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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

May 17, 2000

**BY HAND**

Ms. Magalie Roman Salas  
Secretary  
Federal Communications Commission  
445 Twelfth Street, S.W.  
12<sup>th</sup> Street Lobby  
TWA-325  
Washington, D.C. 20554

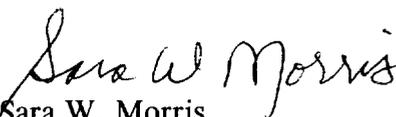
**Re: Comments of Thomson Consumer Electronics, Inc.**  
**(MM Docket No. 00-39)**

Dear Ms. Salas:

Enclosed for filing please find the original and nine (9) copies of the Comments of Thomson Consumer Electronics, Inc. in the above-referenced docket.

Please stamp and return to this office with the courier the enclosed extra copy of this filing designated for that purpose. Please direct any questions that you may have to the undersigned.

Respectfully submitted,

  
Sara W. Morris  
Telecommunications Consultant

Enclosures

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

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OFFICE OF THE SECRETARY

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

MM Docket No. 00-39

**COMMENTS OF**  
**THOMSON CONSUMER ELECTRONICS, INC.**

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May 17, 2000

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## EXECUTIVE SUMMARY

The transition to DTV is at a critical juncture. Without question, substantial progress has been made in many areas important to the success of the transition. Today, consumers can choose from among more than 150 DTV products, at steadily increasing performance levels and steadily decreasing prices. Less than 18 months after the first DTV services came on-air, more than 60 percent of American households have access to at least one DTV signal. Several broadcast networks (albeit often with substantial financial backing from the consumer electronics industry, including Thomson) and cable networks are offering growing amounts of HDTV programming. Finally, innovative DTV-based services, such as Geocast and iBlast, are emerging to exploit further the ATSC DTV standards' full capabilities and drive consumer interest in DTV and overall economic growth. For its part, Thomson is offering an array of DTV products which give consumers maximum choice in technology and price, and, with its partners, introducing DTV products and services that fully exploit the ATSC DTV standard's capabilities.

However, notwithstanding this progress, serious obstacles remain which, if left unresolved, threaten the entire transition. Principal among these issues are: (1) the need for final resolution on cable compatibility standards, including DTV labeling and copy protection; (2) the harmful uncertainty resulting from lingering doubts among some broadcasters about capabilities of the ATSC standard; and (3), perhaps most important (yet, for some reason, frustratingly unattainable), the need for much greater amounts of DTV programming to drive consumer interest in and conversion to DTV.

Thanks in large part to its consistent and thoughtful leadership, the Commission has helped to foster an environment in which these and other challenges that will inevitably arise can be addressed and resolved expeditiously by all parties in a manner that moves the transition *forward*, not backward, and that places the interests of consumers above all else.

In particular, Thomson commends the Commission for showing extremely wise judgement in rejecting calls by some to reopen the DTV standard debate. At this critical juncture in the DTV transition, it is more important than ever before that the Commission do nothing to disrupt the transition. Concerns regarding the ATSC DTV standard's use of 8VSB modulation, and the calls by some broadcasters that the Commission reopen the DTV standard to allow the use of COFDM modulation are both misguided and wrong-headed. In fact, newer generation DTV products (especially Thomson's low-priced, fully featured DTC100 set-top receiver/converter) have proven to exceed early generation DTV receivers' performance and are being very well received by consumers – the ultimate test of a product's performance. Where there is room for more improvement, such as in the area of indoor reception of DTV signals, manufacturers, including Thomson, are committed to making those improvements on a continuing basis, in the same intensely competitive fashion that drives nearly all types of consumer electronics innovations.

Thomson reaffirms its strong opposition to mandated performance standards for DTV receivers. In addition to being antithetical to promoting DTV innovation, adoption of such standards for DTV receivers falls outside the Commission's authority, including that conferred under the All Channel Receiver Act.

Finally, Thomson cannot emphasize enough the critical importance of digital content to the success of the transition. Nobody's going to buy a digital television if there's nothing to watch. Just as the Commission has put enormous *positive* pressure on the CE and cable industries to resolve outstanding compatibility issues to drive the transition forward, so too should the Commission now lean heavily on broadcasters to step up to the plate to offer consumers DTV programming at levels of quality and quantity needed to spur consumers to make the transition. Moreover, the Commission should make clear that it expects broadcasters to deliver more than just upconverted analog programming, and instead offer high quality HDTV programming to the greatest extent possible.

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

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To Digital Television	)	
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**COMMENTS OF  
THOMSON CONSUMER ELECTRONICS, INC.**

**I. INTRODUCTION AND STATEMENT OF INTEREST.**

Thomson Consumer Electronics, Inc. (“Thomson”) respectfully submits these Comments in response to the Federal Communications Commission’s (“FCC” or “Commission”) *Notice of Proposed Rulemaking* in the above-captioned proceeding.<sup>1</sup> Thomson commends the Commission for its timely consideration of these important matters, especially at such a critical juncture in America’s transition to digital television (“DTV”).

Although certain aspects of the DTV transition are moving forward with growing momentum, as the Commission is well aware, several serious obstacles – including final resolution on whether and how cable consumers will be able to receive DTV services, lack of sufficient digital content, and misguided concerns about the DTV standard itself – threaten to drown the DTV transition in a quicksand of uncertainty and delay. Thanks in

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<sup>1</sup> *Notice of Proposed Rulemaking* in MM Docket 00-39 (released Mar. 8, 2000) (“*NPRM*”).

large part to its consistent and thoughtful leadership, the Commission has helped to foster an environment in which these and other challenges that will inevitably arise can be addressed and resolved expeditiously by all parties in a manner that moves the transition *forward*, not backward, and that places the interests of consumers above all else. At this critical juncture in the DTV transition, it is more important than ever before that the Commission continue on this positive and progressive path.

**A. Statement of Interest in This Proceeding.**

Known best for its RCA, PROSCAN and GE brand names, Thomson is the leading television and digital satellite receiver manufacturer and marketer in the United States, selling each year more than 4 million televisions and 2 million digital satellite receivers. One out of every five television sets sold in the United States is a Thomson product. Headquartered in Indianapolis, Indiana, Thomson employs more than 7,000 Americans working in facilities across the nation.

Thomson has played an active leadership role in the development of digital television technology for more than a decade. As a member of both the Advanced Television Research Consortium and, later, the digital HDTV "Grand Alliance," Thomson was heavily involved in developing a digital over-the-air broadcast television technology that best suits the characteristics of the American broadcast archetype, and the needs of American broadcasters. This endeavor culminated in the Commission's adoption of the ATSC DTV standard in 1996, and now serves as the technological foundation for the DTV transition.

## II. THOMSON'S APPROACH TO DTV: "SOMETHING FOR EVERYONE"

Thomson's success in the consumer electronics marketplace reflects an adherence to a core business strategy: offer "something for everyone." Indeed, Thomson's line of analog television products offers the consumer a wide variety of television products (more than 100 models currently) – including the most advanced and desirable NTSC-based technologies and features (such as interactive electronic program guides) – at prices that fit virtually any budget. Consumers rightly demand such a breadth of choices, both in terms of technology and price. As such, the "something for everyone" approach is a winner for Thomson *because* it is a winner for consumers.

In the DTV context, the "something for everyone" strategy is essential to meeting the DTV penetration levels stipulated by Congress when it adopted its DTV transition timetable.<sup>2</sup> Not only must manufacturers offer a range of high-end products and features to drive purchases by early adopters (which, in turn, creates the necessary momentum to drive other aspects of the transition, particularly HDTV programming), they must make every effort to offer products that are affordable to all consumers as quickly as possible. As discussed below, Thomson is a leader on all of these fronts.

### A. Thomson is Offering an Array of DTV Products, Giving Consumers Maximum Choice in Technology and Price.

With its "something for everyone" approach firmly in mind, Thomson has dedicated itself to maximizing consumer choice in DTV and, most importantly, to driving down DTV costs to "mass market" levels as quickly as possible. Accordingly, for the early adopter who wants to enjoy the full HDTV experience, Thomson offers a line of

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<sup>2</sup> See Balanced Budget Act of 1997, Pub. L. No. 105-33, § 3003, 11 Stat 251 (1997).

fully integrated direct-view and projection widescreen HDTVs (in 2000, these will include 34" and 38" direct view models; and 61" and 65" projection models).<sup>3</sup> Alternatively, for those consumers seeking a more modestly-priced means to receive DTV programming and enjoy a crystal-clear, high-resolution, though not widescreen, picture, Thomson offers the DTC100 set-top receiver/converter and a line of high-resolution, direct-view and projection 4:3 monitors (currently offered in 36" and 52" screen sizes). Finally, the consumer who is interested simply in receiving DTV programming using their current analog TV can purchase Thomson's DTC100 alone and *still* experience a noticeable improvement in picture quality (assuming high quality content is transmitted), not to mention the added benefit of receiving DIRECTV satellite service.

Moreover, and perhaps most importantly, Thomson (and some other manufacturers) is succeeding in driving its DTV prices rapidly downward, in some instances by as much as 50 percent since just last year.<sup>4</sup> This dramatic decline is due mainly to the availability of cost-effective wide-screen HDTV direct view picture tubes – a key investment made by Thomson, which committed \$20 million to facilitate HDTV production in Marion, Indiana. In fact, the DTC100, with a suggested retail price of \$649, represents by far the most affordable means by which consumers can access DTV, and already thousands of consumers are enjoying DTV using this device. Thomson will

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<sup>3</sup> All of Thomson's integrated HDTV products, as well as HDTV set-top converter boxes, enable consumers to receive over-the-air analog and digital signals, as well as programming, including digital HDTV, delivered via DIRECTV satellite service).

<sup>4</sup> With a suggested retail price of \$3,999 – 50 percent less than its lowest-priced HDTV only nine months ago, Thomson's 38" HDTV is the world's largest *and most affordable* direct-view HDTV. In addition, consumers can purchase RCA's 36" high-resolution 4:3 monitor *with the DTC100 set-top receiver and the*

continue its work to drive down DTV prices so as to make DTV a technology that can be enjoyed by all Americans as quickly as possible.

**B. Thomson and Its Partners are Introducing DTV Products and Services That Fully Exploit ATSC Technology and Will Fuel Consumer Interest in DTV.**

The second prong of the “something for everyone” approach is the need to develop innovative products and services that make maximum use of the ATSC DTV standard’s capabilities, including data services. As the Commission is well aware, analog television’s metamorphosis to a purely digital medium makes possible the introduction of an entirely new realm of interactive digital services. Today, Thomson and a host of DTV entrepreneurs are working to make that possibility a reality. These initiatives focus heavily on both the ATSC DTV standard’s robust data delivery capabilities and DTV services designed to revolutionize the way consumers interact with their televisions.

***Digital Datacasting:*** Thomson recently announced a \$15 million investment in Geocast Network Systems, with whom it has partnered to introduce, in early 2001, a DTV datacasting network, product and service designed to deliver TV-quality news, entertainment, advertising and other rich media to personal computers using local broadcasters’ ATSC DTV broadcast signals. Geocast’s innovative service, which will be transmitted via DTV to consumers with an RCA-branded Geocast receiver, is representative of the wide breadth of applications possible using ATSC DTV technology (*i.e.*, beyond video programming), as the service includes software downloads, games and audio, as well as video content from national and local sources. The RCA Geocast

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*HD satellite dish* for \$2499 – \$900 less than it costs to purchase these devices separately. Thomson intends to expand these types of promotional DTV packages late this year.

receiver, which will carry a suggested retail price of approximately \$300, will connect directly to the consumer's personal computer and allow access to highly customized content at the user's convenience. Geocast is easily distinguished from other datacast concepts because of its stand-alone receiver (including a multi-gigabyte storage capacity), sophisticated content management software that enables personalization, and continuous update capability through the "always on" Geocast receiver.

***Electronic Program Guides.*** Thomson products already are among the industry's most advanced in terms of offering interactive program guides in its television products – Thomson has built the no-fee *GUIDE Plus+* electronic program guide from Gemstar into more than 2 million of its RCA and PROSCAN analog televisions. In the digital environment, such navigational aides are no longer a convenience, they are a necessity: without them, consumers will be hard pressed to navigate in a 300-, 400-, even 500- channel programming "jungle."<sup>5</sup>

**III. THE DTV TRANSITION HAS MADE ENORMOUS PROGRESS SO FAR. CHALLENGES REGARDING DTV'S IMPLEMENTATION MUST BE ADDRESSED IN A MANNER THAT DOES NOT HALT OR REVERSE THIS PROGRESS.**

Clearly, there is a lot of good news about the DTV transition to date. Less than two years after the first DTV broadcasts were initiated, more than 60 percent of all households have access to a digital television signal. As discussed above, a robust

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<sup>5</sup> Thomson recently filed comments supporting Gemstar Development Corporation's *Petition for Special Relief* (filed March 16, 2000), which asks the Commission to order Time Warner to cease its anticompetitive practice of stripping Gemstar's EPG data from the VBI of broadcaster's signal, which disables affected consumers' *GUIDE Plus+*. As Thomson has stated in the Commission's *Digital Must Carry Proceeding* previously, it is critical that cable operators who carry broadcasters' digital signals be required to deliver this and other PSIP data in its entirety to ensure that consumers can choose and enjoy the use of competitive EPGs without interference from a cable operator, such as Time Warner, that may seek to discriminate in favor of an affiliated EPG. See *Comments of Thomson Consumer Electronics, Inc.* in MM Docket 98-120 (October 13, 1998) at 15.

consumer market for a host of products, designed to exploit the high-quality capability possible in the digital domain, is emerging, and a growing number of DTV manufacturers is driving DTV prices steadily lower, in some cases dramatically so. ATSC-based entrepreneurial ventures (such as Geocast, iBLAST, etc.) are spurring new innovation, consumer services and economic growth. Recent agreements on cable interconnectivity specifications<sup>6</sup> promise a virtual tidal wave of new, compatible digital products, greatly expanding consumer exposure to DTV and HDTV. And finally, though far below what is needed to drive the volume of consumer purchases required to achieve Congress's mandated 85 percent DTV penetration rate (and, accordingly, broadcasters' return of analog spectrum), broadcasters and some cable networks are beginning to offer some amounts of DTV, including HDTV, programming.<sup>7</sup>

The Commission deserves a great deal of credit for this progress. In particular, the Commission should be credited for its steadfastness in ensuring that issues pertaining to DTV's *implementation* (such as progress in the area of DTV receiver performance, discussed *supra*) are addressed in a manner that does not threaten the overall integrity and pace of the transition.

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<sup>6</sup> As discussed further below, Thomson has been an active participant in the industry negotiations that produced agreements between the consumer electronics and cable industries on baseline compatibility standards for cable systems and DTV receivers. Thomson believes the solutions encompassed in the CEA/NCTA agreements, announced on February 22, 2000, are critical to enabling manufacturers to move forward with research, development, and production of cable-compatible products for consumers, which is critical to speeding the transition to DTV.

<sup>7</sup> See discussion in Section VII, *supra*.

**A. The Commission Showed Extremely Wise Judgement in Rejecting Sinclair Broadcast Group’s Petition to Reopen the DTV Standard Debate.**

The Commission’s thoughtful but firm rejection of Sinclair Broadcast Group’s *Petition for Expedited Rulemaking* (“Sinclair Petition”) to permit broadcasters to transmit DTV signals using a COFDM-based modulation scheme,<sup>8</sup> is strong evidence of the Commission’s commitment to ensuring that the DTV transition moves forward without unnecessary disruption and delay. As Thomson has argued for many months, the “factual” predicate and other assumptions upon which Sinclair based its Petition – that the ATSC DTV standard is intrinsically incapable of delivering DTV signals for reliable reception indoors, particularly in areas with high multipath “ghosts;” that converting to a COFDM-based DTV system could be done quickly and at relatively little cost to broadcasters; and that improvements in 8VSB receiver technology – and IC chip innovations – cannot be relied upon to bridge the performance gap that currently exists between 8VSB and COFDM on this one parameter – are simply wrong. Moreover, Sinclair’s recommended solution – that broadcasters be allowed to pick and choose between two entirely *incompatible* DTV transmission standards – exhibits breathtaking disregard for the interests of American consumers, particularly those who already have invested in 8VSB equipment incapable of receiving COFDM signals.

In stark contrast to Sinclair’s “if we repeat it often enough then it must be true” approach, the Commission’s rejection of the Petition, and the OET Report which formed the underpinning for the Commission’s decision, was based on carefully gathered facts, a

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<sup>8</sup> See Letter dated February 4, 2000, from Magalie Roman Salas to Mr. Martin R. Leader, Counsel to Sinclair Broadcast Group, Inc. (“Sinclair”), informing recipient of the Commission’s rejection of Sinclair’s *Petition for Expedited Rulemaking* (filed on October 8, 1999) (“FCC Letter”).

sound analysis of the evolving state of DTV technology, and an unwavering commitment to moving the transition forward in a manner that serves the needs of all stakeholders, but particularly consumers. Not surprisingly, the Commission:

- Concluded, *inter alia*, that, based on the relative merits of each system, the ATSC 8VSB standard system is better suited for DTV service in the U.S. than COFDM, and that the benefits that might result from changing the DTV transmission standard to allow the use of COFDM modulation would not outweigh the costs of making such a revision;<sup>9</sup>
- Reaffirmed the importance – for consumers, broadcasters and consumer electronics manufacturers – of mandating a *single* transmission standard;<sup>10</sup>
- Recognized the “significant delay” in the implementation and provision of DTV services to the public that would result from even considering a new DTV standard;<sup>11</sup> and
- Found that, contrary to Sinclair’s claims, “reasonable solutions to the indoor reception and multipath interference issues . . . are being developed and are expected to be available in the near future.”<sup>12</sup>

Perhaps most importantly, the Commission’s dismissal of the Sinclair Petition, which already had had a chilling effect on DTV investment on many levels, signaled to other DTV stakeholders that the Commission will not allow a minority stakeholder’s concerns about an *implementational* issue to threaten the entire transition.

Especially given the progress already made in the transition, it is critical that the Commission not stray from this course. As the Commission correctly foresaw in establishing its *Biennial Review* process,<sup>13</sup> to the extent new issues or needs arise – as

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<sup>9</sup> *Id* at 2.

<sup>10</sup> *Id* at 3. *See also*, *Fourth Report and Order*, Advanced Television Systems and Their Impact on the Existing Television Broadcast Services, 11 FCC Rcd 17771, 17787-17791 (1996).

<sup>11</sup> FCC Letter at 3.

<sup>12</sup> *Id.* at 4.

<sup>13</sup> *See Fifth Report and Order* in MM Docket No. 87-268, 12 FCC Rcd 12856 (1997).

they inevitably will – which present broadcasters, DTV manufacturers and other stakeholders with challenges to DTV’s implementation, those issues should be addressed – and resolved – in a productive, not a destructive, manner.<sup>14</sup> For its part, Thomson is committed to working with broadcasters to address in-depth their concerns with respect to indoor reception of DTV, and to explore non-traditional business models that broadcasters may wish to pursue.

**IV. ADVANCES IN DTV RECEIVER TECHNOLOGY, INCLUDING CHIP DESIGN AND INNOVATION, WILL ALLOW THE ATSC SYSTEM TO EXCEED EXPECTATIONS.**

In response to concerns raised by certain broadcasters regarding the disappointing indoor reception performance of certain early generation DTV receivers, the Commission seeks comment on the “progress being made to improve indoor DTV reception . . . and manufacturers’ efforts to implement DTV design or chip improvements.” NPRM at ¶ 12.

It is certainly no secret that some early generation DTV receivers fell far short of expectations with regard to replication of NTSC service in an indoor environment, particularly in the presence of strong multipath signals.<sup>15</sup> However, a “myth” has been wrongly perpetuated which suggests that the cause of this competitively inadequate performance is some intrinsic deficiency in the ATSC DTV standard’s 8VSB modulation scheme rather than the state of technology designed to *receive* 8VSB-modulated DTV signals. In fact, nothing can be further from the truth. As the Commission’s own

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<sup>14</sup> In this regard, it is essential that the Commission’s policies and rules reflect a commitment to the early adopters of DTV that they will not suddenly find the DTV product they purchased – and paid a premium for – inoperable even for its most basic functions, such as receiving particular broadcasters’ off-air DTV signals.

<sup>15</sup> Thomson notes emphatically that this does not include its “first” generation of DTV receivers. In fact, the retail availability of Thomson’s DTC100 and its line of integrated HDTVs was purposely (and at some public relations cost) delayed in part to implement reception improvements.

technical experts found when concluding that the ATSC DTV standard should be retained, optimization in receiving ATSC signals in the presence of strong multipath reception conditions “can be solved with...improved adaptive equalizer performance”<sup>16</sup>

Indeed, if the ATSC standard were to be found so intrinsically flawed as to be incapable of providing NTSC performance comparable to consumers relying on an indoor antenna, Thomson (and likely every other manufacturer seeking to survive in the CE industry) would be the first in line to say “dump it.”<sup>17</sup> For reasons discussed below, and in greater detail in Appendix A, Thomson is confident that innovations in DTV receiver technology, including its own and others’ dramatic advances in DTV chip design, will enable indoor reception in all but the most severe multipath environments.<sup>18</sup>

**A. Thomson DTV Receivers’ Indoor Reception Performance is Already Very Good and Will Continue to Improve.**

Notwithstanding the fact that, by the very nature of physics, reception of terrestrial broadcast signals works best using an outdoor antenna, Thomson has, for some time, devoted enormous resources to optimizing its DTV products’ indoor reception performance – largely through improved adaptive equalizer performance – to ensure the satisfaction of its customers living in locations where strong multipath signals are

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<sup>16</sup> *DTV Report on COFDM and 8-VSB Performance*, Office of Engineering and Technology (September 30, 1999) (“OET Report”) at 27.

<sup>17</sup> Of course, like today, consumers may find it necessary to subscribe to cable or satellite services where indoor reception is impossible regardless of the modulation standard.

<sup>18</sup> Appendix A contains a presentation, “*HDTV For Everyone; When Will It Happen?*”, made by David M. Badger, Director Of U.S. Digital Television Multimedia & Services, Research & Development, Thomson Multimedia, to the Society of Motion Picture & Television Engineers (March 15, 2000). The presentation provides Thomson’s views on the factors influencing DTV sales growth, including projections and analysis of industry-wide efforts to improve DTV receiver performance, including in indoor environments.

common.<sup>19</sup> As a result, Thomson's DTV products, including its first generation receivers are far superior to earlier products in tracking static and fast-moving (i.e., "dynamic") ghosts.<sup>20</sup>

Specifically, DTV chip sets, designed by Thomson, use a number of convergence and tracking algorithms which allow a better overall ghost canceling capability (approximately 2-3 dB better) than earlier released products. For instance, unlike the approach taken by initial DTV products, Thomson's DTV receivers utilize a "full update" equalizer, which updates every tap on every symbol. This capability alone enables Thomson's DTV receiver products to attain dynamic ghost performance levels 10 to 100 times better than earlier-generation DTV receivers. Dynamic ghost performance is particularly important for indoor reception, since the physical environment of the antenna is dynamic.

Based on the level of effort already underway, throughout the industry, Thomson expects that chip design innovations, graphic equalizer improvements, and other breakthroughs advancing DTV receiver performance will continue to the point where, in 2002, indoor antennas can be used nearly everywhere to receive an ATSC signal.<sup>21</sup>

Combined, Thomson's innovative techniques are allowing solid and ever-improving over-the-air reception and display of DTV in environments typically hostile to

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<sup>19</sup> Importantly, this work began well before recent activities (i.e., Sinclair Broadcasting's public demonstrations and *Petition* to allow the use of a COFDM-based modulation scheme).

<sup>20</sup> In fact, Thomson's 1<sup>st</sup> generation DTV receivers, including the DTC100 set-top receiver, incorporate advancements on a number of performance parameters, enabling them to demonstrably outperform such receivers as those used in public exhibitions by Sinclair Broadcasting Group. In addition to the dynamic ghost performance, Thomson has implemented advancements such as a longer pre-ghost equalizer and faster automatic gain control ("AGC") and recovery functions.

<sup>21</sup> At this point, truly "portable" applications become realistic.

over-the-air signals, including urban high-rise apartment buildings, even when a consumer uses an indoor antenna.<sup>22</sup> While, just as with NTSC, there may be particularly difficult locations in which reception of an 8VSB DTV signal will require an outdoor antenna, Thomson is committed to maximizing its products' indoor reception performance so that such instances become nothing more than aberrational.

**B. Multiple Other Offsetting Benefits Distinguish 8VSB as the Superior Standard for the U.S. as Compared to COFDM.**

Beyond the singular parameter of indoor reception of 8VSB signals, the ATSC DTV standard's use of 8VSB modulation provides multiple benefits over a COFDM system. Specifically, 8VSB system exceeds COFDM's performance in:

*Signal-to-Noise Performance.* Resistance to interference and noise performance is a very important criteria to consider when evaluating the performance of a DTV receiver. On this parameter, 8VSB will always be superior to COFDM. Indeed, while receivers designed to the ATSC standard quickly are approaching parity with COFDM in terms of handling strong multipath ghosts (due to the fact that ghost performance is directly determined by the receiver's electronics), receivers designed to receive COFDM will NEVER equal 8VSB in terms of signal-to-noise ("SNR") performance. In fact, 8VSB receiver technology enjoys SNR performance of 15dB. The very structure of COFDM technology will forever keep it from bettering its current SNR performance, which is generally around 19dB. In addition, the European DVB-T standard for COFDM

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<sup>22</sup> The robustness of Thomson's indoor reception performance has been demonstrated publicly at multiple sites, including: the fourth floor of a downtown parking garage (approximately 10 miles from the digital transmitter) in the center city of Indianapolis – America's 12<sup>th</sup> largest city; the 18<sup>th</sup> floor of a 30-story apartment building (from which high-level reflections were measured from nearby buildings and an adjacent skyscraper); and a mid-town Manhattan townhouse. In each instance, Thomson's DTV products, including the DTC100 and an integrated HDTV, were able to obtain and keep over-the-air DTV signals despite the presence of strong multipath ghosts.

results in a far greater sensitivity to impulse noise than the ATSC standard due to a lack of adequate data interleaving. While this could be theoretically corrected in the DVB-T system, correction would require time – a precious commodity with the clock already ticking.

*Overall Coverage.* One of the ATSC standard's greatest benefits is its superiority in duplicating, to the greatest extent possible, broadcasters' entire NTSC coverage area at non-interfering power levels (*i.e.*, substantially less than would be needed with COFDM), a criterion judged to be the most important factor of the entire transition by broadcasters.

*Protection of Existing NTSC Services.* The very structure of the 8VSB signal minimizes both co-channel and adjacent channel interference to broadcasters' NTSC signals. By contrast, even at congruent power levels, the structure of the COFDM signal will cause noticeable interference with NTSC services. If COFDM power levels are increased to fully replicate NTSC coverage, this interference problem would only be exacerbated, likely requiring the creation and adoption of a new Table of Allotments.

*Optimization for HDTV and DTV Data Applications.* The 8VSB ATSC standard is more spectrum efficient than COFDM, in large part because COFDM trades off data capacity (between 14.7 and 17.9 Mbps for a fixed service 6 MHz channel) for improved indoor reception. The increased data capacity possible with 8VSB modulation (which reliably transports 19.4 Mbps per 6 MHz channel) makes it not only superior for more demanding DTV data applications, but also superior for HDTV applications.

### **C. Consumer Acceptance Is The Most Important Test of a Product's Performance.**

In the context of its questions regarding the state of technology of DTV receivers and chip design, the Commission seeks information concerning “any additional studies...regarding NTSC replication using the 8VSB standard.” *NPRM* at ¶ 12.

Thomson has conducted field testing, as well as testing in the lab, to verify and improve the over-the-air performance of its DTV receivers, including indoor reception performance in high multipath environments. These tests have yielded results that consistently match the expected performance for ATSC – i.e., where NTSC was viewable, ATSC was viewable, with few exceptions.<sup>23</sup>

From Thomson's perspective, however, the ultimate – and most important – “study” of a product's performance is its acceptance by consumers and its success in the marketplace. By that scorecard, Thomson's DTV products, particularly its DTC100 set-top box, have been extremely well-received by thousands of consumers, many of them “early adopters.” While Thomson does not seek to diminish the value of data received through more formal types of testing, both in simulated and “real-world” environments, Thomson urges the Commission to recognize this point: it is ultimately at the hands of the consumer that a product will succeed or fail in the marketplace. Therefore, as is the case with all of its products, it is consumers to whom Thomson will look and respond when working to optimize the quality and performance of its DTV products.

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<sup>23</sup> Tests were conducted in Indianapolis (2 stations), Cincinnati (2 stations), Charlotte, NC (1 station); Los Angeles (4 stations), San Francisco (4 stations), Chicago (1 station), New York (2 stations), Washington, D.C. (3 stations), Philadelphia (4 stations), and South Bend, IN (1 station). Additionally, Thomson is participating in a three-year research and testing project, funded through the National Institute of Standards and Technology, with NBC, General Electric and Comark, to classify and improve indoor DTV reception performance.

It is also important to note that these consumers will rightly expect – if not demand – a great amount and wide variety of DTV programming to watch on the equipment they purchase. In fact, consumer satisfaction with and enthusiasm for DTV rests largely on whether such programming is made available on a regular and meaningful basis by all broadcasters.

**V. GOVERNMENT-MANDATED RECEIVER STANDARDS ARE LEGALLY SUSPECT, UNNECESSARY AND UNDESIRABLE.**

In response to the misguided claims of some broadcasters that government regulation is the best means by which to ensure adequate DTV receiver performance, the Commission seeks comment on “whether it has the authority to set minimum performance levels for DTV receivers,” and, if so, whether such government-imposed performance standards would be desirable. *NPRM* at ¶ 13. As Thomson and other entities expert in the introduction of high quality, state-of-the-art consumer products have argued in numerous earlier instances, the answer to both questions is, without question, “NO.”

**A. The Commission Lacks Authority to Impose Performance Standards for DTV Receivers.**

As the Commission notes, the question of the FCC’s authority to prescribe minimum performance levels for television receivers has been addressed at length in the Commission’s *Fourth and Fifth Further Notices of Proposed Rulemaking* in the DTV proceeding.<sup>24</sup> From a purely legal perspective, parties advocating the FCC’s adoption of receiver performance standards have relied heavily, if not exclusively, on the All Channel

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<sup>24</sup> *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).

Receiver Act (“ACRA”), adopted in 1962.<sup>25</sup> Such a reliance, in Thomson’s view, is misplaced.

Congress adopted ACRA to address a very narrow and specific policy goal: preserving the viability of UHF television service in the U.S.<sup>26</sup> Broadcasting has evolved considerably since the introduction of UHF television service and the passage of ACRA. However, neither the text of ACRA, nor its legislative history, indicate that Congress either foresaw or intended to accommodate new modes of broadcasting, particularly not digital broadcasting, when it adopted ACRA. In fact, the Commission itself acknowledged ACRA’s narrow scope in this area when it found that the Act does not mandate the manufacture of so-called dual-mode receivers (i.e., receivers capable of receiving both analog and DTV signals).<sup>27</sup>

Absent a specific grant of authority by Congress to apply the same type of receiver requirements intended to preserve analog UHF television service, to digital television receivers, the Commission is compelled to allow, as it has thus far, market forces to drive DTV receiver performance.

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<sup>25</sup> 47 U.S.C. § 303(s).

<sup>26</sup> In adopting the 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, 87<sup>th</sup> Cong., 2d Sess. 2 (1962). In fact, the Commerce Committee was impressed with the FCC’s judgement that “it was necessary to break this vicious cycle that has been strangling UHF television. *See Id.*”

<sup>27</sup> *Memorandum Opinion and Order/Third Report and Order/Third Further Notice of Proposed Rulemaking* in MM Docket No. 87-268, 7 FCC Rcd 6984 (1992), *Reaffirmed in Fourth Further Notice of Proposed Rule Making and Third Notice of Inquiry* in MM Docket No. 87-268, 10 FCC Rcd 10540, 10552 (1995).

**B. Government-Imposed Receiver Standards Serve No Useful Purpose In an Already Competitive Marketplace, and Would Only Stifle DTV Innovation and Unnecessarily Delay the DTV Transition.**

Assuming *arguendo*, that the Commission possessed sufficient authority to impose government-mandated DTV receiver standards, such regulation would be unnecessary and would have serious negative consequences on the pace of both DTV innovation and the transition overall.

As discussed earlier, marketplace incentives are more than sufficient motivation for manufacturers to design DTV receivers to receive DTV signals as reliably as possible at every stage of DTV technology's development.

Moreover, it is important to note that, consistent with the competitive nature of the CE industry, improvements in DTV chips and receivers will be introduced on a *rolling* basis: numerous manufacturers will introduce new generations of DTV products – with successively greater performance improvements – *continuously*. In other words, a performance “baseline” set by Thomson in July 2000 will, in all likelihood, be reset by another manufacturer's innovation in a few months, and then, yet again, by another manufacturer several months after that. This kind of rapid technological “leapfrogging” is emblematic of the consumer electronics marketplace and will serve to ensure that consumers have access to state-of-the-art DTV receiver technologies nearly as quickly as they are developed. Moreover, such a technological “race to the top” will inevitably yield spin-off DTV-related innovations, further benefiting consumers and the advancement and continued viability of over-the-air television.

Were the Commission to overlay on this competition-driven innovation model government-imposed performance standards, it would effectively nullify these efforts, and actually have the effect of slowing the introduction of receiver innovations. If the

market is allowed to drive these innovations,<sup>28</sup> *and* if the Commission continues to address other DTV implementation issues in a manner that does not inject uncertainty or delay in the transition, *and* if consumers see a steadily increasing amount of available HDTV programming, Thomson has every confidence that the concerns underlying some broadcasters' calls for government-imposed DTV performance standards will cease as a practical matter by 2002.

Importantly, the Commission has historically recognized the advantages of relying on market forces to dictate receiver design rather than trying to forecast consumer demand. Specifically, earlier in the digital television proceeding, the FCC recognized the difficulties of predicting consumer demand and declined to mandate the manufacture of a certain type of DTV receiver.<sup>29</sup> The Commission's concerns about predicting market demand still hold true. Equipment manufacturers, motivated by market demands, are still in the best position to respond to market changes free of regulatory constraints that will only limit consumer choice.<sup>30</sup> To ensure digital television's rapid deployment, the Commission should refrain from mandating DTV receiver standards.

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<sup>28</sup> In its *Fifth Report and Order*, the Commission determined 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. As discussed *supra*, Thomson believes any form of government-imposed performance standards would likely slow this innovation timetable substantially.

<sup>29</sup> 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).

<sup>30</sup> See *Advanced Television Systems and Their Impact Upon Existing Television Broadcast Service*, Fifth Report and Order, 12 FCC Rcd 12809, 12855-6 (1997).

## **VI. OUTSTANDING CABLE COMPATIBILITY ISSUES MUST BE RESOLVED.**

Notwithstanding the formidable, and laudable, efforts of the Commission, as well as the enormous private resources devoted to solving the myriad technical, legal, and regulatory issues necessary to make America's transition to DTV possible, unless America's 67 million-plus cable-subscribing households<sup>31</sup> are able to access the benefits that DTV has to offer, the DTV transition will be doomed.

Thomson has consistently advocated a DTV transition that encompasses both cable subscribers and consumers who receive their broadcast signals over-the-air.<sup>32</sup> The success of America's transition to DTV can only be assured if, throughout the transition period and beyond, consumers are confident that the DTV equipment they purchase is compatible with any DTV delivery medium that they access. To that end, Thomson commends the recent industry-led efforts that produced the agreement between CEA and NCTA to provide baseline compatibility between cable systems and digital televisions. Thomson believes the approach encompassed in the CEA/NCTA agreement is a very positive development. However, Thomson does not believe that this agreement represents a complete solution. Much work remains to be done, particularly in the area of copy protection.<sup>33</sup> Nevertheless, Thomson remains committed to working with all interested parties to ensure a complete and lasting solution to all remaining cable

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<sup>31</sup> *Source:* National Cable Television Association < <http://www.ncta.com/glance.html> >.

<sup>32</sup> *See, e.g., Comments of Thomson Consumer Electronics, Inc.* in MM Docket 98-120 (October 13, 1998) at 6.

<sup>33</sup> Thomson will file separate substantive comments regarding copy protection and DTV labeling in the Commission's proceeding examining those issues.

compatibility issues, so as to ensure a smooth and complete DTV transition for all consumers.

**VII. GREATER AMOUNTS OF HIGH QUALITY, DIGITALLY-PRODUCED PROGRAMMING ARE CRITICAL TO DRIVING THE DTV TRANSITION.**

As discussed above, Thomson and other DTV manufacturers have delivered on the promise they made at the onset of the DTV transition, offering, less than 18 months after the initiation of the first DTV services in the U.S., more than 150 DTV products, at dramatically declining prices, to consumers. However, if broadcasters do not keep their end of the bargain by offering increasing amounts of digitally-produced programming, especially HDTV – the driver technology for American consumers – this effort will be wasted. It cannot be overstated: “content is king.” Without it, DTV penetration will never reach levels sufficient to meet Congress’s 2006 deadline, and interest and investment in DTV will wither.

While a few broadcasters have made progress in offering growing amounts of regularly-scheduled HDTV programming, most have virtually fallen off the DTV radar screen. Just as the Commission has put enormous *positive* pressure on the CE and cable industries to resolve outstanding compatibility issues to drive the transition forward, so too should the Commission now lean heavily on broadcasters to step up to the plate to offer consumers DTV programming at levels of quality and quantity needed to spur consumers to make the transition. Moreover, the Commission should make clear that it expects broadcasters to deliver more than just upconverted analog programming, and instead offer high quality HDTV programming to the greatest extent possible.

**VIII. CONCLUSION.**

Thomson again applauds the Commission for its tireless work on behalf of American consumers and all DTV stakeholders to ensure that the transition to DTV is a success on every level, and that challenges to DTV's implementation are addressed in a constructive, not a destructive, manner. We urge the Commission to consider the recommendations contained herein and look forward to continuing to work with the Commission and other stakeholders toward a successful and swift DTV transition for all Americans.

Respectfully submitted,

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May 17, 2000

## **APPENDIX A**

*THOMSON multimedia - Bringing HDTV to the People*

# **HDTV for Everyone When Will It Happen?**

*SMPTE New York Meeting Mar 15, 2000*

*Dave Badger - Director of US DTV MMP R&D*

*THOMSON multimedia - Bringing HDTV to the People*

# **Factors Influencing DTV Sales Growth Great Pictures and Sound !**

- **Everyone who sees HD is amazed**
- **Even SD video is often superior to analog cable**
- **AC-3 audio is richer than BTSC**
- **HD programming, new digital features, and lower prices will make HDTV a success**

# **Factors Influencing DTV Sales Growth Device to Device Compatibility**

- **Examples**
  - **VGA vs YPrPb baseband connections**
  - **1394 port implementation**
- **Complicates retail story (can't explain it)**
- **Frustrates consumer (buyer remorse)**
- **CE industry defining common terms and interfaces**
- **Market converging - driven by retailers**
- **Common interfaces in 2000**

# **Factors Influencing DTV Sales Growth Price**

**HDTV design trends toward integration**

**2:1 reduction in IC, parts, and size for next gen**

**Multiple IC suppliers for HD parts - competition**

SGS-Thomson

Teralogic

Motorola

Broadcom

**Price reduced 50% in 2 years**

**Hi-Res 4x3 monitors now at \$2.5k**

**Integrated 16x9 PTV sets going to \$5k soon**

**Set Tops now at \$650**

**Price trend will support/accelerate growth**

**SDTV products on steep curve**

**HDTV price will decline slower due to display cost**

*THOMSON multimedia - Bringing HDTV to the People*

# **Factors Influencing DTV Sales Growth Digital Cable Compatibility**

**Dependent on digital cable roll out rate  
Digital cable requirements for receivers  
defined**

**PSIP will be passed - key issue**

**Labeling issue should soon be resolved**

**Copy protection licensing is still at issue**

**Product available en masse in 2002**

**Requirements in 2000**

**First product in 2001**

# **Factors Influencing DTV Sales Growth Broadcast Compatibility**

**Most problems are due to specification ambiguities or misinterpretations**

**ATSC is an open system**

**Easily solved through mfg/broadcaster cooperation**

**Many PSIP implementation issues**

- not a key issue, PSIP not yet used in most receivers

**A few encoder/decoder issues**

- mostly a 1999 problem

**Encoder mfg, decoder mfg, and broadcaster are learning quickly**

**Only sporadic problems with new stations and equipment mfg in 2001**

# **Factors Influencing DTV Sales Growth**

## **Receiver Performance**

- **Sensitivity - very good**
  - most receivers within 1.5 dB of theoretical implementation loss and improving
- **Adjacent channel performance - very good**
  - dual SAWs often used
- **Co-channel**
  - some receivers need improvement in NTSC into ATSC
  - fixed in 2nd generation

# **Factors Influencing DTV Sales Growth Receiver Performance**

## **Multipath performance needs to be improved**

### **Present receivers work with outdoor antennas**

- Antenna selection and installation is critical in some cases

### **Set top antennas can be used in many locations**

- with current receivers having decent dynamic multipath such as the DTC100
- high success rate in benign environments such as midwest and LA
- lower success rates for worst environments such as Manhattan

# **Factors Influencing DTV Sales Growth Receiver Performance**

**Multipath performance will improve**

**Noticeable improvement in 2000**

**Significant improvement in 2001**

- Still some problem locations
- Will not affect consumer acceptance

**Indoor antennas work nearly everywhere in 2002**

- Portable applications begin to be realistic

# Multipath Performance Improvement Priorities

## Dynamic Multipath

**Once a signal is acquired, small variations in ghost must be accommodated as consumer moves around**

**Need to track to 5-10 Hz for indoor applications**

- this is done on best of current designs
- tracking needs to be maintained for stronger ghosts

**Need to track to 300 Hz for airplane flutter**

- much more difficult
- but most airplane ghosts are lower level, below threshold for strong received signal level

# **Multipath Performance Improvement Priorities**

## **Acquire and maintain lock**

**Some mid-level ghosts can squash carrier and/or timing recovery loops**

**Would prevent success of other solutions**

**Methods are being developed to aid recovery loops Improved in 2001 if not before**

# Multipath Performance Improvement Priorities

## Static ghost performance

### Handle longer ghosts

- designs going from 22  $\mu$ S to 44  $\mu$ S equalizer lengths
- must not degrade tracking or acquisition performance
- available in 2000

## Handle very strong ghosts or multiple strong ghosts

- Need bigger feed forward path
  - sparse equalization
  - dynamic allocation of resources
- More complicated control/convergence algorithms
- Must not degrade tracking or acquisition performance
- May require 2 more years

## **Consumer Acceptance**

**Consumer acceptance will drive the market**

**Need high definition for WOW factor**

**Presently in early adopter phase**

**Willing to go through installation**

- *and are successful, few reception issues*

**Love the pictures**

- Leno, Super Bowl, Raymond, Titanic, etc generate excitement

**Frustrated by**

- Lack of programming
- Equipment compatibility

**See for yourself at [www.avforum.com](http://www.avforum.com)**

## **DTV Timetable**

**2000**

**Reduce price**

**Fix equipment and broadcast compatibility**

**Improve NTSC co-channel and multipath**

**2001**

**Reduce price**

**Further improve multipath**

**Begin to offer digital cable compatible receivers**

**2002**

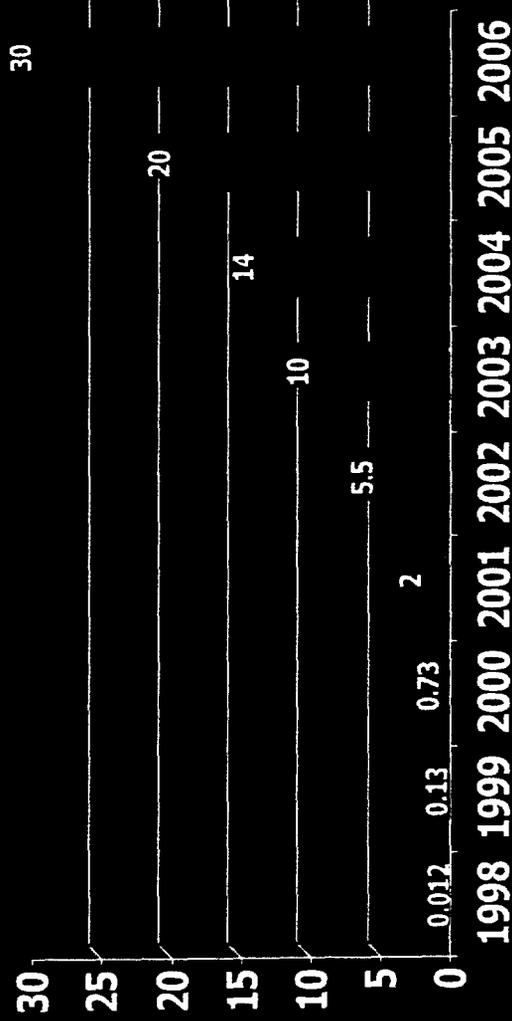
**Priced for the masses**

**Indoor antennas work everywhere**

**Digital cable ready receivers widely available**

# Digital Television Growth (Estimated from CEA Predictions)

Digital Television Receivers Cummulative  
(millions)



Growth assumes:

More products

More stations

More HD programming

2000 Q1 sales 20k/mo - on target

## **Conclusion**

**DTV receiver improvements will support a large increase in volume in 2002 and beyond**