

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

In the Matter of)
)
Review of the Commission's)
Rules and Policies)
Affecting the Conversion)
To Digital Television)
)

MM Docket No. 00-39

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FEDERAL COMMUNICATIONS COMMISSION
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**COMMENTS OF THE CONSUMER ELECTRONICS
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- D. Monitors Capable of Displaying 480p Signals at Rates of 31.5k Hz or Higher

EXECUTIVE SUMMARY

CEA welcomes the Commission's review of DTV-related rules and policies affecting the transition to digital television. The Commission's expressed goals for DTV remain valid today: "to preserve and promote free, universally available, local broadcast television in a digital world"; and "to promote spectrum efficiency and rapid recovery of spectrum by fostering the swift development of DTV." A swift and certain transition requires the type of certainty in the marketplace that will result from the Commission's continued leadership and expedited decision-making.

Competitive DTV consumer equipment is widely available today at declining prices. But widespread broadcast of compelling high definition programs is absolutely essential to continued success. To date, the availability of broadcast high definition programs have been limited, despite sponsorship of some programs by CEA members. Superior digital high definition programming is key to attracting consumers to DTV and accelerating penetration. When initiated, new innovative complementary digital data services also should help push the success of digital broadcasting.

The DTV Standard itself meets or exceeds consumer reception requirements. Implementation issues with early receivers are quickly being resolved, speeded along by the strong forces of the competitive marketplace. Laboratory and field tests indicate that new generations of equipment will provide superior performance for the consumer. This dynamic working of the marketplace is far quicker and yields superior results to any performance standards that the Commission might consider for receivers were it to have statutory authority to do so.

Significant progress has been made on cable compatibility issues. CEA is working to complete very shortly, an inter-industry accord on set labeling. However, there has been disappointingly little progress on reaching an agreement on copy protection issues. Resolving these issues is essential to the DTV transition, and we are hopeful that the Commission's attention to copy protection issues will facilitate an agreement.

Based on the facts we discuss herein, it is crystal clear that the DTV Standard should be re-affirmed. Consideration of any non-compatible changes for DTV would create needless delay and marketplace confusion, disadvantaging those who have worked the hardest to attain the FCC's goals and undermining the certainty that is necessary for rapid deployment of DTV products and services.

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ASSOCIATION**

The Consumer Electronics Association (“CEA”), pursuant to Section 1.415 of the Commission’s rules,¹ hereby respectfully submits comments in response to issues raised by the Commission in its first periodic review of the transition to digital television Digital Television (“DTV”) broadcasting (“biennial review”).²

I. Introduction

CEA welcomes the Commission’s review of DTV-related issues in this proceeding. We urge the Commission to continue its leadership role by expediting resolution of the issues it addresses in this proceeding as well as those addressed in the

¹ 47 C.F.R. § 1.415 (1999).

² *Review of the Commission’s Rules and Policies Affecting the Conversion to Digital Television*, Notice of Proposed Rule Making, MM Docket No. 00-39, FCC 00-83 (released March 8, 2000) (“NPRM”).

DTV cable carriage³ and cable compatibility proceedings.⁴ A swift and certain transition to digital broadcasting requires the type of certainty in the marketplace that will result from expedited decision making on DTV matters. The Commission's continued leadership will directly inure to the public interest in the availability of more and better digital services at competitive costs.

It is particularly timely for the Commission in this proceeding to consider issues such as reception capabilities, signal replication, community coverage, permanent channel selection, and standards for resolving mutually exclusive maximization applications. More than 125 broadcast stations reaching over 62 percent of households are broadcasting digital signals, and in two short years all commercial broadcasters are required to have initiated DTV on the channels paired with their existing analog channels for this purpose.⁵ Resolving outstanding issues will remove threatened delay to the transition and its consequent impairment of consumer access to the latest broadcast technologies and services.

Reception misinformation, copy protection disputes and repeated attempts to delay the transition directly affect CEA's members. Misinformation concerning over-the-air reception based on "demonstrations" rather than scientific tests, difficulty in achieving compatibility agreements with the representatives of alternative media, and repeated attempts to delay the transition directly affect CEA's members. Manufacturers

³ See *Carriage of the Transmissions of Digital Television Broadcast Station*, Notice of Proposed Rulemaking, CS Docket No. 98-120, 13 FCC Rcd 15092 (1998).

⁴ See *Compatibility Between Cable Systems and Consumer Electronics Equipment*, Notice of Proposed Rulemaking in PP Docket No. 00-67 (released April 4, 2000).

have invested hundreds of millions of dollars in designing equipment for the new digital services, and they continue to work toward the goal of a fully-implemented all-digital television broadcast system that meets the needs of this country's consumers. We are united in calling for the Commission to continue to insist on adherence to its schedule for the digital transition as it was envisioned and authorized by Congress.⁶ The Commission must reject outright ill-founded attempts to obfuscate issues and create delay.

II. Statement of Interest

CEA, a sector of the Electronic Industries Alliance ("EIA"), the principal U.S. Trade association representing the consumer electronics industry. CEA members design, manufacture, distribute and sell consumer electronics products, including digital and analog television receivers, video cassette recorders ("VCRs"), digital versatile disk ("DVD") players, direct broadcast satellite ("DBS") equipment, personal computers ("PCs"), and a wide variety of other devices that connect to and enhance these products. CEA's 600 members include all of this country's major consumer electronics manufacturers, as well as many companies that manufacture products for the broadcast equipment industry.

⁵ All commercial television broadcast stations are required to initiate digital broadcasts no later than May 1, 2002, *see* 47 C.F.R. § 73.624(d)(1)(iii)(1999).

⁶ *See* 47 U.S.C. § 336; *See also*, Hearing on High Definition Television Before the Telecommunications, Trade and Consumer Protection Subcommittee of the House Commerce Committee, 105th Cong. (Apr. 23, 1998); Hearing on High Definition Television Before the Senate Commerce, Science and Transportation Committee, 105th Cong., (Sept. 17, 1997).

III. Background

In 1996, after nine years of analysis, discussion, and testing, the Commission adopted the DTV Standard codified at Section 73.682(d) of its Rules.⁷ The Commission recognized that broadcasting fills important needs of the American public that would be lost without a transmission standard because television receivers and associated equipment are provided in the competitive marketplace independent of the broadcast stations providing the content with which the receivers must work.

Unlike subscription video services that supply consumers with special set-top boxes and charge monthly fees for equipment rental and programming, free, over-the-air television is provided consumers without monthly subscription charges. The robust and competitive equipment marketplace ensures that consumers receive quality products at the lowest possible price. Program costs are paid directly by advertisers and indirectly by consumers in the cost of advertised products. The public benefits because all sectors have low-cost access, and advertisers benefit by being able to communicate efficiently with a single critical mass of viewers.

As the Commission recognized when it promulgated regulations to govern digital broadcasting, during the transition periodic reviews are needed to ensure that timetables are adhered to, unresolved issues are addressed, and appropriate adjustments are made.⁸

⁷ 47 C.F.R. § 73.682(d)(1999).

⁸ See *Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service*, Fifth Report and Order, MM Docket No. 87-268, 12 FCC Rcd 12809, at 12856.

We welcome the Commission's seizing this opportunity to address DTV issues in a fashion that will promote the public's rapid transition to digital broadcasting.

IV. The Public's Goals

The Commission set forth the following two bedrock goals when in 1997 it adopted rules to govern digital television broadcasting :

- to preserve and promote free, universally available, local broadcast television in a digital world; and
- to promote spectrum efficiency and rapid recovery of spectrum by fostering the swift development of DTV.⁹

These remain laudable public interest goals for the digital transition. A smooth and swift transition to DTV will unlock substantial value from the relinquished analog spectrum for new digital services and simultaneously provide the public with access to valuable new digital programming and services that broadcasters will provide using the digital television spectrum and signals.

The Commission invited general comment on the progress of the transition.¹⁰ Three years have passed since the Commission adopted its rules and goals for the DTV service. The issues raised by the Commission in the *NPRM* are best addressed in the broad context of overlapping competitive markets by taking stock of progress in three areas: equipment, programming, and innovative new services.

⁹ See *id.* at 12811.

¹⁰ *NPRM* at ¶ 15.

A. Competitive DTV Consumer Equipment is Widely Available

In early 2000, CEA/TWICE found an astounding **118** different **high definition** DTV displays (monitors) available to consumers in the competitive marketplace.¹¹ These monitors may be matched with appropriate set-top boxes to provide high definition programming transmitted to consumers by terrestrial over-the-air broadcasters, by direct broadcast satellite (DBS), and/or by cable television. Each of the monitors counted is capable of 1080i and/or 720p displays at rates ranging between 15.7 and 33.75 kHz or better.

In addition to the 118 high definition displays, we found 24 set-top boxes capable of receiving over-the-air DTV standard signals in all of the ATSC formats used.¹² We also found 28 DTV receivers consisting of high definition displays (1080i) integrated with digital over-the-air decoders.¹³ Finally, outside of the high definition 1080i and 720p range, we found 24 monitors capable of displaying 480p signals at rates of 31.5 kHz or higher.¹⁴

This large number of sets demonstrates the vitality of the very competitive DTV equipment marketplace. Manufacturers have spent hundreds of millions of dollars designing, testing, building, and bringing to market these many different products, and many more are in the pipeline. Our members have delivered many DTV reception

¹¹ The complete list as published is set forth in Appendix A. The chart includes monitors that have been publicly announced this year.

¹² See the complete list at Appendix B.

¹³ These sets are listed at Appendix C.

¹⁴ These sets are listed at Appendix D.

options in just the eighteen months that digital broadcast signals have been selectively aired in major cities.

B. Wider Availability of More Digital Programs is Essential to Speed the Transition

Compelling high definition content is, and will remain, “King.” Its widespread availability is essential to continued success in the digital equipment marketplace, and its appeal to consumers is a pre-requisite to the speedy transition to digital broadcasting.

The National Association of Broadcasters (“NAB”) reports that 127 broadcasters are on the air in 49 different television markets, and that more than 62 percent of viewers have access to at least one free, over-the-air (“FOTA”) digital broadcast signal.¹⁵ This is an admirable record. Operating stations include a substantial number that faced no requirement to come on the air until May 1, 2002. This number also does not include some network-affiliated stations in the top 30 markets where the deadline passed, but for various reasons extensions have been requested.¹⁶ We expect and hope that the remaining commercial broadcasters are on target to meet their May 1, 2002 deadline. The marketplace will only take off with the availability of compelling digital programming.

To date, the available broadcast high definition program has been limited, despite substantial sponsorship of HDTV programs by CEA members. CBS has offered 12-15

¹⁵ As of May 2, 2000; these figures are updated periodically on the NAB website, see: <http://www.nab.org/newsroom/pressrel/dtvstations.asp>. *Cf.*, as of April 27, 2000, the FCC listed 99 stations on the air, see <http://www.fcc.gov/mmb/vsd/files/dtvonair.html>, and 29 additional stations allowed to operate using special temporary authority (“STA”), see <http://www.fcc.gov/mmb/vsd/files/dtvstas.html>.

¹⁶ The status of stations in the top 10 markets can be found at: <http://www.fcc.gov/mmb/vsd/files/dtvstat.html> ; that of markets 11-30 is at: <http://www.fcc.gov/mmb/vsd/files/dtvstat11.html> .

hours per week of primetime HDTV programming that included movies (converted to high definition from film) and some live sports championships. ABC has aired a number of live sporting events (including the Super Bowl), as well as Disney movies in High Definition Television (“HDTV”). NBC has produced and aired its nightly “Tonight Show with Jay Leno” in high definition since April, 1999, and also aired the NBA All-Star game. PBS has aired a number of HDTV programs originating from WETA in Washington or KCTS in Seattle. Finally, FOX now offers 15 hours a week of digital programming in 480p “enhanced” definition.¹⁷

DBS operators have recognized the potential and seized the opportunity to serve the “high-end high definition” market. DirecTV and EchoStar carry the HBO HDTV service. DirecTV also has DIRECTV HD, a premium service, on a second channel; and plans to add the Discovery Channel high definition service. EchoStar also is carrying the Showtime high definition channel and is reported to be planning to add the Discovery Channel high definition service.¹⁸ The high-end EchoStar set-top box, like the DTV-100 DirecTV set-top box, includes an over-the-air DTV receiver to enable local broadcast DTV reception in addition to satellite high definition programming. Unlike the broadcast channels, however, high definition programs on DBS usually consist movies, and not live events or new original programming.

Unlike DBS, cable is carrying little digital high definition programming. Only a few systems carry the Showtime and HBO high definition channels, but we expect these

¹⁷ See *HDTV Programming Gains Momentum*, DTV Guide, March 2000 (jointly produced by CEA and TWICE) at p. 16.

¹⁸ *Id.*

channels to be made available on digital cable systems eventually. Regional sports cable channels MSG and Fox SportsNet New York, however, are more prolific than the national broadcast networks. They are producing and carrying approximately 30 hours a week of live high definition sports programming for New York area distribution over Cablevision systems.¹⁹

There is a perceptibly disquieting side to the current status of the broadcast programming marketplace. Despite the large number of stations on the air broadcasting in digital, most of the programming is upconverted from analog programs and therefore limited by the resolution and quality of the original material. Even where quality material exists, such as that which uses 35 mm film, broadcasters are not in the vanguard of continually delivering high resolution programs to the public.

Although many HDTV broadcast programs, especially those featuring live sports, have attracted substantial notice and have been much more plentiful than color programming in its early days back in the 1950's, for many consumers the day-to-day introduction to digital broadcast programming has been to the inferior quality renditions of the analog programming upconverted from the broadcaster's main NTSC channel rather than to HDTV programming. While there has been some memorable and high-quality programming, there is evidence that high-end viewers increasingly are turning to DBS and DVDs for the higher definition programs they desire. If this trend continues, the role of broadcasters in fostering a rapid transition to digital will be endangered, and continued analog operations in the broadcast spectrum will be prolonged. This will undermine the Commission's express goals, *supra*, and substantially delay the delivery of

¹⁹ *Id.*

newer and better digital broadcast services to the public and recovery of the spectrum for additional services.

Superior digital and high definition content is key to attracting consumers to digital television. CEA projects that if broadcasters elect the “fast lane” to DTV by meeting the FCC’s rollout deadlines **and** provide a high percentage of digitally-originated content to consumers, including HDTV, DTV product penetration could reach 50 percent by 2006. If broadcasters take a “middle of the road” approach and experience continued station conversion delays while airing a high percentage of up-converted analog content, DTV penetration will be no more than 30 percent by 2006. Finally, if broadcasters choose the “off ramp” from the road to DTV by following non-high definition business models and advocating reopening modulation standards issues, DTV product penetration could be a paltry 15 percent in 2006.

CEA and its members have invested in digital consumer products and elected the “fast lane”. We are working diligently to ensure that high definition quality programs increase in availability through all distribution media, but especially through broadcasting. Many of our members – including Thomson, Mitsubishi, Panasonic, Sony, Samsung, and Harris – have sponsored substantial high definition programming on the broadcast networks during the past 18 months. To promote communications and cooperation among the various DTV industries, CEA has held a number of “DTV Summits” in connection with broadcast and cable organizations.

To further support the creation and airing of quality digital and high definition content, on April 10, 2000, CEA announced creation of the “Academy of Digital Television Pioneers” to recognize leadership in the programming and delivery of digital

television. The Academy will recognize the best in digital and high definition programming.

Another part of its effort to support quality high definition content is CEA's sponsorship of the International Electronic Cinema Festival (IECF). The IECF is the oldest and most prestigious forum for recognizing outstanding achievements in high definition production. Individuals involved in all aspects of digital television and cinema attend the festival. This year's festival – the first to be held in the United States – will convene private and public interests to discuss and exchange information about the production, policy and business issues of high definition television and cinema. It is the hope and expectation of CEA and its members that these efforts, joined by those of others, will speed the digital transition by promoting creation of quality digital content.

C. Complementary New Innovative Digital Services Will Succeed With Quality Digital Programming

A plethora of new digital services – some related to programming and some unrelated – will share the success of digital broadcasting. The creators of these new innovative services are just beginning to draw the curtains, but it appears that many of the entities creating new types of services to share the broadcast digital bitstream tend to be small start-up enterprises that would be especially damaged if there were delay in the rollout and transition process.

Companies such as Geocast and iBlast have announced plans to provide broadband one-way data service in a fully compatible manner with broadcaster's need to present quality digital programming to their viewers. Additional start-ups known to be working to add value to the digital broadcast signal with services or equipment include

Wink Communications, SkyStream Corporation, and Sarnoff's venture "inTelecast". All of these enterprises have been built upon the promise of a quick transition to digital broadcasting. Delay in the transition likely would be fatal to most of them. Assuming that data services would not interfere with the delivery of quality digital and high definition programming, these entrepreneurial companies should not needlessly be put at risk.

V. Mandated Receiver Standards are Unauthorized and Unwise

The Commission seeks comment on whether it has authority to set minimum performance standards for DTV receivers, and on whether such minimum performance standards are desirable.²⁰ As the Commission noted, it addressed receiver standards multiple times in its DTV proceeding and each time declined to adopt such standards.²¹

Statutory authority that would have broadly authorized the Commission to set minimum performance standards for television receivers in fact was explicitly rejected by Congress in 1962. Instead, Congress enacted a more limited provision to improve UHF reception.²²

²⁰ *NPRM at ¶ 13.*

²¹ *Fourth Further Notice of Proposed Rule Making/ Third Notice of Inquiry* in MM Docket No. 87-268, 10 FCC Rcd 10541 (1995); *Fifth Further Notice of Proposed Rule Making* in MM Docket No. 87-268, 11 FCC Rcd 6235 (1996).

²² In passing the All Channel Receiver Act ("ACRA"), Congress sought to "permit maximum efficient utilization of the broadcast spectrum space, *especially that portion of the spectrum assigned to UHF television*" (emphasis added). *See* S. Rep. No. 1526, 87th Cong., 2d Sess. 2 (1962). The Senate Commerce Committee expressed agreement with the FCC's judgement that "it was necessary to break this vicious cycle that has been strangling UHF television." *See id.*

Today, in the digital context as a policy matter, considering adoption of minimum performance standards would be both unwise and unwarranted even without considering the lack of statutory authority. The competitive marketplace is dynamic and constantly changing at “Internet speed.” Receivers produced by multiple manufacturers in the very competitive consumer electronics marketplace almost constantly are being re-designed and rapidly improved.

A. The FCC Lacks Statutory Authority to Mandate DTV Receiver Standards

Parties advocating mandated receiver performance standards generally rely almost exclusively on the All Channel Receiver Act (“ACRA”) adopted in 1962.²³ The intent of Congress when it passed ACRA, however, was limited to ensuring the viability of UHF broadcasting.²⁴ Congress explicitly considered but rejected empowering the Commission generally to set receiver performance standards. Rather, after specifically considering the breadth of its legislation, the House Committee on Interstate and Foreign Commerce amended the Bill that become ACRA to ensure that it addressed only the specific and limited policy goal of ensuring the viability of UHF television service.²⁵

Specifically, instead of authorizing the Commission to set “minimum performance standards,” Congress authorized the Commission “to require that apparatus designed to receive television pictures broadcast simultaneously with sound be capable of adequately receiving all frequencies. . . .” The text of ACRA and its legislative history therefore are unambiguously clear that Congress intended this authority to narrowly

²³ 47 U.S.C. § 303(s).

²⁴ ACRA legislative history, *supra* note 22.

address the UHF reception problem, and not to more broadly authorize the Commission to adopt minimum performance standards to govern television receivers for other purposes.

B. The FCC Repeatedly and Correctly Has Declined to Mandate DTV Receiver Standards as a Policy Matter

In previous DTV rulings the Commission recognized the advantages of relying on market forces, rather than government edict, to govern DTV receiver design. Throughout its digital television proceedings the FCC recognized the difficulties of predicting consumer demand and consistently declined to mandate the manufacture of receivers capable of receiving and decoding dual mode NTSC and ATSC signals.

In its *Third Report & Order and Third Further Notice of Proposed Rulemaking*, the FCC decided not to establish manufacturing requirements because it was concerned that such requirements would overly burden consumers.²⁶ The Commission did seek additional comment on the effect that mandated receiver requirements would have on consumers. Three years later in 1995, in its *Fourth Further Notice of Proposed Rulemaking*, the Commission restated its previous conclusion that a receiver requirement would hurt consumers and acknowledged that ACRA “does not mandate the manufacture of dual-mode. . . receivers.”²⁷ ACRA, the FCC observed, only gives the Commission

²⁵ See H.R. Rep. No. 1559, 87th Cong., 2d Sess. 1 (1962).

²⁶ See *Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*, Memorandum Opinion and Order, Third Report and Order, Third Further Notice of Proposed Rule Making, 7 FCC Rcd 6924, 6984 (1992).

²⁷ *Id.*, Fourth Further Notice of Proposed Rule Making and Third Notice of Inquiry, 10 FCC Rcd 10540, 10551 (1995).

authority to require that receivers “be capable of adequately receiving all frequencies allocated by the Commission to television broadcasting.”²⁸

Notwithstanding its earlier finding, the Commission sought comment on whether permitting the manufacture and sale of receivers that decode and display only NTSC, SDTV, or HDTV signals, or some combination thereof, would be consistent with the ACRA and in the public interest.²⁹ In its *Fifth Report and Order* the Commission put the issue to rest by concluding that “equipment manufacturers should have maximum latitude to determine which video formats DTV equipment will receive...” and that market forces provide the best incentive to create receiver designs most in demand by consumers.³⁰

The Commission was properly reticent about predicting market demand. Equipment manufacturers, motivated by market demands, are in the best position to respond quickly to marketplace changes. Regulatory constraints not only will limit consumer choice, but also may lessen the strength of competitive forces that inevitably drive manufacturers to gain an advantage by investing in the development and implementation of improvements and new functionalities. Consumers directly benefit from the wide range of enhanced features and functions that result from the competitive nature of the consumer electronics marketplace. The Commission’s earlier conclusions remain valid: mandatory receiver performance standards would be unwise because their

²⁸ *Id.*

²⁹ *Id.*

³⁰ *See Fifth Report and Order*, 12 FCC Rcd 12809, 12855-6 (1997).

most likely effect would be to dampen the competitive incentive to improve receivers and thereby limit consumer choice.

VI. The DTV Standard Meets or Exceeds Consumer Reception Requirements

The Commission notes that concerns have been raised with service area replication by some in the broadcast industry due to what some argue to be deficiencies in the DTV transmission standard. The Commission invited comment on the current status of the standard. Comment was specifically solicited on manufacturers' efforts to implement receiver design and chip improvements, and on indoor reception.³¹

A. The ATSC Standard has Specific Benefits for the United States

After eight years of deliberations that witnessed the transformation of analog "high definition" television proposals to "digital" high definition television proposals, in 1995 the FCC's Advisory Committee on Advanced Television Services ("ACATS") unanimously recommended the ATSC Standard to the Commission.³² The Commission adopted the DTV Standard in 1996, modifying video format aspects in the manner unanimously recommended to it by representatives of a broad cross-section of industry participants that included the broadcasting, computer, and consumer equipment manufacturing industries.³³

³¹ NPRM at para. 12.

³² See Advisory Committee on Advanced Television Service Final Report and Recommendation, November 28, 1995. The ATSC Standard is documented in ATSC Publications A/52 (audio) and A/53 (video); See www.atsc.org.

³³ Fourth Report and Order in MM Docket 87-268, 11 FCC Rcd 17771 at ¶¶ 17771, 17775 (1996).

1. Accommodating All Stations With Same Service Area Using Existing Spectrum

The Commission adopted the DTV Standard only after long and hard analysis of the complete array of factors affecting the broadcast transmission environment, and detailed consideration of all variations and alternatives.³⁴ The DTV Standard was designed to enable maximum coverage with analog NTSC stations operating on co-channels and adjacent channels during the transition, without impairing the Standards' attributes in an all-digital environment. The beneficial result of this approach is closer spacing of analog-to-digital and digital-to-digital stations, as well as the discard of the analog "UHF Taboos" for digital signals.³⁵ These attributes allowed the FCC, after years of detailed work (and with close collaboration with the Association of Maximum Service Telecasters [MSTV]), to propose and adopt a new Table of Allotments that provides each existing broadcast station with a paired 6 MHz channel to be used simultaneously with their analog 6 MHz channel during an extended "consumer-friendly" transition period.³⁶

2. Recovering Spectrum for Auction and Assignment to New Service Providers

After the transition period, analog signals can be turned off and broadcast stations continue to serve their pre-existing analog service areas using the DTV Standard. Doing

³⁴ See, e.g., Trip Report and Recommendation Regarding COFDM, submitted to the ACATS by the Task Force on COFDM of the Transmission Expert Group, January, 1994.

³⁵ The analog "taboos" limit the total number of non-collocated analog stations that can transmit simultaneously in any geographic service area. A description of the taboos and their impact upon broadcast spectrum efficiency is contained in the Notice of Inquiry in MM Docket No. 87-268, 2 FCC Rcd 5125 (1987).

³⁶ See Sixth Report and Order in MM Docket No. 87-268, 12 FCC Rcd 14588 (1997); *recon.* 13 FCC Rcd 7418 (1998), *fur recon.*, 14 FCC Rcd 1348 (1998)

so will provide superior service to consumers, yet occupy substantially less total spectrum. One of the Commission's most important goals has been to recover more than a quarter of the broadcast spectrum thus freed up and to auction it for new and additional services.

In addition, at the end of the transition, additional new broadcast stations can be accommodated within the permanent "core" spectrum of channels 2-51. The net result of transitioning from analog to digital television broadcasting therefore not only is delivering the new and improved digital broadcast signals to consumers, but also (1) a substantial contiguous chunk of spectrum —108 megahertz of analog broadcasting's original 408 megahertz – is returned to the FCC for auction to enable additional and new services over a broad range of options; and (2) the addition of new broadcast (or possibly other) stations within the remaining 50 TV channels when analog NTSC is shut down at the end of the transition. Thus the full benefit of this greatly increased spectrum efficiency will be realized by consumers only at the end of the digital transition. This fact requires diligent attention and consistent policy decisions to ensure that the full benefits of the digital transition are realized by consumers in the most expeditious manner. Delay tactics and hesitation to invest cannot be entertained. The digital path has been adopted and in place for three years already, and a road block now would delay service to the public and return of the analog spectrum.

3. Efficient Coverage of Area Served

Every test of the DTV Standard has verified its superior carrier-to-noise ratio (C/N) for unit of radiated power. The DTV Standard permits serving the extremities of broadcasters' service areas using less than one-half the power (4 dB or more) required for

other tested modulation schemes.³⁷ The DTV Standard also limits peak power demands, providing additional efficiency over other tested systems of 1.6 - 2 dB (peak-to-average ratio demand requirement, or "PAR").³⁸

The net effect of these efficiencies in power is 5-6 dB, or a power factor of approximately 4. A broadcast station using 1 kilowatt digital power with the DTV Standard would require 4 kilowatts of power using other tested standards in order to obtain the same coverage area. The benefits of this efficiency are clear and concrete:

- reduced cost to broadcasters -- power bills are reduced by as much as \$200,000 per year for a full power station; and
- closer station spacings -- permitting incumbent broadcasters to serve their existing viewers with separate analog and digital signals during the transition to digital.

4. Superior Resistance to Impulse Noise

Unlike many other countries, the United States has substantial populations outside the core urban environment. The suburbs of cities like New York, Los Angeles, and Chicago stretch for 40 or more miles beyond city centers,³⁹ and service to this population,

³⁷ The latest test results generally available were published in March, 2000, from data collected in Brazil by ABERT/SET. *See* RESULT ANALYSIS at Table 6, "Carrier-to-noise ratio at the threshold" (Section V-1.4.1), showing 4.4 dB ATSC advantage over DVB; 4.0 dB advantage over ISDB.

³⁸ *See Id.* at Table 8, "Peak-to-average ratio" (at Section V-1.5.1), showing an ATSC PAR advantage of 1.6 dB ATSC/DVB; 1.9 dB ATSC/ISDB.

³⁹ For example, according to 1996 U.S. Census Bureau estimates for the Chicago-Cary-Kenosha, IL-IN-WI Consolidated Metropolitan Statistical Area ("CMSA"), of the total population of 8.6 million, only 2.7 million live within the central city. An estimated 68% of the population in the CMSA live outside the central city. *See* U.S. Bureau of the Census. State and Metropolitan Area Data Book 1997-98 (5th ed.) Washington, DC, 1998, Table D. Central Cities. p. 173.

as well as service to persons residing in rural areas, is an important objective. The Commission retained television broadcast allocations on VHF channels 2-13, which have superior reach to far suburban and rural areas, even though these channels are significantly more susceptible to impulse noise generated by a wide variety of sources (including automobiles and power lines). The DTV Standard adopted by the Commission exhibits superior rejection of many varieties of impulse noise, enabling better reception. The DTV Standard also is relatively immune to receiver-generated noise, such as the phase noise generated by the frequency synthesizers used in television set tuners. These characteristics of the standard permit more economical receivers and fewer disruptions to service.

5. Maximized Digital Bit Capacity

Bit capacity of the digital data stream within the authorized 6 megahertz channels is determined by trade-offs among a number of factors, including power, coverage, and reliability (“robustness”). Those designing the DTV Standard for the United States, for instance, knowingly chose to design it to maximize its bit-rate capacity for fixed service use, but included methods that can be utilized for the Standard to be adapted to future demands while maintaining backward compatibility.

Similarly, the Los Angeles-Riverside-Orange County, CA CMSA has a total estimated population of 15.5 million, of which only 3.6 million live within the central city. An estimated 77% of the population in the CMSA live outside the central city. *See id.* at 175.

B. *Extending Standard for New Applications Possible if Potential Providers Define Desired Services*

Additional new services can be carried within the DTV Standard in a fully compatible manner, and should be explored if there is interest within the industries involved. The earlier disinterest in portable uses does not prejudice their rejuvenation and standardization in the future as fully compatible extensions of the existing DTV Standard. CEA is participating in industry fora to consider and analyze such options, but up to now has been frustrated by the lack of specific definition and discussion of exactly what services and options various licensees want to explore.⁴⁰ We are hopeful that continuing discussions at the ATSC will clarify these issues and lead to a consensus on the needs and desires of licensees and how to meet such requirements so that all benefit.

The DTV Standard was designed in an extensible manner to facilitate supporting future options and services without causing existing equipment to become obsolete. We support using this flexibility to provide whatever services are desired. Existing consumer equipment can continue to be fully functional with new service capabilities added to the DTV Standard. This basic technological law does not preclude consideration of how to expand upon the services and functionalities enabled by the DTV Standard. It does, however, require making certain trade-offs and considering not only the technology options, but also their impact upon the public and also upon the Commission's rules and overall purpose of ensuring that consumer needs and the public interest are protected.

⁴⁰ At the end of March, the ATSC established a task force to examine technical issues related to DTV radio frequency system performance. Three *ad hoc* groups were established to consider VSB performance, broadcaster requirements, and field test and measurement methodology.

C. *Field and Laboratory Testing Indicate Improved Multipath Performance*

Much has been written recently about effects of the engineering trade-offs made in the DTV Standard. One particular issue – operation of receivers in complex multipath environments – has attracted substantial attention. We would like to clarify the issues underlying this discussion.

The most important element to consider is whether the reported reception difficulties arise because of some aspect inherent in the DTV Standard, or does the issue relate to implementation of the standard in transmission or reception equipment? Reception issues arose early in 1998 as field tests were being performed on early prototype consumer equipment being rushed to market in order to be available when the first “volunteer” broadcast stations began airing digital programs as provided pursuant to the Commission’s April, 1997, decisions in its *Fifth Report and Order*.⁴¹ Certain manufacturers used the Washington, D.C. WHD test station signal that was co-sponsored by CEA for field testing. At the time it was one of only three available over-the-air DTV Standard signals in the nation. Several of CEA’s constituent consumer electronics industry members thoroughly analyzed this issue then, each independent of the others. Their universal conclusion was that the observed reception difficulty in select instances was not inherent in the DTV Standard itself, but rather was caused in some cases by transmission parameters that deviated outside the norm;⁴² and in other cases by

⁴¹ *Supra* note 8.

⁴² Transmission issues can impair reception. *See* CBS Engineering, KYW-DT DTV Field Test Report (3/28/00) (Prepared by Walter Sidas, PE) at 12, noting the importance of eliminating clock jitter, ensuring a flat SWR, eliminating phase noise in studio-to-transmitter links, and correcting coding problems in the PSIP generator and encoder.

equalization in receivers that was inadequate to handle the complex multipath being experienced at certain sites.

The result of this analysis was reaffirmation of the DTV Standard itself; more careful adjustment and measurement of the different elements affecting the DTV over-the-air signal; and initiation of engineering analysis projects to better characterize the multipath environment and to design suitable receiver equalizers. At the same time, a number of chip designers and receiver manufacturers undertook similar work to better decode the DTV signal in difficult reception environments.⁴³ The products resulting from these developments are just beginning to enter the marketplace, and later generation improvements are in the process of moving off the design boards and into physical silicon chips. Each company operates on their own schedule, and therefore for the industry as a whole, increasingly better components are entering the marketplace on a staggered but consistent basis.

⁴³ For example, in this timeframe both NxtWave and Motorola concluded licensing arrangements with Sarnoff Laboratories and initiated work on improving chip designs, the first generation of which have been announced. A number of other manufacturers initiated similar projects based on work they already were doing. The result is that there have been multiple improvements designed and beginning to enter the marketplace from companies that include, but are not limited to, Philips, Thomson, Zenith, Broadcom, and Oren. These developments, all of which originated quietly on a case-by-case *ad hoc* basis in 1998 before any public debate, demonstrate the responsiveness and vitality of the very competitive consumer electronics industry.

D. Considering Any Non-Compatible Standard for DTV Would Create Needless Delay and Marketplace Confusion, Disadvantage Those Who Worked the Hardest to Attain the FCC's Goals, and Undermine the Certainty that is Necessary for Rapid Development of DTV Products and Services

As the Commission notes in the *NPRM*, some industry participants, including the Sinclair Broadcast Group in particular, asked the Commission to consider changing the DTV Standard or adopting a non-compatible second standard. The Commission correctly dismissed Sinclair's petition at CEA's request, based in part upon the sound technical analysis of its Office of Engineering and Technology and other information submitted by industry.⁴⁴

CEA is committed to ensuring that the United States has the world-leading DTV system. This is in the best interests of its member consumer electronics equipment manufacturers as well as broadcasters and consumers. The pace of technological change indisputably has accelerated markedly over the past few years, and in the face of this acceleration it is important to keep abreast of technological developments and to flexibly act to develop new and exciting service and equipment options to better serve consumers.

These factors lead us to emphasize that the consumer marketplace, first and foremost, is characterized by diversity in desired equipment and service options. The way to best serve consumer needs, manufacturers' needs, broadcasters' needs, and the public interest is to build upon the DTV standard that was adopted less than four years ago. Without exception, our members believe that the DTV Standard is vital and

⁴⁴ Letter from Magalie Roman Salas, Secretary, Federal Communications Commission, to Martin R. Leader, Fisher, Wayland, Cooper, Leader & Zaragoza, L.L.P.

extensible. The marketplace disruption that would be occasioned by Commission consideration of any inconsistent alteration or change without broad industry consensus would, at a minimum, delay the DTV rollout substantially.

It is our belief – and that of our members, who have devoted substantial technical resources and talent to this very issue – that there is nothing wrong with the standard. Indeed, some (but not all) believe that technological advances made over the past five years indicate that the underlying basic technology can be harnessed in ways previously not possible to provide superior service without sacrificing the advantages of the DTV Standard.

VII. Additional Issues

A. A Copy Protection Agreement is Essential to the Future use of DTV by Consumers.

The Commission requested comment on the extent to which a failure to reach agreement on copy protection technology licensing and related issues would hinder the transition.⁴⁵ While we have every expectation of reaching an inter-industry accord with the cable industry on set labeling, the current lack of progress on copy protection is disheartening. To an unknown degree the lack of an agreement already has dampened demand for DTV. We expect the negative effects to increase as the market continues to mature and consumers want to continue to use recording devices to time-shift and make other fair use of the digital broadcast, cable, and satellite programming, as they have in the analog world for decades. Although free broadcast digital television programming

(Feb. 4, 2000); *See* Office of Engineering and Technology, OET Report; FCC/OET 99-2, 199 FCC LEXIS 4945, September 30, 1999.

should not be copy protected, and therefore not affected technically by it, the success of digital television in general is directly linked to the success of cable delivery of digital programming (cable originated as well as broadcast originated). Cable operators will be required to employ copy protection as a condition of distribution of a large number of cable originated digital programs. For this reason copy protection issues, such as those related to the Point Of Deployment (POD) interface, must be resolved.

The CEA and its members have worked diligently with the cable industry to define a receiver that will support the success of cable delivery of digital programming and have included the support of copy protection in the definition of those receivers. However, copy protection licenses must not be used to influence other features and functions of consumer equipment nor should it be configured for punitive purposes.⁴⁶

We are hopeful that the Commission's attention to the copy protection issues will facilitate an agreement. From the public interest and consumer perspective, such an agreement must permit viewers to continue their normal and fair use recording of programs while providing the necessary protections for intellectual property, as has been the case with analog equipment.

B. Definition of Principal Community Coverage and Permanent Channel Elections Should Be Expedited.

The Commission requests comment on options for defining principal community coverage and whether it should establish a deadline for broadcasters to select their

⁴⁵ *NPRM* at ¶ 10.

⁴⁶ CEA will be submitting comments in the FCC rulemaking recently initiated that focuses specifically on copyright and labeling issues, *see Compatibility Between Cable*

permanent DTV channels. The Commission should expedite decisions on these matters in order to expedite the transition to all-digital broadcasting. We offer just a couple of observations. With regard to community coverage, we have noted with dismay the dissemination of grossly misleading ATSC/NTSC reception comparisons that either fail to account for the low power and often lower-placed antenna used for the digital signal, compared to stations' authorized digital facilities, or reduce such information into an obscure note with no adjustment made to the data presented. While we do not have an opinion on what the required power should be over a licensee's community of license *per se*, we do believe that broadcasters should be required to operate at their maximum authorized facilities on a date certain established by the Commission, or they should relinquish the service area that they are not reaching so that others may serve the viewers in such areas. Viewers were promised service area replication, and with Congressional approval the Commission has issued broadcasters licenses that provide such replication.⁴⁷ Building under-powered digital facilities and then complaining about consumer reception difficulties should not be tolerated or facilitated by the Commission.

Finally, requiring those broadcasters with a choice of channels to select their permanent channel in a reasonably prompt manner would facilitate the spectrum plans of broadcasters burdened with both their channels "out-of-core". Doing so also will permit power and translator stations to begin their planning process for relocation. Requiring reasonably prompt election also would permit development of long term plans by

Systems and Consumer Electronics Equipment, Notice of Proposed Rulemaking, MM Docket No. 00-67 (FCC 00-137, released April 14, 2000).

potential new entrants who will bid for the remaining channels that will be available when analog NTSC service ceases at the end of the transition.

VIII. Conclusion

We welcome this opportunity to resolve outstanding issues related to the transition, and urge the Commission to decide these and related issues in a comprehensive and cohesive fashion that furthers the public's interest in ensuring a successful transition to an all-digital television broadcast service.

Respectfully Submitted,



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⁴⁷ See 47 U.S.C. § 336; See *Advanced Television Systems and their Impact upon the Existing Television Broadcast Service*, 14 FCC Rcd 1348 at 1394 *et seq.* (1998) (DTV Table of Allotments).

Appendices

- A. The High Definition DTV Displays (Monitors) Available to Consumers
- B. Set-top Boxes Capable of Receiving Over-the-Air DTV Standard Signals in all of the ATSC Formats Used
- C. DTV Receivers Consisting of High Definition Displays (1080i) Integrated with Digital Over-the-Air Decoders
- D. Monitors Capable of Displaying 480p Signals at Rates of 31.5k Hz or Higher

DTV Products

The following CEA/TWICE charts contain the most comprehensive source of information on DTV products available in the market. All of the DTV products listed fall into one of the following three categories:

- integrated high-definition sets that include a digital receiver and display;
- digital set-top boxes designed to work with high-definition and digital displays, or current analog displays; or
- DTV displays, which, with the addition of a digital set-top box, offer a complete DTV system.

1080i and/or 720p-Capable Monitors (15.7kHz-33.75kHz or better)

Brand	Model	Display Type	Screen Size	HDTV Scan Rate Display Capability	On-Board Line Doubling/Scaling?	Number of NTSC Tuners	Interface for DTV Tuner/Decoder	Available	Price
Cinevision	1050	7" CRT Front PTV	Variable	720p 1080i	No	0	VGA 15-pin D-sub	Now	\$20,000
Dwin	HD500	7" CRT Front PTV	Variable	720p 1080i (1024x1024)	No, Optional Line doubling multiplier available	0	RGB H&V/C Sync via BNC	Now	\$12,000
Dwin	HD700	7" CRT Front PTV	Variable	720p 1080i	No, Optional Line doubling multiplier available	0	RGB H&V/C Sync via BNC	Now	\$12,500
Faroudja	RP-5800	CRT Rear PTV	58W" 16:9	720p 1080i	Yes	0	RGBS-H&V via VGA 15-pin D-sub	Now	\$35,000
Fujitsu	PDS-4221	Plasma Panel	42W" 16:9	720p 1080i (1024x1024)	No	0	RGB-H&V BNC Component BNC RGB 15-pin D SUB	Now	\$15,995
Fujitsu	PDS-4222	Plasma Panel Brushed Silver	42W" 16:9	720p 1080i	No (1024x1024)	0	RGB-H&V BNC, Component BNC, RGB 15-pin D SUB	Now	\$15,995
Hitachi	60SDX88B	7" CRT Rear PTV	60" 4:3	1080i	Yes	2	HD Component	Now	\$4,299
Hitachi	36SDX88B	Direct View	36" 4:3	1080i	Yes	1	HD Component, 1 5-pin D-sub	Now	\$2,799
Hitachi	53SDX89B	7" CRT Rear PTV	53" 4:3	1080i	Yes	2	HD Component	Now	\$3,499
JVC	AV-61S90 D'Anita	D-ILA Hologram Rear PTV	61W" 16:9 (1.32 mil. pixels)	1080i line doubles NTSC	Yes	2	(2) HD Component	June	\$6,999
Konka	HR3093U	Direct View	30W" 16:9	1080i	Yes	1	RGB High Density 15-way D-type socket	April	\$2,499
Konka	HR3289U	Direct View	32" 4:3	1080i	Yes	1	RGB High Density 15-way D-type socket	Q3-00	TBA
Konka	HD5098U	Rear Projection	50W" 16:9	1080i	Yes	1	RGB High Density 15-way D-type socket	Q4-00	TBA
Madrigal	MP-9	9" CRT Front PTV	Variable	1080i 720p	No	0	RGB H&V sync	March	\$60,000
Madrigal	MP-8	8" CRT Front PTV	Variable	1080i 720p	No	0	RGB H&V sync	March	\$45,000
Marantz	VP-8000	DLP Front PTV	Variable	1080i	Yes	0	HD Component	Now	\$9,999
Mitsubishi Platinum Series	WT-46805	7" CRT Rear PTV	46W" 16:9	1080i	Yes	2	HD Component RGB via VGA	Now	\$3,799
Mitsubishi Platinum Series	VS-50805	7" CRT Rear PTV	50" 4:3	1080i	Yes	2	HD Component RGB via VGA	Now	\$3,999
Mitsubishi Platinum Series	WS-55805	7" CRT Rear PTV	55W" 16:9	1080i	Yes	2	HD Component RGB via VGA	Now	\$4,499
Mitsubishi Platinum Series	VS-60805	7" CRT Rear PTV	60" 4:3	1080i	Yes	2	HD Component RGB via VGA	Now	\$4,499
Mitsubishi Platinum Series	VS-80803	9" CRT Rear PTV	80" 4:3	1080i	Yes	2	HD Component RGB via VGA	Now	\$9,999
Mitsubishi Diamond Series	WS-55905	7" CRT Rear PTV	55W" 16:9	1080i	Yes	2	HD Component RGB via VGA	Now	\$5,499
Mitsubishi Diamond Series	WS-65905	7" CRT Rear PTV	65W" 16:9	1080i	Yes	2	HD Component RGB via VGA	Now	\$6,999
Mitsubishi Diamond Series	WS-73905	9" CRT Rear PTV	73W" 16:9	1080i	Yes	2	HD Component RGB via VGA	Now	\$9,999
NetTV	DTV29X	Direct View	27" 4:3	1080i 720p	No	0	VGA 15-pin D-sub	Now	\$899

Courtesy of TWICE

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DTV Products

1080i and/or 720p-Capable Monitors (15.7kHz-33.75kHz or better) — continued from page 18

Brand	Model	Display Type	Screen Size	HDTV Scan Rate Display Capability	On-Board Line Doubling/Scaling?	Number of NTSC Tuners	Interface for DTV Tuner/Decoder	Available	Price
NetTV	DTV29XT	Direct View	27" 4:3	1080i 720p	No	1	VGA 15-pin D-sub	Now	\$999
NetTV	DTV34X	Flat Faced Direct View	32" 4:3	1080i 720p	Yes	0	VGA 15-pin D-sub HD Component	April	\$1,299
NetTV	DTV34XTF	Flat Faced Direct View	32" 4:3	1080i 720p	Yes	1	VGA 15-pin D-sub HD Component	April	\$1,399
NetTV	DTV36WTF	Flat Faced Direct View	36W"	1080i 720p	Yes	1	VGA 15-pin D-sub HD Component	April	TBA
Panasonic	CT-34WDM60 Tau	Flat-Faced Direct View	34W" 16:9	1080i	Yes	0	HD Component	Now	\$5,999
Panasonic	CT-34WX50	Flat-Faced Direct View	34W" 16:9	1080i	Yes	1	HD Component	May	\$5,999
Panasonic	PT-56WFX95	7" CRT Rear PTV	56W" 16:9	1080i 720p	Yes	2	HD Component	Now	\$5,999
Panasonic	PT-65WX50	7" CRT Rear PTV	65W" 16:9	1080i 720p	Yes	2	HD Component	3Q-00	TBA
Philips	60PP9701	7" CRT Rear PTV	60W"	1080i	Yes	2	HD Component	Summer	\$5,500
Philips	55PP9701	7" CRT Rear PTV	55W" 16:9	1080i	Yes	2	HD Component, VGA 15-pin D-sub	Summer	\$5,000
Philips	60PP9601	7" CRT Rear PTV	60" 4:3	1080i	Yes	2	HD Component	Summer	\$4,200
Philips	30PW9815	Direct View	30W" 16:9	1080i	Yes	2	HD Component	2Q-00	\$3,000
Philips	34PW9815	Direct View	34W" 16:9	1080i	Yes	2	HD Component	2Q-00	\$4,000
Pioneer	PDP-505HD	Plasma Panel	50W" 16:9 (1280x768)	720p 1080i	Yes	0	RGB HD Component	Now	\$20,000
Pioneer	SD-641HD5	7" CRT Rear PTV	64WW" 16:9	1080i	Yes	2	HD Component	Now	\$6,999
Pioneer	SD-532HD5	7" CRT Rear PTV	53WW" 16:9	1080i	Yes	2	(2) HD Component VGA 15-pin D-sub	Now	\$4,499
Pioneer	SD-582HD5	7" CRT Rear PTV	58W" 16:9	1080i	Yes	2	(2) HD Component VGA 15-pin D-sub	Now	\$5,499
Pioneer Elite	PRO-510HD	7" CRT Rear PTV	53W" 16:9	1080i	Yes	2	(2) HD Component VGA 15-pin D-sub	Now	\$6,300
Pioneer Elite	PRO-610HD	7" CRT Rear PTV	58W" 16:9	1080i	Yes	2	(2) HD Component 15-pin D-sub	Now	\$7,300
Pioneer Elite	PRO-710HD	7" CRT Rear PTV	64W" 16:9	1080i	Yes	2	(2) HD Component Expansion Slot Connection For SH-D07	Now	\$8,300
Princeton	AR2.7T	Multi-scan, Direct View	27" 4:3	1080i 720p	Yes	1	(2) RGBHV via VGA	Now	\$1,429
Princeton	AR3.2T	Multi-scan, Direct View	32" 4:3	1080i 720p	Yes	1	(2) RGBHV via VGA	Now	\$1,999
Princeton	AF3.0HD Direct View	Multi-scan, Direct View	30W" 16:9	1080i 720p	Yes	0	RGBHV with BNC or VGA, HD Component	Now	\$4,100
Princeton	AF3.4HDF	Flat-Faced, Multi-scan Direct View	34W" 16:9	1080i 720p	Yes	1	RGBHV with BNC or VGA, HD Component	Jun-00	TBA
Princeton	AF3.6HDF	Direct View	36" 4:3	1080i 720p	Yes	1	RGBHV with BNC or VGA, HD Component	Mar-00	\$4,000
ProScan	TBA	7" CRT Rear PTV	61" 4:3	1080i	Yes	2	RGB 15-pin D-sub HD Component	TBA	TBA
ProScan	PS32800HR	Multi-scan Direct View	32" 4:3	1080i	Yes	2	RGB 15-pin D-Sub HD Component	2Q-00	\$2,199
ProScan	PS36800HR	Multi-scan Direct View	36" 4:3	1080i	Yes	2	RGB 15-pin D-Sub HD Component	Now	\$2,699
ProScan	PS50100W	Plasma Panel	50W" 16:9	720p 1080i	TBA	TBA	RGB 15-pin D-sub	TBA	TBA
Proton	MM3601VT	Direct View	36" 4:3	1080i	No	0	HD Component VGA 15-pin D-sub	Now	\$3,200
Proton	MM2701VT	Direct View	27" 4:3	1080i	No	0	HD Component VGA 15-pin D-sub	Now	\$1,700

Courtesy of TWICE

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DTV Products

1080i and/or 720p-Capable Monitors (15.7kHz-33.75kHz or better) — continued from page 19

Brand	Model	Display Type	Screen Size	HDTV Scan Rate Display Capability	On-Board Line Doubling/Scaling?	Number of NTSC Tuners	Interface for DTV Tuner/Decoder	Available	Price
RCA	MM27100HR	Direct View	27" 4:3	1080i	No	2	15-Pin D-Sub	TBA	\$1,399
RCA	MM36100HR	Direct View	36" 4:3	1080i	No	2	15-Pin D-Sub	Now	\$2,499
RCA	MM52100HR	7" CRT Rear PTV	52" 4:3	1080i	Yes	2	15-Pin D-Sub, HD Component	1Q-00	\$3,299
RCA	MM61100HR	7" CRT Rear PTV	61" 4:3	1080i	Yes	2	15-Pin D-Sub, HD Component	TBA	\$3,699
Revor	E542	Plasma Panel	42W 16:9	480p 720p (852x480)	Yes	0	Component Video RGB via VGA	Now	\$18,950.00
Runco	PL-42	Plasma Panel	20.5" x 36.5"	720p 1080i (852x480)	Yes	0	HD Component via RCA	Now	\$13,995
Runco	Reflection Series VX-10	1-chip DLP Front PTV with controller	Variable	720p 1080i (1024x768)	Yes	0	RGBS via VGA 15-pin D-sub	Now	\$14,995
Runco	VX-3	3-chip DLP Front PTV	Variable	720p 1080i (1024x768)	Yes	0	HD Component via BNC	Now	\$64,995
Runco	VX-7	3-chip DLP Front PTV 1024x768	Variable	720p 1080i (1024x768)	Yes	0	HD Component via BNC	Now	\$110,000
Runco	DTV-940	7" CRT Front PTV	Variable	720p 1080i	No	0	HD Component via BNC RGB via BNC	Now	\$13,995
Runco	DTV-943 scaling 39.8kHz	7" CRT Front PTV	Variable	720p 1080i	Yes	0	HD Component via BNC RGB via BNC	Now	\$17,995
Runco	DTV-991RP	7" CRT Rear PTV	58W 16:9	720p 1080i 1080p	No	0	RGB via BNC	Now	\$24,995
Runco	DTV-992Ultra	8" CRT Front PTV	Variable	720p 1080i 1080p	No	0	HD Component via BNC RGB via BNC	Now	\$32,995
Runco	DTV-1100	9" CRT Front PTV	Variable	720p 1080i 1080p	No	0	HD Component via BNC RGB via BNC	Now	\$39,995
Runco	DTV-5801	7" CRT Rear PTV	58W 16:9	1080i	Yes	2	HD Component via RCA connectors	Now	\$9,995
Samsung Tantus	HCJ552W	7" CRT Rear PTV	55W 16:9	1080i	Yes	2	HD Component	Now	\$4,999
Samsung Tantus	HCJ652W	7" CRT Rear PTV	65W 16:9	1080i	Yes	2	HD Component	Now	\$6,999
Samsung Tantus	PCJ534RF	7" CRT Rear PTV	53" 4:3	1080i	Yes	2	HD Component	Now	\$3,499
Samsung Tantus	PCJ614RF	7" CRT Rear PTV	61" 4:3	1080i	Yes	2	HD Component	Now	\$3,999
Samsung Tantus	HLK-436W	Ferro LCD Rear PTV	43W 16:9	All Formats >720p	Yes	2	HD Component VGA 15-pin D-sub	Apr-00	\$6,000
Samsung Tantus	HLK-506W	Ferro LCD Rear PTV	50W 16:9	All Formats >720p	Yes	2	HD Component VGA 15-pin D-sub	May-00	\$7,000
Seleco (DWL Video)	SVD-500HT	7" CRT Front PTV	Variable	1080i	No	0	RGBS via BNC 15-pin D-sub	Now	\$9,995
Seleco (DWL Video)	SDG-700L6	7" CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNC 15-pin D-sub	Now	\$11,595
Seleco (DWL Video)	SDG-800HD	7" CRT Front PTV	Variable	720p 1080i	Yes (DVDR i-scan)	0	RGBS via BNC 15-pin D-sub HD Component	Now	\$14,995
Seleco (DWL Video)	SDG-900	8" CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNC 15-pin D-sub	Now	\$19,895
Seleco (DWL Video)	SDZ-1300	3-chip DLP Front PTV	Variable	720p 1080i	No	0	RGB/YUV BNC, DB 15	Now	\$27,750
SharpVision	64LHP4000	7" CRT Rear PTV	64W 16:9	1080i	Yes	2	HD Component Video	Now	\$6,995
SharpVision	XV-DW100U	LCD Front PTV	Variable	1080i 720p (1,024x768)	Yes	0	HD Component RGBHV VGA	Now	\$10,995
SharpVision	LC-R60HDU	CG-Silicon LCD Rear PTV	60W 16:9	1080i	Yes	0	HD Component RGB H&V sync	2Q-00	\$49,995
SharpVision	LC-P050U	Plasma Panel	50W 16:9	720p (1280x768)	Yes	0	HD Component RGB H&V	Now	\$20,995

Courtesy of TWICE

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DTV Products

1080i and/or 720p-Capable Monitors (15.7kHz-33.75kHz or better) — continued from page 20

Brand	Model	Display Type	Screen Size	HDTV Scan Rate Display Capability	On-Board Line Doubling/Scaling?	Number of NTSC Tuners	Interface for DTV Tuner/Decoder	Available	Price
SharpVision	34N-WF5H	Direct View	34W 16:9	1080i	Yes	2	HD Component, RGBHV via VGA	Now	\$4,995
Sony	KP-53HS10	7" CRT Rear PTV	53" 4:3	1080i	Yes (DRC)	2	HD Component	April	\$3,200
Sony	KP-61HS10	7" CRT Rear PTV	53" 4:3	1080i	Yes (DRC)	2	HD Component	April	\$3,700
Sony	KV32XBR400	Flat Screen, Direct View	32" 4:3	1080i	Yes (DRC)	2	HD Component	Summer	\$2,200
Sony	KV36XBR400	Flat Screen, Direct View	36" 4:3	1080i	Yes (DRC)	2	HD Component	Summer	\$2,700
Sony	KP-53XBR300	7" CRT Rear PTV	53" 4:3	1080i	Yes (DRC)	2	HD Component	Now	\$4,500
Sony	KP-61XBR300	7" CRT Rear PTV	61" 4:3	1080i	Yes (DRC)	2	HD Component	Now	\$5,500
Sony	VPH-G90U	9" CRT Front PTV	Variable	720p 1080i	Yes (DRC)	0	RGBS-BNC, HD Component	Now	\$35,000
Sony	VPH-D50HTU	CRT Front PTV	Variable	720p 1080i	Yes (DRC)	0	RGB H&V-sync HD Component	Now	\$13,990
Sony	VPL-VW10HT	LCD Front PTV	Variable	720p (1366x768)	Yes (DRC)	0	RGB H&V-sync HD Component	Now	\$6,990
Sony	PFM-510A1WU	Plasma Panel	42W 16:9	720p 1080i (1024x1024)	Yes	0	RGBHV, HD Component Video	Now	\$15,999
Toshiba	CW34X92	Direct View	34W 16:9	1080i	Yes (IDSC, horz. & vert.)	2	2 HD Component Video Inputs	Now	\$4,499
Toshiba	CN36X81	Direct View	36" 4:3	1080i	Yes (IDSC, horz. & vert.)	2	2 sets of HD Component Video	Now	\$2,199
Toshiba	TN50X81	7" CRT Rear PTV	50" 4:3	1080i	Yes (IDSC, horz. & vert.)	2	2 sets of HD Component Video	Now	\$2,999
Toshiba	TN55X81	7" CRT Rear PTV	55" 4:3	1080i	Yes (IDSC, horz. & vert.)	2	2 sets of HD Component Video	Now	\$3,199
Toshiba	TN61X81	7" CRT Rear PTV	61" 4:3	1080i	Yes (IDSC, horz. & vert.)	2	2 sets of HD Component Video	Now	\$3,599
Toshiba	TW-56X81	7" CRT Rear PTV	56W 16:9	1080i	Yes (IDSC, horz. & vert.)	2	2 sets of HD Component Video	Now	\$4,999
Toshiba	TW-65X81	7" CRT Rear PTV	65W 16:9	1080i	Yes (IDSC, horz. & vert.)	2	2 sets of HD Component Video	Now	\$6,499
Toshiba	TW-40X81	7" CRT Rear PTV	40W 16:9	1080i	Yes (IDSC, horz. & vert.)	2	2 sets of HD Component Video	Now	\$2,999
Vidikron	Vision One	CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNC	Now	\$49,995
Vidikron	Vision Two	CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNC	Now	\$31,995
Vidikron	Vision Three	CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNC	Now	\$24,995
Vidikron	VPF50HDX	CRT Front PTV	Variable	720p 1080i	No	0	RGBS BNC	Now	\$19,995
Vidikron	Image 2-A	7" CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNC	Now	\$10,995
Vidikron	Epoch D-600	LCD Front PTV	Variable	720p 1080i (1024x768)	Internal Scaler	0	RGB via VGA 15-pin D-Sub	Now	\$9,495
Vidikron	Epoch HD-2200	LCD Front PTV	Variable	720p 1080i	No	0	(2) RGB via VGA 15-pin D-Sub	Now	\$12,995
Vidikron	Kronos One	7" CRT Front PTV	Variable	720p 1080i	No	0	RGBS via BNC	Now	\$10,995
Zenith	IQC50H94W	7" CRT Rear PTV	50" 4:3	1080i	Yes	2	HD Component	Q3-00	TBA
Zenith	IQC50H95W	7" CRT Rear PTV	50" 4:3	1080i	Yes	2	HD Component	Q3-00	TBA
Zenith	IQC60H94W	7" CRT Rear PTV	60" 4:3	1080i	Yes	2	HD Component	Q3-00	TBA
Zenith	IQC60H95W	7" CRT Rear PTV	60" 4:3	1080i	Yes	2	HD Component	Q3-00	TBA
Zenith	Pro 900X	7" CRT Front PTV	Variable	720p 1080i	No	0	RGB H&V-sync	Now	\$12,600
Zenith	Pro 1200X	8" CRT Front PTV	Variable	720p 1080i	Optional add-in line-quadrupler	0	RGB H&V-sync	Mid Year	\$24,995

Courtesy of TWICE



B

DTV Products

Digital TV Set Top Decoders

Brand	Model	DTV Formats Received	Scan Conversion (Input-Output)	HD Interface for DTV Monitor	Includes NTSC Receiver	Includes NTSC Line Doubler/Scaler	Built in Dolby Digital Decoder	IEEE 1394 Digital Interface	Available	Suggested Retail Price
EchoStar	Adapter module for Dish 5000**	All 18 Table 3 Formats	Passes Undecoded HD Signal In Format Received	Connects via RF (RG6) To Separate DTV Decoder	No	No	No	No	Now	\$299.00
EchoStar	6000**	All 18 Table 3 Formats	All Formats>480i Formats>1080i Formats>720p	HD Component, RGB H&V via BNC, RGB via 15-pin D-Sub	Has Upgradable Expansion Slot For Optional Terrestrial/NTSC/ATSC Tuners	No	Yes (2 Channel)	No	Spring	\$499.00
EchoStar	6100**	All 18 Table 3 Formats	All Formats>480i Formats>1080i Formats>720p	HD Component, RGB H&V via BNC, RGB via 15-pin D-Sub	Receives both NTSC and ATSC Terrestrial Broadcasts	No	Yes (2 Channel)	No	TBA	TBA
Hughes Network Systems	HSVE-4688 Platinum HD*	All 18 Table 3 Formats	All Formats>480i All Formats>1080i HD Component	HD Component	Yes	No	Yes	No	2Q-00	TBA
Integra	ITB15ST Formerly Unity Motion HDR-1000A	All 18 Table 3 Formats	HD Formats>1080i SD Formats>480p	HD Component RGBHV D-sub	No	No	Yes	No	Now	\$795.00
Konka	HD-0001	All 18 Table 3 Formats	All Formats>1080i	RGB (High Density 15-pin D-sub)	No	No	Yes	No	April	\$999.95
Loewe	TBA	All 18 Table 3 Formats	Switchable: All Formats>480i All Formats>480p All Formats>1080i	RGB via VGA, HD Component Video	Yes	No	Yes (2-channel)	No	TBA	TBA
Mitsubishi	HD-1080	All 18 Table 3 Formats	480i>960i 480p>960i 720p>1080i 1080i>1080i	Proprietary RGB H&V-Sync	No	Yes	Yes	No	Now	\$3,499.00
Mitsubishi	SR-HD500*	All 18 Table 3 Formats	All Formats>480i All Formats>1080i	HD Component Video Proprietary RGB H&V-Sync	Yes	No	Yes (2-channel)	Yes	1Q-00	\$999.00
Panasonic	TU-HD520*	All 18 Table 3 Formats	All Formats>Any Output Selected	Switchable: HD Component or RGB H-V (RCA jacks)	Yes	Yes	No	No	June	\$1,099.95
Panasonic	TU-DST51	All 18 Table 3 Formats	Switchable: All Formats>NTSC, All Formats In Native Form, 720p>480p, 1080i>480p, 480i>480p	HD Component Video	Yes	No	No	Yes	Now	\$1,099.95
Pioneer	SH-D508	All 18 Table 3 Formats	Switchable: All Formats>480p All Formats>720p All Formats>1080i	HD Component Video, RGB H&V-Sync	No	No	No	Upgradable Expansion Port	Now	\$2,500.00
ProScan	PSHD105*	All 18 Table 3 Formats	Switchable: All Formats>480i, All Formats>540p, 720p>1080i, 1080i>1080i	RGB via VGA	Yes	Yes	Yes	No	TBA	\$649.00
Proton	TBA	All 18 Table 3 Formats	Switchable: All Formats>480i All Formats In Native Form, 720p>480p, 1080i>480p, 480i>480p	RGB via VGA, Component (YUV)	No	No	Yes	No	TBA	TBA
RCA	DTC100*	All 18 Table 3 Formats	Switchable: All Formats>480i, All Formats>540p, 720p>1080i, 1080i>1080i	RGB via VGA, Component (YUV)	Yes	Yes	Yes	No	Now	\$649.00
Samsung	SIR-T100	All 18 Table 3 Formats	Switchable: All Formats>480p All Formats>1080i	HD Component Video VRBG VGA and RCA	No	Yes	Yes	No	Now	\$1,999.00
Samsung	SIR-T200	All 18 Table 3 Formats	Switchable: All Formats>480p All Formats>720p All Formats>1080i All Formats>NTSC Line double NTSC	HD Component Video RGB via RCA	Yes	Yes	No	No	August	\$899.00

Courtesy of TWICE

continued on page 27

Digital TV Set Top Decoders — continued from page 26

Brand	Model	DTV Formats Received	Scan Conversion (Input-Output)	HD Interface for DTV Monitor	Includes NTSC Receiver	Includes NTSC Line Doubler/Scaler	Built in Dolby Digital Decoder	IEEE 1394 Digital Interface	Available	Suggested Retail Price
Samsung	SIR-T100	All 18 Table 3 Formats	Switchable: All Formats>480p All Formats>1080i	HD Component Video VRGB VGA and RCA	No	Yes	Yes	No	Now	\$1,999.00
Samsung	SIR-TS200*	All 18 Table 3 Formats	Switchable: All Formats>480p All Formats>720p All Formats>1080i All Formats>NTSC Line double NTSC	HD Component Video RBG via RCA	Yes	Yes	No	No	August	\$999 dish optional
SharpVision	TU-DTV1000	All 18 Table 3 Formats	Switchable: All Formats>480i All Formats>480p All Formats>1080i	HD Component Video RGB H&V-Sync	No	No	Yes	Upgradable Expansion Port	Now	\$1,995.00
Sony	SAT-M100*	All 18 Table 3 Formats	TBA	Secure iLINK (IEEE 1394), others TBA	TBA	TBA	TBA	Yes	August	TBA
Toshiba	DST-3000*	All 18 Table 3 Formats	Switchable: All Formats>480i All Formats>1080i	Secure iLINK HD Component Video	Yes	No	Yes	No	April	\$1,100 with dish
Zenith	ICDTV-1080*	All 18 Table 3 Formats	All Formats>1080i, 720p, 480i, All Formats>NTSC	RGB 15-Pin HD Component	Yes	Yes	Yes	TBA	Q3-00	\$699.95
Zenith	IQADTV1W	All 18 Table 3 Formats	All Formats>1080i	RGB H&V-Sync	No	No	Yes (2-channel)	No	Now	\$3,995.00

Courtesy of *TWICE*

DTV Products

Fully Integrated 1080i Sets

(Digital Decoder included)

Brand	Model	Display Type	Screen Size	Aspect Ratio	DTV Native Scan Format	Scan Conversion	Line Doubling For NTSC?	Built-in AC-3 Decoder?	IEEE 1394 Digital Interface	Available	Suggested Retail Price
Daewoo	DSP-3060N	Direct View	30W"	16:9	1080i	All Formats>1080i	Yes	Yes	No	Apr-00	\$3,000
Hitachi	61HDX98B*	7" CRT Rear Projection	61W"	16:9	1080i	NTSC>540p 480p>540p; 480i>540p 720p>1080i; 1080i>1080i	Yes	Yes	No	Now	\$7,999 <small>includes satellite dish</small>
Konka	HD3098U	Direct View	30W"	16:9	1080i	All Formats>1080i	Yes	Yes	No	May	\$3,499.00
Konka	HD3498U	Direct View	34W"	16:9	1080i	All Formats>1080i	Yes	Yes	No	Q4-00	TBA
Marantz	HD6400W	9" CRT Rear Projection	64W"	16:9	1080i	NTSC>525p; 480p>540p 480i>540p; 720p>1080i; 1080i>1080i	Yes	Yes	No	June	\$11,999.00
Philips	64PH9905	9" CRT Rear Projection	64W"	16:9	1080i	NTSC>525p; 480p>540p 480i>540p; 720p>1080i; 1080i>1080i	Yes	Yes	No	Now	\$9,990
Philips	34PH9915	Direct View	34W"	16:9	1080i	NTSC>525p; 480p>540p 480i>540p; 720p>1080i; 1080i>1080i	Yes	Yes	No	2Q-00	\$5,000
ProScan	PS61000*	7" CRT Rear Projection	61W"	16:9	1080i	NTSC>540p; 480p>540p 480i>540p; 720p>1080i; 1080i>1080i	Yes	Yes	No	Now	\$7,999
ProScan	PS34000* Performax	Direct View	34W"	16:9	1080i	NTSC>540p; 480p>540p 480i>540p; 720p>1080i; 1080i>1080i	Yes	Yes	No	4Q-00	\$3,499.00
ProScan	PS38000* Performax	Direct View	38W"	16:9	1080i	NTSC>540p; 480p>540p 480i>540p; 720p>1080i; 480p>540p 1080i>1080i	Yes	Yes	No	Spring	\$3,999.00
RCA	F38310* Performax	Direct View	38W"	16:9	1080i	NTSC>540p; 480p>540p 480i>540p; 720p>1080i; 1080i>1080i	Yes	Yes	No	Spring	\$3,999.00
RCA	P61300*	7" CRT Rear Projection	61W"	16:9	1080i	NTSC>540p; 480p>540p 480i>540p; 720p>1080i; 1080i>1080i	Yes	Yes	No	Now	\$7,999
Samsung (Taurus Digital)	HCJ555W	7" CRT Rear Projection	55W"	16:9	1080i	All Formats>1080i	Yes	Yes	No	Now	\$7,999 <small>includes HD Component</small>
Samsung (Taurus Digital)	HCJ655W	9" CRT Rear Projection	65W"	16:9	1080i	All Formats>1080i	Yes	Yes	No	Now	\$11,000 <small>includes HD Component</small>
SharpVision	64LHP5000	7" CRT Rear Projection	64W"	16:9	1080i	NTSC>480p; 480p>540p 480i>540p; 720p>1080i; 1080i>1080i	Yes	Yes	No	Now	\$8,995
Sanyo	TBA	Direct View	30W"	16:9	1080i	NTSC>480i/p; 480i>480i/p 480p>480p; 720p>1080i; 1080i>1080i	Yes	Yes	No	TBA	\$3,499
Sony	KWP-65HD1	CRT Rear Projection	65W"	16:9	1080i	NTSC>960i; 480i>960i 480p>480p; 720p>1080i; 1080i>1080i	Yes (DRC)	No	No	Now	\$10,999 <small>on-board ProLogic</small>
Sony	KW-34HD1	Direct View	34W"	16:9	1080i	NTSC>960i; 480i>960i 480p>480p; 720p>1080i 1080i>1080i	Yes	Yes	No	Now	\$8,499
Sony	KW-34HD2	Direct View	34W"	16:9	1080i	NTSC>960i; 480i>960i 480p>480p; 720p>1080i 1080i>1080i	Yes (DRC)	Yes	Yes	August	\$5,500
Sony	KD-36HD2	Direct View	36"	4:3	1080i	NTSC>960i; 480i>960i 480p>480p; 720p>1080i 1080i>1080i	Yes (DRC)	Yes	Yes	August	\$5,000
Sony	KWP-57HD2	Rear PTV	57"	16:9	1080i	NTSC>960i; 480i>960i 480p>480p; 720p>1080i; 1080i>1080i	Yes (DRC)	Yes	Yes	August	\$6,000
Sony	KWP-65HD2	Rear PTV	65"	16:9	1080i	NTSC>960i; 480i>960i 480p>480p; 720p>1080i; 1080i>1080i	Yes (DRC)	Yes	Yes	August	\$7,000
Sony	KDP-53XBR500	Rear PTV	53"	4:3	1080i	NTSC>960i; 480i>960i 480p>480p; 720p>1080i; 1080i>1080i	Yes (DRC)	Yes	Yes	August	\$5,500
Sony	KDP-61XBR500	Rear PTV	61"	4:3	1080i	NTSC>960i	Yes (DRC)	Yes	Yes	August	\$6,500
Toshiba	DW65X91*	7" CRT Rear Projection	65W"	16:9	1080i	NTSC>540p; 480i>540p 480p>540p; 720p>1080i; 1080i>1080i	Yes	Yes	No	April-00	\$8,499 <small>includes satellite dish</small>
Toshiba	DW56X91*	7" CRT Rear Projection	56W"	16:9	1080i	NTSC>540p; 480i>540p 480p>540p; 720p>1080i	Yes	Yes	No	TBA	\$6,999 <small>includes satellite dish</small>
Zenith/Inteq	IQB56W10	7" CRT Rear Projection	56W"	16:9	1080i	All Formats>1080i	Yes, <small>Includes: HD Component Video, RGB via VGA inputs</small>	Yes	No	Now	\$8,499
Zenith/Inteq	IQA64W10	9" CRT Rear Projection	64W"	16:9	1080i	All Formats>1080i	Yes, <small>Includes: HD Component Video, RGB via VGA inputs</small>	Yes	No	Now	\$9,999

Courtesy of TWICE



D



480p CAPABLE MONITORS

(31.5kHz or higher scanning frequency) External DTV-Decoder Required

Brand	Model	Display Type	Screen Size	Aspect Ratio	DTV Native Scan Format	On-Board Line Doubling/Scaling?	Number of NTSC Tuners	Interface for DTV Tuner/Decoder	Available	Price
Fujitsu	PDS-4203	Plasma Panel	42W"	(16:9)	480p	Yes	0	RGB-H&V BNC, Component BNC, RGB 15-pin D SUB	Now	\$6,995.00
Fujitsu	PDS-4212	Plasma Panel	42W"	(16:9)	480p	Yes	0	RGB-H&V BNC, Component BNC, RGB 15-pin D SUB	Now	\$9,995.00
Hitachi	40LDX99B	LCD Rear PTV	40"	(4:3)	Non-standard 600p (4:3) 450p (16:9)	Yes Flex Converter	2	HD Component, VGA 15-pin D-sub	February	\$4,799.00
Hitachi	52LDX99B	LCD Rear PTV	52"	(4:3)	Non-standard 600p (4:3) 450p (16:9)	Yes Flex Converter	2	HD Component, VGA 15-pin D-sub	February	\$4,999.00
InFocus	LS-700	LCD Front PTV	Variable	Variable	480p (XGA)	Yes Processing by Parocia	0	VGA	Now	\$12,995
Loewe	Planus Tabletop	Direct View	30W"	(16:9)	480p	Yes	2	RGB via VGA	Now	\$3,800.00
Loewe	Planus Console/ette	Direct View	30W"	(16:9)	480p	Yes	2	RGB via VGA	Now	\$4,400.00
Loewe	Arcada Tabletop	Direct View	32"	(4:3)	480p	Yes	2	RGB via VGA	Now	\$3,900.00
Loewe	Galida Tabletop	Direct View	32"	(4:3)	480p	Yes	2	RGB via VGA	Now	\$3,500.00
Loewe	Art Console	Direct View	36"	(4:3)	480p	Yes	2	RGB via VGA	Now	\$5,000.00
Marantz	PD-4290D	Plasma Panel	42W"	(16:9)	1080i, 720p (853x480)	Yes	0	RGB via VGA, HD Component	Now	\$14,999.00
NetTV	DTV42WP	Plasma Panel	42W"	(16:9)	480p	Yes	0	RGB via VGA	Now	\$8,999.00
Panasonic	PT-61DX80	7" Rear PTV	61"	(4:3)	480p	Yes	2	HD Component Video	Now	\$3,199.00
Panasonic	PT-51DX80	7" Rear PTV	51"	(4:3)	480p	Yes	2	HD Component Video	Now	\$2,699.00
Panasonic	CT-32XF56	Direct View	32"	(4:3)	480p	Yes	2	HD Component Video	Now	\$1,799.00
Panasonic	PT-42PD1-P	Plasma Panel	42W"	(16:9)	480p	Yes	0	HD Component, VGA 15-pin D-sub	Now	\$13,999.95
Philips	42FD9932	Plasma Panel	42W"	(16:9)	480p	Yes	0	RGB via 15-pin D-sub, HD Component,	1Q-00	\$10,000 \$11,000 with component NTSC PC box (PTM-9952)
ProScan	PSP4200	Plasma Panel	42W"	(16:9)	480p	Yes	0	RGB via VGA	Now	\$12,999.00
Samsung	SLJ402W	TFT LCD Rear PTV	40W"	(16:9)	480p native	Yes	2	HD Component Video VGA	Now	\$3,999.00
Samsung	SLK-407W	TFT LCD Rear PTV	40W"	(16:9)	480p native	Yes	2	HD Component Video VGA	March	\$3,999.00
Samsung	TSK2700F	Flat Face Direct View "PureFlat"	27"	(4:3)	480p native	Yes	2	HD Component Video	July	\$1,199.00
Samsung	TSK3200F	Flat Face Direct View "PureFlat"	32"	(4:3)	480p native	Yes	2	HD Component Video	July	\$1,699.00
Samsung	TSK3000F	Flat Face Direct View "PureFlat"	30W"	(16:9)	480p	Yes	2	HD Component Video	July	\$2,199.00
SharpVision	XVZW99	LCD Front PTV	Variable	Variable	480p	Yes	0	RGB H&V, HD Component	Now	\$7,999.00
Sony	PFM-500A2WU	Plasma Panel	42W"	(16:9)	480p (852x480)	Yes	0	RGBHV HD Component	Now	\$9,999.00

Courtesy of *TWICE*