

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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JUN 23 1995

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)
)
Digital Data Transmission Within)
the Video Portion of Television)
Broadcast Station Transmissions.)

MM Docket No. 95-42
RM-7567

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To: The Commission - Mail Stop 1170

COMMENTS OF RADIO TELECOM & TECHNOLOGY INC.

1. Radio Telecom & Technology Inc. (RTT) herein submits these comments in response to the Commission's Notice of Proposed Rule Making (NPRM) in the above-captioned proceeding, FCC 95-155, released May 2, 1995. RTT is a developer and manufacturer of new technologies, including technologies related to broadcasting, and supports the adoption of rules in this proceeding that will allow broadcasters wide flexibility to utilize new digital technologies integrated with NTSC television transmission. RTT urges that rules permitting the transmission of digital data within the video portion of television broadcast transmissions be adopted in this proceeding, but the pace of invention is so rapid that no mandatory or protected uniform standard should or need be adopted, at least at this time and perhaps not ever. RTT also asks the Commission to rule on certain practices that slightly modify the traditional NTSC waveform to accommodate digital transmissions.

2. Under existing rules, broadcasters may transmit ancillary signals on certain lines of the TV vertical blanking interval (VBI), provided there is no observable degradation of the TV signal. While this proceeding focuses largely on the insertion of ancillary signals in the video

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portion of the TV signal, the NPRM nonetheless discusses all kinds of ancillary signal insertion, even in the TV blanking intervals, and solicits comments on these more general questions as well. The scope of this proceeding is thus broad enough to encompass RTT's "two-Way TV" technology which operates in a "reverse VBI" mode, permitting response links from viewers to broadcasters. RTT requests consideration this technology within the regulatory framework which may emerge in this proceeding.

3. RTT has devoted the last ten years to the development of methods for superimposing information on television signals in a manner that is compatible and non-interfering. The United States and other countries have awarded patents to RTT covering a generic area called "synergistic modulation," which patents directly bear on the subject matter of this NPRM and which are a key subset of RTT's patented "T-NET" wireless data transmission system. The T-NET system is currently being deployed in the Interactive Video and Data Service (IVDS) in the 218-219 MHz band but is readily adaptable to TV broadcast bands. RTT is a key supplier of IVDS equipment, with contracts to install the T-NET system in the eight largest U.S. cities, as well as letters of intent to do so in over 125 additional markets.

4. RTT supports the concept of enhancing the efficiency and opening new market opportunities for existing television broadcasters within the existing broadcast spectrum. As noted in previous RTT comments addressed to the rule making petition of WavePhore, Inc. (WavePhore), RTT believes that any broadcaster who wishes to superimpose signals on an existing television signal should be permitted to do so without prior Commission authorization,

as long as the signal does not degrade the television broadcast reception in any discernible way.^{1/} In this NPRM, the Commission basically proposed to grant this latitude to broadcasters but is concerned with future signal compatibility issues, and perhaps future deterioration of signal quality. RTT believes the Commission should not be concerned with these matters for two reasons: (1) the market place has and will continue to reward or punish on the basis of what it finds acceptable; and (2) in the more distant future, advanced television (ATV) is planned to replace NTSC over a period of years. The proposals in this proceeding provide an excellent way to allow the public itself either to accelerate the phase-out of NTSC or to embrace a more capable version which has been enhanced by the new technologies.

5. Accordingly, RTT urges the Commission to approve any new method or application to enable broadcasters and the public to benefit from the fruits of new communications technologies, all of which will become part of the so-called "Information Superhighway." Unless new technologies are allowed to come into being without undue regulatory restraints, television broadcasters will not be able to compete effectively in the future multimedia and interactive television world.

6. There is at least one major question which the Commission must address in evaluating WavePhore's specific technology that is not a question with any of the other technologies

^{1/} It may be appropriate for the Commission to examine each technology one time, through the equipment authorization process under Part 2 of its Rules; but there appears to be no reason to subject both broadcasters and the Commission to the administrative burdens involved in authorizing individual broadcast stations to transmit ancillary data.

discussed in the NPRM or with RTT technologies: the impact of WavePhore's proposal to insert its new data signal within the NTSC signal in the range between 3.9 MHz and 4.2 MHz.^{2/} WavePhore's proposed signal lies between the chroma subcarrier and the audio carrier. The bottom paragraph of page 2 of WavePhore's original request to the Commission indicates that "the encoder performs two functions: a slight low pass filtering and delay equalization of the video signal and linear addition of the data to the video." This spectrum reformatting function raises the question of whether it is permissible to filter out some of the video signal customarily required by Commission rules in order to insert the desired new data signal.

7. Considering this question in more detail, Figure 5 of Section 73.699 of the Commission's current regulations shows clearly that the bandpass characteristics of the transmitted video signal channel is expected to begin to roll off at a frequency above 4.2 MHz, reaching a negligible value just below the sound carrier centered at 4.5 MHz. On the other hand, at the TV receiver, Figure 11 of rule 73.699 illustrates the assumed (by the Commission) TV receiver detector output and indicates that the ideal receiver detector output rolls off at frequencies above 4.2 MHz. WavePhore apparently wishes to roll-off the video below these limits, at approximately 3.9 MHz, where their signal begins. This roll-off could not only adversely affect the monochrome picture high end fidelity but could also cause the chroma subcarrier I and Q sidebands to become even more asymmetric. This asymmetry is caused by the fact that the I component of the chroma subcarrier nominally has a bandwidth of 1.5 MHz, therefore extending sidebands this amount above and below the 3.5795 MHz subcarrier (i.e.,

^{2/} RTT raised this issue in comments on WavePhore's initial petition.

2.1 to 5.1 MHz). However, the upper sideband is truncated at 4.2 MHz, as noted above, making it asymmetrical. On the other hand, the Q component, the nominal bandwidth of which is about 0.5 MHz, is not so badly affected. If the I component upper sideband is further truncated to 3.9 MHz (only 0.32 MHz rather than ideal 1.5 MHz above the subcarrier), one will be hard put to call the resulting modulation true QAM (quadrature amplitude modulation), which is the basis for this NTSC multiplexing scheme. Historically, this asymmetry has been one of the main factors causing the artifacts seen on NTSC television.

8. Consequently, a question arises as to whether or not a broadcaster may reshape the output of its transmitted video signal so as to delete any video that might otherwise interfere with the proposed new inserted data. Would such reshaping affect any equipment authorization issued pursuant to Part 2 of the Rules for the underlying transmitter, or require a new notification to the Commission? RTT's design philosophy has always assumed that existing video bandpass characteristics described in the Commission's Rules are not to be altered. RTT has experimented with modulation mechanisms, both at baseband and subcarrier, so as to position the new data signal energy in various portions of the assigned TV channel, including areas between the chroma subcarrier and the sound subcarrier (in 1988 trials). If the Commission permits alteration (e.g., notching or faster roll-off) of the video bandpass characteristics, then RTT will revisit the question of placing its data signal between the chroma subcarrier and the audio carrier, or indeed at any other place where a "notch" would not "cause discernible degradation of the video signal." All of these options are covered under RTT patents.

9. On the other hand, if the Commission takes the position that the video bandpass characteristics as set forth in Section 73.699 must not be altered, that would set a different standard for designers. RTT requests clarification on this point in this proceeding.

10. The Commission must base its decision not only on the basis of the WavePhore's request but also within the context of the numerous multimedia technologies and applications of which WavePhore's proposal is only one example. If broadcasters are given the flexibility to use their signal in a variety of ways, as long as there are no discernible effects on NTSC transmissions to television receivers or on adjacent channels, and the public is the beneficiary, then the Commission should not be concerned with the details of implementation. RTT further believes the judgment as to whether the new signal is discernible or not should be left to the broadcaster, who has a powerful market-based incentive to preserve the quality of the main video program signal so as not to lose viewers.

11. It is clear to technical experts that the NTSC standard that has served many nations well for several decades is no longer an efficient format by itself in today's world of highly advanced electronic technology. Nevertheless, NTSC is and will continue to be a good work horse that can carry considerably more information in a synergistic manner than anyone has heretofore imagined. The NBC application noted in the NPRM and approved by the Commission, as well as the proposed WavePhore and RTT technologies, are merely a first opening of the door to the many potential applications that can effectively share today's 6 MHz NTSC channel.

12. A particularly exciting example of a new application of television technology is the future use of "reverse VBI" to transmit TV viewer replies back to the broadcast studio. RTT calls this two-way TV. RTT has demonstrated that broadcasters can use their existing 6 MHz bandwidth not only to send data-over-video outbound to viewers superimposed on TV video but also to receive inbound viewer responses during the NTSC blanking intervals. This technology is described and discussed in U.S. patent numbers 4,750,036 and 5,177,604 granted to RTT and in pending applications.

13. In the instant proceeding, the Commission must look beyond the applications recited in the NPRM. Eliminating regulatory constraints will open the door to new ideas, and no one can know today what these ideas will be tomorrow. RTT looks to the time when broadcasters are given greater flexibility to use their spectrum in such applications as two-way television.^{3/} Such flexibility could immediately launch broadcasters into the interactive TV world in a very competitive position, without requiring additional spectrum. Viewers could quickly and easily respond with their remote control keypads to surveys, home shopping, educational programs, town hall meetings and the like. This kind of activity would fit within the concept of mass media "broadcasting" in the most traditional sense of the term.^{4/}

^{3/} To guard against even the potential for interference to conventional television reception, initial technical standards for co-channel viewer response signals could be based on the same concepts the Commission developed for IVDS (Interactive Television and Data Service), for example, the five-second-per-hour duty cycle for each subscriber unit.

^{4/} Data transmission of the nature discussed in these comments does not raise the issue currently being debated in Congress over whether broadcasters should be permitted to use new spectrum for any purpose they like without paying for it. That debate relates principally to new
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14. RTT holds an experimental license to investigate and demonstrate two-way television technology co-channel, and in cooperation with, an existing television broadcast station serving the New York City market. RTT looks forward to submitting the results of its experiment to the Commission and subsequently requesting approval permitting broadcasters to use their channel for co-channel viewer responses in a manner similar to IVDS, including its protective provisions (e.g., viewer responses limited to 5 second cumulative transmission per hour).

15. The number of potential new technologies, and the rapidity with which they are being developed, should make it abundantly clear that the adoption of a single technical standard at this time is at a minimum premature, if not unwise in all respects. Any uniform standard, whether mandatory or simply protected from any conflicting system, will saddle the public with what will surely soon be deemed a rudimentary and outmoded technology. There are many reasons for standardizing the main broadcast picture, including the accompanying stereophonic audio, even at the cost of stifling or slowing technological innovation, so that the public does not have to purchase multiple receivers to watch basic television programs. There is much less reason to stifle innovation by standardizing ancillary signals, which may or may not be program-

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spectrum to be allotted to broadcasters for ATV. The type of data transmission proposed by WavePhore, NBC, and RTT is no different in basic concept from VBI and subcarrier data transmissions that have been permitted by the Commission for many years at the discretion of broadcast licensees.

related, but certainly are not required to view the basic program. If one technology is clearly superior, its superiority will emerge in the marketplace, without any government fiat.^{5/}

16. At paragraph 25 of the NPRM, the Commission expresses concern that data signals may be inserted "upstream" of, and in a manner perhaps undetectable by, the broadcaster. This could undermine the licensee's effective control. RTT wishes to note that data signals can also be inserted "downstream" of the TV transmitter, using RTT's synergistic modulation technology (as described in the patents recited in paragraph 12, supra), to transmit different information in different directions and vastly increase the data through-put. Broadcasters can nonetheless maintain control, because RTT proposes to furnish them a monitor; and, of course, the contractual agreement can provide for appropriate safeguards.

17. Decisions relating to the future of NTSC television and associated synergistic technology must be made and implemented notwithstanding the future advent of Advanced Television Systems (ATV). While the instant NPRM indirectly raises the ATV issue, the question of the phasing out NTSC in favor of ATV cannot help but come to mind. If technologies such as proposed by WavePhore, RTT and others find strong market appeal, then NTSC may be phased out more slowly than many have predicted. With some 300 million NTSC television receivers operating today in the United States, NTSC technology may continue to benefit the public in new ways far longer than the Commission has previously anticipated.

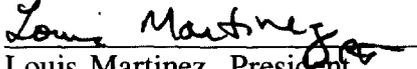
^{5/} Even the infamous conflict between Beta and VHS home videotape formats, involving billions of dollars of consumer purchases, resolved itself without government intervention.

Therefore, RTT urges the Commission not to delay approval of the instant petition because of fear that NTSC may "compete" with ATV or become entrenched longer than anticipated. If NTSC is a service the market demands, improvements must not be stifled,^{6/} and the system must be allowed to operate, until the market decisively moves in favor of a replacement.

Of Counsel:

Respectfully submitted,

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June 23, 1995

^{6/} Indeed, the emerging data transmission capacity of the NTSC system is as much a "new technology" as ATV and is entitled to the same encouragement under Section 7 of the Communications Act.