

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of)
)
Review of the Commission's Rules and) MM Docket No. 00-39
Policies Affecting the Conversion to)
Digital Television)

COMMENTS OF MOTOROLA, INC.

Richard C. Barth
Vice President and Director
Telecommunications Strategy
and Regulation
Motorola, Inc.
1350 I Street, N.W., Ste 400
Washington, DC 20005

Christine G. Crafton
Vice President and Director
Broadband Regulatory Policy
Motorola, Inc.
1350 I Street, N.W., Ste 400
Washington, DC 20005

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SUMMARY

In responding to the Commission's Notice of Proposed Rule Making and general inquiry into the current status of the transition to digital television (DTV), Motorola offers its general observation that favorable progress has been made in the pricing and availability of DTV consumer equipment and strongly urges the FCC to avoid regulatory actions that could upset this progress such as reconsidering the ATSC transmission standard. The public interest cannot assume the tremendous costs associated with changing direction at this time for only marginal technological enhancements.

Motorola also notes that digital closed captioning is a critical unresolved issue in the cable compatibility area that could affect the progress of the digital transition. Therefore, Motorola urges the FCC to avoid crafting requirements that would render obsolete the substantial deployed base of digital encoding and decoding captioning equipment used in the cable industry.

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Motorola, Inc. (Motorola) hereby submits these comments in response to the FCC's Notice of Proposed Rule Making in the above-captioned proceeding.¹ Motorola takes this opportunity to: 1) provide its assessment of the DTV transition; 2) encourage the FCC to avoid regulatory actions that could delay this transition such as reconsidering the ATSC transmission standard; and 3) urge the FCC to avoid crafting requirements for digital closed captioning that would render obsolete the substantial deployed base of digital encoding and decoding captioning equipment used in the cable industry.

I. BACKGROUND

The FCC's *Notice* initiates a biennial review process to ensure that the introduction of digital television and the recovery of spectrum at the end of the transition fully serve the public interest.² To this end, the *Notice* seeks general comment on overarching issues affecting the transition and more specific comments on issues that are preliminarily identified as potential

¹ *In the Matter of Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television*, MM Docket No. 00-39, FCC 00-83, *Notice of Proposed Rule Making*, released March 8, 2000 (*hereinafter Notice*).

² *Notice* at ¶ 1.

impediments to the transition's progress.³ The fundamental goal of the proceeding is to resolve any impediments to a complete and rapid DTV transition.⁴

Motorola has numerous interests in the transition to digital television in the United States. First, Motorola's Semiconductor Product Sector is directly involved in the design and manufacturing of advanced integrated circuitry to enable *affordable* DTV reception. Second, Motorola's Broadband Communications Sector, which now contains the assets of the former General Instrument Corporation, is a leading manufacturer of digital customer terminals designed to deliver advanced broadband communications, including DTV, to multichannel video subscribers. Third, product groups throughout Motorola's Communications Enterprise will manufacture advanced wireless products for both public safety users and consumers in the 698-806 MHz bands which will become available by the DTV transition. The breadth of Motorola's business interests allow it to provide a unique commentary on the status of the DTV transition.

II. THE FCC SHOULD AVOID ACTIONS THAT THREATEN TO DERAIL THE PROGRESS OF THE DTV TRANSITION SUCH AS REOPENING THE ATSC TRANSMISSION STANDARD.

The broadcast television industry's transition to digital transmissions offers huge public interest benefits by ultimately allowing under-utilized spectrum to be recaptured for other purposes. However, it is also another important step in providing broadband digital services to consumers, a process that Motorola strongly supports regardless of the medium. Given these concomitant results, it is clearly the FCC's role to ensure that the transition is expedited consistent with the public interest.

³ *Id.*

Essentially, the DTV transition is driven by two key components. The first is the cost of DTV consumer equipment and the second is the availability of DTV programming provided by broadcasters and satellite and cable service providers. Clearly, the cost of consumer DTV equipment is decreasing. Digital direct view television sets capable of receiving 1080 lines of interlaced source material are routinely advertised for about \$2000.⁵ Digital wide screen rear projection models are available at prices beginning at approximately \$3000. The prices for such high-end components will decrease as further manufacturing efficiencies are achieved.

These favorable consumer trends are resulting in relatively strong DTV sales. According to the Consumer Electronics Association (CEA), the total monthly DTV display and unit sales in March 2000 were 24,332 which represents a 7 percent increase over February.⁶ While reporting strong consumer interest in DTV technology, CEA cautions that the penetration of digital television devices is linked to the availability of digital broadcast programming. According to CEA, even if broadcasters achieve 100 percent compliance with the FCC's rollout schedule for operational facilities *and* provide a high percentage of digitally oriented content, DTV product penetration may not achieve the 85% penetration threshold by the 2006 transition deadline.⁷

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⁴ *Id.* at ¶ 8.

⁵ See <http://www.DTVWeb.org/default.cfm?levelone=products> for a tabulation of currently available DTV receivers and set top terminals and manufacturer's suggested retail prices.

⁶ CEA Press Release, *DTV Sales Still Strong*, April 27, 2000, available at <http://www.dtvweb.org>.

⁷ See 47 U.S.C. §309(j)(14).

It is within this context that Motorola has developed transitional technology to enable affordable DTV reception capability for existing analog TV set designs. The MCT5100 HDTV to NTSC converter module can be integrated into existing analog TV chassis designs for decoding 8-VSB modulated ATSC transport streams. With more than 20 million analog television sets sold in the U.S. each year, this module will allow manufacturers to leverage their experience in analog TV and offer digital services at attractive prices. Production of sets equipped with the MCT5100 can begin this year and provide excellent picture quality compared to NTSC broadcasts while offering relatively low cost access to digital features such as multicasting, digital sound and data services not found on analog TV. Motorola estimates that the introductory price to the consumer should be under \$1200, moving to under \$1000, for a 32-inch 4:3 display. By late 2001, the price could be down near \$800 – comparable to the average analog set price of today.

These and other positive technology trends will continue *provided that* the FCC maintains the existing 8-VSB transmission standard and rejects efforts to re-open the standardization process to review coded orthogonal FDM (COFDM) technology.⁸ Indeed, Motorola strongly supports the conclusions of the FCC’s own Office of Engineering and Technology that any multipath reception problems attributed to first-generation 8-VSB receivers are “solvable” with expected design improvements and that any technology benefits of changing the DTV transmission standard to COFDM “would not outweigh the costs of making such a transition.”⁹ In Motorola’s view, reopening the ATSC standards process would stop all product momentum,

⁸ Notice at ¶ 11.

⁹ *DTV Report on COFDM and 8-VSB Performance*, OET Report FCC/OET 99-2, September 30, 1999 at 3-5.

cause tremendous consumer uncertainty, and add at least a five year further delay in the universal availability of the Congressionally mandated 746-806 MHz public safety allocation. The public interest cannot assume such tremendous costs for, at best, marginal technological enhancements.

III. THE COMMISSION'S COMPATIBILITY RULES MUST ADDRESS HOW TO AVOID RENDERING OBSOLETE THE SUBSTANTIAL DEPLOYED BASE OF DIGITAL ENCODING AND DECODING CAPTIONING EQUIPMENT USED IN THE CABLE INDUSTRY.

The *Notice* seeks comment on “critical unresolved issues” in the cable compatibility area that could affect the progress of the digital transition.¹⁰ One such issue is the compatibility of cable systems, consumer electronics equipment, and programming with respect to the transmission, decoding, and display of closed captions in digital programming. While Motorola recognizes that the Commission is currently addressing in another proceeding the question of closed captioning decoding requirements for digital TVs (“Captioning Notice”),¹¹ because of the importance of this issue to the disabled community, and because this issue raises compatibility concerns that extend beyond digital TVs to analog TVs, cable customer terminals, and programmer encoding equipment, Motorola presents below the analysis it has previously submitted on the Captioning Notice. Motorola feels strongly that this issue requires the Commission’s attention and direction in order to avoid rendering obsolete a broad-based and well-established system in the cable industry that has been delivering closed captioning information within digital video programming to millions of hearing-impaired Americans for

¹⁰ *Notice* at ¶ 8.

¹¹ *In the Matter of Closed Captioning Requirements for Digital Television Receivers, Notice of Proposed Rule Making*, ET Docket No. 99-254, FCC 99-180 (rel. July 15, 1999) (“Captioning Notice”).

several years.¹²

The cable industry relies on the EIA-608 standard to create closed captions for analog and digital programming, as do most video distributors.¹³ Cable programmers and cable operators that provide digital programming to millions of American consumers deliver the EIA-608 captioning data using the DVS-157 format, a well-established SCTE transport standard. Specifically, all cable programmers' digital encoders, all digital cable headend equipment, and the over 7 million digital customer terminals that have already been shipped to cable MSOs (most of which have already been deployed to consumers) are designed solely to process EIA-608 closed captioning data in the DVS-157 format.

Motorola is concerned that the rules proposed in the Captioning Notice would render obsolete this substantial deployed base of cable closed captioning encoding and decoding

¹² Numerous commenters in the DTV closed captioning proceeding, including many in the disabled community, agreed that the Commission should address the backward compatibility issue. *See, e.g.*, Comments of National Cable Television Association, filed in ET Docket No. 99-254, at 5-7 (Oct. 18, 1999) ("NCTA Captioning Comments"); Reply Comments of Council of Organizational Representatives On National Issues Concerning People Who Are Deaf Or Hard Of Hearing, filed in ET Docket No. 99-254, at 9 (Nov. 15, 1999) (noting that GI's concerns about backward compatibility should be addressed); Reply Comments of Thomson Consumer Electronics, filed in ET Docket No. 99-254, at 7 (Nov. 15, 1999) (stating that cable compatibility issues raised by GI and NCTA should be resolved before captioning rules are adopted); Reply Comments of WGBH Educational Foundation, filed in ET Docket No. 99-254, at 17-18 (Nov. 15, 1999) (noting that incompatibilities between digital terrestrial broadcast and digital cable television standards must be resolved).

¹³ The EIA-608 standard is widely used across the video industry to deliver closed captioning to American consumers. As the Commission knows, analog television programmers carry closed captioning data within Line 21 of the television signal's vertical blanking interval ("VBI") as defined in the EIA-608 standard. Other programmers utilize the EIA-608 standard, as well. For example, digital broadcasters currently use a combination of proprietary and open standards to transport analog EIA-608 captioning data embedded in the original digital programming content. Similarly, satellite broadcasters use proprietary systems to encode EIA-608 captioning data within the picture user data extensions of the MPEG-2 video streams.

equipment. The Captioning Notice proposes that future digital TVs be required to support a new closed captioning transport method planned for use by digital terrestrial broadcasters, namely section 9 of the EIA-708 standard. As correctly noted by NCTA and other commenters, however,¹⁴ EIA-708 is incompatible with closed captioning encoding and decoding equipment utilized in the cable industry today. This is because, as noted, cable encoding equipment and cable customer terminals are designed to process closed captions carried in the DVS-157 format, whereas the EIA-708 standard specifies that closed captions must be carried in the incompatible ATSC A/53 format. Consequently, for example, a digital terrestrial broadcast that carries captioning information in the A/53 format cannot be processed and reconstructed by cable headend equipment or digital customer terminals for display on

¹⁴ See NCTA Captioning Comments at 5-7; Comments of General Instrument Corporation, filed in ET Docket No. 99-254, at 5-8 (Oct. 18, 1999) ("GI Captioning Comments"); Reply Comments of General Instrument Corporation, filed in ET Docket No. 99-254, at 1-2 (Nov. 15, 1999) ("GI Captioning Reply"); Reply Comments of AT&T Corporation, filed in ET Docket No. 99-254, at 3-6 (Nov. 15, 1999) ("AT&T Captioning Reply").

analog TVs.¹⁵ Similarly, since digital cable programming services, such as HBO, all use the DVS-157 format to carry EIA-608 captions, if the Commission were to require new digital TVs to incorporate a closed captioning decoding capability that complies only with the EIA-708 standard (and the accompanying A/53 format), the captions included in such digital cable programming services could not be processed and displayed on new digital TV sets. This, of course, could negatively impact the transition to digital by discouraging consumers from purchasing digital TVs because of their inability to process and display closed captioning information in digital cable programming services.¹⁶

¹⁵ The fact that the Captioning Notice proposes to apply the rules only to equipment manufactured one year after the adoption of the rules does not help this situation. Since the deployed digital customer terminals have useful lives of five years and greater, they will still be around for quite a while to allow consumers with analog TVs to view digital video signals. If the standard for carrying closed captions is changed by Commission rule to the A/53 format and programmers thereafter no longer carry captions in the DVS-157 format, these terminals would no longer be able to decode captions after the rule takes effect.

¹⁶ Motorola notes that the DVS-157 technology was developed and implemented before the A/53 format was created and was established as a de facto cable industry standard before the relevant portion of A/53 was incorporated into any DTV product. General Instrument (“GI”) developed the DVS-157 format for carrying NTSC captions in digital video signals in 1992-1993. The DVS-157 technology was built into digital cable equipment beginning in 1993-1994 and deployed soon thereafter by cable operators. The A/53 format did not exist at that time. GI submitted the DVS-157 technology to the Grand Alliance in 1994 for adoption as a digital broadcast standard. The Grand Alliance modified this proposal so that it could carry DTV captions instead of EIA-608 captions, and this resulted in the A/53 format (which was standardized by ATSC in September 1995). However, the A/53 format that was standardized was not backward compatible with the submitted DVS-157 format. In February 1999, SCTE formally adopted the de facto DVS-157 standard. EIA-708-B was balloted in October 1999, and this standardized the coding and carriage of DTV captions, as well as “a method” of carrying EIA-608 captions. Unfortunately, this method (based on the A/53 format) was not compatible with the SCTE-DVS-157 format, and the EIA-708-B standard did not include any statements on other methods that were being used by the cable and satellite industries for carriage of EIA-608 captions in digital video programming.

As a result, to comply with a Commission requirement specifying EIA-708 and the A/53 format as the new standard, cable programmers would have to spend between \$18,000 and \$28,000 per encoder (depending on the status of the encoder's warranty and excluding all field engineering implementation costs) for new encoding software.¹⁷

Likewise, cable systems -- which are all currently designed to process, deliver, and decode EIA-608 captions in the DVS-157 format -- would be unable to process captions in the A/53 format, and cable operators would therefore confront two costly and equally undesirable alternatives: (1) purchase and install new equipment at each headend to parse and decode the EIA-608 captions carried in the new A/53 format and re-encode them in the DVS-157 format so they can be understood by the 7+ million (and growing) deployed digital customer terminals, and, in turn, displayed on analog TVs;¹⁸ or (2) dispatch trucks and technicians to swap existing digital customer terminals with terminals that can process and decode closed captions in the new A/53 format. Either alternative would be extremely expensive for such distributors and, ultimately, for consumers. For example, the cost to cable operators alone to pursue the former of the above

¹⁷ While Motorola recognizes that the focus of the Captioning Notice is on establishing closed captioning decoding requirements for digital receivers, any such requirements will necessarily cause programmers to transmit closed captions using a compatible standard, and this, in turn, will produce the incompatibility with existing digital equipment that cannot process or decode the new standard.

¹⁸ Motorola notes that the impact of the backward compatibility issue addressed herein is not limited solely to the cable industry. It affects the satellite industry as well. For example, Star Choice, a direct-to-home provider of multichannel video service that operates primarily in Canada, has already deployed 500,000 digital customer terminals (and expects to deploy 1.2 million), and these terminals are also capable of decoding only the DVS-157 format. Similarly, the digital customer terminals designed to operate with the recently-launched HITS2HOME service -- which will allow subscribers in small cable systems with only analog service to receive 140+channels of digital programming via a direct satellite feed -- are also capable of decoding only the DVS-157 format. Several million such terminals are expected to be deployed in the near

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options would be approximately \$7,000 per digital transport multiplex feed, which would translate into approximately \$42,000 to \$50,000 per digital-capable headend. Since there are approximately 1,000 cable headends currently delivering digital video signals, the cost to cable operators in the aggregate would be approximately \$40-\$50 million, excluding the significant additional field engineering costs to implement such new equipment.¹⁹

In effect, exclusive adoption by the Commission of EIA-708 would severely penalize the cable industry for leading the early development and deployment of digital video programming and digital closed captioning equipment. More importantly, exclusive adoption of EIA-708 would leave millions of hearing-impaired individuals and other consumers who currently use deployed digital terminals to decode closed captions for their analog TVs with equipment that no longer works merely as a result of a regulatory change in the standard used to transmit closed captioning information.

It is important to stress that the enormous costs that would be incurred by cable programmers, distributors, manufacturers, and consumers alike to carry EIA-608 captions in the A/53 format would provide no corresponding benefits to consumers over carriage of EIA-608 captions in the existing DVS-157 format.

In light of these cost, efficiency, and compatibility concerns, Motorola respectfully suggests that the Commission should ensure that there is compatibility among the closed captions

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future.

¹⁹ Of course, the number of digital-capable headends and the number of deployed digital customer terminals will be much higher still by the time the FCC's rules become effective, which would further increase the costs for addressing these backward compatibility issues.

that are carried in digital video streams, the substantial deployed base of digital cable encoding and decoding equipment, and digital TVs. The optimal way to achieve such backward compatibility would be for the Commission to require that all closed captions are transmitted in the well-established DVS-157 format (even if they are also simultaneously transmitted in the A/53 format) and that digital TVs are capable of decoding captions in the DVS-157 format (even if they are also capable of decoding captions in the A/53 format).

Such an approach would ensure that the EIA-608 captions delivered in any digital video signal would be backwardly compatible with the substantial deployed base of cable closed captioning encoding and decoding equipment. For example, digital TVs that have a dual captioning decoding capability would be able to display A/53-formatted captions in digital broadcast signals, whether those signals are received over-the-air or over a cable system. Such digital TVs would also be capable of processing DVS-157-formatted captions contained in digital cable programming services, with or without the use of a separate digital customer terminal. Moreover, the continued use of DVS-157 would mean that the substantial deployed base of digital customer terminals will continue to be able to process and decode captions in digital video programming for display on millions of analog TV receivers which will be around for a long time.²⁰

²⁰ It is important to note that even if digital TVs were to incorporate decoding functionality for the DVS-157 format, that alone would not solve the backward compatibility problem. For example, absent carriage by broadcasters of closed captions in the DVS-157 format, cable systems that carry a broadcaster's digital signal would still be unable to process and decode the closed captions carried in the digital broadcast signal which is transmitted in the A/53 format. Similarly, as noted, unless digital TVs can process captions in the DVS-157 format, the closed captions contained in digital cable programming services that carry EIA-608 captions in the DVS-157 format could not be displayed on new digital TV sets.

Motorola notes that the burden of such a requirement on broadcasters and equipment manufacturers would be minimal. For example, most broadcasters that use Motorola encoding equipment have already upgraded their encoders to a software version that allows the simultaneous transmission of captions in both the A/53 and DVS-157 formats, and Motorola notes that the impact of such simultaneous transmission on broadcast spectrum is de minimis. Moreover, certain suppliers are already building chip-sets for Motorola and other manufacturers that provide dual processing functionality for both the A/53 and the DVS-157 formats, and the incremental cost of including such dual functionality is less than a penny. In fact, Motorola has already begun to incorporate such dual processing functionality into its new digital hosts, beginning with its DCT2020 model. Motorola is thus only asking that TV manufacturers be required to step up to the same level of commitment that Motorola has already undertaken in order to ensure compatibility in the closed captioning area.

IV. CONCLUSION.

An expedited transition to digital television technology promises tremendous public interest benefits by enabling another broadband digital transmission medium to consumers and freeing up over 100 megahertz of spectrum for advanced wireless services. The Commission must not threaten to undue progress to date by reconsidering the DTV transmission standard. Maintaining the 8-VSB ATSC standard will ensure the earliest arrival of affordable DTV consumer devices and spur penetration at mass market levels. In addition, Motorola also urges the FCC to avoid crafting requirements for digital closed captioning that would render obsolete the deployed base of digital encoding and decoding captioning equipment used in the cable industry.

