. If a window overlaps another window, the overlapped window need not be displayed by the decoder.

(3) At a minimum, decoders will assume that all windows have rows and columns "locked". This implies that if a decoder implements the SMALL pen-size, then word-"un"wrapping, when shrinking captions, need not be implemented. Also, if a decoder implements the LARGE pen size, then word wrapping (when enlarging captions) need not be implemented.

(4) Whenever possible, the receiver should render embedded carriage returns as line breaks, since these carriage returns indicate an important aspect of the caption's formatting as determined by the service provider. However, it may sometimes be necessary for the receiver to ignore embedded line breaks. For example, if a caption is to appear in a larger font, and if its window's rows and/or columns are unlocked, the rows of text may need to become longer or shorter to fit within the allocated space. Such automatic reformatting of a caption is known as "word wrap." If decoders support word-wrapping, it must be implemented as follows:

(i) The receiver should follow standard typographic practice when implementing word wrap. Potential breaking points (word-wrapping points) are indicated by the space character (20h) and by the hyphen character (2Dh).

(ii) If a row is to be broken at a space, the receiver should remove the space from the caption display. If a row is to be broken after a hyphen, the hyphen should be retained.

(iii) If an embedded return is to be removed, it should usually be replaced with a space. However, if the character to the left of the embedded return is a hyphen, the embedded return should be removed but NOT replaced with a space.

(iv) This specification does not include optional hyphens, nor does it provide for any form of automatic hyphenation. No non-breaking hyphen is defined. The non-breaking space (A0h in the G1 code set) and the non-breaking transparent space (21h in the G2 code set) should not be considered as potential line breaks.

(v) If a single word exceeds the length of a row, the word should be placed at the start of a new row, broken at the character following the last character that fits on the row, and continued with further breaks if needed.

(g) *Window Text Painting.* (1) All decoders should implement "left", "right", and "center" caption-text justification. Implementation of "full" justification is optional. If "full" justification is not implemented, fully justified captions should be treated as though they are "left" justified.

For "left" justification, decoders should display any portion of a received row of text when it is received. For "center", "right", and "full" justification, decoders may display any portion of a received row of text when it is received, or may delay display of a received row of text until reception of a row completion indicator. A row completion indicator is defined as receipt of a CR, ETX or any other command, except SetPenColor, SetPenAttributes, or SetPenLocation where the pen relocation is within the same row.

Receipt of a character for a displayed row which already contains text with "center", "right" or "full" justification will cause the row to be cleared prior to the display of the newly received character and any subsequent characters. Receipt of a justification command which changes the last received justification for a given window will cause the window to be cleared.

(2) At a minimum, decoders must support LEFT_TO_RIGHT printing.

(3) At a minimum, decoders must support BOTTOM_TO_TOP scrolling. For windows sharing the same horizontal scan lines on the display, scrolling may be disabled.

(4) At a minimum, decoders must support the same recommended practices for scroll rate as is provided for NTSC closed-captioning.

(5) At a minimum, decoders must support the same recommended practices for smooth scrolling as is provided for NTSC closed-captioning.

(6) At a minimum, decoders must implement the "snap" window display effect. If the window "fade" and "wipe" effects are not implemented, then the decoder will "snap" all windows when they are to be displayed, and the "effect speed" parameter is ignored.

(h) *Window Colors and Borders.* At a minimum, decoders must implement borderless windows with solid, black backgrounds (i.e., border type = NONE, fill color = (0,0,0), fill opacity = SOLID), and borderless transparent windows (i.e., border type = NONE, fill opacity = TRANSPARENT)..

(i) *Predefined Window and Pen Styles.* Predefined Window Style and Pen Style ID's may be provided in

the DefineWindow command. At a minimum, decoders should implement Predefined Window Attribute Style 1 and Predefined Pen Attribute Style 1, as shown in Table 4 and Table 5, respectively.

Style ID #	Justify	Print Direction	Scroll Direction	Word Wrap	Display Effect	Effect Direction	Effect Speed	Fill Color	Fill Opacity	Border Type	Border Color	Usage
1	LEFT	LEFT-TO-RIGHT	BOTTOM-TO-TOP	NO	SNAP	n/a	n/a	(0,0,0) Black	SOLID	NONE	n/a	*NTSC Style PopUp Captions*
2	LEFT	LEFT-TO-RIGHT	BOTTOM-TO-TOP	NO	SNAP	n/a	n/a	n/a	TRANS-PARENT	NONE	n/a	*PopUp Captions w/o Black Background*
3	CNTR	LEFT-TO-RIGHT	BOTTOM-TO-TOP	NO	SNAP	n/a	n/a	(0,0,0) Black	SOLID	NONE	n/a	*NTSC Style Centered PopUp Captions*
4	LEFT	LEFT-TO-RIGHT	BOTTOM-TO-TOP	YES	SNAP	n/a	n/a	(0,0,0) Black	SOLID	NONE	n/a	*NTSC Style RollUp Captions*
5	LEFT	LEFT-TO-RIGHT	BOTTOM-TO-TOP	YES	SNAP	n/a	n/a	n/a	TRANS-PARENT	NONE	n/a	*RollUp Captions w/o Black Background*
6	CNTR	LEFT-TO-RIGHT	BOTTOM-TO-TOP	YES	SNAP	n/a	n/a	(0,0,0) Black	SOLID	NONE	n/a	*NTSC Style Centered RollUp Captions*
7	LEFT	TOP-TO-BOTTOM	RIGHT-TO-LEFT	NO	SNAP	n/a	n/a	(0,0,0) Black	SOLID	NONE	n/a	*Ticker Tape*

Table 4 Predefined Window Style ID's

Predefined Style ID	Pen Size	Font Style	Offset	Italics	Underline	Edge Type	Foregrnd Color	Foregrnd Opacity	Backgrnd Color	Backgrnd Opacity	Edge Color	Usage
1	STNDR	0	NORMAL	NO	NO	NONE	(2,2,2) White	SOLID	(0,0,0) Black	SOLID	n/a	*Default NTSC Style**
2	STNDR	1	NORMAL	NO	NO	NONE	(2,2,2) White	SOLID	(0,0,0) Black	SOLID	n/a	*NTSC Style* Mono w/ Serif*
3	STNDR	2	NORMAL	NO	NO	NONE	(2,2,2) White	SOLID	(0,0,0) Black	SOLID	n/a	*NTSC Style* Prop w/ Serif*
4	STNDR	3	NORMAL	NO	NO	NONE	(2,2,2) White	SOLID	(0,0,0) Black	SOLID	n/a	*NTSC Style* Mono w/o Serif*
5	STNDR	4	NORMAL	NO	NO	NONE	(2,2,2) White	SOLID	(0,0,0) Black	SOLID	n/a	*NTSC Style* Prop w/o Serif*
6	STNDR	3	NORMAL	NO	NO	UNIFRM	(2,2,2) White	SOLID	n/a	TRANS-PARENT	(0,0,0) Black	*Mono w/o Serif, Bordered Text, No BG*
7	STNDR	4	NORMAL	NO	NO	UNIFRM	(2,2,2) White	SOLID	n/a	TRANS-PARENT	(0,0,0) Black	*Prop. w/o Serif, Bordered Text, No BG*

Table 5 Predefined Pen Style ID's *** "NTSC Style" - White Text on Black Background**

(j) *Pen Size.* Decoders must support the standard, large, and small pen sizes and must allow the caption provider to choose a pen size and allow the viewer to choose an alternative size.

The STANDARD pen size should be implemented such that the height of the tallest character in any implemented font is no taller than 1/15 of the height of the safe-title area, and the width of the widest character is no wider than 1/32 of the width of the safe-title area for 4:3 displays and 1/42 of the safe-title area width for 16:9 displays.

The LARGE pen size should be implemented such that the width of the widest character in any implemented font is no wider than 1/32 of the safe-title area for 16:9 displays. This recommendation allows for captions to grow to a LARGE pen size without having to reformat the caption since no caption will have more than 32 characters per row.

(k) *Font Styles.* Decoders must support the eight fonts listed below. Caption providers may specify 1 of these 8 font styles to be used to write caption text. The styles specified in the "font style" parameter of the **SetPenAttributes** command are numbered from 0 through 7.

The following is a list of the 8 required font styles. For information purposes only, each font style references one or more popular fonts which embody the characteristics of the style:

0 - Default (undefined)
1 - Monospaced with serifs (similar to Courier)
2 - Proportionally spaced with serifs (similar to Times New Roman)
3 - Monospaced without serifs (similar to Helvetica Monospaced)
4 - Proportionally spaced without serifs (similar to Arial and Swiss)
5 - Casual font type (similar to Dom and Impress)
6 - Cursive font type (similar to Coronet and Marigold)
7 - Small capitals (similar to Engravers Gothic)

Font styles may be implemented in any typeface which the decoder manufacturer deems to be a readable rendition of the font style, and need not be in the exact typefaces given in the example above. Decoders must include the ability for consumers to choose among the eight fonts. The decoder must display the font chosen by the caption provider unless the viewer chooses a different font.

(l) *Character Offsetting.* Decoders need not implement the character offsetting (i.e., subscript and superscript) pen attributes.

(m) *Pen Styles.* At a minimum, decoders must implement normal, italic, and underline pen styles.

(n) *Foreground Color and Opacity.* (1) At a minimum, decoders must implement transparent, translucent, solid and flashing character foreground type attributes.

(2) At a minimum, decoders must implement the following character foreground colors: white, black, red, green, blue, yellow, magenta and cyan.

(3) Caption providers may specify the color/opacity. Decoders must include the ability for consumers to choose among the color/opacity options. The decoder must display the color/opacity chosen by the caption provider unless the viewer chooses otherwise.

(o) *Background Color and Opacity.* (1) Decoders must implement the following background colors: white, black, red, green, blue, yellow, magenta and cyan. It is recommended that this background is extended beyond the character foreground to a degree that the foreground is separated from the underlying video by a sufficient number of background pixels to insure the foreground is separated from the background.

(2) Decoders must implement transparent, translucent, solid and flashing background type attributes. Caption providers may specify the color/opacity. Decoders must include the ability for consumers to choose among the color/opacity options. The decoder must display the color/opacity chosen by the caption provider unless the viewer chooses otherwise.

(p) *Character Edges.* Decoders must implement separate edge color and type attribute control.

(q) *Color Representation.* (1) At a minimum, decoders must support the 8 colors listed in Table 6.

Color	Red	Green	Blue
Black	0	0	0
White	2	2	2
Red	2	0	0
Green	0	2	0
Blue	0	0	2
Yellow	2	2	0
Magenta	2	0	2
Cyan	0	2	2

Table 6 Minimum Color List Table

(2) When a decoder supporting this Minimum Color List receives an RGB value not in the list, it will map the received value to one of the values in the list via the following algorithm:

- All one (1) values are to be changed to 0
- All two (2) values are to remain unchanged
- All three (3) values are to be changed to 2

For example, the RGB value (1,2,3) will be mapped to (0,2,2), (3,3,3) will be mapped to (2,2,2) and (1,1,1) will be mapped to (0,0,0).

(3) Table 7 is an alternative minimum color list table supporting 22 colors.

Color	Red	Green	Blue
Black	0	0	0
Gray	1	1	1
White	2	2	2
Bright White	3	3	3
Dark Red	1	0	0
Red	2	0	0
Bright Red	3	0	0
Dark Green	0	1	0
Green	0	2	0
Bright Green	0	3	0
Dark Blue	0	0	1
Blue	0	0	2
Bright Blue	0	0	3
Dark Yellow	1	1	0
Yellow	2	2	0
Bright Yellow	3	3	0
Dark Magenta	1	0	1
Magenta	2	0	2
Bright Magenta	3	0	3
Dark Cyan	0	1	1
Cyan	0	2	2
Bright Cyan	0	3	3

Table 7 Alternative Minimum Color List Table

When a decoder supporting the Alternative Minimum Color List in Table 7 receives an RGB value not in the list (i.e., an RGB value whose non-zero elements are not the same value), it will map the received value to one of the values in the list via the following algorithm:

- For RGB values with all elements non-zero and different - e.g., (1,2,3), (3,2,1), and (2,1,3), the 1 value will be changed to 0, the 2 value will remain unchanged, and the 3 value will be changed to 2.
- For RGB values with all elements non-zero and with two common elements - e.g. (3,1,3), (2,1,2), and (2,2,3), if the common elements are 3 and the uncommon one is 1, then the 1 elements is changed to 0; e.g. (3,1,3) -> (3,0,3). If the common elements are 1 and the uncommon element is 3, then the 1 elements are changed to 0, and the 3 element is changed to 2; e.g. (1,3,1) -> (0,2,0). In all other cases, the uncommon element is changed to the common value; e.g., (2,2,3) -> (2,2,2), (1,2,1) -> (1,1,1), and (3,2,3) -> (3,3,3).

All decoders not supporting either one of the two color lists described above, must support the full 64 possible RGB color value combinations.

(r) *Character Rendition Considerations.* In NTSC Closed Captioning, decoders were required to insert

leading and trailing spaces on each caption row. There were two reasons for this requirement:

(i) to provide a buffer so that the first and last characters of a caption row do not fall outside the safe title area, and

(ii) to provide a black border on each side of a character so that the "white" leading pixels of the first character on a row and the trailing "white" pixels of the last character on a row do not bleed into the underlying video.

Since caption windows are required to reside in the safe title area of the DTV screen, reason i (above) is not applicable to DTVCC captions.

The attributes available in the **SetPenAttributes** command for character rendition (e.g.,character background and edge attributes) provide unlimited flexibilty to the caption provider when describing caption text in an ideal decoder implementation. However, manufacturers need not implement all pen attributes. Thus it is recommended that no matter what the level of implementation, decoder manufacturers should take into account the readability of all caption text against a variety of all video backgrounds, and should implement some automatic character delineation when the individual control of character foreground, background and edge is not supported.

(s) *Service Synchronization.* Service Input Buffers must be at least 128 bytes in size. Caption providers must keep this lower limit in mind when following Delay commands with other commands and window text. In other words, no more than 128 bytes of DTVCC commands and text should be transmitted (encoded) before a pending Delay command's delay interval expires.

(t) *Settings.* Decoders must include an option that permits a viewer to choose a setting that will display captions as intended by the caption provider (a default). Decoders must also include an option that allows a viewer's chosen settings to remain until the viewer chooses to alter these settings, including periods when the television is turned off.

PART 79—CLOSED CAPTIONING OF VIDEO PROGRAMMING

Part 79 of Title 47 of the Code of Federal Regulations is amended as follows:

1. The authority citation for Part 79 continues to read as follows:

Authority: 47 U.S.C. 613

2. Section 79.1(a)(4) is amended to read as follows:

(4) Closed captioning. The visual display of the audio portion of video programming pursuant to the technical specifications set forth in Part 15 of this chapter

3. Section 79.1(c) is amended to read as follows:

(c) Obligation to Pass Through Captions of Already Captioned Programs. All video programming distributors shall deliver all programming received from the video programming owner or other

origination source containing closed captioning to receiving television households with the original closed captioning data intact in a format that can be recovered and displayed by decoders meeting the standards of Part 15 of this chapter unless such programming is recaptioned or the captions are reformatted by the programming distributor.

Appendix C

FINAL REGUALTORY FLEXIBILITY ANALYSIS

As required by the Regulatory Flexibility Act ("RFA"),[121] an Initial Regulatory Flexibility Analysis ("IRFA") was ncorporated into the *Notice of Proposed Rule Making* ("NPRM") in this docket, ET Docket 99-254.[122] The Commission sought written public comment on the proposals in the NPRM, including comment on the IRFA. The Final Regulatory Flexibility Analysis ("FRFA") in this Report and Order conforms to the RFA.[123]

A. Need for, and Objectives of, the Report and Order.

This Report and Order amends the Commission's rules to adopt technical standards for the display of closed captions on digital television ("DTV") receivers. In 1990, Congress passed the Television Decoder Circuitry Act ("TDCA").[124] The TDCA requires that any apparatus designed to receive television broadcast signals, manufactured or imported for use in the United States, must be able to display closed captioned information if its television screen is 33 centimeters (13 inches) or larger. The TDCA also instructs the Commission to ensure that closed captioning service continues to be available to consumers as new video technology is developed. The introduction of digital broadcasting requires the Commission to update its rules to fulfill its continuing obligations under the TDCA.

B. Summary of Significant Issues raised by Public Comments in Response to the IRFA.

No comments were filed in response to the IRFA or specifically regarding small entities.

C. Description and Estimate of the Number of Small Entities to Which the Rules Will Apply.

The RFA directs agencies to provide a description of, and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.[125] The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdictions." In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act, 15 U.S.C. § 632, unless the

[121] *See* 5 U.S.C. § 603. The RFA, *see* 5 U.S.C. § 601 *et. seq.*, has been amended by the Contract With America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996) (CWAAA). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA).

[122] *See* ET Docket 99-254, FCC 99-180, 64 FR 41897 (1999).

[123] *See* 5 U.S.C. § 604.

[124] Pub. L. No. 101-431, 104 Stat. 960 (1990) (codified at 47 U.S.C. §§ 303(u), 303(b)).

[125] 5 U.S.C. § 603(b)(3).

Commission has developed one or more definitions that are appropriate to its activities.[126] A "small business concern" is one that: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) meets any additional criteria established by the Small Business Administration ("SBA").[127]

Television Equipment Manufacturers. According to the SBA's regulations, television equipment manufacturers must have 750 or fewer employees in order to qualify as a small business concern.[128] Census Bureau data indicates that there are 858 U.S. companies that manufacture radio and television broadcasting and communications equipment, and that 778 of these firms have fewer than 750 employees and would be classified as small entities.[129] The Census Bureau category is very broad, and specific figures are not available as to how many of these firms are manufacturers of television equipment. However, we believe that many of the companies that manufacture television equipment may qualify as small entities.

Multichannel Video Programming Distributors ("MVPDs"). The SBA has developed a definition of small entities for cable and other pay television services under Standard Industrial Classification 4841 (SIC 4841), which covers subscription television services, which includes all such companies with annual gross revenues of $11 million or less.[130] This definition includes cable systems operators, closed circuit television services, direct broadcast satellite services, multipoint distribution systems, satellite master antenna systems and subscription television services. According to the Census Bureau, there were 1,423 such cable and other pay television services generating less than $11 million in revenue that were in operation for at least one year at the end of 1992.[131] The following provides a more precise estimate for the affected MVPD services individually.

Cable Services or Systems. The Commission has developed, with SBA's approval, its own definition of a "small cable company" and "small system" for the purposes of rate regulation. Under the Commission's rules, a "small cable company," is one serving fewer than 400,000 subscribers nationwide.[132] Based on our most recent information, we estimate that there were 1,439 cable companies

---

[126] *See* 5 U.S.C. § 601(3).

[127] 15 U.S.C. § 632.

[128] 13 C.F.R. § 121.201, (SIC) Code 3663.

[129] U.S. Department of Commerce, 1992 Census Transportation, Communications, and Utilities, SIC Code 3663 (issued may 1995).

[130] 13 C.F.R. §121.201.

[131] 1992 Census, *supra*, at Firm Size 1-123. *See Implementation of Sections of the Cable Telecommunications Consumer Protection and Competition Act of 1992, Rate Regulation and Cable Pricing Flexibility*, MM Docket No. 92-266 and CS Docket No. 96-157, Memorandum Opinion and Order and Notice of Proposed Rule Making, 11 FCC Rcd 9517, 9531 (1996).

[132] 47 C.F.R. § 76.901(e). The Commission developed this definition based on its determinations that a small cable company is one with annual revenues of $100 million or less. *Implementation of Sections of the 1992 Cable Act: Rate Regulation,* MM Docket Nos. 92-266 & 93-215, Sixth Report and Order and Eleventh Order on Reconsideration, 10 FCC Rcd 7393 (1995).

that qualified as small cable companies at the end of 1995.[133] Since then, some of those companies may have grown to serve over 400,000 subscribers, and others may have been involved in transactions that caused them to be combined with other cable companies. Consequently, we estimate that there are fewer than 1,439 small entity cable companies. The Commission's rules also define a "small system," for the purposes of cable rate regulation, as a cable system with 15,000 or fewer subscribers.[134] We do not request nor do we collect information concerning cable systems serving 15,000 or fewer subscribers and thus are unable to estimate at this time the number of small cable systems nationwide.

The Communications Act also contains a definition of a "small cable operator," which is "a cable operator that, directly or through an affiliate, serves in the aggregate fewer than 1 percent of all subscribers in the United States and is not affiliated with any entity or entities whose gross annual revenues in the aggregate exceed $250,000,000."[135] The Commission has determined that there are 61,700,000 subscribers in the United States. Therefore, we found that an operator serving fewer than 617,000 subscribers is deemed a small operator, if its annual revenues, when combined with the total annual revenues of all of its affiliates, do not exceed $250 million in the aggregate.[136] Based on available data, we find that the number of cable operators serving 617,000 subscribers or less totals 1,450.[137] Although it seems certain that some of these cable system operators are affiliated with entities whose gross annual revenues exceed $250,000,000, we are unable at this time to estimate with greater precision the number of cable system operators that would qualify as small cable operators under the definition in the Communications Act. Furthermore, of those cable system operators that may qualify as small cable operators, only those that deliver digital cable programming would be affected by our rules. According to General Instrument Corporation, approximately 1,000 headends are currently delivering digital video signals.[138] It is uncertain how many of these 1,000 cable operators fall under the definition of a small cable company based on the Commission's rules or the Communications Act, but in any event the number would be no greater than 1,000.

Direct Broadcast Satellite ("DBS") Service. The SBA includes DBS service in its classification of cable and other pay television services. Therefore, a small DBS service is defined as a company generating $11 million or less in annual receipts.[139] As of November 1999, there were four DBS licensees, one of which was not in operation. Providing DBS service requires a great investment of capital to build, launch, and operate satellite systems. Typically, small businesses do not have the financial ability to become DBS licensees because of the high implementation costs associated with launching satellites. Most recent industry statistics suggest that the revenue attributed to DBS

[133] Paul Kagan Associates, Inc., *Cable TV Investor*, Feb. 29, 1996 (based on figures for Dec. 30, 1995).

[134] 47 C.F.R. § 76.901(c).

[135] 47 U.S.C. § 543(m)(2).

[136] 47 C.F.R. § 76.1403(b).

[137] Paul Kagan Associates, Inc., *Cable TV Investor*, Feb. 29, 1996 (based on figures for Dec. 30, 1995).

[138] General Instrument Corporation Comments at 6.

[139] 13 C.F.R. § 121.201.

subscribers for EchoStar was $682.8 million for the year of 1998 and $1.55 billion for DirecTV. We do not have similar revenue information for the third operating licensee, Dominion Video Satellite, Inc. However, we do not believe that any DBS licensees could be categorized as a small business.

Home Satellite Dish ("HSD") Service. The market for HSD service is difficult to quantify. HSD owners have access to more than 500 channels of programming placed on C-band satellites by programmers for receipt and distribution by MVPDs, of which 350 channels are scrambled and approximately 150 channels are unscrambled.[140] To receive scrambled channels, an HSD owner must purchase an integrated receiver-decoder from an equipment dealer and pay a subscription fee to an HSD programming packager. Thus, those HSD users that subscribe to a programming package are similar to consumers that subscribe to cable and other pay television services. Accordingly, it appears that the definition of small entity under SIC 4841 (i.e., all such companies generating $11 million or less in annual receipts[141]) would be applicable to this service.

According to the most recently available information, there are approximately 20 to 25 program packagers nationwide offering packages of scrambled programming to retail consumers.[142] As of June 1999, these program packagers provide subscriptions to approximately 1,783,411 subscribers nationwide.[143] This is an average of about 90,000 subscribers per program packager. This is substantially smaller than the 400,000 subscribers used in the Commission's definition of a small multiple system operator ("MSO"). Furthermore, because this is an average, it is likely that some program packagers may be substantially smaller. Therefore, this Report and Order could affect all 25 program packagers.

D. Description of Projected Reporting, Record Keeping and Other Compliance Requirements.

The Commission's rules require television receivers to be verified for compliance with applicable FCC technical requirements. See 47 CFR Sections 15.101, 15.117, and 2.951, *et seq.* Documentation concerning the verification must be kept by the manufacturer or importer. The rules adopted in this proceeding require that digital television receivers comply with industry-developed standards for closed captioning display. However, testing regarding closed captioning display is not necessary because compliance with the industry-developed standards, and the associated Commission rules, can be determined easily during the equipment design process. The Commission may, of course, ask manufacturers and importers to document upon occasion how a particular television receiver or computer system complies with the closed captioning display requirements. This should be a nominal request, requiring no specific expertise or knowledge, and should be accomplished in a very brief amount of time.

---

[140] *See Annual Assessment of the Stations of Competition in Markets for the Delivery of Video Programming*, CS Docket No. 97-141, Fourth Annual Report, 13 FCC Rcd 1034, 1077-8 (1998) ¶ 68.

[141] 13 C.F.R. § 121.201.

[142] *Id.* at 1077-8 ¶ 68.

[143] *See Annual Assessment of the Stations of Competition in Markets for the Delivery of Video Programming*, CS Docket No. 99-230, Sixth Annual Report, 14 FCC Rcd 978, 1019 (2000) ¶ 84.

E. Steps Taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered.

The RFA requires an agency to describe any significant alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities. 5 U.S.C. § 603(c).

Some commenters representing cable operators and cable equipment manufacturers are concerned that adoption of the proposals in the NPRM will render many cable boxes obsolete.[144] They state that the boxes that are used to receive digital cable programming are unable to process EIA-708 data. These boxes only read closed captioning data which has been delivered through a cable system pursuant to the Society of Cable Telecommunications Engineers ("SCTE") standard DVS-157.[145] Many cable boxes that only receive caption data delivered via DVS-157 are already in customer's homes and are being used to view digital cable programming on analog televisions.

Cable commenters propose that the Commission adopt rules that would require that digital closed captioning information be delivered in the DVS-157 format and would require that digital televisions ("DTVs") contain decoder circuitry that responds to DVS-157. Alternatively, they state that the Commission could consider a "dual carriage" requirement wherein broadcasters would deliver captions in both the EIA-708 format and the DVS-157 format.[146] The third option they suggest is that the Commission detail which advanced features are required, such as support for multiple character colors, and let manufacturers design receivers to accomplish these features using existing captioning standards and the digital television's built-in graphic processing capabilities.[147]

We disagree with these suggested alternatives to the proposed rules. We note that the comments and replies in this proceeding express an overwhelming support for adoption of the EIA-708 standard.[148] Although commenters have raised some concerns regarding the amount of EIA-708 to include in our rules, most were in favor of adopting at least portions of the standard. Adoption of EIA-708 will supply manufacturers with a uniform set of rules to follow in providing closed captioning capability. Furthermore, EIA-708 is the logical choice for delivering closed caption information to digital television receivers because DTVs have been designed to receive programming formatted pursuant to the digital

[144] *See* GI Comments, NCTA Comments, and AT&T Comments.

[145] General Instruments developed DVS-157 in 1992-1993 as a means for delivering NTSC captioning data (formatted pursuant to industry standard EIA-608) within digital video signals.

[146] GI Comments at 7-8; ATT Reply Comments at 3-6.

[147] GI Comments at 8-12.

[148] *Supra* at paragraphs 18-31.

television transmission standard, ATSC A/53. The transmission standard reserves a data stream for the delivery of caption information. EIA-708 was developed to fill that reserved space. In the NPRM the Commission proposed that manufacturers comply with the regulations within one year. However, to minimize the impact on businesses, including small entities, we have provided two years in order to comply.

We note that SCTE, which is currently drafting its Digital Cable Network Interface Standard, has delayed modifying the closed captioning requirements in that standard, pending FCC action in this proceeding. SCTE notes that, "Some have proposed that the references to the current practice of using DVS-157 to transport captions be removed. They want to be able to build portable receiving devices compatible with these specifications without the support to decode captions carried in the DVS-157 format."[149] Therefore, it appears that the industry is already working to resolve this standards issue.

F. Report to Congress.

The Commission will send a copy of the Report and Order, including this FRFA, in a report to be sent to Congress pursuant to SBREFA.[150] In addition, the Commission will send a copy of the Report and Order, including FRFA, to the Chief Counsel for Advocacy of the SBA. A copy of the Report and Order and FRFA (or summaries thereof) will also be published in the Federal Register.[151]

[149] SCTE DVS/335, "Report of DVS/313 Drafting Group on Outstanding Issues of DVS 313 Revision 1", April 27, 2000.

[150] *See* 5 U.S.C.§ 801(a)(1)(A).

[151] *See* 5 U.S.C. § 604(b).

Statement of Commissioner Harold W. Furchtgott-Roth,
Concurring in Part and Dissenting in Part

I concur in all of today's Order but Part B, which adopts "additional enhancements" that go beyond the minimum decoder requirements of Section 9 of the industry's EIA-708 standard. I would simply have implemented the Section 9 plan, a course of action that would have been more consistent with our statutory directive in this proceeding.

In the Television Decoder Circuitry Act, Congress required the Commission to adopt rules governing television circuitry designed to display closed captioning. We adopted such rules in 1991. *See* 47 C.F.R. section15.119. Congress further instructed, however, that "[a]s new video technology is developed, the Commission shall take such action as it deems appropriate to ensure that closed captioning services *continues to be available* to consumers." 47 U.S.C. section 330(b) (emphasis added).

I believe that, in essence, this provision instructs us to carry over our current analog closed captioning rules into the digital television age. That is, section 330(b) tells us to guarantee that the closed captioning provided today under section 15.119 is not somehow omitted or diminished – *i.e.*, that it "continues to be available" -- as the industry moves toward new digital technology. To "continue" means to maintain the *status quo*; it does not mean to create a new, more expansive regulatory regime. Thus, section 330(b) does not create authority to add further requirements regarding features and functionalities not now required, as the do the "enhancements" adopted today.

To all of this, the Commission responds by citing Part 1 of the TDCA. *See Report & Order* at para. 17. That section, however, is simply a legislative finding. It is not, of course, a binding statutory directive. However one might construe it, then, it cannot trump the plain meaning of section 330(b).

For these reasons, I must respectfully dissent from the decoder requirements that go over and above those of Section 9.

# # #