

Future work will include:

- (i) Conduct a detailed evaluation of the test of 2 approaches being considered for the production of subjective test material, i.e. parallel shooting or serial shooting of test scenes, using a number of pickup devices, and standards conversion from a single HDTV source. WP-6 will recommend the preferred approach.
- (ii) Evaluate any new proposals for the preparation of test material that may be put forward
- (iii) Coordinate the production of the specified and selected set of test materials.

Because the preparation of test material is likely to become the pacing activity for the entire test program of the Advisory Committee, it is critical to conduct the comparative assessment of the two approaches at the earliest possible date.

PLANNING SUBCOMMITTEE WORKING PARTY 7

- (i) WP-7 should complete the detailed planning of the proposed audience research program and the estimate of the costs involved.
- (ii) Consider and define a first test to determine the acceptability of the use of a letter box display as compared with the normal full screen display, and prepare a cost estimate and schedule for such a test. Coordinate this work with the ATTC and the Cable Laboratories.

PLANNING SUBCOMMITTEE ADVISORY GROUP 1

Aspect Ratio:

One of the fundamental features of an ATV system is the wide screen 16:9 aspect ratio now accepted throughout Western Europe, Asia, Canada, and Mexico.

Despite this general acceptance, the maintenance of a 4:3 aspect ratio has been urged by some in the production community.

AG-1 should investigate the views on this and report to the Planning Subcommittee. Consider the short term (1-5 years) and the long term (5 years and beyond) implications of the decision on aspect ratio.

PLANNING SUBCOMMITTEE ADVISORY GROUP 2

Following the numerous reports submitted in response to Representative Markey's request, a careful study of the data there presented should be made, and a report prepared which will be submitted to the Advisory Committee. This report should contain conclusions concerning:

- (i) The prospects for US employment in the manufacture of HDTV receivers
- (ii) The prospects for increasing US ownership of TV set manufacture and HDTV set manufacture
- (iii) The prospects for US-owned companies in the development and manufacture of transmission systems and professional high definition equipment for program production and recording
- (iv) If the above prospects are poor, what is the likely macro-economic impact on the U.S. economy and the international trade balance of payments in particular?

D. Chairman's Report: Working Party 1



**Advisory Committee on
Advanced Television (ATV) Service**

APPENDIX D

PS/WP1-058

Doc. No. _____

Date _____

TO: J.A.Flaherty, Chairman-Planning Subcommittee

FM: R.A.McMann, Chairman - Working Party One

DT: November 1, 1989

RE: Chairman's Report for WP-1

The Planning Subcommittee Chairman in his letter of 15 May 1989 (document number PS-032, also entered as PS/WP1-052), requested that Working Party 1 undertake to complete "unfinished business" as follows:

1. "to specify the minimum number of audio channels which proponents should provide in ATV systems".
2. "to define the attributes of an ATV system required for ghost elimination".

Subsequently, the Technical Attributes Working Party (WP1) was reconvened; meetings being held on July 6 and September 20, 1989.

At the first meeting, the Working Party members agreed that an ATV service needs to have an audio service of near CD stereo quality, noting that such a recommendation did not necessarily imply support of any particular implementation. It was further noted that a near CD stereo quality audio service did not necessarily imply a digital stereo pair in addition to the NTSC stereo service; it might be possible to accomplish the same by other means such as a digitally assisted audio (DAA) implementation.

The members of WP1 still believe that the number of sound or data channels and the methodology by which they are achieved should be a choice of the system proponents.

During the first meeting it was further agreed that a service survey to determine what services in addition to a stereo audio service might be provided. Such additional services to include SAP, analog or digital data service, etc. WP1 is currently undertaking such a survey.

The request to define the attributes of an ATV system required for ghost cancelling were discussed and then finalized during the second meeting. Additional attributes were also added. The additional attributes are as follows:

- a. Ghost Cancelling: Attributes were added as section 2.10.4.1 through 2.10.4.5 supplemented by an additional paragraph to section 6.3 on page 9 of the notes.

- b. IDTV Prefiltering Attributes covering the issue of temporal and spatial prefiltering of compatible NTSC signals appear as sections 2.11.1 through 2.11.4 and 6.7.4
- c. Collocation/Non-collocation contours appear as section 6.12.1 and 6.12.2
- d. The question of Sync ruggedness resulted in the addition of sections 6.2.1, 6.2.2, 6.13 and 8.5
- e. The attributes list on ATV Audio was amended to include a note after attribute 3.3 and a new attribute 3.8.1
- f. WPl added section 6.14 on Non-flat transmission paths and
- g. WPl also added Section 1.5 on Video "cuts"
- h. The question of camera steadiness resulted in a note being added to section B covering section 1.1
- i. Attributes were added concerning bit and symbol errors in section 5.3.1 through 5.3.4
- j. The question of base band format compatibility is addressed by adding section 7.5

The revised attributes matrix and accompanying notes was reissued as document PS/WPl-054 which is attached to this report.

WPl will issue a report on the results of the survey when the results have been compiled.

Your letter of 24 October 1989, (PS-046, PS/WPl-056) provided a list of eight (8) additional system features which needed to be defined. The requirements of this list were filled during our meeting of September 20, 1989.

Respectfully Submitted
R.H.McMann, Jr.
Chairman, PS/WPl

**Advisory Committee on
Advanced Television (ATV) Service**PS/WP1-050
Doc. No. PS/WP1-050Date 14 Nov 89**FCC ADVISORY COMMITTEE ON ADVANCED TELEVISION SERVICE [ATS]
PLANNING SUBCOMMITTEE
WORKING PARTY 1 [PS/WP1]
ON ATS TECHNOLOGY ATTRIBUTES AND ASSESSMENTS****DOCUMENTS LIST**

<u>PS/WP1#</u>	<u>DOCUMENT</u>
-045 Rev1)	Minutes of FCC ACATS PS/WP1 for 9 January 1989, revised.
-049	(Proposed) Agenda of PS/WP1 Meeting of 6 July 1989.
-050	Document List - 3rd Report
-051	Minutes of FCC ACATS PS/WP1 for 6 July 1989
-052	PS-032, Letter on Planning Subcommittee Activities; J.A. Flaherty, 15 May 1989
-053	(Proposed) Agenda of PS/WP1 Meeting of 20 Sept. 1989.
-054	Attribute/Systems Matrix (Rev.1)
-055	Minutes of FCC ACATS PS/WP1 for 20 September 1989
-056	PS-042, Letter on Planning Subcommittee Activities; J.A. Flaherty, 14 August 1989
-057	List of Attendees, Meetings of 6 July and 20 September 1989
-058	Chairman's Report, 01 November 1989
-059	PS-046, Letter on Planning Subcommittee Activities; J.A. Flaherty, 24 October 1989

MEETING OF FCC ADVISORY COMMITTEE
ON ADVANCED TELEVISION SERVICE (ATS)
PLANNING SUBCOMMITTEE,
WORKING PARTY ON ATS TECHNOLOGY
ATTRIBUTES AND ASSESSMENTS (PS/WP1)

The meeting was called to order by the acting-Chairman, Robert Niles at approximately 9:30 a.m., on January 9, 1989, in Mezzanine Conference Room B, NBC 30 Rockefeller Plaza, New York, NY 10112.

Those present were:

Stan Baron, Vice-Chairman (NBC)
Robert Niles, Vice-Chairman (ABC)
Bernard Dickens (CBS)
Alan Godber (NBC)
Charles Heuer (Zenith)
Bud Klueck (Fletcher, Heald & Hildreth)
Bernard Lechner (Consultant)
Bruce Sidran (ABC)
John Storey (CABSC/CRC)
John Watson (Group W)

1. The draft agenda (PS/WP1-040 attached) was accepted.
2. The minutes of the previous meeting (PS/WP1-041) were reviewed and accepted with some editorial changes as follows:
 - A. 2nd page, paragraph 3.a., 2nd subparagraph, 2nd line was revised to read: "(4.3 Mbps/channel including data and protection). 16 bits at" and the 4th line was revised to read "(1.0 Mbps/channel)..."
 - B. 2nd paragraph 3.a., 4th subparagraph, 6th line at end of line "surrond" changed to "surround"
 - C. 2nd page, paragraph 3.a., 5th subparagraph, 4th through 6th lines changed to read: "is developed first. Left and right are mixed to create a center sound. At the receiver, a high quality phantom center is very costly to construct [leading to a \$500 decoder cost to the consumer]."
 - D. 2nd page, paragraph 3.a., 6th subparagraph, 2nd line, "television for the blind" replaced by "audio description of video action".
3. S. Baron reported that there had been no response to date of our request for additional attributes (reference doc. PS/WP1-042).

It was agreed that the memo would be resent and the Chairmen of the Subcommittees and Working Parties called to give all parties a second opportunity to respond. S. Baron to propose an approach to dividing the calling assignments for Chairman McMann's approval.

4. B. Sidran reported that the SS/WP2 survey had not yet been distributed. The survey requires the approval of the Working Party whose next meeting is scheduled for the last week of January. Parties will be given 30 days to respond.

B. Dickens charged that the Working Group was avoiding its commitments. Various members including Messrs. Sidran & Baron disagreed pointing out that a proper response to the Planning Subcommittee request required the collection of data. The collection of data was not a 30 day assignment.

5. The question of establishing a minimum number of audio channels and ancillary signals which proponent systems should provide was discussed.

B. Dickens stated that such minimum requirements were necessary and that whether a system was compatible with NTSC or not, the audio service must be an improvement over the current NTSC service.

B. Lechner stated that it was appropriate for CBS and others to state as to what were appropriate minimum services and for the proponents to respond as they could, but that it was inappropriate for PS/WP1 to design the system. Our role is to gather the information and distribute the same.

C. Heur reminded those present that the Working Party has been requested by the Planning Subcommittee to set minimum bounds at previous meetings and the request had been rejected for cause.

S. Baron submitted a draft document for consideration by the Working Party as the basis of the Chairman's report to the Subcommittee (reference PS/WP1-043).

C. Heur reminded the Working Party that setting bounds is not a planning function nor a system attribute, it is a system specification. The Planning Subcommittee plans the work of the Advisory Committee activity not the planning of the systems. If the Working Group is to establish bounds on the requirements than the proponents have to be allowed an extension of time to respond.

The committee reviewed the document and all present contributed to the changes. The modified document provides a list of concerns and recommended activity and is attached to these minutes (reference PS/WP1-044).

The modified document was accepted by all present with the exception of B. Dickens who objected to both its content and form.

In summary, the Working Party agreed:

- to continue working with SS/WP2 to gather data on current practice, and
- to gather and disseminate data on services needed in support of an ATV service.

AGENDA

PS/WP1-049

FCC ADVISORY COMMITTEE ON ADVANCED TELEVISION SERVICE

MEETING OF FCC-ATS PS/WP1
(WORKING PARTY ON ATS TECHNOLOGY ATTRIBUTES AND ASSESSMENTS)

THURSDAY, JULY 6, 1989
9:30 AM
NBC, ROCKEFELLER PLAZA
CONFERENCE ROOM MEZZANINE B

1. Acceptance of Agenda
2. Ghost Cancelling Attributes
3. Number of Audio Channels
4. Other Business

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6789



**Advisory Committee on
Advanced Television (ATV) Service**

PS/WP1-050
Doc. No. PS/WP1-050
Date 14 Nov 89

**FCC ADVISORY COMMITTEE ON ADVANCED TELEVISION SERVICE [ATS]
PLANNING SUBCOMMITTEE
WORKING PARTY 1 [PS/WP1]
ON ATS TECHNOLOGY ATTRIBUTES AND ASSESSMENTS**

DOCUMENTS LIST

<u>PS/WP1#</u>	<u>DOCUMENT</u>
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MEETING OF
FCC ADVISORY COMMITTEE ON ADVANCED TELEVISION SERVICE [ATS]
PLANNING SUBCOMMITTEE
WORKING PARTY 1 [PS/WP1]
ON ATS TECHNOLOGY ATTRIBUTES AND ASSESSMENTS

The meeting was called to order by the Chairman, Ren McMann at approximately 9:30 a.m., on 6 July 1989, in Mezzanine Conference Room B, NBC, 30 Rockefeller Plaza, New York, NY 10112.

Those present were:

Ren McMann, Chairman
Stan Baron, Vice-Chairman (NBC)
Jim Gaspar (CBS)
Charles Heuer (Zenith)
Jill Pender (Fletcher, Heald and Hildreth)
Bruce Sidran (Bellcore)
John Watson (Group W)

1. The draft agenda (PS/WP1-049) was accepted.
2. The minutes of the previous meeting (PS/WP1-045) were reviewed and accepted with the following editorial change on page 2, paragraph 8, second line, changing "planning function but a system attribute." to "planning function nor a system attribute, it is a system specification." C.Heuer requested that the minutes be reissued with the change inserted.
3. The Chairman read the charge to the Working Party from the Chairman of the Planning Subcommittee as found in the third through fifth paragraphs of document PS-032 (PS/WP1-052, attached), namely to revisit the issue of the number of audio channels and to investigate the question of ghost elimination.
4. S.Baron suggested that prior to any discussion on the number of audio channels there must be a determination of the other services which might be required; audio is only one of the applications; and recommended that a survey be conducted to determine the requirements.

R.McMann noted that the current NTSC service provides a stereo pair, a SAP channel, and an analog data channel; and that we should develop information to determine the minimum number of channels that an ATV service must provide. Currently, FCC rules do not mandate either stereo audio, SAP, or analog data services.

C.Heuer noted that the question is how to distribute the use of a finite resource, the spectrum, and that a determination of current services, including those currently carried in the vertical interval was a first step.

R.McMann suggested that PS/WP1 should make a recommendation for minimum ATV service which will probably include a stereo audio pair plus what ever other services are required to support the current NTSC service.

C.Heuer suggested that the current analog data channel is not an essential part of NTSC and could probably be violated by a future ATV service.

J.Watson questioned whether "letterboxing" didn't violate current NTSC rules in that it doesn't fill all of the active lines and therefore, whether not carrying the SAP channel, for instance, could be looked at from the same vantage point. The question is where do we place the limits of "NTSC Compatibility".

C.Heuer noted that the establishment of minimum requirements is not a planning function but is a system analysis function.

R.McMann suggested that an ATV service needs to have an audio service of near CD stereo quality and that this Working Party can so recommend.

S.Baron noted that a near CD stereo quality audio service did not necessarily imply a digital stereo pair in addition to the NTSC stereo service; it might be possible to accomplish the same with a digitally assisted audio (DAA) implementation or some other encoding method.

The Working Party concurred with Chairman McMann's recommendation noting that such recommendation did not necessarily imply support of any particular implementation.

B.Sidran reported on the status of the service survey discussed earlier. The survey questionnaire is nearly complete and will be forwarded to A.Godber, NBC, for mailing by 15 July. Responses will be returned to NBC for compilation and analysis. The Working Party agreed that a three week response period would suffice and that the survey should be conducted.

C.Heuer recommended that the questionnaire be reviewed for proper formating to optimise the compilation process. B.Sidran reported that this had been done.

5. R.McMann suggested that the attributes for ghost cancelling as follows:

- is ghost cancelling required?
- if so, does it require a training signal?
- if so, what are the characteristics of the training signal:
 - a. wave form shape
 - b. spectrum
 - c. repetition rate.

R.McMann also suggested that other information such as the speed of response, how many reflections could be handled, etc. might be useful.

C.Heuer suggested that the attribute (is ghost cancelling required?) be replaced by two attributes:

- does the system incorporate a training signal?
- can the system incorporate a training signal?

noting that the system performance is dependent on the nature of the of the ATV system and the quality of the implementation.

J.Watson questioned whether WP1 should deal with ghost cancelling since it is a proponent decision as to whether or not to employ ghost cancelling.

B.Sidran noted that the attributes list provides a review of system performance and questioned whether we need to be concerned about ghost cancelling.

R.McMann noted that if ghost cancelling is used, systems concerns and receiver designs need to be aware of the characteristics of the technique. The attributes listed provide that information.

C.Heuer suggested that assessment should be a first order subjective assessment.

J.Watson asked whether we need to note artifacts or improvements introduced into NTSC by the ghost cancelling. It was decided that the current attributes list provided a sufficient overview.

C.Heuer recommended that the performance should be examined with a variety of single and multiple echoes of different phases and amplitudes and with time variations representing those found in characterization of the terrestrial transmission media.

WP1 agreed to insert such a note after paragraph 6.3 in on page 9 of the attributes notes (PS/WP1-030 section B).

WPl agreed to add the ghost cancelling attributes as PS/WPl-030, section 2.10.

6. Other Business

B.Sidran noting that certain kinds of prefiltering effect the response of IDTV receivers, asked whether attributes describing such characteristics needed to be added to the list. R.McMann addressed the issue of line and frame combs and their effect on IDTV receivers.

B.Sidran also noted that where augmented or simulcast systems are implemented and the antennae are not co-located, that the meaning of the A and B contours may need to be redefined. He questioned whether this was an area of concern for WPl.

R.McMann recommended discussion of these last two topics at the next meeting.

The next meeting is scheduled for Wednesday, 20 September 1989, at 9:30 a.m. at NBC, 30 Rockefeller Plaza, Mezzanine Conference Room B.

PLANNING SUBCOMMITTEE ADVISORY GROUP 2

Following the numerous reports submitted in response to Representative Markey's request, a careful study of the data there presented should be made, and a report prepared which will be submitted to the Advisory Committee. This report should contain conclusions concerning:

- (i) The prospects for US employment in the manufacture of HDTV receivers
- (ii) The prospects for increasing US ownership of TV set manufacture
- (iii) The prospects for US owned companies in the development of manufacture of transmission systems and professional high definition equipment for program production and recording

Yours Sincerely,



Joe Flaherty
Chairman, Planning Subcommittee

Distribution: Renville H. McNiann, Chairman WP-1, Richard Green, Chairman WP-2, Dale Hatfield, Chairman WP-3, Edward Horowitz, Chairman WP-4, Michael Tyler, Chairman WP-5, Bronwen Jones, Chairman WP-6, Richard Ducey, Chairman WP-7, James Hindmann, Chairman AG-1, Robert Crandall, Chairman AG-2, Wendell Bailey, Vice Chairman, PS, Greg DePriest, Vice Chairman, PS, Richard Wiley, Chairman, Advisory Committee on ATV Service, Irwin Dorros, Chairman, SS, William Hassinger, FCC, Lex Felker, Chief of FCC Mass Media Bureau



Advisory Committee on Advanced Television (ATV) Service

Doc. No. PS-032Date 5/15/89

Dear Chairman:

In preparation for the Steering Committee Meeting on May 17, 1989, I thought it might be valuable to lay out some of the possible activities which should be undertaken by Working Parties in the third period of work.

I am extraordinarily appreciative of the volume and diversity of work which has been done to date, and I know that you have your own thoughts on the further work to be done. Therefore, please consider this as a list of suggestions which can be discussed fully at our meeting when a complete statement of work can be developed.

PLANNING SUBCOMMITTEE WORKING PARTY 1

The principal unfinished business is the continued need to specify the minimum number of audio channels which proponents should provide in ATV systems.

Certainly, and to meet the FCC requirements of NTSC compatibility, it should be possible to confirm that the 4 analog audio channels of the NTSC standard should be retained. Beyond that, the minimum number of digital audio channels for ATV service should be agreed. That some proponents wish provide more than the minimum is understood, but for effective ATV service a defined minimum number should be attainable, and we have been asked to do this by the Chairman of the Advisory Committee.

The second and new issue is to define the attributes of an ATV system required for ghost elimination, a feature to be introduced in future NTSC receivers, and one which should be available also in an ATV system. The parameters involved should be defined.

PLANNING SUBCOMMITTEE WORKING PARTY 2

In coordination with the work of PSWP-1, PSWP-2 should develop the test procedures necessary to access the effectiveness of ghost elimination systems provided by proponents.

PLANNING SUBCOMMITTEE WORKING PARTY 6

- (i) Continue work to specify with precision the exact composition of the 30 scenes proposed for use in psychophysical subjective assessment.
- (ii) Conduct a detailed evaluation of the test of 2 approaches to the production of subjective test materials, i.e. parallel shooting and/or serial shooting, and standards conversion from a single HDTV source. Recommend the preferred approach.
- (iii) Evaluate any new proposals for the preparation of test materials which may be put forward.
- (iv) Coordinate the production of the specified and selected set of test materials.
- (v) Work with SS WP-2 in the conduct of the actual tests.

PLANNING SUBCOMMITTEE WORKING PARTY 7

- (i) Complete the detailed planning of the proposed audience research program and the estimate of the costs involved.
- (ii) Consider and define a first test to determine the acceptability of the use of a letter box display as compared with the normal full screen display, and prepare a cost estimate of such a test.

PLANNING SUBCOMMITTEE ADVISORY GROUP 1

Aspect Ratio:

One of the fundamental features of an ATV system is the wide screen 16:9 aspect ratio now accepted throughout Western Europe, Asia, Canada, and Mexico.

Despite this general acceptance, the maintenance of a 4:3 aspect ratio has been urged by some in the production community.

AG-1 should investigate the views on this and report to the Planning Subcommittee. Please consider the short term (1-5 years) and the long term (5 years and beyond) implications of the decision on Aspect Ratio.

AGENDA

FCC ADVISORY COMMITTEE ON ADVANCED TELEVISION SERVICE

MEETING OF FCC-ATS PS/WP1
(WORKING PARTY ON ATS TECHNOLOGY ATTRIBUTES AND ASSESSMENTS)

WEDNESDAY, SEPTEMBER 20, 1989

9:30 AM

NBC, ROCKEFELLER PLAZA
CONFERENCE ROOM MEZZANINE B

1. Acceptance of Agenda
2. Acceptance of minutes of previous meeting
3. Ghost Cancelling Attributes
4. IDTV Prefiltering Attributes
5. Collocation/Non-collocation contours
6. Other Business

3003A
81589

ATTRIBUTES/SYSTEMS MATRIX, REVISION 1

Section A: Attributes List

System

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
NTSC	Hi Perf. TV	Hi Perf. Film	

I. General Description (Proponent)

1. Compatibility
 - 1.1 NTSC Receiver
 - 1.2 VCR
 - 1.3 Channel
 - 1.4 Other ATV Systems
2. Transmission Scenario
 - 2.1 Number of channels required
 - 2.2 Channel Bandwidth
 - 2.3 Contiguous/Non-Contiguous
3. Terrestrial Implementation Scenarios
4. Intended Display Size/Viewing Angle (Measured)

II. System Attributes

1. ATV Image Issues
 - 1.1 Luminance spatial/temporal resolution
 - 1.1.1 Static Horizontal resolution - MTF curve
 - 1.1.2 Static Vertical resolution - MTF curve
 - 1.1.3 Static Diagonal resolution - MTF curve
 - 1.1.4 Dynamic Horizontal resolution - MTF curve
 - 1.1.5 Dynamic Vertical resolution - MTF curve
 - 1.1.6 Dynamic Diagonal resolution - MTF curve
 - 1.1.7 Graph of Samples/Frame vs. Frame/Second rate
 - 1.2 Chrominance spatial/temporal resolution
 - 1.2.1 Static Horizontal resolution - MTF curve
 - 1.2.2 Static Vertical resolution - MTF curve
 - 1.2.3 Static Diagonal resolution - MTF curve
 - 1.2.4 Dynamic Horizontal resolution - MTF curve
 - 1.2.5 Dynamic Vertical resolution - MTF curve
 - 1.2.6 Dynamic Diagonal resolution - MTF curve
 - 1.2.7 Graph of Samples/Frame vs. Frame/Second rate
 - 1.3 Chromaticity/Colorimetry Characteristics
 - 1.3.1 Color Difference Signals Axes
 - 1.3.2 Transfer Characteristics
 - 1.4 Artifacts
 - 1.5 Transient Response
Particular attention should be given to video "cuts" in which the image contains high-frequency components.
 - 1.6 Aspect Ratio

- 1.7 Baseband Video Bandwidth
- 1.8 Subjective Assessment of Overall Picture Quality
- 2. Compatible NTSC Image Issues
 - 2.1 Luminance spatial/temporal resolution
 - 2.1.1 Static Horizontal resolution - MTF curve
 - 2.1.2 Static Vertical resolution - MTF curve
 - 2.1.3 Static Diagonal resolution - MTF curve
 - 2.1.4 Dynamic Horizontal resolution - MTF curve
 - 2.1.5 Dynamic Vertical resolution - MTF curve
 - 2.1.6 Dynamic Diagonal resolution - MTF curve
 - 2.1.7 Graph of Samples/Frame vs. Frame/Second rate
 - 2.2 Chrominance spatial/temporal resolution
 - 2.2.1 Static Horizontal resolution - MTF curve
 - 2.2.2 Static Vertical resolution - MTF curve
 - 2.2.3 Static Diagonal resolution - MTF curve
 - 2.2.4 Dynamic Horizontal resolution - MTF curve
 - 2.2.5 Dynamic Vertical resolution - MTF curve
 - 2.2.6 Dynamic Diagonal resolution - MTF curve
 - 2.2.7 Graph of Samples/Frame vs. Frame/Second rate
 - 2.3 Colorimetry Transfer Characteristic
 - 2.4 Artifacts
 - 2.5 Sync/Blanking/Subcarrier Modifications
 - 2.6 Transient Response
 - 2.7 Aspect Ratio
 - 2.8 Use of Overscan/Underscan
 - 2.9 Subjective Assessment of Overall Picture Quality
 - 2.10 Ghost Cancelling
 - 2.10.1 Does the system incorporate a ghost cancelling training signal?
 - 2.10.2 Can the system incorporate a ghost cancelling training signal?
 - 2.10.3 If a training signal is incorporated please describe:
 - 2.10.3.1 Wave form shape
 - 2.10.3.2 Spectrum
 - 2.10.3.3 Repetition rate
 - 2.10.4 Performance Characteristics
 - 2.10.4.1 Single Ghost
 - 2.10.4.2 Multiple Ghosts
 - 2.10.4.3 Noise Performance
 - 2.10.4.4 Short Term Ghost
 - 2.10.4.5 Long Ghosts
 - 2.11 Temporal and/or spatial prefiltering of NTSC signals
 - 2.11.1 Is Prefiltering used, and if so:
 - 2.11.2 Effect on Conventional NTSC receivers
 - 2.11.3 Effect on comb-filtered NTSC receivers.
 - 2.11.4 Effect on IDTV Receivers.

- 3. ATV Audio Issues
 - 3.1 Number of Channels
 - 3.2 Modulation Scheme
 - 3.3 Signal to Noise Ratio (per channel) (dB)
with digital audio systems, performance is measured after
reconversion to analog
 - 3.4 Non-linear
 - 3.4.1 Total Harmonic Distortion (THD)
 - 3.4.2 International Distortion
 - 3.5 Channel Crosstalk (dB) (Audio/Audio, Video/Audio)
 - 3.6 Audio/Video Delay (lip sync) (±ms)
 - 3.7 Dynamic Range (dB)
 - 3.8 Frequency Response (±dB)
 - 3.8.1 Level vs. frequency response
 - 3.9 Noise Reduction (if used)
 - 3.9.1 Analog/Digital?
 - 3.9.2 Noise Improvement (dB)
 - 3.9.3 Bandwidth Requirement (Hz)
 - 3.9.4 Artifacts of Noise Reduction
 - 3.9.4.1 Non-Linear Distortion
 - 3.9.4.2 Crosstalk (dB)
 - 3.9.4.3 A/V Delay (ms)
 - 3.9.4.4 Dynamic Range (dB)
 - 3.9.4.5 Frequency Response (±dB)
 - 3.9.4.6 Pumping
 - 3.9.4.7 Any other artifacts
 - 3.10 Companding/Compression (if used)
 - 3.10.1 Analog/Digital?
 - 3.10.2 Noise Improvement (dB)
 - 3.10.3 Bandwidth Requirement (Hz)
 - 3.10.4 Artifacts of Companding/Compression
 - 3.10.4.1 Non-Linear Distortion
 - 3.10.4.2 Crosstalk (dB)
 - 3.10.4.3 A/V Delay (ms)
 - 3.10.4.4 Dynamic Range (dB)
 - 3.10.4.5 Frequency Response (±dB)
 - 3.10.4.6 Pumping
 - 3.10.4.7 Any other artifacts
 - 3.11 Audio Security (if available)
 - 3.11.1 Analog/Digital?
 - 3.11.2 Level of Security
 - 3.11.3 Bandwidth Requirement (Hz)
 - 3.11.4 Artifacts of Security Technique
 - 3.11.4.1 Non-Linear Distortion
 - 3.11.4.2 Crosstalk (dB)
 - 3.11.4.3 A/V Delay (ms)
 - 3.11.4.4 Dynamic Range (dB)
 - 3.11.4.5 Frequency Response (±dB)
 - 3.11.4.6 Any other artifacts

- 3.12 Encoded Audio Baseband and RF Spectrum
- 3.13 Stereo Separation
- 4. Degradation of Compatible NTSC Audio (MTS)
 - 4.1 Intercarrier Audio
 - 4.2 Audio/Video Delay (lip sync) (±ms)
- 5. Ancillary Signals
 - 5.1 Provisions for Ancillary signals
 - 5.2 Lines available for Ancillary signals in compatible NTSC signal
 - 5.3 Bit and Symbol Errors
 - 5.3.1 Error rate
 - 5.3.2 Error distribution
 - 5.3.3 Effects of multi-level coding, frequency, phase and group delay
 - 5.3.4 Other characteristics
- 6. Terrestrial Transmission Issues
 - 6.1 Characterization of Compatibility
 - 6.2 Noise Susceptibility
 - 6.2.1 Video
 - 6.2.2 Sync
 - 6.3 Susceptibility to Multipath or Echo
 - 6.4 Susceptibility to Interference
 - 6.4.1 Adjacent Channel Interference
 - 6.4.2 Co-Channel Interference
 - 6.4.3 Airplane Flutter
 - 6.4.4 Impulse Noise
 - 6.4.5 Other
 - 6.5 Susceptability to Group Delay Errors
 - 6.6 Susceptability to Non-Linear Distortions
 - 6.7 Transmitter/Antenna Requirements
 - 6.7.1 Required Number of Transmitters/Antennas
 - 6.7.2 Complexity of Transmitter/Antenna
 - 6.7.3 Use of Present Transmitter/Antenna
 - 6.7.4 Use of Present Diplexer
 - 6.8 Bandwidth Requirements
 - 6.8.1 Near Term
 - 6.8.2 Long Term
 - 6.9 Transmission Field Testing
 - 6.10 Coverage Relative to NTSC
 - 6.11 Gracefulness of Degradation
 - 6.11.1 Video
 - 6.11.2 Audio
 - 6.11.3 Audio vs. Video
 - 6.12 Effect of two-channel systems on A and B contours:
 - 6.12.1 When co-located
 - 6.12.2 When non-co-located
 - 6.13 Sync recovery time

6.14 Non-flat transmission frequency response

7. Suitability for Alternate Media Distribution

7.1 Suitability for Cable Television Distribution

- 7.1.1 Channel Bandwidth
- 7.1.2 Co-Channel Interference
- 7.1.3 Interference To/From Other Services
 - 7.1.4.1 Navigation
 - 7.1.4.2 Amateur Radio
 - 7.1.4.3 FM Radio
 - 7.1.4.4 Citizens Band
 - 7.1.4.5 Industrial Band
- 7.1.5 Effect of Micro-Reflections
- 7.1.6 Intermodulation Distortion
- 7.1.7 Channel Loading
- 7.1.8 Cross Modulation Distortion
- 7.1.9 Composite Triple Beat Distortion
- 7.1.10 Second Order Distortion
- 7.1.11 Minimum C/N Requirements
- 7.1.12 Security System Issues
- 7.1.13 Propagation Delay
- 7.1.14 Compatibility with AGC of Distribution Systems
- 7.1.15 Peak Power
- 7.1.16 Frequency Accuracy
- 7.1.17 Sensitivity to Phase Noise

7.2 Suitability for Satellite Distribution

- 7.2.1 Bandband Video Bandwidth
- 7.2.2 Bandband Audio Bandwidth
- 7.2.3 Audio Bandwidth Requirement
- 7.2.4 Exciter Modifications
- 7.2.5 Uplink Power Requirements
- 7.2.6 Optimum FM Deviation
- 7.2.7 Minimum C/N
- 7.2.8 Minimum Antenna Size
- 7.2.9 Satellite Receiver Requirements
 - 7.2.9.1 Clamping
 - 7.2.9.2 Deemphasis
 - 7.2.9.3 IF Bandwidth
- 7.2.10 Compatibility with Satellite Security Systems
- 7.2.11 FM Channel Artifacts

7.3 Suitability for Other Terrestrial Distribution Systems

- 7.3.1 Amplitude Modulated Links (AML)
- 7.3.2 Frequency Modulated Links (FML)
- 7.3.3 Microwave Distribution Service (MDS)
- 7.3.4 Multi-Channel MDS (MMDS)
- 7.3.5 Fiber-Optic Cables (FO)
- 7.3.6 Telephone Company Lines (TELCO)
- 7.3.7 Video Cassette Recorders (VCR)
- 7.3.8 Video Disk Recorders

7.4 Transmission Security

7.5 Is the same baseband format signal used for all media?

8. Consumer Equipment Issues

- 8.1 Complexity of Receivers

- 8.2 Receiver Input/Output Characteristics
 - 8.2.1 RF Interface
 - 8.2.2 Baseband Video Interface
 - 8.2.3 Baseband Audio Interface
 - 8.2.4 Interfacing with Ancillary Signals
 - 8.2.5 Receiver Antenna Systems Requirements
 - 8.3 Compatibility with Existing NTSC Consumer Equipment
 - 8.3.1 RF Compatibility
 - 8.3.2 Baseband Video Compatibility
 - 8.3.3 Baseband Audio Compatibility
 - 8.4 Allows Multi-Standard Display Devices
 - 8.5 Reaquisition of Sync
9. Other Considerations
- 9.1 Practicality of Near-Term Technological Implementation
 - 9.2 Long-Term Viability/Rate of Obsolescence
 - 9.3 Upgradability/Extendability
 - 9.4 Studio/Plant Compatibility

SECTION B

EXPLANATORY NOTES OF ATTRIBUTES/SYSTEMS MATRIX

Items on the Attributes/System Matrix for which no explanatory note is provided were deemed to be self-explanatory.

I. General Description (Proponent)

Section I shall be used by a system proponent to define the features of the system being proposed. The features shall be defined and organized under the headings of the following subsections 1 through 4.

Section I. General Description (Proponent) shall consist of a description of the proponent system in narrative form, which covers all of the features and characteristics of the system which the proponent wishes to be included in the public record, and which will be used by various groups to analyze and understand the system proposed, and to compare with other proposed systems.

1. Compatibility

1.1 NTSC Receiver

The proponent shall state if the transmitted ATV signal can be viewed on conventional NTSC receivers without additional hardware. The proponent shall set forth the details of any lack of compliance with all applicable FCC Rules and Regulations.

1.2 VCR

The proponent shall state if and if so, how the system maintains compatibility with video cassette recorders as presently designed and available to and for use in the consumer market. Compatibility of a proposed system with the above VCR's shall be defined in terms of the capability of the signal to be recorded and played back, and the quality of the resultant video, audio and any ancillary services or features in comparison to the performance of such VCR's with present day standard NTSC signals.

1.3 Channel

The proponent shall state if the ATV system operates consistent with the present 6MHz channelization scheme. The proponent shall set forth the details of any lack of compliance with applicable FCC Rules.

1.4 Other ATV Systems

The proponent shall identify compatibility with other proposed ATV systems. The proponent shall specifically classify those key system components necessary to ensure compatibility.

2. Transmission Scenario

2.1 Number of Channels Required

The proponent shall state the number of transmission channels required and the bandwidth of each. Specifically what transmission channelization scheme is being proposed shall be defined by the proponent.

2.2 Channel Bandwidth

The proponent shall state if the ATV system will be accommodated within the 6MHz bandwidth channels presently allocated for television broadcasting. If additional channels are to be used, what spectrum (bandwidth and frequency) is proposed.

2.3 Contiguous/Non-Contiguous

Those proponents requiring more spectrum than the 6MHz channels currently allocated, shall state whether the spectrum needed for augmentation must be adjoining the present allocation or if it can be in another frequency band.

3. Terrestrial Implementation Scenarios

The proponent shall state what steps would be necessary to implement the proposed systems. All pertinent changes and/or additions which would be required to be made to the present terrestrial broadcast system to fully implement the proposed system should be defined including sequence of changes and timetable.

4. Intended Display Size/Viewing Angle (Measured)

The proponent shall state what maximum size of video display and/or maximum viewing angle of display the proposed system is intended to support. The display size shall be defined in height and width of viewable image. Overscan percentage shall be $y\%$ in the vertical direction and $x\%$ in the horizontal direction.

II. 1. ATV Images Issues

1.1 Luminance spatial/temporal resolution

In a manner analogous to the description of an electrical filter by its frequency response, entire television systems or components of such systems can be characterized by their spatial and temporal frequency responses. In this case the inputs and outputs are sinusoidal functions of space or time. The modulation transfer function (MTF) is the ratio of the magnitudes of output and input plotted as a function of frequency. For example, the "vertical frequency response" is measured by using, as input, an