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Federal Communications Commission
Office of the Secretary

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

In the Matter of	)	
	)	
Advanced Television Systems and Their Impact on the Existing Broadcast Service	)	MM Docket No. 87-268

Summary of
Reply Comments
of
National Broadcasting Company, Inc.

The comments filed in this proceeding uniformly demonstrate interest in responding to the public's desire for enhanced television service. Yet, largely because broadcasters are constrained by their present spectrum allocations, nonbroadcast video services may be in a position to provide enhanced television service more readily and sooner than television broadcasters.

Television broadcasters must be able to provide visual (and auditory) enhancements promised by ATV in conjunction with their nonbroadcast competitors. Otherwise, over-the-air television broadcasting may be relegated to the status of a "second-class" service, which, while available to all, may be spurned by those members of the public who can (and choose to) afford enhanced, nonbroadcast video services. Ultimately, the erosion of broadcast television's broad audience base caused by this exodus may significantly reduce over-the-air broadcast television's ability to continue to serve the public in its present manner.

NBC's ACTV system, a 6-MHz, NTSC-compatible ATV system, has several critical advantages over other proposed systems. It will allow broadcasters to participate in ATV sooner than any other system. It can be provided by every existing broadcaster on its present channel. The cost of modification of existing transmitters would be moderate in comparison with the expense of new transmission equipment that would be entailed by ATV systems requiring augmentation with additional spectrum. Furthermore, the cost of ACTV receivers should compare favorably with that of other ATV receivers.

ATV systems that would require reallocation of existing spectrum or additional spectrum entail formidable risks and time delays for broadcasters desiring a system to compete with alternative media. We do not believe, as some have proposed, that simulcasting represents functional compatibility.

Simulcasting would require, at a minimum, additional transmission and antenna facilities. The use of an additional channel for the same program material can hardly be considered spectrally efficient or inexpensive. Furthermore, ATV systems requiring the use of a separate converter for the signal to be viewed on NTSC receivers do not meet the definition of compatibility of paragraph 81 of the Notice.

While ACTV in its present form can deliver ATV to the home without any additional spectrum, in the future consumer preferences may demand higher-definition delivery to the home. If and when that occurs, ACTV will require the additional spectrum that competing systems need immediately. Recognizing this, NBC has urged the Commission to proceed with studies to determine additional spectrum availability for ATV.

All of the ATV systems currently under consideration can be said to achieve less than maximum quality enhancement due to signal compression. "True" HDTV may be represented by a signal with on the order of two times the vertical and horizontal resolution of NTSC. MUSE, like all other currently-proposed ATV systems, does not meet this criterion for typical moving television pictures. Until prototype ATV systems are developed and psychophysical tests of audience perception are conducted, it will not be possible to predict with any degree of certainty which artifacts will pass unobserved and which will be unacceptable to viewers. Nevertheless, preliminary subjective studies indicate that wider aspect ratio contributes more to viewer satisfaction than higher resolution. Therefore, at the present stage of development, it appears that, given the quality limitations imposed on all ATV systems by the present necessity for bandwidth compression, home viewers will find ACTV substantially comparable in image quality to the other ATV systems under consideration. Moreover, considering the other clear advantages that ACTV will have over other systems, particularly NTSC compatibility, it is likely that ACTV will be preferred by consumers.

ACTV will afford the significant advantage of being implementable in its present form in the near term, while being adaptable to any spectrum augmentation strategy. ACTV can provide both present signal enhancement and act as a bridge to further improvements that may require additional spectrum. Spectrum decisions should not and need not be made in haste. With a system such as ACTV, every broadcaster and other video service provider choosing to do so can provide wide-screen, enhanced-resolution transmissions comparable to those promised by other ATV systems. NTSC receivers will not be rendered instantly obsolete so that viewers can continue to enjoy their accustomed program service, either with or without the significant quality enhancements that ACTV will deliver.

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Reply Comments of National Broadcasting Company, Inc.

National Broadcasting Company, Inc. (NBC) files the following reply comments in response to the comments filed in connection with the Notice of Inquiry (Notice) in the above-referenced proceeding.

I. The Public Interest Will Suffer If Television Broadcasters Are Not Able To Participate In The Service Enhancements Promised By Advanced Television Systems (ATV) At The Same Rate As Nonbroadcast Video Delivery Systems.

The comments filed in this proceeding uniformly demonstrate interest throughout the various sectors of the industry in responding to the public's desire for enhanced television service. Yet, largely because broadcasters are constrained by their present spectrum allocations, it appears that nonbroadcast video services may be in a position to provide enhanced television service more readily and sooner than television broadcasters.

The comments indicate that broadcasters wish to meet in a timely fashion the competitive challenge that will be posed by ATV provided by nonbroadcast video purveyors. Moreover, it is clear that this objective is not merely self serving; rather, it is strongly supported by public interest considerations. Television broadcasting is the only video service that today is virtually universal. That is, every home equipped merely with a conventional television set can receive some stations without making any additional expenditure or installing any additional equipment. This is not true of any other video delivery service, from basic cable through video cassette recorders and home satellite receiving antennas. Though all video services require a television receiver (or monitor) to be viewed in the home, each nonbroadcast video service also will require additional expenditures, as well, for equipment and/or actual program service.

Television broadcasters must be able to provide visual (and auditory) enhancements promised by ATV in conjunction with their nonbroadcast competitors. Otherwise, over-the-air television broadcasting may be relegated to the status of a "second-class" service, which, while available to all, may be spurned by those

members of the public who can (and choose to) afford enhanced, nonbroadcast video services. Ultimately, the erosion of broadcast television's broad audience base caused by this exodus may significantly reduce over-the-air broadcast television's ability to continue to serve the public in its present manner.

This concern is especially serious because television broadcasting is the only video service that today provides any significant amount of local and locally-oriented programming. Not only has broadcast localism been mandated by the allocations scheme promulgated pursuant to Section 307(b) of the Communications Act and other Commission rules and regulations, it also has been dictated by the concerns of good business in response to consumer preferences.

Yet, local programs that are attractive to viewers also are an expensive business. If the enhancements of ATV provided by nonbroadcast video services do significantly erode broadcast television audiences, as posited above, the unique role of television broadcasting as a provider of local television informational and entertainment programming will be seriously impaired, to the clear detriment of the public interest.

II. A 6-MHz, NTSC-Compatible ATV System, Such As NBC's ACTV, Will Ensure That Broadcasters Are Able To Keep Pace With Nonbroadcast Video Delivery Systems.

The above-described scenario need not transpire, if terrestrial broadcasters are able to take advantage of the opportunity to provide ATV service in the near term afforded by technologies such as NBC's ACTV system. ACTV, a 6-MHz, NTSC-compatible ATV system, has several critical advantages over other proposed systems.

First and foremost, it will allow broadcasters to participate in ATV sooner than any other system. ACTV can be provided by every existing VHF or UHF broadcaster on its present 6-MHz channel. It is NBC's view that ACTV signals could be transmitted by broadcasters and viewed on receivers available to consumers by 1991 or 1992.

Some modification of existing transmitters would be necessary. But these costs would be moderate in comparison with the expense of new transmission equipment that would be entailed by ATV systems requiring augmentation with additional broadcast spectrum. Furthermore, we believe that the cost of ACTV receivers will compare favorably with that of other ATV receivers.

ATV systems that would require reallocation of existing spectrum or additional spectrum entail formidable risks and time delays for broadcasters desiring a system to compete with alternative media. In particular, NBC believes that the NHK proposal that the United States reallocate VHF and UHF spectrum to 9-MHz spacing is impractical for several reasons. All existing television receivers would be rendered obsolete. The number of broadcast services that could be accommodated within the existing spectrum would be reduced by a third. The economic disruption to broadcasters and the public of any reallocation plan is likely to make the concept impractical for the near-term future. Even if a scheme involving spectrum reallocation were to be implemented broadcasters would not be able to respond competitively for many years into the future under any such scheme.

Alternatively, were microwave spectrum to be used for ATV, differences in signal propagation characteristics could well require new and/or additional transmitter sites, relay equipment and relay channels. Our preliminary view is that microwave spectrum would be impractical as well as expensive, particularly if multiple transmitters at different sites are neccessary, for ATV. Long experience has shown that VHF and UHF spectrum is satisfactory for terrestrial broadcasting. On the other hand, particularly in urban areas and areas with

rugged terrain, it is not at all clear that microwave transmission ever could provide wide-area coverage comparable to that currently provided by broadcast television stations. Serious concerns exist as to whether propagation mechanisms inherent in the higher microwave frequencies will limit their effectiveness for a similar terrestrial service. This is certainly a major reason for the Commission to hold off on reallocating VHF and UHF spectrum for uses other than terrestrial broadcasting, at least until the long-term spectrum needs of ATV have been determined and a plan for meeting them established.

While ACTV in its present form can deliver ATV to the home without any additional spectrum, in the future consumer preferences may demand higher-definition delivery to the home. If and when that occurs, ACTV will require the additional spectrum that competing systems need immediately. Recognizing this, NBC has urged the Commission to proceed with studies to determine additional spectrum availability for ATV.

The time problem posed in implementation of any system requiring reallocation of spectrum should not be minimized. Indeed, spectrum allocation is such a time-consuming process that, if they must await its outcome in order to compete in the ATV arena, broadcasters

will be seriously damaged economically. Furthermore, after the reallocation issues are decided, broadcasters then must undergo the whole implementation process, including the acquisition of additional sites, environmental impact process and local zoning compliance, not to mention the installation of equipment, all of which exacerbates the time problem.

In contrast, ACTV in its present form can be implemented as soon as the equipment is available, without involving the Commission in costly and time-consuming reallocation studies, although additional spectrum will be necessary in the future even for ACTV as transmission systems are developed that are capable of providing higher definition and resolution than any of the ATV systems proposed today. Moreover, because ACTV will be NTSC-compatible, the television receivers in the homes of viewers will not be made immediately obsolete by ACTV. Indeed, ACTV transmission will not noticeably degrade the signal received on NTSC receivers and in fact will improve it. ACTV will allow broadcasters to respond competitively more quickly than any other ATV system proposed to date.

NTSC compatibility, or what several comments refer to as "backward compatibility," is endorsed as an essential component of any ATV system by many commenters, including

the Association of Maximum Service Telecasters (AMST), Hitachi, Outlet Broadcasting, Pulitzer Broadcasting, Tribune Broadcasting, North American Philips (NAP), Times Mirror Broadcasting, King Broadcasting, Zenith Electronics, Meredith Corporation, National Telecommunications and Information Administration (NTIA), Chronicle Broadcasting, Cox Enterprises, Del Rey Group, Black Television Workshop and others.

An additional advantage of ACTV in achieving NTSC compatibility is that it will not require two separate transmissions (and the additional spectrum attendant upon this) to be viewed by those members of the viewing public who do not immediately choose to or who cannot afford to purchase ACTV receivers. Indeed, we do not believe, as some have proposed, that simulcasting represents functional compatibility. Simulcasting would require, at a minimum, additional transmission and antenna facilities. While NTSC/ATV simulcasting may be one way to minimize disruption to NTSC viewers, the use of an additional channel for the same program material can hardly be considered spectrally efficient or inexpensive and therefore must be regarded as quite impractical.

It also should be noted that ATV systems requiring the use of a separate converter for the signal to be viewed on NTSC receivers do not meet the definition of

compatibility of paragraph 81 of the Notice. On that basis, they should not be claimed to be "compatible." Furthermore, as the comments of the National Black Media Coalition and National Association for the Advancement of Colored People point out, any ATV system that requires a converter in order to receive television service that is available today without the converter unreasonably penalizes the consumer, particularly the less-affluent consumer, by requiring additional expenditures.

Presumably, consumers desiring ATV service from one video medium will also desire ATV from others they may be able to receive. Indeed, the reality is that viewers typically do not distinguish among the sources of the programs that they receive on their TV sets. Nor should they be expected to. Therefore, just as it is important that broadcasters be able to offer ATV service competitive with alternative media, it also is important that the alternative media are able to utilize the same techniques adopted by broadcasters. Only in this manner will the inevitable expense to the consumer of ATV service from all media be minimized. ACTV meets this requirement.

Clearly, ACTV will allow broadcasters to upgrade to ATV sooner, more practically and less expensively than other ATV systems currently under consideration.

Additionally ACTV will not disrupt present NTSC viewers or cause them any extra costs, but, indeed, will actually eliminate certain artifacts from the NTSC picture.

III. ACTV Will Offer A Very Substantial Improvement To NTSC In Providing Widescreen, Enhanced-Resolution Picture Quality.

Some of the comments filed in this proceeding express doubt that the maximum quality enhancement promised by advanced television technology can be achieved in 6 MHz, because the need for bandwidth compression entails the sacrifice of certain signal improvements. Indeed, the Commission has recognized that "most higher definition transmission systems trade off video/audio quality performance ... for reduced transmission bandwidth," Notice, at page 5 paragraph 39, and that any signal compression will result in some loss of signal quality. All of the ATV systems currently under consideration can be said to achieve less than maximum quality enhancement due to signal compression.

NBC disagrees with the implication that MUSE is synonymous with HDTV. It is commonly accepted that "true" HDTV may be represented by a signal with on the order of two times the vertical and horizontal resolution of NTSC. MUSE, like all other currently-proposed ATV systems, does not meet this criterion for typical moving television pictures.

NBC agrees with the definition of ATV in paragraph 19 of the Notice that establishes NTSC as the reference for comparison of proposed improvements. MUSE should not be used as a reference because it is one of the systems under development. Furthermore, its parameters and performance often have been changed and it already exists in numerous versions, each with its own level of performance.

Moreover, we believe that it overstates the facts to assert that MUSE has been "vigorously tested." MUSE has been demonstrated in various forms but has received only one limited terrestrial test, to our knowledge. As the National Association of Broadcasters (NAB) states: "In the end it is the viewer, of course, who will judge the value of improved picture quality." Comments of NAB at page 14. And the comments of AMST point out at pages 18-32 that until prototype ATV systems are developed and psychophysical tests of audience perception are conducted, it will not be possible to predict with any degree of certainty which artifacts will pass unobserved and which will be unacceptable to viewers.

Nevertheless, preliminary subjective studies indicate that wider aspect ratio contributes more to viewer satisfaction than higher resolution. Therefore, at the

present stage of development, it appears that, given the quality limitations imposed on all ATV systems by the present necessity for bandwidth compression, home viewers will find ACTV substantially comparable in image quality to the other ATV systems under consideration. Moreover, considering the other clear advantages that ACTV will have over other systems, particularly NTSC compatibility, it is likely that ACTV will be preferred by consumers.

IV. As It Becomes Possible To Implement ATV Transmission Schemes Requiring Additional Spectrum To Provide Better Picture Quality, ACTV Will Be Adaptable To Any Spectrum Augmentation Scheme That The Commission Ultimately May Adopt.

Not only is "backward compatibility" a criterion for ATV systems prized by many commenters, several also endorse the notion of "forward compatibility." For example, the comments of NAP discuss the hierarchical development of NTSC to date and approvingly quote the CCIR Study Group document on the notion of "evolutionary" transition in broadcast technology. "Evolutionary" in this context refers to a system that is capable of progressive improvement. Comments of NAP, at pages 22 and 23. This concept of evolution envisions an orderly and somewhat gradual transition to future technological improvements, maintaining forward and backward compatibility at each step along the way. One advantage of an evolutionary progression is that it entails minimal disruption to the public as changes are implemented.

Moreover, such an approach to ATV systems would permit the industry and the public to enjoy the benefits of technological improvements that can be implemented in the near term while further refinements are being planned, developed and tested. As many (including NBC) acknowledge, as signal emission and display design technology advances, additional spectrum will be necessary to improve upon whatever ATV system is implemented.

The Commission's Advisory Committee and its working subcommittees already have begun to evaluate various spectrum augmentation scenarios. Every one of the possibilities will involve great expenditures of time, effort and, ultimately, money before it reaches implementation. The time and expense involved in computer modeling, signal propagation testing, Commission rulemaking, reallocation of spectrum, prototype-development and testing, equipment manufacturing, possible site changes and related construction, and, finally, implementation of any spectrum augmentation program, should not be underestimated.

In its present form, ACTV requires no additional spectrum for delivery. However, contrary to the implication drawn from this in the comments of the Land Mobile Communications Council (LMCC), this is not the whole story. It appears that LMCC misunderstood NBC's

testimony on ATV systems before the House Telecommunications Subcommittee. Future improvements to ACTV will themselves require additional spectrum, in order for terrestrial broadcast systems to remain competitive with alternative media and provide the public with broadcast service approaching true high-definition television, which none of the ATV systems under consideration today, including MUSE, are capable of providing.

Because it is so clear that additional spectrum will be required as ATV technology is perfected, the Commission should defer consideration of the reallocation to land mobile communications of spectrum currently allocated to broadcasting. This delay will not have as serious consequences for land mobile communications as LMCC would have the Commission believe. It appears that land mobile will be able to meet its present and anticipated spectrum needs within current allocations by adoption of trunking techniques that would allow increased time sharing of single channels by multiple users.

Similarly, the Commission would be ill-advised to rush to choose standards for ATV. Study, testing and analysis is necessary to ensure that a realistic, workable standard is adopted and that it is one proper for the unique conditions of the American television industry.

This, of course, is not to counsel delay. NBC continues to encourage the Commission to proceed in its work expeditiously. We merely point out that the standard-selection process must be a rigorous one informed by public interest concerns. It should not be unduly influenced by considerations such as the number of manufacturers producing 1125/60 equipment or the amount of program material alleged to be available in 1125/60.

Indeed, the assertion that 25 manufacturers now make 1125/60 equipment, while literally true, may be somewhat misleading. The number of manufacturers currently offering a complete product line is insignificant and the quantity of product in the market at this time very small. Moreover, we question the claim that a vast library of HDTV archive material is available. The 1125/60 productions to date are relatively limited in number and appeal. While it is true that there is a large number of theatrical features available on film, their use is not limited to 1125/60 and to the extent that they represent desirable programming, they could be converted to any system.

V. Conclusion

The Commission has been urged by many commenters, including those representing broadcasters, not to make spectrum allocation decisions in haste, but to evaluate carefully all its options and make spectrum allocation decisions that will prove effective for many years into the future. At the same time, many of the same broadcasters have expressed a sense of urgency regarding their ability to provide ATV transmission in the same time frame as nonbroadcast video services. They have also expressed significant concern that viewers with NTSC receivers not be "disenfranchised" by the advent of ATV.

The 6-MHz, NTSC-compatible approach of ACTV will meet all of these concerns. Therefore, ACTV will afford the significant advantage of being implementable in its present form in the near term, while being adaptable to any spectrum augmentation strategy. ACTV can provide both present signal enhancement and act as a bridge to further improvements that may require additional spectrum. The Commission would be wise to recall that it adopted an incompatible color television system in 1950, only to regret its hasty action less than three years later. When that system failed to receive any public, and only little industry, support, the Commission adopted the compatible color television system still in use today.

Spectrum decisions should not and need not be made in haste. With a system such as ACTV, every broadcaster and other video service provider choosing to do so can provide wide-screen, enhanced-resolution transmissions comparable to those promised by other ATV systems. NTSC receivers will not be rendered instantly obsolete so that the public can continue to enjoy their accustomed program service, choosing freely to view either with or without the significant quality enhancements that ACTV will deliver.

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January 19, 1987

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